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Llandovery graptolites from localities along and adjoining the valleys of the Afon Cothi, Nant Melyn and west of the Afon Pysgotwr, Lampeter district

Central Wales Mapping Programme

Internal Report IR/02/193

Llandovery graptolites from localities along and adjoining the valleys of the Afon Cothi, Nant Melyn and west of the Afon Pysgotwr, Lampeter district

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Summary

This report describes the Llandovery graptolite biostratigraphy at localities along the valleys of the Afon Cothi and Nant Melyn, and in the vicinity of Pen-y-raglan-wynt, Lampeter district. Some of the age assignments remain provisional and further collecting is recommended at some localities.

Graptolite localities are summarised as following:

Item	Locality in brief	Grid reference	graptolite Biozone
1a	road section, Nant y Clun	SN 7472 4631	probably <i>magnus</i>
1b	road section, Nant y Clun	SN 7472 4631	'gregarius'
1c	road section, Nant y Clun	SN 7472 4631	<i>triangulatus</i> or <i>magnus</i>
2	Troed y rhiw hir	SN 7463 4666	<i>convolutus</i>
3	Troed y rhiw hir	SN 7490 4678	probably <i>convolutus</i>
4	Crugiau Merched	SN 7225 4595	<i>magnus</i>
5a	S of Bwlch y rhiw cottage	SN 7303 4631	low Llandovery?
5b	S of Bwlch y rhiw cottage	SN 7304 4590	<i>triangulatus</i> or <i>magnus</i>
6	SSE of Craig Diferion	SN 7346 4598	possibly <i>convolutus</i>
7	W of Bwlch y rhiw	SN 7205 4623	probably <i>convolutus</i>
8	near Bwlch y rhiw	SN 7235 4637	<i>convolutus</i>
9	near Bryn-arau-duon	SN 7260 4653	<i>convolutus</i>
10	Afon Cothi Valley	SN 7213 4650	uncertain
11	Afon Cothi Valley	SN 7182 4708 - 7185 4710	<i>proteus</i> or <i>crispus</i>
12	Nant y Gelynen	SN7456 4539	<i>convolutus</i>
13	Nant y Gelynen	SN 7452 4542 to 7452 4541	<i>sedgwickii</i> s.l.
14	Nant y Gelynen	SN 7446 4542	late Aeronian or early Telychian
15	Nant y Gelynen	SN 7446 4525	<i>convolutus</i> or <i>sedgwickii</i> s.l.
16	Pen-y-raglan-wynt	SN 7445 4938	<i>guerichi</i> - <i>crispus</i>
17	Pen-y-raglan-wynt	SN 7362 4915	<i>turriculatus</i> - <i>griestoniensis</i>

Biostratigraphy

The graptolite biozonal scheme used in the following discussions is based on Rickards (1976) and Loydell (1992, 1998).

A. Valleys of the Nant Melyn and Afon Cothi

Localities near Troed-y-rhiw-hir

K. A. Davies (1932, fig. 2) depicted a wide tract of ground north of Troed-y-rhiw-gelynen (NGR SN 7495 4605) underlain by rocks which he assigned to the 'M. leptotheca beds'. Collections from along the road section south of where the Nant y Clun stream crosses the road, probably identify the *magnus* Biozone in the middle of the 'M. leptotheca beds' at NGR SN 7472 4631 (see items 1a and 1c below). Further to the north, crags and exposures near Troed-y-rhiw-hir farmhouse (items 2 and 3 below) yield graptolites indicative of the *convolutus* Biozone. A thick anoxic NNE of Troed-y-rhiw-hir at NGR SN 7495 4698, thought by the mapping team to possibly be the '*sedgwickii* anoxic', has so far failed to yield graptolites. Further collecting in this area, particularly south of Troed-y-rhiw-hir along the Nant y Clun stream and in the stream to the west of Rhandir Owen [SN 7395 4688] has so far proved unsuccessful.

Item 1) roadside exposures 18 to 22 paces SE of where the Nant y Clun stream crosses the road.
NGR SN 7472 4631

a) 18 paces SE of stream. Loc. 9a of Lampeter register.

Specimens MWL5735-5748

Fauna: *Rhaphidograptus toernquisti* (Elles and Wood, 1906) – very common, cf. *Neodiplograptus peggyae* Cullum and Loydell, 1996, *Normalograptus*? sp., *Rastrites* sp. (possibly *longispinus* or *approximatus*), *Glyptograptus*? sp., fragment of triangulate? *Monograptus* or *M. simulans*-like, other monograptids

Age. The fauna is very poorly preserved and most specimens are short undiagnostic fragments. **Collectively they suggest the broadly defined *gregarius* Biozone** (= the *triangulatus*, *magnus* and *leptotheca* biozones combined), and, if the specimen of *peggyae* is confirmed, **the horizon is most probably the *magnus* Biozone.**

b) 19 paces SE of stream, about 1 m stratigraphically below 'a' above. Loc. 9b of Lampeter register.

Specimens MWL5749-5769

Fauna: *Campograptus lobiferus* (M'Coy, 1850)?, *Rhaphidograptus toernquisti*, *Normalograptus* sp. (*scalaris*?), *Glyptograptus incertus* (Elles and wood, 1907) or *G. sinuatus* (Nicholson, 1869) s.l.?, dorsally curved monograptid fragment, other monograptids

Age. The fauna is very poorly preserved and most specimens are short undiagnostic fragments. **Collectively they suggest the broadly defined *gregarius* Biozone.** If the presence of *C. lobiferus* can be verified by further collection, this horizon is most likely the *leptotheca* Biozone.

Should this prove the case, the boundary between the *leptotheca* and *magnus* biozones may lie hereabouts (see 'c' below). However, this horizon seems to be sandwiched by levels yielding *triangulatus* or *magnus* Biozone graptolites and so a *leptotheca* age seems most unlikely.

c) 22 paces SE of stream. Loc. 9c of Lampeter register.

Specimens MWL5770-5797

Fauna: *Monograptus triangulatus* (Harkness, 1851) s.l., *Rhaphidograptus toernquisti* – very common, *Pribylograptus incommodus* (Törnquist, 1899)?, *Glyptograptus* sp.

Age. **The graptolites indicate the *triangulatus* or *magnus* Biozone.**

Remarks. In the Rheidol Gorge section *R. toernquisti* is particularly common at the level of the *magnus* Biozone.

Item 2) Trackside exposure at 'hairpin'-bend, NW of Troed-y-rhiw-hir. Loc. 10 of Lampeter register.

NGR SN 7463 4666

Specimens MWL5711-5734

Fauna: *Monograptus limatulus* Törnquist, 1892, *Lituigraptus convolutus* (Hisinger, 1837), *Campograptus clingani* (Carruthers, 1867), *G. incertus*, *R. toernquisti*, *C. lobiferus*?, *Torquigraptus involutus* (Lapworth, 1876)? and *Metaclimacograptus* sp.

Age. **The fauna indicates the *convolutus* Biozone**, and using the criteria defined by Zalasiewicz (1996), this appears to be a horizon in the 'lower' or 'middle' *convolutus* Biozone.

Item 3) NW end of crag exposure above scree slope, c. 300 m NE of Troed-y-rhiw-hir. Loc. 11 of Lampeter register.

NGR SN 7490 4678

Specimen numbers: MWL5686-5710

Fauna: *C. lobiferus*, *Pristiograptus regularis* (Törnquist, 1899) s.l., *Rastrites* or *Lituigraptus* (fragments), *Glyptograptus*? sp. (small), *Metaclimacograptus*? sp.

Age. **The fauna suggests the *convolutus* Biozone (undifferentiated)**, though it is possible that this horizon could be in the *leptotheca* Biozone

Localities near Bwlch-y-rhiw and Bwlch-y-rhiw cottage

(Note that Bwlch-y-rhiw [SN 7238 4625] and Bwlch-y-rhiw cottage [SN 7300 4643] are 2 different localities)

Item 4) Hill (Crugiau Merched), south of Bwlch-y-rhiw cottage, at northern-most outcrop in west bank of small stream, *c.* 10 m south of fence. Loc. 12 of Lampeter register.

NGR SN 7225 4595

Specimen numbers: MWL5906-5945

Fauna: *R. toernquisti* – very common, *Metaclimacograptus hughesi* (Nicholson, 1869), *Monograptus triangulatus fimbriatus* (Nicholson, 1868), *M. triangulatus* s.l., *Neodiplograptus? magnus* (H. Lapworth, 1900) – very common, *N. peggyae?*, *Metaclimacograptus cf. undulatus* (Kurck, 1882)

Age. **The fauna indicates the *magnus* Biozone.**

Remarks. The *magnus* Biozone graptolites at this locality provide a minimum age for the underlying thick unit of conglomerates mapped here by Dr. D. Wilson.

Item 5) Stream section south of Bwlch-y-rhiw cottage

a, stream, south of Bwlch-y-rhiw cottage, about 100 m upstream from the cottage and SSE of the Chapel, from waterfall in stream bed. Loc. 22 of Lampeter register.

NGR SN 7303 4631

Specimen numbers: MWL5976-5978

Fauna: monograptid with simple tubular thecae, diplograptid indet.

Age. Low Llandovery? (see remarks).

Remarks. The graptolites are from thin sandy mudstone layers sandwiched between turbidite sandstone beds within the thick conglomeratic unit on the south side of the Nant Melyn valley (see also Item 4 above). Preservation is poor and this is an unusual lithology to yield graptolites, though the monograptid is suggestive of *Atavograptus atavus*, a species that ranges from the *atavus* to *magnus* biozones.

b, Stream (Gogyrrnant), south of Bwlch-y-rhiw cottage, about 500 m upstream from the cottage, east bank. Loc. 23 of Lampeter register.

NGR SN 7304 4590

Specimen numbers: MWL5998-6008

Fauna: *Rhaphidograptus toernquisti*, *Monograptus triangulatus* s.l., *Coronograptus?* sp., diplograptid (*Metaclimacograptus?*)

Age. **The fauna indicates the *triangulatus* or *magnus* Biozone.**

Remarks. The lithology at this horizon looks ashy. Small globular structures in hemipelagic layers are suggestive of radiolaria.

Item 6) Near head of stream, SSE of Craig Diferion. Loc. 24 of Lampeter register.

NGR SN 7346 4598

Specimen numbers: MWL5960-5975

Fauna: *Campograptus lobiferus*?, *Glyptograptus* cf. *tamariscus* (Nicholson, 1868), *Pristiograptus* sp., *Torquigraptus*? sp.,

Age. Very poorly preserved fauna, but **possibly indicates the *convolutus* Biozone.**

Item 7) Roadside crags, 300 m west of Bwlch-y-rhiw, 34 paces SW of where the crash barrier begins at western end of bend. Loc. 15 of Lampeter register.

NGR SN 7205 4623

Specimen numbers: MWL5818-5830

Fauna: *C. lobiferus*, *Monograptus capis* Hutt, 1975, *R. toernquisti*, *M. hughesi*?, *Torquigraptus*? sp., *Normalograptus*? sp.

Age. Although somewhat deformed by the cleavage, the fauna most **probably indicates the *convolutus* Biozone.**

Remarks. Davies (1932, p. 184) reported graptolites of the 'zone of *Monograptus sedgwicki*' from a quarter of a mile west of Bwlch-y-rhiw. Recollection, at what is most likely the same horizon that he reported, indicates the *convolutus* Biozone. It is evident, from the faunal list given for the *sedgwickii* Biozone by Davies (1932, p. 187), that he was conflating faunas that are now regarded as exclusively *convolutus* Biozone (e.g. *Monograptus clingani*, *Monograptus decipiens*) with those of the *sedgwickii* Biozone. Clearly, this may have implications for his mapped units, the M. sedgwicki Shales and M. sedgwicki Mudstones, if these represent bio/lithostratigraphically defined units. It may explain some of the problems of identifying these units encountered during the mapping of the Builth Wells Sheet.

Item 8) Track section just north of Bwlch-y-rhiw, 25 paces west of junction with main track to Bryn-arau-duon. Loc. 13.

NGR SN 7235 4637

Specimen numbers: MWL5869-5879

Fauna: *C. lobiferus*, *Campograptus harpago* (Törnquist, 1899)?, *M. limatulus*?, small fragment of *Petalolithus*?

Age. Although somewhat deformed by the cleavage, **the fauna indicates the *convolutus* Biozone:** *C. harpago* has been regarded as an uppermost *convolutus* Biozone form (e.g. Bjerreskov, 1975).

Item 9) Track section to Bryn-arau-duon, 37 paces north of gate/fence-line which marks boundary of land. Loc. 14 of Lampeter register.

NGR SN 7260 4653

Specimen numbers: MWL5880-5898

Fauna: *C. lobiferus*, *Glyptograptus tamariscus* (Nicholson, 1868)?, *M. limatulus*?, *M. hughesi*?

Age. **The fauna most probably indicates the *convolutus* Biozone.**

Item 10) Forest track exposure, about 300 m SE of Pwll Uffern-Gothi, Afon Cothi valley. Loc. 28 of Lampeter register.

NGR SN 7213 4650

Specimen numbers: MWL5952-5954

Fauna, monograptid fragments.

Age. Uncertain.

Remarks. The small number of graptolites were recovered after more than one hour of collecting. It is unlikely that this thin anoxic horizon will bear any diagnostic fauna.

Item 11) Forest track exposure, west of Llethr Gwinau, 560 to 590 paces NE of fork in track (2, along strike sub-localities), Afon Cothi Valley. Locs 21 and 21a of Lampeter register.

Sheet SN74/NW/3

NGR SN 7182 4708 to SN 7185 4710

Specimen numbers: MWL6009-6014, MWL6015-6027, MWL6482-6496

Fauna: *Monograptus bjerreskovae* Loydell (common), 1993, cf. *Torquigraptus proteus* (Barrande, 1850), *Monograptus marri* Perner, 1897, *Petalolithus* sp., *Glyptograptus* sp., *Pristiograptus* sp.

Age. **Telychian, probably the *proteus* Subzone**, suggested by the absence of *Monograptus discus* or *M. crispus*.

Item xx) Small roadside exposure from ditch on E side of track. Locality 8/7/3-1 of Lampeter Register.

Sheet SN74/NW/3

NGR SN 7156 4691

Specimen numbers: MWL6459-6466

Fauna: *Monograptus bjerreskovae*?, proximal fragment of *Torquigraptus* (with elongate prothecae), other graptolite fragments

Age. **Telychian, within the range *guerichi* to *crispus* biozones.**

Item xx) Small quarry NW of Banc y Garth on farm track to Nant-yr-ast farm. Loc. 8/7/3-2 of Lampeter Register.

Sheet SN74/NW/1

NGR SN 7095 4806

Specimen numbers: MWL6467-6481

Fauna: *Streptograptus exiguus* (Nicholson, 1868) (very common), hooked monograptid cf. *Monograptus marri*

Age. **Telychian, probably the *carnicus* Subzone**

Remarks. The specimens of *Streptograptus exiguus* have a proximal width of 0.25-0.30mm and reach a distal maximum width of 0.56mm. They have distal 2TRD of about 1.3-1.5mm. For the first 3 to 4 thecae the rhabdosome is straight, and thereafter is ventrally curved. Hooked monograptids are also common in this collection, and one proximal fragment appears referable to *M. marri*. However, the distal dimensions of some of the specimens, which have been tectonically distorted, are too broad for that species.

Item xx) At bend of track, c. 200m from the farm Nant-yr-ast. Loc. 8/7/3-3 of Lampeter Register. Low yield horizon.

Sheet SN74/NW/1

NGR SN 7077 4824

Specimen numbers: MWL6497-6503

Fauna: *Monograptus discus*, *Monograptus clintonensis*, cf. *Monograptus marri* (incomplete and distal fragments)

Age. **Telychian, *crispus* Biozone.**

Item xx) Track section about 600m due N of Nant-yr-ast. Locality 8/7/3-4 of Lampeter Register. Low yield horizon, c. 2 to 3 graptolites per hour.

Sheet SN74/NW/1

NGR SN 7084 4886

Specimens numbers: MWL6504-6515

Fauna: *Monoclimacis* cf. *geinitzi*, *Torquigraptus spiralooides*, *Monograptus clintonensis*, *Monograptus* aff. *parapriodon*

Age. **Telychian, *griestoniensis* Biozone**

Localities along the Nant y Gelynen

Additional collecting along the Nant y Gelynen is needed. The following results are the product of a cursory examination of the graptolite material thus far collected.

Item 12) Tributary of the Nant y Gelynen opposite Craig Cwmbeudy, towards mouth of tributary and downstream from fork. Loc. 29 of Lampeter register.

NGR SN 7456 4539

Specimen numbers: MWL6087-6104

Fauna: *Campograptus lobiferus*, *Pristiograptus* sp., *Petalolithus* sp., other graptolites

Age. The fauna indicates the ***convolutus* Biozone**

Item 13) Tributary of the Nant y Gelynen opposite Craig Cwmbeudy, midway up stream, north and south bank (along strike localities. Locs 30 and 32 of register.

NGR SN 7452 4542 to 7452 4541

Specimen numbers: MWL6089-6078

Fauna: *Stimulograptus sedgwickii* (Portlock, 1843), *Stimulograptus sedgwickii* or *halli*, *Metaclimacograptus undulatus* (Kurck, 1882)

Age. The fauna indicates the ***sedgwickii* Biozone s.l.**

Item 14) Tributary of Nant y Gelynen opposite Craig Cwmbeudy, near top of stream at break of slope to plateau. Loc. 33 of Lampeter register.

NGR SN 7446 4542

Specimen numbers MWL6062-6068, MWL6516-6523

Fauna: cf. '*Monograptus*' *obtusus*, *Glyptograptus* sp., *Stimulograptus*? sp., monograptid cf. *Monograptus bjerreskovae* or *Paradiversograptus runcinatus*

Age. **Late Aeronian or early Telychian**

Remarks. Davies (1932, p. 186) reports *Monograptus turriculatus* and *Rastrites linnaei* from the upper part of the Nant y Gelynen section, but I am so far unable to confirm this stratigraphical level. The present collection suggests the upper Aeronian ('*M.*' *obtusus*) or earliest Telychian (*M. bjerreskovae*/*P. runcinatus*) though all of the fauna from this horizon is poor and fragmentary.

Item 15) Tributary of Nant y Gelynen southwest of Craig Cwmbeudy, near mouth of stream on north bank. Loc. 31 of Lampeter register.

NGR SN 7446 4525

Specimen numbers: MWL6079-6086

Fauna: *Campograptus lobiferus*?, *Stimulograptus sedgwickii*?, other graptolites

Age. The fauna indicates the ***convolutus* or *sedgwickii* s.l. Biozone**

B. Pen-y-raglan-wynt Hill

Item 16) Forest track side exposure, East of Pen-y-raglan-wynt. Loc. 26 of Lampeter register.

NGR SN 7445 4938

Specimen numbers: MWL5979-5997a-f

Fauna: *Monograptus marri*?, *Monograptus bjerreskovae*, *Stimulograptus*?, *Torquigraptus*?, monoclimacid? fragment

Age. **Within the range *guerichi* to *crispus* Biozone**

Remarks. The fauna is very poorly preserved making identification difficult. The locality lies along strike from the sequence sampled to the NE of the Pysgotwr Gorge (see Williams, 2002, IR/02/132).

Item 17) Small quarry on forest track, SW of Pen-y-raglan-wynt: at southern end of quarry. Loc. 25 of Lampeter register.

NGR SN 7362 4915

Specimen numbers: MWL5955-5959

Fauna: *Normalograptus nebula* (Cocks and Toghil, 1973), hooked monograptid

Age. **Within the range upper *turriculatus* Biozone s.s. (*proteus* Subzone) to *griestoniensis* Biozone**

Remarks. Graptolite fauna in this quarry is extremely sparse.

Selected references

References listed below are held in the Library of the British Geological Survey at Keyworth, Nottingham. Copies of the references may be purchased from the Library subject to the current copyright legislation. References for graptolite species names are not given, but these can be found in Hutt (1974, 1975), Cullum and Loydell (1996) and Strachan (1997).

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