Observations of millipedes in Kitley cave, Devon, including the first confirmed British record of *Polydesmus asthenestatus* Pocock, 1894

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On 21st November 2020, a visit to several caves in the Yealm Valley, close to Plymouth, was undertaken to carry out some net sampling for stygobitic Crustacea. Amongst these sites was Kitley Cave (SX575512, VC 3) once developed as a show cave in the 1970s and 80s, but which has been closed since 2000 (Fig. 1). During this visit large numbers of pale millipedes were noted throughout the cave on most moist stalagmite and rock surfaces, with concentrations on occasional piles of bat guano. The specimens superficially resembled slightly darkened versions of the common cavernicolous species *Brachydesmus superus*. Specimens (including an adult male) were sent to Helen Read, who identified them as *Polydesmus asthenestatus*, from the description and figures in Anderson (2015), the first confirmed records of this species from Britain. The identification was confirmed by Roy Anderson from photographs.

Figure 1: Kitley Cave, main chamber (image Lee Knight)

Polydesmus asthenestatus is native to north west Italy and Corsica (Kime and Enghoff, 2011), but is now well-established in Ireland, mostly around Belfast and a site south of Dublin. Within its native range, and at many Irish sites, it appears to favour wet woodland, primarily riparian alder, although it does show a small degree of synanthropic behaviour (Anderson, 2015). The entrance to Kitley Cave is within 50m of the River Yealm, to which it is hydrologically connected, although the surrounding habitat is primarily mixed deciduous, rather than alder carr. There is a possible previous record of *P. asthenestatus* from Lamorran House Gardens, near Falmouth, Cornwall by Steve Gregory in September 2020, although only sub-adult males have been obtained from this site so far (Gregory, 2021).

Figure 2: *Polydesmus asthenestatus* in Kitley Cave.
A) Specimens on bat guano, November 2020; B) Close up of an individual (images Lee Knight)

Anderson (2015) mentions that *P. asthenestatus* is resistant to low temperatures and very much a winter species, with sub-adults and adults active from September through May, with its activity in surface leaf litter during two cold winters in Ireland supporting this. However, it might be the case that caves, particularly in the warmer southern parts of Britain, could potentially represent good habitats for the initial colonisation of southern European species, as they provide a relatively stable environment, with significant buffering from temperature fluctuations on the surface, especially in winter. Several other Mediterranean species have colonised Devon caves and mines (analogous to man-made caves) in recent decades, including the Bloxworth snout moth (*Hypena obsitalis*), now a common overwintering member

of the parietal community in many coastal caves around Torbay, and the thysanuran *Trigoniophthalmus alternatus*, common in many Devon caves, both coastal and inland (Proctor 2006). Coastal caves have also been suggested by Mosely and Proctor (2016) to potentially offer colonisation routes and inland expansion for several invertebrate species, including the Lusitanian woodlouse *Trichoniscoides saeroeensis*, first recorded in Britain from a mine adit near Morecambe Bay (Sheppard 1968, 1971, Moseley 1970) and which is now known to occur in several caves and mines around the British coastline. Another introduced north Italian millipede *Polydesmus barberii* has an established breeding colony in Corbridge Cave, near Brixham (Proctor 2012). Substantial numbers are usually observed in the vicinity of a single large boulder in the entrance chamber, covered in tree roots and appear to be limited to this area. There are also surface records of this species in Devon from the Plymouth and Dartmouth areas (Bolton and Jones 1996, Bolton 1996, Lee 2006).

Moseley (2016), describing the fauna of coastal caves and mines on the Isle of Man and around Morecambe Bay lists a group of soil-dwelling invertebrates, termed seasonal transients, that migrate down into the deeper layers of the soil in preparation for winter and in doing so might find their way into cave and mine passages. Within this group he included geophilid centipedes, root weevils and julid millipedes, thus, it is not inconceivable that many soil-dwelling myriapods could end up in subterranean habitats as part of this migratory movement. During a second visit to Kitley on 20th February 2021, specimens of *Polydesmus asthenestatus* were notably scarce throughout the cave compared to the previous visit, being limited to a stalagmite boss, fed by a trickle of water from fissures in a roof hollow, and a couple of small guano piles. Whereas previously specimens in the 100s were present throughout the cave just, 10-20 were observed on this occasion. This second visit also noted at least 15 specimens of *Tachypodoiulus niger* and a single male *Chordeuma proximum* on the roof of the same alcove, although they were confined to dry sections of the roof, whereas the *P. asthenestatus* appeared to prefer the damp guano piles or were present on the thin film of water trickling over the stalagmite. Mosely (2016) also recorded *T. niger* in caves and mines around Morecambe Bay, noting seasonal fluctuations in its occurrence consistent with autumn and spring migration from and to the surface. This species is also known from other caves and mines across Britain and Ireland, although mostly from the threshold zone and it is not believed to be particularly cavernicolous, although in Germany it penetrates much further into caves, including well into the dark zone and is considered a eutroglophile. The specimens in Kitley were certainly within the dark zone and it is possible that this species might be more widely distributed in British subterranean habitats than currently known. According to the database of subterranean biological records held by the British Cave Research Association (the *Hazelton Database*) *C. proximum* has only been recorded at one other subterranean locality, Godstone Mine in Surrey and is not regarded as associated with underground habitats.

In addition to its millipede fauna, Kitley is of significant biospeleological interest as the aquatic sampling (the original purpose of the November visit) also recorded the stygobitic amphipods *Niphargus aquilex* and the British endemic *Niphargus glenniei*, as well as the subterranean diving beetle *Hydroporus ferrugineus*. This latter species is believed to have a subterranean larval stage and is more commonly associated with springs, although it does occur in several caves, mostly in the Yorkshire Dales and Peak District, with the Kitley record being the only cavernicolous record in southern Britain.

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