biology letters

Reply: giant claws and big bodies

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Biol. Lett. 2008 **4**, 281
doi: 10.1098/rsbl.2008.0116

biology letters
Palaeontology

Biol. Lett. (2008) **4**, 281
doi:10.1098/rsbl.2008.0116
Published online 19 March 2008

Invited reply

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We welcome the comments by Kaiser & Klok (2008) on our article concerning the giant pterygotid chelicerae, although we note that they do not provide a revised size estimate, thus providing an alternative hypothesis to test. As we noted in our original article, the conclusion that this fossil claw represents the largest known arthropod is based on two assumptions: (i) the ratio of chelicerae to body length in *Jaekelopterus* is similar to other closely related pterygotids and (ii) there is no significant positive allometry in the size of their chelicerae.

Regarding the first point, we simply scaled the new claw by previously known large pterygotids (in which their chelicerae to body length ratio is known), both *Acutiramus* and *Pterygotus*, providing a size range, because our phylogenetic analysis indicated that these taxa were closely related. Indeed, *Pterygotus* and *Jaekelopterus* are so similar that they can be distinguished only by their genital appendage and perhaps telson; we really wonder whether their true taxonomic diversity is oversplit.

Regarding the second point, Kaiser and Klok illustrate their arguments by pointing out striking examples of positive allometric growth in the appendages of beetles and crustaceans. Although examples of positive allometric appendage growth are known in some arachnids (e.g. the pedipalps of some amblypygids), this has not been demonstrated, to our knowledge, in the chelicerae of any eurypterid or other merostome. We are aware of some positive allometry in pterygotids concerning the size of their lateral eyes, telson morphology and exaggerated growth of the terminal denticle in the free ramus, although preliminary analysis of data on the ratio of the length of the free ramus to that of the terminal denticle actually indicates considerable variation. Also, each of these traits would follow their own selective pressures.

As Kaiser and Klok note, the fossil record contains numerous incomplete specimens, particularly of eurypterids, and especially pterygotids. This is because their chelicerae are much more durable than their body tergites, as discussed in our original article. As such, this claw may represent a truly 'unique' discovery, although we are now aware of a less completely preserved and hitherto undescribed fixed ramus of similar dimensions, which is now in a private collection and was found in the same layers as 'our' specimen; we cannot exclude the possibility that this is the other claw of the same individual!

In conclusion, we intended our article as a brief report. We would welcome further research on eurypterid ontogeny, systematics and phylogeny. Research continues on the patterns and processes of gigantism in Palaeozoic arthropods, particularly trilobites, which have a much higher diversity, more resolved phylogeny and higher preservation potential, placing them in a better macroevolutionary context. We remain convinced, however, despite the lack of relevant data, that our estimate of the maximum body length in *Jaekelopterus* is more accurate (and actually more conservative) than previous estimates, particularly those reported in some textbooks and the media.

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Kaiser, A. & Klok, J. 2008 Do giant claws mean giant bodies? An alternative view on exaggerated scaling relationships. *Biol. Lett.* **4**, 279–280. (doi:10.1098/rsbl.2008.0015)

The accompanying comment can be viewed on page 279 or at http://dx.doi.org/doi:10.1098/rsbl.2008.0015.

Received 3 March 2008
Accepted 4 March 2008