Host specific infestation in early Cambrian worms

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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 *Mafangscolex 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** *Mafangscolex 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 anoxia'.

Host worm	Host preservation	Size of attached <i>I.</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
Cricocosmia jinningensis	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, Ercaicun, Event mudstone	YKLP 13226 a, b	Minimum of 12 (YKLP13235a,b, and YKLP13236- 13246)
Cricocosmia jinningensis	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.</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, Ercaicun, Event mudstone	YKLP 13231	Minimum of 15 (YKLP13247- 13261)
Cricocosmia jinningensis	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)
Mafangscolex sinensis	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, Ercaicun, Event mudstone	YKLP 13230	2 specimens (YKLP13268, 13269)
Mafangscolex sinensis	Well preserved, body outline intact, annulation good (DR=1)	Specimens are incomplete, but the longest are a minimum of 2.2 mm	I. fellatus 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 Ercaicun, Event mudstone	YKLP 13232 a, b	Minimum of 6 (YKLP13281a,b, and YKLP13282- 13287)
Mafangscolex sinensis	Well preserved, body outline intact, annulation good (DR=1)	Incomplete	One attached individual, poorly preserved (DR=2)	Near posterior end	Type locality, Ercaicun Event mudstone	YKLP 13227	1 specimen (YKLP13288)
Mafangscolex sinensis	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).