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Parergodrilus heideri Reisinger, 1925 (Annelida: Polychaeta) from a holm oak wood in an extinct volcano of southern Italy

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A well established population of the soil-dwelling polychaete *Parergodrilus heideri* Reisinger, 1925 was discovered during a survey of the woodland soil fauna in the Astroni Crater (a State Nature Reserve near Naples, Italy, 50 m a.s.l., 40°50′52″N, 14°08′59″E) (Fig. 1A, B). This is the southernmost capture of this worm in Europe (Fig. 2A), although a lower latitude record (35°22′0.4″N, 127°34′52″E), the sole (so far) outside the continent, has been reported recently from Korea in this same journal (Dózsa-Farkas & Hong 2010). In Italy the species was known only from the Casentino National Park (1,120 m a.s.l.) in Tuscany and the Regional Park of Suviana and Brasimone Lakes (975 m a.s.l.) in Emilia Romagna (Rota 1997; Rota *et al.* 2001). Also in central Europe the species appears confined to mountain habitats (650-1,200 m a.s.l.), the lowland records being located along the northern coasts of Spain and Germany and in southern Sweden (Fig. 2A, B).

Parergodrilus heideri is a minute grub-like worm, with dimensions comparable to those of the marine mesopsammic fauna. Live adult specimens are maximally 1 mm long and 180 μm wide (Fig. 1A). The body has neither appendages nor parapodia, and chaetae are inconspicuous, rod-like, arranged in two ventral pairs per segment (Rota 1997, 1998). Molecular evidence (Rota *et al.* 2001; Rousset *et al.* 2007) has confirmed its classification in the same polychaete family, the Parergodrilidae Reisinger, 1960, as the marine interstitial *Stygocapitella subterranea* Knöllner, 1934. However, relationships to other polychaetes remain uncertain. The possibility of a position close to the Orbiniidae has emerged in some recent molecular analyses but support was significant only in two such studies (Bleidorn *et al.* 2003; Struck *et al.* 2008). Besides, none of the morphological similarities between Parergodrilidae and Orbiniidae (glandularized ventral pharyngeal organ; glandular gonoducts; production of egg capsules or cocoons; see Purschke & Jördens 2007) appears to be exclusive to the clade.

The earliest records of *Parergodrilus* (Reisinger 1925, 1960; Remy 1932, 1935; Schweitzer 1936) indicated a restrictive preference for the litter of beech forests on well-drained soils. Field surveys suggested an aversion to conifer woodlands in view of a supposed intolerance of tannin-rich litter, as well as avoidance of seasonally flooded depressions because of waterlogging intolerance (Reisinger 1925). Later studies, however, have reported *Parergodrilus* from a moder spruce forest (pH 3.6–4.5) (Römbke & Jans 1991) as well as from the hyporheal of streams (Schwank 1981; Martinez-Ansemil & Parapar 2009). Graefe (1993) even found it in organic water-logged soil, low in basic nutrients (dystric histosol). Our finding in tannin-rich holm-oak litter from inside an extinct Italian volcano further expands the range of soil types on which this worm can thrive successfully, while confirming its great power of dispersal.

The crater of Astroni (Fig. 1B), located 16 km to the northwest of Naples and 3 km from the seashore, was built during the third epoch of activity of the Campi Flegrei caldera (ca. 4,000 years ago), at a time when the Campanian plain was already inhabited and cultivated by humans (Isaia *et al.* 2004; Marzocchella 1998). Seven mainly phreatomagmatic explosions gave origin to a still well-preserved, elliptical ash-ring surrounding a 250 ha area. The rim of the crater has today an average altitude of 200 m a.s.l.; the highest peaks occur at the intersections with the Agnano crater, whereas the lowest point (100 m a.s.l.) is on the SE at Torre d'Ingresso, facing the Agnano plain. Only two eruptions ended with lava extrusion, which produced two central hills about 75 m and 60 m in height (Isaia *et al.* 2004). Over the centuries, a dense vegetation developed inside the crater, reflecting the climax vegetation of the Campi Flegrei but with an inverted zonation with respect to altitude (i.e. thermophilous maquis and evergreen oak woodland above mesophilous deciduous woodland with *Quercus robur*), the bottom of the crater being cooler and more humid than the slopes. While the surrounding landscape was increasingly impacted by human activity (agriculture, wood cutting, drainage of wetlands; Amalfitano *et al.* 1990), the Astroni crater preserved its wild and scenic qualities for long time, so much as to be chosen as a royal hunting ground by the Aragons and the Bourbons. In the last three centuries, extensive logging of the crater's secular trees was allowed and parts of the bottom were reafforested with alien species *(Quercus rubra, Carpinus orientalis*). Climate changes, landslides and fire also facilitated the establishment of invasive species, e.g. *Robinia pseudoacacia* and *Ailanthus altissima*. Nevertheless, the deciduous community is still dominated by *Quercus robur* and

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