

New ideas about the euchelicerate stem-lineage

*Jason A. Dunlop*¹

Abstract: Historically, various early Palaeozoic arthropods have been assigned to the fossil stem-lineage of Chelicerata. These include Trilobita and/or a number of extinct taxa belonging to the Arachnomorpha; most of which resemble Xiphosura (horseshoe crabs). However, many of the characters supporting Arachnomorpha fail when applied to Arachnida or Pycnogonida (sea spiders). Pycnogonida resolve either as basal Chelicerata or as sister-group to all other Euarthropoda. Furthermore, a new palaeontological hypotheses is reviewed here which identifies an assemblage of Cambrian ‘great-appendage’ arthropods (alternatively named protochelicerates or megacherians) as potential stem-group chelicerates. Significantly, these fossils have a robust pair of anterior head appendages and show a possible trend by which they became increasingly raptorial – approaching the condition of the chelate chelicerae. Homology of appendages at the ‘head’ end of arthropods remains highly controversial, but recent data suggests that chelicerae are homologous with the (a1) antennae. Thus in the scenario presented here euchelicerates did not lose (and indeed never had) long, sensory antennae, but probably evolved their chelicerae from a leg-like pair of uniramous appendages. The head region of the ‘great-appendage’ arthropods is not a prosoma, but may be segmentally homologous with an anterior body region associated with four pairs of appendages occurring in pycnogonids, many mites (Acari) and in arachnids with a divided carapace, or propeltidium.

Key words: Arthropoda, Chelicerata, stem-lineage, fossil, phylogeny, tagmosis