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Silurian (Wenlock and Ludlow) graptolites from localities between Tirabad in the west and the area of Crychan Forest to the east, Bulth Wells area (E & W Sheet 196):

- Caerau farm track and the military firing range immediately to the east;
- Track section at Blaengefail
- Track sections on the military firing range to the south of Maesyron
- Localities between the roadside quarry southeast of Maesyron to Cefn-brith, including the track section at Cynala-uchaf

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Geographical index

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Subject index

Graptolites

Silurian; Wenlock & Ludlow

Biostratigraphy

British Geological Survey, Keyworth, Nottingham

Distribution

Keyworth: Biostratigraphy Research Group files (2),
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Introduction

This report documents Wenlock and Ludlow age graptolites from the area between Tirabad in the west and the Crychan Forest to the east. Graptolite localities are treated in four subsections:

- A) - Caerau farm track and the military firing range immediately to the east, vicinity of Tirabad
- B) - Track section at Blaengefail
- C) - Llwynfynwent farm to the track sections on the military firing range to the south of Maesyron
- D) - Localities between the roadside quarry southeast of Maesyron to the track section northwest of Cefn-brith, including the track section southeast of Cynala-uchaf

The Wenlock graptolite biozonation used herein follows Zalasiewicz & Williams (1999). The biozonation for the Ludlow follows Rickards (1976).

Biostratigraphy

A) - Caerau farm track and the military firing range immediately to the east, vicinity of Tirabad

The river section which runs through the military firing range (assault course) in grid square SN 88 40 to the southeast of Tirabad was examined in some detail. **Graptolites were only recovered at the eastern end of the section (see Item 2), but further collecting is needed here.** Two mid-Wenlock graptolite-bearing horizons were collected in the quarry just to the northeast of Caerau farm (Item 1). A rock sample was also taken from the small quarry beside the road to the northwest of Caerau (at NGR SN 8792 4082) for micropalaeontological analysis (passed to Dr S.G. Molyneux).

Item 1) quarry adjacent track, just to the north-northeast of Caerau farm: Loc. **29/9/00-A**, at level in quarry 70 paces north-northeast from ford across river (outcrop near base of quarry face) at NGR SN 8811 4075; Loc. **29/9/00-B**, as above but 51 paces from ford at NGR SN 8810 4073
Specimen numbers: MWL4315-4333, 4431-4436

Fauna
Monograptus flexilis Elles, 1900 (abundant)

Locality
A, B

<i>Monograptus priodon/flemingii</i>	A
<i>Monoclimacis flumendosae</i> (Gortani, 1923) (biform morphology)	B
orthoconic nautiloid	B
Problematicum	A

Age: mid Wenlock, *dubius* or *rigidus* biozone, probably the latter

Remarks. The abundance of *M. flexilis* suggests the *rigidus* biozone at both horizons (see also Williams & Zalasiewicz 1997; Zalasiewicz & Williams 1999).

There is probably no more than a couple of metres stratigraphically between 29/9/00-A and the higher horizon 29/9/00-B.

Item 2) Locality 26/10/00-B, Senney Bridge military firing range, *c.* 1km southeast of Tirabad, stream section, first crag on east bank *c.* 50 paces downstream from road bridge.

NGR SN 8868 4075

Specimen numbers: MWL4331-4333

Fauna: graptolite fragments including ?*Pristiograptus*

Age: Silurian

Remarks. Further collecting is needed here: collection was aborted in order to study the stream section northwest of Cefn (see below, section D).

B) - Track section at Blaengefail

The farm track section leading from the road just to the north of Penlanwen farm, north-westwards to the Afon Dulas, has been examined in detail. It yields several graptolite and shell-bearing horizons. Those to the northwest of Blaengefail farm include graptolites of early Wenlock age. Rich trilobite faunas were collected (R.A. Waters & J.R. Davies) from the track opposite the caravan, near the junction with the road (NGR SN 8950 4210; specimens MWL4185-4196). The quarry which lies in the field to the southwest of Blaengefail at NGR SN 8920 4223 was also examined. It yields numerous beyrichiacean ostracods and other shelly fossils, but no graptolites were seen.

Item 1) Locality 28/9/00-C, track section, 40 paces along track northwest from gate at Gefail-fach, *c.* 0.5km south-southeast of Abergefai farm. The graptolites are from a single hemipelagic lamina.

NGR SN 8907 4253

Specimen numbers: MWL4132-4139, 4305-4314

Fauna: *Retiolites angustidens* Elles & Wood, 1908
Monoclimacis vomerina 'gracilis' (Elles & Wood, 1910)
Monograptus priodon (Bronn, 1835)
Cyrtograptus centrifugus Boucek, 1931

Age: early Wenlock, *centrifugus* biozone

Remarks. The fauna is similar to that recorded for item 3 below.

Item 2) Locality 23/10/00-A, farm track section, 19 paces along track from gate at Gefail-fach, *c.* 0.5km south-southeast of Abergefai farm.

NGR SN 8900 4250

Specimen numbers: MWL4284-4304

Fauna: *Monograptus riccartonensis* Lapworth, 1876
Monograptus firmus Boucek, 1931 s.l.?
 shell material

Age: early Wenlock, *riccartonensis* biozone

Item 3) Locality 22/10/00-A, track section at Gefail-fach, first outcrop just to the east of the gate. The graptolites are from a single hemipelagic lamina.

NGR SN 8911 4249

Specimen numbers: MWL4494-4508

Fauna: *Retiolites angustidens*
Monoclimacis vomerina 'gracilis'
Monoclimacis vomerina vomerina (Nicholson, 1872)?
Monograptus parapriodon Boucek, 1931 (specimen oblique to lamination)
Monograptus priodon?
Cyrtograptus centrifugus? (distal fragment)

Age: possibly early Wenlock, *centrifugus* biozone

Remarks. *M. parapriodon* if correctly identified would suggest the late Telychian *spiralis* biozone, though the specimen in question is oblique to the lamination and might be a deformed *M. priodon*. The distal fragment referred questionably to *C. centrifugus* is identical to more complete specimens of that species in the Harris Cambridge collection. On the weight of evidence, and given proximity to a definite *centrifugus*-bearing locality (see Item 1 above), this horizon is probably low in the Wenlock.

C) – Llwynfynwent farm to the track sections on the Senney Bridge military firing range to the south of Maesyron

Localities are detailed in an approximate west to east traverse, beginning with those outcrops south of Llwynfynwent farm, along the track and east of the Sheep shed at NGR SN 8985 4265. In the outcrop behind the sheep shed the strata yield orthoconic nautiloids but no graptolites were seen.

The collections of items 3-7 below (on the military firing range) contain graptolite assemblages dominated by *Pristiograptus* ex gr. *dubius* - including *P. tumescens* morphologies - and possible *Colonograptus*. These are unusual for the near absence of saetograptids. The graptolite assemblages resemble late Gorstian *tumescens* biozone faunas, though the occurrence of colonograptids(?) is also suggestive of late Wenlock or early Ludlow horizons. The Ludlow Research Group (LRG) collected hereabouts in 1975 and recovered similar *P. tumescens*-dominated faunas (at NGR SN 9030 4245: see Walmsley 1976, p. 17). Along strike localities at Cynala-uchaf (see section D below) yield definitive Ludlow faunas. At some horizons on the firing range (e.g. Item 6) the graptolites co-occur with shelly faunas, and there is a strong suggestion that the absence of diagnostic saetograptids or lobograptids may be (shallow) facies related: some horizons at Aberedw Hill (see Report IR/00/056) yield similar faunas, but these are sandwiched between more diagnostic Ludlow graptolite faunas. Facies control has serious implications for the recognition of a discrete temporal interval defined as the *tumescens* biozone.

Item 1) 'Knucklas-castleoid' locality, excavation in track section just west of the road, west-southwest of Cwm Dwfnant: Locality 25/10/00-E, 57 paces along track (NGR SN 9025 4294); Locality 23/10/00-C, about 30 paces along track (NGR SN 9024 4292).
Specimen numbers: MWL4220-4233, 4424-4430

Fauna	Locality
<i>Monograptus flemingii</i> (Salter, 1852)	25/10/00-E
trilobites	25/10/00-E, 23/10/00-C
beyrichiacean ostracods (abundant)	25/10/00-E, 23/10/00-C

Age: mid or late Wenlock

Remarks. The age is based on a single distal fragment of *M. flemingii*. Several attempts to recover more graptolites have failed. Refinement of the biostratigraphy may be possible by means of the abundant and well preserved beyrichiacean ostracods and trilobites. Nearby at Cwm Dwfnant itself, the LRG identified upper Wenlock strata (shelly faunas including trilobites) in fault contact with Ludlow strata (see Walmsley 1976, p. 17).

Item 2) Locality 28/9/00-B, Senney Bridge military firing range, northernmost studied track section of grid square SN 90 42, within the Crychan forest southeast of Maesyron farm; 50 paces along track east from junction of tracks. Sample from drainage gutter cut into bedrock. Despite intensive hammering for more than 2 hours, I have been unable to recover additional specimens from the gutter at this point, or from the gutter section along the southerly directed track lying just to the west. The graptolite was recovered from a pyritic layer in black hemipelagic mudstones.
NGR SN 9051 4291
Specimen number: MWL4140

Fauna: *Saetograptus colonus colonus* (Barrande, 1850)

Age: Ludlow, *nilssoni* or *scanicus* biozone

Remarks. The specimen of *S. colonus colonus* has spines at least to the level of theca 5. The occurrence of Ludlow graptolites at this locality is in accordance with the report of 'middle Elton' graptolites hereabouts by the LRG (see Walmsley 1976, p. 17).

Item 3) Locality 27/9/00-C, Senney Bridge military firing range, northernmost studied track section of grid square SN 90 42, within the Crychan forest southeast of Maesyron farm; 140 paces along track east from junction of tracks. Sample from drainage gutter cut into bedrock: all easily available exposure mined out.
NGR SN 9062 4292
Specimen numbers: MWL4147-4161

Fauna: *Pristiograptus tumescens* (Wood, 1900)
Pristiograptus ex gr. *dubius* (Suess, 1851)
Colonograptus? sp.
Saetograptus chimaera (Barrande) s.l.?
graptolite or plant fragment (MWL4152)

Age: Ludlow, within the range *nilssoni* to *tumescens* biozones – see Remarks

Remarks. The material referred to *Colonograptus?* (e.g. MWL4155, 4148) shows evidence of a lappeted theca 1, and in some instances a lappeted theca 2 (e.g. MWL4148). Theca 1 also has its ventral wall markedly concave. The species closely resembles *Colonograptus ludensis* (Murchison, 1839), diagnostic for the eponymous late Wenlock biozone. However, *C. ludensis* also ranges into the *nilssoni* biozone of the Ludlow. Nevertheless, I am uncertain how far such features might represent intraspecific variation amongst *P. ex gr. dubius* or *P. tumescens* forms.

It should be noted that at Aberedw Hill, intra Ludlow faunas can be dominated by *Pristiograptus ex gr. dubius* with no saetograptids (see IR/00/56, section D, items 5, 6). Thus, this horizon, apparently up-sequence from Loc. 28/9/00-B, might lie within the Ludlow, despite the absence of saetograptids or lobograptids, and despite the occurrence of possible *Colonograptus*. A Ludlow age is also suggested by the occurrence of numerous *Pristiograptus tumescens*, and by along strike faunas at Cynala-uchaf (see Section D below).

The specimen referred to *Saetograptus chimaera?* resembles that reported from Cynala-uchaf (see Item 7, Section D).

Two graptolite-bearing horizons just to the west, localities 28/9/00-A (at NGR SN 9056 4292) and 27/9/00-D (at NGR SN 9060 4292), yield very poor faunas which could be of Wenlock or Ludlow age.

Item 4) Senney Bridge military firing range, northernmost studied track section of grid square SN 90 42, within the Crychan forest southeast of Maesyron farm: Loc. **27/9/00-B**, 240 paces along track east from junction of tracks (from outcrop at side of track) at NGR SN 9070 4286; Loc. **27/9/00-A**, 260 paces along track east from junction of tracks (from outcrop at side of track) at NGR SN 9072 4285. Both of these horizons appear to be in oxic mudstones.
Specimen numbers: MWL4162-4165

Fauna	Locality
<i>Pristiograptus ex gr. dubius</i>	B
<i>Pristiograptus tumescens</i>	A

Age: probably Ludlow

Item 5) Locality 23/10/00-B, Senney Bridge military firing range, northernmost studied track section of grid square SN 90 42, within the Crychan forest southeast of Maesyron farm; 140 paces along track east from junction of tracks. Sample from drainage gutter cut into bedrock.
NGR SN 9074 4283
Specimen numbers: MWL4262-4283

Fauna: *Pristiograptus ex gr. dubius*
Pristiograptus tumescens
'*Pristiograptus auctus* Rickards, 1965?

Age: probably Ludlow, within the range *nilssoni* to *tumescens* biozones

Remarks. The specimen referred to '*P. auctus*' (MWL4274), a typical late Wenlock – early Ludlow form, lies on a slab with specimens of *Pristiograptus tumescens* and *Pristiograptus ex gr. dubius*. It shows thickening of the virgella into a small bulb and the ventral wall of its theca 1 appears to be concave, though I cannot discern a definite lappeted aperture. I am uncertain how far such features might represent intraspecific variation amongst *P. ex gr. dubius* forms.

Item 6) Locality 10/02/01-A, Senney Bridge military firing range, southernmost studied track section of grid square SN 90 42, small excavation on east side of track, just south of hairpin bend. NGR SN 9076 4258
Specimen numbers: MWL4893-4909

Fauna: *Pristiograptus* ex gr. *dubius*
Colonograptus? sp.
brachiopods
beyrichiacean ostracods

Age: probably Ludlow

Remarks. The fauna is not diagnostic of the Ludlow and the age is based on along strike considerations (as for item 7 below).

Item 7) Locality 10/02/01-B, Senney Bridge military firing range, southernmost studied track section of grid square SN 90 42, east side of track, buff mudstones near southern end of exposure, c. 100m south of where S-bend straightens into track. NGR SN 9189 4235
Specimen numbers: MWL4888-4892 (several very poor specimens discarded)

Fauna: *Pristiograptus* ex gr. *dubius*
Pristiograptus tumescens

Age: probably Ludlow, within the range *nilssoni* to *tumescens* biozones

D) - Localities between the roadside quarry southeast of Maesyron to Cefn-brith, including the track section southeast of Cynala-uchaf

Within this area seven localities were visited. Attempts to recover graptolites from the quarry just north of Maesyron in the farmyard (NGR SN 9030 4360), from the small quarry at Gallt-yr-halarn (NGR SN 9105 4405), and from the stream section to the east of Tynllwyni (NGR SN 4395 9065) were unsuccessful. Orthoconic nautiloids are present in the quarry at Maesyron and this might correlate with along strike? localities south of Llwynfynwent Farm which also yield orthocones (see Section C above).

Item 1) Locality 24/10/00-A, quarry at bend in road south-southeast of Maesyron, 39 paces from gate (walking east). NGR SN 9037 4330
Specimen numbers: MWL4239-4261

Fauna: *Pristiograptus* ex gr. *dubius* (Suess, 1851) (abundant)
'*Pristiograptus*' cf. *deubeli* (Jaeger, 1959)

Age: late Wenlock or early Ludlow

Remarks. The composition of this fauna resembles those from the track sections on the military firing range (Section C, items 2-7). However, the occurrence of a possible *deubeli* (with a typical flared sicula: see MWL4249) might suggest the late Wenlock *ludensis* biozone s.l.

Item 2) Locality 25/10/00-B, stream section 300m north-northwest of Maesyron, south bank of stream, from crag at convex break of slope. Poorly fossiliferous horizon in silty mudstone.

NGR SN 9015 4378

Specimen numbers: MWL4212-4219

Fauna: *Monograptus riccartonensis*

Age: early Wenlock, *riccartonensis* biozone

Item 3) Locality 26/10/00-A, Tynllwyni, from rockery outcrop to the east of the main house. The material is from scree as the horizon was not located in the rock face & additional collecting is impossible without undermining the land owner's rockery.

NGR SN 9044 4400

Specimen numbers: MWL4234-4236

Fauna: *Monograptus priodon*

Age: probably not younger than the Wenlock *riccartonensis* biozone

Item 4) Locality 26/10/00-C, middle of stream bed, 30 paces west (downstream) of the road, c. 0.5km north of Cynala-uchaf.

NGR SN 9102 4483

Specimen numbers: MWL4197-4211

Fauna: *Monoclimacis flumendosae* (biform morphology)
Pristiograptus ex gr. *dubius*
Cyrtograptus sp. (long distal fragments of *C. rigidus*?)
 retiolitid?

Age: mid Wenlock, *rigidus* or *lundgreni* biozone

Item 5) Locality 11/02/01-A, old mill track section to the northwest of Cefn-brith farm, 73 paces down track from gate. Exposure in trackway, needs excavating.

NGR SN 9152 4546

Specimen numbers: MWL4910-4915 (preservation of specimens suggests shearing)

Fauna: *Pristiograptus* ex gr. *dubius*
Monoclimacis flumendosae (proximal fragment)
Sokolovograptus? sp. (retiolitid)
 plant fragments?

Age: mid Wenlock, within the range *dubius* – *lundgreni* biozones

Remarks. This section appears to lie approximately along strike from locality 26/10/00-C (above).

Elsewhere in the Builth Wells area *Sokolovograptus*-like retiolitids have been recorded particularly from the *rigidus* biozone.

Despite their occurrence in hemipelagic sediments, the general rarity of graptolites at this horizon, and the preponderance of juvenile colonies and siculae, suggests a stressed, graptolite-unfriendly environment.

Item 6) Locality 12/02/01-A, track section southeast of Cynala-uchaf, just west of small quarry, 44 paces east of gate across track. Graptolite-bearing horizon in silty sandstones.

NGR SN 9148 4411

Specimen numbers: MWL4916-4933

Fauna: *Saetograptus varians* (Wood, 1900)

Pristiograptus tumescens

Pristiograptus ex gr. *dubius*

Lobograptus? (small fragment)

other graptolite fragments

crinoid ossicles

brachiopods

Age: Ludlow, within the range *nilssoni* to early *tumescens* biozone

Remarks. Apart from the occurrence of saetograptids, this fauna resembles those collected from the track sections on the military firing range (items 2-7, section C), which appear to lie directly along strike. Despite similarity to faunas of the *tumescens* biozone, the absence of lobograptids might be environmental, rather than temporal.

Item 7) Locality 10/02/01-C, track section southeast of Cynala-uchaf, 195 paces east of gate across track and east of small quarry. Low yielding graptolite-bearing horizon in sandstones.

NGR SN 9157 4406

Specimen numbers: MWL4934-4937

Fauna: *Saetograptus* cf. *chimaera chimaera* (Barrande, 1850)

graptolite fragments

macerated plant debris

Age: Ludlow, ?*nilssoni* or *scanicus* biozone

Remarks. If the identification of *S. chimaera chimaera* is correct, this horizon – the youngest graptolite-bearing locality in the Cynala-uchaf section – is probably not younger than the *scanicus* biozone.

Selected references

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Rickards, R.B. 1976. The sequence of Silurian graptolite zones in the British Isles. *Geological Journal* 11, 153-188.

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