The Herpetological Bulletin 166, 2023: 25–26
SHORT COMMUNICATION

https://doi.org/10.33256/hb166.2526

Observation of scale organs on the head of the slow worm *Anguis fragilis*

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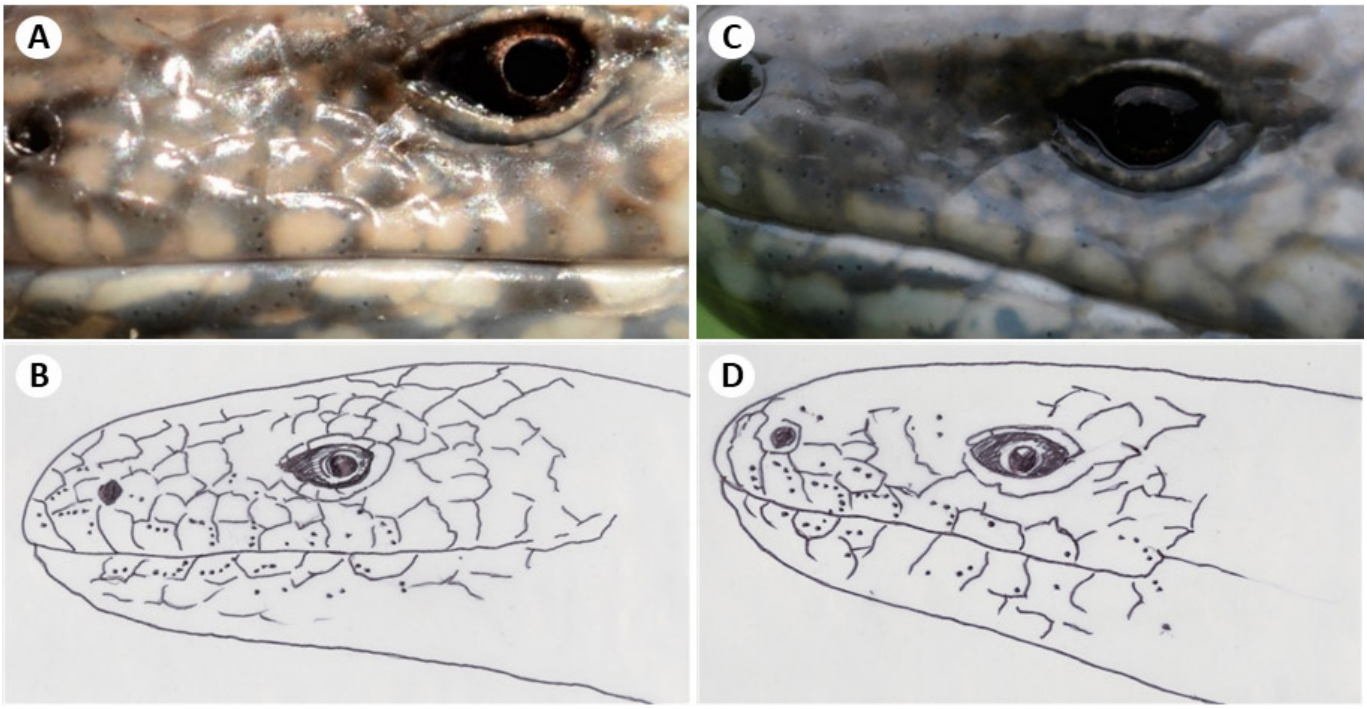

Figure 1. Lateral views of the heads of two male slow worms in pre-slough condition showing scale organs (black dots) – **A.** Close-up of part of the lateral view of the head of a male from Cheltenham, Gloucestershire and **B.** Tracing of the entire lateral view of A. to show the distribution of scale organs, **C.** Close-up of part of the lateral view of the head of a male from Hounslow, London, and **D.** Tracing of C. to show the distribution of scale organs

The existence of sensory structures, known as scale organs, in the skin of various kinds of reptile has been known since at least the second half of the nineteenth century (for example, Leydig, 1868). Of relevance to this note, their presence has been studied in at least three lizard families, namely Agamidae, Iguanidae and Gekkonidae, where the highest density of scale organs was found on the head, specifically on the frontal and lateral scales (Matveyeva & Ananjeva, 1995). In squamates more generally, the same tendency for a high density of sense organs to occur on the head is seen in the snakes *Leptotyphlops dilcis* and *L. munoal*, (Oreyas-Miranda et al., 1977). Receptor density on the head has been found to decrease from anterior to posterior and it has been suggested that this arrangement, in terms of functional ability, may be explained by the importance of the sensory fields surrounding the rostral part of the head, nostrils, eyes and ears (Matveyeva & Ananjeva, 1995).

The slow worm *Anguis fragilis* is a species of legless lizard belonging to the family Anguidae. Despite being widespread and locally common across much of Europe including Britain, many aspects of its biology remain poorly understood due to its cryptic nature, being largely fossorial and semi-fossorial and hence being most often encountered under refuges. Its occupancy of soil and leaf litter, and consequently its intimate contact with these media, would suggest that it might be well-provisioned with scale organs.

Evidence for possible existence of such scale organs in the slow worm was first noted by the author when reviewing a photograph of a large adult male in a pre-slough state briefly captured for photographic purposes near to Cheltenham, Gloucestershire, England on 11 April 2017. Detailed scrutiny of the image appeared to show many dark dots distributed mainly around the jaws of the slow worm, specifically mostly on the upper and trailing edges of the labial scales,

although with others being scattered elsewhere on the head (Fig. 1A & B). The approximate diameter of each scale organ is estimated at between 50 and 100 micrometres. On 28 April 2023 an unusually large male slow worm was captured in Hounslow, London for biometric purposes and photographed; it was 454 mm long including an intact tail. Subsequent examination of this individual, also in a state of pre-slough, revealed a similar (but not identical) pattern of dots to the Cheltenham male (Fig. 1C & D). The similar distribution between the two individuals suggests that the structures were unlikely to be a result of pathology or other anomaly but could indeed be scale organs.

A subsequent casual internet search of sufficiently high-resolution images of slow worm heads has also revealed the presence of these putative sense organs, especially on large males in pre-slough condition. It is perhaps likely that the larger size of the male slow worm head makes it easier to resolve these structures (i.e. that this is a case of observer bias) and that closer examination may show them to be present also in females and the immature stages. Additionally, the pre-slough condition may make the scale organs easier to see, and hence explain why they appear to have been otherwise overlooked. As to their specific function, it is perhaps most likely in a fossorial or semi-fossorial species that the scale organs' primary purpose would be mechanoreception (this function has been shown in other lizard families – see for example Hiller, 1978) although other functions or even a multisensory function cannot be discounted. Further analysis of a wider sample of detailed photographs as well as photomicrography of preserved histological samples would be the next obvious steps in elucidating the precise nature of these structures. The author would be grateful for any further information relating to the presence of scale organs in slow worms and other anguid lizards at the correspondence address above.

ACKNOWLEDGEMENT

The author would like to thank Dr Jozef Klembara for his helpful review of the manuscript.

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Accepted: 1 March 2023