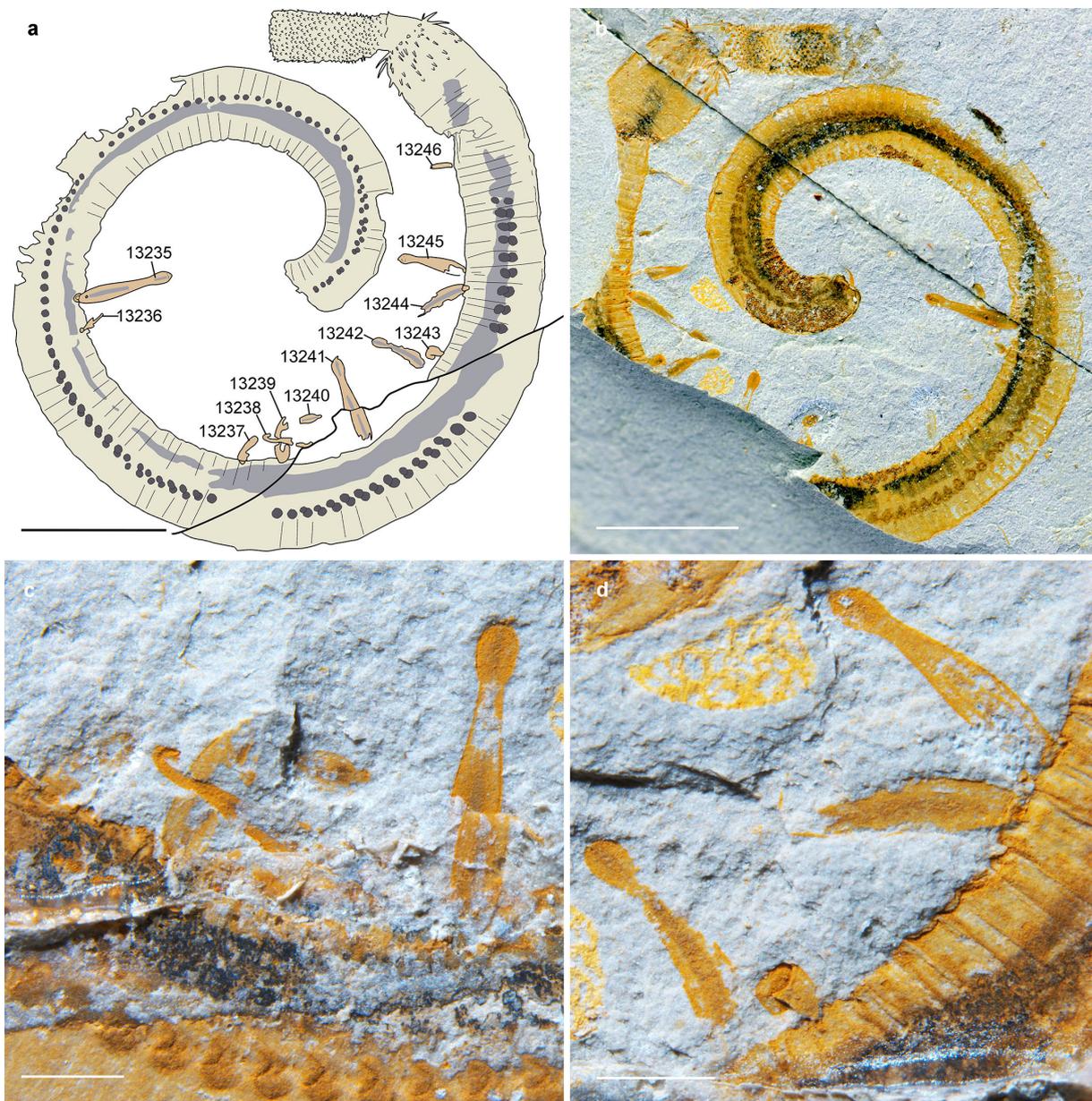


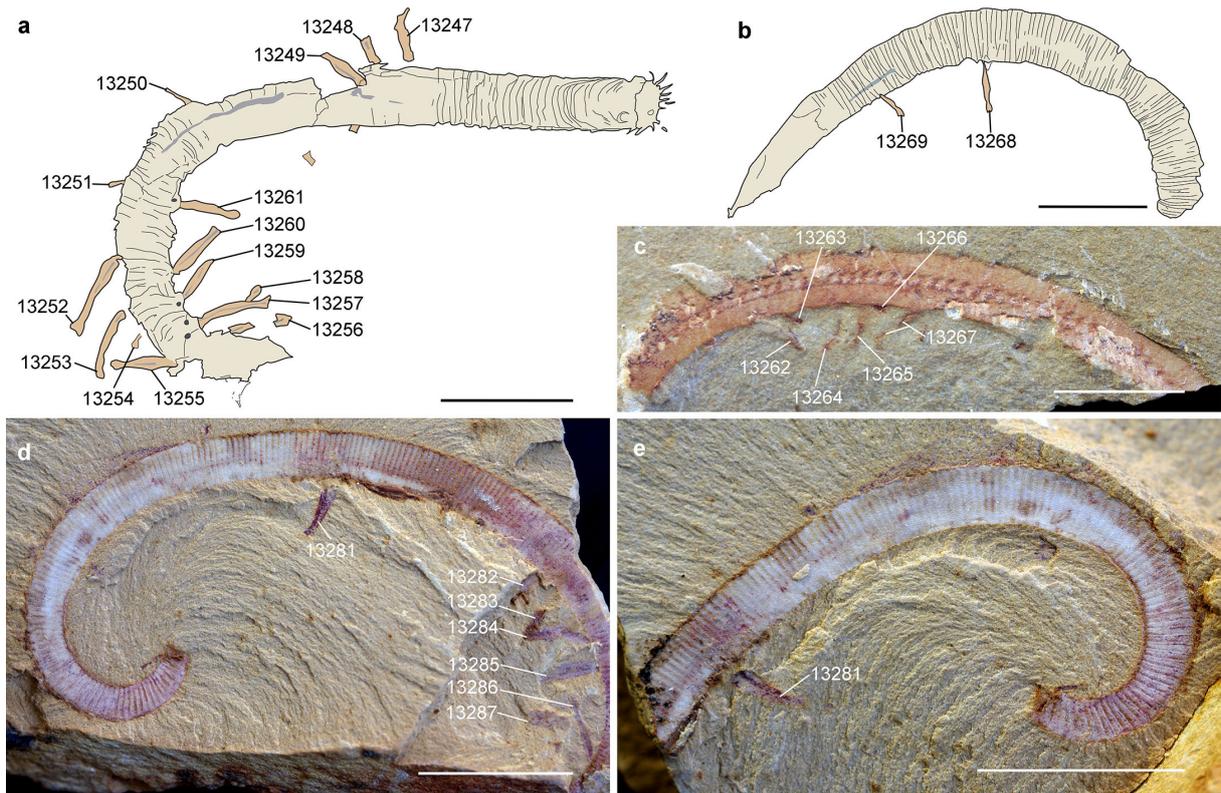
Host specific infestation in early Cambrian worms

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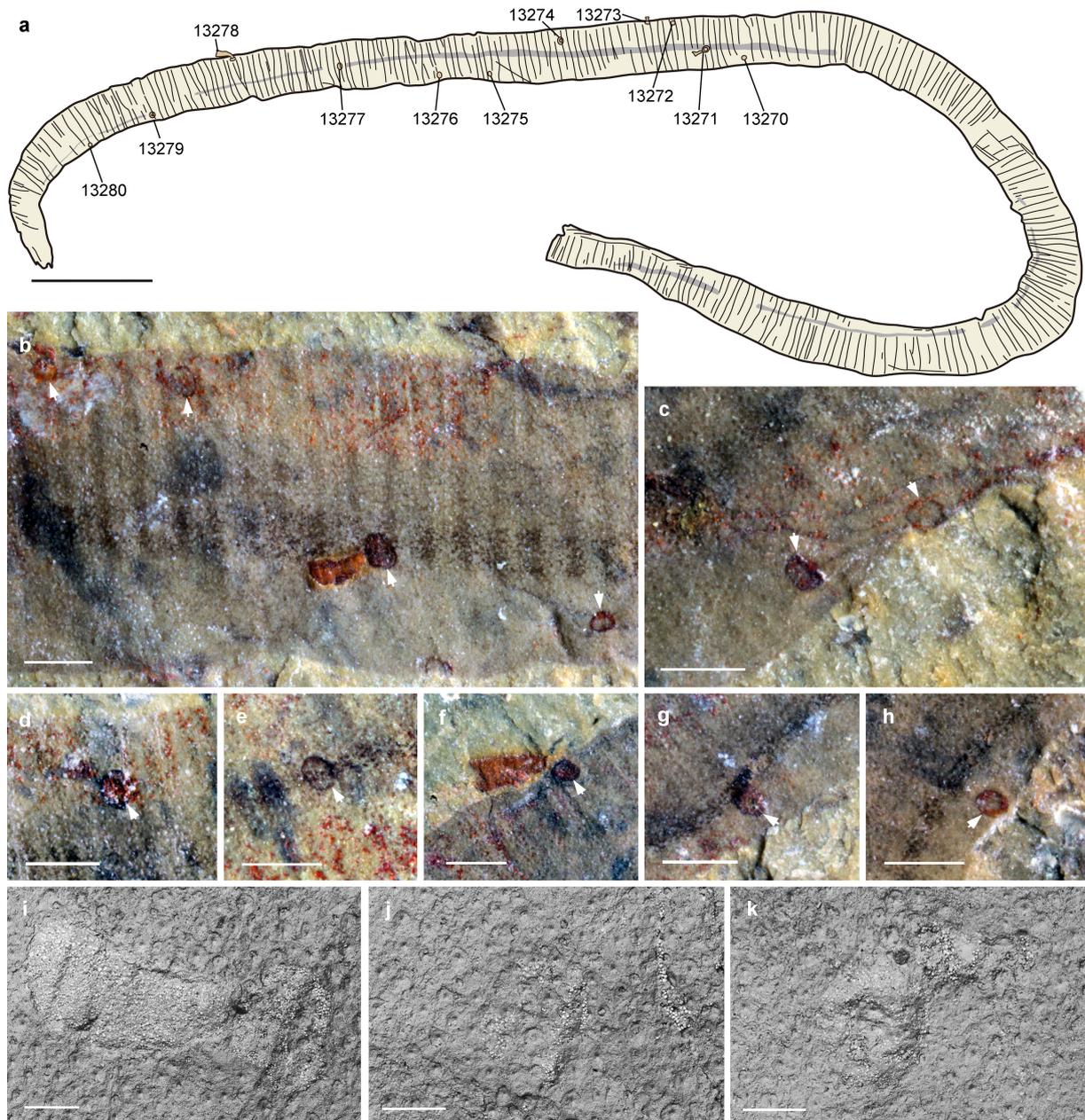
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Supplementary Figure 1 | *Cricocosmia jinningensis* (YKLP13226) infested by *Inquicus fellatus*. **a**, YKLP registration numbers for *I. fellatus* on YKLP13226a (interpretative drawing); **b**, YKLP 13226b (counterpart). **c**, **d**, close-up of multiple *I. fellatus* on YKLP 13226a. Scale bars, **a-b**, 5mm; **c-d**, 1mm.



Supplementary Figure 2 | *Inquicus fellatus* infesting *Cricocosmia jinningensis* (a, c) and *Mafangsolex sinensis* (b, d, e). a, YKLP numbers for *I. fellatus* on YKLP 13231 (interpretative drawing). b, YKLP numbers for *I. fellatus* on YKLP 13230. c, YKLP numbers for *I. fellatus* on YKLP 13229b (counterpart, see Fig. 3c for the part of same specimen), d-e, YKLP numbers for *I. fellatus* on part (d) and counterpart (e) of YKLP 13232. Scale bars, a-e, 5mm.



Supplementary Figure 3 | Distribution and morphology of attachment discs of *Inquicus fellatus* on host *Mafangsclex sinensis* (YKLP 13228). **a**, drawing of the host (see Fig. 3d for a photographic image of this fossil) and YKLP registration numbers for *Inquicus fellatus*. **b-h**, detail of the attachment discs (arrows), YKLP 13270-13273 (b, right to left), YKLP 13275-13276 (c, right to left), YKLP 13274 (d) and YKLP 13277-YKLP 13280 (e-h). **i-k**, scanning electron micrographs showing pyritized remains of the attachment discs, YKLP 13271 (i), YKLP 13276 (j) and YKLP 13279 (k). Scale bars, **a**, 5 mm; **b-h**, 500 μm ; **i-k**, 100 μm .

Supplementary Table 1. Summary of host infestation by *Inquicus fellatus*. DR (columns 2 and 4) indicates the Decay Rank for each specimen based on the presence/absence of anatomy and characteristics of anatomy (such as completeness of outline, folding of integument, deformed or lost annulation etc.). DR=0, best preserved through to DR=3, poorly-preserved. Note that in all specimens listed (except for YKLP 13227 where only one *I. fellatus* occurs) the decay rank for the host corresponds to that of *I. fellatus*. Redox-sensitive elements indicate that both Event mudstone beds and Background mudstone beds were deposited under oxic conditions, with intermittent episodes of dysoxia and anoxia¹.

Host worm	Host preservation	Size of attached <i>I. fellatus</i>	Disposition of attached individuals	Distribution of attached individuals	Locality & Horizon type	YKLP number for host worm	Number of attached individuals and their YKLP numbers
<i>Cricocosmia jinningensis</i>	Intact, appears to have been killed <i>in vivo</i> (DR=0)	Complete specimens are 2.5 - 3.3 mm	7 <i>I. fellatus</i> are complete or near complete, and some show internal gut (DR=0)	Ventral side of the 'host', indicated by the lateral sclerotized plates	Type locality, Eraicun, Event mudstone	YKLP 13226 a, b	Minimum of 12 (YKLP13235a,b, and YKLP13236-13246)
<i>Cricocosmia jinningensis</i>	Decaying, annulation deformed at anterior, proboscis retracted (DR=2)	Complete specimens are 2.75 - 3.3 mm	Decay halo adjacent two of the <i>I. fellatus</i> that are superimposed on each other (DR=2)	Possibly both ventrally and dorsally, indicated by the sclerotized plates, but note that the worm body is twisted	Type locality, Eraicun, Event mudstone	YKLP 13231	Minimum of 15 (YKLP13247-13261)
<i>Cricocosmia jinningensis</i>	Decaying, with detail of annulation almost lost (DR=3)	Specimens degraded, but longest is <i>circa</i> 2 mm	Decayed, in similar way to host (DR=3)	Ventral side, based on worm curvature	Sanjiezi, Jinning, Event mudstone	YKLP 13229 a, b	Minimum of 6 (YKLP13262a,b,to YKLP13267a,b)
<i>Mafangsoalex sinensis</i>	Mostly intact with minor folding of cuticle (DR=2)	One, near complete specimen is 2.4 mm long	Both <i>I. fellatus</i> are well-preserved, but do not show as much detail as in 13266 (DR=2)	Ventral side, based on worm curvature	Type locality, Eraicun, Event mudstone	YKLP 13230	2 specimens (YKLP13268, 13269)
<i>Mafangsoalex sinensis</i>	Well preserved, body outline intact, annulation good (DR=1)	Specimens are incomplete, but the longest are a minimum of 2.2 mm	<i>I. fellatus</i> are well preserved including details of internal anatomy (DR=1)	Ventral side, based on worm curvature. Appear to be concentrated towards the head end	Type locality Eraicun, Event mudstone	YKLP 13232 a, b	Minimum of 6 (YKLP13281a,b, and YKLP13282-13287)
<i>Mafangsoalex sinensis</i>	Well preserved, body outline intact, annulation good (DR=1)	Incomplete	One attached individual, poorly preserved (DR=2)	Near posterior end	Type locality, Eraicun Event mudstone	YKLP 13227	1 specimen (YKLP13288)
<i>Mafangsoalex sinensis</i>	Decaying, cuticle folds, body outline with folding at edges (DR=2)	All specimens are incomplete	Most <i>I. fellatus</i> are represented only by the basal disc, or in 3 examples by specimens broken off near their base (DR=2)	Appear to be attached both ventrally and dorsally	Mafang Background mudstone	YKLP 13228a, b	Minimum of 11 (mostly attachment discs but including 3 partially complete animals) (YKLP13270-YKLP13280)

Supplemental Reference

1. Forchielli, A., Steiner, M., Kasbohm, J., Hu, S.X., & Keupp, H. Taphonomic traits of clay-hosted early Cambrian Burgess Shale-type Lagerstätten in South China: *Palaeogeog. Palaeoclimatol. Palaeoecol.* **398**, 59– 85 (2014).