

Original Article

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A new Silurian synziphosurine arthropod from Ukraine

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Abstract

The Silurian of Podolia, Ukraine, is renowned for its arthropod fauna, including eurypterids and the synziphosurine *Pasternakevia*. Here, we describe one of several new arthropods recently discovered in the vicinity of the Smotrych River. *Smotrychaspis kurtopleurae* gen. et sp. nov. is a synziphosurine euchelicerate with semicircular carapace lacking eyes, an unfused opisthosoma with 11 visible segments, the posterior tergites wide and bearing falcate epimera and a relatively long and stout telson. *Smotrychaspis* resembles pseudoniscid and bunodid synziphosurines but cannot be placed in either of these families.

1. Introduction

Exceptionally preserved biotas (EPBs) are important fossil assemblages that provide the most complete record of Earth's life forms and palaeo-communities through time. Silurian EPBs have been less studied than those of other periods. They include the Herefordshire (e.g. Briggs *et al.* 2012), Leintwardine (also in Herefordshire, e.g. Gladwell, 2018) and, in North America, the Waukesha (Kleussendorf & Mikulic, 2017; Anderson *et al.* 2021; Gass & Braddy, 2023), Scotch Grove (van Iten *et al.* 2023) and Eramosa (von Bitter *et al.* 2007) EPBs.

These cases represent a range of palaeo-environments from marginal to open marine. Kleussendorf (2007), discussing North American Silurian EPBs, inferred that a eurypterid-phylocarid association (in the Williamsville, Syracuse, Pointe-aux-Chenes, Kokomo and Waubakee biotas) represented hypersaline peritidal lagoons. Vrazo *et al.* (2017: 383) further discussed the North American eurypterid-bearing units, concluding that their occurrence was 'controlled by the presence of an ecological-taphonomic window that recurred predictably in nearshore, marginal environments during transgressions'.

Recent collecting from the uppermost 5–10 m of the Ustya Formation along the Smotrych River in the Silurian of Podolia, in a geological context comparable with that of the North American eurypterid-bearing EPBs, has yielded several new arthropods, the first of which, a synziphosurine euchelicerate, is described here.

The suborder Synziphosurina was erected by Packard (1886) for a number of merostome arthropods which could be placed into neither Eurypterida nor Xiphosura, but appeared to be bridging forms between these groups. He included in the suborder *Bunodes* von Eichwald, 1854, *Hemiaspis* Woodward, 1865, *Pseudoniscus* Nieszkowski, 1859, *Exapinurus* Nieszkowski, 1859 and (with reservation) *Neolimulus* Woodward, 1868. Of these, *Hemiaspis* species are now split between *Bunodes* and *Limuloides* Woodward, 1865, and *Exapinurus* is in *Bunodes* (see Howard, 2024, for the complex nomenclature surrounding *Limuloides*). Eldredge (1974) and Bergström (1975) revised the suborder; the former author included within it *Weinbergina* Richter and Richter, 1929, *Legrandella* Eldredge, 1974, *Bunodes* and *Limuloides*, whilst Bergström (who considered it an order) included the same genera except for *Legrandella* (which was mentioned in an addendum). Both of these authors included *Pseudoniscus* and *Neolimulus* within the xiphosurids. Anderson and Selden (1997), in the first cladistic analysis of Palaeozoic Xiphosura, showed that the synziphosurines formed a paraphyletic grade of stem-group horseshoe crabs, rather than a monophyletic group. More recently, phylogenetic analyses including synziphosurines within a broader sample of Euchelicerata by Lamsdell (2013, 2016), Lamsdell *et al.* (2015) and Selden *et al.* (2015) have shown synziphosurines to be polyphyletic. Half of synziphosurine taxa (e.g. *Legrandella* and *Dibasterium* Briggs *et al.* 2012) resolved in the euchelicerate stem group, while the rest, the more traditional synziphosurines such as *Limuloides*, *Pseudoniscus* and *Bunodes*, as well as *Houia* (Lamsdell *et al.* 2013) from China, resolved between Xiphosurida and Dekatriata Lamsdell, 2013 (Chasmataspida + Eurypterida + Arachnida) (Selden *et al.* 2015: figure 6). Some recent analyses of synziphosurine relationships, in the Supplemental Material of Lustri *et al.* (2024a, b), located Bunodidae Packard, 1886 (essentially *Bembicosoma* Laurie, 1899, *Bunodes* and *Limuloides* and probably also *Pasternakevia* Selden & Drygant, 1987) as sister to Pseudoniscidae Packard, 1886 (*Pseudoniscus* and *Cyamocephalus* Currie, 1927), chasmataspids, eurypterids and arachnids,

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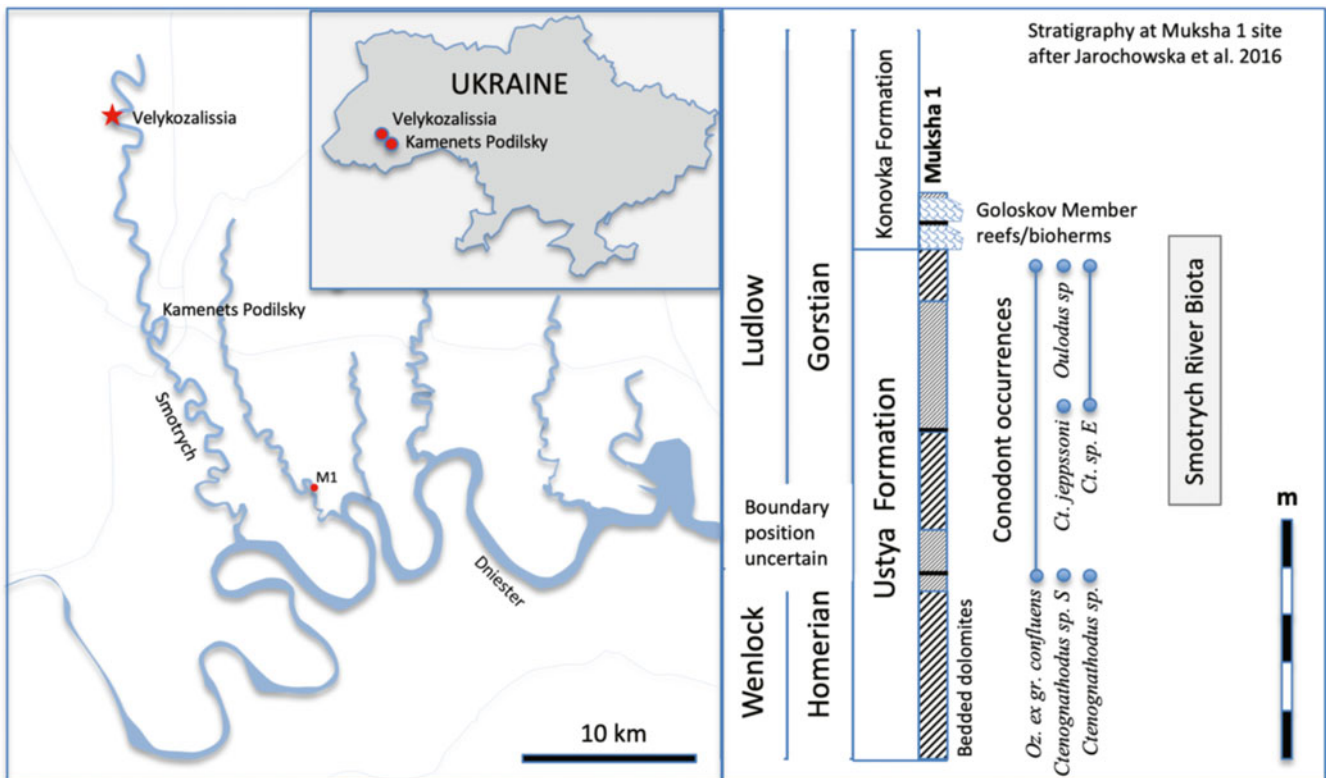


Figure 1. Location map and stratigraphy of the fossil locality on the Smotrych river, near Velikozalissya, Podolia, Ukraine. Horizon: uppermost 5–10 m of the Ustyia Formation (Silurian: topmost Wenlock: Homerian to Ludlow: Gorstian; ~427 Ma).

but not Xiphosura (which occupied a more basal position as sister to this entire grouping). More recent phylogenetic analysis (Lamsdell, 2025, supplementary figure S1) resolved an expanded Bunodidae (including both bunodids and pseudoniscids) as sister to Xiphosura.

The new synziphosurine described here, *Smotrychaspis kurtopeuriae* gen. et sp. nov., belongs to the traditional synziphosurine group, which contains the families Bunodidae and Pseudoniscidae. Whilst the new animal shows similarities to both these families, it cannot be housed in either, and so remains *Euchelicerata incertae sedis*.

2. Geological setting

Silurian rocks of Podolia, Ukraine, were deposited in an epicontinental basin on the East European Platform, part of Baltica, with water depth increasing in a WSW direction from the Ukrainian Shield towards the Teisseyre-Tornquist Zone (Skompski *et al.* 2008; Mazur *et al.* 2015; Skompski *et al.* 2023). A belt of carbonate deposition 150–200 km wide extends along strike for nearly 2000 km with a central zone of crinoidal and stromatoporoid-coral shoals separating an inner shelf facies from outer shelf and slope settings.

The Silurian shallow-water inner shelf facies are represented in the Podolia region mainly by fine-grained laminated dolomiticrites (see Mazzullo, 2000, for discussion) containing common ostracodes and eurypterids. Desiccation cracks have been locally observed (e.g. Naugolnykh & Shpinev, 2019), indicating coastal peritidal depositional environments. Laminated dolomiticrites are

commonly intercalated with levels rich in stromatoporoids (Skompski *et al.* 2008).

Recent collecting from the Ustyia Formation (D. Polypenko, pers. comm) has yielded eurypterids, synziphosurine chelicerates including *Pasternakevia podolica* (Selden & Drygant, 1987; Krzeminski *et al.* 2010) and several undescribed forms, ceratiocarids, leperditicopid ostracodes, orthoconic and breviconic nautiloid cephalopods, bivalves, lingulid brachiopods and marine algae.

Jarochowska *et al.* (2016) reasoned that the Ustyia Formation ranges in age from Homerian (Wenlock) to Gorstian (Ludlow) age, with the Wenlock-Ludlow boundary within the middle to upper Ustyia Fm (Figure 1). While cautioning (Jarochowska *et al.* 2016: 189) that the “stratigraphic distribution of *Ctenognathodus* is not well-known, as this genus shows a strong affinity to shallow-water, lagoonal environments”, elements of *Ctenognathodus* sp. S found 7 m below top Ustyia Formation were placed in the *C. murchisoni* Zone (uppermost Homerian). They also stated (Jarochowska *et al.* 2016: 193) that “Based on correlations with the conodont succession in Saaremaa, Estonia (Viira and Einasto, 2003), it is more likely that the uppermost Ustyia Fm., particularly the interval bearing *C. jeppssoni*, is of early Ludlow age.” Since this is the interval containing the fauna described here (D. Polypenko, pers. comm), the age of the Smotrych EPB is most probably Lower Ludlow (Gorstian) to topmost Homerian.

3. Materials and methods

3.a. Preservation and morphological interpretation

The specimen is preserved as part and counterpart in very fine-grained dolomiticrite. The slab bearing the specimen in convex

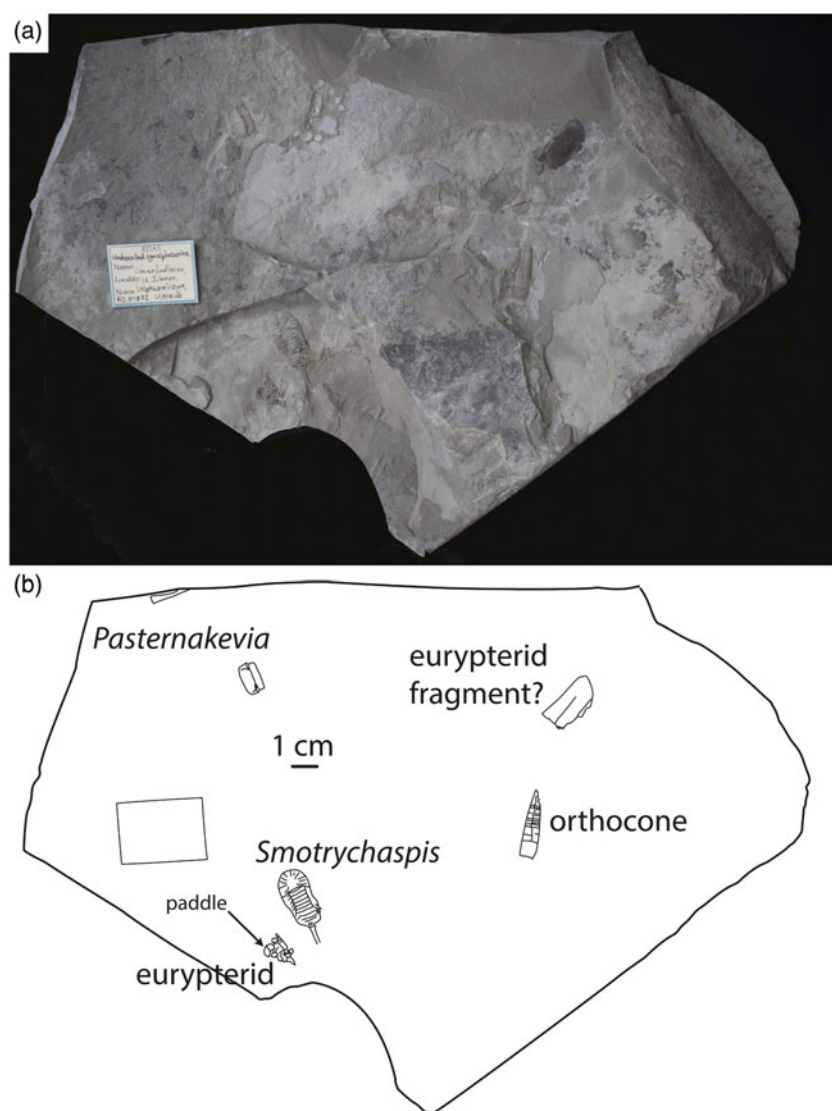


Figure 2. *Smotrychaspis kurtopleurae* gen. et sp. nov. holotype G.2025.2.1. (a) Photograph of entire slab bearing the part. (b) Interpretive drawing of the slab, showing associated fauna.

relief, and showing mainly ventral features of the exoskeleton, is deemed the part (Figures 2 and 3); the slab with the specimen in concave relief, preserving mostly dorsal features, is the counterpart (Figure 4). The larger slab, bearing the part (Figure 2) is some 32 cm at its widest, by 21 cm. Numerous other faunal elements are present on the slab, including eurypterid fragments, two tergites of *Pasternakevia*, and an orthicon nautiloid (Figure 2).

The external surface of the carapace (the counterpart) is smooth. Both parts and counterparts bear fragments of darker material interpreted as cuticle remnants (shown in grey on Figures 3 and 4). On the counterpart (Figure 4), these remnants lie mainly along the anterior edges of the tergites (where the tergites overlap one another), along the edges of the epimera, and around the edges of the carapace. On the part (Figure 3), cuticle remnants mainly occur on lateral areas of the axial parts of the tergites, parts of the epimera, around the edges of the carapace, at the base of the telson and in radiating lines on the carapace. In some studies (e.g. Lustrì *et al.* 2024a, b), these radiating cuticle traces have been interpreted as appendages. However, no podomeres can be discerned, and it is likely that the traces mark ridges between

concavities on the ventral surface of the carapace, which correspond to the prosomal appendages. As such, spaces can be seen for the chelicerae (prosomal appendage I), followed by five corresponding to post-cheliceral appendages (II–VI).

The anterior and lateral margins of the carapace form a continuous, smooth curve, similar to part of an ellipse, which terminates posterolaterally in an acute renal angle. The anterior border of the carapace shows a narrow strip which may be interpreted as the doublure beneath the carapace rim. The posterior border of the carapace is preserved laterally, but the median portion is broken in the fossil, revealing the first opisthosomal tergite beneath. Hence, the border is reconstructed as a smooth recurved shape (Figure 5). Eleven opisthosomal tergites are present, 1–10 slightly overlapping the more posterior on their posterior median border. Laterally, the tergites have epimera developed, which are more prominent and backwardly curved on more posterior tergites, except 11, which is a narrower pretelsonic tergites lacking large epimera. The posterior border of the pretelsonic tergite is procurved around a depressed area, which bears brown cuticle on the (ventral) part (Figure 3). This is

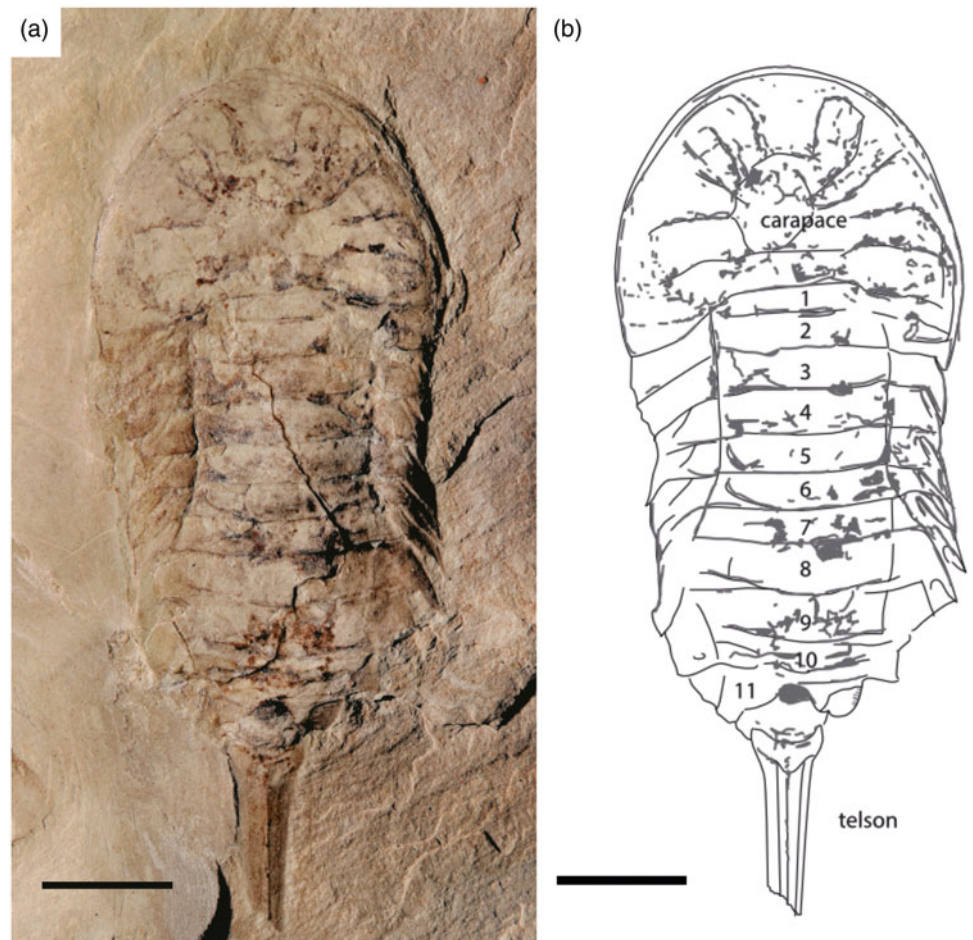


Figure 3. *Smotrychaspis kurtopleurae* gen. et sp. nov. holotype G.2025.2.1. (a) Photograph of part. (b) Interpretive drawing of part. All scale bars = 5 mm. Tergites numbered 1–11.

interpreted as the area where a muscle for operating the telson would be attached. The telson shows a ridge with small nodes on the part (Figure 3), which is presumed to be dorsal because it is in positive relief. The length of the telson is not determinable, but more is preserved on the counterpart.

3.b. Study methods

The specimen was studied using a Leica MZ16 stereomicroscope and photographed with a Canon EOS 5DSR digital camera on the microscope. Photographs were captured using DSLR Assistant (www.dslrassistant.com) running on Mac OS 15, and manipulated in Affinity Photo 2.5 (affinity.serif.com), in dry conditions with low-angle incident light. Several shots at different focus levels were stacked using Focus Merge in Affinity, and several stacks taken across the specimen were merged into a composite using the Panorama tool (see Selden, 2014). Drawings and the reconstruction were made from the photographs using Affinity Designer 2.5 (affinity.serif.com). Measurements were made using Graphic 3.1 (www.graphic.com).

4. Systematic palaeontology

Chelicerata Heymons, 1901

Euchelicerata Weygoldt & Paulus, 1979

Smotrychaspis gen. nov.

Etymology. The genus name comes from the type locality, the Smotrych river, and *-aspis*, a common suffix for synziphosurines, from the Greek ἄσπις, a shield.

Type and only species. *Smotrychaspis kurtopleurae* gen. et sp. nov.

Diagnosis. Euchelicerate with 11 visible tergites, lacking anterior median carapace projection. Carapace horseshoe-shaped in dorsal outline; smooth dorsally, lacking cardiac or ocular ridges; with recurved posterior margin; small, acute genal angles; approximately as wide as long; length $\sim\frac{1}{3}$ of total (exc. telson), $\sim 2\times$ that of opisthosoma. Opisthosoma with subparallel sides from tergites 1 to 9; increasing gape between progressively more falcate epimera posteriorly. Styliform telson $\sim\frac{1}{2}$ length of opisthosoma; stout.

Smotrychaspis kurtopleurae sp. nov.

Diagnosis. As for the genus.

Etymology. The species epithet *kurtopleurae* is derived from the Greek ἄσπις, meaning hooked, and πλευρόν, a rib, with reference to the hooked lateral edges of the posterior pleural segments.

Material, locality, horizon. Specimen G.2025.2.1, part and counterpart, held in the National Museums of Scotland, Edinburgh. Collected from the banks of the Smotrych river, near Velikozalissyia, 48°47'6.71"N 26°32'6.84"E, Podolia, Ukraine. Horizon: uppermost 5–10 m of the Ustyia Formation (Silurian: topmost Wenlock: Homerian to Ludlow: Gorstian; ~ 427 Ma).

Description. Total length inc. telson 36.2, exc. telson 28.1. Carapace horseshoe-shaped in outline, slightly convex dorsally,

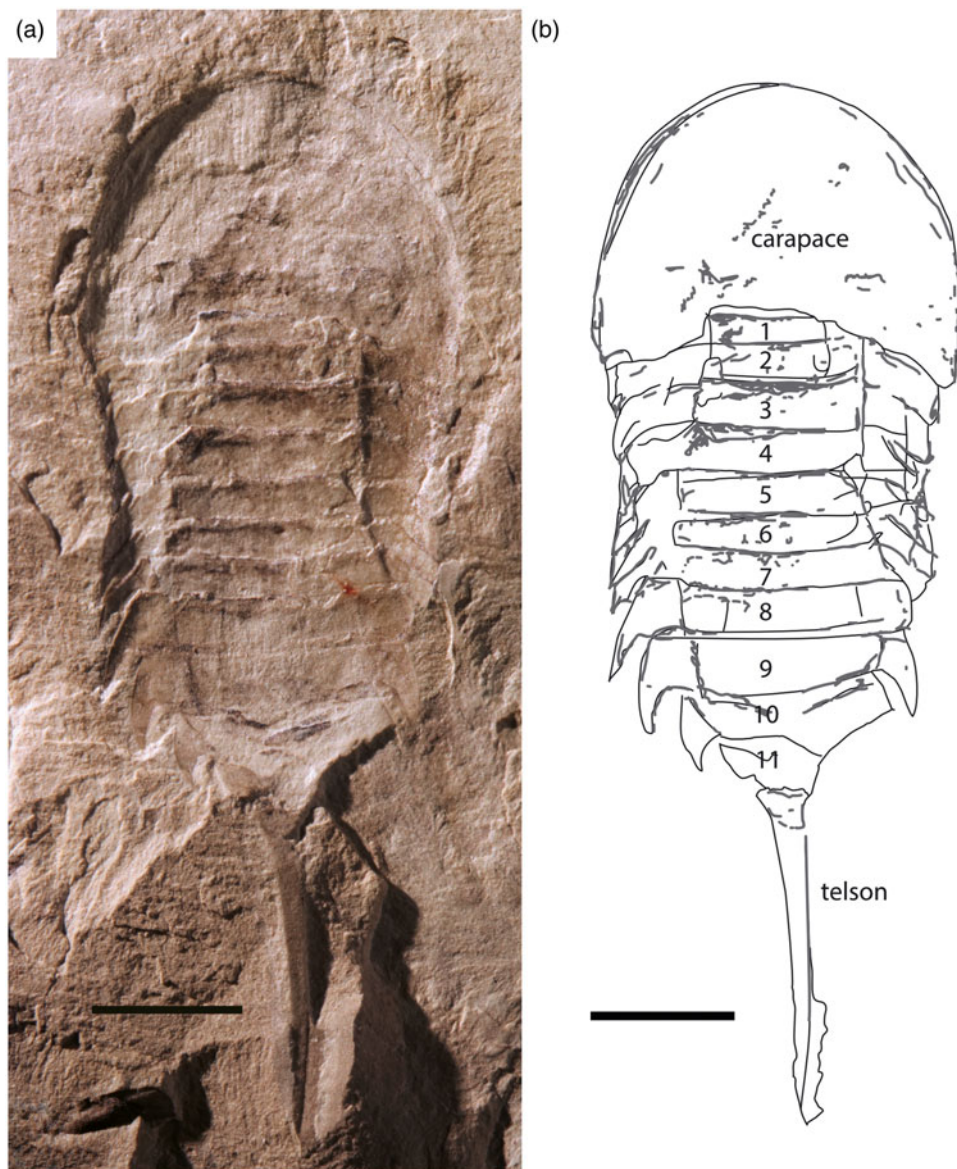


Figure 4. *Smotrychaspis kurtopleurae* gen. et sp. nov. holotype G.2025.2.1. (a) Photograph of counterpart. (b) Interpretive drawing of counterpart. All scale bars = 5 mm. Tergites numbered 1–11.

with somewhat more extended genal angles ($\sim 50^\circ$); anterior margin with narrow doublure, posterior margin recurved, straighter in axial region, lateral parts slightly recurved; total length (inc. genae) 11.0, sagittal length 9.2, maximum width 14.4, posterior width across genae 13.9; L/W ratio 0.66; no visible anterior median projection. Carapace length $\sim \frac{1}{3} \times$ total length of animal (exc. telson). Carapace ventral (interior) surface bearing trace of segment in posterior, axial part, length 1.6, width 5.8. Central part of carapace, immediately anterior to segment trace, bearing trace of subcircular structure, $\sim 3.0 \times 3.0$; lines radiate from this structure at angles of (from posteriormost forward) $\sim 190^\circ$, $\sim 180^\circ$, $\sim 110^\circ$, $\sim 75^\circ$, $\sim 30^\circ$. Anteriormost two lines each joined by a curve at the anterior of the carapace, forming a bilobed structure on either side of the midline.

Opisthosoma parallel parallel-sided over anterior $\sim 80\%$ of length, with axial region and lateral epimera. Total length (exc. telson) 18.8, maximum width 13.2, L/W ratio 1.4, minimum width 12.0, width of axial region 7.4. Eleven visible tergites (I–XI), measurements (sagittal length, axial width, total width): I 1.1, 5.9, 14.0; II 1.6, 7.1, 13.4; III 1.8, 6.9, 12.5; IV 1.8, 6.7, 12.3; V 1.6, 6.9,

11.9; VI 1.5, 7.0, 12.3; VII 1.6, 7.2, 12.5; VIII 1.9, ~ 7.4 , 12.3; IX 2.2, ~ 6.9 , 12.0; X ~ 1.7 , 6.2, 10.3; XI 2.0, ~ 4.5 , 7.1. Division line between axial and pleural regions of tergites is parallel for anterior 5 tergites, then diverges on tergites 6–7, where it ends. More posterior tergites are longer and lack clear division between axial and pleural regions. Epimera become more posteriorly curved and pointed posteriorly; those on tergites IV–IX bear a groove along their lengths. Telson length > 9.4 , width at base 2.7.

4. Discussion

4.a. Identity of the new taxon

Synziphosurines, previously considered to be the stem group of the Xiphosurida (Anderson & Selden, 1997), have since been shown to form a polyphyletic group of chelicerate arthropods composed of various basal euchelicerates (i.e. Chelicerata excluding Pycnogonida) (Lamsdell, 2013). In Lamsdell's (2013) analysis, the Herefordshire Lagerstätte euchelicerates *Offacolus* Orr *et al.* 2000 and *Dibasterium* (= family Offacolidae Sutton *et al.* 2002),

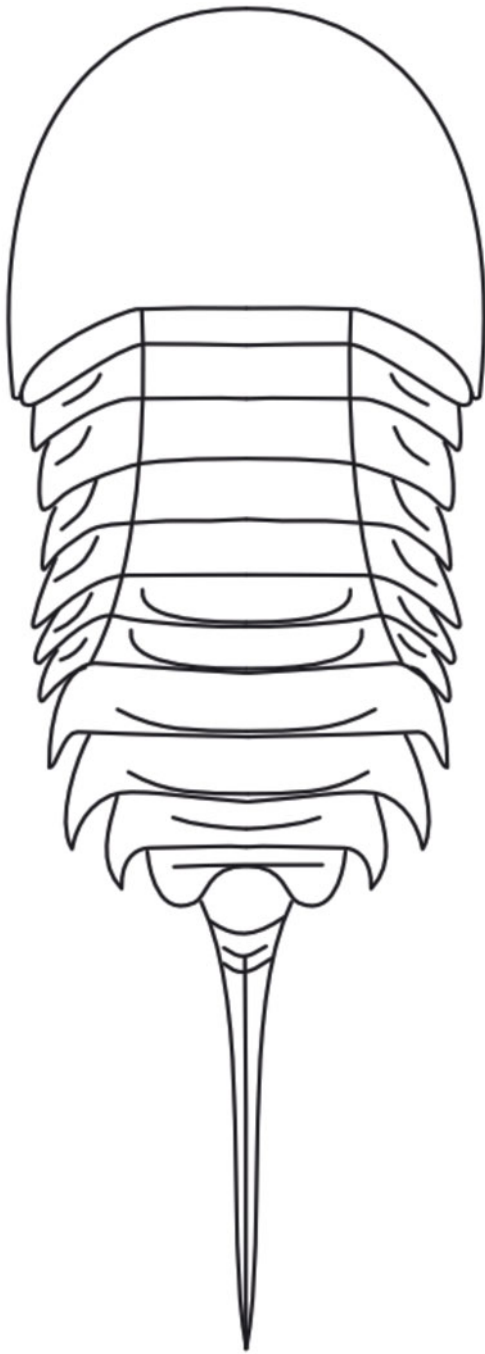


Figure 5. *Smotrychaspis kurtopleurae* gen. et sp. nov. Reconstruction.

which show biramous appendages, are resolved as sister to all other euchelicerates, the Prosomapoda Lamsdell, 2013. Within Prosomapoda, Xiphosura *sensu stricto* forms a sister group to Planaterga Lamsdell, 2013, consisting of the bunodid and pseudoniscid synziphosurines, as well as a group called Dekatriata Lamsdell, 2013, which includes chasmataspidids, eurypterids and arachnids. Also in Prosomapoda is a stem group of other synziphosurines, e.g. *Camanchia* Moore *et al.* 2011, *Legrandella* Eldredge, 1974, *Venustulus* Moore, in Moore *et al.* 2005, and *Weinbergina* Richter and Richter, 1929. The relationships proposed by Lamsdell (2013) are well expressed in a stratigraphic context in Figure 3 of Garwood and Dunlop (2023). More recently, Lustri *et al.* (2024b) described a new

synziphosurine, *Setapedites* Lustri *et al.* 2024b, from the Ordovician Fezouata biota, as a member of the basal euchelicerate Offacolidae, and Lustri *et al.* (2024a) redescribed the Silurian synziphosurine *Bunaia woodwardi* Clarke, 1919 from new material, also placing it in Offacolidae. This family is diagnosed mainly on appendage morphology (e.g. biramous prosomal appendages) and a bifurcate tip to the telson (Sutton *et al.* 2002; Lustri *et al.* 2024b). Thus, at present, synziphosurines occur as stem taxa in three places in the euchelicerate tree: sister to all Prosomapoda (Offacolidae), stem to Xiphosura + Planaterga and within Planaterga as stem to Dekatriata (see Garwood & Dunlop, 2023: Figure 3).

Smotrychaspis lacks the buckler of chasmataspidids and the distinct division of the opisthosoma into mesosoma and metasoma of eurypterids; hence, it can be excluded from Dekatriata Lamsdell, 2013. Xiphosura *sensu stricto* are characterised by cardiac lobes and ridges on the proximal shield, which are lacking in the new genus. Among the polyphyletic synziphosurines, few show the smooth carapace, lack of opisthosomal differentiation and lack of dorsal tuberculation as shown by the new taxon. *Smotrychaspis* lacks the axial nodes which characterise the more basal synziphosurines, such as *Weinbergina* and *Legrandella* (Lamsdell, 2013). The new genus mainly resembles the pseudoniscines such as *Cyamocephalus* and *Pseudoniscus*. These taxa show a smooth carapace, approximately equal in length and width, with small genal angles, an opisthosoma not narrowing rapidly posteriorly, and with increasing lateral gape between the epimera posteriorly (Lamsdell, 2013).

4.a.1. Pseudoniscidae

Two genera, *Cyamocephalus* and *Pseudoniscus*, are included in the family Pseudoniscidae (Anderson, 1999). Note that, in their horseshoe crab atlas, Bicknell and Pates (2020: Figure 8) listed *Cyamocephalus* and *Pseudoniscus* as lacking a family assignment, and that, in his most recent phylogenetic analysis, Lamsdell (2025, supplementary figure S1) included pseudoniscids within Bunodidae. The type genus *Pseudoniscus* was described by Nieszkowski (1859) from the famous quarry on Viita Farm, Rootsiküla, Saaremaa, Estonia (in beds of upper Wenlock age), which has yielded abundant eurypterids (*Eurypterus tetragonophthalmus* Fischer, 1839), other synziphosurines (*Bunodes lunula* Eichwald, 1854), fish, etc. (e.g. Märss *et al.* 2014). The type specimen of *Pseudoniscus aculeatus* shows a portion of a smooth carapace, followed by nine segments which become increasingly curved and hastate posteriorly, and terminates in a tail spine (Nieszkowski, 1859: 39–40, pl. II, figure 15). Thus, the type resembles *Smotrychaspis* except that the anterior part of the opisthosoma (where presumably additional tergites may be present) and much of the rest of the carapace is missing. Since the first description of the genus, other species have been added to *Pseudoniscus*: *P. clarkei* Ruedemann, 1916 from Pittsford, New York; *P. falcatus* (Woodward, 1868) from Lesmahagow, Scotland; and *P. roosevelti* Clarke, 1902 from the Bertie Waterlime of New York. Recent photographs of these specimens were published by Bicknell *et al.* (2019: Figure 3–4), in their study of the presence of lateral compound eyes in Palaeozoic horseshoe crabs, and in the horseshoe crab atlas of Bicknell and Pates (2020: Figure 9). The carapace of *Pseudoniscus* is smooth in most species, but *P. falcatus* shows strong cephalic ridges. This species was transferred to *Pseudoniscus* from *Neolimulus* Woodward, 1868 by Bergström (1975), but differs from other members of the genus by this strong relief. Bicknell *et al.* (2019) confirmed the presence of lateral eyes in

P. clarkei, *P. falcatus* and *P. roosevelti*, as well as in *Cyamocephalus loganensis* Currie, 1927, but not in *P. roosevelti*. *Pseudoniscus* species have an undifferentiated opisthosoma of 10 visible tergites, followed by a short telson (Lamsdell, 2013). *Cyamocephalus* was first described by Currie (1927) from the Silurian (Llandovery) of Lesmahagow, Scotland. The type specimen (Bicknell *et al.* 2019: Figure 2C) is preserved as carbonaceous film on the rock matrix, but additional examples (Eldredge & Plotnick, 1974: Figure 2; Anderson, 1999: Figure 1) are preserved in relief. A characteristic feature of *Cyamocephalus* is the apparent fusion of opisthosomal tergites 6 and 7 (Anderson, 1999).

Smotrychaspis would fit into Pseudoniscidae except that it lacks a median anterior projection on the carapace (present in most *Pseudoniscus* spp.), there is no fusion of opisthosomal tergites (seen in *Cyamocephalus*) but, more importantly, it bears 11 visible tergites while pseudoniscids show only 10.

4.a.2. Offacolidae

Offacolus, from the Herefordshire Lagerstätte, was described as a euchelicerate and placed in the new family Offacolidae by Sutton *et al.* (2002). Their analysis placed the family within Chelicerata in a more derived position than *Weinbergina* (one of the few synziphosurines with appendages preserved). The analysis of Lamsdell (2013) placed *Offacolus* (along with *Dibasterium*, described in the same year) as basal euchelicerates, sister to all others (Prosomapoda). Members of Offacolidae are diagnosed on their elongate chelicerae; at least second to fifth prosomal appendage pairs being biramous; seventh pair of appendages uniramous and lobate, paddle-like, fringed by lateral spines; and tip of the telson bifurcate (Lustri *et al.* 2024b). Lustri *et al.* (2024b) added the new genus *Setapedites* to the Offacolidae, and Lustri *et al.* (2024a) transferred *Bunaia woodwardi* to the family. Note that another *Bunaia* species, *B. heintzi* Størmer, 1934, consists of a single carapace quite unlike that of the type species, so it was excluded informally from the genus by Eldredge (1974). Both *Setapedites* and *Bunaia woodwardi* were placed in Offacolidae on the basis of their biramous prosomal appendages and bifurcate telson tip.

Smotrychaspis differs from members of Offacolidae in that its opisthosoma is rather longer, has a narrower axial region, and remains quite wide towards the posterior than in offacolids. See, for example, Sutton *et al.* (2002, Figure 1: *Offacolus*), Briggs *et al.* (2012, Figure 1: *Dibasterium*), Lustri *et al.* (2024b, Figure 1: *Setapedites*) and Lustri *et al.* (2024a, Figure 1: *Bunaia woodwardi*).

It is interesting to mention here that *Bunaia woodwardi* was suggested as a possible synonym of *Pseudoniscus clarkei* (both are from the Bertie Waterlime) by Eldredge (1974: 31). Furthermore, Eldredge (1974) also suggested that *P. clarkei* might be a junior synonym of *P. roosevelti* (also Bertie Waterlime). Thus, all of these animals were considered somewhat similar in morphology until Lustri *et al.* (2024a) redescribed *Bunaia woodwardi*, based on new material, and discovered that it possessed not only biramous appendages but also 11 opisthosomal tergites. Hence, these authors moved *B. woodwardi* from the pseudoniscines to the basal Offacolidae.

Smotrychaspis is in a rather similar situation: it resembles pseudoniscids but possesses 11 visible opisthosomal tergites. The material to hand does not preserve appendages, so we cannot know whether its prosomal appendages are biramous. Hence, it is not possible to place *Smotrychaspis* into a lower taxon than Euchelicerata, though it is clearly a synziphosurine of some kind. Two features of *Smotrychaspis* make it stand out from other pseudoniscid/bunodid synziphosurines. (1) The axis of

Smotrychaspis does not taper posteriorly until very close to the base of the telson. Indeed, the large, falcate epimera on the posterior opisthosomal tergites (8 and 9 in particular) increase the opisthosomal width in this region (Figure 3–4). Moreover, tergites 8 and 9 are somewhat longer than the more anterior ones. In this respect, *Smotrychaspis* somewhat resembles *Cyamocephalus* (see, e.g. Anderson, 1999), which shows curved epimera on the posterior three tergites, following fused tergites 6 and 7. However, the opisthosomal width decreases normally in this animal, and the fused tergites are different from the larger ones in *Smotrychaspis*. (2) The base of the telson of *Smotrychaspis* is relatively stout compared with other synziphosurines. The large muscle-attachment area on the pretelsonic tergite probably reflects this more powerful telson.

5. Conclusions

The new synziphosurine described here increases the known diversity of arthropods from the Silurian eurypterid-bearing strata of Podolia. Several other new forms have been collected (Polypenko pers. comm) and are yet to be described. Once this fauna is more fully documented, comparisons with other Silurian eurypterid-bearing EPBs, in Europe and North America, will be fruitful.

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