

the joint, have disappeared; on the other hand, the uterus, with its ova, immediately makes its appearance. In this case, however, it does not present, as in other *Tæniæ*, the characteristic form, already often compared to a stem and branches, but only forms a sac densely filled with ova, and occupying the whole joint. Each joint contains about 100–150 eggs. The fully developed ova are elliptical, 0·0560 mill. in length and 0·0455 mill. broad; they present three envelopes, of which the outermost is smooth and transparent, the intermediate one very thin and slightly folded, and the innermost one, which is closely applied to the embryo, 0·0035 mill. in thickness. The diameter of the six-hooked embryo is 0·0315 mill.; the distinctly perceptible embryonal hooks are 0·0105 mill. in length.

The second *Tænia* met with in the Shrew, which I will call *T. furcata*, on account of the forked form of its hooks, is very rare. Its length is 8–10 mill.; the round head, distinctly separated from the neck, is 0·151 mill. in breadth, and possesses four sucking-disks and a short proboscis, which is furnished with a circlet of from twenty-two to twenty-eight hooks. The neck is 0·210 mill. in breadth. The width of the segments increases gradually with the length, so that the broadest segments are 0·56 mill. in breadth and 0·21 mill. in length: the last joints, from which the ova are already removed, exhibit smaller dimensions; they are 0·280 mill. broad, and 0·105 mill. long. The number of distinctly recognizable segments is 100. The genital orifices are all on one side.

The hooks are distinguished by a long and thin root-process, which is clearly separated from the true hook-process. The distance from the root-process to the apex of the hook is 0·024 mill.; the apex of the hook is distant 0·005 mill. from the distal process, and the two processes are 0·0210 mill. apart.

With regard to the sexual organs and the ova, I have nothing to add, as all that has been said of *T. uncinata* applies also to this *Tænia*.

XVI.—*Remarks on some Coal-measure Crustacea belonging to the Genus Belinurus, König; with Description of two new Species from Queen's County, Ireland.* By WILLIAM HELLIER BAILY, F.G.S.\*

[Plate V.]

THE generic term *Belinurus* was applied by König, in 1820, to a peculiar Crustacean from the Coal-measures, figured and named

\* An abstract of this paper was read at the Meeting of the British Association in 1858.



by him *Belinurus bellulus*\*; previous to this, Martin† gave a figure and short description of this species, which he called *Entomolithus monoculites?* (*lunatus*), including it with *Trilobites* under the same generic term of *Entomolithus*, a name which would therefore, according to the rules of nomenclature, be inadmissible. Parkinson‡ figures a similar fossil from ironstone found in the Coal-measures of Dudley, which he includes with the *Trilobites*, stating at the same time that it appeared to be identical with that described by Martin. The same species is figured and noticed by Dr. Buckland under the name of *Limulus trilobitoides*§, and afterwards by Mr. Prestwich, in his paper on the Geology of Coalbrook Dale, who adopts the same name, giving a figure of this and other species belonging to the genus, from the Ironstone found in the Coal-measures of Coalbrook Dale||. Lastly, General Portlock figures a specimen, said to be from Carboniferous shale (most probably, however, Coal-measures), Maghera, co. Derry, which he doubtfully refers to the same species¶.

Prof. Morris, in his Catalogue of British Fossils, ed. 2, 1854, cites all the above authorities, except Parkinson, referring the same species to *Limulus trilobitoides*, Buckland.

In a paper read by me before the Geological Society of Dublin\*\* a description was given of a specimen (the only one then obtained) from Bilboa Colliery, Queen's County, discovered by Mr. G. H. Kinahan, of the Geological Survey of Ireland, in *débris* derived from the three-foot bed of shale immediately over the Coal No. III. of the section, Castlecomer district. The accompanying fossils in the same bed of shale were a few scattered plant-remains and numerous small bivalve *Unio*-like shells (probably *Myacites*), and others of a Mytiloid form, which may be referred to *Myalina*. In this paper some remarks were offered on the allied species from Coalbrook Dale, which had been included with it in the genus *Limulus*; and it was proposed, from the characteristic differences they presented, and their greater affinity with the *Trilobites*, to remove all these Coal-measure Crustacea from that genus, and group them into a new one, under the name of *Steropis*. Since then, more complete specimens have been obtained from Bilboa Colliery, which have

\* Icones Fossilium sectiles, by Charles König, 1820, pl. 18. fig. 230.

† Petrificata Derbiensia, 1809, pl. 45. fig. 4.

‡ Organic Remains, 1811, vol. iii. p. 274, pl. 17. fig. 18.

§ Bridgewater Treatise, 1836, p. 396, vol. i., & vol. ii. p. 77, t. 46". fig. 3.

|| Trans. of Geol. Soc. of London, ser. 2. 1840, vol. v. pl. 41. fig. 8.

¶ Report on the Geology of Londonderry and Tyrone, 1843, p. 316, pl. 24. fig. 11.

\*\* Journal of the Geological Society of Dublin, 1858, vol. viii. p. 89.



still further confirmed my views with regard to the advisability of separating them from *Limulus*; and, on reconsideration, I preferred adopting the appropriate name of *Belinurus*, which was applied by König to one of the most common species, in preference to that under which I had formerly proposed to group them.

In the Explanation of Sheet 137 of the Maps of the Geological Survey of Ireland\*, I have given a short account of the fossils from the Coal-measures of this district, which includes a notice of these remarkable Crustacea from Bilboa, after visiting the locality, when I was fortunate enough to obtain the very perfect specimen named by me *Belinurus Reginæ*, and represented at Pl. V. fig. 1 A.†

On another visit, a still more perfect specimen (fig. 1 B) was obtained by the gentleman who accompanied me on that occasion, Mr. John Edge, to whom I am indebted for that and the loan of other specimens which have materially assisted me in drawing up these descriptions‡.

## CRUSTACEA. ENTOMOSTRACA.

### Legion PÆCILOPODA. Order Xiphosura.

#### Genus BELINURUS, König.

Etym. Βέλος, a dart; οὐρά, the tail.

*Gen. Char.*—General form suborbicular. Head or cephalic shield semicircular, slightly arched; the central portion (*glabella*?) prominent and declining towards the circumference, surrounded with a flattened margin, and terminating at its posterior angles in long spines. Body composed of five segments, which terminate in spines and diminish gradually towards the

\* Explanation of Sheet 137, Geol. Survey of Ireland, Palæontological Notes, pp. 12–14.

† Since writing this paper for the British Association, I found that Pictet, in his 'Traité de Paléontologie,' ed. 2, 1854, had anticipated me by removing these Crustacea (as I had proposed to do) from the genus *Limulus*, restoring them to that of *Belinurus*, with the following remarks:—

“Les *Belinurus*, König, diffèrent des deux genres précédents par l'articulation de la queue, et surtout parce que le bouclier abdominal présente deux sillons longitudinaux qui lui donnent une ressemblance avec le corps des *Trilobites*.” The following is from his classification of Crustacea:—

#### Order XIPHOSURA.

Genus 1. LIMULUS.

Genus 2. HALYCINE.

Genus 3. BELINURUS.

Genus 4. PTERYGOTUS.

‡ I also take the opportunity to acknowledge the kind assistance I have received from Benj. B. Edge, Esq., J. P., of Clonbrock House, Crettyard, near Carlow, who has aided me, on the several occasions of my visits, with valuable information and the loan of specimens.



posterior extremity, Tail or caudal portion small, with a few slight radiating divisions, to which is articulated an elongated spine (*telson*).

*Belinurus Reginae*, n. sp. Pl. V. fig. 1 A-D.

*Diagnosis*.—*B. latus*, limbo scuti cephalici orbiculari, angulis longispinosus; corpore decurtato; thorace quinque articulis longispinosus munito; pleuris sulco longitudinali, usque ad finem spinæ producto; tripartita cauda, cui spina prælonga coaptatur.

*Description*.—General form broadly ovate, acuminate posteriorly; axis convex. Cephalic shield three and a half times as broad as long, bow-shaped anteriorly, and surrounded by a narrow and flattened margin; the posterior angles produced into long spines, which are directed outwards; central portion, or glabella, smooth and moderately convex, of the same breadth as the axis of the thorax at its junction, but decreasing gradually towards the anterior margin, having an arched division on each side extending towards the anterior margin. Eyes central, lunate, attached to these divisions. Thoracic rings (*somites*) five, the lobes of the first twice as broad as the axis, those of the last rather less in breadth than the axis, the lateral lobes extending in a straight line, each being furrowed and terminating in a spine, the length of which diminishes in regular gradation towards the tail; each of the rings of the axis bears a moderate-sized tubercle. Tail or caudal portion very small, having about three slightly marked divisions on each side, to which is appended or articulated (?) an extremely long spine (*telson*), being three times the length of the other portion of the animal, broad at the base, and tapering gradually to a point.

*Remarks*.—The little Crustacean to which I have given the above specific name (Pl. V. fig. 1 A) was found by me in the *débris* of the same coal-pit which yielded the next species; it is in a very perfect condition, and exhibits in a remarkable manner the extravagant development of its various segments into long spines spreading out on each side of the body, and gradually decreasing as they approach the tail, from which proceeds an enormous spine. These characters sufficiently distinguish it from any other species. The head and body in the specimen figured appear to have been a little squeezed together. Another specimen of what I believe to be the same species (fig. 1 B), obtained by Mr. John Edge, is still more perfect, with the exception of the tail-spine, a portion of which has been broken away: this specimen is enlarged at fig. 1 C, D, and shows a slight wrinkling or furrowing of the expanded margin of the cephalic shield, as well as the sulcated pleuræ and single tubercle upon each ring of the axis terminating in a larger and more obtuse prominence on the tail.



The spine or telson which is attached to this portion exhibits a central longitudinal ridge, having a membranous expansion on each side similar to that noticed by Parkinson as occurring in the species described by Martin, and which I have referred to *B. bellulus*, König.

The following are the measurements of fig. 1 A:—

[The line is considered as being the twelfth of an inch.]

Total length from anterior margin of cephalic shield to point of telson..	1 inch 1 line, or 27 mill.
Breadth at widest part of spines ..	7 lines or 15 „
„ of cephalic shield .....	5 „ or 10 „
Length of telson .....	10 „ or 20 „

Measurements of fig. 1 B:—

Length of, from anterior margin of cephalic shield to end of tail ....	5 lines or 10 mill.
Length from anterior to posterior margin of cephalic shield .....	2½ „ 5 „
Breadth of cephalic shield .....	6½ „ 13 „
Length of body and tail .....	2½ „ 5 „
Breadth of body at cephalic shield ..	4 „ 8 „

*Locality.* From Coal-shale, Bilboa Colliery, Queen's County.

*Belinurus arcuatus*, n. sp. Pl. V. fig. 2 A–C.

*Diagnosis.*—*B. latus*; limbo scuti cephalici orbiculari, angulis longispinosus; glabella spinis duabus brevioribus munita; thorace quinque articulis brevispinosis; pleuris usque ad terminos sulcatis; tripartita cauda, cui spina longa coaptatur.

*Description.*—General form broadly ovate, acuminate posteriorly; axis convex. Cephalic shield semicircular, slightly elevated, declining towards the circumference, and surrounded by a narrow flattened margin; the central portion or glabella having three ridges extending to about two-thirds the breadth of the shield, rounded at their anterior extremity, and forming a double arch, the central portion being broadest at its posterior extremity, the two outermost ridges curving at about half their length towards the very slightly raised semicircular eyes, and continuing beyond the posterior extremity of the shield in two sharp straight spines, which project over the body about one-tenth of an inch; the posterior angles of the cephalic shield are produced into long spines, as in the preceding species, three-tenths of an inch in length, slightly curved, and spreading out on either side from the body. Thoracic rings five, which, as in the preceding species, decrease in breadth towards the posterior extremity; the lateral lobes, extending in a straight line, terminate in a short spine, and have an angular furrow, which proceeds to the end, curving at the same angle to the point of each spine.



Caudal extremity small, with two or three radiating divisions, to which is appended a spine about equal in length to the head and body.

*Remarks.*—This Crustacean differs from the preceding one in having much shorter spiny terminations to the pleuræ, and a much shorter tail-spine. The detached head or cephalic shield (Pl. V. fig. 2 A, B) is more orbicular, and the arched ridges proceeding from the middle portion of the head (*glabella*) terminate on each side in short spines—a character not observed in any of the specimens of *B. Reginae*. I have not succeeded in obtaining good specimens of this species with the body and tail entire: an imperfect one (fig. 2 C) forms the centre of a concretion in the shale, and exhibits a portion of the body with the tail-spine uncompressed, showing distinctly the division of each thoracic ring, with its grooved lateral angles as in the *Trilobites*. In another specimen, which was accidentally relieved from the shale, exposing both sides, the body was found to be doubled back upon the head, like an *Ampyx* or *Trinucleus*. This species is allied to *Belinurus bellulus*, König, but differs from it in the more orbicular form of the head, the spiny terminations of the pleuræ, and the greater proportion of the body to the cephalic shield.

Total length .....	1 inch, or 25 mill.
„ breadth .....	11 lines, or 22 „
Length of body .....	7 „ 15 „
Breadth of cephalic shield .....	8 „ 17 „
Length of cephalic shield .....	4 „ 8 „
„ telson, about .....	$\frac{1}{2}$ inch 12 „

*Locality.*—Found with the previous species at Bilboa Colliery, Queen's County.

A third species, closely allied, if not identical, with *Belinurus* (*Limulus*) *rotundus*, Prestwich, sp., was also obtained at the same locality; but as it is scarcely perfect enough for description, I have preferred referring it, with a doubt, to that species. A figure, of the natural size and enlarged, is given on Plate V. fig. 3 A, B.

The following is a list of the species of *Belinurus*, with their synonyms and localities:—

1. *Belinurus bellulus*, König, Icon. Foss. Sect. pl. 18. fig. 230.  
Coal-measures, Coalbrook Dale, Shropshire.

Syn. *Entomolithus* (*monoculus*) *lunatus*, Martin, Pet. Derb. pl. 45.  
fig. 4. Near Mansfield, Nottingham.

— — —, Parkinson, Org. Rem. vol. iii. pl. 17. fig. 18.  
Dudley, Shropshire.

*Limulus trilobitoides*, Buckland, Bridg. Treat. pl. 46". fig. 3.

— — —, Prestwich, Geol. Trans. ser. 2. vol. v. pl. 41. fig. 8.

— — —? Portlock, Geol. Report, pl. 24. fig. 11.



2. *Belinurus arcuatus*, n. sp., Baily. Bilboa Colliery, Queen's County, Ireland.
3. — *Reginæ*, n. sp., Baily. Bilboa Colliery, Queen's County, Ireland.
4. — *anthrax*, Prestwich, Geol. Trans. vol. v. pl. 41. figs. 1-4. Coalbrook Dale.
5. — *rotundus*, Prestwich, *ibid.* Coalbrook Dale and ?Bilboa Colliery, Queen's County.

The discovery of these peculiar Coal-measure Crustacea in Ireland, with associated shells and plants corresponding so remarkably with those found in similar deposits at Coalbrook Dale in Shropshire and other parts of the Midland counties in England, is a point of great palæontological interest, showing their distribution over a wide area, and indicating the prevalence of the same conditions in both countries, although at localities so widely distant. The great differences observable in some parts of their structure to that of the more recent and living forms of *Limulus* may be accounted for by the wide interval which separates the Coal-measure strata in which their remains are found from the Upper Jurassic formation, where those of true *Limuli* first occur. There are, however, certain points in their structure analogous to that of *Limulus*, which they somewhat resemble in their general form and in being provided with a tail-spine that was most probably (although the articulation is not clearly shown), like that of *Limulus*, capable of mobility; on the other hand, as we recede in time, we find intermediate forms, such as *Pterygotus* and *Himantopterus*, connecting them with the *Trilobites*, to which they are also allied by the moveable nature of their body-segments, and in other particulars. We have, therefore, in these Coal-measure Crustacea such a modification of structure as may be considered sufficient to constitute them a distinct genus, and show them to be a link in the chain leading from the important group of *Trilobites*, so characteristic of the Palæozoic rocks, to the Oolitic *Limuli*, in which the whole body is covered by a double shield, the segments of the abdominal portion being merely rudimentary and immoveable, like those of the existing species.

As to the question of the freshwater or marine habitat of these Crustacea and their associated fossils, I am inclined to the opinion that the deposits in which they occur were of freshwater or estuary origin, from the abundance of small shells like *Unio*, and others very similar to the freshwater *Mytilus* (*Dreissena*) *polymorpha*, accompanied by the remains of succulent or marshy plants. This opinion corresponds with the observations of Martin and Prestwich. Other theories have been advanced



attributing a general marine origin to the Coal-beds, in support of which great stress has been laid upon the fact of the occurrence of minute spiral bodies found attached to some of the plant-remains, and formerly referred to *Spirorbis*, a marine genus of Annelida common upon our shores at the present day, where it is generally attached to sea-weeds, and is well known as *Spirorbis nautiloides*. These little spiral bodies of the Coal-measure plants have, however, been described by Göppert as a Fungus, under the name of *Gyromyces Ammonis*, and are figured by Geinitz in his fine work on the Coal-plants of Saxony\*. We have here, therefore, an instance of the great caution required in drawing general conclusions from insufficient data, and would rather concur with the remarks offered on the subject at page 54 of this Journal, believing that the Coal-measures afford evidence of having been deposited under both freshwater and marine conditions.

#### EXPLANATION OF PLATE V.

Fig. 1 A-D. *Belinurus Reginae*, n. sp. : A, B, natural size ; C, D, enlarged 3 diameters. (The dotted lines represent the part restored.)

Fig. 2 A, C. *Belinurus arcuatus*, n. sp. : A, detached cephalic shield, natural size ; B, the same, enlarged 2 diameters ; C, a small uncompressed specimen from a concretion.

Fig. 3 A, B. *Belinurus rotundus*?, Prestwich : A, natural size ; B, enlarged 3 diameters. (The dotted lines represent parts restored.)

#### XVII.—On new Species of Fishes from Victoria, South Australia.

By Dr. ALBERT GÜNTHER.

A COLLECTION of fishes from Victoria, sent to the International Exhibition, and procured for the British Museum, was distinguished by the unusually large size of the specimens. They are all stuffed, and unfortunately not accompanied by smaller examples preserved in spirits, so that we are obliged to leave the descriptions of the new species incomplete in some points. We hope, however, soon to make up for this deficiency, as we may expect further supplies from that colony.

##### *Lates colonorum.*

B. 6. D. 8 |  $\frac{1}{10}$ . A.  $\frac{2}{8}$ . L. lat. 55. L. transv. 8/21.

The specimen is 17 inches long, apparently a female, and rather extended by stuffing ; the length of the head, however, appears to be a little less than one-third of the total (without

\* Die Versteinerungen der Steinkohlenformation in Sachsen, pl. 34. figs. 1-3. Dr. Geinitz first called my attention to this little fossil on a Calamite-stem from a neighbouring colliery, in Mr. B. Edge's collection.





Baily, William Hellier. 1863. "XVI.—Remarks on some Coal-measure Crustacea belongint to the genus *Belinurus*, König; with description of two new species from Queen's County, Ireland." *The Annals and magazine of natural history; zoology, botany, and geology* 11, 107–114.

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