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### The taxonomic status of *Deroceras hesperium* Pilsbry, 1944 (Gastropoda: Pulmonata: Agriolimacidae), a species of conservation concern in Oregon, USA

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Two native species of the slug genus *Deroceras* Rafinesque, 1820, have been identified in samples from Fremont–Winema National Forest and other national forests in the Pacific Northwest of the United States: (a) *Deroceras laeve* (Müller, 1774), common and widespread in North America (Pilsbry, 1948); and (b) *Deroceras hesperium* Pilsbry, 1944, thought to have a more restricted distribution and considered a species of special status by the US Forest Service and US Bureau of Land Management. Since at least 2004 the two species have been identified in previous samples on the basis of external appearance and features of the reproductive system. The localities for the two species are distributed in a mosaic, seemingly haphazard, pattern within the forests. Most samples previously examined and identified by author BR were assignable *in toto* to one or the other species, but both *D. hesperium* and *D. laeve* were identified in a sample from John Spring, Klamath County, Oregon. Specimens from central and southern Oregon counties represented an extension of the published range of *D. hesperium* southward from Oswego Lake, Clackamas County (Pilsbry, 1948; Branson, 1977).

The fact that two individuals differing in the diagnostic characters above were found at the same locality, along with the other distributional data, raises the question whether there are really two sympatric species or if the characters in question are variable within a population of a single species. In standard molluscan taxonomy, considerable weight is given to reproductive system differences, suggesting as they do that the bearers of different types of lower genitalia may be reproductively isolated from one another (e.g. Reise *et al.*, 2011).

This paper re-examines these two putative species, utilizing morphological and molecular evidence. Together these datasets should be competent to show whether slugs heretofore identified as a distinct species, *D. hesperium*, are in fact a separate, coherent, evolutionary lineage (a phylogenetic species), a discrete subset within the more inclusive species *D. laeve*, or merely individuals that happen to express an unusual, variant shape of their reproductive organs. We examined 164 specimens of *Deroceras* collected in six Oregon counties (Table 1; Figure 1). These were samples collected by Forest Service and Bureau of Land Management personnel in the course of their fieldwork. These specimens were deposited at the Oregon State Arthropod Collection (OSAC), Oregon State University, Corvallis, Oregon, and had been preserved in molecular grade ethanol.

**Methods: Morphological Study.** We inspected specimens from sampling localities designated for the study as D1 through D31 (Table 1). From one to five individuals from each locality were dissected. To avoid observer bias only one author, BR, performed all the morphological descriptions of the specimens and assigned the samples to one or the other species without knowing the molecular results. Characters that sort into alternate states (Table 2) were observed and recorded.

We excluded characteristics such as soft-tissue measurements because they are often unreliable taxonomically for reasons enumerated by Emberton (1989) and because they vary through an individual's ontogeny and perhaps in response to nutrition and time of year. *Deroceras laeve*, moreover, is genitally polymorphic, with some individuals never developing male terminal genitalia (Pilsbry, 1948; Jordaens *et al.*, 2006). We also excluded shape of the internal shell, particularly the curvature of the anterior margin, because it varies throughout the ontogeny of the individual, as can be seen from the growth lines preserved in the shell (compare Pilsbry, 1948:fig. 296F).