

The unnatural history of cave olms *Proteus anguinus* in England

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INTRODUCTION

The olm or human fish, *Proteus anguinus* (Fig. 1), is a neotenuous species of blind cave salamander, retaining its gills even in adulthood, found in Eastern Europe and usually growing to around 25 cm in length (Arnold & Ovenden, 2002). The species has a number of adaptations that allow it to survive in such a challenging environment such as the ability to undergo long periods of starvation (Hervant et al., 2001) and tolerance of anoxia (Issartel et al., 2009). Olms have a long life history and under ideal conditions may be very long-lived; the maximum recorded age has been 100 years or more (Voituron et al., 2011). *Proteus anguinus* is particularly vulnerable to both physical and chemical changes to the karst ecosystems they inhabit, including contamination from anthropogenic sources (Prelovšek, 2016; Kolar, 2019).



Figure 1. A male olm (*Proteus anguinus*) in pre-mating condition from a cave in Herzegovina

There have been rumours that wild olms are present in England. The origins of these would appear to stem from the 1930s and the illegal removal of some individuals from Slovenia (then part of the former Yugoslavia). These were of the white sub-species (*Proteus anguinus anguinus*) and were housed in a tank in the former Zoology Department at the University of Bristol (Chapman, 1993). During the 1940s the olms had apparently outstayed their welcome and two students were tasked with releasing the olms into a suitable

cave in the Mendip Hills (Chapman, 1993). There is no record of how many olms were released.

Chapman (1993) speculates about whether any of the olms could have survived the ordeal in the Mendips. To confirm their presence by direct manual searching would be very difficult as access to some caves may not be possible. It has been suggested that the detection of eDNA could be used in this case (Vörös et al., 2017; Gorički et al., 2017), but the use of this method assumes that acceptable error rates could be maintained (Griffin et al., 2019) which may well not be the case. However, there are several reasons for thinking that olms would no longer be present in the Mendips. First, it seems likely that they would have perished soon after release due to the significant difference of the hydrophysico-chemical conditions between the karst water in the Mendips and those in their native range. In the Mendips the water is contaminated due to farm waste runoff, recreational activity, and agrochemical contamination probably rendering Mendip karst water uninhabitable for the olms (Atkinson, 1971; Hardwick & Gunn, 1996). Second, the olms were released some 80 years ago and as they were likely collected from the wild as adults, which would have been easier to catch than larvae and juveniles, they were at least 10 years old when originally caught making them at least 95 years of age as we write and are therefore close to the maximum observed age. Thirdly, British caves generally are quite poor in stygobitic biodiversity, so their food supply would also have been very limited (Maurice et al., 2016). The whole scenario points to the probable rapid demise of the olms.

More recently due to incorrect information circulated online, Kent's Cavern in Torquay, Devon has been subject to hearsay as a place where olms may potentially be seen. But to the best of our knowledge, no *P. anguinus* have ever been released into caves in Devon. However the William Pengelly Cave Studies Centre at Buckfastleigh did once have a small aquarium in one of its demonstration caves during 1977, containing a small number of Mexican axolotls (*Ambystoma mexicanum*). Axolotls are superficially similar to olms with pale coloration and retained gills (Fig. 2) so that the two species could easily be confused by non-specialists. It is therefore likely that these individuals were either mislabelled or visitors have wrongly identified them and attributed them to Kent's Cavern.

To conclude, the conditions needed to sustain olms are unlikely to be present in English cave systems. Although some individuals were released in the first half of the 20th century,



Figure 2. An albino axolotl (*Ambystoma mexicanum*) showing its similarities with the olm, such as a pale coloration and the presence of external gills. These features could lead to confusion between the two.

these individuals almost certainly expired very rapidly soon after. Since then other suggestions have been made for the presence of olms but there is no evidence to support these. Despite the exploration of such systems by recreational cavers as well as keen herpetologists, the evidence for any *P. anguinus* remains at zero. Whilst *P. anguinus* may have made a brief entry to the introduced herpetofauna of England, it is almost certain that they are long gone.

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