

Short communication:

Ground nesting in the paper wasp *Polistes aurifer* (Hymenoptera, Vespidae)

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Summary. *Polistes* paper wasp species vary in their nest site selection, with some nesting in relatively exposed areas and others in protected cavities. Locating the nest sites of cavity dwelling species in natural habitat can prove difficult, and most behavioral studies on these species are therefore conducted using human-built structures. Since Hungerford and Williams (1912) and Rau (1929) noted the location of several *P. fuscatus* (Fabricius) nests in rodent burrows, there have been no published accounts of ground nesting *Polistes* species. I report the occurrence of a large, dense cluster of *P. aurifer* (Saussure) nests located within cracks in the dried soil of the Santa Monica Mountains of southern California, USA.

Key words: *Polistes aurifer*, nesting behavior, paper wasps.

Paper wasps of the genus *Polistes* build open-combed nests that are suspended from one or more petioles. Although *Polistes* nests share the same general architecture, their location can be quite variable (Reed and Vinson, 1979; Reeve, 1991; Wenzel, 1996). Many *Polistes* species build relatively exposed nests on vegetation or building eaves (Rau, 1929; Gillaspay, 1973; Reeve, 1991). Others preferentially nest in cavities, such as hollow tree trunks or within building walls (Rau, 1929; Reed and Vinson, 1979). Two reports of ground nesting *Polistes* exist in the literature: Hungerford and Williams (1912) located nests of *P. fuscatus* (Fabricius; reported as *P. variatus*), in exposed rodent burrows on cliff faces in Kansas. Rau (1929) also found one *P. fuscatus* nest in a rodent burrow in Missouri, one under a pile of partially buried bricks, and others under a large stone ‘which covered a depression in the ground’. Here I report an aggregation of ground nests built by *P. aurifer* (Saussure) in southern California, USA.

P. aurifer is a common species throughout the west coast of North America (Bohart and Bechtel, 1957). In urban areas of southern California, this species builds nests in cavities

such as under roof tiles (personal observation). Although *P. aurifer* is also found in the nearby Santa Monica Mountains, I am unaware of any published accounts of nests in natural habitat. From 1999–2001, I conducted a field study of *P. aurifer* in nest boxes placed in grassland areas of the Stunt Ranch Santa Monica Mountains Reserve (34° 6′ N, 118° 39′ W, elevation 244–488 m). From 1999–2000, I also searched for *P. aurifer* nests on shrubs and found none, although I did observe wasps entering and exiting an ornamental agave plant through its dried, tunnel-like leaves. In May 2001, I observed that some wasps would suddenly slow down mid-flight and drop into the grass. After following individuals to the exact spot where they disappeared and then parting the mat of grasses covering the dry soil, I discovered 25 nests that were suspended into holes or cracks in the ground (5–15 cm wide, 20–90 cm deep). The petioles were attached either to fallen plant stems, or directly to the dry soil wall. The nests were aggregated in a 200 m² area, with some closer than 60 cm, yet they all remained extremely well hidden under the thick mat of dried vegetation covering the soil. Similar nests probably had been present for the previous two years, but I failed to locate them because I did not search below this layer.

Ground nesting in this population may have adaptive benefits. Summer temperatures can range from 10–40°C, so underground nests may be buffered from these extremes. Also, the mat of vegetation covering the nest may provide protection from birds or other predators known to prey on more exposed *Polistes* nests (Gibo, 1972). An unknown predator did destroy many nests on one night during the study; however, I may have increased their predation risk because the nests were left partially exposed during the observation period. If ground nesting is historically widespread in this population of *P. aurifer*, it may have contributed to selection for the high rate of solitary nest foundation (86.2%) and small mean colony size of 44.5 cells (Liebert, 2003). The availability of nest sites and difficulty of finding other foundresses may have selected for haplometrosis, which could be reinforced through reduced per capita pro-

ductivity of multifoundress nests due to space constraints. Of the 25 ground nests, nine were attended by a single female. The remaining nests had multiple females; however, I could not distinguish between pre-emergence multifoundress nests and post-emergence solitary foundress nests.

No *P. aurifer* nests were initiated in this area in 2002, most likely due to drought. Future monitoring of the two species for which ground nesting has been reported, (*P. aurifer* and *P. fuscatus*), should consider the frequency and possible advantages of this nesting strategy, especially as the invasive European *P. dominulus* expands its range and appears to displace *P. fuscatus* (Gamboa et al., 2002). The difficulty of locating nests in natural habitat might lead to overstatement of the extent of this displacement.

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