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Fabián Casas^a; Francois Mougeot^b; Javier Viñuela^a

^a Instituto de Investigación en Recursos Cinegéticos, Ciudad Real, Spain ^b Estación Experimental de Zonas Áridas (EEZA, CSIC), Almería, Spain

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SHORT REPORT

Occurrence of Common Quail *Coturnix coturnix* eggs in Red-legged Partridge *Alectoris rufa* nests

FABIÁN CASAS¹*, FRANCOIS MOUGEOT² and JAVIER VIÑUELA¹

¹Instituto de Investigación en Recursos Cinegéticos, IREC (CSIC, UCLM, JCCM) Ronda de Toledo s/n., 13071, Ciudad Real, Spain and ²Estación Experimental de Zonas Áridas (EEZA, CSIC), Carretera de Sacramento s/n, 04120 La Cañada de San Urbano, Almería, Spain

Capsule We present the first description of interspecific nest parasitism in Common Quail. Incidence was low; only two nests contained common quail eggs out of 82 Red-legged Partridges nests.

While intraspecific nest parasitism appears to be frequent in galliformes (Yom-Tov 2001), interspecific nest parasitism – whereby a species lays eggs in the nest of another species – has rarely been documented (cases were reported in 11 out of the 281 Galliformes species [Krakauer & Kimball 2009 and references therein]). Red-legged Partridge *Alectoris rufa* and Common Quail *Coturnix coturnix* are galliformes, whose breeding distributions overlap in Spain (Martí & Del Moral 2003) where they share the same habitat type (agricultural landscapes) (Del Hoyo *et al.* 1994). Red-legged Partridge are sedentary (Del Hoyo *et al.* 1994), while Common Quail are long-distance migrants (Del Hoyo *et al.* 1994), but the two species breed at the same time in many areas (March–August in our study area) (Casas *et al.* 2009, Casas, pers. obs.). Although intraspecific parasitism has been documented in both species (Casas *et al.* 2006; Cramp & Simmons 1980; Rodríguez-Teijeiro *et al.* 2003), to date no study has reported interspecific parasitism (i.e. quail laying in partridge nests or vice versa). For six years, during the breeding seasons 2003–09 (with the exception of 2006), we carried out an intensive field study of Red-legged Partridge breeding ecology in Campo de Calatrava (Central Spain, 38° 80' N, 3° 80' W, 610 m a.s.l.). Each year, we caught and radiotagged adult partridges in February–March to study their breeding biology. A total of 222 Red-legged Partridges were radiotagged during the study (39 in 2003; 44 in 2004; 32 in 2005; 44 in 2007; 38 in 2008; and 25 in 2009). The individuals caught and tagged each year were mainly different individuals, with

the exception of four individuals caught and monitored in two consecutive years. To catch and tag birds, we used cage traps in 2003–05, and a night lamping technique in 2007–09 (see Casas *et al.* [2009] for more details). Each individual was fitted with a necklace radio-transmitter (Biotrack, Dorset, UK, 10 gr.) and released at the capture site. During this study period, we located 82 Red-legged Partridge nests (22 in 2003; 12 in 2004; 8 in 2005; 23 in 2007; 11 in 2008; and 6 in 2009).

We found Common Quail eggs in two Red-legged Partridge nests during the study period (1.64%, $n = 82$). Eggs of Common Quail are noticeably smaller than those of Red-legged Partridges (Red-legged Partridge: 41.1 × 31.1 mm; Common Quail: 30.4 × 23.0 mm [Harrison 1991]), and have a different colour pattern (Harrison 1991). Specifically, on 29 May 2007 we found one nest incubated by an adult male Red-legged Partridge (hereafter 'Nest 1') that contained 1 Common Quail egg and 12 Red-legged Partridge eggs. The partridge eggs were incubated until 28 May 2007, while the Common Quail egg, which was taken to an incubator just after the nest was destroyed, hatched on 16 June 2007, confirming that this was a Common Quail egg. On 19 May 2008, we found another nest incubated by a female Red-legged Partridge (hereafter 'Nest 2') that contained 4 Common Quail eggs and 12 Red-legged Partridge eggs. In 'Nest 1', the quail egg was laid at the beginning of the Partridge incubation period (about 3 days after the onset), because the quail chick hatched 19 days after the Red-legged Partridge incubation had started (estimated backdating from observed hatching date, and considering that the quail egg incubation lasts 16 days [Cramp & Simmons 1980]). For Nest 2,

*Correspondence author. Email: Fabian.Casas@uclm.es

we could not determine when in the laying or incubating sequence of the partridge the quail laid its eggs. Both nests were located in barley fields, a habitat commonly used by Red-legged Partridges for breeding in this area (Casas & Viñuela 2010). Neither of the nests were successful; Nest 1 was probably destroyed by humans (eight eggs were trampled and we found human footprints around nest) before the eggs hatched (29 May 2007) and Nest 2 was predated by a carnivore, also before hatching.

Our study is, to our knowledge, the first to document interspecific parasitism behaviour in Common Quail. In this species, intraspecific nest parasitism has been previously reported (Yom-Tov 2001; Rodríguez-Teijeiro *et al.* 2003), suggesting that as in other anseriformes and galliformes, interspecific brood parasitism is strongly associated with intraspecific brood parasitism (Krakauer & Kimball 2009). Red-legged Partridge nests are vulnerable to interspecific egg-dumping since intraspecific brood parasitism occurs frequently in this species (Casas *et al.* 2006). This could also explain why the quail's eggs were not expelled from Red-legged Partridge nests, and were incubated as if from the clutch. In Common Quail, the interspecific parasitism behaviour could also be explained by a strong bias in sex ratio in favour of males throughout the breeding season (five males to one female [Rodríguez-Teijeiro *et al.* 1992]), and a constant turnover of males throughout the female fertile period (Rodríguez-Teijeiro *et al.* 1992). Common Quails are polygynous, and males do not contribute to parental care (Rodríguez-Teijeiro *et al.* 2003). Therefore, when males are more numerous, females might prefer to lay in alternative nests first, and delay laying and incubating eggs in their own nest, in order to have more time to search for alternative mating opportunities (serial mating occurs during the breeding season [Rodríguez-Teijeiro *et al.* 2003]). It should also be noted that there is a marked difference in the length of the incubation period of these species; about 24 days in Red-legged Partridge (Del Hoyo *et al.* 1994), about 16 days in Common Quail (Cramp & Simmons 1980). Thus, the probability of quail eggs hatching before those of Red-legged Partridges is high, and this could be to the detriment of Red-legged Partridges, since the first chicks to hatch are taken by the parent, while the others, if they hatch much later, are abandoned in the nest (F. Casas, pers. obs.). Therefore, the host species could have reduced nesting success and hatchability because of this interspecific parasitism (because of the earlier hatching of the quail eggs, nest abandonment or increased mortality of the embryos [Kenaga *et al.* 1955; Westemeier

et al. 1998]). On the other hand, because of their smaller size, the Quail eggs might not be properly incubated by Red-legged Partridges (these smaller eggs could end up below the partridge eggs where they would have less contact with the partridge's brood patch). In Red-legged Partridges, both males and females incubate clutches (females often lay clutches in two different nests [Casas *et al.* 2009]), but from our data we cannot say whether clutches incubated by males are more vulnerable to interspecific parasitism than those incubated by females. This would deserve further research, based on a larger sample of nests. Our study documented for the first time interspecific nest parasitism between Red-legged Partridges and Common Quail, with a relatively low occurrence. It adds to the body of evidence that both intra- and interspecific nest parasitism occurs frequently in the galliformes (Krakauer & Kimball 2009), although interspecific nest parasitism appears rarer than intraspecific parasitism.

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