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ORIGINAL ARTICLES.

L.—WOODWARDIAN MUSEUM NOTES: A NEW CARBONIFEROUS
TRILOBITE.

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(PLATE X.)

AMONGST the fossils collected from the Pendleside Limestone of Butterhaw Knoll, Cracoe, Yorkshire, in which *Cyphaspis acanthina* (Coignou)¹ was discovered a few years ago, there are in the Woodwardian Museum a few specimens of a species of *Phillipsia*, which were found in 1889 by Professor Hughes' same geological party. My attention has been recently directed to them, and it has become evident, after a careful examination, that they do not belong to any of the hitherto described species of this genus. The characters of this new species, to which the name *Phillipsia cracoensis* is given, are as follows:—

Head-shield nearly semicircular; glabella regularly and gently convex, slightly elevated above the cheeks, cylindrical but narrowing a little in front of the eye-lobe. Anterior end of glabella rounded, not reaching front margin of head-shield, but separated from it by a narrow rounded border ornamented with a few concentric lines. Glabella marked off from neck-ring by a strong undulating neck-furrow consisting of a central portion arched forwards and oblique lateral portions bounding the basal lobes of the glabella.

Basal lobes of the glabella subquadrate in form, distinctly defined by furrows curving back towards the neck-furrow, before reaching which they become weaker. In front of the furrows defining anteriorly the basal lobes the glabella is marked by three pairs of furrows directed obliquely backwards. The posterior pair is the strongest and longest; the middle pair does not join the axial furrow; and the anterior pair, though invariably present, is very short, and in some specimens is represented merely by a pair of small pits.

Neck-ring broad and band-like, median portion averaging one-fifth the length of glabella and wider than first thoracic segment. Anterior part of lateral portion of neck-ring swollen on each side behind basal lobe to form a small low, elongated, triangular nodule,

¹ Quart. Journ. Geol. Soc., vol. xli (1890), p. 422.

with shortest side on axial furrow. Small median tubercle also present on neck-ring.

Facial suture cuts anterior border of head-shield almost at a right angle; from this point it curves backward and inward to the glabella, bending again outwards between the first and second glabella-furrows and defining a large, long, crescentic eye-lobe, at the base of which it turns sharply outwards and runs in an oblique direction to meet the posterior border of the head-shield at a very acute angle.

Eye-lobe extends from second furrow of glabella nearly to neck-furrow.

Free-cheek smooth, triangular, surrounded by raised rounded border ornamented with four or five raised concentric lines on upper surface. Genal angle obtuse, not produced into a spine.

Eye large, reniform, prominent, marked off from surface of free-cheek by encircling, broad, shallow groove. Surface finely faceted as in *Phill. gemmulifera*.

Thorax incompletely known. In one partly enrolled specimen seven segments of the axis are preserved which are attached to a head-shield. These segments are smooth and devoid of tubercles. The axis is gently convex, and very gradually diminishes in width towards the pygidium. The pleuræ in this specimen are unfortunately broken off, but were apparently about equal in breadth to the axis.

Pygidium semicircular, gently arched, edge smooth, slightly bevelled, without any marginal rim or grooved area. Axis prominent, rounded, rather more than one-third the width of pygidium, composed of twelve rings, each bearing an almost obsolete low median tubercle (scarcely visible on the posterior rings), with a lateral, stronger tubercle on each side, separated from the median one by a distinct, small, oval, striated patch, visible only in the cast. Axis extends a little over three-fourths the length of the pygidium, gradually tapering to its posterior end, which is obtusely pointed. A faint ridge slopes down with diminishing strength from the end of the axis to the margin of the pygidium.

Pleural portions of pygidium, forming area gently arched downwards from axis, marked on each side by 8–10 ribs, of which only the first three or four are distinct, the posterior ones being very faint and almost obsolete. The first furrow is strong and reaches the lateral margin of the pygidium; the second becomes weak before reaching the margin; the third is still weaker and shorter; the fourth is generally distinguishable in the cast, but those behind it are scarcely visible. The ribs are each marked with a central longitudinal groove, and each rib bifurcates at the weak fulcrum, which is situated about half-way along their length and is only perceptible in the first two or three ribs. These three first ribs reach the margin with distinctly bifurcated ends, but decrease in strength beyond the fulcrum. The posterior ribs, though much weaker along their whole length, are, nevertheless, traceable to the pygidial margin.

The actual surface of the pygidium is not preserved in its entirety in any of our specimens, but from isolated fragments of the shell attached to the casts the above features can be made out. A fine punctation is also noticeable on the surface with a hand-lens. The under surface of the pygidium is furnished with a broad infolded marginal portion ornamented with concentric striae.

Hypostome elongate, obtusely pointed posteriorly; central portion convex, swollen, with subparallel sides; anterior portion most elevated, ornamented with several longitudinal lines, and provided with a narrow border marked off by a faint groove. Alæ subquadrate rather than triangular in shape, marked with irregular wrinkles, not separated from central portion of hypostome by furrow. Rounded narrow border surrounding posterior part of central portion behind alæ, but marked off from it by distinct groove. Lateral angles obtuse.

MEASUREMENTS OF SIX SPECIMENS OF HEAD-SHIELDS AND PYGIDIA.

	mm.	mm.	mm.
Length of head-shield ...	11.5	11.0	9.0
Length of glabella ...	9.0	8.0	7.0
Width of glabella at base ...	7.0	6.5	6.0
Length of pygidium ...	11.0	10.0	8.0
Width of pygidium ...	16.0	14.5	12.0
Length of axis ...	9.0	8.0	7.0
Width of axis at front end ...	6.0	5.25	5.0

Affinities.—This new species, *Phill. cracoensis*, has wide affinities, but does not appear to be closely allied to any of the British species. The want of genal spines to the free cheeks recalls *Phill. derbiensis* (Martin), but in almost every other detail the head-shield is different, and the pygidium, moreover, bears no resemblance.

With *Phill. Colei* (McCoy) it agrees in the general shape and marginal characters of the pygidium, in possessing the same number of segments on the pygidial axis, and in the faintness of the pleuræ on the lateral portions. But it differs in the shape and ornamentation of the axis, and in the more strongly marked fulcrum and the bifurcation of the ribs. The head-shield is completely different, except in the relative size of the eyes; and the hypostome is narrower, has larger alæ, and a more strongly developed posterior border.

The general shape of the glabella and course of the facial suture are somewhat similar in *Phill. gemmulifera* (Phillips), but in all other respects the differences are marked. The three pairs of furrows on the glabella, in addition to the one marking off the basal lobe, recall *Phill. truncatula* (Phillips). But the pygidium shows little similarity.

From *Phill. Eichwaldi* (Fischer) our species is in most respects so completely different as to make any comparison needless. But a hypostome doubtfully referred to *Phill. Eichwaldi* by Dr. Woodward¹ is not unlike that of *Phill. cracoensis*, except in its less elongate form, less regularly convex axis, and triangular alæ.

¹ Mon. Brit. Carb. Trilob., p. 22, pl. iv, fig. 4.

The fewer glabellar furrows of *Phill. latacaudata* (Woodw.), the ornamentation of the axis of the pygidium, and the non-bifurcation of its pleuræ, compel us to regard this species as distinct, though it agrees in the shape of the pygidium and number of axial segments.

Phill. scabra (Woodw.) shows several points of resemblance, i.e., the non-elongation of the genal angles into spines, the striated border of the free cheeks, and the large eyes; but the shape and furrows of the glabella and the pygidium are quite different.

Phill. quadrilimba (Phillips) and *Phill. carinata* (Salter) are completely unlike *Phill. cracoensis* so far as they are known.

In *Phill. Leei* (Woodw.) the pleuræ of the pygidium are grooved, the neck-ring of the head is widest in the centre, the margin of the head is ornamented with parallel lines; but the eyes, the fixed cheeks, the glabellar furrows, and number of rings in the axis of the pygidium are different. *Phill. Cliffordi* (Woodw.), of which the head-shield resembles that of *Phill. Leei*, has bifurcated pleuræ in the pygidium, but there are thirteen rings on the axis, and these are unornamented. *Phill. minor* (Woodw.) has also bifurcated pleuræ on the pygidium, but fourteen unornamented segments on the axis and an entirely different head-shield. *Phill. articulosa* (Woodw.) shows no important points of resemblance, nor does *Phill. Van der Grachtii* (Woodw.).¹ *Phill. Polleni* (Woodw.),² though agreeing with *Phill. cracoensis* in the shape of the pygidium, the faint pleuræ, and course of the facial suture, is in other respects unlike it, but Dr. Woodward considers it allied to *Phill. Colei*.

The pygidia on which the species *Griffithides? carringtonensis* (Ether. MS.) was founded resemble our new species in possessing twelve axial rings and grooved pleuræ, but differ in having a distinct flattened margin and absence of ornamentation.

Amongst foreign species there is none with which I am acquainted possessing any close affinity with this new one from Cracoe.

The points of resemblance of this species to the genus *Proetus*, which has been recorded from the Carboniferous System, though only doubtfully in the British Isles,³ are of special interest. Dr. Woodward (loc. cit.) has clearly pointed out the affinities of *Griffithides*, *Phillipsia*, and *Proetus*, and this species seems still more completely to bridge over the gap between the two last genera, so that it is even possible to hesitate to which genus we ought to assign it. The features which indicate its very close alliance with *Proetus* are: (1) the course of the facial suture cutting the front margin nearly at a right angle, instead of curving inwards so as to cut it at an acute angle, as in the typical *Phillipsia*; (2) the presence of the small lateral lobes on the neck segment, which are distinctly recognizable, though obsolescent; (3) the few pleural furrows on the pygidium (when not decorticated); and (4) the presence of a distinct fulcrum on the anterior pygidial pleuræ. By these characters it is differentiated from all the species of *Phillipsia*, but the numerous other points of similarity to various

¹ GEOL. MAG., Dec. IV, Vol. I (1894), p. 485.

² Ibid., p. 487.

³ Woodward: Mon. Brit. Carb. Trilob., 1883, p. 55.

species of this genus, which have been described above, show that it is a generalized form, and suggest the idea that *Phillipsia* is separable as a distinct genus from *Proetus* more for stratigraphical than morphological reasons.

EXPLANATION OF PLATE X.

FIG. 1.	<i>Phillipsia cracoensis</i> , n.sp.	Central portion of head-shield.	× 3.
" 2.	" "	Central portion of another head-shield.	× 3.
" 3.	" "	Pygidium.	× 3.
" 4.	" "	Another pygidium.	× 3.
" 5.	" "	Free cheek.	× 3.
" 6.	" "	Hypostome.	× 3.
" 7.	" "	Outline restoration of head-shield.	

II.—ON *ARCHANODON JUKESI* (FORBES MS.), BAILY, SP., FROM THE OLD RED SANDSTONE OF MONMOUTHSHIRE.

By R. BULLEN NEWTON, F.G.S.

INTRODUCTION.

THROUGH the kind intervention of Professor H. G. Seeley, F.R.S., some few years since, Mr. Percy Hawkins was induced to present to the Geological Department of the British Museum a slab of Old Red Sandstone from Llanvaches, nearly midway between Caerleon and Chepstow, Monmouthshire, containing some excellent impressions of *Archanodon Jukesi*.

Originally found in Ireland, and since reported from Northumberland, the present notice of the shell forms a second record of its occurrence in Britain. So far as our knowledge extends, it remains the most ancient lacustrine or fluviatile bivalve mollusc yet known in the British Islands, and on that account, coupled with its great rarity, it is hoped that the following account, dealing with its discovery in Western England, may lend an additional interest to the species. Before entering upon this, however, it may be of advantage to submit a brief summary of the literature relating to this organism.

BIBLIOGRAPHICAL REVIEW OF *ARCHANODON JUKESI*.

The first reference to this mollusc was made by Edward Forbes¹ in 1853 in a provisional list of fossils characterizing the 'Yellow Sandstone' at the hill of Knocktopher, co. Kilkenny, Ireland, which included plants (*Cyclopteris Hibernicus*, *Lepidodendron*, and *Stigmara*), fish (*Hotoptychius*), Crustacea (*Pterygotus*), and a 'large bivalve shell,' to which was given the name of *Anodon Jukesi*. These forms of life were recognized as indicative "of fresh or at least brackish water conditions at the period of the deposition of the beds."

In 1857 J. B. Jukes and J. W. Salter² referred to the occurrence of *Anodon Jukesi* in the Yellow Sandstone of Kiltorcan Hill, near

¹ Edward Forbes, "On the Fossils of the Yellow Sandstone of the South of Ireland": 22nd Rep. British Assoc. for 1852, published 1853, p. 43.

² J. B. Jukes and J. W. Salter, "Notes on the Classification of the Devonian and Carboniferous Rocks of the South of Ireland": Journ. Geol. Soc. Dublin, vol. vii (1857), p. 63.

G.M. Woodwood del. et lith.

West, Newman imp.

A New Carboniferous Trilobite.