A NEW SPECIES OF THE CARBONIFEROUS TRILOBITE *LINGUAPHILLIPSIA* FROM CUMBRIA, ENGLAND

by

John Wykeham Tilsley

Summary

Linguaphillipsia mitchelli sp. nov. is described from the Park Limestone, Holkerian stage at Whitbarrow Quarry, Cumbria. *Linguaphillipsia* is rare in the British Dinantian, with only three species previously described from the Arundian to Asbian interval. Further discoveries of *Linguaphillipsia* may prove biostratigraphically significant.

Introduction

Whitbarrow Scar Quarry (NGR, SD 454 847 to 462 855) is an extensive working along the base of White Scar behind Raven's Lodge Farm. Both the limestone and a large area of Pleistocene "cemented" scree have been extracted. Commercial quarrying began in 1946 but operations have now ceased.

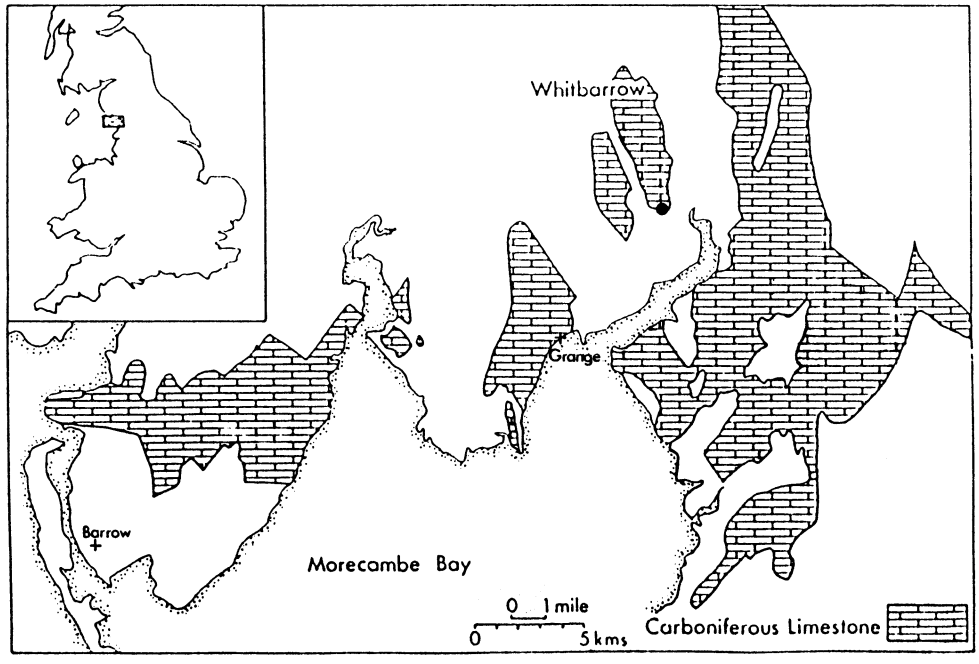


Fig. 1. Location of Whitbarrow Scar Quarry southern Lake District.

Mercian Geologist, Vol. 11,
no. 3, 1988, pp. 155–160,
plates 1 & 2 (2pp.)

Stratigraphy

In the early Carboniferous, limestones with thin subordinate calcareous mudstone and sandstones were deposited on the southern margin of the Lake District. Mitchell (1980, unpublished) has mapped the outcrop of the Dalton Beds and Park Limestone on the Whitbarrow block (Fig. 1). The Dalton Beds are considered to be of Arundian age, whilst the Park Limestone is referred to the Holkerian (Mitchell, 1978). There are excellent exposures in the upper part of the Dalton Beds and lower part of the Park Limestone in Whitbarrow Scar Quarry at the southern end of White Scar. The Dalton Beds are pale to dark-grey, thick-bedded limestone with a prominent mudstone/sandstone unit at the top which is about 0.3 m thick at Whitbarrow and may be equivalent to the Ashfell Sandstone of the Ravenstonedale area to the east. Ramsbottom (1974, p. 57) considers the Ashfell Sandstone to be a regressive phase at the top of Major Cycle 3. The succeeding Park Limestone comprises massive pale grey limestones, which form the upper parts of the outcrop.

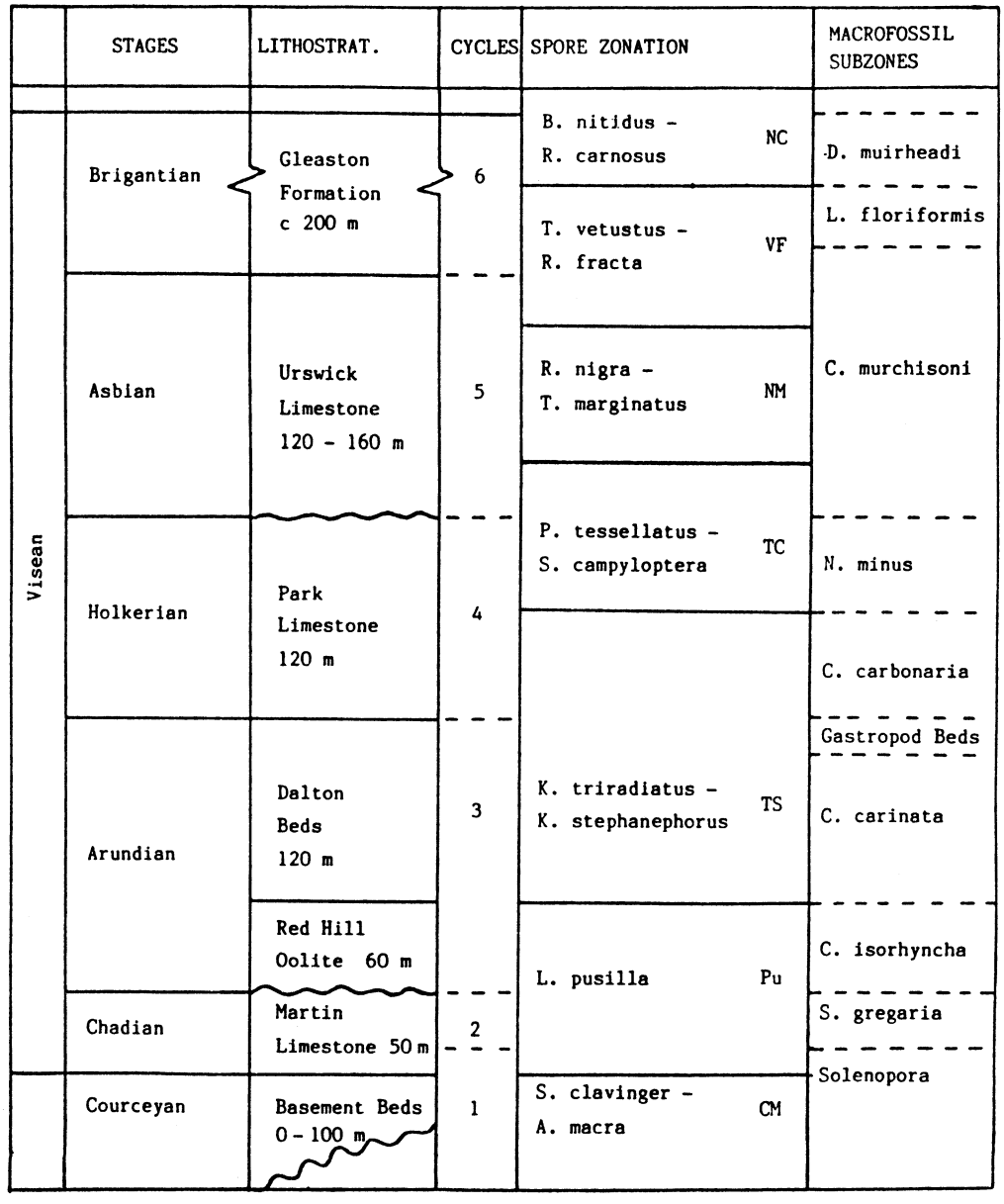


Fig. 2. Visean stratigraphy of the southern Lake District.

Lithostratigraphy after Rose and Dunham (1978), sedimentary cycles after Ramsbottom (1973), spore zonation after Higgs et. al. (in press), local macrofossil zones modified from Garwood (1913) and stages after George et. al. (1976).

Dr. A.E. Adams (pers. comm. 1983) has kindly provided the following petrographical information: "The limestones are pale, medium-grained, bioclastic and peloidal limestones, packstone in texture with some micritic pellets and a diverse suite of bioclasts; algae, foraminifera, calcispheres, echinoderm fragments, molluscs with micritic envelopes, brachiopods, ostracods, tubular problematica and 'ungdarellids'". The new species of *Linguaphillipsia* occurs in the lower part of the Park Limestone, and is associated with a diverse macrofauna that includes brachiopods (*Linoprotonia, Megachonetes, Actinoconchus, Echinoconchus* and *Propriopugnus*), gastropods (*Bellerophon, Straparollus, Naticopsis* and *Pharkidonotus*), corals (*Lithostrotion, Syringopora, Aulopora* and *Clisiophyllum*), bryozoans, fish teeth and bivalves. *Lithostrotion minus* (McCoy) and *Linoprotonia corrugatohemispherica* (Vaughan) are both recorded elsewhere from limestones of Holkerian age Rose & Dunham (1978, p. 36).

Dr. N.J. Riley (B.G.S.) (pers. comm. 1987) has identified the following foraminifera and algae from the trilobite matrix; *Archaediscus* cf *varsanofievae, Archaediscus* stage *concavus, Bogushella ziganensis, Calcisphaeres, Endothyra spp, Endospiroplectammina, Eostaffella* sp, *Forshiinae, Kamaeniids, Koninckopora inflata, Koninckopora minuta, Mediocris* sp, *Nodosarchaediscus* sp, *Palaeotextularia, Pseudolituotuba, Stacheiinae, Tetrataxis* sp and agglutinated single walled palaeo-textulariids. He writes: "The microbiotas are rather illusive, *A. stage concavus* is most useful, although *Holkeria, Pojarkonella* etc. are not present. No Arundian or Asbian guides are present hence the fauna is consistent with a Holkerian age".

Palynological assemblages from Whitbarrow Scar Quarry have been examined by K.J. Dorning, Pallab. Research, Sheffield; the lower part of the Park Limestone typically contains moderately well preserved palynomorphs and sedimentary organic matter, including abundant marine benthonic calcareous algae, a low diversity acritarch microflora and scolecodonts, together with spores of moderate diversity. A diverse spore and acritarch microflora of moderate to excellent preservation was recorded from samples collected from the prominent mudstone/sandstone unit at the top of the Dalton Beds, which include forms indicative of the *K. triradiatus—K. stephanephorus* spore Biozone of Higgs et al. (in press). This assemblage biozone is restricted to the late Arundian—early Holkerian.

Systematic Palaeontology

Family:	*Proetidae*	Hawle & Corda, 1847
Subfamily:	*Linguaphillipsiinae*	G. & R. Hahn, 1972
Genus:	*Linguaphillipsia*	Stubblefield, 1948

Linguaphillipsia scabra (Woodward, 1884)
Plate 2, figs 1–7

1884	*Phillipsia scabra* sp. nov. Woodward, p. 43–44, pl. 9 figs. 5a & 5b.
1926	*Phillipsia scabra* Woodward, Bush, p. 257.
1970	*Linguaphillipsia scabra* (Woodward), Osmólska, p. 48.
1970	*Phillipsia scabra* Woodward Osmólka, p. 49.
1973a	*Linguaphillipsia matthewsi* sp. nov. G. & R. Hahn, p. 551–557, text figs. 1–2, pl. 64, figs. 1–6.
1973b	*Linguaphillipsia matthewsi* G. & R. Hahn, p. 479–509, text fig. 1e.
1975	*Linguaphillipsia matthewsi* G. & R. Hahn, G. & R. Hahn, Leitfossilien: 54.
1982	*Linguaphillipsia matthewsi* G. & R. Hahn, G. & R. Hahn, p. 115–121.
1984	*Linguaphillipsia matthewsi* G. & R. Hahn, Thomas et al., p. 66–67.
1984	*Phillipsia scabra* Woodward, Thomas et al., p. 69.
1984	*Linguaphillipsia matthewsi* G. & R. Hahn, Riley, p. 6–8.
1985	*Linguaphillipsia matthewsi* G. & R. Hahn, Hahn & Amler, p. 72,75.

Description: Woodward described and figured *Phillipsia scabra* from Vallis Vale, Frome, Somerset. Dr. R.M. Owens has examined the type material and states (pers. comm. 1986) "The cephalon figured by Woodward (1884, pl. 9, fig. 5a) has unfortunately been damaged, with most of the central portion of the glabella removed. What remains, as well as the free cheek and pygidium, agree closely with *Linguaphillipsia matthewsi* G. & R. Hahn 1973a". Both these species have identical characteristics (see plate 2, figs. 1–7) therefore *L. matthewsi* may now be regarded as a junior synonym.

Linguaphillipsia mitchelli sp. nov.
Plate 1, figs 1–8

Derivation of name: After Mr. Murray Mitchell, formerly of the British Geological Survey, for his contributions to Dinantian biostratigraphy.

Holotype: NMW 86.25G.2109 pygidium.

Paratypes: NMW 78.1G. 255, 256, 261, 264, 271, 272, 274
86.25G.193, cranidia; 78.1G.265, 86.25G.9, free cheeks; 78.1G. 194, 254, 257–60, 262, 263, 266–70, 273, 275, 276 pygidia.

Type locality: Whitbarrow Quarry, 22 km. NE of Grange-over-Sands, Cumbria, England. NGR. SD 4600 8530.

Age: Park Limestone, Holkerian.

Diagnosis: *Linguaphillipsia* belonging to the "*scabra* group" (=matthewsi group) of G. & R. Hahn 1973b. Frontal lobe of the glabella narrower than across L_1 and with a narrow smooth band of anterior border between frontal lobe and innermost terrace ridge. Posterior margin of pygidum subacuminate in outline. 13–14 axial rings and 10 pairs of pleural ribs.

Description: The following comparative description is condensed since this species closely resembles *L. scabra* (Woodward, 1884) which was described in detail by Hahn & Hahn (1973a).

The glabella has a slightly more strongly forward taper, and the frontal lobe does not extend as far across the anterior border, leaving a narrow smooth band between it and the innermost terrace ridge. Such a band is not present in *L. scabra* where the glabella extends close to the anterior border (Hahn & Hahn 1973a, pl. 64, figs. 1–2; text 1a, p. 555). The preocular facial sutures are more strongly divergent, and the terrace ridges on the lateral border extend further inwards (see pl. 1, fig. 5 and Hahn & Hahn 1973a, pl. 64, fig. 1a, p. 555). The sculpture is of fewer, coarser granules, of similar distribution to *L. scabra*. The pygidium of *L. scabra* and *L. mitchelli* are very similar, differing only in the subacuminate posterior margin and smaller number of axial rings (13–14 compared with 15–18). Small pygida of *L. mitchelli* (pl. 1, fig. 6) are proportionately less elongated, with a rounded posterior margin.

Remarks: Hahn & Hahn (1973b) recognised four species groups within *Linguaphillipsia*, and all three British species belong to the "*scabra* group". Differences between the British species are small, those between *L mitchelli* and *L scabra* have been discussed. The youngest of them, *L. cumbriensis* Riley from the Asbian, differs in having the frontal lobe of the glabella almost as wide (tr) as it is across L_1 and in having a pair of terrace ridges on the dorsal surface of the pygidial border.

L. scabra livensis G. & R. Hahn 1982 from the Visean of Belgium (V_2b—equivalent to early Holkerian) is very similar to *L. scabra*, differing in a narrower glabella with a greater construction at γ, fewer pygidial axial rings (15–16) and a broader margin. It is distinguished from *L. mitchelli* by similar characters to *L. scabra*.

Few trilobites have so far been described from the Arundian and Holkerian in Britain; the presence of *Linguaphillipsia* species at localities in Somerset, Avon, the Gower and Cumbria suggests that this genus might be more widespread than is currently supposed. It is possible that there exists a succession of closely related species that together with other trilobites may prove of biostratigraphical value. In Britain, *Linguaphillipsia* is unknown in carbonate mound facies, and its distribution might be expected to be more widespread than that of many trilobites that are largely restricted to this biofacies.

Acknowledgments

I thank R.M. Owens of the National Museum of Wales for reading the manuscript and providing the photographs also M. Mitchell, A.E. Adams, N.J. Riley and K.J. Dorning for unpublished information.

References

Bush, G.E., 1926. The Avonian succession of Spring Gardens and Vallis Vale, Frome, Somerst. *Proc. Bristol Nat. Soc.* (4), 6, 250–259.

Garwood, E.J., 1913. The Lower Carboniferous succession in the north-west of England. *Q. Jl. Geol. Soc. Lond.* 68, 449–596.

George, T.N., Johnson, G.A.L., Mitchell, M., Prentice, J.E., Ramsbottom, W.H.C., Sevastopoulo, G.D., Wilson, R.B., 1976. A correlation of Dinantian rocks in the British Isles. *Spec. Rep. Geol. Soc. London*, 7, 87pp.

Hahn, G. & Hahn, R., 1973a. Visean trilobites from Holwell, Somerset. *Palaeontology*, 16, 3, 551–561, pl. 64.

Hahn, G. & Hahn, R., 1973b. Zur Evolution von Linguaphillipsia (Trilobita); Unter-Karbon). *Senck. Lenth.*, 53, 6, 479–515, Taf. 1–2.

Hahn, G. & Hahn, R., 1982. Die Trilobiten des belgischen Kohlenkalkes (Unter-Karbon). 3. Linguaphillipsia. Geol. et Palaeon. 15, 115–124. Taf. 1.

Higgs, K., et. al. in press.

Mitchell, M., 1978. Dinantian *in* Moseley, F. (ed.): *The Geology of the Lake District.* Yorks. Geol. Soc., Occ. Pub. no. 3, 284pp.

Osmólska, H., 1970. Revision of non-cyrtosymbolinid trilobites from the Tournaisian-Namurian of Eurasia. *Palaeont.* 23, 1–165.

Ramsbottom, W.H.C., 1974. Dinantian *in* Rayner, D.H. & Hemmingway, J.E. (eds.): *The Geology and Mineral Resources of Yorkshire.* Yorkshire Geol. Soc. 405pp.

Riley, N.J., 1984. Linguaphillipsia cumbriensis sp. nov. from the Chontes Shale (Fifth Shale) of Cumbria. (Trilobita, Dinantian). *Rep. Br. Geol. Surv.*, vol. 16, no. 10, 6–9.

Rose, W.C.C. & Dunham, K.C., 1978. Geology and hematite deposits of South Cumbria. *Geol. Surv. G. B. Econ. Mem.*, 170pp.

Thomas, A.T., Owens, R.M. & Rushton, A.W.A., 1984. Trilobites in British stratigraphy, *Geol. Soc. London. Special Report*, no. 16:1–78.

Woodward, H., 1883–84. British Carboniferous trilobites. *Monogr. Palaeontogr. Soc. London*, 1–86, pls. 1–10.

John Wykeham Tilsley,
Dodington House,
Nether Stowey,
Bridgwater,
Somerset TA5 ILF.

Plate 1. *Linguaphillipsia mitchelli* sp. nov. Whitbarrow Scar Quarry, Grange-over-Sands, Cumbria.

1a,b Holotype, pygidium. ×6. NMW. 86.25G.2109. dorsal and lateral views.

2. Cranidium. ×6. NMW. 78.1G.255.

3. Cranidium. ×4. NMW. 86.25G.193.

4. Free cheek. ×5. NMW. 86.25G.9.

5. Free cheek. ×5. NMW. 78.1G.265.

6. Juvenile pygidium. ×10. NMW. 78.1G.270.

7. Pygidium. × 8. NMW. 78.1G.254.

8. Pygidium. ×5. NMW. 78.1G.263. Latex cast.

Linguaphillipsia cumbriensis Riley, 1984
Chonetes Shale, Yeathouse Quarry, Frizington, Cumbria. (Paratypes)

A. Free cheek. × 4. BGS. Ro 5588. (Photo. N.J. Riley).

B. Pygidium. × 4. BGS. Ro 5506. (Photo N.J. Riley).

NMW = National Museum of Wales.
BGS = British Geological Survey.

Plate 2. *Linguaphillipsia scabra* (Woodward, 1884).

1. Cranidium. × 4. NMW. 85.34G.1a. Clifton Down Limestone, Holkerian, Whatley Quarry, Frome, Somerset.

2. Cephalon. ×6. GSM. 95321. Figured Woodward 1884, pl. 9, fig. 5a. Vallis Vale, Somerset.

3. Free cheek. ×5. NMW. 85.34G.22. Whatley Quarry.

4. Pygidium. ×5. GSM. 33751. Vallis Vale.

5. Pygidium. ×5. NMW. 85.34G.4. Whatley Quarry.

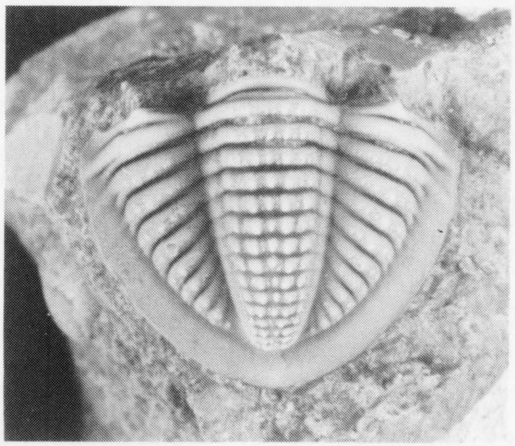
6. Pygidium. ×5. GSM. 33752. Vallis Vale.

7. Pygidium. ×5. NMW. 85.34G.2. Whatley Quarry.

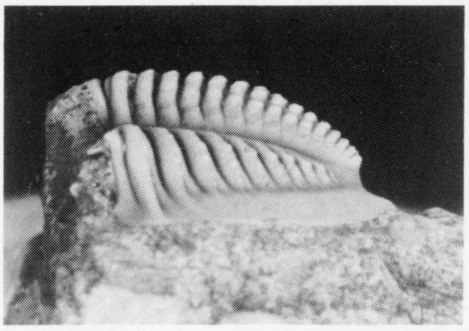
Linguaphillipsia sp. [aff. *Weberiphillipsia*]

8. Pygidium. ×5. NMW. 20.361.ˆq. Chadian/Arundian. Black Rocks, Ogmore-by-Sea, Mid Glamorgan, South Wales.

GSM. (ex Geological Survey Museum now at BGS Keyworth).

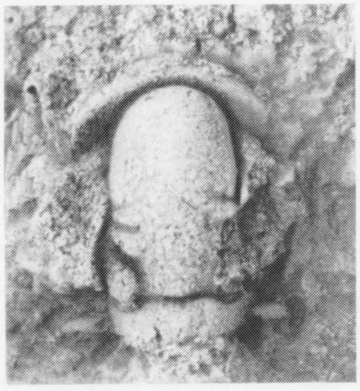


1a



1b

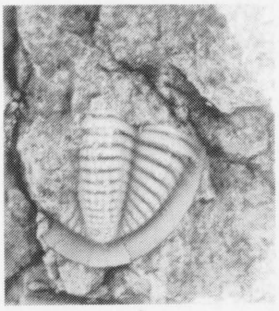
2



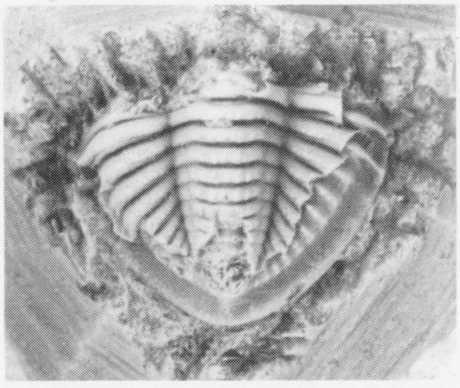
3

4

5

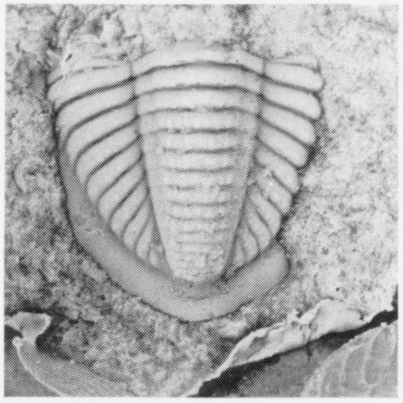


6

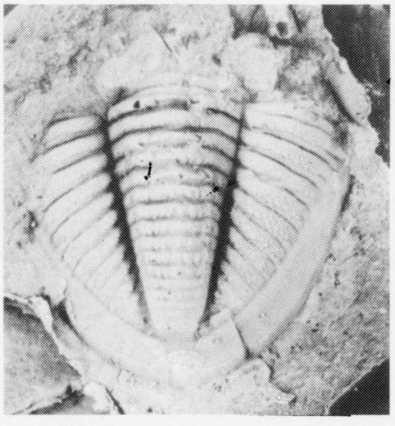


7

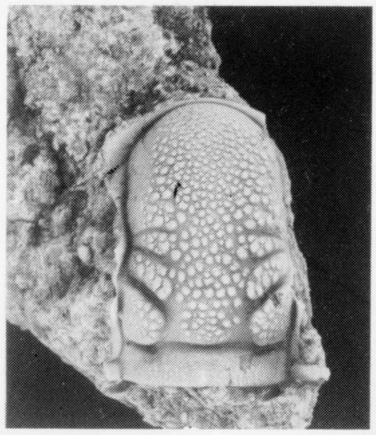
A



8

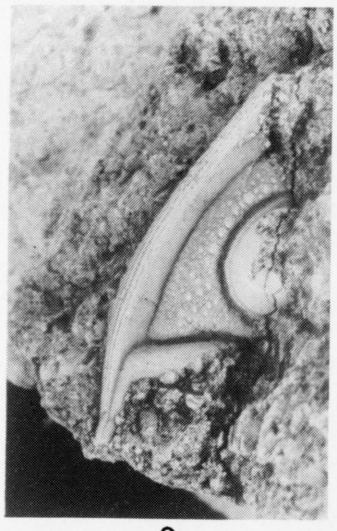


B

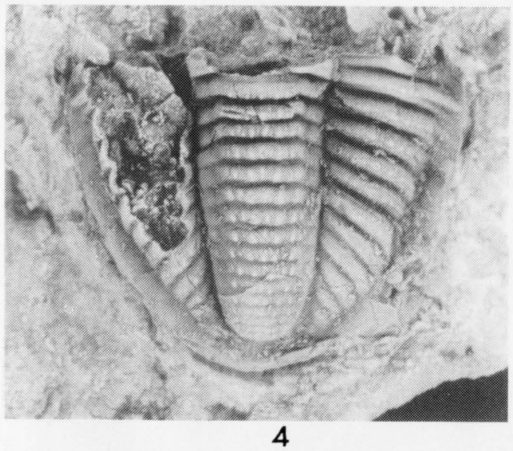


1

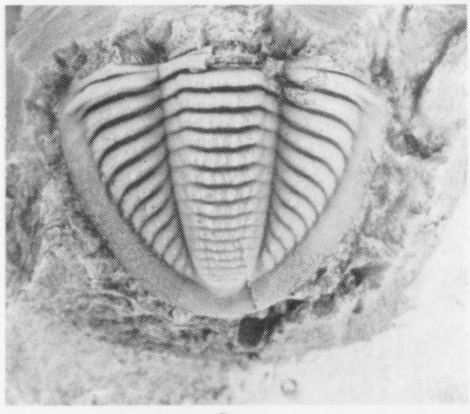
2



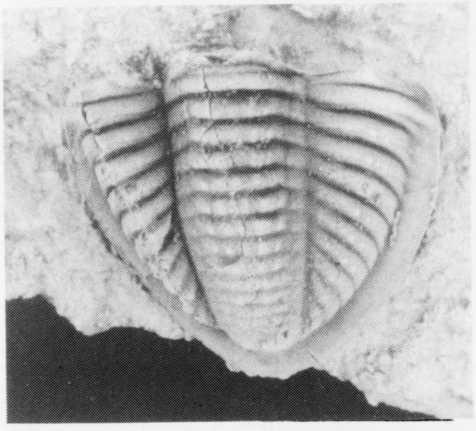
3



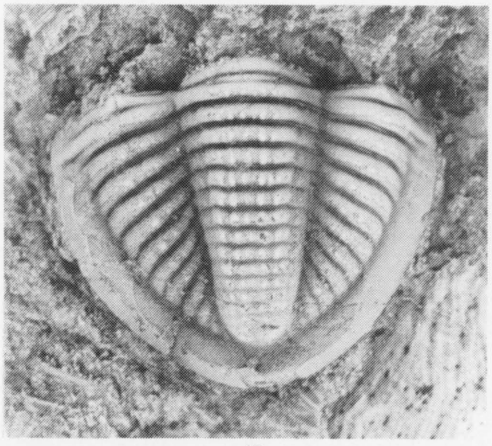
4



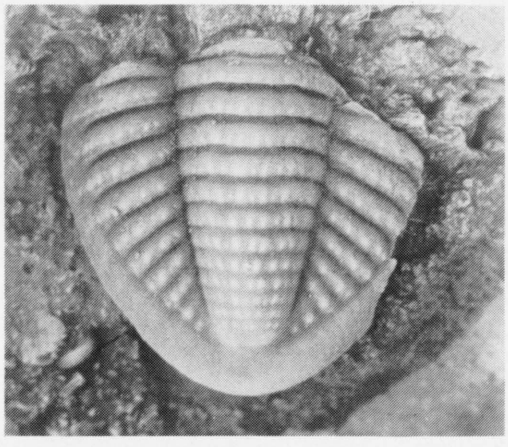
5



6



7



8