**FA000-Fossils-US-NY-**Eurypterus remipes**-Silurian-443.7 to 416.o mya**



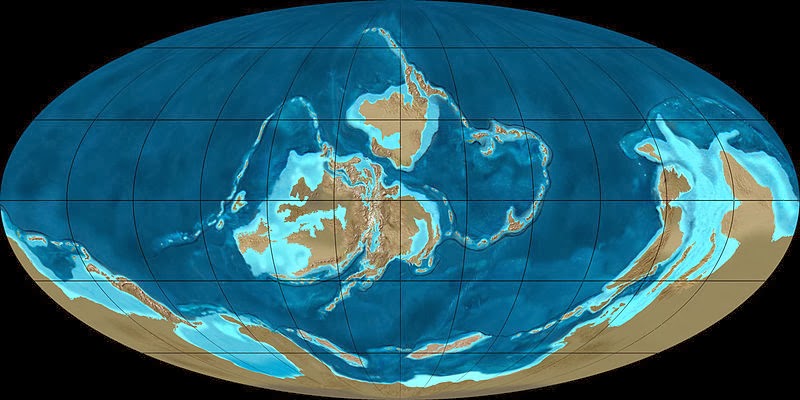
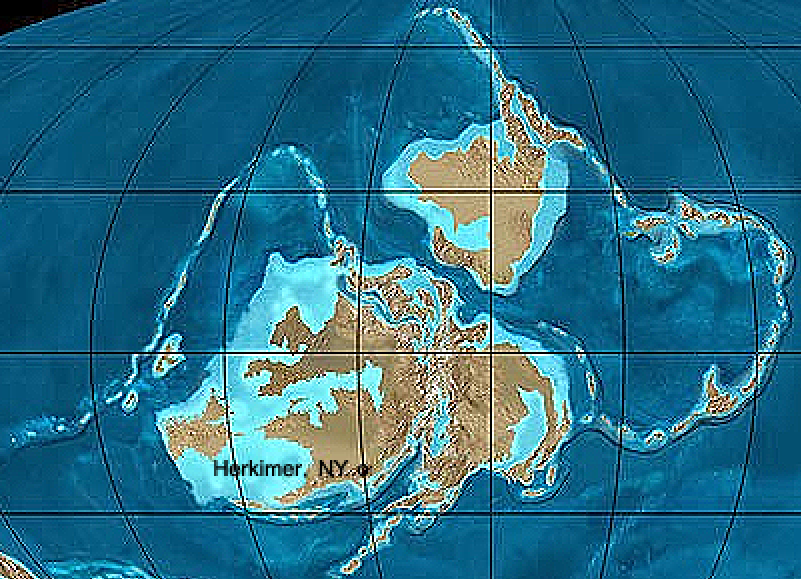
© G. Paselk  
Artist’s depiction of Silurian animals, including, from left: bryozoans, crinoids, clams, cephalopod, jelly, sea scorpion (Pterygotus), brachiopod, jawless fish (Birkenia), gastropod shell, brittle star, trilobite, bivalve mollusk, sponges, sea star.

The Silurian (named by Murchison in 1839 for the Silures, a tribe of the Welch borderland) lasted about 28 million years. There was a rapid recovery of biodiversity after the great extinction event at the end of the Ordovician.  A warm climate and high sea level gave rise to large reefs in shallow equatorial seas. Tabulate corals and stromatoporid sponges were the main builders of these first coral based reefs, but rugose corals and recepticulite algae also contributed.  Invertebrates remained dominant because vertebrates were relatively rare. Sea scorpions (euryptids) reached their maximum diversity. These predators were commonly 5–9 inches long, (see the Eurypterus remipes in “Case Fossils”) but could be as large as 4.3 feet.

Mollusks, bryozoans, and especially brachiopods flourished, but trilobites and graptolites were on the decline. Invertebrates remained dominant, vertebrate fossils are rare. Fish with moveable jaws appear, and the first bony fish (osteichthyans) evolved. Fishes and some invertebrate groups, such as eurypterids, invaded freshwater habitats during the Silurian period.

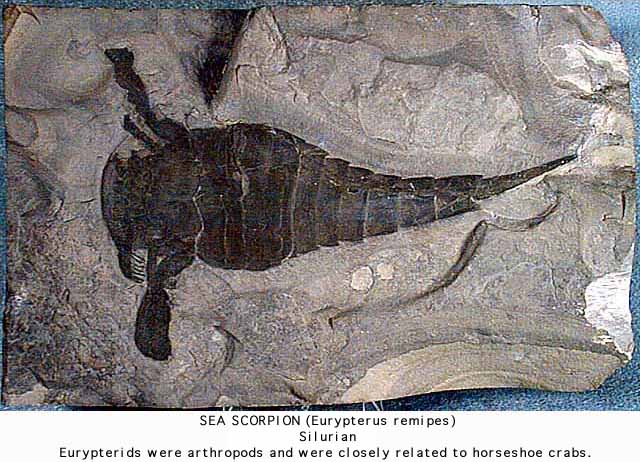
Simple vascular plants emerged on land with moss forests growing along streambeds and lakeshores. The Silurian is the first period with fossils of extensive non-microscopic life on land. Land fauna included spider-like and millipede-like predators, in addition to herbivorous (live plant) and/or detritus feeders.

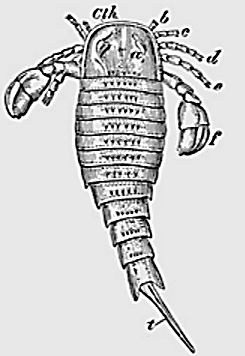
During the Silurian period Earth's continents joined together, closing the Iapetus Ocean and forming two supercontinents: Laurasia in the north, and Gondwanaland to the south. The South American and southern African Gondwana plates moved slowly toward and then over the South Pole. At the same time the northern continents moved together and began forming Laurasia. Glaciers retreated and nearly disappeared as continental warming began. Much of the equatorial land mass was covered by warm shallow seas. There were dramatic worldwide sea-level changes and oceanic turnovers (exchanges of bottom waters and surface waters) resulting in a moderate level of extinctions during the Period. The Silurian ended with a series of relatively minor extinction events linked to climate change.

\

**Eurypterus remipes-Sea Scorpion-Herkimer, NY-Upper Silurian**







***Eurypterus*** ([/jʊəˈrɪptərəs/](https://en.wikipedia.org/wiki/Help:IPA/English) *[yoo-RIP-tər-əs](https://en.wikipedia.org/wiki/Help:Pronunciation_respelling_key" \o "Help:Pronunciation respelling key)*) is an extinct [genus](https://en.wikipedia.org/wiki/Genus) of [eurypterid](https://en.wikipedia.org/wiki/Eurypterid), a group of organisms commonly called "sea scorpions". The genus lived during the [Silurian](https://en.wikipedia.org/wiki/Silurian) period, from around 432 to 418 million years ago. *Eurypterus* is by far the most well-studied and well-known [eurypterid](https://en.wikipedia.org/wiki/Eurypterid) and its fossil specimens probably represent more than 90% of all known eurypterid specimens.[[2]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-tetlie2007-2)

There are fifteen species belonging to the genus *Eurypterus*, the most common of which is *Eurypterus remipes*, the first [eurypterid](https://en.wikipedia.org/wiki/Eurypterid) [fossil](https://en.wikipedia.org/wiki/Fossil) discovered and the [state fossil](https://en.wikipedia.org/wiki/List_of_U.S._state_fossils) of [New York](https://en.wikipedia.org/wiki/New_York_(state)).

Members of *Eurypterus* averaged at about 13 to 23 cm (5 to 9 in) in length, but the largest individual discovered was 1.3 m (4.3 ft) long. They all possessed spine-bearing appendages and a large paddle they used for swimming. They were [generalist species](https://en.wikipedia.org/wiki/Generalist_and_specialist_species), equally likely to engage in [predation](https://en.wikipedia.org/wiki/Predation) or [scavenging](https://en.wikipedia.org/wiki/Scavenging).

in 1825, that the [American](https://en.wikipedia.org/wiki/American_people) [zoologist](https://en.wikipedia.org/wiki/Zoologist) [James Ellsworth De Kay](https://en.wikipedia.org/wiki/James_Ellsworth_De_Kay) identified the fossil correctly as an [arthropod](https://en.wikipedia.org/wiki/Arthropod).[[6]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-waering-6) He named it *Eurypterus remipes* and established the genus *Eurypterus* in the process. The name means "wide wing" or "broad paddle", referring to the swimming legs, from [Greek](https://en.wikipedia.org/wiki/Greek_language) εὐρύς (*eurús*, wide) and πτερόν (*pteron*, wing).[[3]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-nudds-3)

However, De Kay thought *Eurypterus* was a [branchiopod](https://en.wikipedia.org/wiki/Branchiopoda) (a group of [crustaceans](https://en.wikipedia.org/wiki/Crustacean) which include [fairy shrimps](https://en.wikipedia.org/wiki/Anostraca) and [water fleas](https://en.wikipedia.org/wiki/Cladocera)).[[6]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-waering-6) Soon after, *Eurypterus lacustris* was also discovered in New York in 1835 by the [paleontologist](https://en.wikipedia.org/wiki/Paleontologist) [Richard Harlan](https://en.wikipedia.org/wiki/Richard_Harlan). Another species was discovered in [Estonia](https://en.wikipedia.org/wiki/Estonia) in 1858 by [Jan Nieszkowski](https://en.wikipedia.org/w/index.php?title=Jan_Nieszkowski&action=edit&redlink=1). He considered it to be of the same species as the first discovery (*E. remipes*); it is now known as *Eurypterus tetragonophthalmus*.[[3]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-nudds-3) These specimens from Estonia are often of extraordinary quality, retaining the actual [cuticle](https://en.wikipedia.org/wiki/Cuticle) of their exoskeletons. In 1898, the [Swedish](https://en.wikipedia.org/wiki/Swedish_people) paleontologist [Gerhard Holm](https://en.wikipedia.org/w/index.php?title=Gerhard_Holm&action=edit&redlink=1) separated these fossils from the bedrock with [acids](https://en.wikipedia.org/wiki/Acid). Holm was then able to examine the almost perfectly preserved fragments under a [microscope](https://en.wikipedia.org/wiki/Microscope). His remarkable study led to the modern breakthrough on eurypterid [morphology](https://en.wikipedia.org/wiki/Morphology_(biology)).[[4]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-madrid-4)

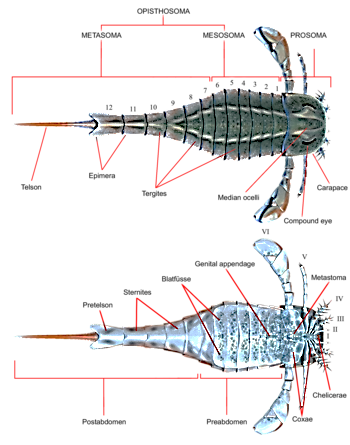
More fossils were recovered in great abundance in New York in the 19th century, and elsewhere in eastern [Eurasia](https://en.wikipedia.org/wiki/Eurasia) and [North America](https://en.wikipedia.org/wiki/North_America). Today, *Eurypterus* remains one of the most commonly found and best known [eurypterid](https://en.wikipedia.org/wiki/Eurypterid) genera, comprising more than 95% of all known eurypterid fossils.[[7]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dist-7)

The genus *Eurypterus* belongs to the [family](https://en.wikipedia.org/wiki/Family_(biology)) [Eurypteridae](https://en.wikipedia.org/wiki/Eurypteridae" \o "Eurypteridae). They are classified under the [superfamily](https://en.wikipedia.org/wiki/Superfamily_(zoology)) [Eurypteroidea](https://en.wikipedia.org/wiki/Eurypteroidea), [suborder](https://en.wikipedia.org/wiki/Suborder) [Eurypterina](https://en.wikipedia.org/wiki/Eurypterina), [order](https://en.wikipedia.org/wiki/Order_(biology))[Eurypterida](https://en.wikipedia.org/wiki/Eurypterida), and the [subphylum](https://en.wikipedia.org/wiki/Subphylum) [Chelicerata](https://en.wikipedia.org/wiki/Chelicerata" \o "Chelicerata).[[8]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlop-8) Until recently, [eurypterids](https://en.wikipedia.org/wiki/Eurypterid" \o "Eurypterid)were thought to belong to the [class](https://en.wikipedia.org/wiki/Class_(biology)) Merostomata along with order [Xiphosura](https://en.wikipedia.org/wiki/Xiphosura" \o "Xiphosura). It is now believed that eurypterids are a [sister group](https://en.wikipedia.org/wiki/Sister_group) to [Arachnida](https://en.wikipedia.org/wiki/Arachnida), closer to [scorpions](https://en.wikipedia.org/wiki/Scorpion) and [spiders](https://en.wikipedia.org/wiki/Spider) than to [horseshoe crabs](https://en.wikipedia.org/wiki/Horseshoe_crab).[[9]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlopwebster-9)[[10]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-weygoldt-10)[[11]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-berkeley-11)

*Eurypterus* was the first recognized [taxon](https://en.wikipedia.org/wiki/Taxon) of eurypterids and is the most common. As a consequence, nearly every remotely similar eurypterid in the 19th century was classified under the genus (except for the distinctive members of the family [Pterygotidae](https://en.wikipedia.org/wiki/Pterygotidae" \o "Pterygotidae) and [Stylonuridae](https://en.wikipedia.org/wiki/Stylonuridae" \o "Stylonuridae)). The genus was eventually split into several genera as the science of [taxonomy](https://en.wikipedia.org/wiki/Taxonomy_(biology)) developed.[[6]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-waering-6)

In 1958, several species distinguishable by closer placed eyes and spines on their swimming legs were split off into the separate genus *[Erieopterus](https://en.wikipedia.org/wiki/Erieopterus" \o "Erieopterus)* by Erik Kjellesvig-Waering.[[6]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-waering-6) Another split was proposed by Lief Størmer in 1973 when he reclassified some *Eurypterus* to *Baltoeurypterus* based on the size of some of the last segments of their swimming legs. O. Erik Tetlie in 2006 deemed these differences too insignificant to justify a separate genus. He merged *Baltoeurypterus* back into *Eurypterus*. It is now believed that the minor variations described by Størmer are simply the differences found in adults and juveniles within a species.[[12]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-tollerton-12)

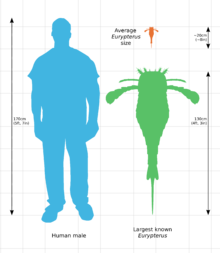
## **Description[**[**edit**](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=3)**]**

[](https://en.wikipedia.org/wiki/File:Eurypterus_anatomy.png)

The largest [arthropods](https://en.wikipedia.org/wiki/Arthropod) to have ever existed were eurypterids. The largest known species (*[Jaekelopterus rhenaniae](https://en.wikipedia.org/wiki/Jaekelopterus_rhenaniae" \o "Jaekelopterus rhenaniae)*) reached up to 2.5 m (8.2 ft) in length, about the size of a crocodile.[[13]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-naturenews-13)Species of *Eurypterus*, however, were much smaller.

*E. remipes* are usually between 13 to 20 cm (5 to 8 in) in length. *E. lacustris* average at larger sizes at 15 to 23 cm (6 to 9 in) in length.[[14]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-size-14) The largest specimen of *E. remipes* ever found was 1.3 m (4.3 ft) long, currently on display at the [Paleontological Research Institution](https://en.wikipedia.org/wiki/Paleontological_Research_Institution)of New York.[[15]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-utexas-15)

*Eurypterus* fossils often occur in similar sizes in a given area. This may be a result of the fossils being 'sorted' into [windrows](https://en.wikipedia.org/wiki/Windrow) as they were being deposited in shallow waters by storms and wave action.

[](https://en.wikipedia.org/wiki/File:Eurypterus_size_comparison.png)

Comparison of an average adult human male (170 cm (5.6 ft)) with the average *Eurypterus remipes* length (around 20 cm (7.9 in)) and the largest known *Eurypterus remipes* fossil (130 cm (4.3 ft)).

The *Eurypterus* body is broadly divided into two parts: the [prosoma](https://en.wikipedia.org/wiki/Prosoma" \o "Prosoma)and the [opisthosoma](https://en.wikipedia.org/wiki/Opisthosoma) (in turn divided into the [mesosoma](https://en.wikipedia.org/wiki/Mesosoma" \o "Mesosoma) and the [metasoma](https://en.wikipedia.org/wiki/Metasoma)).[[3]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-nudds-3)[[16]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-burk-16)

The prosoma is the forward part of the body, it is actually composed of six segments fused together to form the head and the [thorax](https://en.wikipedia.org/wiki/Thorax).[[16]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-burk-16) It contains the semicircular to subrectangular platelike [carapace](https://en.wikipedia.org/wiki/Carapace). On the dorsal side of the latter are two large crescent-shaped [compound eyes](https://en.wikipedia.org/wiki/Compound_eyes).[[17]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-rich-17) They also possessed two smaller light-sensitive [simple eyes](https://en.wikipedia.org/wiki/Simple_eye_in_invertebrates) (the median [ocelli](https://en.wikipedia.org/wiki/Ocelli)) near the center of the carapace on a small elevation (known as the ocellar mound).[[18]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-lamsdell-18) Underneath the carapace is the mouth and six [appendages](https://en.wikipedia.org/wiki/Appendages), usually referred to in [Roman numerals](https://en.wikipedia.org/wiki/Roman_numerals) I-VI. Each appendage in turn is composed of nine segments (known as podomeres) labeled in [Arabic numerals](https://en.wikipedia.org/wiki/Arabic_numerals) 1-9. The first segments which connect the appendages to the body are known as the coxa (plural coxae).[[18]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-lamsdell-18)

The first pair (Appendage I) are the [chelicerae](https://en.wikipedia.org/wiki/Chelicerae), small [pincer](https://en.wikipedia.org/wiki/Pincer_(biology))-like arms used for tearing food apart ([mastication](https://en.wikipedia.org/wiki/Mastication)) during feeding. After the chelicerae are three pairs of short legs (Appendages II, III, and IV). They are [spiniferous](https://en.wikipedia.org/wiki/Spiniferous" \o "Spiniferous), with predominantly two spines on each podomere and with the tipmost segment having a single spine. The last two segments are often indistinguishable and give the appearance of a single segment having three spines.[[12]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-tollerton-12) They are used both for walking and for food capture. The next pair (Appendage V) is the most leg-like of all appendages, longer than the first three pairs and are mostly spineless except at the tipmost segments. The last pair (Appendage VI) are two broad paddle-like legs used for swimming.[[3]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-nudds-3) The coxae of Appendage VI are broad and flat, resembling an 'ear'.[[18]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-lamsdell-18)

The ophisthosoma (the [abdomen](https://en.wikipedia.org/wiki/Abdomen)) is composed of 12 segments, each consisting of a fused upper plate (tergite) and bottom plate (sternite).[[19]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-ea-19) It is further subdivided in two ways.

Based on the width and structure of each segment, they can be divided into the broad preabdomen (segments 1 to 7) and the narrow postabdomen (segments 8 to 12).[[20]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-paleopedia-20) The preabdomen is the broader segments of the anterior portion of the ophisthosoma while the postabdomen are the last five segments of the *Eurypterus body*. Each of the segments of the postabdomen contain lateral flattened protrusions known as the epimera with the exception of the last needle-like (styliform) segment known as the [telson](https://en.wikipedia.org/wiki/Telson" \o "Telson) (the 'tail'). The segment immediately preceding the telson (which also has the largest epimera of the [postabdomen](https://en.wikipedia.org/wiki/Postabdomen" \o "Postabdomen)) is known as the pretelson.[[18]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-lamsdell-18)

An alternative way to divide the ophisthosoma is by function. It can also be divided into the mesosoma (segments 1 to 6), and the metasoma (segments 7 to 12).[[17]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-rich-17)[[18]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-lamsdell-18)[[21]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-plotnick-21) The mesosoma contains the gills and reproductive organs of *Eurypterus*. Its ventral segments are overlaid by appendage-derived plates known as Blatfüsse (singular Blatfuss, [German](https://en.wikipedia.org/wiki/German_language) for "sheet foot"). Protected within which are the branchial chambers which contain the respiratory organs of *Eurypterus*.[[9]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlopwebster-9)[[22]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-resp-22) The metasoma, meanwhile, do not possess Blatfüsse.[[21]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-plotnick-21)

Some authors incorrectly use mesosoma and preabdomen interchangeably, as with metasoma and postabdomen.

The main respiratory organs of *Eurypterus* were what seems to be [book gills](https://en.wikipedia.org/wiki/Book_gills), located in branchial chambers within the segments of the mesosoma. They may have been used for underwater respiration.[[16]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-burk-16) They are composed of several layers of thin tissue stacked in such a way as to resemble the pages of a book, hence the name. In addition, they also possessed five pairs of oval-shaped areas covered with microscopic projections on the ceiling of the second branchial chambers within the mesosoma, immediately below the gill tracts. These areas are known as Kiemenplatten (or gill-tracts, though the former term is preferred). They are unique to eurypterids.[[22]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-resp-22)[[23]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-selden-23)

*Eurypterus* are [sexually dimorphic](https://en.wikipedia.org/wiki/Sexual_dimorphism). On the bottom side of the first two segments of the mesosoma are central appendages used for reproduction. In females, they are long and narrow. In the males they are very short.[[24]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-St%C3%B8rmer-24) A minority of authors, however, assume the reverse: longer genital appendage for males, shorter for females.[[25]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-autec-25)

The [exoskeleton](https://en.wikipedia.org/wiki/Exoskeleton) of *Eurypterus* is often covered with small outgrowths known as ornamentation. They include pustules (small protrusions), [scales](https://en.wikipedia.org/wiki/Scale_(anatomy)), and striations.[[19]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-ea-19) They vary by species and are used for identification. For more detailed diagnostic descriptions of each species under *Eurypterus*, see [sections below](https://en.wikipedia.org/wiki/Eurypterus#Species).[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

## **Distribution and geologic time range[**[**edit**](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=4)**]**

Members of *Eurypterus* existed for a relatively short time, yet they are the most abundant eurypterids found today.[[7]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dist-7) They flourished between the Late [Llandovery](https://en.wikipedia.org/wiki/Llandovery_epoch#Llandovery) [epoch](https://en.wikipedia.org/wiki/Epoch_(geology)) (around 432 million years ago) to sometime during the [Přídolí](https://en.wikipedia.org/wiki/P%C5%99%C3%ADdol%C3%AD_epoch" \o "Přídolí epoch) epoch (418.1 million years ago) of the [Silurian](https://en.wikipedia.org/wiki/Silurian) [period](https://en.wikipedia.org/wiki/Period_(geology)). A span of only around 10 to 14 million years.[[1]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-paleodb-1)[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

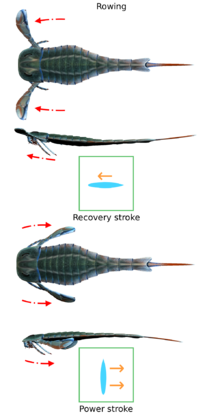
During this period, the landmasses were mostly restricted to the [southern hemisphere](https://en.wikipedia.org/wiki/Southern_hemisphere) of the Earth, with the [supercontinent](https://en.wikipedia.org/wiki/Supercontinent) [Gondwana](https://en.wikipedia.org/wiki/Gondwana" \o "Gondwana) straddling the [South Pole](https://en.wikipedia.org/wiki/South_Pole). The equator had three continents ([Avalonia](https://en.wikipedia.org/wiki/Avalonia), [Baltica](https://en.wikipedia.org/wiki/Baltica" \o "Baltica), and [Laurentia](https://en.wikipedia.org/wiki/Laurentia" \o "Laurentia)) which slowly drifted together to form the second supercontinent of [Laurussia](https://en.wikipedia.org/wiki/Laurussia) (also known as [Euramerica](https://en.wikipedia.org/wiki/Euramerica), not to be confused with [Laurasia](https://en.wikipedia.org/wiki/Laurasia)).[[4]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-madrid-4)

The ancestors of *Eurypterus* were believed to have originated from Baltica (eastern Laurussia, modern western Eurasia) based on the earliest recorded fossils. During the Silurian, they spread to Laurentia (western Laurussia, modern North America) when the two continents began to collide. They rapidly colonized the continent as [invasive species](https://en.wikipedia.org/wiki/Invasive_species), becoming the most dominant eurypterid in the region. This accounts for why they are the most commonly found genus of eurypterids today. *Eurypterus* (and other members of [Eurypteroidea](https://en.wikipedia.org/wiki/Eurypteroidea" \o "Eurypteroidea)), however, were unable to cross vast expanses of [oceans](https://en.wikipedia.org/wiki/Ocean) between the two supercontinents during the Silurian. Their [range](https://en.wikipedia.org/wiki/Range_(biology)" \o "Range (biology))were thus limited to the coastlines and the large, shallow, and [hypersaline](https://en.wikipedia.org/wiki/Salinity" \o "Salinity)inland seas of Laurussia.[[4]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-madrid-4)[[7]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dist-7)

They are now only known from fossils from North America, Europe, and northwestern [Asia](https://en.wikipedia.org/wiki/Asia), [cratons](https://en.wikipedia.org/wiki/Craton) that were the former components of Laurussia. While three species of *Eurypterus* were purportedly discovered in China in 1957, the evidence of them belonging to the genus (or if they were even eurypterids at all) is nonexistent. No other traces of *Eurypterus* in modern continents from Gondwana are currently known.[[7]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dist-7)

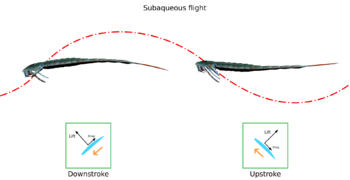
*Eurypterus* are very common fossils in their regions of occurrence, millions of specimens are possible in a given area, though access to the [rock formations](https://en.wikipedia.org/wiki/Formation_(stratigraphy)) may be difficult.[[27]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-lacustris_fauna-27) Most fossil eurypterids are the disjointed shed exoskeleton (known as [exuviae](https://en.wikipedia.org/wiki/Exuvia" \o "Exuvia)) of individuals after molting ([ecdysis](https://en.wikipedia.org/wiki/Ecdysis" \o "Ecdysis)). Some are complete but are most probably exuviae as well. Fossils of the actual remains of eurypterids (i.e. their [carcasses](https://en.wikipedia.org/wiki/Cadaver)) are relatively rare.[[4]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-madrid-4) Fossil eurypterids are often deposited in characteristic windrows, probably a result of wave and wind action.[[28]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-wave-28)

## **Paleobiology and paleoecology[**[**edit**](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=5)**]**

[](https://en.wikipedia.org/wiki/File:Rowing.png)

Rowing in *Eurypterus*.

*Eurypterus* belongs to the suborder Eurypterina, eurypterids in which the sixth appendage had developed a broad swimming paddle remarkably similar to that of the modern-day [swimming crab](https://en.wikipedia.org/wiki/Swimming_crab). Modeling studies on *Eurypterus*swimming behavior suggest that they utilized a drag-based rowing type of locomotion where appendages moved synchronously in near-horizontal planes.[[25]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-autec-25) The paddle blades are almost vertically oriented on the backward and down stroke, pushing the animal forward and lifting it up. The blades are then oriented horizontally on the recovery stroke to slash through the water without pushing the animal back. This type of swimming is exhibited by [crabs](https://en.wikipedia.org/wiki/Crab) and [water beetles](https://en.wikipedia.org/wiki/Water_beetle).[[29]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-merck-29)

[](https://en.wikipedia.org/wiki/File:Subaqueous_flight.png)

Subaqueous flight in *Eurypterus*.

An alternative hypothesis for *Eurypterus*swimming behavior is that individuals were capable of underwater flying (or [subaqueous flight](https://en.wikipedia.org/wiki/Aquatic_locomotion)), in which the sinuous motions and shape of the paddles themselves acting as [hydrofoils](https://en.wikipedia.org/wiki/Hydrofoil) are enough to generate [lift](https://en.wikipedia.org/wiki/Lift_(force)).[[30]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-30) This type is similar to that found in [sea turtles](https://en.wikipedia.org/wiki/Sea_turtle) and [sea lions](https://en.wikipedia.org/wiki/Sea_lion). It has a relatively slower acceleration rate than the rowing type, especially since adults have proportionally smaller paddles than juveniles. But since the larger sizes of adults mean a higher [drag coefficient](https://en.wikipedia.org/wiki/Drag_coefficient), using this type of propulsion is more energy-efficient.[[25]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-autec-25)[[31]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-merck2-31)

Juveniles probably swam using the rowing type, the rapid acceleration afforded by this propulsion is more suited for quickly escaping predators. A small 16.5 cm (6.5 in) *Eurypterus* could achieve two and a half body lengths per second immediately.[[25]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-autec-25) Larger adults, meanwhile, probably swam with the subaqueous flight type. The maximum velocity of adults when cruising would have been 3 to 4 m (9.8 to 13.1 ft) per second, slightly faster than turtles and [sea otters](https://en.wikipedia.org/wiki/Sea_otter).[[31]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-merck2-31)[[32]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-gknight-32)

Trace fossil evidence indicates that *Eurypterus* employed a rowing stroke when in close proximity to the seafloor.[[33]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-33) *[Arcuites bertiensis](https://en.wikipedia.org/wiki/Arcuites" \o "Arcuites)* is an [ichnospecies](https://en.wikipedia.org/wiki/Ichnotaxon) that includes a pair of crescent-shaped impressions and a short medial drag, and it has been found in upper Silurian eurypterid [Lagerstatten](https://en.wikipedia.org/wiki/Lagerst%C3%A4tte" \o "Lagerstätte) in Ontario and Pennsylvania. This trace fossil is very similar to traces made by modern aquatic swimming insects that row such as [water boatmen](https://en.wikipedia.org/wiki/Corixidae), and is considered to have been made by juvenile to adult-sized eurypterids while swimming in very shallow nearshore marine environments. The morphology of [*A. bertiensis*](https://en.wikipedia.org/wiki/Arcuites) suggests that *Eurypterus* had the ability to move its swimming appendages in both the horizontal and vertical plane.

*Eurypterus* did not swim to hunt, rather they simply swam in order to move from one feeding site to another quickly. Most of the time they walked on the substrate with their legs (including their swimming leg). They were [generalist species](https://en.wikipedia.org/wiki/Generalist_and_specialist_species), equally likely to engage in [predation](https://en.wikipedia.org/wiki/Predation) or [scavenging](https://en.wikipedia.org/wiki/Scavenging). They hunted small soft-bodied [invertebrates](https://en.wikipedia.org/wiki/Invertebrate) like worms. They utilized the mass of spines on their front appendages to both kill and hold them while they used their chelicerae to rip off pieces small enough to swallow. Young individuals may also have fallen prey to [cannibalism](https://en.wikipedia.org/wiki/Cannibalism_(zoology)) by larger adults.[[25]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-autec-25)

*Eurypterus* were most probably [marine](https://en.wikipedia.org/wiki/Marine_(ocean)) animals, as their remains are mostly found in intertidal shallow environments. The concentrations of *Eurypterus*fossils in certain sites has been interpreted to be a result of mass mating and molting behavior. Juveniles were likely to have inhabited nearshore hypersaline environments, safer from predators, and moved to deeper waters as they grew older and larger. Adults that reach sexual maturity would then [migrate](https://en.wikipedia.org/wiki/Animal_migration) en masse to shore areas in order to mate, lay eggs, and molt. Activities that would have made them more vulnerable to predators. This could also explain why the vast majority of fossils found in such sites are molts and not of actual animals. The same behavior can be seen in modern [horseshoe crabs](https://en.wikipedia.org/wiki/Horseshoe_crabs).[[16]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-burk-16)

### Respiration[[edit](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=6)]

Examinations of the [respiratory systems](https://en.wikipedia.org/wiki/Respiratory_system) of *Eurypterus* have led many paleontologists to conclude that it was capable of breathing air and walking on land for a short amount of time. *Eurypterus* had two types of respiratory systems. Its main organs for breathing were the book gills inside the segments of the mesosoma. These structures were supported by semicircular 'ribs' and were probably attached near the center of the body, similar to the gills of modern horseshoe crabs.[[22]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-resp-22) They were protected under platelike appendages (which actually formed the apparent 'belly' of *Eurypterus*) known as Blatfüsse.[[34]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-seldenjeram-34) These gills may have also played a role in [osmoregulation](https://en.wikipedia.org/wiki/Osmoregulation).[[25]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-autec-25)

The second system are the Kiemenplatten, also referred to as gill-tracts. These oval-shaped areas within the body wall of the preabdomen. Their surfaces are covered with numerous small spines arranged into hexagonal 'rosettes'. These areas were [vascularized](https://en.wikipedia.org/wiki/Vascularized), hence the conclusion that they were secondary breathing organs.[[23]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-selden-23)

The function of the book gills are usually interpreted to be for aquatic breathing, while the Kiemenplatten are supplementary for temporary breathing on land.[[22]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-resp-22) However, some authors have argued that the two systems alone could not have supported an organism the size of *Eurypterus*. Both structures might actually have been for breathing air and the true gills (for underwater breathing) of *Eurypterus* have yet to be discovered.[[23]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-selden-23)[[34]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-seldenjeram-34)*Eurypterus*, however, were undoubtedly primarily aquatic.[[34]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-seldenjeram-34)

### Ontogeny[[edit](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=7)]

Juvenile *Eurypterus* differed from adults in several ways. Their carapaces were narrower and longer ([parabolic](https://en.wikipedia.org/wiki/Parabola)) in contrast to the [trapezoidal](https://en.wikipedia.org/wiki/Trapezoid" \o "Trapezoid)carapaces of adults. The eyes are aligned almost laterally but move to a more anterior location during growth. The preabdomen also lengthened, increasing the overall length of the ophisthosoma. The swimming legs also became narrower and the telsons shorter and broader (though in *E. tetragonophthalmus* and *E. henningsmoeni* the telsons changed from being angular in juveniles to larger and more rounded in adults). All these changes are believed to be a result of the respiratory and reproductive requirements of adults.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

## **Species[**[**edit**](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=8)**]**

[](https://en.wikipedia.org/wiki/File:Eurypterus_Smithsonian.jpg)

*Eurypterus* reconstruction exhibited in the [Smithsonian National Museum of Natural History](https://en.wikipedia.org/wiki/Smithsonian_National_Museum_of_Natural_History) Hall of Fossils.

[](https://en.wikipedia.org/wiki/File:Eurypterus_remipes_001.jpg)

*Eurypterus remipes* from the [State Museum of Natural History Karlsruhe](https://en.wikipedia.org/wiki/State_Museum_of_Natural_History_Karlsruhe), Germany.

[](https://en.wikipedia.org/wiki/File:Eurypterus.jpg)

*Eurypterus lacustris* from the [Muséum national d'histoire naturelle](https://en.wikipedia.org/wiki/Mus%C3%A9um_national_d%27histoire_naturelle), France.

[](https://en.wikipedia.org/wiki/File:Eurypterus_dekayi_Exhibit_Museum_of_Natural_History.JPG)

*Eurypterus dekayi* from the [University of Michigan Exhibit Museum of Natural History](https://en.wikipedia.org/wiki/University_of_Michigan_Exhibit_Museum_of_Natural_History), [Michigan](https://en.wikipedia.org/wiki/Michigan).

[](https://en.wikipedia.org/wiki/File:Eurypterus_tetragonophthalmus_-_Amherst_College_Museum_of_Natural_History.jpg)

*Eurypterus tetragonophthalmus*from the [Amherst College Museum of Natural History](https://en.wikipedia.org/wiki/Amherst_College_Museum_of_Natural_History), [Massachusetts](https://en.wikipedia.org/wiki/Massachusetts).

Species belonging to the genus, their diagnostic descriptions, [synonyms](https://en.wikipedia.org/wiki/Synonym_(biology)) (if present), and [distribution](https://en.wikipedia.org/wiki/Range_(biology)) are as follows:[[8]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlop-8)

***Eurypterus*** De Kay, 1825

* ?***Eurypterus cephalaspis***Salter, 1856 – Silurian, England

Uncertain placement. Only 3 of the specimens described in 1856 are probably *Eurypterus*, the rest probably belonged to [Hughmilleriidae](https://en.wikipedia.org/wiki/Hughmilleriidae" \o "Hughmilleriidae). Its name means "shield head", from Greek [κεφαλή](https://en.wiktionary.org/wiki/%CE%BA%CE%B5%CF%86%CE%B1%CE%BB%CE%AE" \o "wikt:κεφαλή)(*kephalē*, head), and [ἀσπίς](https://en.wiktionary.org/wiki/%E1%BC%80%CF%83%CF%80%CE%AF%CF%82" \o "wikt:ἀσπίς)(*aspis*, shield or bowl). Specimens recovered from [Herefordshire](https://en.wikipedia.org/wiki/Herefordshire), England.[[8]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlop-8)[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus dekayi*** Hall, 1859 – Silurian, United States & Canada

No raised scales on the posterior margin of the carapace or of the three front-most tergites. The rest of the tergites each have four raised scales. Four to six spines on each podomere of Appendages III and IV. Pretelson has large, rounded epimera without ornamentation on the margins. The species is very similar to *E. laculatus*. The species is named after [James Ellsworth De Kay](https://en.wikipedia.org/wiki/James_Ellsworth_De_Kay). Specimens recovered from [New York](https://en.wikipedia.org/wiki/New_York_(state)) and [Ontario](https://en.wikipedia.org/wiki/Ontario).[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus flintstonensis***Swartz, 1923 – Silurian, USA

Probably a [synonym](https://en.wikipedia.org/wiki/Synonym_(biology)) of *E. remipes* or *E. lacustris*. Probably named after [Flintstone, Georgia](https://en.wikipedia.org/wiki/Flintstone,_Georgia) (?). Specimen recovered from eastern United States.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus hankeni*** Tetlie, 2006– Silurian, Norway

Small *Eurypterus* species, averaging at 10 to 15 centimetres (3.9 to 5.9 in) long. The largest specimen found is about 20 to 25 centimetres (7.9 to 9.8 in) in length. They can be distinguished by pustules and six scales at the rear margin of their carapaces. Appendages I to IV has two spines on each podomere. The postabdomen have small epimera. The pretelson has long pointed epimera. Telson has striations near its attachment to the pretelson. The species is named after [Norwegian](https://en.wikipedia.org/wiki/Norwegian_people" \o "Norwegian people)paleontologist Nils-Martin Hanken, of the [University of Tromsø](https://en.wikipedia.org/wiki/University_of_Troms%C3%B8). Found in the [Steinsfjorden Formation](https://en.wikipedia.org/wiki/Steinsfjorden_Formation" \o "Steinsfjorden Formation) of [Ringerike](https://en.wikipedia.org/wiki/Ringerike_(traditional_district)" \o "Ringerike (traditional district)), Norway.[[8]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlop-8)[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus henningsmoeni*** Tetlie, 2002 – Silurian, Norway

*Eurypterus* with broad paddles and metastoma. Postabdomen has small epimera. Pretelson has large rounded epimera with imbricate scales (overlapping, similar to fish scales). It is very similar and closely related to *E. tetragonophthalmus*. The species was named after the Norwegian paleontologist [Gunnar Henningsmoen](https://en.wikipedia.org/wiki/Gunnar_Henningsmoen). Found in [Bærum](https://en.wikipedia.org/wiki/B%C3%A6rum" \o "Bærum), Norway.[[8]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlop-8)[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus laculatus*** Kjellesvig-Waering, 1958 – Silurian, USA & Canada

The visual area of the compound eyes of this species are surrounded by depressions. The ocelli and the ocellar mound are small. No pustules or raised scales on the carapace or the first tergite. It is probably closely related to *E. dekayi*. Its specific name means "four-cornered", from Latin *laculatus* (four-cornered or checkered). Found in New York and Ontario.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus lacustris*** Harlan, 1834 – Silurian, USA & Canada

= *Eurypterus pachycheirus*Hall, 1859 – Silurian, USA & Canada

= *Eurypterus robustus* Hall, 1859 – Silurian, USA & Canada

One of the two most common *Eurypterus* fossils found. It is very similar to *E. remipes* and often found in the same localities, but the eyes are placed at a more posterior position on the carapace of *E. lacustris*. It is also slightly larger with a slightly narrower metastoma. Its status as a distinct species was once disputed before diagnostic analysis by Tollerton in 1993. Its specific name means "from a lake", from Latin *lacus* (lake). Found in New York and Ontario.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus leopoldi*** Tetlie, 2006 – Silurian, Canada

Frontmost tergite is reduced. Metasoma is rhombiovate in shape with tooth-like projections at the anterior part. The pretelson has serrated edges. the epimera are large, semi-angular with angular striations. The telson is styliform with large angular striations interspersed among smaller more numerous striations. The species is named after [Port Leopold](https://en.wikipedia.org/wiki/Port_Leopold) and the [Leopold Formation](https://en.wikipedia.org/wiki/Leopold_Formation) where they were collected. Found in the Leopold Formation of [Somerset Island](https://en.wikipedia.org/wiki/Somerset_Island_(Nunavut)), Canada.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus megalops*** Clarke & Ruedemann, 1912 – Silurian, USA

Specific name means "large eye", from Greek [μέγας](https://en.wiktionary.org/wiki/%CE%BC%CE%AD%CE%B3%CE%B1%CF%82" \o "wikt:μέγας) (*megas*, big or large) and [ὤψ](https://en.wiktionary.org/wiki/%E1%BD%A4%CF%88" \o "wikt:ὤψ) (*ōps*, eye). Discovered in [New York](https://en.wikipedia.org/wiki/New_York_(state)), United States.[[8]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlop-8)

* ?***Eurypterus minor*** Laurie, 1899 – Silurian, Scotland

Small *Eurypterus* with large pustules on the carapace and abdomen. Does not possess the scale ornamentation found in other species of *Eurypterus*. It is the earliest known species of *Eurypterus*. They have large palpebral lobes (part of "cheeks" of the carapace adjacent to the compound eyes), making it easy to mistake their eyes for being oval. This enlargement is more typical of the genus *[Dolichopterus](https://en.wikipedia.org/wiki/Dolichopterus" \o "Dolichopterus)*and it may actually belong to [Dolichopteridae](https://en.wikipedia.org/wiki/Dolichopteridae" \o "Dolichopteridae).[[7]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dist-7) The specific name means "smaller", from [Latin](https://en.wikipedia.org/wiki/Latin) *minor*. Found in the [Reservoir Formation](https://en.wikipedia.org/w/index.php?title=Reservoir_Formation&action=edit&redlink=1)of [Pentland Hills](https://en.wikipedia.org/wiki/Pentland_Hills" \o "Pentland Hills), Scotland.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus ornatus*** Leutze, 1958 – Silurian, USA

Ornamentation of pustules on the entire surface of the carapace and at least the first tergite. Does not possess raised scales. Its specific name means "adorned", from Latin *ōrnātus* (adorned, ornate). Recovered from [Fayette](https://en.wikipedia.org/wiki/Fayette,_Ohio), [Ohio](https://en.wikipedia.org/wiki/Ohio).[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus pittsfordensis*** Sarle, 1903 – Silurian, USA

The posterior margin of the carapace has three raised scales. Apendages II to IV has two spines per podomere. The metastoma is rhomboid in shape with a deep notch at the front part. The postabdomen has serrated fringes at the middle with small angular epimera at the sides. The pretelson has large, semiangular epimera with angular striations at the margins. The telson is styliform with sparse angular striations at the margins. The name of the species comes from its place of discovery – the [Salina shale](https://en.wikipedia.org/w/index.php?title=Salina_shale&action=edit&redlink=1) formations of [Pittsford](https://en.wikipedia.org/wiki/Pittsford_(town),_New_York), New York.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus quebecensis*** Kjellesvig-Waering, 1958 – Silurian, Canada

Has six raised scales on the posterior margin of the carapace but does not possess pustule ornamentation. It is named after the location it was recovered from – [Quebec](https://en.wikipedia.org/wiki/Quebec), Canada.

* ***Eurypterus remipes*** DeKay, 1825 – Silurian, USA, Canada

= *Carcinosoma trigona* (Ruedemann, 1916) – Silurian, USA

The most common *Eurypterus* species. Has four raised scales at the posterior margin of the carapace. Appendages I to IV has two spines on each podomere. Postabdomen has small epimera. Pretelson has small, semiangular epimera with imbricate scale ornamentation at the margins. The telson has serrated margins along most of its length. It is very similar to *E. lacustris* and can often only be distinguished by the position of the eyes. The specific name means "oar-foot", from [Latin](https://en.wikipedia.org/wiki/Latin) *[rēmus](https://en.wiktionary.org/wiki/remo" \o "wikt:remo)* (oar) and [*pes*](https://en.wiktionary.org/wiki/pes) (foot). Found in New York and Ontario.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus serratus*** (Jones & Woodward, 1888) – Silurian, Sweden

Similar to *E. pittsfordensis* and *E. leopoldi* but can be distinguished by the dense angular striations on their styliform telson. The specific name means "serrated", from Latin *[serrātus](https://en.wiktionary.org/wiki/serratus" \o "wikt:serratus)* (sawn [into pieces]). Originally discovered from [Gotland](https://en.wikipedia.org/wiki/Gotland), Sweden.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

* ***Eurypterus tetragonophthalmus*** Fischer, 1839 – Silurian, [Ukraine](https://en.wikipedia.org/wiki/Ukraine) & [Estonia](https://en.wikipedia.org/wiki/Estonia)

= *Eurypterus fischeri* Eichwald, 1854 – Silurian, Ukraine

= *Eurypterus fischeri*var. *rectangularis* Schmidt, 1883 – Silurian, [Estonia](https://en.wikipedia.org/wiki/Estonia)

Four raised scales on the posterior margin of the carapce. Appendages II to IV each have two spines on each podomere. Postabdomen has small epimera. The pretelson has large, rounded epimera with imbricate scale ornamentation at the margins. Telson has imbricate scale ornamentations at the margins of the base which become serrations towards the tip. The specific name means "four-edged eye", from Greek [τέσσαρες](https://en.wiktionary.org/wiki/tetra-" \o "wikt:tetra-) (*tessares*, four), [γωνία](https://en.wiktionary.org/wiki/%CE%B3%CF%89%CE%BD%CE%AF%CE%B1" \o "wikt:γωνία) (*gōnia*, angle), and [ὀφθαλμός](https://en.wiktionary.org/wiki/ophthalmo-" \o "wikt:ophthalmo-) (*ophthalmos*, eye). Found in the [Rootsiküla Formation](https://en.wikipedia.org/wiki/Rootsik%C3%BCla,_Saare_County" \o "Rootsiküla, Saare County) of [Saaremaa](https://en.wikipedia.org/wiki/Saaremaa) ([Ösel](https://en.wikipedia.org/wiki/Saaremaa" \o "Saaremaa)), [Estonia](https://en.wikipedia.org/wiki/Estonia) with additional discoveries in Ukraine, Norway, and possibly [Moldova](https://en.wikipedia.org/wiki/Moldova) and [Romania](https://en.wikipedia.org/wiki/Romania).[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

The list does not include the large number of fossils previously classified under *Eurypterus*. Most of them are now reclassified to other genera, identified as other animals (like [crustaceans](https://en.wikipedia.org/wiki/Crustacean)) or [pseudofossils](https://en.wikipedia.org/wiki/Pseudofossils" \o "Pseudofossils), or remains of doubtful placement. Classification is based on Dunlop *et al.*(2011).[[8]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-dunlop-8)

## **Phylogeny[**[**edit**](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=9)**]**

The genus *Eurypterus* derives from *E. minor*, the oldest known species from the Llandovery of Scotland. *E. minor* is believed to have diverged from *[Dolichopterus macrocheirus](https://en.wikipedia.org/wiki/Dolichopterus" \o "Dolichopterus)* sometime in the Llandovery.

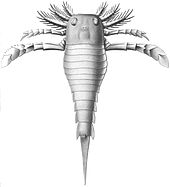
***Dolichopterus*** is a [genus](https://en.wikipedia.org/wiki/Genus) of the [prehistoric](https://en.wikipedia.org/wiki/Prehistoric) [sea scorpions](https://en.wikipedia.org/wiki/Eurypterida), [arthropods](https://en.wikipedia.org/wiki/Arthropod) in the [order](https://en.wikipedia.org/wiki/Order_(biology)) Eurypterida. *Dolichopterus* contains four species, all from the Late Silurian. Three species (*D. jewetti*, *D. macrocheirus* and *D. siluriceps*) have been recovered from [New York](https://en.wikipedia.org/wiki/New_York_(state)), [United States](https://en.wikipedia.org/wiki/United_States) and one (*D. gotlandicus*) has been recovered from [Gotland](https://en.wikipedia.org/wiki/Gotland), [Sweden](https://en.wikipedia.org/wiki/Sweden).[[1]](https://en.wikipedia.org/wiki/Dolichopterus#cite_note-1)



## Contents

* [1 Distribution](https://en.wikipedia.org/wiki/Dolichopterus#Distribution)
* [2 Description](https://en.wikipedia.org/wiki/Dolichopterus#Description)
* [3 References](https://en.wikipedia.org/wiki/Dolichopterus#References)
* [4 See also](https://en.wikipedia.org/wiki/Dolichopterus#See_also)

## Distribution

[](https://en.wikipedia.org/wiki/File:The_Eurypterida_of_New_York_plate_40.jpg)

Restoration of *D. macrocheirus*

It lived in the [Late Silurian](https://en.wikipedia.org/wiki/Late_Silurian) (around [420](http://tools.wmflabs.org/timescale/?Ma=420) million years ago) in [shelf](https://en.wikipedia.org/wiki/Shelf_sea) or [epicontinental seas](https://en.wikipedia.org/wiki/Epicontinental_sea) of the region where [Avalonia](https://en.wikipedia.org/wiki/Avalonia), [Baltica](https://en.wikipedia.org/wiki/Baltica) and [Laurentia](https://en.wikipedia.org/wiki/Laurentia) met during the [Caledonian orogeny](https://en.wikipedia.org/wiki/Caledonian_orogeny); its fossils have been found in modern-day [North America](https://en.wikipedia.org/wiki/North_America) and the [Baltic region](https://en.wikipedia.org/wiki/Baltic_region). They were about 25–30 centimetres (10–12 in) long.

## Description

[Dolichopteridae](https://en.wikipedia.org/wiki/Dolichopteridae), which lived in the Silurian and Devonian periods, had outer surfaces that were either smooth with pustules and semilunar scales. Their compound eyes were arcuate and located anteriorly on the prosoma (head). Their abdomens had epimers (lateral projections). The telson, (tail) was lanceolate. Their chelicerae were small, and the first three pairs of walking lags were stout, with powerful spines. The last pair of walking lags had supplementary lobes, while the swimming lags had the last joint enlarged, as part of the paddle. The male genital appendage was long.[[2]](https://en.wikipedia.org/wiki/Dolichopterus#cite_note-Størmer-2)

*Dolichopterus* is distinguishable by its nearly smooth outer surface; its subquadrate prosoma (head), and the slightly serrated margins on the distal joints and lobes of the swimming legs.[[2]](https://en.wikipedia.org/wiki/Dolichopterus#cite_note-Størmer-2)

## References

 Dunlop, J. A., Penney, D. & Jekel, D. 2015. A summary list of fossil spiders and their relatives. In World Spider Catalog. Natural History Museum Bern, online at http://wsc.nmbe.ch, version 16.0 <http://www.wsc.nmbe.ch/resources/fossils/Fossils16.0.pdf> (PDF).

 L. Størmer (1955). "Merostomata". [*Treatise on Invertebrate Paleontology*](https://en.wikipedia.org/wiki/Treatise_on_Invertebrate_Paleontology), Part P Arthropoda 2, Chelicerata. p. 39. [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [*0-8137-3016-3*](https://en.wikipedia.org/wiki/Special:BookSources/0-8137-3016-3).The following is the [phylogenetic tree](https://en.wikipedia.org/wiki/Phylogenetic_tree) of *Eurypterus* based on [phylogenetic studies](https://en.wikipedia.org/wiki/Phylogeny) by O. Erik Tetlie in 2006. Some species are not represented.[[26]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-eur-26)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ← | |  |  |  | | --- | --- | --- | |  | [Dolichopteridae](https://en.wikipedia.org/wiki/Dolichopteridae) | | |  | |  | |  | | |  |  |  | | --- | --- | --- | |  | *Eurypterus minor* | | |  | |  | |  | | |  |  |  | | --- | --- | --- | |  | *Eurypterus hankeni* | | |  | |  | |  | | *Eurypterus ornatus* | |  | | |  | | *Eurypterus dekayi* | |  | | |  | | *Eurypterus laculatus* | |  | | |  | | |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  | *Eurypterus pittsfordensis* | |  | |  | *Eurypterus leopoldi* | |  | |  | *Eurypterus serratus* | |  | | |  | |  | |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | |  | |  |  | | --- | --- | |  | *Eurypterus remipes* | |  | |  | *Eurypterus lacustris* | |  | | |  | |  | |  |  | | --- | --- | |  | *Eurypterus henningsmoeni* | |  | |  | *Eurypterus tetragonophthalmus* | |  | | |  | | |  | | |  | | |  | | |  | |
|  |

## **In popular culture[**[**edit**](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=10)**]**

*E. remipes* was designated the [New York State Fossil](https://en.wikipedia.org/wiki/List_of_U.S._state_fossils) by the then Governor [Mario Cuomo](https://en.wikipedia.org/wiki/Mario_Cuomo) in 1984.[[35]](https://en.wikipedia.org/wiki/Eurypterus#cite_note-nys-35)

## **See also[**[**edit**](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=11)**]**

* [List of eurypterids](https://en.wikipedia.org/wiki/List_of_eurypterids)

## **References[**[**edit**](https://en.wikipedia.org/w/index.php?title=Eurypterus&action=edit&section=12)**]**

* 1. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-paleodb_1-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-paleodb_1-1) [*"Eurypterus"*](http://paleodb.org/cgi-bin/bridge.pl?a=checkTaxonInfo&taxon_no=18968&is_real_user=1). Paleobiology Database*. Retrieved May 20, 2011*.
  2. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-tetlie2007_2-0) O. Erik Tetlie (2007). [*"Distribution and dispersal history of Eurypterida (Chelicerata)"*](https://web.archive.org/web/20110718202232/http:/fossilinsects.net/pdfs/tetlie_2007_PX3_DistribDispersalEurypterida.pdf) *(PDF)*. *[Palaeogeography, Palaeoclimatology, Palaeoecology](https://en.wikipedia.org/wiki/Palaeogeography,_Palaeoclimatology,_Palaeoecology" \o "Palaeogeography, Palaeoclimatology, Palaeoecology)*. **252** (3–4): 557–574. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1016/j.palaeo.2007.05.011*](https://doi.org/10.1016%2Fj.palaeo.2007.05.011). Archived from [*the original*](http://fossilinsects.net/pdfs/tetlie_2007_PX3_DistribDispersalEurypterida.pdf) *(*[*PDF*](https://en.wikipedia.org/wiki/Portable_Document_Format)*)* on 2011-07-18.
  3. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-nudds_3-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-nudds_3-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-nudds_3-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-nudds_3-3) [***e***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-nudds_3-4) John R. Nudds; Paul Selden (2008). [*Fossil ecosystems of North America: a guide to the sites and their extraordinary biotas*](https://books.google.com/books?id=_z-ca7JAVJIC&lpg=PP1&pg=PA78#v=onepage&q&f=false). Manson Publishing. pp. 74, 78–82. [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [*978-1-84076-088-0*](https://en.wikipedia.org/wiki/Special:BookSources/978-1-84076-088-0).
  4. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-madrid_4-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-madrid_4-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-madrid_4-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-madrid_4-3) [***e***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-madrid_4-4) O.E. Tetlie; I. Rábano (2007). [*"Specimens of Eurypterus(Chelicerata, Eurypterida) in the collections of Museo Geominero (Geological Survey of Spain), Madrid"*](https://web.archive.org/web/20110722131826/http:/www.igme.es/internet/Boletin/2007/118_1_2007/ART.%209.pdf) *(PDF)*. Boletín Geológico y Minero. **118** (1): 117–126. [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*0366-0176*](https://www.worldcat.org/issn/0366-0176). Archived from [*the original*](http://www.igme.es/internet/Boletin/2007/118_1_2007/ART.%209.pdf) *(PDF)* on July 22, 2011*. Retrieved May 22, 2011*.
  5. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-ucmp2_5-0) [*"Eurypterida: Fossil Record"*](http://www.ucmp.berkeley.edu/arthropoda/chelicerata/eurypteridfr.html). University of California Museum of Paleontology*. Retrieved May 21, 2011*.
  6. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-waering_6-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-waering_6-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-waering_6-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-waering_6-3) Erik N. Kjellesvig-Waering (1958). "The genera, species and subspecies of the family Eurypteridae, Burmeister, 1845". Journal of Paleontology. **32** (6): 1107–1148. [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*0022-3360*](https://www.worldcat.org/issn/0022-3360).
  7. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dist_7-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dist_7-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dist_7-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dist_7-3) [***e***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dist_7-4) O. Erik Tetlie (2007). [*"Distribution and dispersal history of Eurypterida (Chelicerata)"*](https://web.archive.org/web/20110718202232/http:/fossilinsects.net/pdfs/tetlie_2007_PX3_DistribDispersalEurypterida.pdf) *(PDF)*. Palaeogeography, Palaeoclimatology, Palaeoecology. **252** (3–4): 557–574. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1016/j.palaeo.2007.05.011*](https://doi.org/10.1016%2Fj.palaeo.2007.05.011). [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*0031-0182*](https://www.worldcat.org/issn/0031-0182). Archived from [*the original*](http://fossilinsects.net/pdfs/tetlie_2007_PX3_DistribDispersalEurypterida.pdf) *(PDF)* on July 18, 2011*. Retrieved May 20, 2011*.
  8. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlop_8-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlop_8-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlop_8-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlop_8-3) [***e***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlop_8-4) [***f***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlop_8-5) [***g***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlop_8-6) Jason A. Dunlop, David Penney, & Denise Jekel; with additional contributions from Lyall I. Anderson, Simon J. Braddy, James C. Lamsdell, Paul A. Selden, & O. Erik Tetlie (2011). [*"A summary list of fossil spiders and their relatives"*](http://research.amnh.org/iz/spiders/catalog/Fossil11.5.pdf) *(PDF)*. In Norman I. Platnick. The world spider catalog, version 11.5. American Museum of Natural History*. Retrieved May 21, 2011*.
  9. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlopwebster_9-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-dunlopwebster_9-1) Jason A. Dunlop; Mark Webster (1999). [*"Fossil Evidence, Terrestrialization and Arachnid Phylogeny"*](http://www.museunacional.ufrj.br/mndi/Aracnologia/pdfliteratura/Dunlop%20&%20Webster%20JOA%201999%20Fossil%20Arach%20terrestrialization.pdf) *(PDF)*. The Journal of Arachnology. **27**: 86–93. [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*0161-8202*](https://www.worldcat.org/issn/0161-8202)*. Retrieved May 23, 2011*.
  10. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-weygoldt_10-0) P. Weygoldt; H. F. Paulus (2009). "Untersuchungen zur Morphologie, Taxonomie und Phylogenie der Chelicerata† II. Cladogramme und die Entfaltung der Chelicerata". Journal of Zoological Systematics and Evolutionary Research. **17** (3): 177–200. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1111/j.1439-0469.1979.tb00699.x*](https://doi.org/10.1111%2Fj.1439-0469.1979.tb00699.x). [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*1439-0469*](https://www.worldcat.org/issn/1439-0469).
  11. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-berkeley_11-0) [*"Eurypterida: Systematics"*](http://www.ucmp.berkeley.edu/arthropoda/chelicerata/eurypteridsy.html). University of California Museum of Paleontology*. Retrieved May 20, 2011*.
  12. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-tollerton_12-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-tollerton_12-1) V. P. Tollerton, Jr. (1989). "Morphology, Taxonomy, and Classification of the Order Eurypterida Burmeister, 1843". Journal of Paleontology. **63** (5): 642–657. [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*0022-3360*](https://www.worldcat.org/issn/0022-3360).
  13. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-naturenews_13-0) Daniel Cressey (2007). [*"Giant sea scorpion discovered"*](http://www.nature.com/news/2007/071120/full/news.2007.272.html). Nature. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1038/news.2007.272*](https://doi.org/10.1038%2Fnews.2007.272)*. Retrieved May 22, 2011*.
  14. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-size_14-0) Samuel J. Ciurca, Jr. [*"The size that common Eurypterus species attained (Late Silurian Bertie Group of New York and Ontario, Canada)"*](http://eurypterids.net/EurypteridMonth5.html). Eurypterids.net*. Retrieved May 22, 2011*.
  15. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-utexas_15-0) [*"Eurypterus remipes NPL4415"*](http://www.utexas.edu/tmm/npl/exhibits/eurypterus.html). Texas Natural Science Center: Non-vertebrate Paleontology, The University of Texas*. Retrieved May 22, 2011*.
  16. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-burk_16-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-burk_16-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-burk_16-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-burk_16-3) Conrad Burkert. [*Environment preference of eurypterids – indications for freshwater adaptation?*](http://www.geo.tu-freiberg.de/oberseminar/os06_07/Conrad_Burkert.pdf) *(PDF)*. Technische Universität Bergakademie Freiberg*. Retrieved May 21, 2011*.
  17. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-rich_17-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-rich_17-1) Pat Vickers Rich, [*Mildred Adams Fenton*](https://en.wikipedia.org/wiki/Mildred_Adams_Fenton), [*Carroll Lane Fenton*](https://en.wikipedia.org/wiki/Carroll_Lane_Fenton), & Thomas Hewitt Rich (1989). [*The fossil book: a record of prehistoric life*](https://books.google.com/books?id=_ntSspji0LYC&lpg=PP1&pg=PA225#v=onepage&q&f=false). Courier Dover Publications. p. 225. [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [*978-0-486-29371-4*](https://en.wikipedia.org/wiki/Special:BookSources/978-0-486-29371-4).
  18. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-lamsdell_18-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-lamsdell_18-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-lamsdell_18-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-lamsdell_18-3) [***e***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-lamsdell_18-4) James Lamsdell. [*"Eurypterid Basics"*](https://web.archive.org/web/20110815213520/http:/eurypterids.co.uk/eurypterids.htm). Eurypterids.co.uk. Archived from [*the original*](http://www.eurypterids.co.uk/eurypterids.htm) on August 15, 2011*. Retrieved May 20, 2011*.
  19. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-ea_19-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-ea_19-1) "Eurypterid". The Encyclopedia Americana: Egypt to Falsetto. **10**. Grolier. 1983. pp. 708–709. [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [*978-0-7172-0114-3*](https://en.wikipedia.org/wiki/Special:BookSources/978-0-7172-0114-3).
  20. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-paleopedia_20-0) [*"Les scorpions de mer (les Eurypterida)"*](http://paleopedia.free.fr/invert%E9br%E9_arthropode_eurypteridae.html) (in French). Paleopedia*. Retrieved May 23, 2011*.
  21. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-plotnick_21-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-plotnick_21-1) Roy Plotnick. [*"Eurypterida"*](http://accessscience.com/content/Eurypterida/246600). Access Science. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1036/1097-8542.246600*](https://doi.org/10.1036%2F1097-8542.246600)*. Retrieved May 23, 2011*.
  22. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-resp_22-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-resp_22-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-resp_22-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-resp_22-3) Phillip L. Manning; Jason A. Dunlop (1995). [*"The respiratory organs of Eurypterids"*](https://web.archive.org/web/20120309062653/http:/palaeontology.palass-pubs.org/pdf/Vol%2038/Pages%20287-297.pdf) *(PDF)*. Palaeontology. **38** (2): 287–297. [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*0031-0239*](https://www.worldcat.org/issn/0031-0239). Archived from [*the original*](http://palaeontology.palass-pubs.org/pdf/Vol%2038/Pages%20287-297.pdf) *(PDF)* on March 9, 2012*. Retrieved May 21, 2011*.
  23. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-selden_23-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-selden_23-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-selden_23-2) P. A. Selden (1985). [*"Eurypterid respiration"*](https://web.archive.org/web/20110803072635/http:/homepage.mac.com/paulselden/Sites/Website/EuryResp.pdf) *(PDF)*. Philosophical Transactions of the Royal Society of London. B 309 (1138): 219–226. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1098/rstb.1985.0081*](https://doi.org/10.1098%2Frstb.1985.0081). [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*0080-4622*](https://www.worldcat.org/issn/0080-4622). Archived from [*the original*](http://homepage.mac.com/paulselden/Sites/Website/EuryResp.pdf) *(PDF)* on August 3, 2011*. Retrieved May 22, 2011*.
  24. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-St%C3%B8rmer_24-0) Lief Størmer (1955). "Merostomata". In C. Raymond. [*Treatise on Invertebrate Paleontology, Part P: Arthropoda 2: Chelicerata, Pycnogonida & Palaeoisopus*](https://en.wikipedia.org/wiki/Treatise_on_Invertebrate_Paleontology). Geological Society of America and University of Kansas Press. pp. 31–34. [*ISBN*](https://en.wikipedia.org/wiki/International_Standard_Book_Number) [*978-0-8137-3016-5*](https://en.wikipedia.org/wiki/Special:BookSources/978-0-8137-3016-5).
  25. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-autec_25-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-autec_25-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-autec_25-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-autec_25-3) [***e***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-autec_25-4) [***f***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-autec_25-5) Selden, Paul A. (1981). [*"Functional morphology of the prosoma of Baltoeurypterus tetragonophthalmus (Fischer) (Chelicerata: Eurypterida)"*](https://www.cambridge.org/core/journals/earth-and-environmental-science-transactions-of-royal-society-of-edinburgh/article/functional-morphology-of-the-prosoma-of-baltoeurypterus-tetragonophthalmus-fischer-chelicerata-eurypterida/D47ECC0D4657530A7931691566F08D5F). Transactions of the Royal Society of Edinburgh: Earth Sciences. **72**: 9–48*. Retrieved February 9, 2018*.
  26. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-2) [***d***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-3) [***e***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-4) [***f***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-5) [***g***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-6) [***h***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-7) ***[i](https://en.wikipedia.org/wiki/Eurypterus" \l "cite_ref-eur_26-8)*** [***j***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-9) [***k***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-10) [***l***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-11) [***m***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-12) [***n***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-13) [***o***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-14) [***p***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-15) [***q***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-16) [***r***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-eur_26-17) O. Erik Tetlie (2006). [*"Two new Silurian species of Eurypterus (Chelicerata: Eurypterida) from Norway and Canada and the phylogeny of the genus"*](http://www.museunacional.ufrj.br/mndi/Aracnologia/Eurypterida/Tetlie%202006%20Silurian%20Eurypterus.pdf) *(PDF)*. Journal of Systematic Palaeontology. **4**(4): 397–412. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1017/S1477201906001921*](https://doi.org/10.1017%2FS1477201906001921). [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*1478-0941*](https://www.worldcat.org/issn/1478-0941)*. Retrieved May 20, 2011*.
  27. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-lacustris_fauna_27-0) Samuel J. Ciurca, Jr. [*"Eurypterus lacustris Fauna"*](http://eurypterids.net/EurypteruslacustrisFauna.html). Eurypterids.net*. Retrieved May 22, 2011*.
  28. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-wave_28-0) Samuel J. Ciurca, Jr. [*"Commentary on a specimen of an Eurypterid"*](http://eurypterids.net/EurypterusLacustris4.html). Eurypterids.net*. Retrieved May 22, 2011*.
  29. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-merck_29-0) John W. Merck, Jr. [*"The biomechanics of swimming"*](https://web.archive.org/web/20110724192433/http:/www.geol.umd.edu/~jmerck/bsci392/lecture10/lecture10.html). Department of Geology, University of Maryland. Archived from [*the original*](http://www.geol.umd.edu/~jmerck/bsci392/lecture10/lecture10.html) on 2011-07-24*. Retrieved May 23, 2011*.
  30. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-30) Plotnick, Roy E. (1985). [*"Lift based mechanisms for swimming in eurypterids and portunid crabs"*](https://www.cambridge.org/core/journals/earth-and-environmental-science-transactions-of-royal-society-of-edinburgh/article/lift-based-mechanisms-for-swimming-in-eurypterids-and-portunid-crabs/89954954F4CB25CD197F5BC4BB1F55D6). Earth and Environmental Science Transactions of the Royal Society of Edinburgh. **76** (2–3): 325–337. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1017/S0263593300010543*](https://doi.org/10.1017%2FS0263593300010543). [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*1755-6929*](https://www.worldcat.org/issn/1755-6929).
  31. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-merck2_31-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-merck2_31-1) John W. Merck, Jr. [*"Eurypterids, arachnids, and the arthropod invasion of the land"*](https://web.archive.org/web/20110724192518/http:/www.geol.umd.edu/~jmerck/bsci392/lecture25/lecture25.html). Department of Geology, University of Maryland. Archived from [*the original*](http://www.geol.umd.edu/~jmerck/bsci392/lecture25/lecture25.html) on 2011-07-24*. Retrieved May 23, 2011*.
  32. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-gknight_32-0) [*"The story of one man's plight to make fossils swim"*](http://gknight.tripod.com/)*. Retrieved May 23,2011*.
  33. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-33) Vrazo, Matthew B.; Ciurca, Jr., Samuel J. (2018-03-01). "New trace fossil evidence for eurypterid swimming behaviour". Palaeontology. **61** (2): 235–252. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1111/pala.12336*](https://doi.org/10.1111%2Fpala.12336). [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*1475-4983*](https://www.worldcat.org/issn/1475-4983).
  34. ^ [Jump up to:***a***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-seldenjeram_34-0) [***b***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-seldenjeram_34-1) [***c***](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-seldenjeram_34-2) Paul A. Selden; Andrew J. Jeram (1989). [*"Palaeophysiology of terrestrialisation in the Chelicerata"*](https://web.archive.org/web/20110803072642/http:/homepage.mac.com/paulselden/Sites/Website/Palaeophysiology.pdf) *(PDF)*. Transactions of the Royal Society of Edinburgh: Earth Sciences. **80** (3–4): 303–310. [*doi*](https://en.wikipedia.org/wiki/Digital_object_identifier):[*10.1017/s0263593300028741*](https://doi.org/10.1017%2Fs0263593300028741). [*ISSN*](https://en.wikipedia.org/wiki/International_Standard_Serial_Number) [*0263-5933*](https://www.worldcat.org/issn/0263-5933). Archived from [*the original*](http://homepage.mac.com/paulselden/Sites/Website/Palaeophysiology.pdf) *(PDF)* on August 3, 2011*. Retrieved May 23, 2011*.
  35. [**^**](https://en.wikipedia.org/wiki/Eurypterus#cite_ref-nys_35-0) [*"New York State Fossil – Eurypterus remipes"*](http://www.nysl.nysed.gov/emblems/fossil.htm). New York State Library. April 27, 2009*. Retrieved May 20, 2011*.