A FAUNAL ANALYSIS OF SOUDLEYAN/LONGVILLIAN ROCKS IN SNOWDONIA, NORTH WALES

DAVID KENNETH WRIGHT B.Sc. (Hons.)

A thesis submitted for the degree of
Doctor of Philosophy of the
Council of National Academic Awards

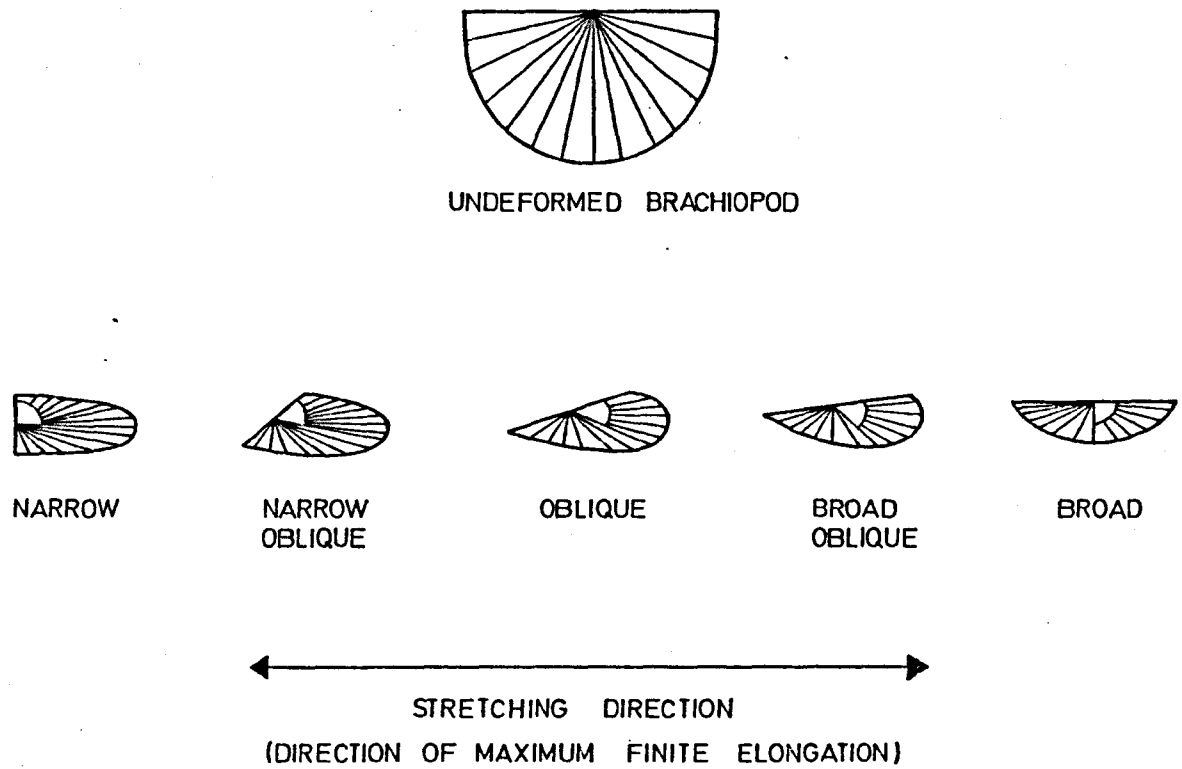
School of Geology, Kingston Polytechnic

Vol.2

JUNE 1979

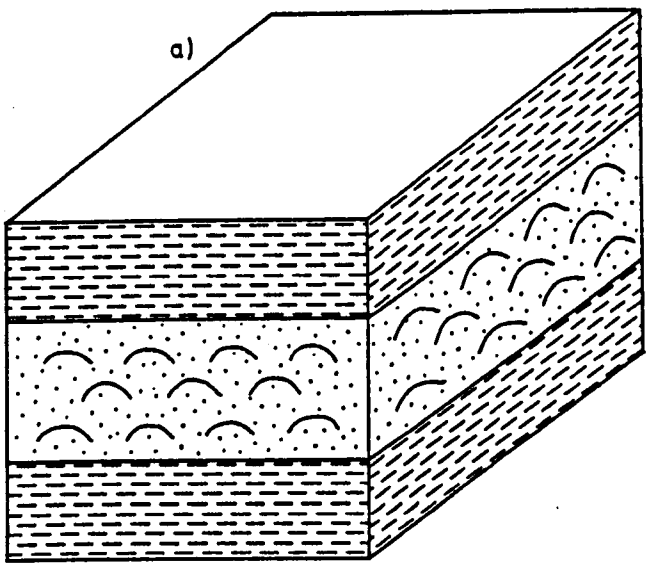
Fig. 3.1

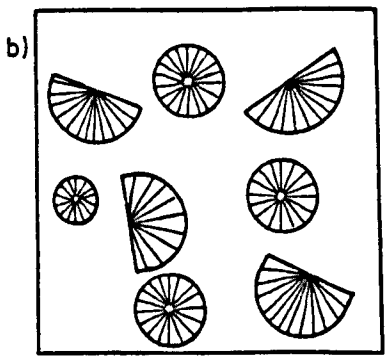
BRACHIOPOD DEFORMATION



(after Voll, 1960)

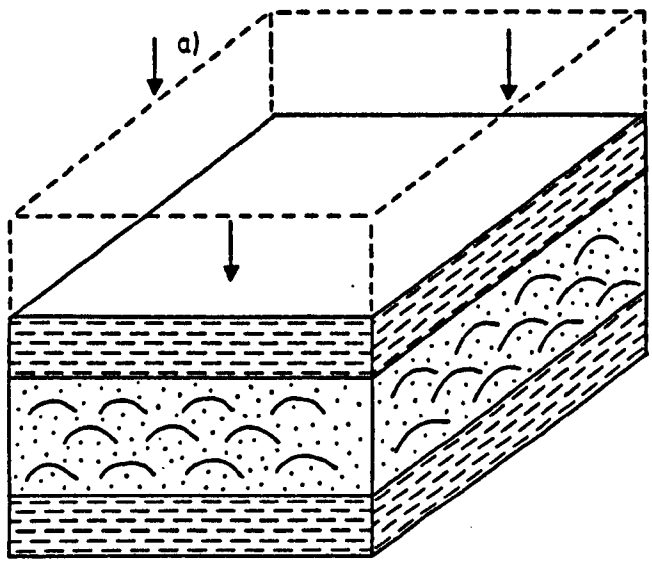
Fig. 3.2 UNIAXIAL DEFORMATION

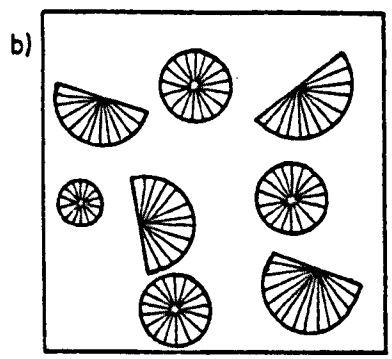




PLAN VIEW OF BEDDING PLANE WITH BRACHIOPOD VALVES AND DISARTICULATED CRINOID COLUMNALS

UNDEFORMED

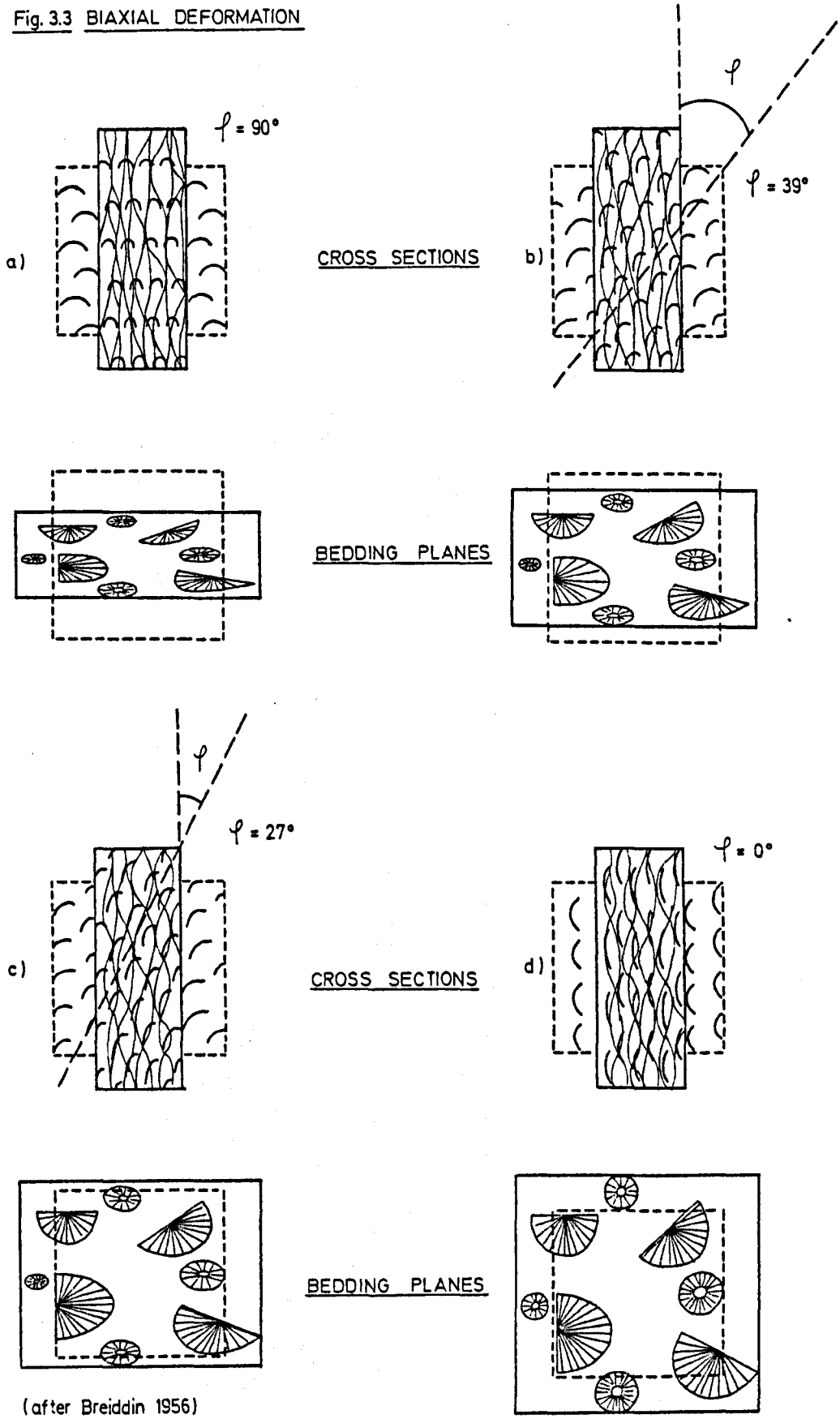




PRETECTONIC COMPACTION OR DIAGENETIC DEFORMATION
(UNIAXIAL DEFORMATION) (Voll 1960)

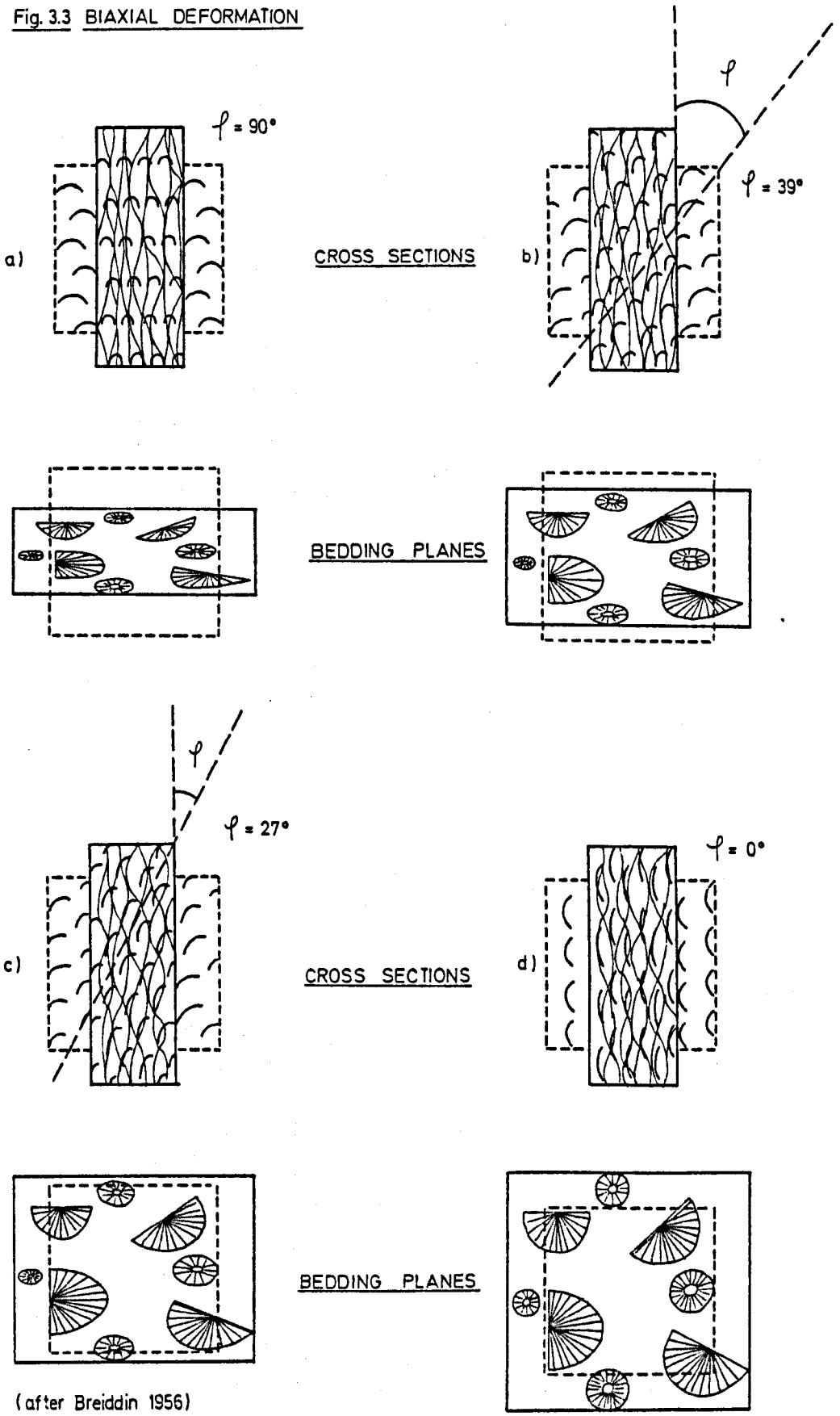
(after Breiddin 1956)

Fig. 3.3 BIAXIAL DEFORMATION



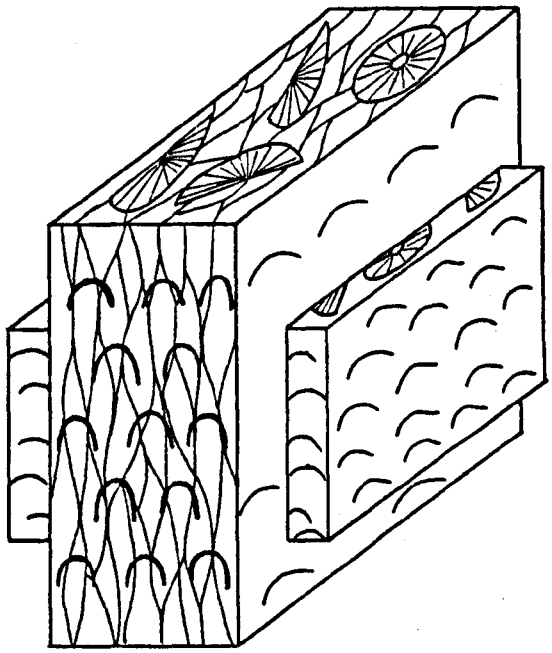
(after Breiddin 1956)

Fig. 3.3 BIAXIAL DEFORMATION

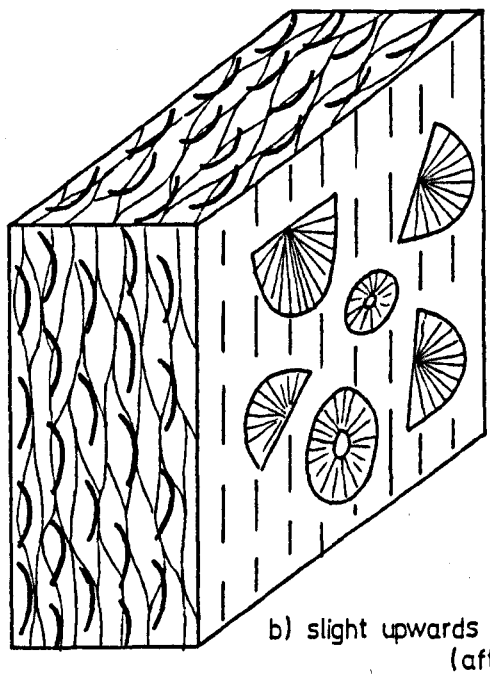


(after Breiddin 1956)

Fig.3.4 TRIAXIAL DEFORMATION

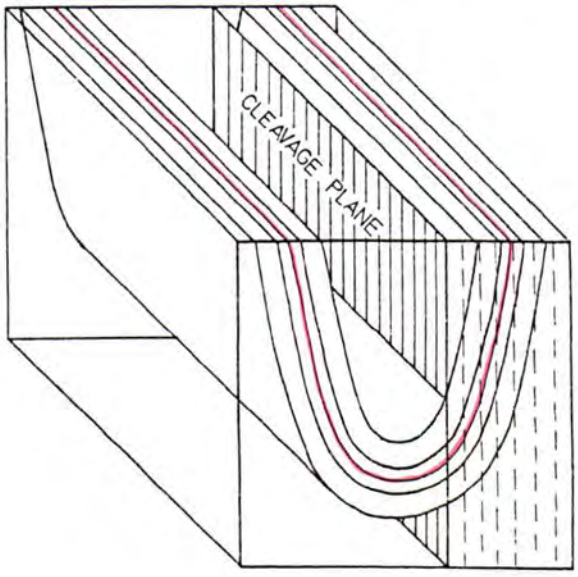


a) lateral extension $\varphi = 90°$



b) slight upwards extension $\varphi = 0°$
(after Breiddin 1956)

Fig. 3.5
UPRIGHT HORIZONTAL SYMMETRICAL SYNCLINE WITH AXIAL PLANAR CLEAVAGE



PROFILE PLANE

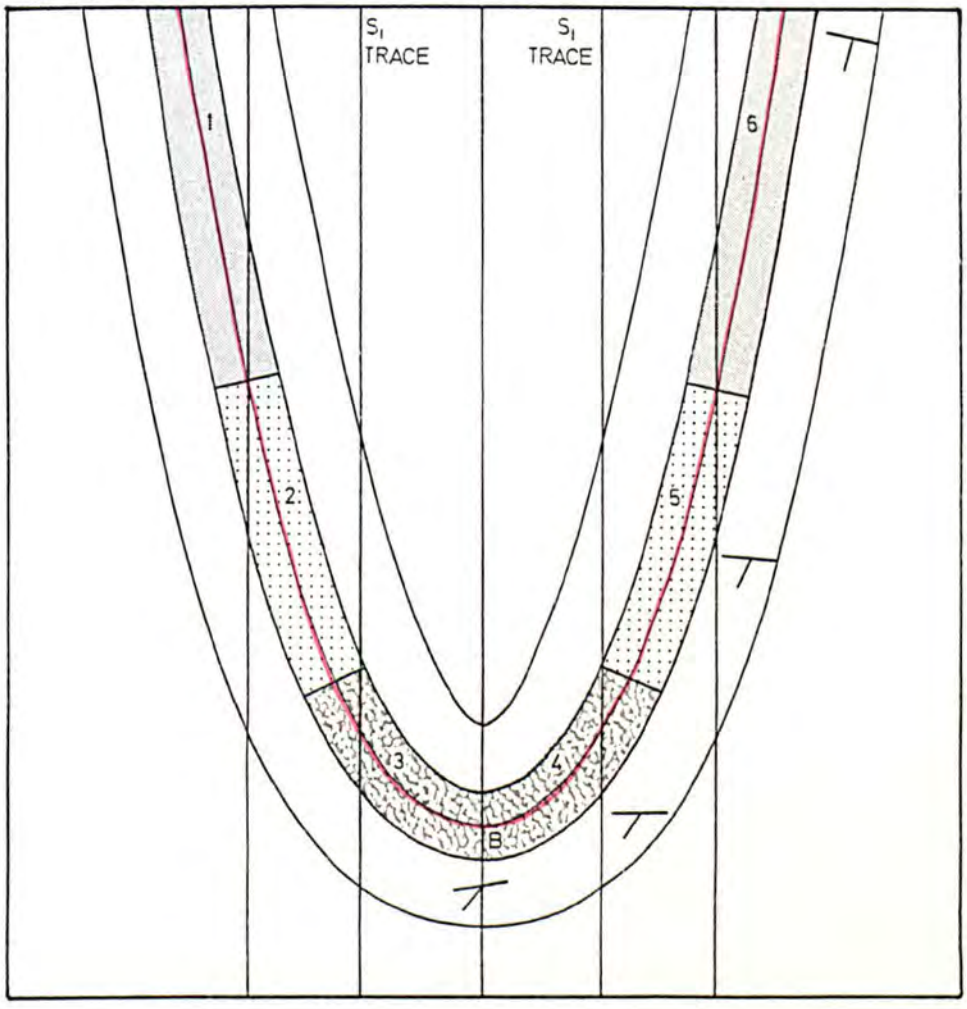
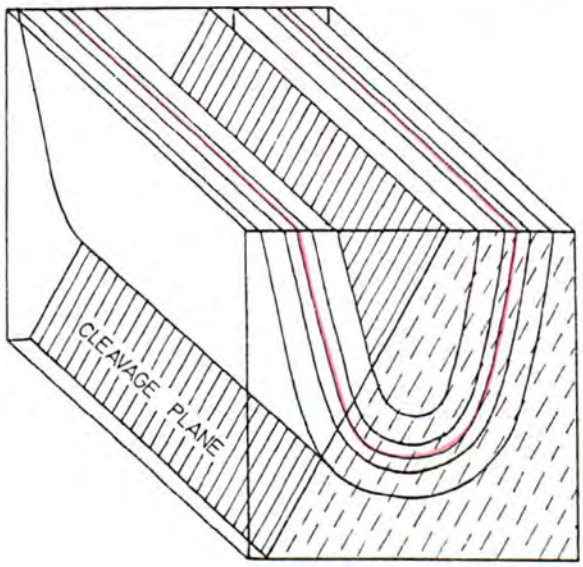


Fig. 3.6
UPRIGHT HORIZONTAL SYMMETRICAL SYNCLINE WITH OBLIQUE CLEAVAGE



PROFILE PLANE

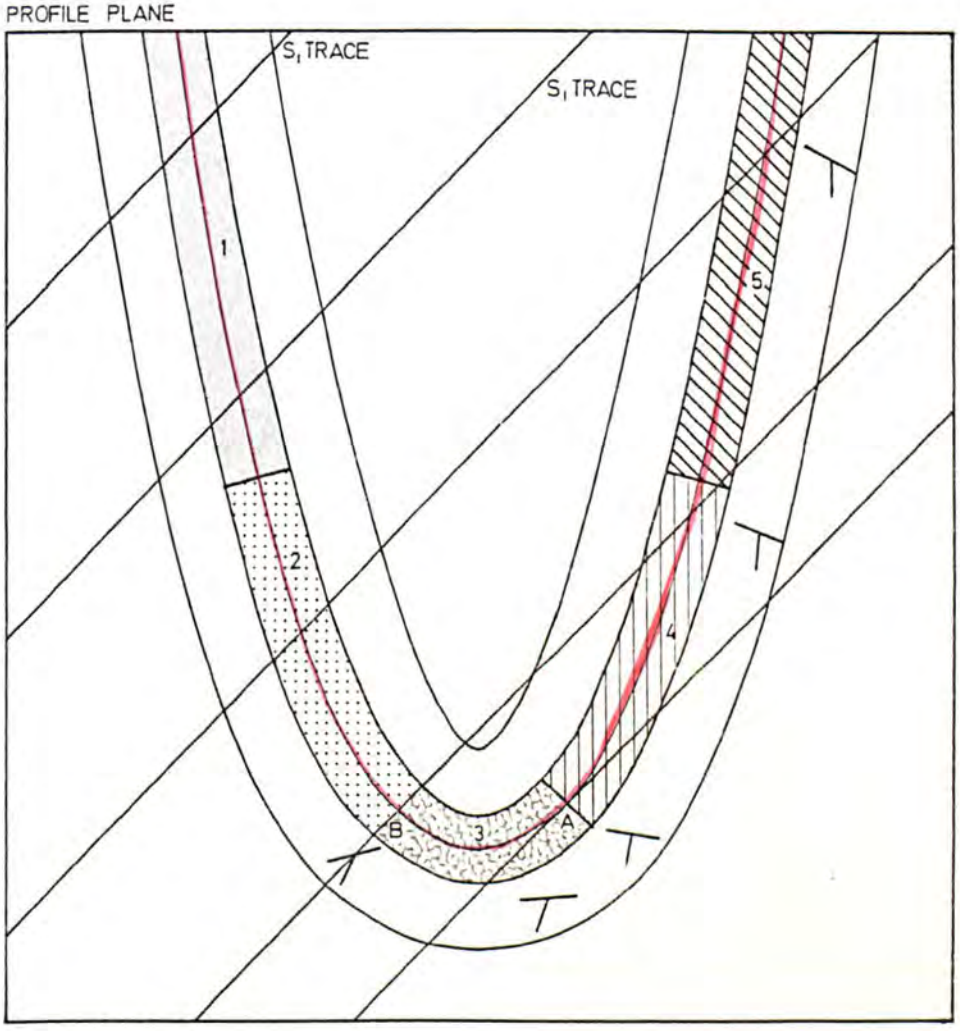
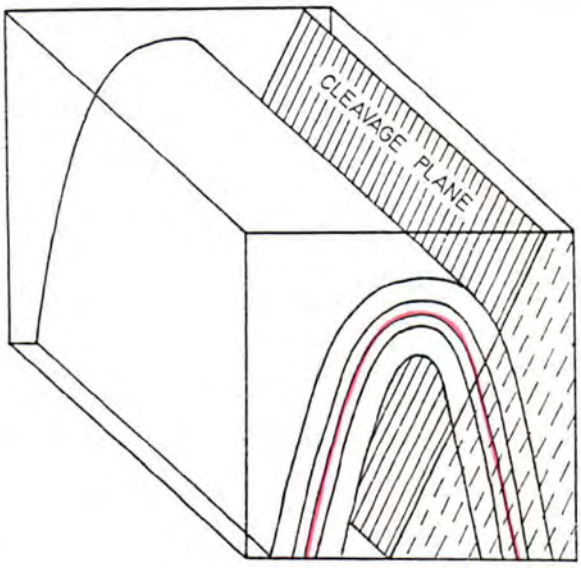


Fig. 3.7
UPRIGHT HORIZONTAL SYMMETRICAL ANTICLINE WITH OBLIQUE CLEAVAGE



PROFILE PLANE

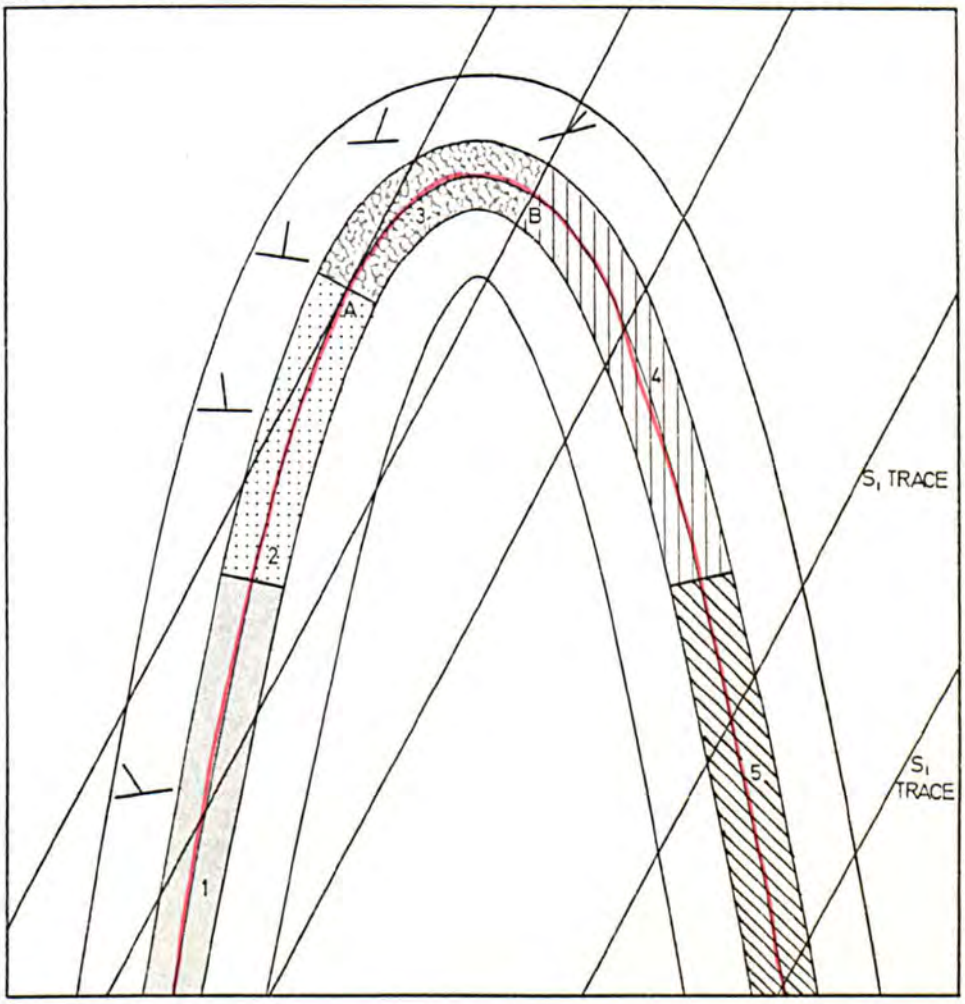
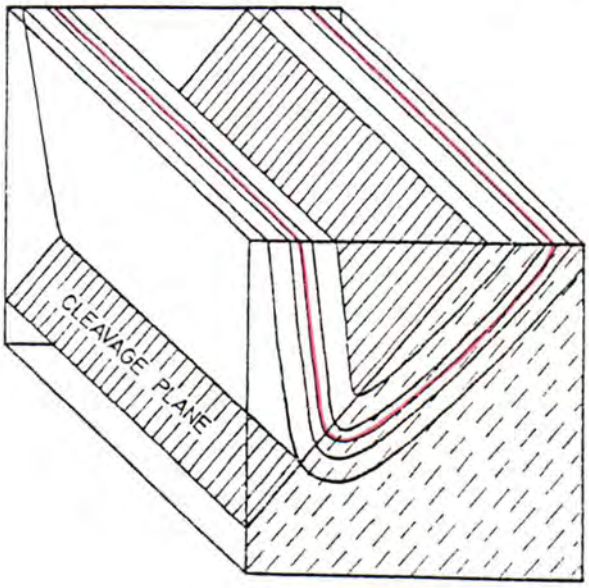


Fig. 3.8
UPRIGHT HORIZONTAL ASYMMETRICAL SYNCLINE WITH OBLIQUE CLEAVAGE



PROFILE PLANE

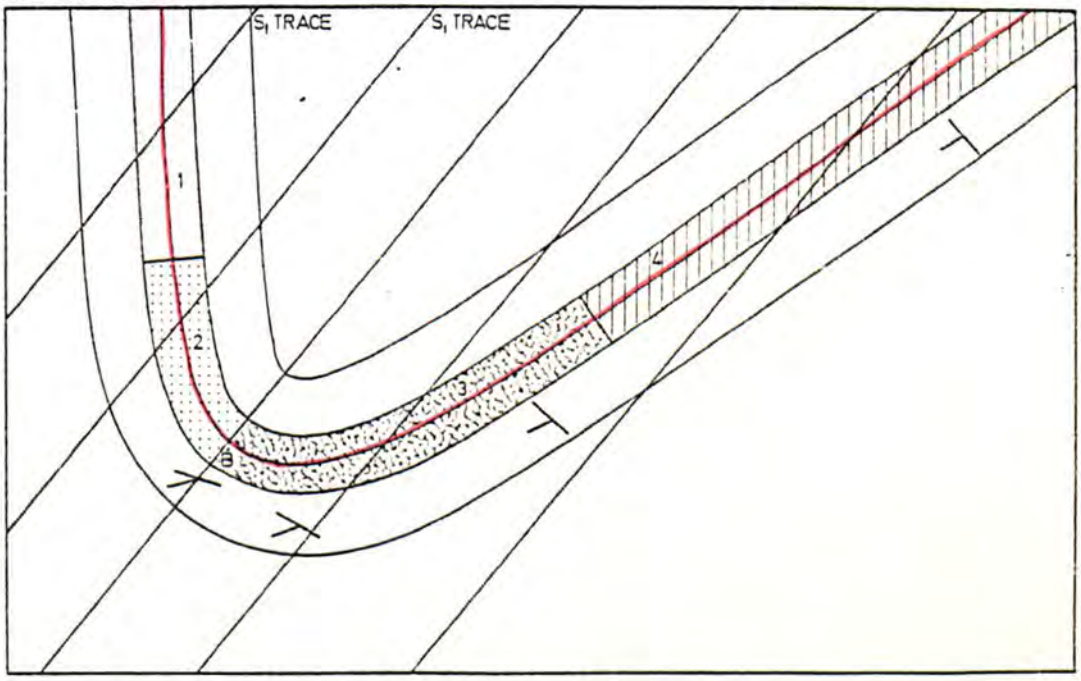
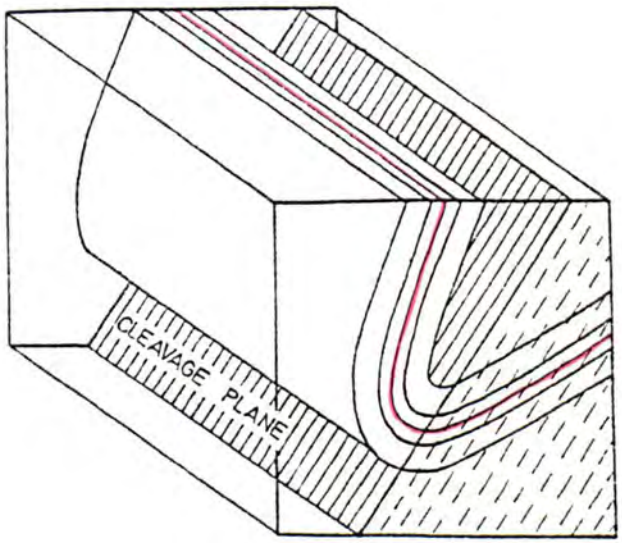


Fig. 3.9
RECLINED SYMMETRICAL SYNCLINE WITH OBLIQUE CLEAVAGE



PROFILE PLANE

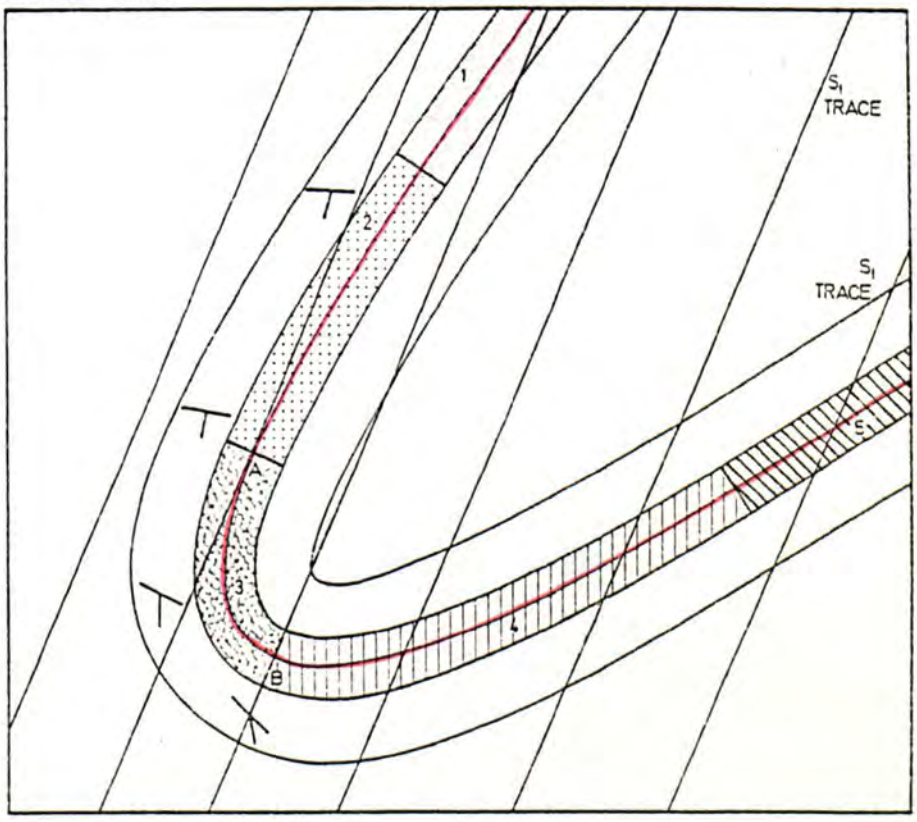
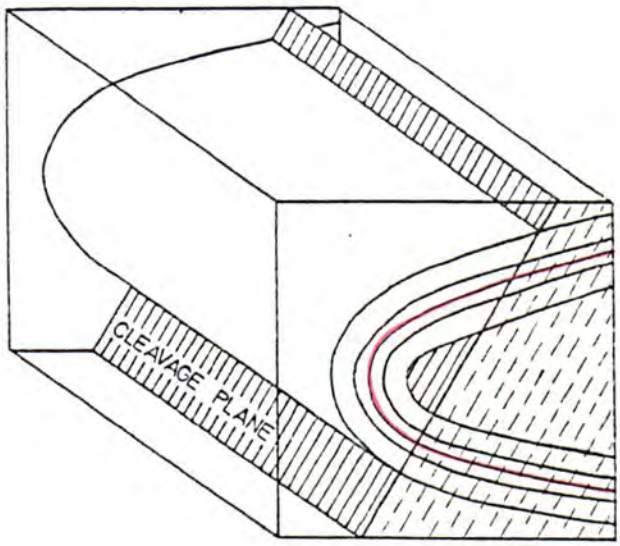


Fig. 3.10
RECUMBENT SYMMETRICAL SYNCLINE WITH OBLIQUE CLEAVAGE



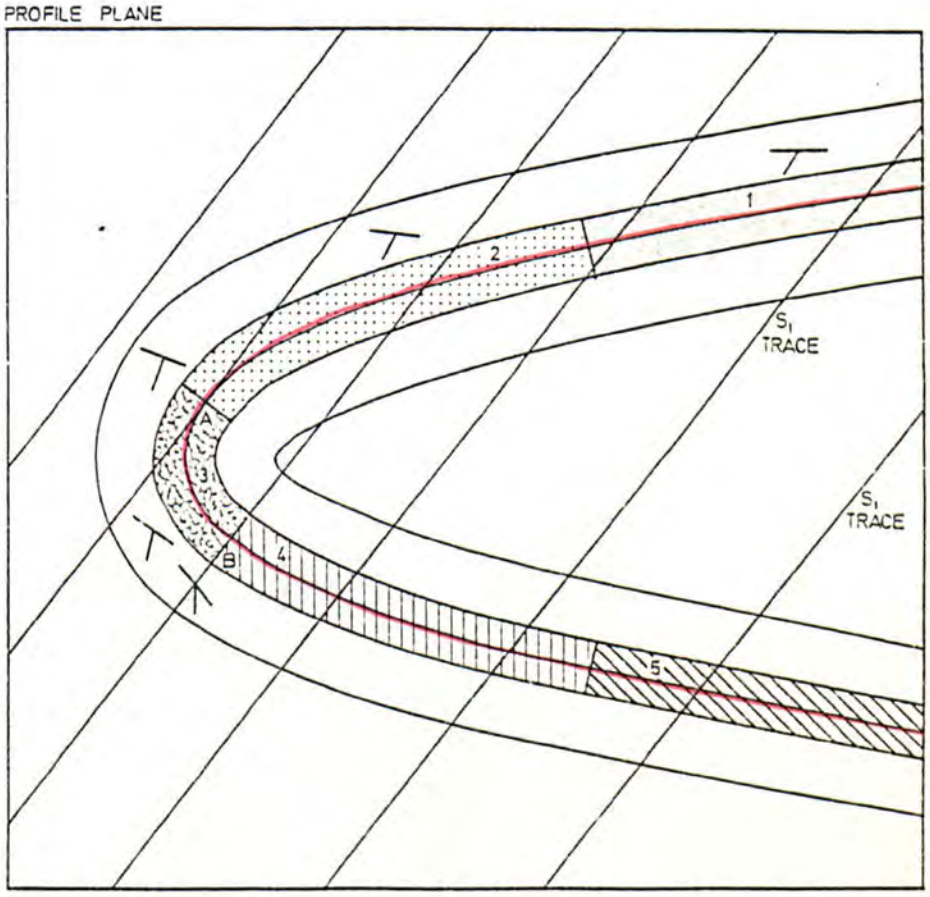
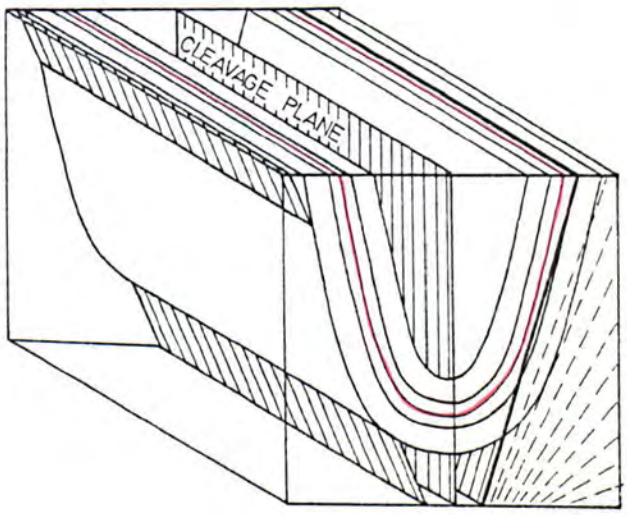


Fig. 3.11
UPRIGHT HORIZONTAL SYMMETRICAL SYNCLINE WITH CONVERGENT CLEAVAGE ABOUT THE AXIAL PLANE



PROFILE PLANE

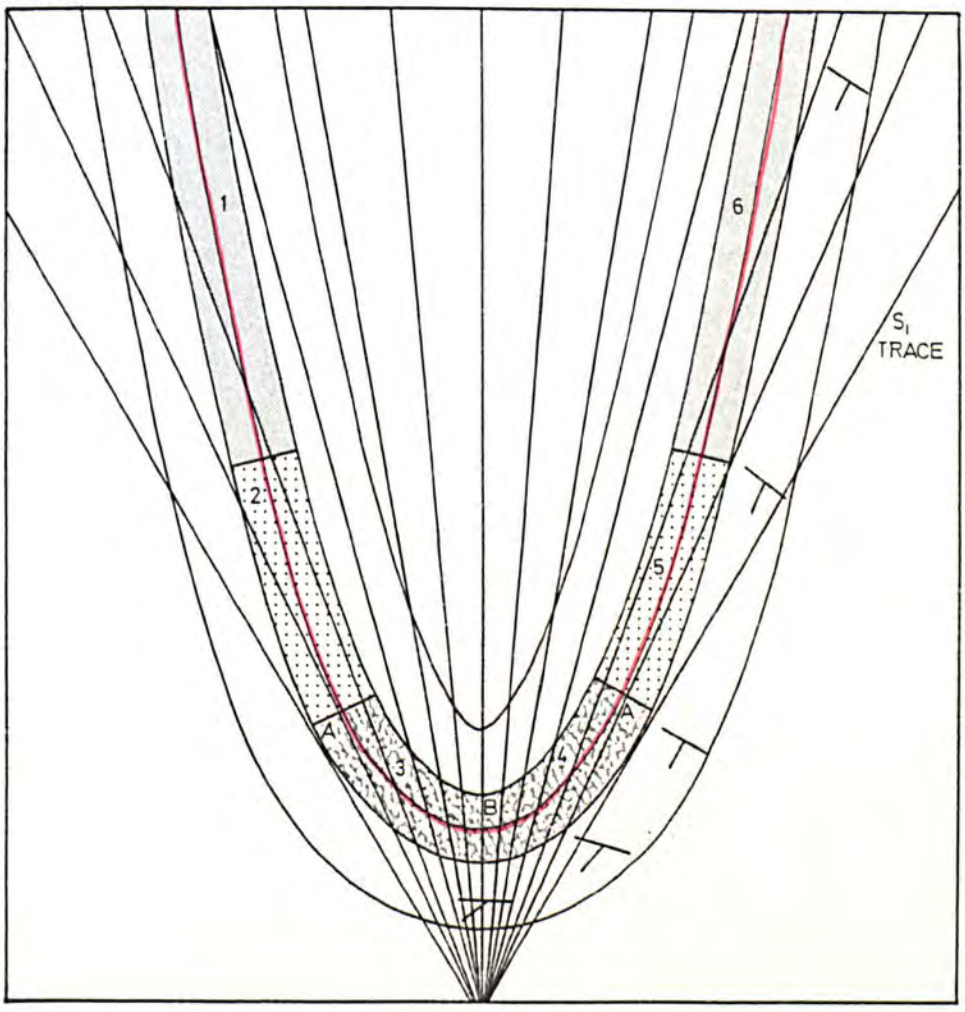
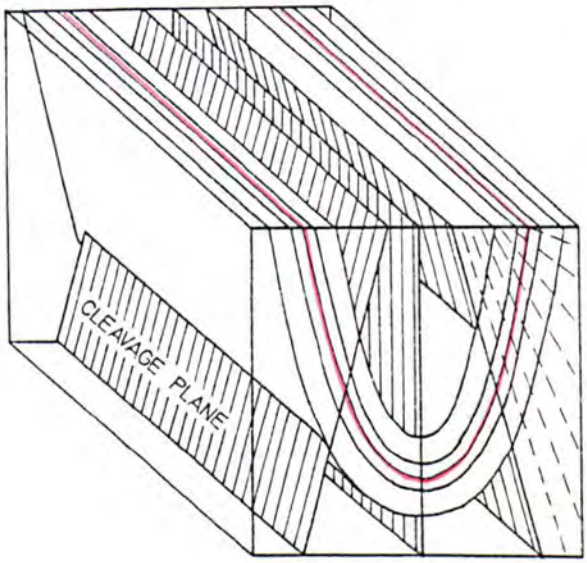


Fig. 3.12
UPRIGHT HORIZONTAL SYMMETRICAL SYNCLINE WITH DIVERGENT CLEAVAGE DEVELOPED ABOUT THE AXIAL PLANE



PROFILE PLANE

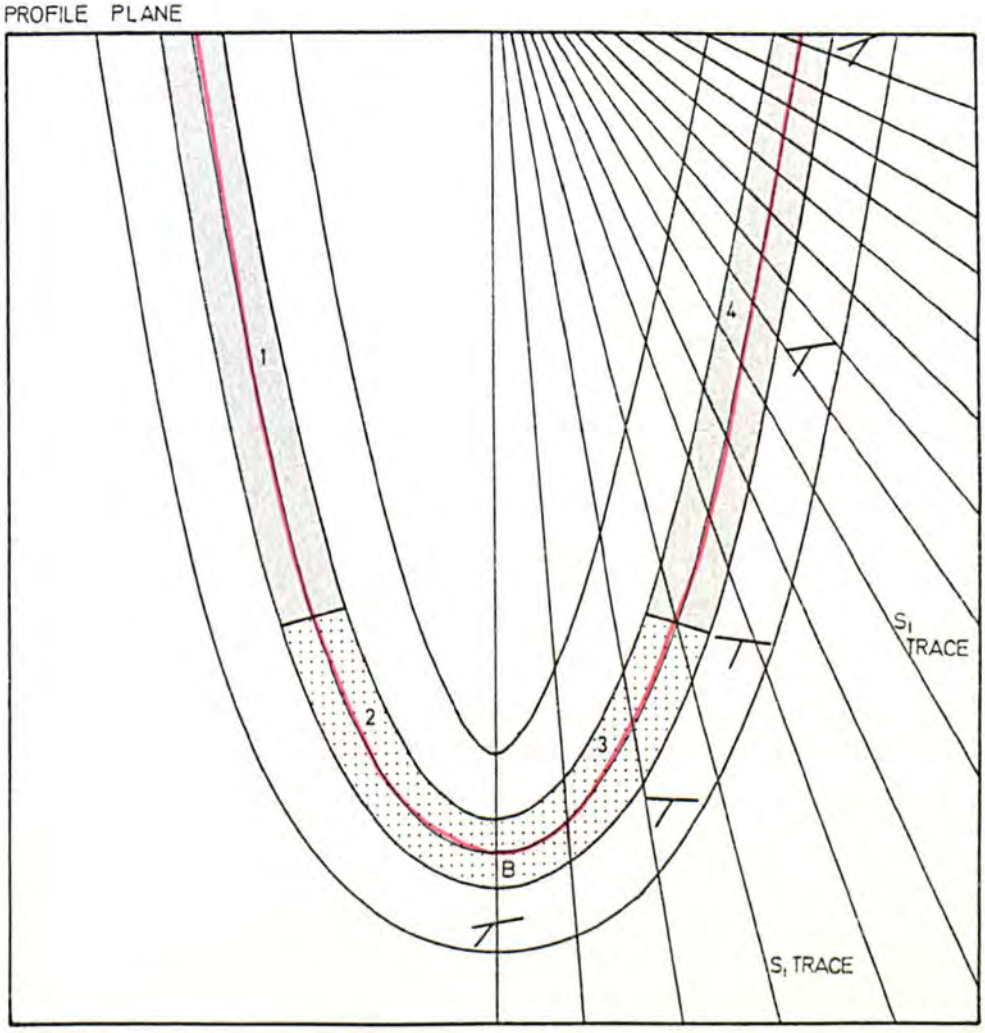
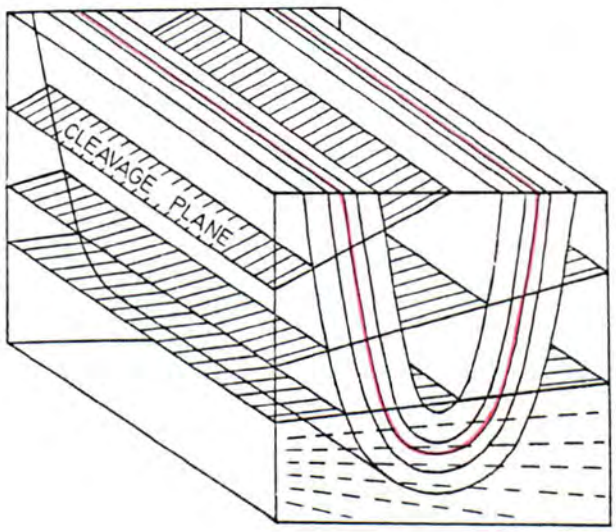


Fig. 3.13

UPRIGHT HORIZONTAL SYMMETRICAL SYNCLINE WITH OBLIQUE CONVERGENT CLEAVAGE



PROFILE PLANE

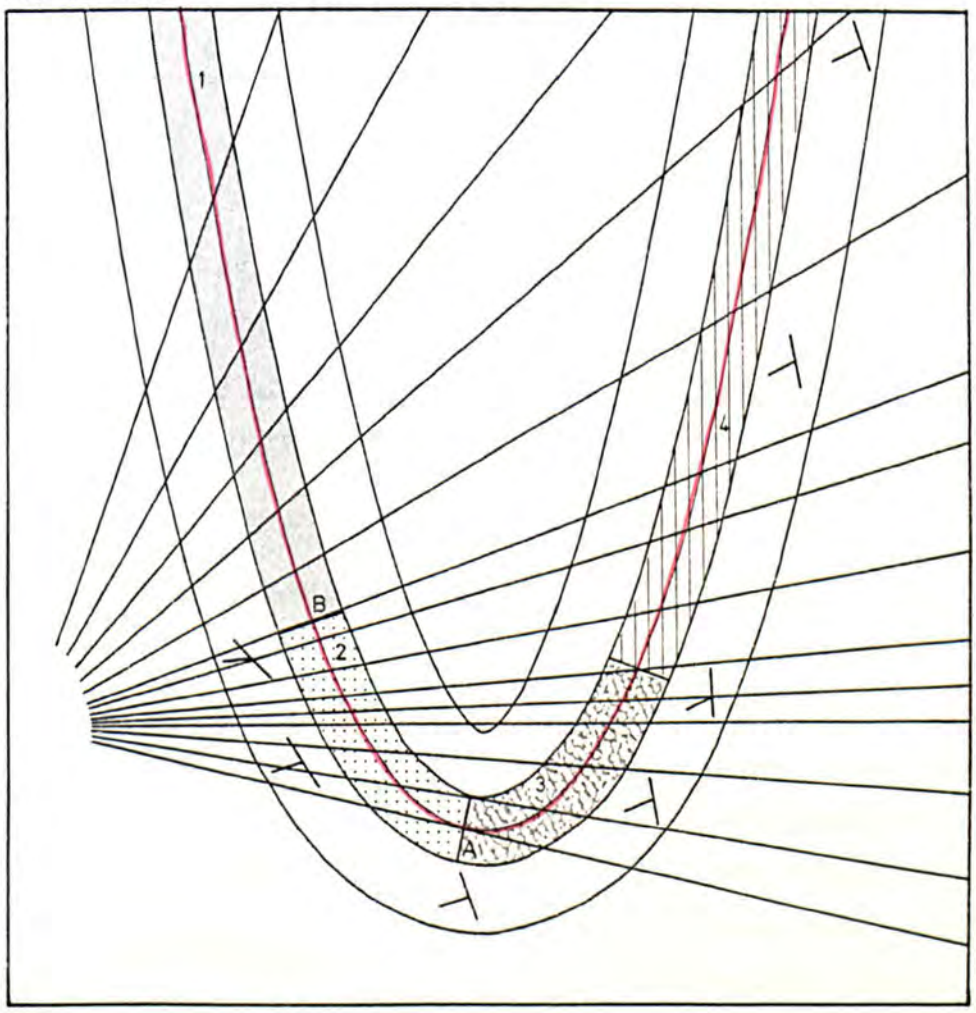
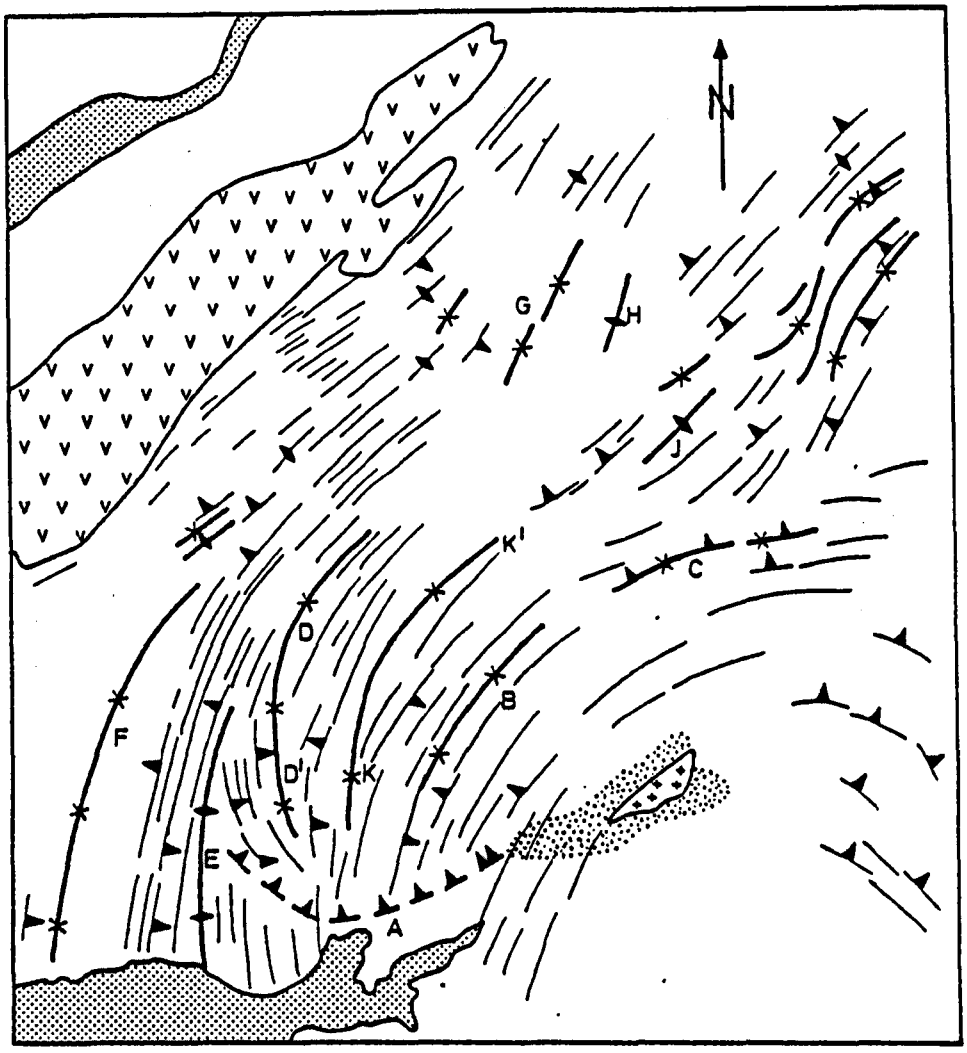


Fig. 3.14

GENERAL STRUCTURAL MAP OF SNOWDONIA



CALEDONIAN GRANITE AND AUREOLE

CAMBRIAN ORDOVICIAN AND SILURIAN

URICONIAN AND ARVONIAN

CLEAVAGE

SYNCLINE

ANTICLINE

THRUST

5 Miles

(after Shackleton 1954)

A - TREMADOC THRUST

B - ARDDU SYNCLINE

C - DOLWYDDELAN SYNCLINE

D - SNOWDON SYNCLINE

D' - HEBOG SYNCLINE

E - YNYSCYNHAIARN ANTICLINE

F - LLYWD MAWR SYNCLINE

G - IDWAL SYNCLINE

H - CWM TRYFAN ANTICLINE

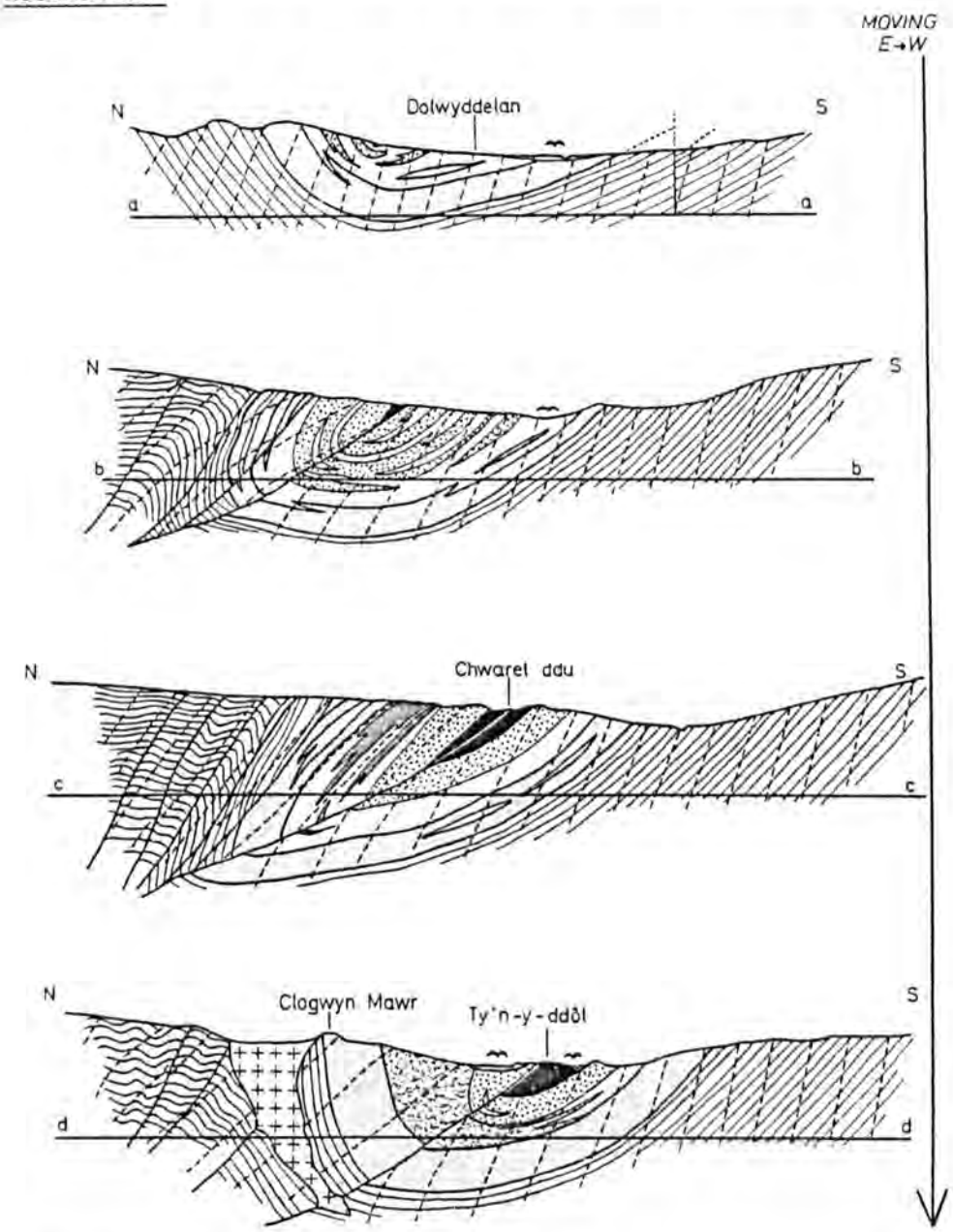
J - CAPEL CURIG ANTICLINE

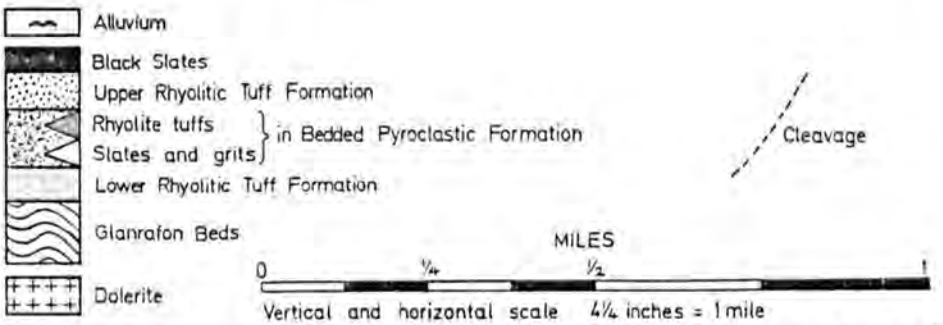
K - MOEL DDU SYNCLINE

K' - GWYNANT SYNCLINE

Fig. 3.15

CROSS SECTIONS OF THE DOLWYDDELAN SYNCLINE, SHOWING CLEAVAGE - BEDDING RELATIONSHIPS

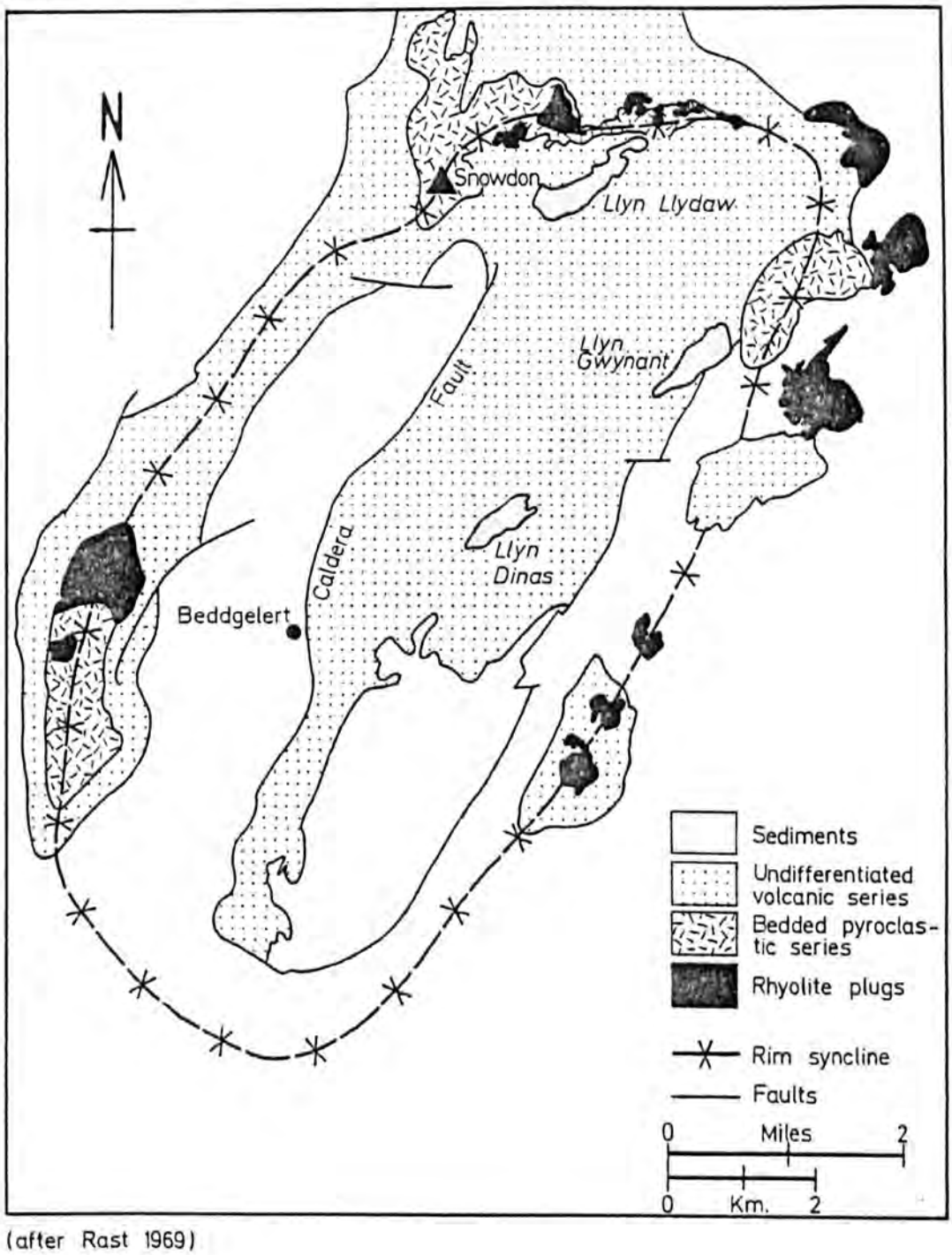




(after Williams and Bulman, 1931)

Fig. 3.16

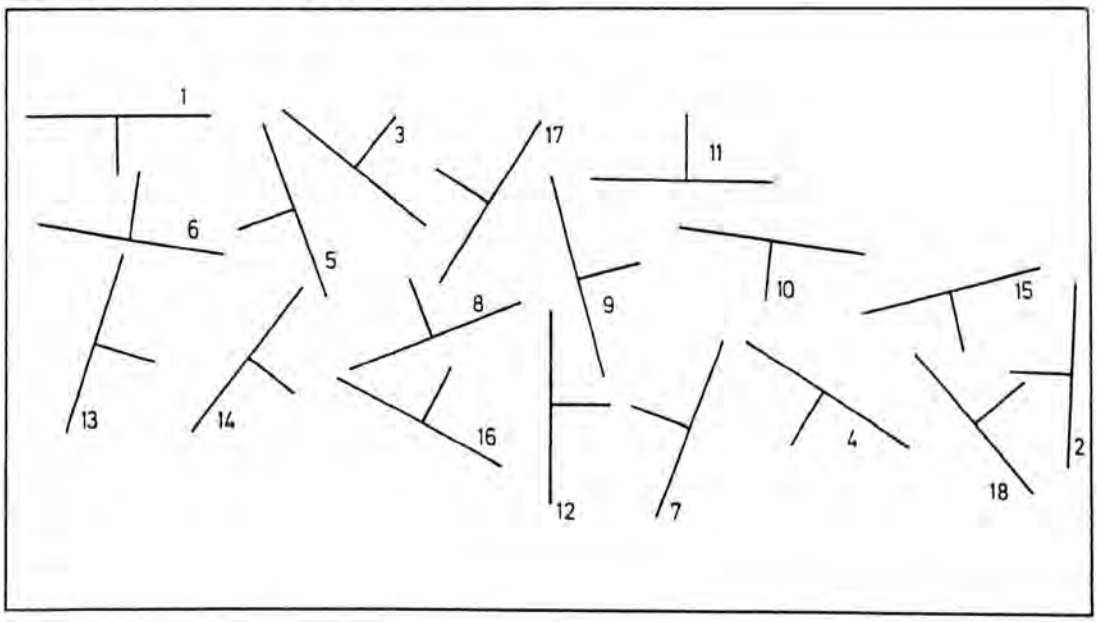
THE SNOWDON RIM-SYNCLINE AND CALDERA FAULT



(after Rast 1969)

Fig. 3.17
TO SHOW THE PRE- AND POST- DEFORMATION ORIENTATIONS OF THE STYLISED "BRACHIOPODS"

(a)
UNDEFORMED BRACHIOPODS (STYLISED)



(b)
DEFORMED BRACHIOPODS

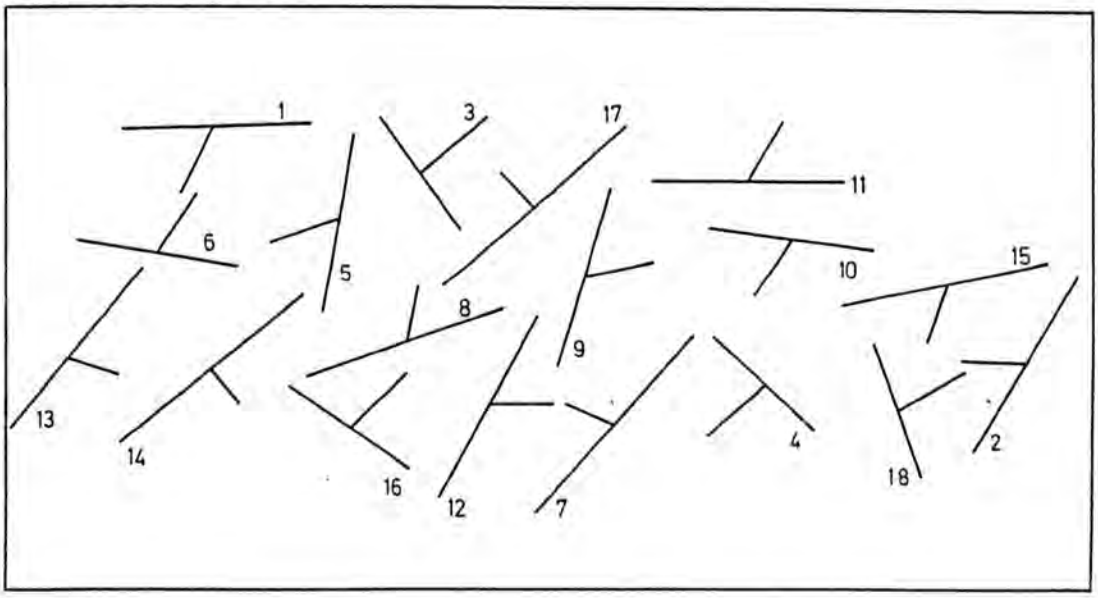


Fig. 3.18

DEFORMED "BRACHIOPODS" WITH THE ARBITRARY REFERENCE LINE AB

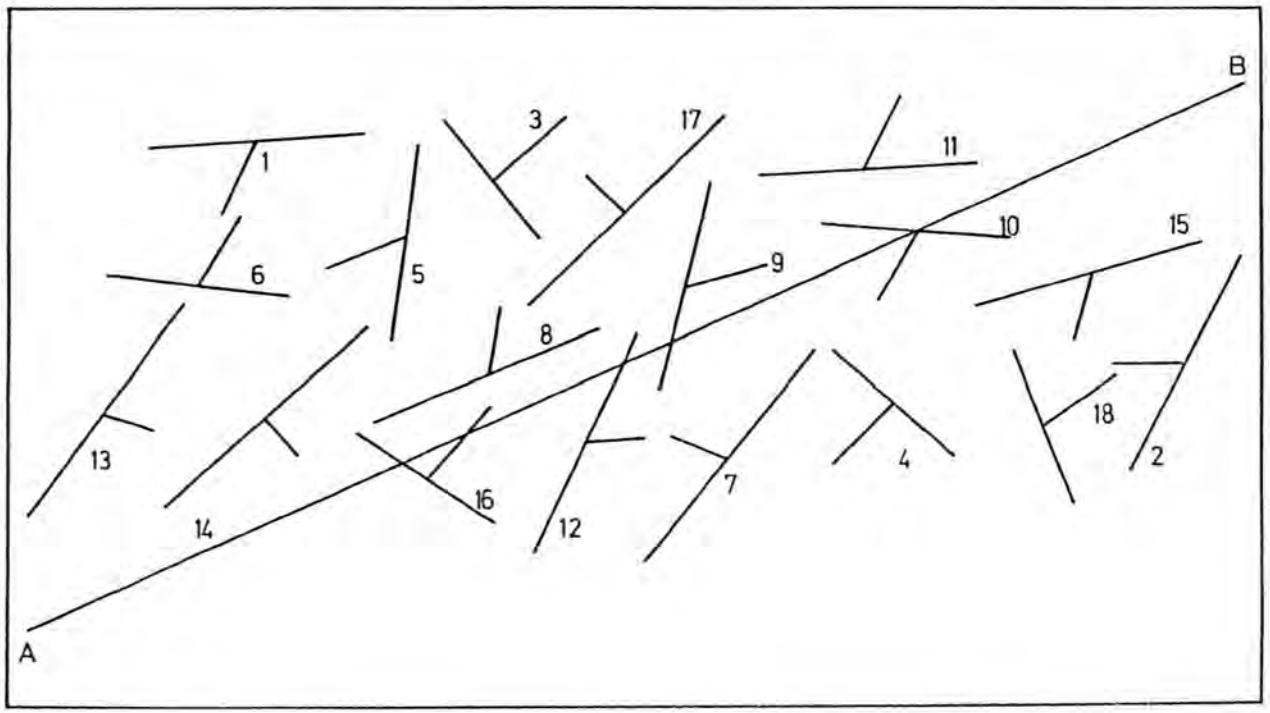
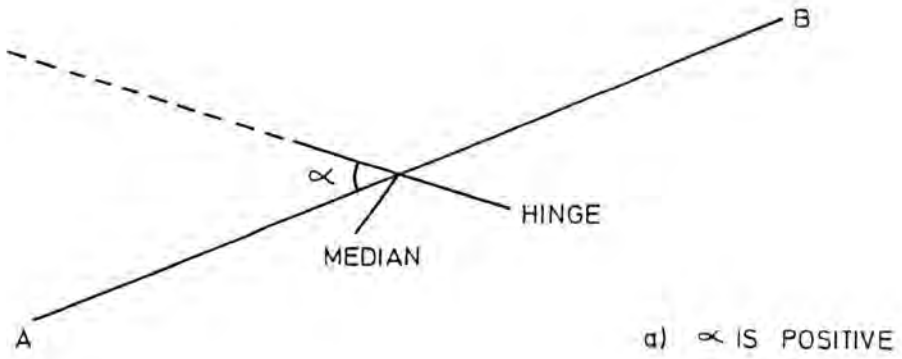
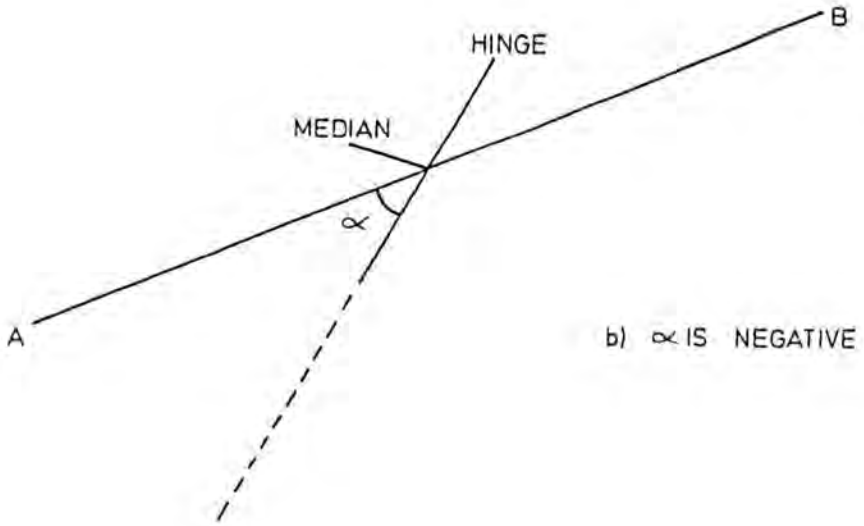


Fig. 3.19

BRACHIOPOD ORIENTATIONS AND HOW THEY GOVERN THE SIGN OF $\angle\alpha$ (ANGLE BETWEEN THE HINGE LINE AND AB)



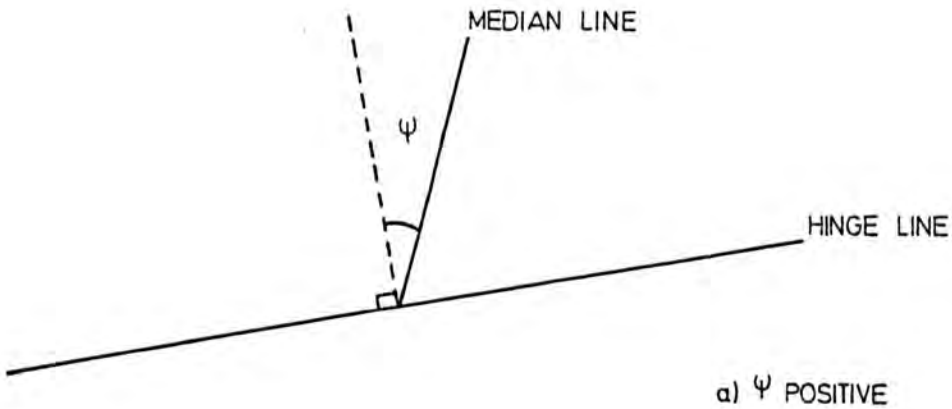
a) α IS POSITIVE



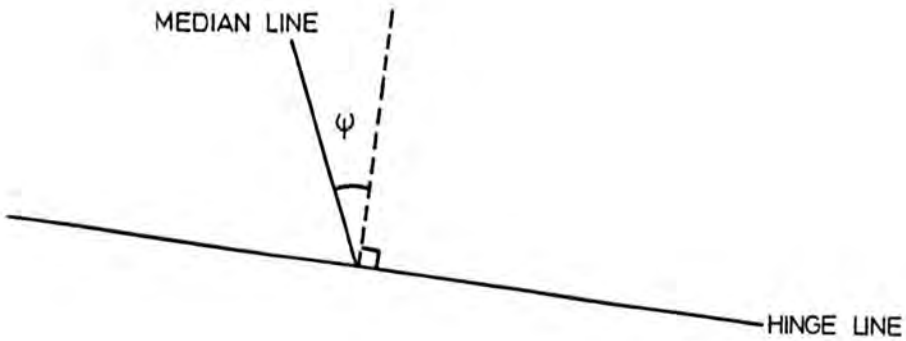
b) α IS NEGATIVE

Fig. 3.20

DEFORMED BRACHIOPODS, SHOWING HOW THE ORIENTATION OF THE DISTORTED MEDIAN LINE WITH RESPECT TO THE ORIGINAL UNDISTORTED MEDIAN LINE, GOVERNS THE SIGN OF Ψ (ANGULAR SHEAR)



a) Ψ POSITIVE



b) Ψ NEGATIVE

Fig. 3.21

GRAPH TO SHOW Ψ (ANGULAR SHEAR STRAIN) AGAINST ∝ (ORIENTATION ANGLE)

THE GRAPH SHOWS VARIATION IN ANGULAR SHEAR STRAIN WITH CHANGE IN ORIENTATION ANGLE

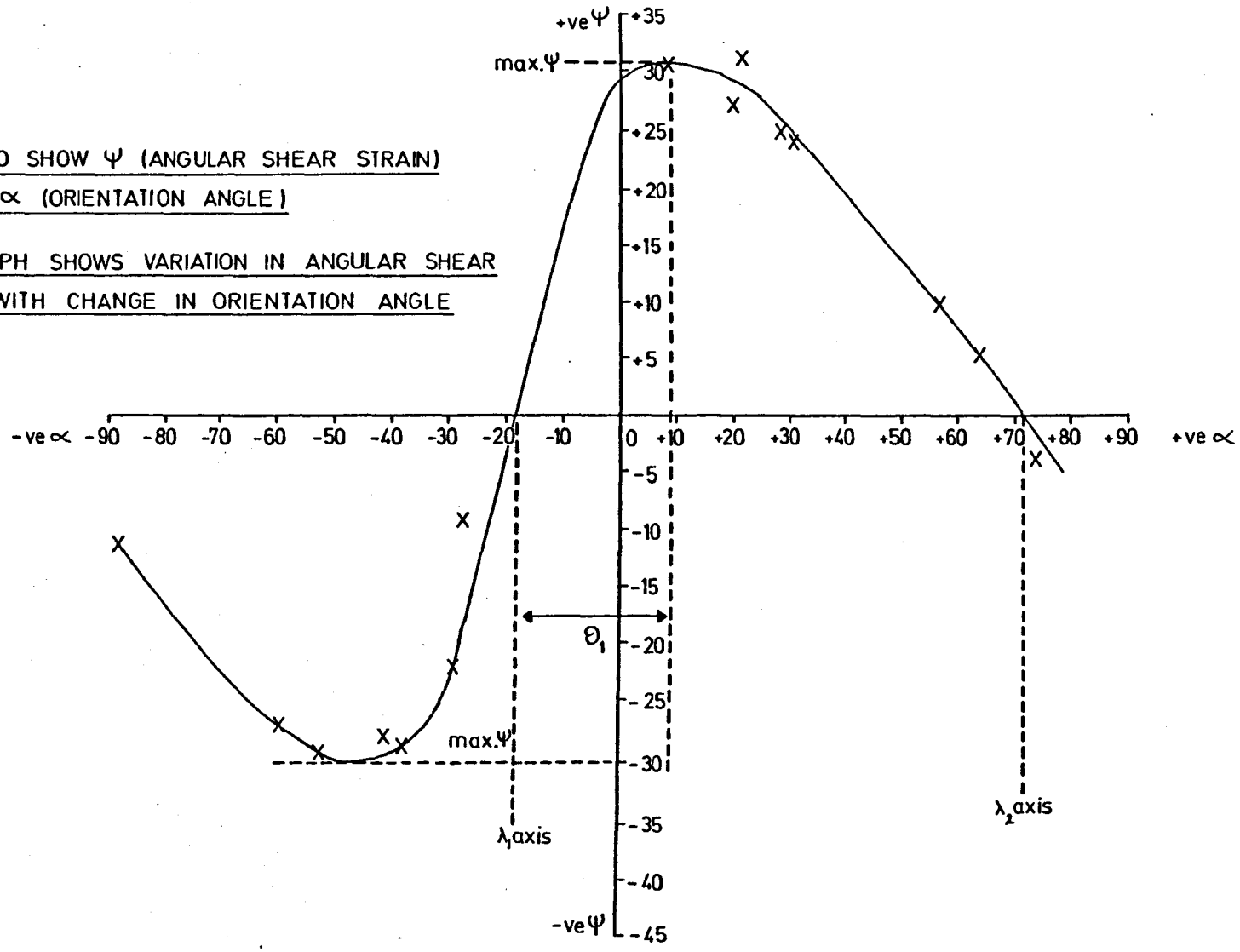
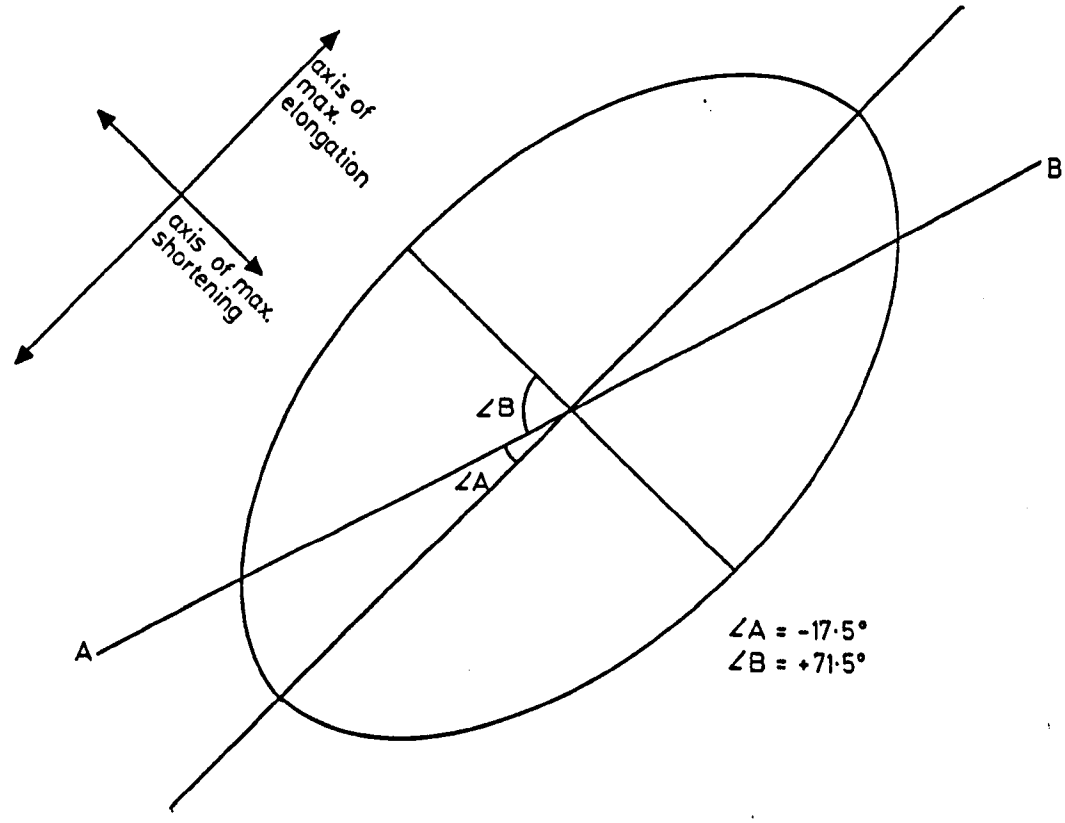


Fig. 3.22 TO SHOW THE ORIENTATION OF THE STRAIN ELLIPSE WITH RESPECT TO THE DEFORMED "BRACHIOPODS"



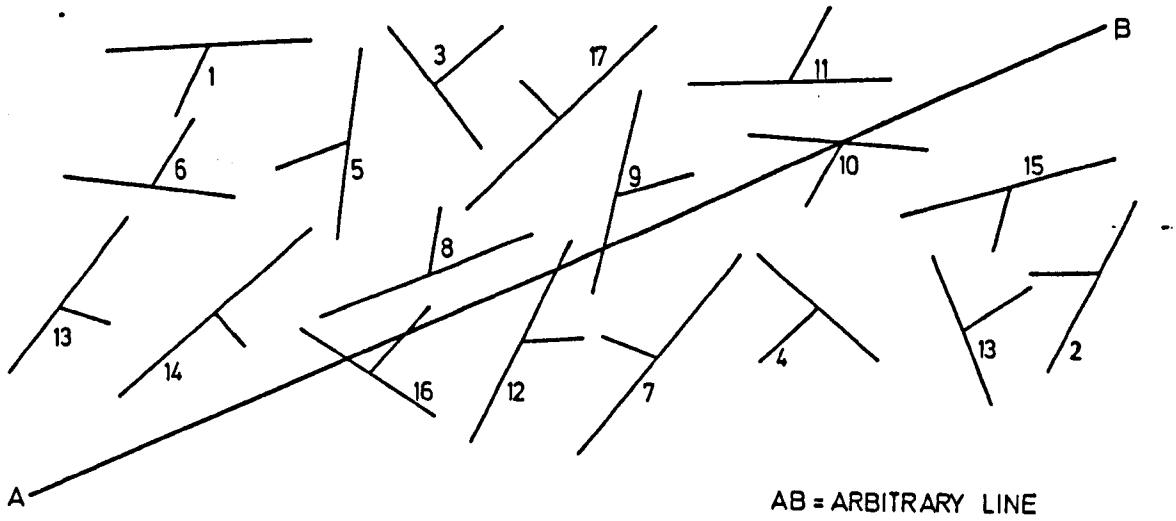


Fig. 3.23

BRACHIOPOD ORIENTATIONS AND HOW THEY GOVERN THE SIGN AND MAGNITUDE OF $\angle \beta$ (ANGLE BETWEEN THE MEDIAN LINE AND AB)

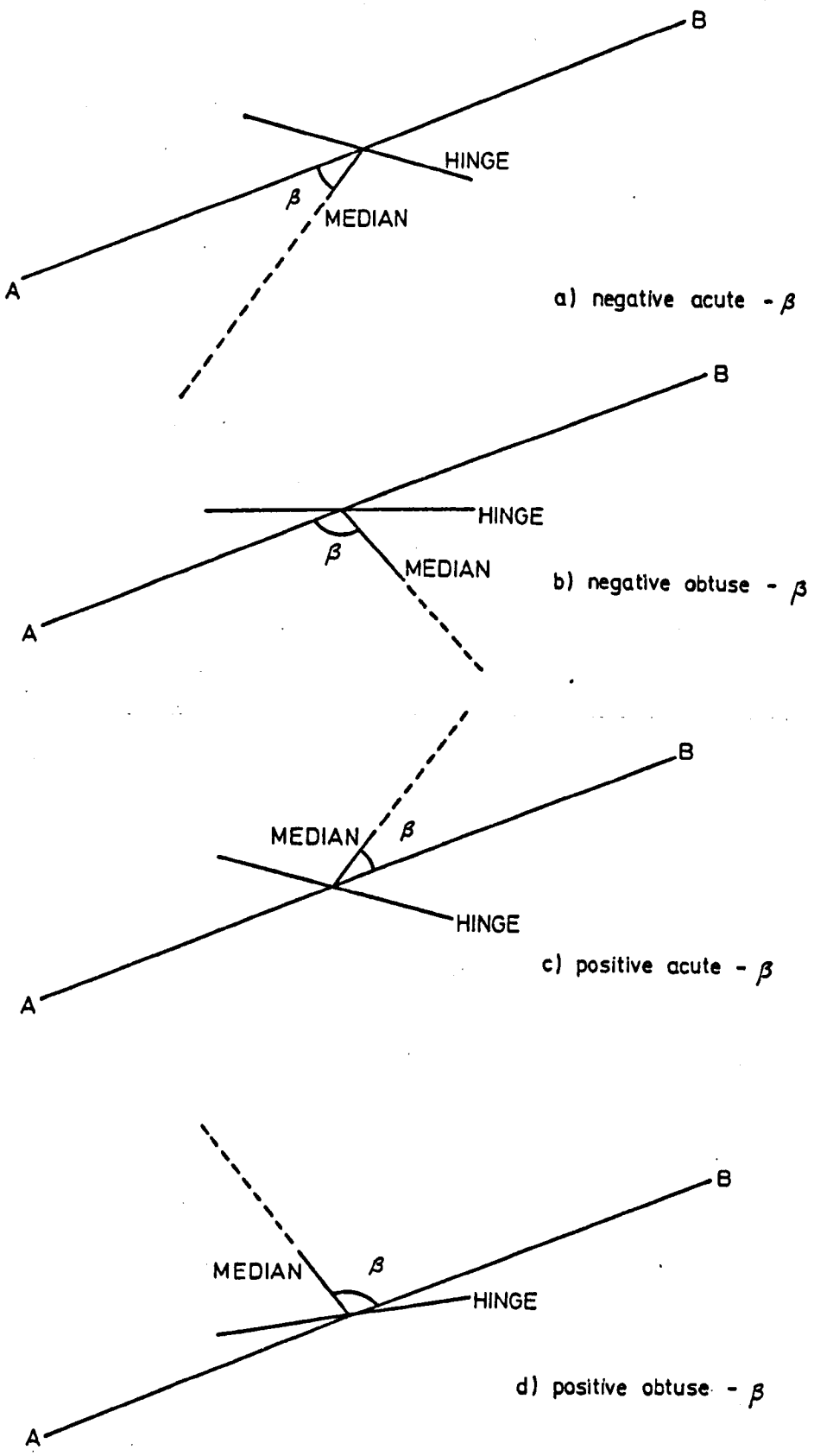
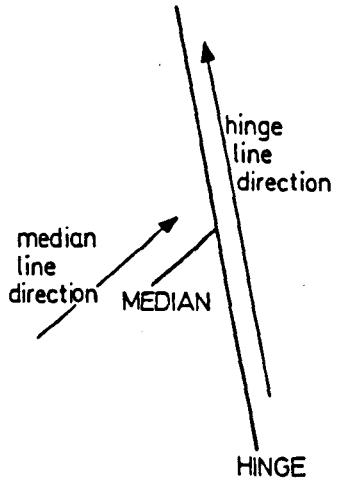
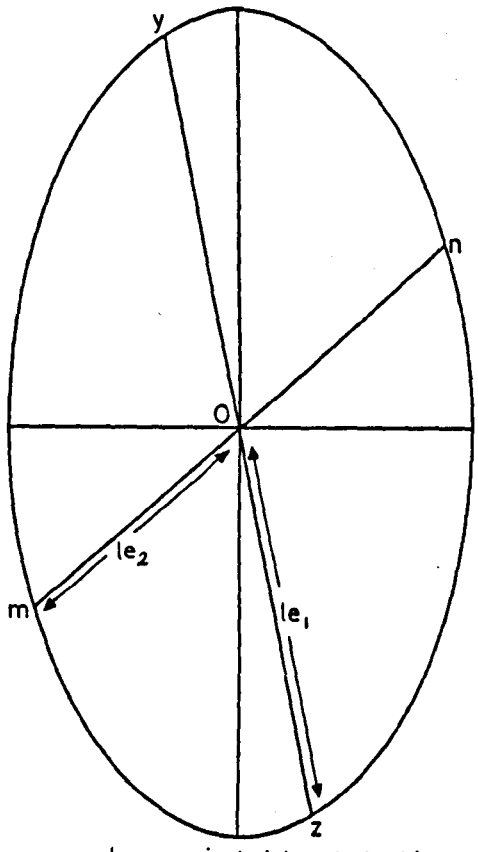


Fig. 3.24

TO ILLUSTRATE HOW THE HINGE AND MEDIAN LINE ORIENTATIONS ARE PROJECTED THROUGH THE CENTRE OF THE STRAIN ELLIPSE

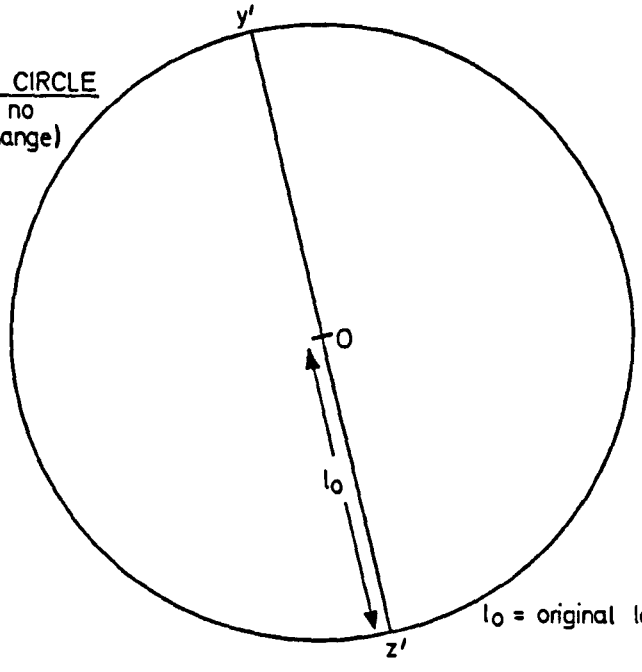


STRAIN ELLIPSE



le_1 = projected length for hinge line
yz = hinge line direction within ellipse
mn = median line direction within ellipse
le_2 = projected length for median line

ORIGINAL CIRCLE
(assuming no volume change)



l_o = original length (circle radius)

Fig. 3.25 TO SHOW THE METHOD FOR PLOTTING THE HINGE LINE DIRECTION

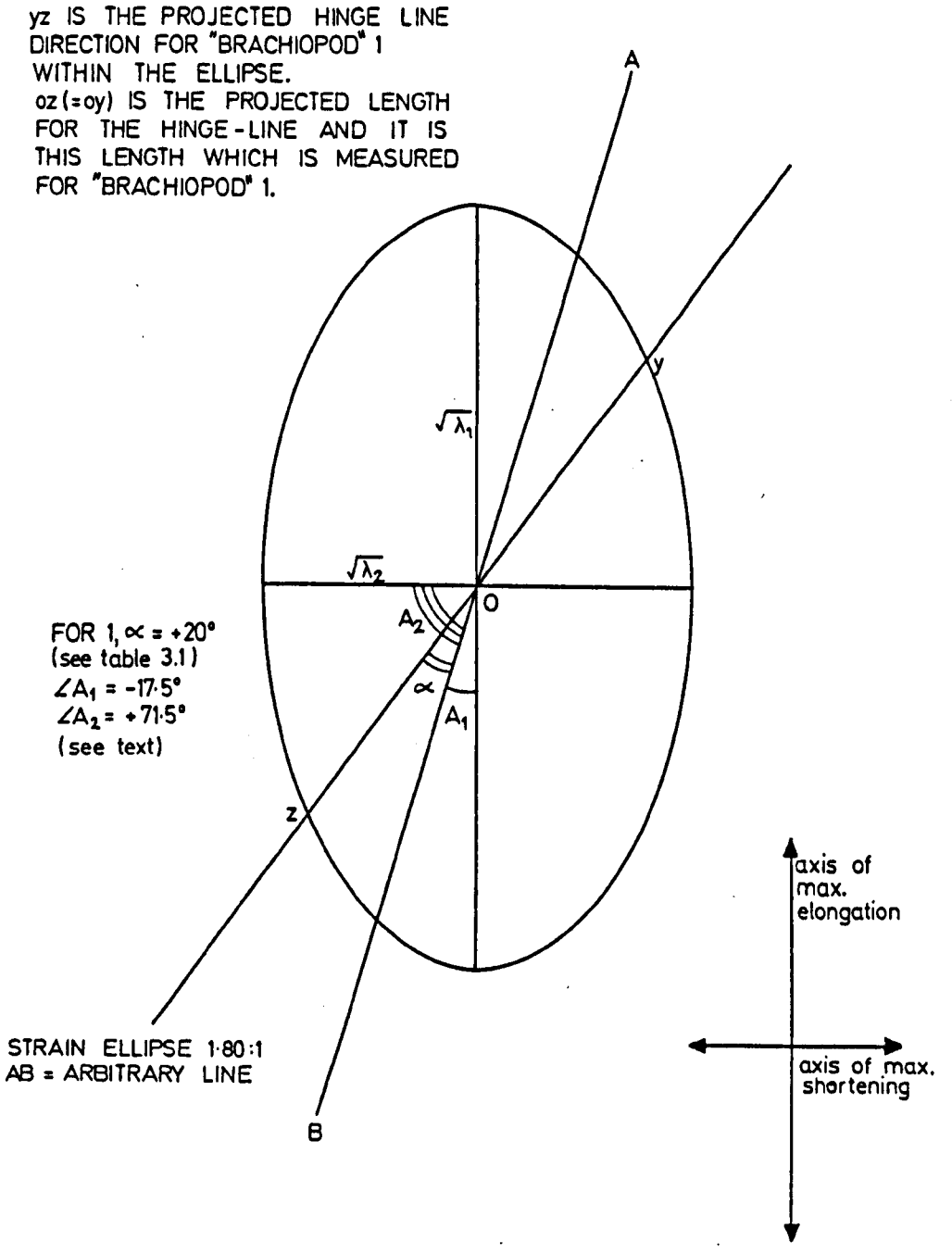


Fig. 3.26 TO SHOW THE METHOD FOR PLOTTING THE MEDIAN LINE DIRECTION

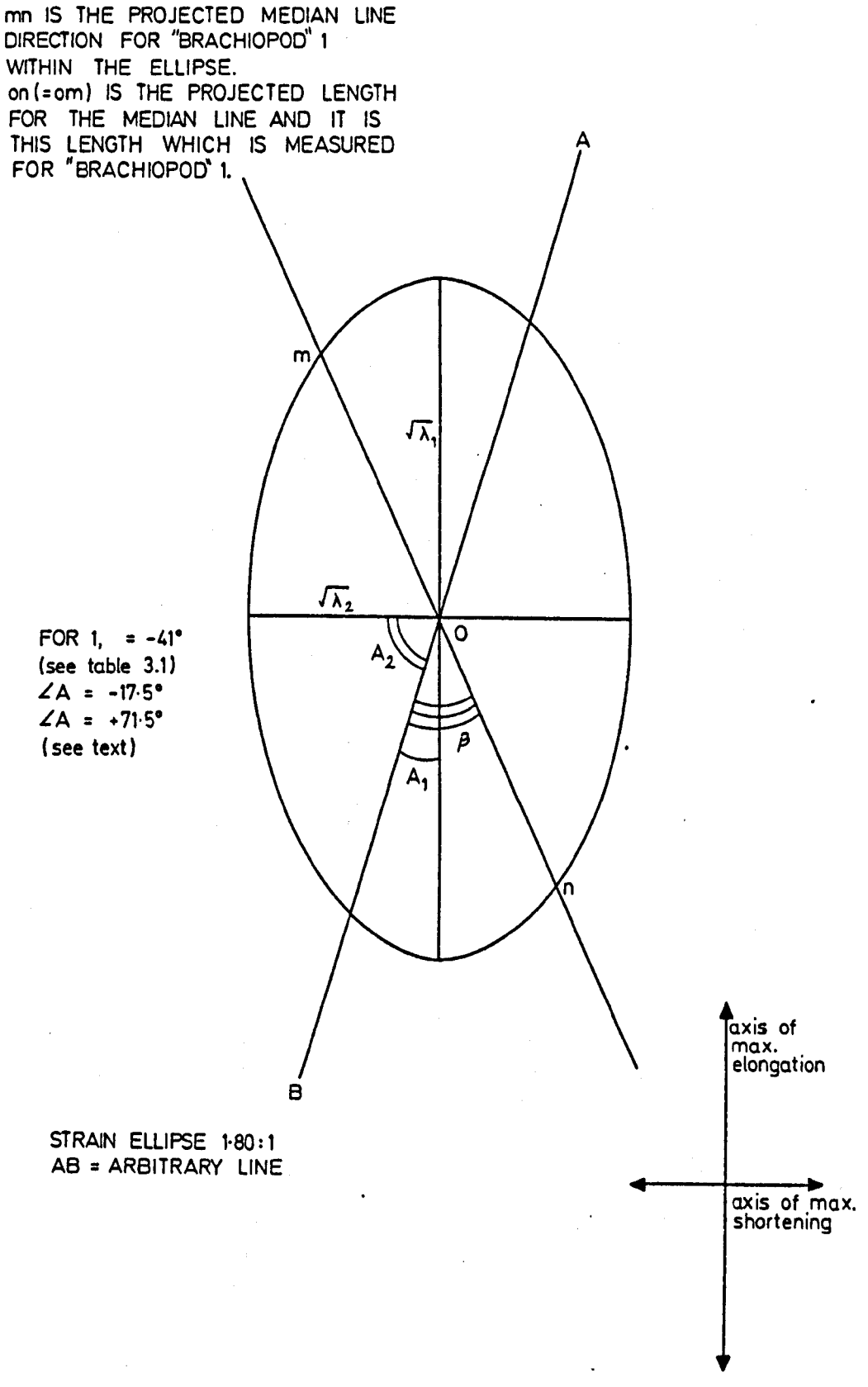


Fig. 3.27 TO SHOW THE PROJECTED HINGE LINE DIRECTIONS WITHIN THE STRAIN ELLIPSE

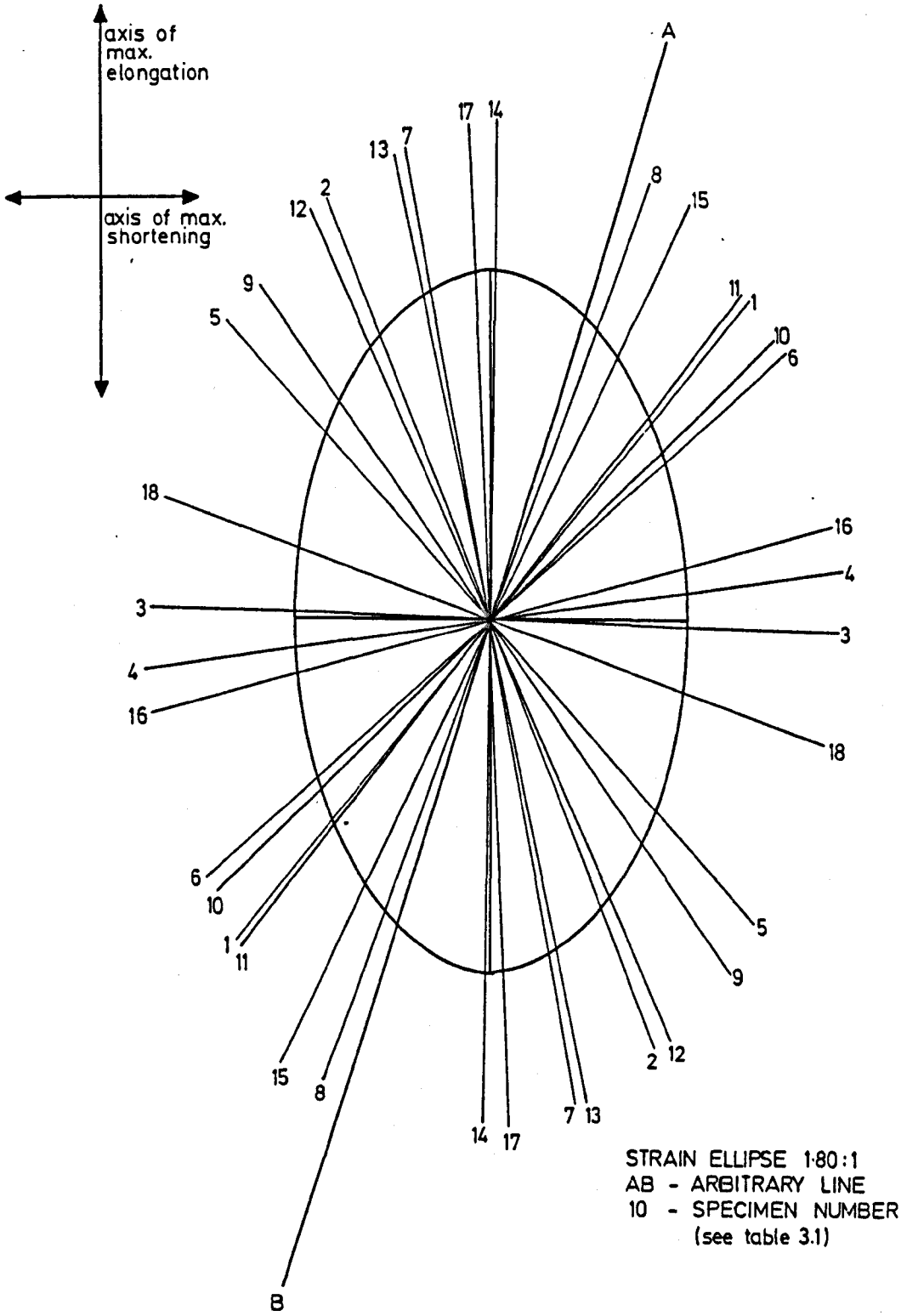


Fig. 3.28 TO SHOW THE PROJECTED MEDIAN LINE DIRECTIONS WITHIN THE STRAIN ELLIPSE

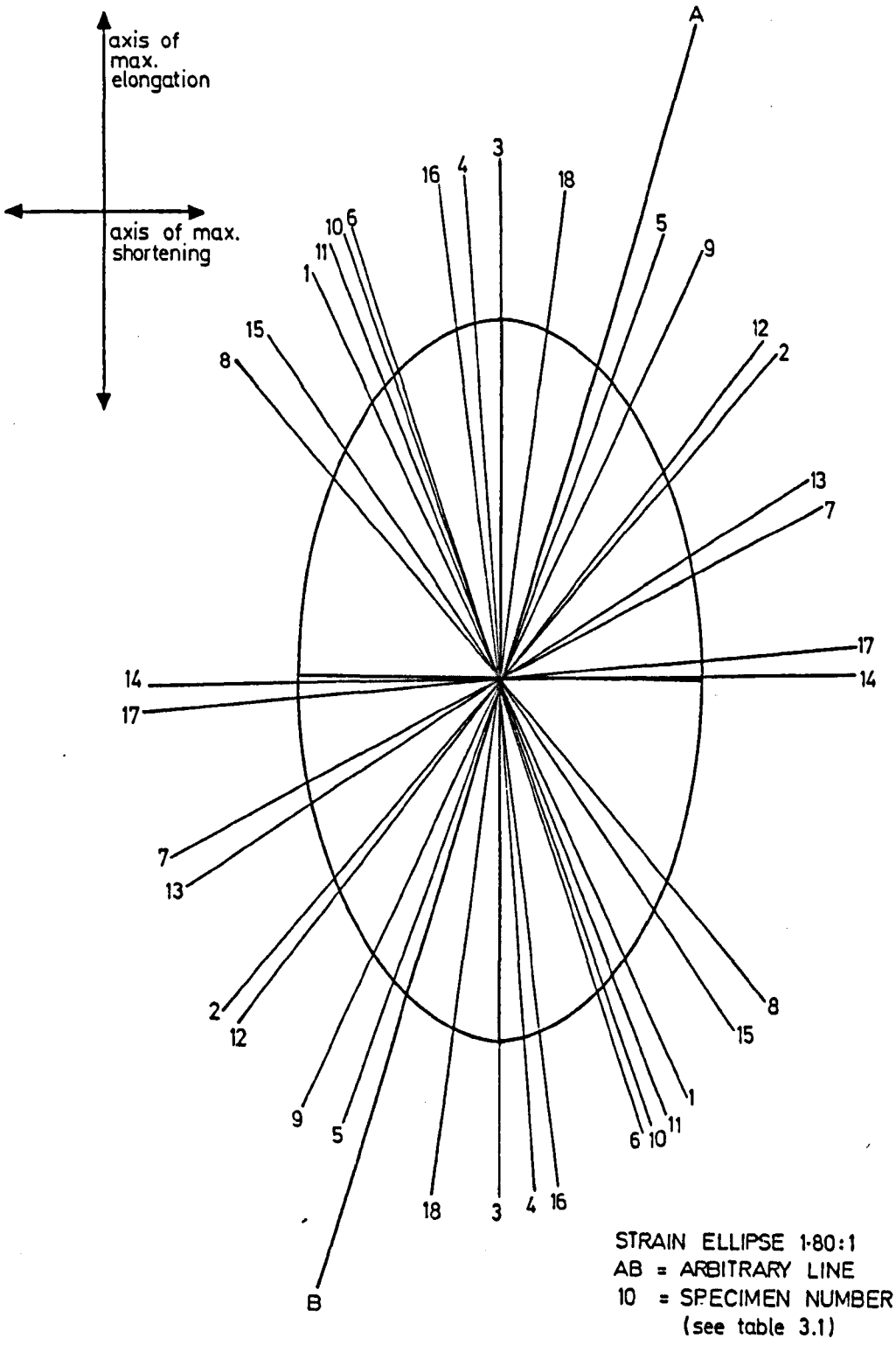


Fig. 3.29 RELATIONSHIP OF STRAIN ELLIPSE TO ORIGINAL UNDEFORMED CIRCLE

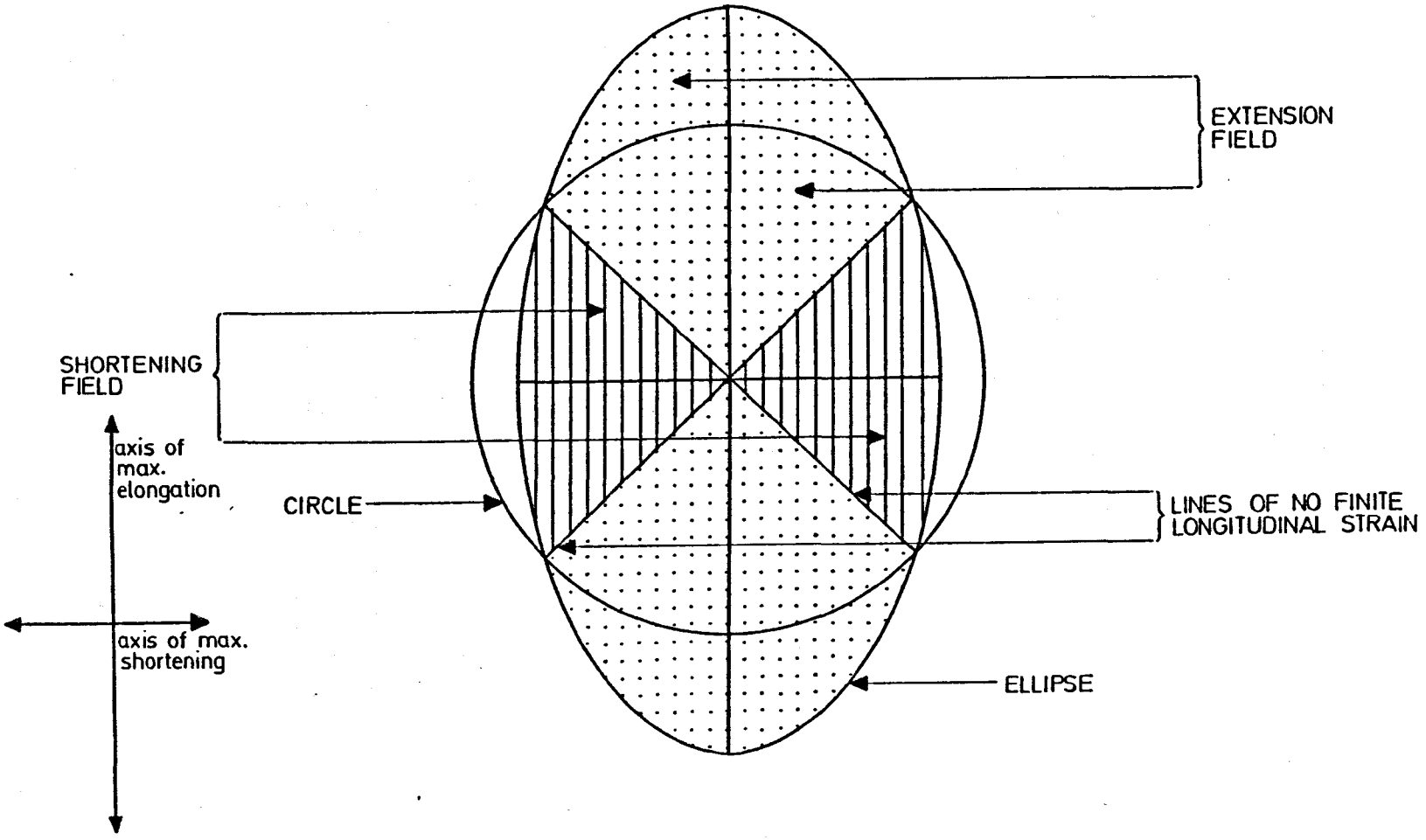


Fig. 3.31 TO SHOW SEVERAL POSSIBLE SEQUENTIAL PROCESSES RELATING PRETECTONIC COMPACTION, DECALCIFICATION AND TECTONIC DEFORMATION TO THE RESULTANT DISTORTED FOSSILS

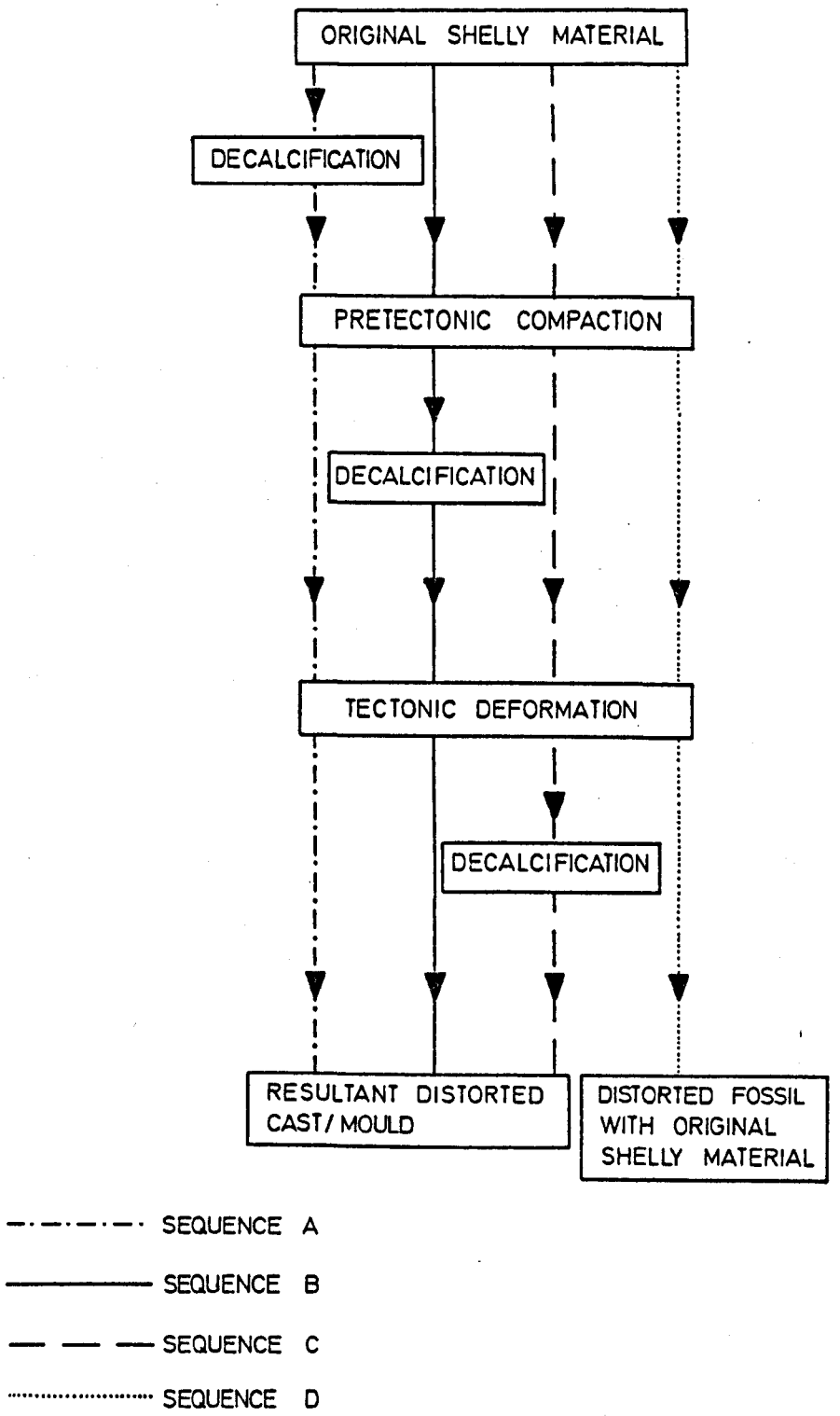


Table 3.1

Data relating to the practical method for deriving the original dimensions of tectonically deformed bilaterally symmetrical fossils.

Key to columns.

A - Brachiopod specimen number

B - Length of the distorted hinge lines (mm.)

C - Length of the distorted median lines (mm.)

D - Angle α (degrees)

E - Angle ψ (degrees)

F - Angle β (degrees)

G - Length of the hinge line projection within the ellipse (mm.)

H - Length of the median line projection within the ellipse (mm.)

A	B	C	D	E	F	G	H
1	31.0	12.0	+20	+28	-41.5	39.5	46.7
2	35.0	10.5	-39	-29	+23	48.0	39.2
3	22.0	13.5	+74	-3.5	+163	30.0	55.0
4	23.5	12.5	+64.5	+5.5	-21	30.25	54.75
5	29.0	12.0	-59	-27	+3	39.0	48.35
6	27.0	12.0	+30.5	+24.5	+145	36.0	49.85
7	40.0	9.0	-27.5	-9	+44.5	53.0	32.7
8	35.0	9.5	+2.5	+31	+122.5	48.0	39.8
9	31.0	11.5	-52	-29.5	-172	41.0	45.9
10	28.0	11.5	+28.5	+25.5	-36	36.5	49.95
11	31.0	11.5	+21.5	+32	+142	39.5	48.45
12	34.5	9.5	-41	-28	-159	46.5	39.55
13	39.0	8.5	-29	-22	-140	52.5	38.7
14	40.0	7.0	-17	0	-108	55.0	30.5
15	34.0	10.0	+8.5	+31.5	-51	45.5	42.1
16	24.0	13.5	+57	+10	+156	31.0	53.85

A	B	C	D	E	F	G	H
17	39.5	8.0	-19.5	-3	+67.5	54.5	30.0
18	23.5	13.0	-88	-11.5	+171	30.5	53.45

Table 3.2

Calculations for the original lengths of the hinge lines of the deformed "brachiopods"

Specimen 1	$\frac{40.25}{39.5}$	x	31.0	=	31.59 mm.
Specimen 2	$\frac{40.25}{48.0}$	x	35.0	=	29.35 mm.
Specimen 3	$\frac{40.25}{30.0}$	x	22.0	=	29.52 mm.
Specimen 4	$\frac{40.25}{30.25}$	x	23.5	=	31.27 mm.
Specimen 5	$\frac{40.25}{39.0}$	x	29.0	=	29.93 mm.
Specimen 6	$\frac{40.25}{36.0}$	x	27.0	=	30.19 mm.
Specimen 7	$\frac{40.25}{53.0}$	x	40.0	=	30.38 mm.
Specimen 8	$\frac{40.25}{48.0}$	x	35.0	=	29.35 mm.
Specimen 9	$\frac{40.25}{41.0}$	x	31.0	=	30.43 mm.
Specimen 10	$\frac{40.25}{36.5}$	x	28.0	=	30.88 mm.

Specimen 11	$\frac{40.25}{36.5}$	x	31.0	=	31.59 mm.
Specimen 12	$\frac{40.25}{46.5}$	x	34.5	=	29.86 mm.
Specimen 13	$\frac{40.25}{52.5}$	x	39.0	=	29.90 mm.
Specimen 14	$\frac{40.25}{55.0}$	x	40.0	=	29.27 mm.
Specimen 15	$\frac{40.25}{45.5}$	x	34.0	=	30.08 mm.
Specimen 16	$\frac{40.25}{31.0}$	x	24.0	=	31.16 mm.
Specimen 17	$\frac{40.25}{54.5}$	x	39.5	=	29.17 mm.
Specimen 18	$\frac{40.25}{30.5}$	x	23.5	=	31.01 mm.

Mean 30.27 mm.

Standard Deviation 0.81

Table 3.3

Calculations for the original lengths of the median lines of the deformed "brachiopods"

Specimen 1	$\frac{40.25}{46.7}$	x	12.0	=	10.34 mm.
Specimen 2	$\frac{40.25}{39.2}$	x	10.5	=	10.78 mm.
Specimen 3	$\frac{40.25}{55.0}$	x	13.5	=	9.88 mm.
Specimen 4	$\frac{40.25}{54.75}$	x	12.5	=	9.19 mm.
Specimen 5	$\frac{40.25}{48.35}$	x	12.0	=	9.99 mm.
Specimen 6	$\frac{40.25}{49.85}$	x	12.0	=	9.69 mm.
Specimen 7	$\frac{40.25}{32.7}$	x	9.0	=	11.08 mm.
Specimen 8	$\frac{40.25}{39.8}$	x	9.5	=	9.61 mm.
Specimen 9	$\frac{40.25}{45.9}$	x	11.5	=	10.08 mm.
Specimen 10	$\frac{40.25}{49.45}$	x	11.5	=	9.36 mm.

Specimen 11	$\frac{40.25}{48.45}$	x	11.5	=	9.55 mm.
Specimen 12	$\frac{40.25}{39.55}$	x	9.5	=	9.67 mm.
Specimen 13	$\frac{40.25}{38.7}$	x	8.5	=	8.84 mm.
Specimen 14	$\frac{40.25}{30.0}$	x	7.0	=	9.47 mm.
Specimen 15	$\frac{40.25}{42.1}$	x	10.0	=	9.56 mm.
Specimen 16	$\frac{40.25}{53.85}$	x	13.5	=	10.09 mm.
Specimen 17	$\frac{40.25}{30.0}$	x	8.0	=	10.73 mm.
Specimen 18	$\frac{40.25}{53.45}$	x	13.0	=	9.79 mm.

Mean 9.87 mm.

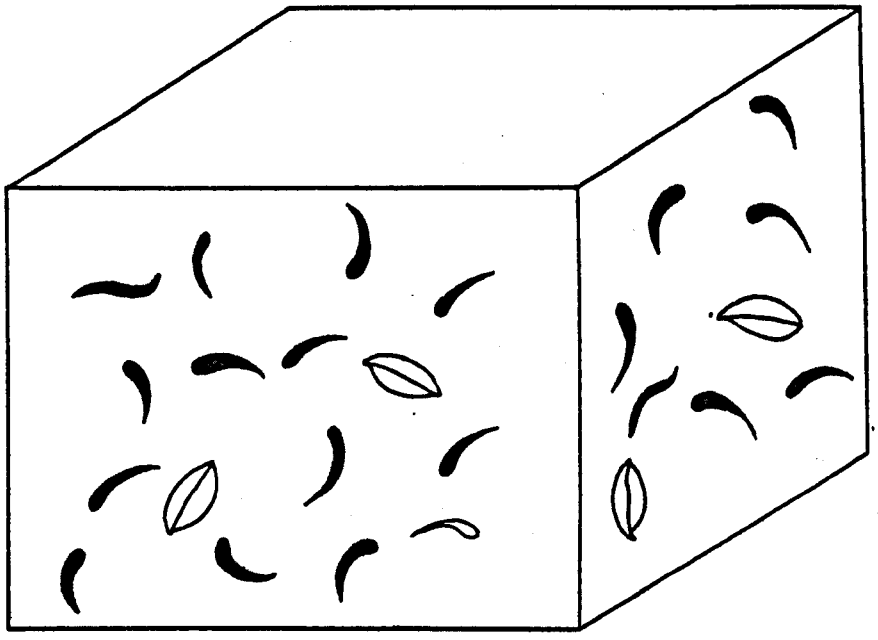
Standard Deviation 0.57

TABLE 4.1 DISCRIMINATION DATA FOR SELECTED DALMANELLID GENERA

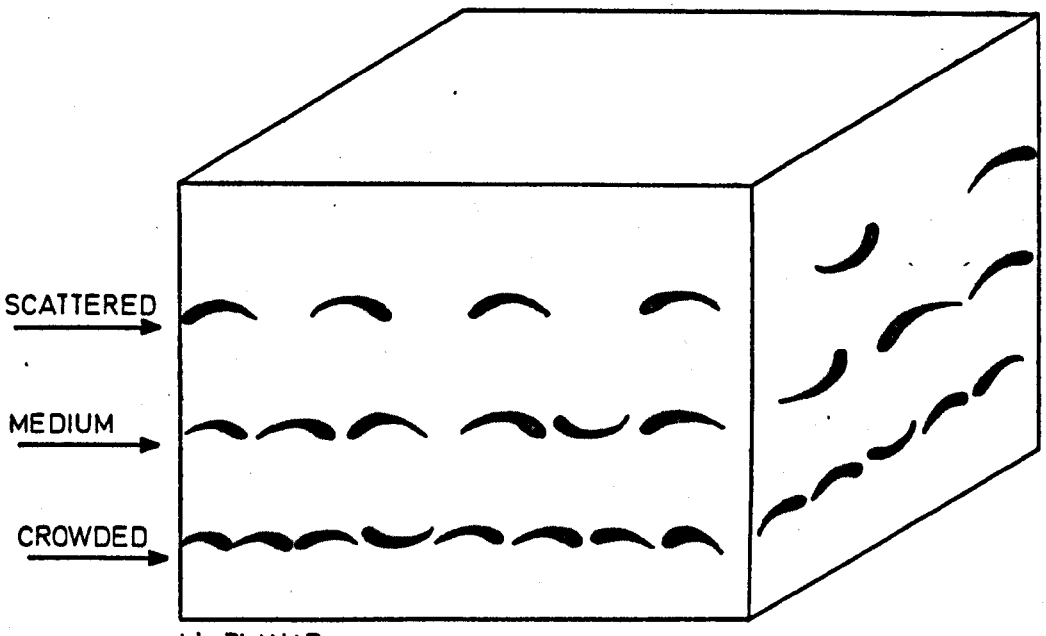
GENERA	VALVE SHAPE	ORNAMENTATION	VENTRAL MUSCLE-FIELD	BRACHIOPHORES	FULCRAL PLATES	CARDINAL PROCESS
DALMANELLA	UNEQUALLY BICONVEX	COARSELY-FINELY COSTELLATE. BRACHIAL VALVE LESS CONVEX - VARIABLY SULCATE	CORDATE. SUBMEDIAN DIDUCTOR LOBES EXTENDING BEYOND ADDUCTOR LOBES	BASES CONVERGENT ONTO MEDIAN RIDGE	PRESENT	UNDIFFERENTIATED BILOBED
BANCROFTINA	UNEQUALLY BICONVEX	COSTELLATE. DEEP PEDICLE VALVE. SHALLOW BRACHIAL VALVE, AND HAS WIDE SULCUS	NARROWLY BILOBATE. SUBMEDIAN DIDUCTOR LOBES EXTEND BEYOND ADDUCTOR LOBES	BASES SUBPARALLEL TO HINGE LINE, SUPPORTED BY ANCILLARY STRUTS FROM NOTOTHYRIAL PLATFORM	RARE	UNDIFFERENTIATED. TRILOBED. MAY BE FISSURED
HOWELLITES	UNEQUALLY BICONVEX	FINELY COSTELLATE. HIGH VENTRAL UMBO. GENTLY CONVEX, SULCATE BRACHIAL VALVE	BILOBATE. SUBMEDIAN DIDUCTOR LOBES EXTEND BEYOND, BUT DO NOT ENCLOSE ADDUCTORS	BASES SLIGHTLY DIVERGENT RELATIVE TO THEIR TOPS	SOMETIMES DIFFERENTIATED	UNDIFFERENTIATED. BILOBED
ONNIELLA	UNEQUALLY AND GENTLY BICONVEX	COSTELLATE. SMALL VENTRAL UMBO. LESS CONVEX, SULCATE BRACHIAL VALVE AND WIDE HINGE LINE	WIDELY CORDATE. SUBMEDIAN DIDUCTOR LOBES EXTEND BEYOND, BUT RARELY ENCLOSE THE ADDUCTORS	BASES GREATLY DIVERGENT RELATIVE TO THEIR TOPS	RARE	UNDIFFERENTIATED. BILOBED. MAY BE EXPANDED INTO SEMI-OVOID STRUCTURE

Data adapted from Williams & Wright (1963)

Fig. 5.1 MAJOR FAUNAL OCCURRENCE TYPES



a) RANDOM



b) PLANAR

Fig 5.2 RANDOMLY ORIENTATED VALVES IN COARSE SILTSTONES, AT LOCALITY 238 (SH 77155727), WEST OF BETWS-Y-COED REDRAWN FROM A PHOTOGRAPH

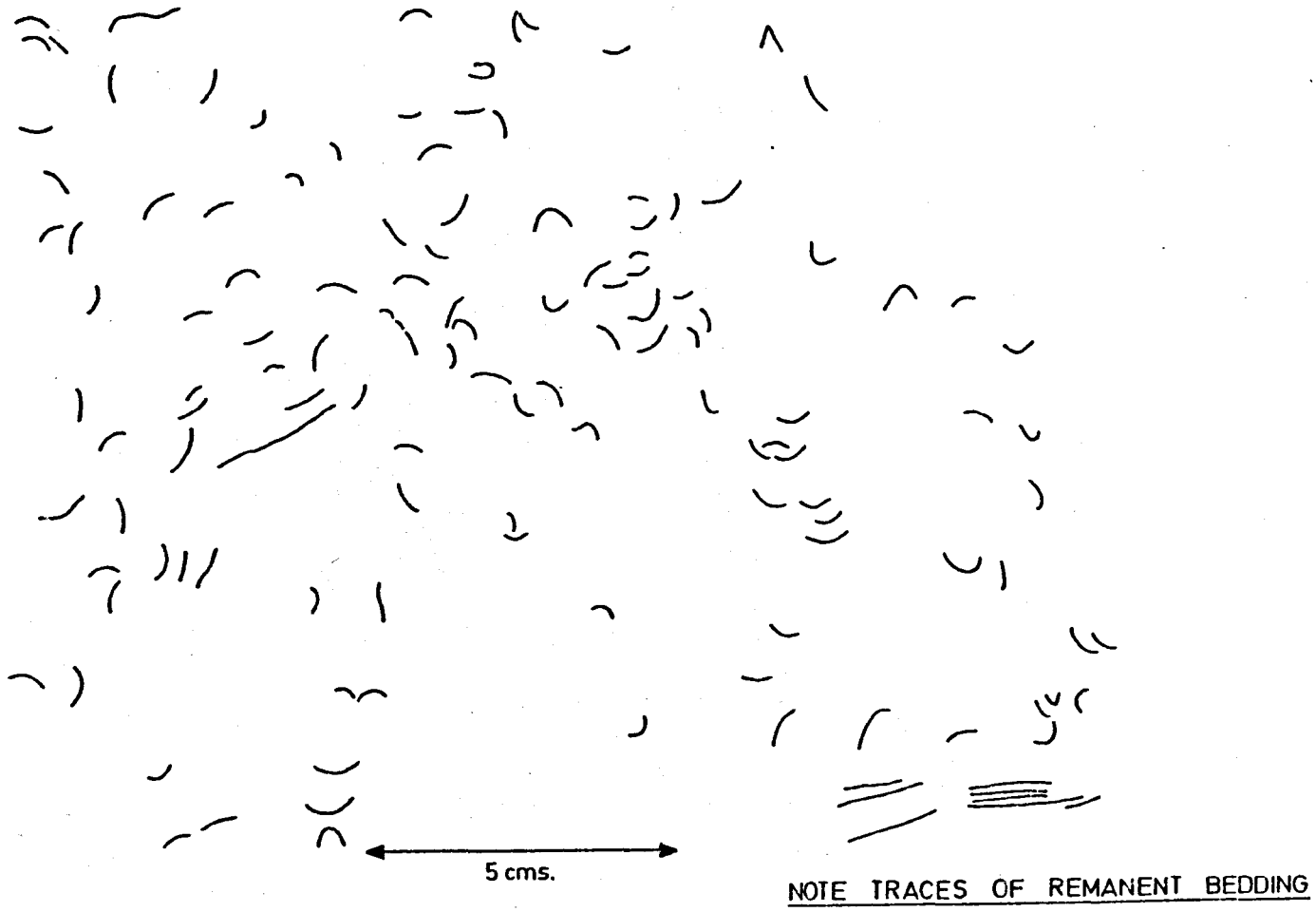
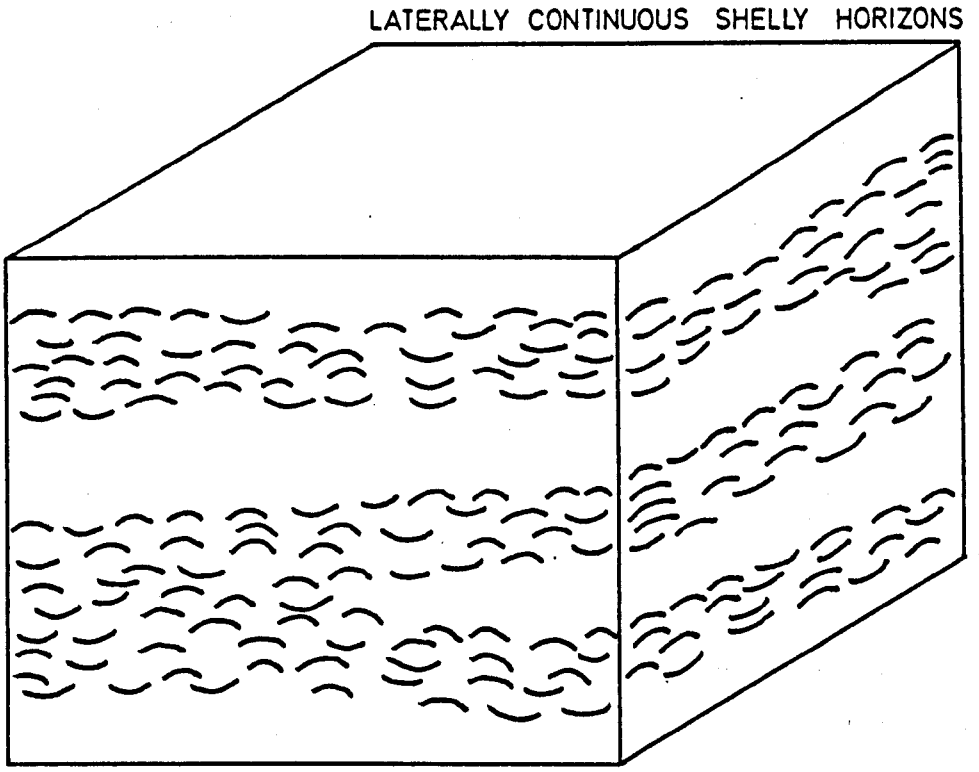
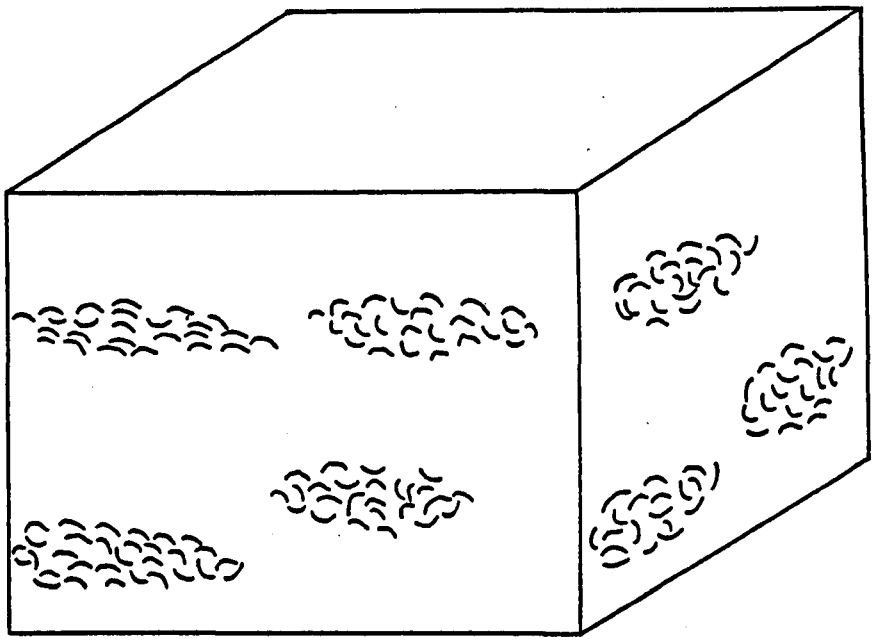


Fig. 5.3 PLANAR FAUNAL OCCURRENCE TYPE

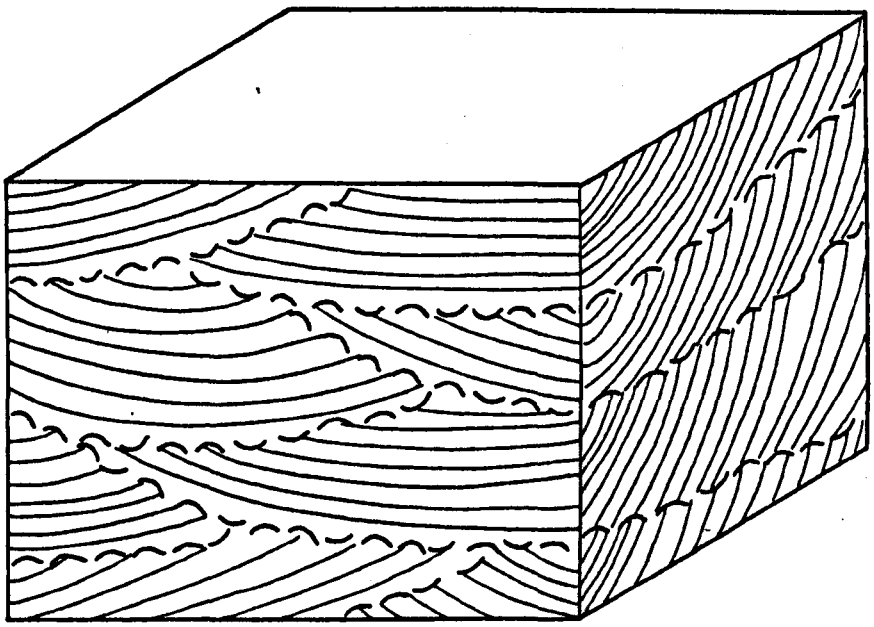


3D SCHEMATIC REPRESENTATION SHOWING SHELLY HORIZONS AND THE FORMATION OF A THICK SHELLY HORIZON BY THE COALESCENCE OF TWO THINNER HORIZONS.

Fig. 5.4 INTERMITTENT FAUNAL OCCURRENCE TYPES

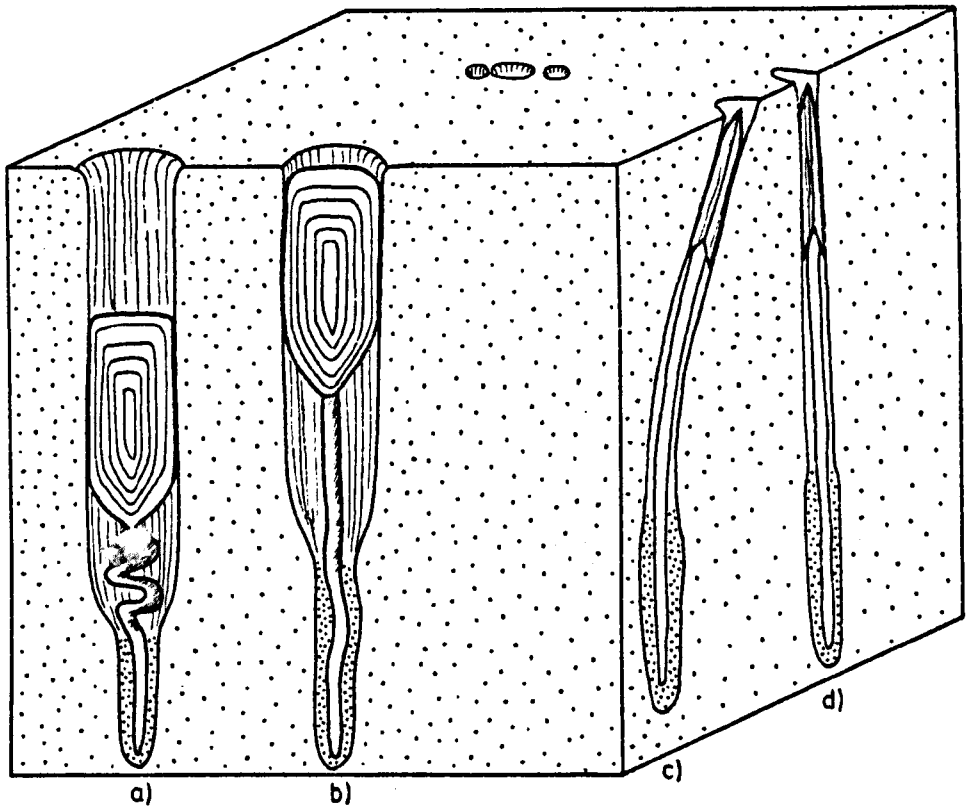


a) LENTICULAR SHELLY CONCENTRATIONS



b) SHELLY HORIZONS DEFINING THE BASAL FORESET BEDS OF TROUGH CROSS-BEDDED UNITS

Fig. 5.5 LIFE ORIENTATION (OBOLIDS)



a) NORMAL VIEW OF OBOLID IN RETRACTED POSITION IN BURROW
b) NORMAL VIEW OF OBOLID IN FEEDING POSITION IN BURROW
c) EDGE VIEW OF OBOLID IN FEEDING POSITION IN OBLIQUE BURROW
d) EDGE VIEW OF OBOLID IN FEEDING POSITION IN BURROW

Fig. 5.6 PREFERRED VALVE ORIENTATIONS

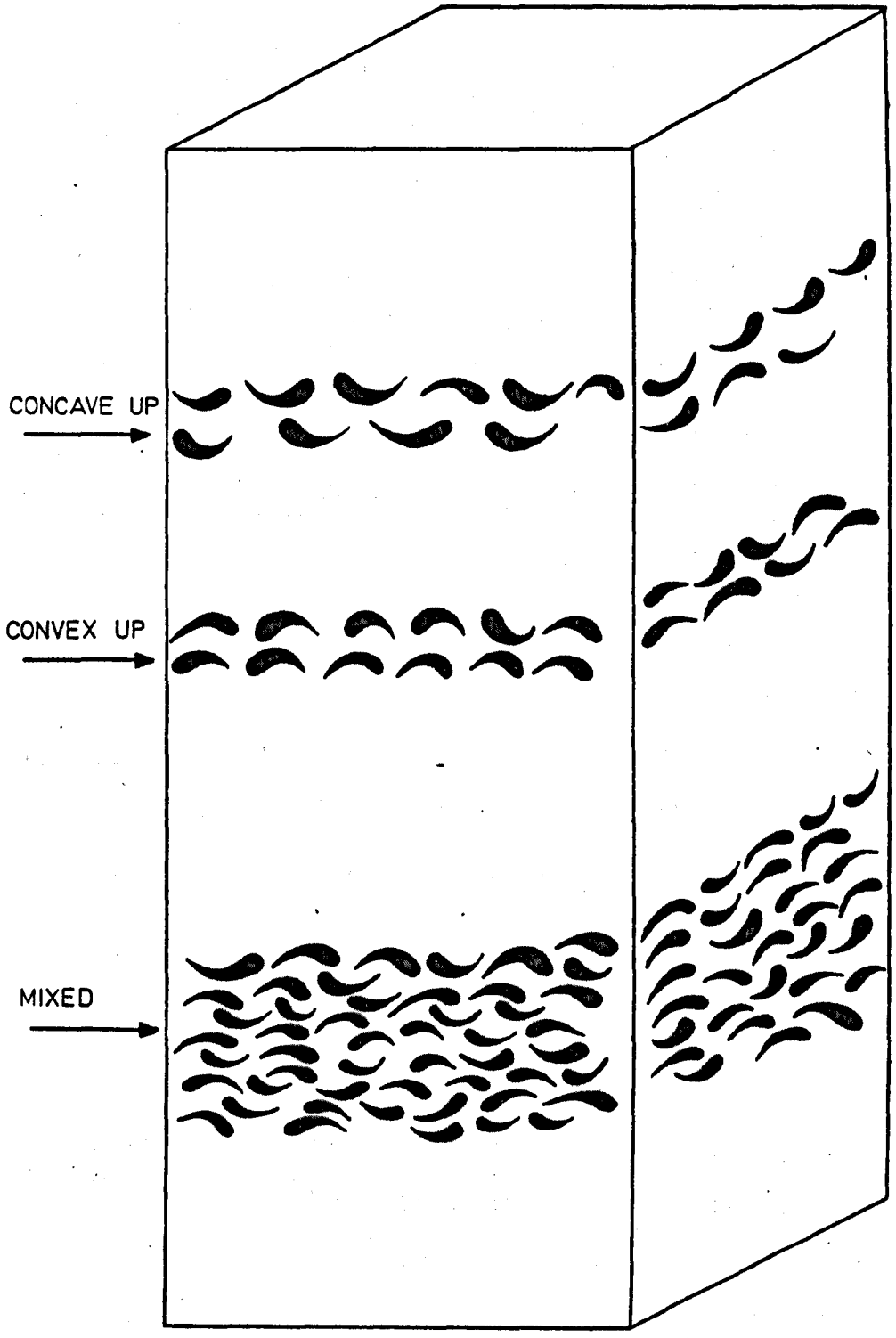
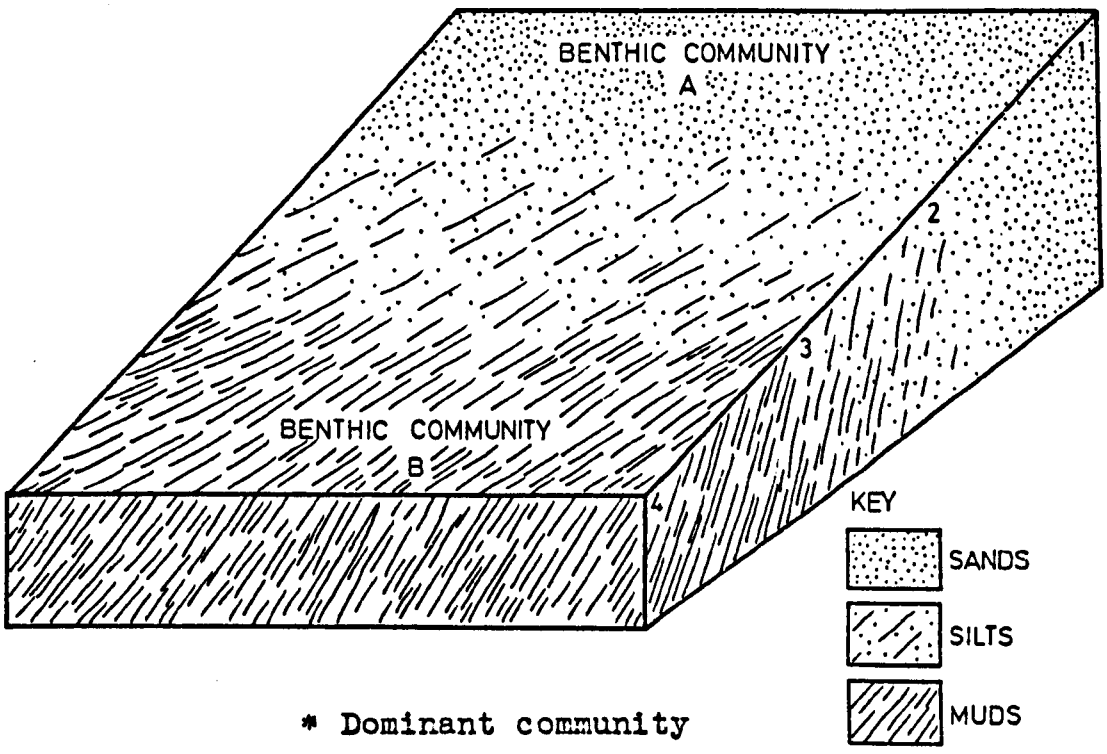


Fig. 6.1
TO SHOW THE RELATIONSHIP BETWEEN SEDIMENT TYPE AND COMMUNITY COMPOSITION



* Dominant community

The numbers on the diagram refer to lateral sampling points.

The relative distribution and abundance of the communities at each of the points is given below.

1 - * Community A - Represented by abundant low order (characteristic) and less frequent high order succession species.

Community B - Represented by very rare intergrading species (ubiquitous ? or low order succession species).

2 - * Community A - Represented by moderately abundant low order and rare high order succession species, some of those

from 1) being absent.

Community B - Represented by frequent low order (intergrading) and very rare high order (intergrading) succession species.

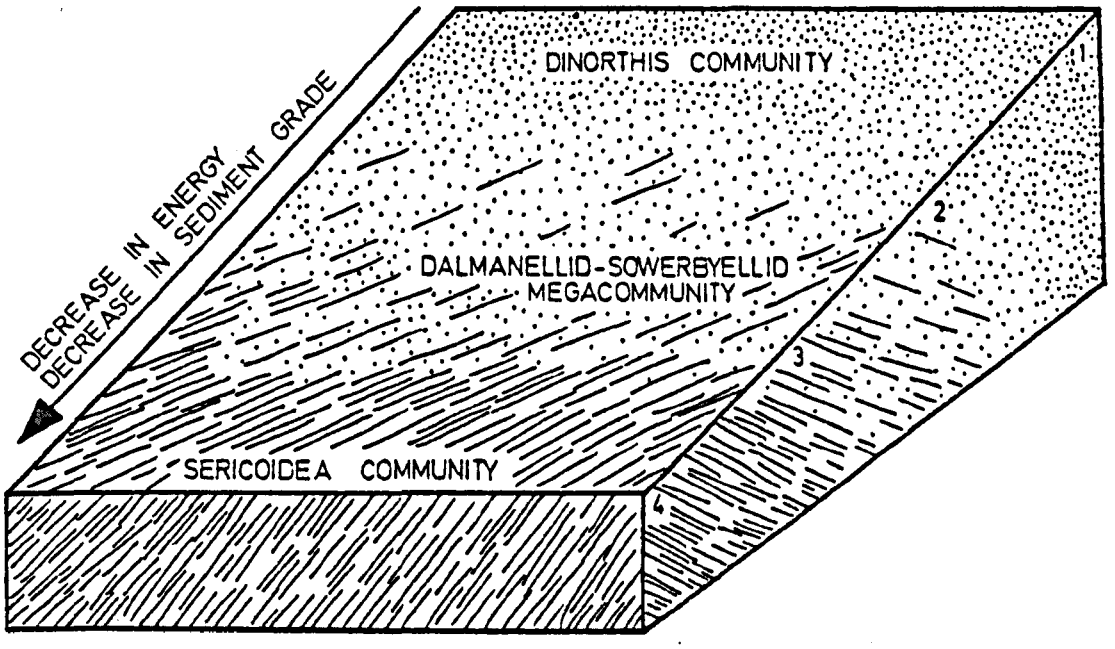
3 - Community A - Represented by frequent low order (characteristic and intergrading) and very rare high order succession species.

* Community B - Represented by moderately abundant low order (characteristic) and rare high order succession species.

4 - Community A - Represented by very rare intergrading species (ubiquitous ? or low order succession species).

* Community B - Represented by abundant low order (characteristic) and less frequent high order succession species.

Fig. 6.2
A MODEL TO SHOW SEDIMENT-COMMUNITY INTER-RELATIONSHIPS AND HOW THIS EFFECTS INTERGRADATION OF COMMUNITIES



* Dominant Community

The numbers on the diagram refer to lateral sampling points, the analyses of which are given below. Only characteristic species are considered.

1 - * Dinorthis community

Dinorthis 30%; Macrocoelia 25%; Salopia 15·5%; Reuschella 7%; Rafinesquina 6%

Intergradation

a) Dalmanellid - Sowerbyellid "mega" community

dalmanellids 6%; sowerbyellids 6%; triplesiaceans 4%; Broeggerolithus 0.5%

Crinoids/bryozoa - very rare

2 - * Dalmanellid - Sowerbyellid "mega" community

sowerbyellids 32%; dalmanellids 30%; (Dalmanella 2%;

Howellites 1%;) triplesiaceans 6%; Leptaena 2%; Horderleyella 2%; Kjaerina 1%; Broeggerolithus 0.8%; Calymene (s.l.) 0.7%; Brongniartella 0.3%; isotelinids 0.2%; Tallinnella 1%; bellerophontaceans 1%;

Tentaculites 2%

Intergradation

a) Dinorthis community

Macrocoelia 10%; Dinorthis 5%; Reuschella 3%; Rafinesquina 2%;

Crinoids/bryozoa - frequent

3 - * Dalmanellid - Sowerbyellid "mega" community

sowerbyellids 45%; dalmanellids 24%; (Howellites 3%; Dalmanella 1%;) Paracraniops 5%; Kjaerina 4%; Horderleyella 3%; triplesiaceans 2%; Leptaena 2%; Broeggerolithus 1%; Calymene (s.l.) 0.9%; Brongniartella 0.7%; isotelinids 0.7%; Kloucekia 0.6%; proetids 0.1%; Tallinnella 2%; ambonychiaceans 1%; pteriomorphians 1%; pleurotomariaceans 1%; Tentaculites 2%;

Intergradation

a) Dinorthis community

Macrocoelia 2%;

b) Sericoidea community

Sericoidea 1%; Onniella 1%

Crinoids/bryozoa abundant

4 - * Sericoidea community

Sericoidea 75%; Onniella 4%; Ampyx 0.4%;

Intergradation

a) Dalmanellid - sowerbyellid "mega" community

dalmanellids 10%; (some probably being Onniella); sowerbyellids 4%; Horderleyella 1%; Broeggerolithus 0.7%; Calymene (s.l.)0.7%; isotelinids 0.2%; Tallinnella 3%; Tentaculites 2%;

b) Dinorthis community

Rafinesquina 1%

The above percentages are generalised but are based on results from the evaluated assemblages.

The sediment grade and "environmental energy" decrease, with concomitant decreases in water turbulence and sedimentation rates, from the Dinorthis to the Sericoidea community. This does not necessarily imply a water depth transition, although this may be the case in a fully marine sequence.

Table 6.1

To show the distribution of the major characteristic and intergrading groups and genera within the proposed Snowdonian benthic marine communities.

Key to symbols used for genera distribution (after Johnson 1972).

Ch - Characteristic for a particular community

Ii - Characteristic for a particular community, but intergrades within other communities

Ie - Intergrader from another community

U - Ubiquitous; not characteristic for any particular community

Key to communities

A - Sericoidea community

B - Nicolella community

C - Dinorthis community

D - Dalmanellid - Sowerbyellid "mega" community

E - Dalmanella community

F - Howellites community

	COMMUNITIES					
	A	B	C	D	E	F
GENUS/GROUP BRACHIOPODS						
Cremnorthis sp.	-	Ch	-	-	-	-
Dalmanellids	U	U	U	Ch-Ii	U	U
Dalmanella sp.	-	-	-	Ch	Ch-Ii	Ie
Dinorthis sp.	-	-	Ch-Ii	Ie	Ie	Ie
Dolerorthis sp.	-	Ch	-	-	-	-
Horderleyella sp.	Ie	-	-	Ch-Ii	Ch-Ii	Ie
Howellites sp.	-	Ie	-	Ch-Ii	Ie	Ch-Ii
Kjaerina sp.	-	Ie	-	Ch-Ii	U	U
Leptaena sp.	-	Ie	-	Ch-Ii	C-Ii	Ie
Leptestiina sp.	-	Ch	-	-	-	-
Macrocoelia sp.	-	Ie	Ch-Ii	Ie	Ie	-
Nicolella sp.	-	Ch-Ii	-	Ie (rare)	Ie	Ie
Obolids(in life position)	-	-	-	Ch	Not Directly Associated	
Onniella sp.	Ch-Ii	-	-	Ie	-	Ie
Orthambonites sp.	-	Ch	-	-	-	-
Protozyga sp.	-	Ch	-	-	-	-
Paracraniops sp.	-	-	-	Ch	U	U
Petrocrania sp.	-	-	Ch	-	-	-
Rafinesquina sp.	Ie	-	Ch-Ii	Ie	Ie	Ie
Reuschella sp.	-	Ie	Ch-Ii	Ie	Ie	Ie
Rhactorthis sp.	-	Ch	-	-	-	-
Salopia sp.	-	-	Ch	-	-	-
Sericoidea sp.	Ch-Ii	Ie	-	Ie	-	Ie

	A	B	C	D	E	F
Skenidioides sp.	-	Ch-Ii	-	Ie (rare)	Ie	Ie
Sowerbyellids	U	U	U	Ch-Ii	U	U
Triplesiaceans (*Bicuspina* sp.)	-	Ie	Ie	Ch-Ii	Ch-Ii	Ie
TRILOBITES						
Ampyx sp.	Ch	-	-	-	-	-
Broeggerolithus sp.	U	U	U	Ch-Ii	U	U
Brongniartella sp.	-	Ie	-	Ch-Ii	Ie	Ch-Ii
Calymene sp.(s.l.) (*Flexicalymene* sp.)	U	U	-	Ch-Ii	U	U
Chasmops sp.	-	Ch (rare)	-	-	-	-
Estoniops sp.	-	Ch	-	-	-	-
Isotelinid (*Parabasilicus* sp)	Ie	-	-	Ch-Ii	Ie	Ch-Ii
Kloucekia sp.	-	-	-	Ch	U	U
Platylichas sp.	-	Ch-Ii	Ie (rare)	-	-	-
Proetid (*Decoroproteus* sp.)	-	Ie	-	Ch-Ii	Ch-Ii	Ie
Remopleurides sp.	Ch (rare)	-	-	-	-	-
OSTRACODES						
Tallinnella sp.	Ie	-	-	Ch-Ii	Ch-Ii	Ie
Zygobolbids (*Zygobolbina* sp.)	-	-	-	Ch	Ch-Ii	Ie (rare)
Tetradella sp.	-	-	-	Ch	Ch-Ii	Ie (rare)
BIVALVES	-	Ie	Ie	Ch-Ii	Ch	Ch
Ambonychiaceans	-	-	-	Ch	Ch-Ii	Ie?
Modiomorphids	-	-	-	Ch	U?	U?
Nuculoids	-	Ie	-	Ch-Ii	U	U

	A	B	C	D	E	F
Ptereineids	-	-	-	Ch	Ch-Ii	Ie?
Pteriomorphians	-	-	-	Ch	U	U
GASTROPODS	-	Ie	Ie	Ch-Ii	U	U
Bellerophontaceans	-	Ie (rare)	Ie	Ch-Ii	U	U
Pleurotomariaceans	-	Ie (rare)	-	Ch-Ii	U	U
OTHER GROUPS						
CRINOIDS	U	U	U	U	U	U
BRYOZOA	U	U	U	U	U	U
CYSTOIDS (*Haplosphaeronis* sp.)	-	Ch	-	-	-	-
CYCLOCYSTOID (*Cyclocystoides* sp.)	-	Ch	-	-	-	-
Machaeridian plates (*Lepidocoleus* sp.)	-	Ch-Ii	-	Ie	Ie	Ie
Coral (*Favosites* sp.)	-	Ch-Ii	Ie	Ie (rare)	U	U
Tentaculites sp.	Ie	Ie	-	Ch-Ii	Ie	Ch-Ii

Table 6.2 The composition and types of genera/groups in the *Sericoidea* community

*Sericoidea	Ch - Ii
*Onniella	Ch - Ii
Ampyx	Ch
Remopleurides	Ch
Dalmanellids	U
Horderleyella	Ie
Rafinesquina	Ie
Sowerbyellids	U
Broeggerolithus	U
Calymene s.l. (Flexicalymene)	U
Isotelinid (Parabasilicus)	Ie
Tallinnella	Ie
Tentaculites	Ie
Crinoids	U
Bryozoans	U

Fine grade siltstones

Low faunal diversity

Low energy, offshore environments

* Major elements

See table 6.1 for key to symbols used for genera/group distribution (after Johnson 1972)

Bivalve population (Pickerill 1974)

*Nuculaceans
*Ambonychiaceans
*Tallinnella
Parabasilicus
Trinucleids

Gastropods
Orthoconic cephalopods

Fine grade siltstones

Low faunal diversity

Low energy, offshore environments

* Major elements

See table 6.1 for key to symbols used for genera/group distribution (after Johnson 1972)

Table 6.3 The composition and types of genera/groups in the *Nicolella* community

**Skenidioides*	Ch - Ii
**Nicolella*	Ch - Ii
**Leptestiina*	Ch
**Dolerorthis*	Ch
**Protozyga*	Ch
Cremnorthis	Ch
Orthambonites	Ch
Rhactorthis	Ch
**Estoniops*	Ch
Chasmops	Ch (rare)
Platylichas	Ch - Ii
Coral (*Favosites*)	Ch - Ii
Cystoids (*Haplosphaeronis*)	Ch
Cyclocystoids (*Cyclocystoides*)	Ch
Machaeridian plates (*Lepidocoleus*)	Ch - Ii
Dalmanellids	U
Howellites	Ie
Kjaerina	Ie
Leptaena	Ie
Macrocoelia	Ie
Reuschella	Ie
Sericoidea	Ie
Sowerbyellids	U
Triplesiaceans	Ie
Broeggerolithus	Ie
Brongniartella	Ie
Calymene s.l. (*Flexicalymene*)	U
Proetid (*Decoroproteus*)	Ie
Nuculoids	Ie
Bellerophontids	Ie (rare)

Pleurotomariaceans	Ie (rare)
Tentaculites	Ie
*Crinoids	U
*Bryozoans	U

Calcareous sediments of varying grade

High faunal diversity

Offshore environment

* Major elements

See table 6.1 for key to symbols used for genera/group distribution (after Johnson 1972)

Table 6.4 The composition and types of genera/groups in the *Dinorthis* community

**Dinorthis*	Ch - Ii
**Macrocoelia*	Ch - Ii
**Salopia*	Ch
Petrocrania	Ch
Rafinesquina	Ch - Ii
Reuschella	Ch - Ii
Dalmanellids	U
Sowerbyellids	U
Triplesiaceans	Ie
Broeggerolithus	U
Platylichas	Ie (rare)
Bivalves	Ie
Bellerophontids	Ie
Coral (*Favosites*)	Ie
Crinoids	U
Bryozoans	U

Medium - coarse sandstones

Moderate faunal diversity

High energy environment, inner sublittoral zone

* Major elements

See table 6.1 for key to symbols used for genera/group distribution (after Johnson 1972)

Table 6.5 The composition and types of genera/groups in the dalmanellid-sowerbyellid "mega" community

Dalmanella	Ch
*Dalmanellids	Ch - Ii
Horderleyella	Ch - Ii
Howellites	Ch - Ii
*Kjaerina	Ch - Ii
Leptaena	Ch - Ii
Obolids (in life position)	Ch
Paracraniops	Ch
*Sowerbyellids	Ch - Ii
*Triplesiaceans (Bicuspina)	Ch - Ii
*Broeggerolithus	Ch - Ii
Brongniartella	Ch - Ii
*Calymene s.l. (Flexicalymene)	Ch - Ii
*Isotelinid (Parabasilicus)	Ch - Ii
Kloucekia	Ch
Proetid (Decoroproteus)	Ch - Ii
Tallinnella	Ch - Ii
Tetradella	Ch
Zygobolbids (Zygobolbina)	Ch
Bivalves	Ch - Ii
Ambonychiaceans	Ch
Modiomorphids	Ch
Nuculoids	Ch - Ii
Ptereineids	Ch
Pteriomorphians	Ch
Bellerophontids	Ch - Ii
Pleurotomariaceans	Ch - Ii
Tentaculites	Ch - Ii
Dinorthis	Ie
Macrocoelia	Ie
Nicolella	Ie (rare)

Onniella	Ie
Rafinesquina	Ie
Reuschella	Ie
Coral (*Favosites*)	Ie (rare)
Machaeridian plates (*Lepidocoleus*)	Ie
*Crinoids	U
*Bryozoans	U

Medium/coarse grade siltstones - fine grade sandstones

Medium - high faunal diversities

Outer sublittoral zone (subject to periodic fluctuations in sedimentation rate, clastic input and energy levels)

* Major elements

See table 6.1 for key to symbols used for genera/group distribution (after Johnson 1972)

Table 6.6 The composition and types of genera/groups in the *Dalmanella* community

*Dalmanella	Ch - Ii
Horderleyella	Ch - Ii
Leptaena	Ch - Ii
*Triplesiaceans (*Bicuspina*)	Ch - Ii
Proetid (*Decoroproteus*)	Ch - Ii
Tallinnella	Ch - Ii
Tetradella	Ch - Ii
Zygobolbids (*Zygobolbina*)	Ch - Ii
Ambonychiaceans	Ch - Ii
Ptereineids	Ch - Ii
*Dalmanellids	U
Dinorthis	Ie
Howellites	Ie
Kjaerina	U
Macrocoelia	Ie
Nicolella	Ie (rare)
Onniella	Ie
Paracraniops	U
Rafinesquina	Ie
Reuschella	Ie
Skenidioides	Ie
*Sowerbyellids	U
Broeggerolithus	U
Brongniartella	Ie
Calymene s.l. (*Flexicalymene*)	U
Isotelinid (*Parabasilicus*)	Ie
Kloucekia	U
Bellerophontids	U
Pleurotomariaceans	U
Coral (*Favosites*)	U

Tentaculites	Ie
Machaeridian plates (*Lepidocoleus*)	Ie
*Crinoids	U
*Bryozoans	U

Fine grade sandstones

Medium - high faunal diversities

Outer sublittoral zone

* Major elements

See table 6.1 for key to symbols used for genera/group distribution (after Johnson 1972)

Table 6.7 The composition and types of genera/groups in the *Howellites* community

*Howellites	Ch - Ii
Brongniartella	Ch - Ii
*Isotelinid (Parabasilicus)	Ch - Ii
Tentaculites	Ch - Ii
*Dalmanella	Ie
Dalmanellids	U
Dinorthis	Ie
Horderleyella	Ie
Kjaerina	U
Leptaena	Ie
Nicolella	Ie (rare)
Onniella	Ie
Paracraniops	U
Rafinesquina	Ie
Reuschella	Ie
Sericoidea	Ie
Skenidioides	Ie
Triplesiaceans (Bicuspina)	Ie
Broeggerolithus	U
Calymene s.l. (Flexicalymene)	U
Kloucekia	U
Proetid (Decoroproteus)	Ie
Tallinnella	Ie
Tetradella	Ie (rare)
Zygobolbids (Zygobolbina)	Ie (rare)
Ambonychiaceans	Ie (?)
Modiomorphids	U (?)
Nuculoids	U
Ptereineids	Ie (?)
Pteriomorphians	U
Bellerophontids	U

Pleurotomariaceans	U
Coral (*Favosites*)	U
Machaeridian plates (*Lepidocoleus*)	Ie
*Crinoids	U
*Bryozoa	U

Medium - coarse grade siltstones

Medium faunal diversity

Outer sublittoral zone (slightly more offshore than the *Dalmanella* community)

* Major elements

See table 6.1 for key to symbols used for genera/group distribution (after Johnson 1972)

Fig. 7.1
GENERAL STRATIGRAPHY FOR THE CAPEL CURIG AREA
NOT DRAWN TO SCALE

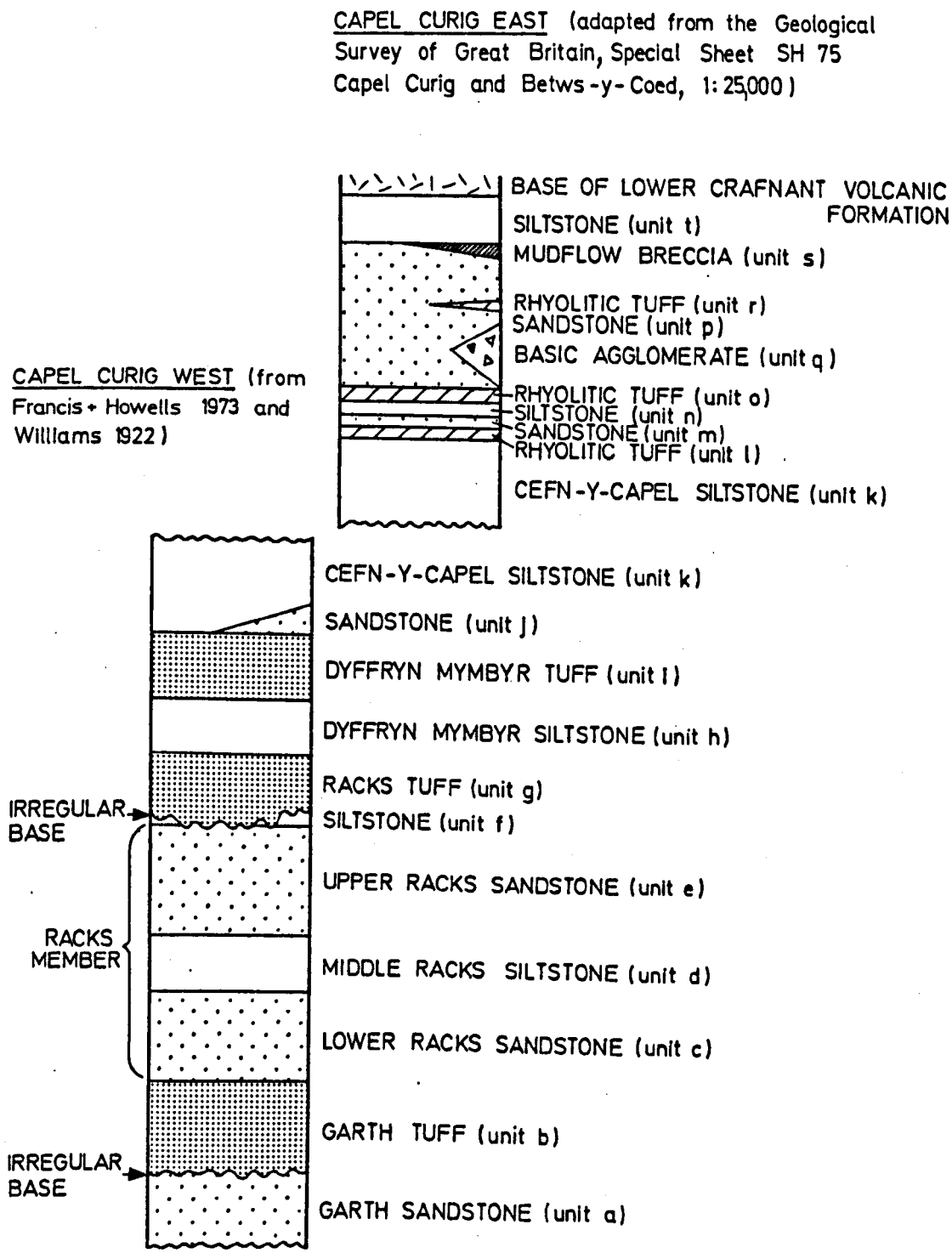


Fig.7.2a

Key to faunal abbreviations as used in fig.7.2

DAL	-	Dalmanellids
DIN	-	*Dinorthis* sp.
MACRO	-	*Macrocoelia* sp.
RAM BRYZ	-	Ramose Bryozoan fragments
SAL	-	*Salopia globosa* (Williams)
SOW	-	Sowerbyellids

Fig. 7.2

TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE CAPEL CURIG STRATIGRAPHICAL SUCCESSION

NOT DRAWN TO SCALE

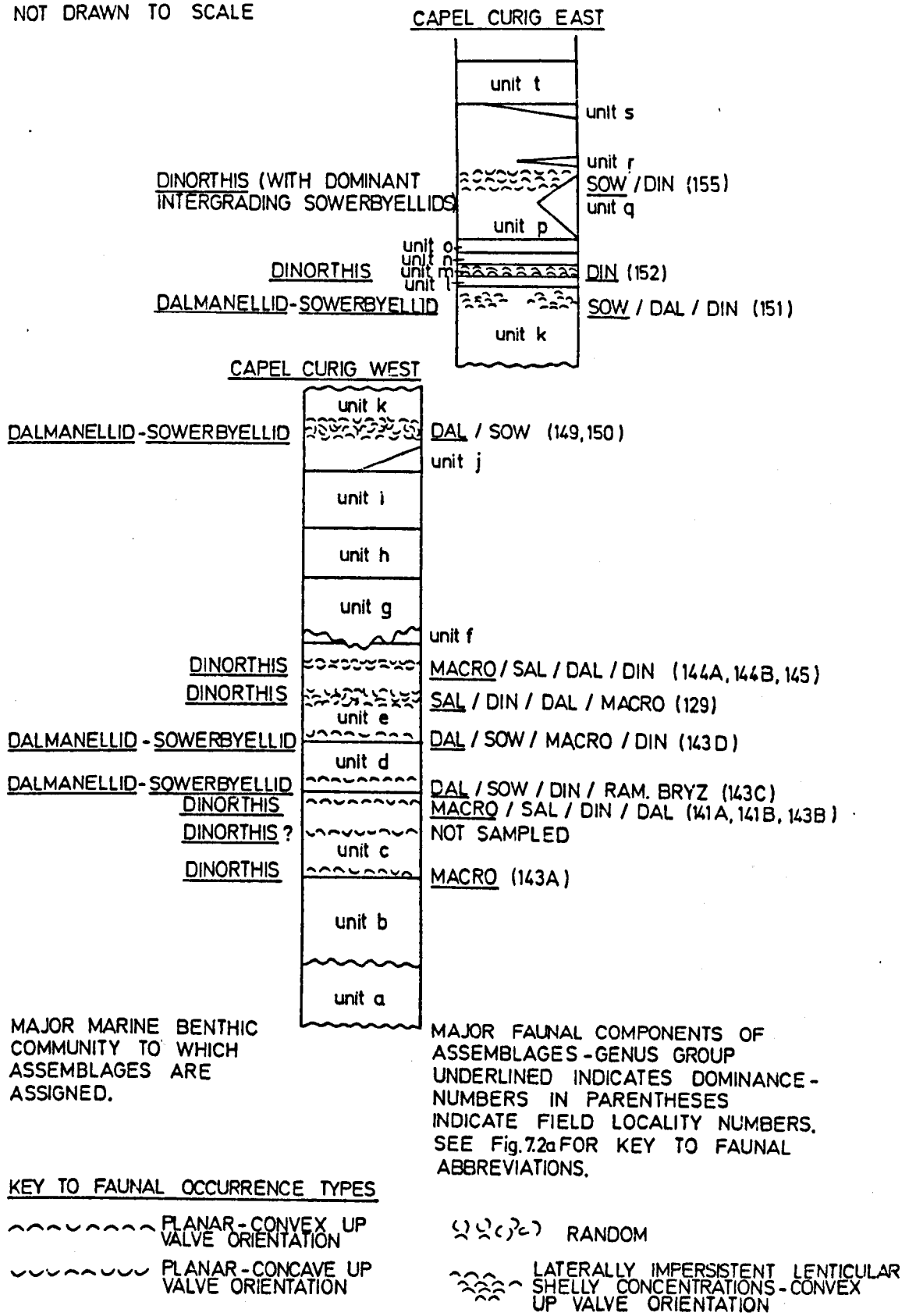


Fig. 7.3 SOFT SEDIMENT DEFORMATION STRUCTURES AS EXPOSED ON A JOINT FACE WITHIN THE LOWER RACKS SANDSTONE, WEST OF CAPEL CURIG.

NOTE THE SAND ROLLS IN THE MIDDLE OF THE EXPOSED SEQUENCE, TRUNCATED BY AN OVERLYING EROSION PLANE. NOTE ALSO THE SUBVERTICAL PIPE LIKE FEATURE AT THE TOP OF THE EXPOSED SEQUENCE.
SEE TEXT FOR EXPLANATION.

Fig. 7.4 A CLOSER VIEW OF THE SAND ROLLS AS SEEN IN Fig. 7.3

Fig. 7.5 DIAPIRIC SOFT SEDIMENT DEFORMATION AS EXPOSED IN THE UPPER PART OF THE LOWER RACKS SANDSTONE, WEST OF CAPEL CURIG.

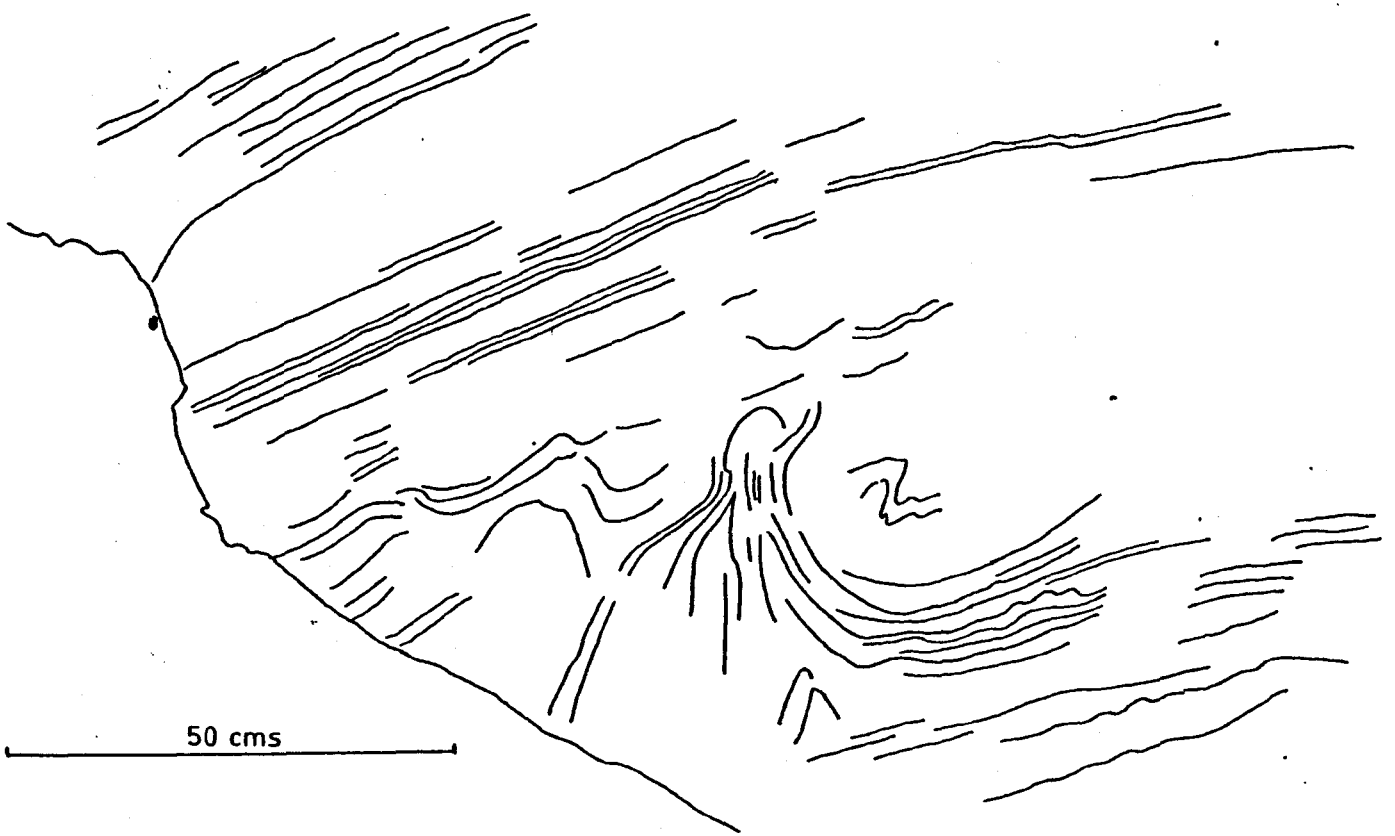
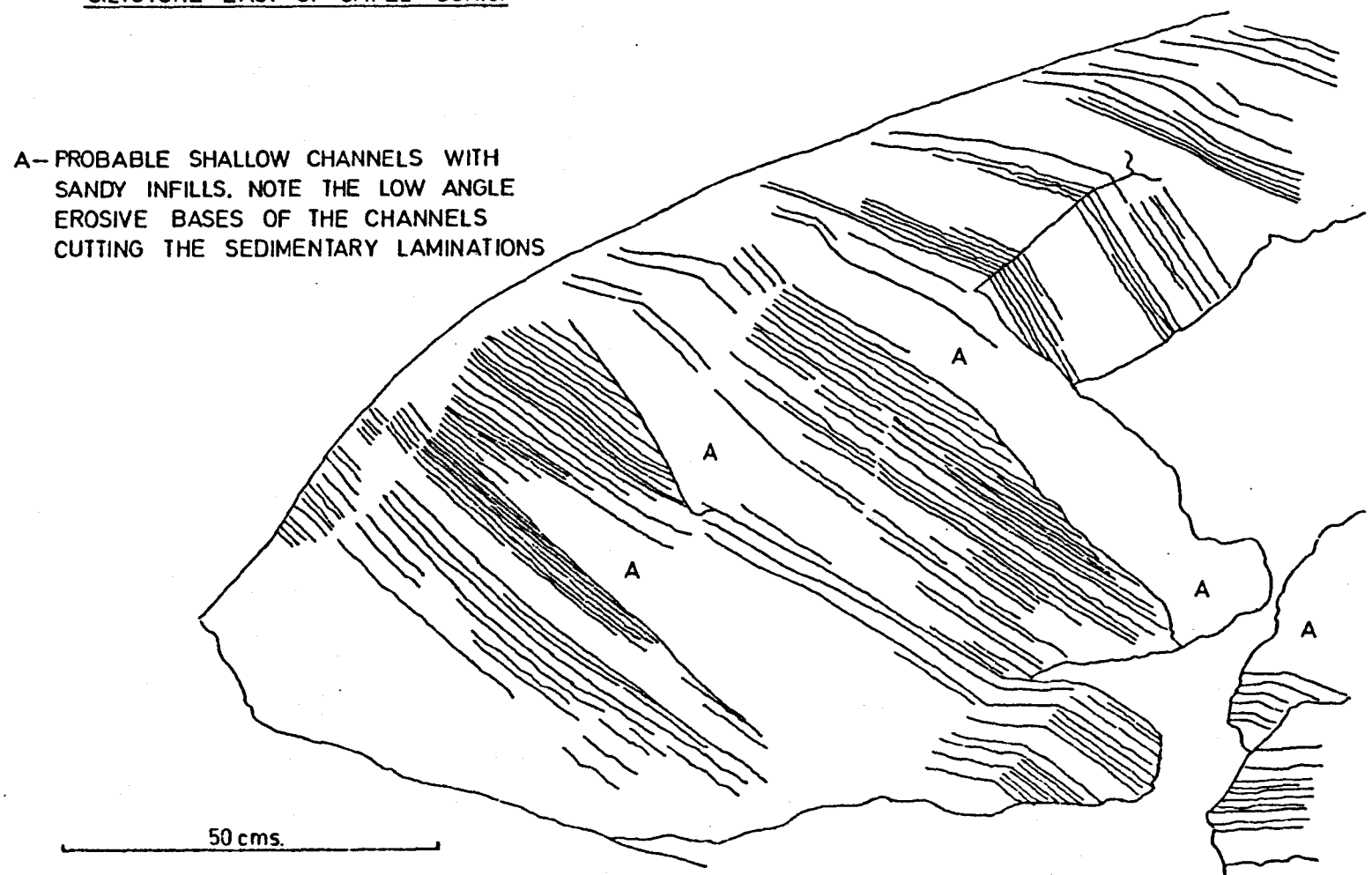


Fig. 7.6 BEDDING STRUCTURES AS DEVELOPED WITHIN THE UPPER SANDY HORIZON OF THE CEFN-Y-CAPEL SILTSTONE EAST OF CAPEL CURIG.



A– PROBABLE SHALLOW CHANNELS WITH SANDY INFILLS. NOTE THE LOW ANGLE EROSIVE BASES OF THE CHANNELS CUTTING THE SEDIMENTARY LAMINATIONS

Fig. 7.7
TO SHOW THE VARIATION IN DIVERSITY INDEX THROUGHOUT THE SUCCESSIONS AT CAPEL CURIG

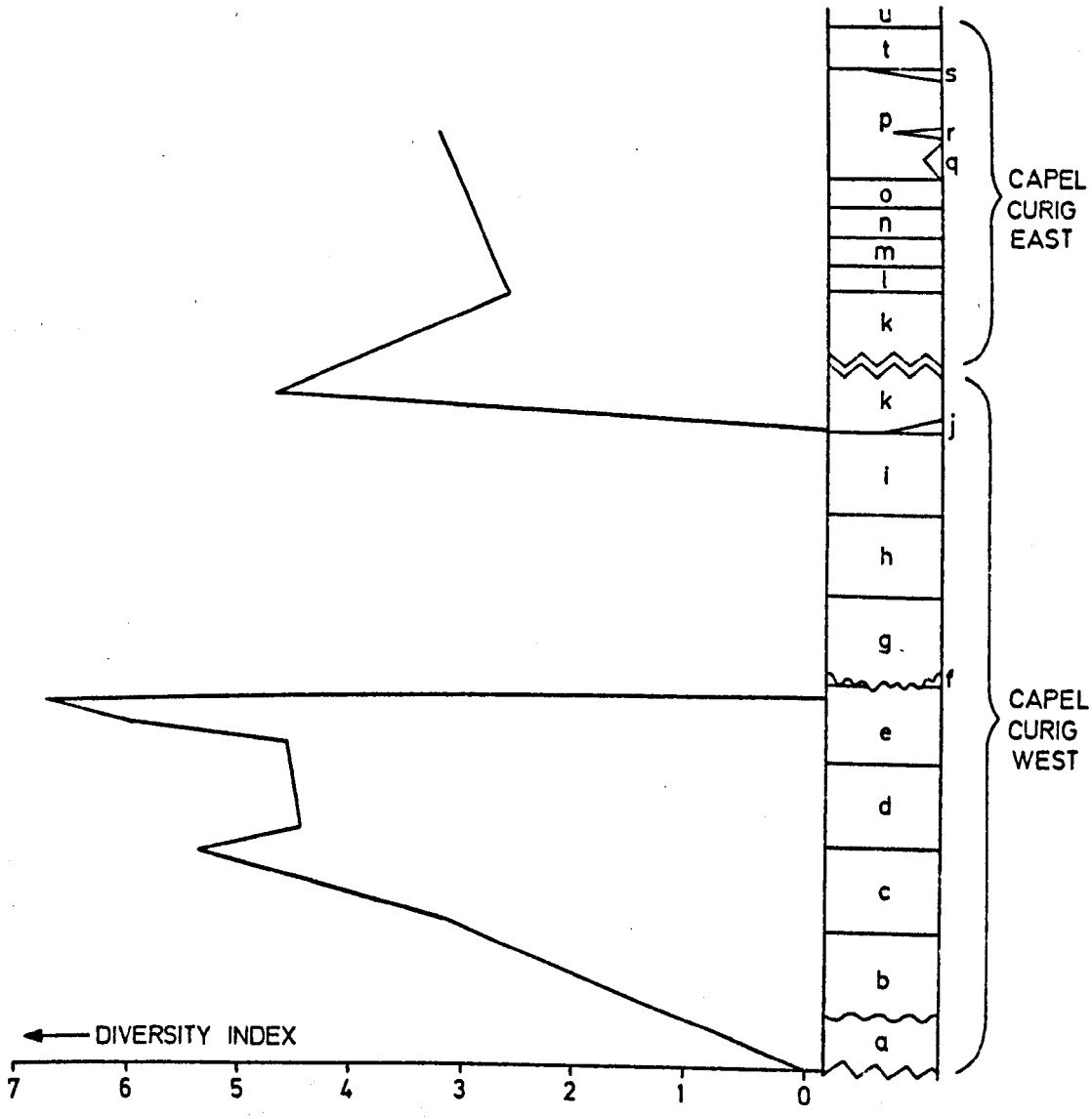


Table 7.1

To show the stratigraphic distribution of fauna in the Capel Curig area.

+ = present - = absent

Key to the respective stratigraphic horizons.
See also fig.7.1

Capel Curig West

A - Lower part of the Lower Racks Sandstone (unit c) (locality 143A)

B - Upper part of the Lower Racks Sandstone (unit c) (localities 141A/B; 143B)

C - Middle Racks Siltstone (unit d) (locality 143C)

D - Lower part of the Upper Racks Sandstone (unit e) (locality 143D)

E - Upper part of the Upper Racks Sandstone (unit e) (localities 129; 144A/B; 145)

F - Cefn-y-Capel Siltstone (unit k) (localities 149;150)

Capel Curig East

G - Upper part of the Cefn-y-Capel Siltstone(unit k) (locality 151)

H* - Unit m (= Multiplicata Sandstone - Diggens and Romano 1968) (locality 152,although horizon not sampled)

I - Unit p (locality 155)

	A	B	C	D	E	F	G	H*	I
Dalmanellids	-	+	+	+	+	+	+	-	+
Dalmanella sp.	-	+	+	-	+	+	-	-	-
Dinorthis cf. *berwynensis* (Whittington) of Williams 1963	-	+	-	-	+	-	-	-	-
Dinorthis cf. *flabellum* (J. de C. Sowerby) of Williams 1963	-	-	-	-	+	-	-	-	-
Dinorthis (*Plaesiomys*) cf. *multiplicata* Bancroft of Bancroft 1945	-	-	-	-	-	-	-	+	+
Dinorthis sp.	+	+	+	+	+	-	+	-	+
Harknessellids	-	-	+	-	+	-	-	-	-
Horderleyella sp.	-	-	+	+	-	-	-	-	+
Howellites sp.	-	-	-	-	+	+	-	-	?
Leptaena sp.	-	-	-	-	+	+	-	-	?
Macroccelia expansa (J. de C. Sowerby)	+	+	-	-	+	-	-	-	+
Macrocoelia prolata Williams	-	+	-	-	+	-	-	-	-
Macrocoelia sp.	+	+	-	+	+	-	?	-	+
Petrocrania sp.	-	-	-	-	+	-	-	-	-
Plaesiomys sp.	-	-	-	-	-	-	-	-	+
Rafinesquina sp.	-	-	-	-	?	-	-	-	-
Reuschella cf. *horderleyensis* Bancroft of Williams 1963	-	-	-	-	+	-	-	-	-
Reuschella sp.	-	+	-	-	+	-	-	-	+
Rostricellula sp.	-	-	-	-	+	-	-	-	-
Salopia globosa (Williams)	-	+	-	-	+	-	-	-	-
Salopia sp.	+	-	+	-	+	-	-	-	-
Schizophorella sp.	-	-	?	-	-	-	-	-	-

	A	B	C	D	E	F	G	H*	I
Sowerbyellids	-	+	+	+	+	+	+	-	+
Sowerbyella cf. *soudleyensis* Jones of Williams 1963	-	-	-	-	-	-	-	-	?
Triplesiaceans	-	-	+	+	-	-	-	-	-
Broeggerolithus sp.	-	+	+	-	+	+	-	-	-
Brongniartella sp.	-	-	-	-	-	+	-	-	-
Calymene sp.(s.l.)	-	-	-	-	-	+	-	-	-
Isotelinids,gen.et sp.indet.	-	-	-	-	+	-	-	-	-
Platylichas sp.	-	?	-	-	-	-	-	-	-
Trinucleids,gen.et sp.indet	-	-	-	-	+	-	-	-	-
Tallinnella sp.	-	-	-	-	-	+	-	-	-
Hollinaceans	-	-	+	-	-	-	-	-	-
Bellerophontids	-	-	-	-	-	+	-	-	-
Bivalves,gen.et sp.indet.	-	-	-	-	-	+	-	-	-
Corals (*Favosites* sp.)	-	+	-	-	+	-	-	-	-
FRAGMENTAL REMAINS									
Cyclocyclopa A	+	+	+	+	+	+	-	-	-
Cyclocyclopa A_1	-	-	+	+	-	-	-	-	-
Cyclocyclopa B	-	-	-	-	+	-	-	-	-
Cyclocyclopa C	-	-	-	-	+	-	-	-	-
Cyclocyclopa G	-	-	-	-	-	+	-	-	-
Cyclocyclopa J	-	-	+	-	+	-	-	-	-
Cyclocyclopa J_1	-	-	-	-	+	-	-	-	-
Cyclopentagonopa A	-	-	-	-	+	-	-	-	-
Cyclopentagonopa B	-	-	-	-	+	-	-	-	-
Cyclopentagonopa C	-	-	-	-	+	-	-	-	-

	A	B	C	D	E	F	G	H*	I
Cyclopentagonopa D	-	-	-	-	-	+	-	-	-
Cyclopentastellatopa A	-	-	-	-	+	-	-	-	-
Pentagonocyclopa B	-	+	+	-	-	-	-	-	-
Pentagonocyclopa D	-	-	+	-	-	-	-	-	-
Pluricolumnals	-	-	+	-	-	-	-	-	-
Echinoderm plates	-	-	-	-	-	+	-	-	-
Ramose Bryozoan fragments	-	+	+	-	+	-	-	-	-
Circular bryozoa	-	-	-	-	+	-	-	-	-
Pinnate$_1$	+	+	+	+	-	-	-	-	-
Pinnate$_2$	-	+	-	-	-	-	-	-	-
Cirrals	-	-	+	+	+	+	+	-	-
Lepidocoleus sp.	-	-	-	-	+	+	-	-	-

Table 7.2

TO SHOW THE AGE RANGE OF CERTAIN GENERA AND SPECIES IN THE CAPEL CURIG SUCCESSIONS

STAGES OF THE CARADOC	*Macrocoelia expansa*	*Salopia globosa*	*Dinorthis berwynensis*	*Dinorthis (Plaesiomys) multiplicata*	*Dinorthis flabellum*	*Reuschella* sp.	*Reuschella horderleyensis*	*Horderleyella* sp.	*Petrocrania* sp.	*Howellites* sp.
U. LONGVILLIAN										
L. LONGVILLIAN										
SOUDLEYAN										
HARNAGIAN										
COSTONIAN										

Fig. 8.1
TO SHOW THE GENERAL STRATIGRAPHY FOR THE MOEL HEBOG AREA

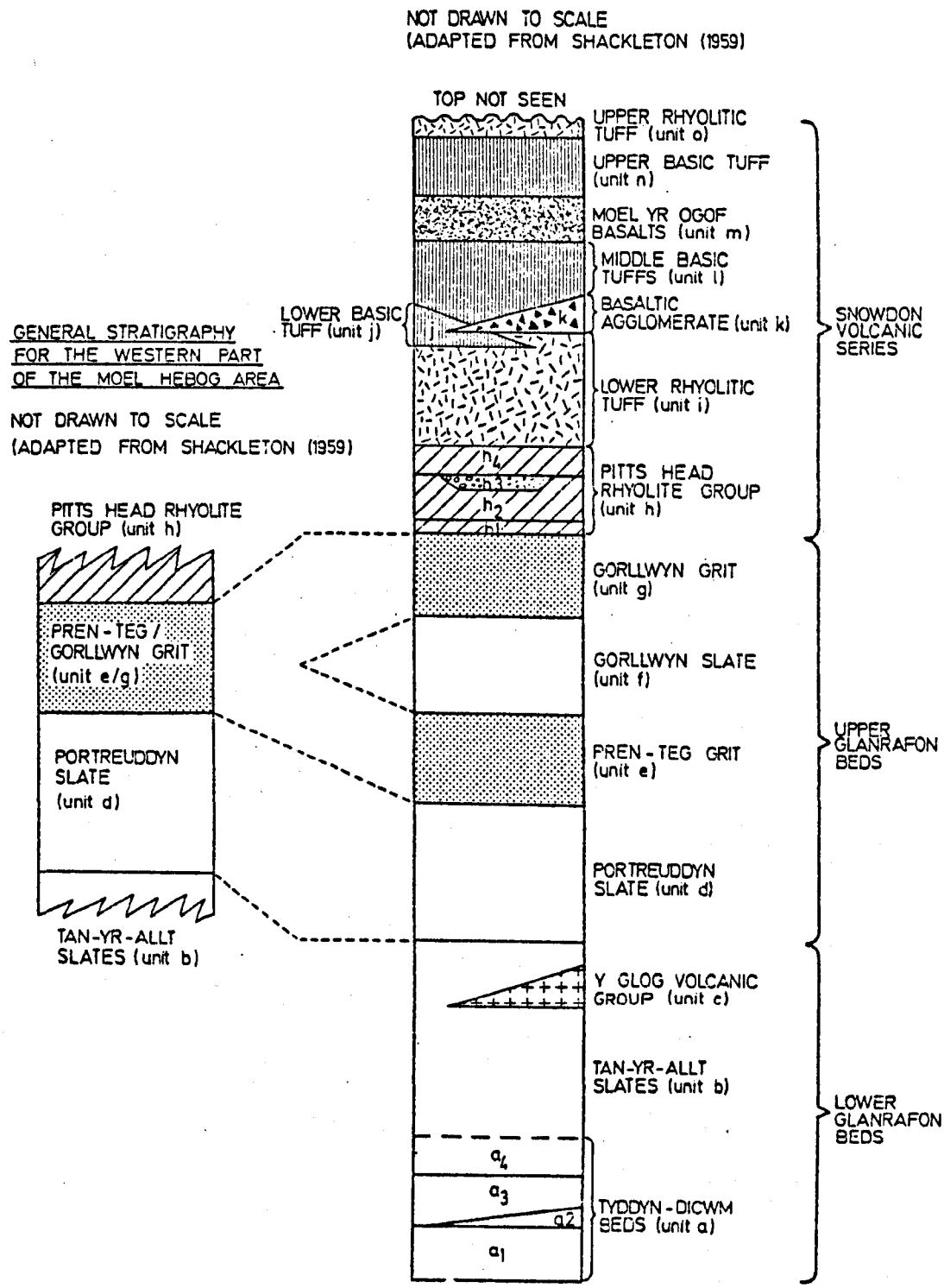


Fig.8.2a

Key to faunal abbreviations as used in fig.8.2

AMPYX	-	Ampyx sp.
B.BAS	-	Balacrinus basalis (M'Coy)
BROEGG	-	Broeggerolithus sp.
CALY	-	Calymene sp. (s.l.)
C.PELT	-	Climacograptus peltifer Lapworth
C.SCH	-	Climacograptus scharenbergii Lapworth
C.GROUPS 1 & 3	-	Climacograptus Groups 1 and 3 (Elles & Wood 1901 - 1918)
CRAN	-	Craniopsids
DAL	-	Dalmanellids
DOL	-	Dolerorthis sp. (duftonensis prolixa Williams)
F.(R.)PUS	-	Flexicalymene (Reacalymene)pusulosa (Shirley)
GAST	-	Gastropods,gen.et sp.indet.
HORD	-	Horderleyella sp.
INARTIC	-	Inarticulate brachiopods,gen.et sp.indet.
KJ	-	Kjaerina sp.
NIC	-	Nicolella actoniae obesa Williams
OGY	-	Ogygiocaris sp.
ONN	-	Onniella sp.
ORTH	-	Orthambonites sp.
OST	-	Ostracodes, gen.et sp.indet.
PA	-	Parabasilicus sp.
PARA	-	Paracraniops sp.

RAM BRYZ	-	Ramose bryozoan fragments
REMO	-	*Remopleurides* sp. (*colbyi* Portlock)
REUS	-	*Reuschella* sp.
SERI	-	*Sericoidea* sp.
SOW	-	Sowerbyellids (*Sowerbyella* sp.)
TEN	-	*Tentaculites* sp.

Fig. 8.2

TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION COMMUNITY DISTRIBUTION AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE STRATIGRAPHIC SUCCESSION OF THE MOEL HEBOG AREA

NOT DRAWN TO SCALE - THE VERTICAL THICKNESS OF SOME OF THE FOSSILIFEROUS UNITS HAS BEEN GREATLY EXAGGERATED - INDIVIDUAL UNIT NOMENCLATURE AS IN Fig. 8.1

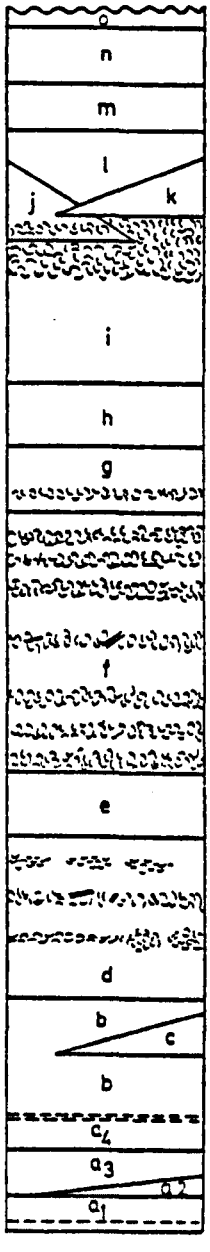
KEY TO FAUNAL OCCURENCE TYPES

RANDOM VALVE ORIENTATION

LENTICULAR SHELLY CONCENTRATION - PREDOMINANT CONCAVE - UP VALVE ORIENTATION

LENTICULAR SHELLY CONCENTRATION - RANDOM VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - MIXED VALVE ORIENTATION



NICOLELLA

NICOLELLA/HOWELLITES

UNIT J - NIC/DOL/SOW/ORTH (SHACKLETON COLLECTION - LOCALITIES 864/1151) - M

DOL/SOW/DAL/TEN/REUS/INARTIC/KJ (117/121) - L

DALMANELLID - SOWERBYELLID

SOW/KJ/DAL/PARA/BROEGG/F(R)PUS (91) - K

SOW/DAL/TEN/GAST/KJ/BROEGG/PA/CALY (255) - J

SOW/DAL/KJ/GAST/BROEGG/PA/CALY (47/53/PA4) - I

SOW/PARA/BROEGG (58/256) - H

DALMANELLID SOWERBYELLID (HOWELLITES ?)

PARA/DAL/SERI/SOW/TEN/BROEGG/PA/CALY (112 A) - G

SOW/GAST/PARA/DAL/BROEGG/CALY (54/55/56/59/PA3) - F

PARA/DAL/SOW/TEN/SERI/BROEGG/PA/CALY/B. BAS/RAM. BRYZ (112) - E

SOW/DAL/CRAN/BROEGG/CALY/PA (PA1/PA2) - D

SERICOIDEA

SERI/SOW (61) - C

DALMANELLID - SOWERBYELLID (HOWELLITES) SERICOIDEA

SOW/SERI/OST/DAL/HORD/BROEGG/PA (111/111A) - B

SERI/DAL/ONN/BROEGG/CALY/AMPYX/REMO (4A/7/8) - A

MAJOR MARINE BENTHIC COMMUNITY TO WHICH ASSEMBLAGE IS ASSIGNED

MAJOR FAUNAL COMPONENTS OF ASSEMBLAGES - DOMINANT GENUS/GROUP UNDERLINED - NUMBERS IN PARENTHESES REFER TO FIELD LOCALITIES - LETTERS REFER TO COLULUMNS IN TABLE. SEE Fig. 8.2a FOR KEY TO FAUNAL ABBREVIATIONS.

C. PELT/C. SCH/C. GROUPS 1+3/OGY (40)

Fig. 8.3
TO SHOW THE GENERALISED SEQUENCE WITHIN THE Y GLOG VOLCANIC GROUP AS DEDUCED FROM OUTCROPS TO THE NORTH OF Y FEDW (SH 55704140)

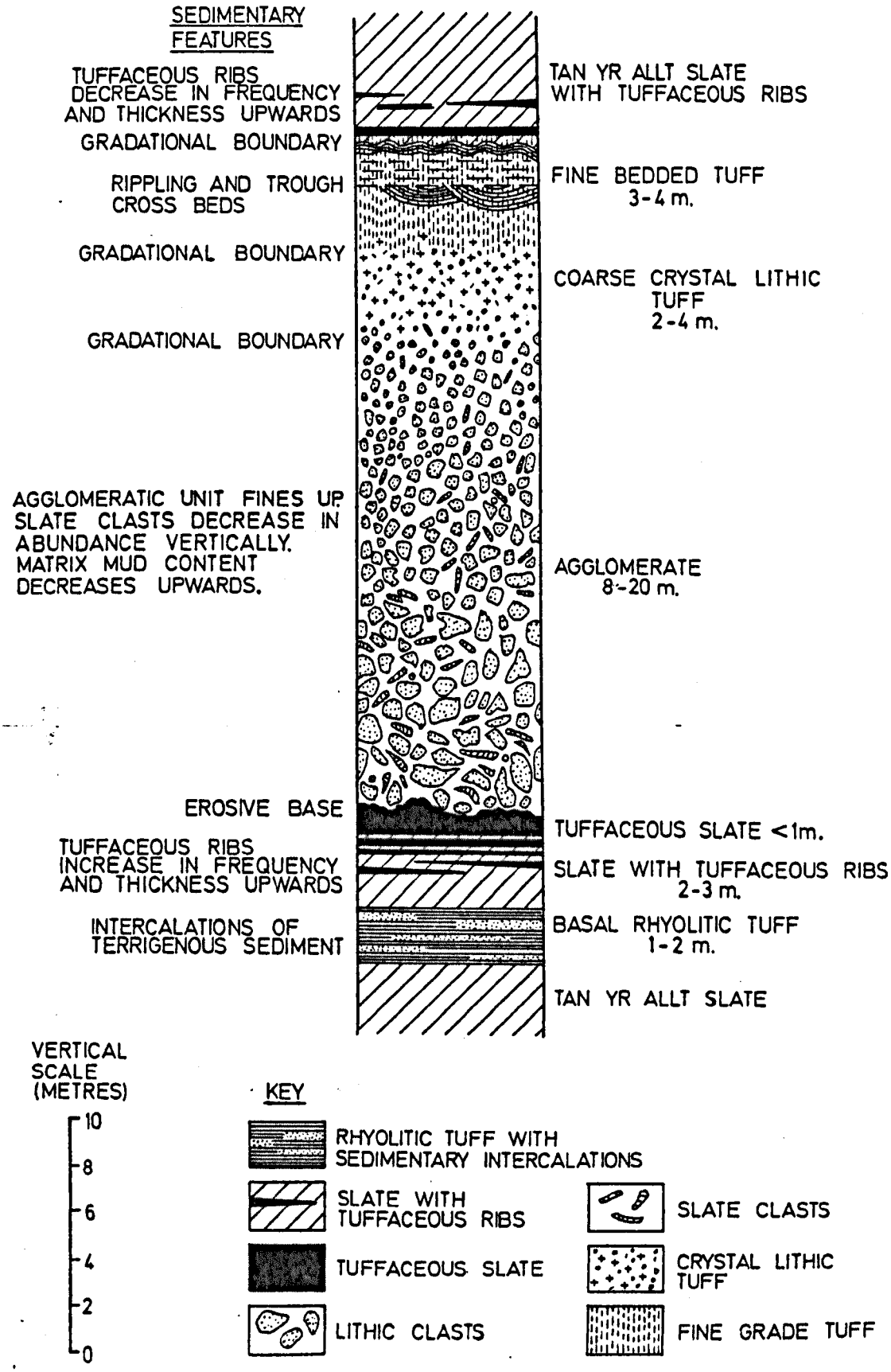


Fig. 8.4
TO SHOW TWO POSSIBLE MODELS FOR THE AGE RELATIONSHIPS OF THE PITTS HEAD RHYOLITE GROUP AND THE LOWER RHYOLITIC TUFF IN THE MOEL HEBOG AREA

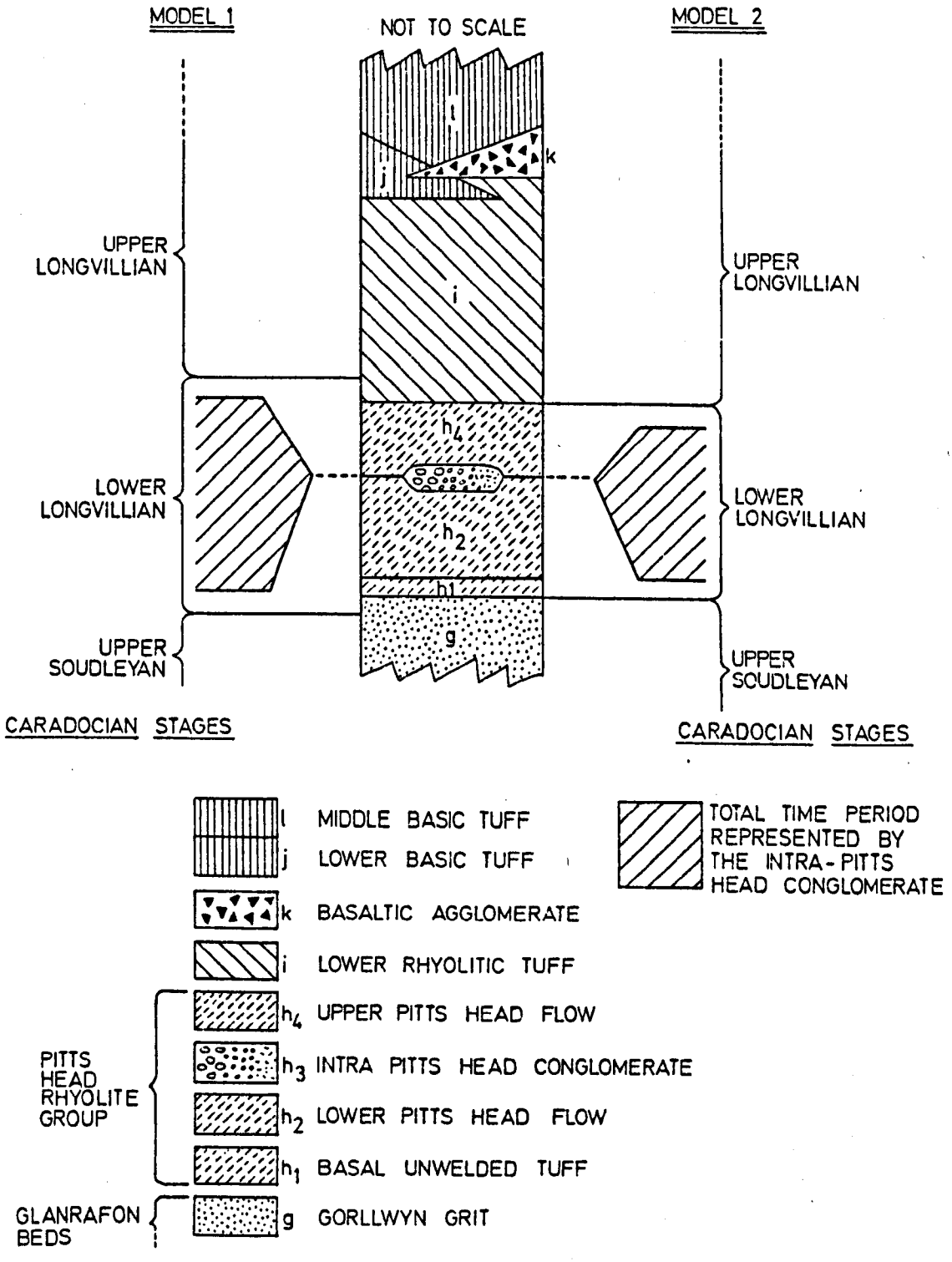


Table 8.1

To show the stratigraphic distribution of fauna within the Glanrafon Beds and Snowdon Volcanic Group in the Moel Hebog area.

+ = present - = absent

Key to stratigraphic horizons. See also figs.8.1,8.2

<u>Glanrafon Beds</u>

A - Lower part of the Portreuddyn Slate (unit d) (localities 4A,7,8)

B - Middle part of the Portreuddyn Slate (unit d) (localities 111,111A)

C - Upper part of the Portreuddyn Slate (unit d) (locality 61)

D,E,F - Lower parts of the Gorllwyn Slate (unit f) (localities 54,55,56,59,112,PA1,PA2,PA3)

G - Middle part of the Gorllwyn Slate (unit f) (locality 112A)

H,I,J - Upper parts of the Gorllwyn Slate (unit f) (localities 47,53,58,255,256,PA4)

K - Gorllwyn Grit (unit g) (locality 91)

<u>Snowdon Volcanic Group</u>

L - Upper part of the Lower Rhyolitic Tuff (unit i) (localities 117,121)

M - Lower part of the Lower Basic Tuff (unit j) (localities of Prof.R.M.Shackleton)

BRACHIOPODS	A	B	C	D	E	F	G	H	I	J	K	L	M
Bancroftina sp.	-	-	?	-	-	-	-	-	-	-	-	?	-
Bicuspina sp.-immature	-	-	-	-	-	-	-	-	-	-	-	-	?
Craniopsids	-	-	-	+	-	+	-	+	+	-	-	-	-
Cremnorthis parva Williams	-	-	-	-	-	-	-	-	-	-	-	+	-
Dalmanellids	+	+	+	+	+	+	+	+	+	+	+	+	+
Dalmanellids (immature)	?	-	-	-	-	-	-	-	-	-	-	-	-
Dalmanella sp.	+	-	?	?	-	+	-	-	+	-	-	+	-
*D.*cf.*lepta*(Bancroft) of Bancroft 1945	-	-	-	-	-	-	-	-	-	-	-	+	-
*D.*cf.*modica* Williams of Williams 1963	-	-	-	-	-	-	-	-	-	-	-	+	-
*D.*cf.*salopiensis gregaria* Williams of Williams 1974	-	-	-	-	-	+	-	-	-	-	-	-	-
Desmorthis sp.	-	-	-	-	-	-	-	-	-	-	-	?	-
Dinorthis sp.	-	?	-	-	-	-	-	-	-	-	-	-	-
D.(*Plaesiomys*)cf.*robusta* Bancroft of Bancroft 1945	-	-	-	-	-	-	-	-	-	-	-	-	+
Dolerorthis sp.	-	-	-	-	-	-	-	-	-	-	-	+	+

	A	B	C	D	E	F	G	H	I	J	K	L	M
D.duftonensis prolixa Williams	-	-	-	-	-	-	-	-	-	-	-	+	+
Eoplectodonta sp.	-	-	-	-	-	-	-	-	-	-	-	+	-
Hesperorthids	-	-	-	-	-	-	-	-	-	-	-	+	-
Heterorthis sp.	-	-	-	-	-	-	-	-	-	-	+	-	-
Howellites sp.	-	-	-	-	-	?	-	-	+	?	-	+	-
Horderleyella sp.	+	+	+	?	-	+	-	-	-	?	-	-	-
H.cf.plicata Bancroft of Bancroft 1928,1945	-	-	+	-	-	-	-	-	-	-	-	-	-
Inarticulate brachiopods,gen.et sp.indet.	-	-	-	-	+	+	-	+	-	-	-	+	-
Kiaromena sp.	-	-	-	-	-	-	-	-	-	-	-	+	-
Kjaerina sp.	-	-	-	+	-	+	-	-	+	?	+	+	+
K.bipartita (Salter)	-	-	-	-	-	-	-	-	-	-	-	+	-
K.aff.jonesi Bancroft of Bancroft 1929a	-	-	-	-	-	-	-	-	-	-	+	-	-
K.cf.hedstroemi Bancroft of Bancroft 1929a	-	-	-	-	-	-	-	-	-	-	-	+	-
K.cf.horderleyensis Bancroft of Bancroft 1929a	-	-	-	-	-	-	-	-	+	-	-	-	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
K.cf.latericostata Bancroft of Bancroft 1929a	-	-	-	-	-	-	-	-	+	-	-	-	-
Macrocoelia sp.	-	-	-	-	-	-	-	-	-	-	-	?	-
Nicolella actoniae obesa Williams	-	-	-	-	-	-	-	-	-	-	-	+	+
Obolids,gen.et sp.indet.	-	-	-	-	+	+	?	-	-	-	-	+	-
Obolid (*Lingulella* sp.	-	-	-	-	-	?	-	-	-	-	-	-	-
Onniella sp.	+	-	?	+	-	+	+	-	+	+	-	-	-
O.cf.soudleyensis(Bancroft) of Williams 1963	+	-	-	-	+	-	-	-	-	-	-	-	-
Orthambonites cf.*cessata* Williams of Williams 1963	-	-	-	-	-	-	-	-	-	-	-	-	+
O.cf.exopunctata Williams of Williams 1974	-	-	-	-	-	-	-	-	-	-	-	-	+
Orthids,gen.et sp.indet.	-	-	+	-	+	+	-	-	+	+	-	+	-
Palaeoglossa sp.	-	-	-	-	-	-	-	+	-	-	-	+	-
cf.*Palaeoglossa* sp.of Williams 1974	-	-	-	-	-	-	-	-	-	-	-	+	-
Paracraniops sp.	-	-	-	-	+	+	+	+	-	-	+	+	-
Plaesiomyids	-	-	-	-	-	-	-	-	-	-	-	+	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
Platystrophia sp.	-	-	-	-	-	-	-	-	-	-	-	+	+
Rafinesquina sp.	+	-	-	-	-	-	-	-	-	-	-	?	-
Reuschella sp.	-	-	-	-	-	-	-	-	-	-	-	+	+
*R.*cf.*horderleyensis* Bancroft of Williams 1963	-	-	-	-	-	-	-	-	-	-	-	-	+
Rhactorthis cf.*crassa* Williams of Williams 1963	-	-	-	-	-	-	-	-	-	-	-	+	-
Schizocrania sp.	-	-	-	-	-	-	-	?	-	-	-	-	-
Schmidtites sp.	-	-	-	-	-	-	-	-	?	-	-	-	-
Sericoidea sp.	+	+	+	-	+	-	+	-	-	-	-	-	-
S. abdita Williams	+	-	-	-	-	-	-	-	-	-	-	-	-
S.restricta (Hadding)	-	-	+	-	-	-	-	-	-	-	-	-	-
*S.*aff.*abdita* Williams of Williams 1962	-	-	+	-	-	-	-	-	-	-	-	-	-
*S.*aff.*restricta* (Hadding) of Williams 1962	+	-	-	-	-	-	-	-	-	-	-	-	-
*S.*aff.*abdita* Williams(cf.*Chonetoidea alpha* Spjeldnaes of Spjeldnaes 1957)	-	-	+	-	-	-	-	-	-	-	-	-	-
*S.*sp.(cf.*C.alpha* Spjeldnaes of Spjeldnaes 1957)	+	-	-	-	-	-	-	-	-	-	-	-	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
S.sp.(cf.C.gamma Spjeldnaes of Spjeldnaes 1957)	-	-	+	-	-	-	-	-	-	-	-	-	-
S.sp.(cf.C.iduna Opik of Spjeldnaes 1957)	-	-	+	-	-	-	-	-	-	-	-	-	-
Skenidioides sp.	-	-	-	-	-	+	-	+	+	-	-	+	-
Sowerbyellids	+	+	+	+	+	+	+	+	+	+	+	+	+
Strophomena sp.	-	-	-	-	-	-	-	-	-	-	-	+	-
S.cf.grandis(J.de C.Sowerby) of Williams 1963	-	-	-	-	-	-	-	-	-	-	-	+	-
Strophomenids,gen.et sp.indet.	-	-	-	-	-	+	-	-	+	-	-	+	-
TRILOBITES													
Ampyx sp.	+	-	-	-	-	-	-	-	-	-	-	-	-
A.cf.linleyensis Whittard of Whittard 1955	+	-	-	-	-	-	-	-	-	-	-	-	-
Atractopyge sp.	-	-	-	-	-	-	-	-	-	-	-	+	-
Broeggerolithus sp.	+	+	+	+	+	+	+	+	+	+	+	+	-
B.broeggeri (Bancroft)	-	-	-	-	-	-	-	+	-	-	-	-	-
B.cf.broeggeri(Bancroft) of Dean 1960	+	+	-	+	+	+	+	-	+	+	-	-	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
B.cf.harnagensis Bancroft of Dean 1960	+	-	-	-	+	-	-	-	-	-	-	-	-
B.cf.soudleyensis (Bancroft) of Dean 1960	-	+	-	+	+	+	+	-	+	-	-	-	-
B.sp.(Group 2 - Dean 1960)	-	-	-	-	+	+	+	-	+	+	-	-	-
Brongniartella sp.	-	-	-	-	+	+	+	?	-	-	-	-	-
B.bisulcata (M'Coy)	-	-	-	-	-	-	-	-	-	-	-	+	+
B.minor(Salter)	-	-	-	-	+	-	+	-	-	-	-	-	-
B.cf.bisulcata(M'Coy)of Dean 1961	-	-	-	+	-	-	-	-	+	-	-	-	-
Brongniartella sp.thoracic segments	-	-	-	-	+	-	-	-	-	-	-	+	-
Calymene sp.(s.l.)	+	+	-	+	+	+	+	+	+	+	-	-	-
Chasmops sp.	-	-	-	-	-	-	-	-	-	-	-	+	-
Encrinurid	-	-	-	-	?	-	-	-	-	-	-	-	-
Estoniops alifrons (M'Coy)	-	-	-	-	-	-	-	-	-	-	-	+	+
Flexicalymene sp.	+	-	-	+	-	?	-	-	?	+	-	-	-
F.(Reacalymene)pusulosa(Shirley)	+	-	-	-	-	-	-	-	-	-	+	-	-
F.cf.acantha Bancroft of Dean 1963a	+	-	-	-	+	-	-	-	-	-	-	-	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
F.(R.) cf. *limba* (Shirley) of Dean 1963a	-	-	-	-	-	-	-	-	+	-	-	-	-
F.(R.) cf. *pusulosa* (Shirley) of Dean 1963a	+	-	-	-	-	-	-	-	-	-	-	-	-
cf. *F. planimarginata* (Reed) of Whittington 1965	-	-	-	-	-	-	-	-	+	-	-	-	-
Isotelinids, gen. et sp. indet.	-	-	-	+	-	+	-	-	+	-	-	-	-
Isotelinid librigenae	-	+	-	+	-	+	+	+	+	+	-	-	+
Isotelinid thoracic segments	-	+	-	+	+	+	-	-	+	+	-	-	-
Parabasilicus sp.	-	+	-	+	+	+	+	+	+	-	-	-	-
P. powisi (Murchison)	-	-	-	-	+	+	-	-	+	+	-	-	-
P. cf. *marstoni* (Salter) of Dean 1963a	-	-	-	-	+	+	+	-	-	-	-	-	-
P. cf. *powisi* (Murchison) of Dean 1963a	-	-	-	-	-	-	-	-	+	-	-	-	-
P. sp. librigenae	-	-	-	-	+	-	-	-	-	-	-	-	-
Platylichas sp.	-	-	-	-	-	-	-	-	-	-	-	+	-
Proetids	-	-	-	-	-	-	-	-	-	-	-	+	-
Proetid librigenae	+	-	-	-	+	-	-	-	-	-	-	-	-
Pterygometopid cheek fragment	-	-	-	-	-	-	-	-	-	-	-	+	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
Raphiophorids	+	-	-	-	-	-	-	-	-	-	-	-	-
Remopleurides cf. *colbyi* Portlock of Whittington 1966	+	-	-	-	-	-	-	-	-	-	-	-	-
Trilobite thoracic segments	+	+	-	+	+	+	+	+	+	+	-	+	-
Ostracodes	+	+	-	-	+	-	-	-	-	-	-	+	-
Hollinaceans	-	+	-	-	-	-	-	-	-	-	-	+	-
Primitia sp.	-	-	-	-	-	-	-	-	?	-	-	-	-
Sigmoopsids	-	-	-	-	-	-	-	-	+	-	-	-	-
Tallinnella sp.	-	-	-	-	-	-	-	-	-	-	-	+	-
Bivalves, gen. et sp. indet.	-	-	-	-	-	-	-	-	+	-	-	+	-
Praectenodonta sp.	-	-	-	-	-	-	-	-	-	-	-	+	-
Gastropods, gen. et sp. indet.	-	-	-	+	-	+	-	-	+	+	-	+	-
Bellerophontid (cf. *Tetranota* sp.)	-	-	-	-	-	+	-	-	-	-	-	-	-
Bellerophontid (cf. *Tropidodiscus* sp.)	-	-	-	-	-	+	-	-	-	-	-	+	-
Lophospira sp.	-	-	-	-	-	?	-	-	-	-	-	-	-
Sinuites sp.	-	-	-	-	-	+	-	?	-	-	-	-	-
Orthoconic cephalopods, gen. et sp. indet.	-	-	-	?	-	+	-	+	?	-	-	-	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
Corals, gen. et sp. indet.	-	-	-	-	-	+	-	-	-	-	-	-	-
Encrusting corals, gen. et sp. indet.	-	-	-	-	-	+	-	+	-	-	-	-	-
Favosites sp.	-	-	-	-	-	-	-	-	+	-	-	+	-
Tentaculites sp.	+	-	-	+	+	+	+	+	+	+	-	+	+
T. scalaris Schlotheim	-	-	-	-	-	-	-	-	-	-	-	+	-
Algae, gen. et sp. indet.	+	-	-	-	-	+	-	-	+	-	+	-	-
Hyolithes sp.	-	-	-	-	+	-	-	-	-	-	-	-	-
FRAGMENTAL REMAINS													
Cyclocyclopa A	+	+	+	+	+	+	+	+	+	+	+	+	-
Cyclocyclopa A_1	-	-	-	+	-	+	-	+	+	+	-	+	-
Cyclocyclopa E	-	-	-	-	-	-	-	-	-	-	-	+	-
Cyclocyclopa F	-	-	-	-	+	-	+	-	-	-	-	+	-
Cyclocyclopa G	-	+	-	+	-	+	-	-	+	-	-	-	-
Cyclocyclopa G_1	-	-	-	-	-	+	-	-	-	-	-	-	-
Cyclocyclopa H	-	-	-	-	+	-	-	-	-	-	-	+	-
Cyclocyclopa J	-	+	-	+	+	+	+	+	+	+	+	-	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
Cyclocyclopa J_1	-	+	-	+	+	+	+	+	+	+	-	-	-
Cyclocyclopa J_1 pluricolumnals	-	-	-	-	-	+	-	-	+	-	-	-	-
Cyclocyclopa K	-	-	-	-	-	+	-	-	+	-	-	+	-
Cyclocyclopa L	-	-	-	+	+	+	+	-	+	+	-	-	-
Cyclopentagonopa C	-	-	-	+	-	+	-	+	-	+	-	-	-
Cyclopentagonopa D	-	-	-	+	+	+	-	-	+	+	-	-	-
Cyclopentagonopa E	-	-	-	-	+	-	+	-	-	-	-	-	-
Cyclopentastellatopa A	-	-	-	-	-	-	-	-	-	-	-	+	-
Pentagonocyclopa A	-	-	-	-	-	?	-	-	-	+	-	+	-
Pentagonocyclopa B	-	+	-	+	+	+	+	-	-	+	-	-	-
Pentagonocyclopa C	-	-	-	-	-	+	-	-	-	-	-	-	-
Pentagonocyclopa D	-	-	-	-	+	-	-	-	-	-	-	-	-
Pentagonopentagonopa A	-	-	-	+	-	-	-	+	+	+	-	-	-
Pentagonopentagonopa D	-	-	-	+	-	+	-	-	+	+	-	-	-
Pentagonopentagonopa E	-	-	-	-	+	-	+	-	-	-	-	-	-
Pentagonopentagonopa F	-	-	-	-	+	-	+	-	-	-	-	-	-
Hexagonocyclopa A	-	-	-	-	+	-	-	-	-	-	-	-	-

	A	B	C	D	E	F	G	H	I	J	K	L	M
cf. *Balacrinus basalis* (M'Coy) of Ramsbottom 1961	-	-	-	-	+	-	-	-	-	-	-	-	-
B. basalis (M'Coy) complete arms	+	-	-	-	-	-	-	-	-	-	-	-	-
cf. *B. basalis* (M'Coy) arms of Ramsbottom 1961	-	-	-	-	+	-	+	-	-	-	-	-	-
Crinoid calyx, gen. et sp. indet.	-	-	-	-	+	+	-	-	-	-	-	-	-
Pinnate$_1$	-	+	-	+	+	+	+	+	+	+	-	+	-
Pinnate$_2$	-	-	-	+	-	+	-	-	+	+	-	-	-
Cirrals	+	+	+	+	+	+	+	+	+	-	-	+	-
Pluricolumnals	+	+	+	+	+	+	+	+	+	+	-	+	-
Crinoid plates	-	-	-	-	+	-	-	-	-	-	-	-	-
Cystoid plates	-	-	-	-	-	+	-	-	+	-	-	-	-
Echinoderm plates	-	-	-	+	+	+	+	-	+	+	-	+	-
Ramose Bryozoan fragments	+	-	-	+	+	+	+	+	+	+	+	+	+
Circular bryozoa	-	-	-	-	+	-	+	-	-	-	-	+	-
Encrusting bryozoa	-	-	-	-	-	+	-	-	-	-	-	-	-
Coral fragments	-	-	-	-	-	-	-	-	-	-	-	+	-
Lepidocoleus sp. (plates)	-	-	-	-	-	-	-	-	-	-	+	+	+

TABLE 8.2

TO SHOW THE STRATIGRAPHIC DISTRIBUTION OF CERTAIN TRILOBITES AND BRACHIOPODS IDENTIFIED IN FAUNAL HORIZON A, PORTREUDDYN SLATE.

STAGES OF THE CARADOC	*Flexicalymene* cf. *acantha* (Bancroft) of Dean 1963	*Flexicalymene* (*Reacalymene*) cf. *pusulosa* (Bancroft) of Dean 1963	*Broeggerolithus* cf. *harnagensis* (Bancroft) of Dean 1960	*Broeggerolithus* cf. *broeggeri* (Bancroft) of Dean 1960	*Horderleyella* sp	*Onniella* cf. *soudleyensis* (Bancroft) of Williams 1963	*Sericoidea abdita* Williams 1955
SOUDLEYAN							
HARNAGIAN							
COSTONIAN							
				SHROPSHIRE SHELVE			BALA SHELVE

TABLE 8.3

TO SHOW THE STRATIGRAPHIC DISTRIBUTION OF CERTAIN TRILOBITES AND BRACHIOPODS IDENTIFIED IN FAUNAL HORIZON E. GORLLWYN SLATE

STAGES OF THE CARADOC	*Broeggerolithus* cf. *harnagensis* (Bancroft) of Dean 1960	*Broeggerolithus* cf. *broeggeri* (Bancroft) of Dean 1960	*Broeggerolithus* cf. *soudleyensis* (Bancroft) of Dean 1960	*Brongniartella minor* (Salter)	*Parabasilicus powisi* (Murchison)	Isotelinid gen. incl. cf. *powisi* (Murchison)	*Onniella* cf. *soudleyensis* (Bancroft) of Williams 1963	*Sericoidea abdita* Williams
LONGVILLIAN					?			
SOUDLEYAN								
HARNAGIAN								
COSTONIAN								
			SHROPSHIRE BALA			BALA		SHELVE

TABLE 8.4

TO SHOW THE STRATIGRAPHIC DISTRIBUTION OF CERTAIN TRILOBITES AND BRACHIOPODS IDENTIFIED IN FAUNAL HORIZON I, GORLLWYN SLATE.

STAGES OF THE CARADOC	*Broeggerolithus* cf. *broeggeri* (Bancroft) of Dean 1960	*Broeggerolithus* cf. *soudleyensis* (Bancroft) of Dean 1960	*Flexicalymene* (*Reacalymene*) cf. *limba* (Shirley 1936) of Whittington 1965	cf. *Flexicalymene planimarginata* (Reed 1906) of Whittington 1965	*Parabasilicus powisi* (Murchison)	*Kjaerina* cf. *horderleyensis* of Bancroft 1929a	*Kjaerina* cf. *latericostata* of Bancroft 1929a	*Howeltites* sp.
U LONGVILLIAN								
L LONGVILLIAN					?			
SOUDLEYAN				?				
HARNAGIAN								
COSTONIAN								

SHROPSHIRE BALA

TABLE 8.5

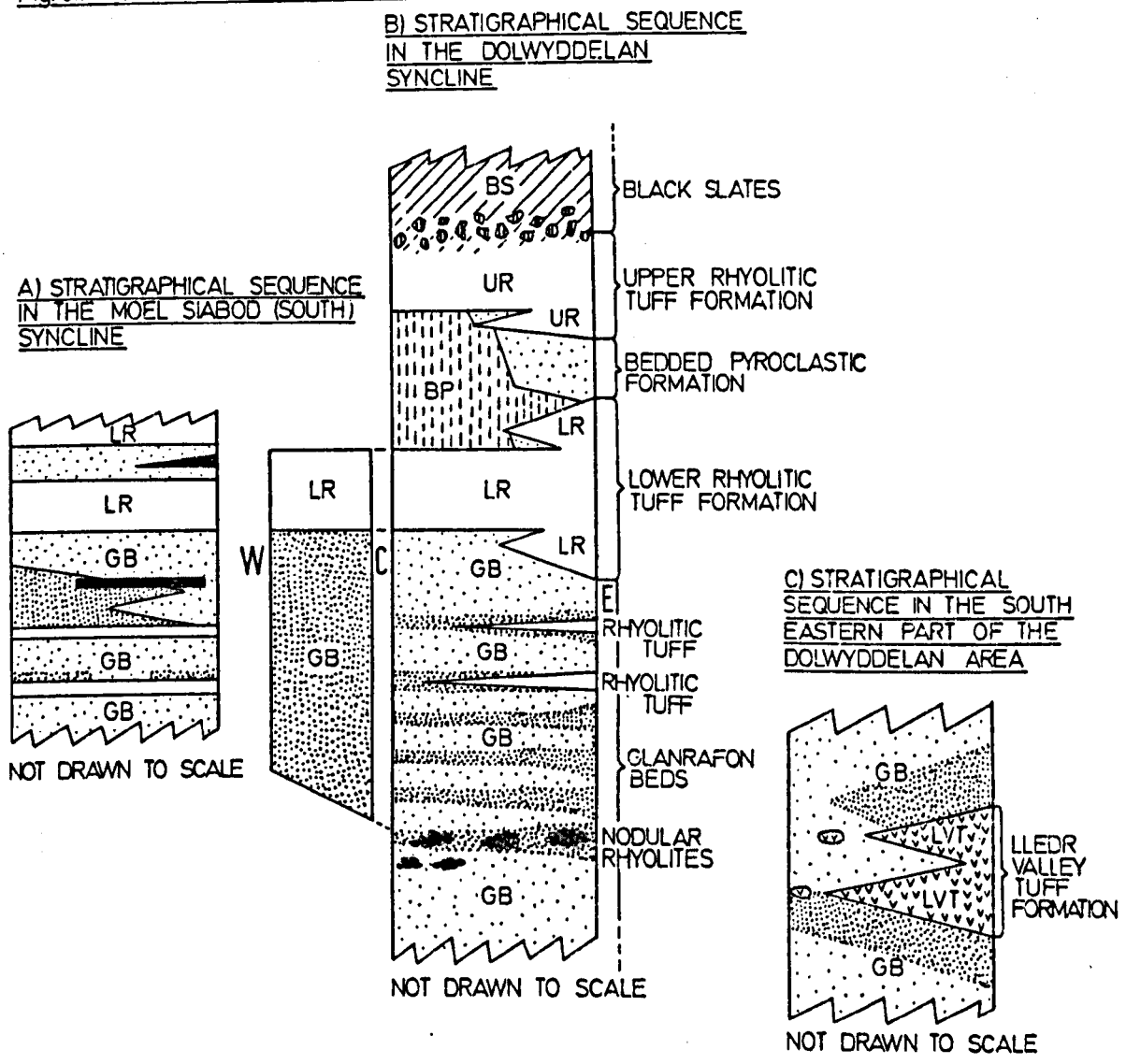
TO SHOW THE STRATIGRAPHIC DISTRIBUTION OF CERTAIN TRILOBITES AND BRACHIOPODS IDENTIFIED IN FAUNAL HORIZON L, LOWER RHYOLITIC TUFF UNIT.

STAGES OF THE CARADOC	*Rhactorthis crassa* Williams 1963	*Skenidioides* sp.	*Strophomena* cf. *grandis* (J de C Sowerby) of Williams 1963	*Atractopyge* sp.	*Brongniartella bisulcata* (M'Coy)	*Chasmops* sp.	*Estoniops alifrons* (M'Coy 1851)	*Platylichas* sp.
MARSHBROOKIAN			?					
U. LONGVILLIAN								
L. LONGVILLIAN								
SOUDLEYAN								

KEY ABUNDANT PRESENT BUT RARE

STAGES OF THE CARADOC	*Dalmanella* cf. *lepta* (Bancroft)	*Dalmanella* cf. *modica* Williams 1963	*Dolerorthis* cf. *duftonensis prolixa* of Williams 1963	*Eoplectodonta* sp.	*Kiaromena* sp.	*Kjaerina bipartita* (Salter)	*Kjaerina* cf. *hedstroemi* Bancroft	*Nicolella* cf. *actoniae obesa* of Williams 1963	*Platystrophia* sp.	*Reuschella* sp.
U. LONGVILLIAN										
L. LONGVILLIAN										
SOUDLEYAN										

Fig. 9.1 STRATIGRAPHY FOR THE DOLWYDDELAN DISTRICT



ALL THE SECTIONS ARE ADAPTED FROM THE GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND & WALES) SHEET SH 75, 1:25000, CAPEL CURIG AND BETWS-Y-COED. ADDITIONAL INFORMATION IS DERIVED FROM WILLIAMS AND BULMAN (1931).

W = WESTERN PART OF THE DOLWYDDELAN SYNCLINE
C = CENTRAL PART OF THE DOLWYDDELAN SYNCLINE
E = EASTERN PART OF THE DOLWYDDELAN SYNCLINE

BS - BLACK SLATES
UR - UPPER RHYOLITIC TUFF FORMATION
BP - BEDDED PYROCLASTIC FORMATION
LR - LOWER RHYOLITIC TUFF FORMATION
LVT - LLEDR VALLEY TUFF FORMATION
GB - GLANRAFON BEDS

BLACK SLATE
BEDDED PYROCLASTIC FORMATION
RHYOLITIC TUFF
SILTSTONES/SLATES
SANDSTONES
LLEDR VALLEY TUFF FORMATION
NODULAR RHYOLITE
BASIC TUFF

Fig.9.2a

Key to the faunal abbreviations as used in figs.9.2-9.7

AM	- Ambonychiaceans
BELL	- Bellerophontids
BICUS	- *Bicuspina* sp.
BIV	- Bivalves, gen. et sp.indet.
BROEGG	- *Broeggerolithus* sp.
C.BIC	- *Climacograptus bicornis* (Hall)
CRAN	- Craniopsids
CYRTO	- *Cyrtolites* sp.
D.MULT	- *Diplograptus multidens* (Elles)
DAL	- Dalmanellids
DALMAN	- *Dalmanella* sp.
DIN	- *Dinorthis* sp.
DOL	- *Dolerorthis* sp.
EO	- *Eoplectodonta* sp.
GAST	- Gastropods, gen. et sp.indet.
HOLL	- Hollinaceans
HORD	- *Horderleyella* sp.
HOW	- *Howellites* sp.
KJ	- *Kjaerina* sp.
LEPT	- *Leptaena* sp.
LEPTEST	- *Leptestiina* sp.
LOPHO	- Lophospirids
MACRO	- *Macrocoelia* sp.
NIC	- *Nicolella* sp.
O.TRUN	- *Orthograptus truncatus* (Lapworth)
PARA	- *Paracraniops* sp.

PLEUR	- Pleurotomariaceans
RAF	- *Rafinesquina* sp.
REUS	- *Reuschella* sp.
RHAC	- *Rhactorthis* sp.
SAL	- *Salopia* sp.
SERI	- *Sericoidea* sp.
SKENI	- *Skenidioides* sp.
SOW	- Sowerbyellids
TALL	- *Tallinnella* sp.
TEN	- *Tentaculites* sp.
TRIP	- Triplesiaceans

Fig.9.2 TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION, AND FAUNAL OCCURRENCE TYPE DISTRIBUTION, WITHIN THE STRATIGRAPHIC SUCCESSION OF THE SOUTH WESTERN SEQUENCE, SOUTH WEST OF DOLWYDDELAN.

KEY

BLACK SLATE CLASTS IN TOPMOST PART OF UPPER RHYOLITIC TUFF FORMATION

TROUGH CROSS BEDDING

BLACK SLATES

UR - UPPER RHYOLITIC TUFF FORMATION

BP - BEDDED PYROCLASTIC FORMATION

IS - INTERCALATED SEDIMENTS

LR - LOWER RHYOLITIC TUFF FORMATION

G - GLANRAFON BEDS

RHYOLITIC TUFF INTERCALATED WITHIN THE GLANRAFON BEDS

KEY TO FAUNAL OCCURRENCE TYPES

RANDOM VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - PREFERRED CONVEX UP VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - PREFERRED CONCAVE UP VALVE ORIENTATION

PLANAR OCCURRENCE TYPE MIXED VALVE ORIENTATION

OBOLIDS IN LIFE POSITION

"LIFE CLUSTERS"

NOT DRAWN TO SCALE.
THE VERTICAL THICKNESS OF SOME OF THE FOSSILIFEROUS UNITS HAS BEEN GREATLY EXAGGERATED.

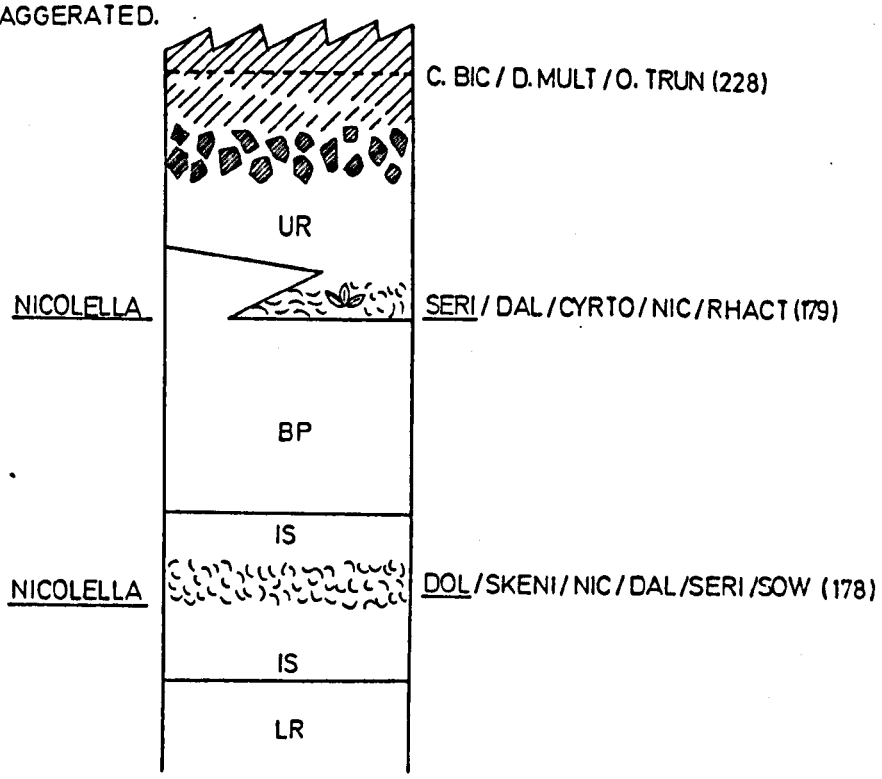
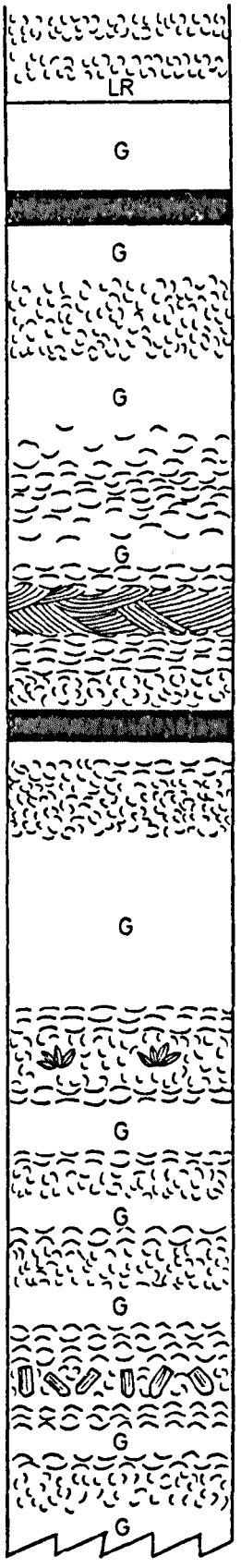


Fig.9.2 (cont.)



DALMANELLID-SOWERBYELLID	SOW/DAL/EO/HOLL (176(2))
DALMANELLID-SOWERBYELLID	DAL/SOW/NIC (176(1))
DALMANELLID-SOWERBYELLID	SOW/DAL/KJ/HOLL/TALL (175)
DALMANELLID-SOWERBYELLID	DAL (HOW>DALMAN)/HOLL (180)
DALMANELLID-SOWERBYELLID	SOW/DAL/TEN/KJ (173/173A/174/181 (1/1A/2 196B)
DALMANELLID-SOWERBYELLID	DAL/SOW/KJ (196/196A)
DALMANELLID-SOWERBYELLID	DAL/SOW/DIN/REUS/MACRO (183(2)/189/195)
DALMANELLID-SOWERBYELLID	DAL/REUS/HORD/DIN/TRIP (183(1))
DALMANELLID-SOWERBYELLID	DAL/TALL/PARA/TEN/SAL/HOLL (188)
DALMANELLID-SOWERBYELLID (DALMANELLA?)	DAL/MACRO/RAF/AM/PARA (186/187)
DALMANELLID-SOWERBYELLID	DAL/PARA/HORD/LEP (185)
MAJOR MARINE BENTHIC COMMUNITY TO WHICH ASSEMBLAGE IS ASSIGNED	MAJOR FAUNAL COMPONENTS OF ASSEMBLAGES. DOMINANT GROUP/GENUS UNDERLINED. NUMBERS IN PARENTHESES REFER TO FIELD LOCALITIES. SEE Fig.9.2a FOR KEY TO FAUNAL ABBREVIATIONS.

Fig. 9.3

TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION AND FAUNAL OCCURRENCE TYPE DISTRIBUTION, WITHIN THE STRATIGRAPHIC SUCCESSION OF THE SOUTH CENTRAL SEQUENCE, SOUTHWEST OF DOLWYDDELAN.

G – GLANRAFON BEDS

– GASTROPODS (EITHER DISPERSED OR FORMING MONOSPECIFIC HORIZONS)

NOT DRAWN TO SCALE. THE VERTICAL THICKNESS OF SOME OF THE FOSSILIFEROUS UNITS HAS BEEN GREATLY EXAGGERATED.

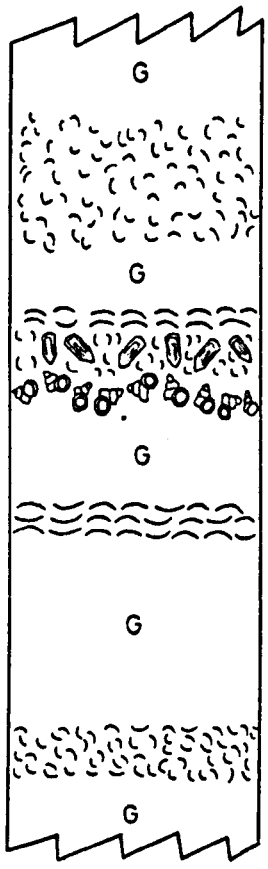
KEY TO FAUNAL OCCURRENCE TYPES

RANDOM VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - PREFERRED CONVEX-UP VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - MIXED VALVE ORIENTATION

OBOLIDS IN LIFE POSITION



MAJOR MARINE BENTHIC COMMUNITY TO WHICH ASSEMBLAGE IS ASSIGNED	MAJOR FAUNAL COMPONENTS OF ASSEMBLAGES. DOMINANT GENUS/GROUP UNDERLINED. NUMBERS IN PARENTHESES REFER TO FIELD LOCALITIES. SEE Fig.9.2a FOR KEY TO FAUNAL ABBREVIATIONS.
DALMANELLID-SOWERBYELLID	DAL/TRIP/DIN/SOW/REUS (198/199)
DALMANELLID-SOWERBYELLID	DAL/DIN/TEN/REUS (201A/201B/201C)
DALMANELLID-SOWERBYELLID	DAL/PLEUR/BELL/BIV/MACRO
DALMANELLID-SOWERBYELLID	DAL/MACRO/KJ (203)
DINORTHIS	DIN/REUS/MACRO/PARA/SOW (197/197A/197B)

Fig. 9.4 TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION, AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE STRATIGRAPHIC SUCCESSION OF THE CWM PENAMNEN SEQUENCE, SOUTH OF DOLWYDDELAN

KEY TO FAUNAL OCCURRENCE TYPES

RANDOM VALVE ORIENTATION.

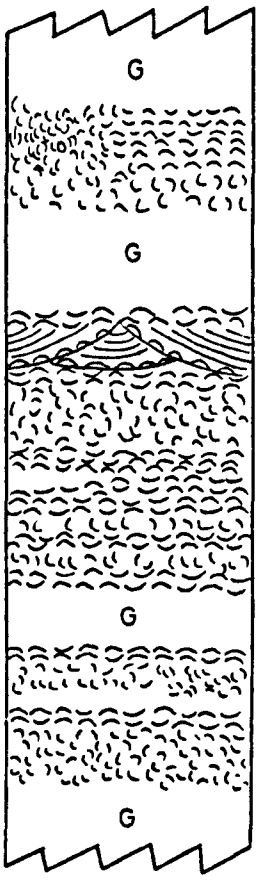
PLANAR OCCURRENCE TYPE - PREFERRED CONVEX-UP VALVE ORIENTATION.

PLANAR OCCURRENCE TYPE - MIXED VALVE ORIENTATION.

INTERMITTENT FAUNAL OCCURRENCE TYPE - THIN SHELLY HORIZONS (CONVEX UP VALVES) DEFINING THE BASE OF TROUGH CROSS BEDDED UNITS

G - GLANRAFON BEDS

NOT DRAWN TO SCALE. THE VERTICAL THICKNESS OF SOME OF THE FOSSILIFEROUS UNITS HAS BEEN GREATLY EXAGGERATED.



DALMANELLID - SOWERBYELLID — DAL/DIN/SOW/CRAN/MACRO (204)

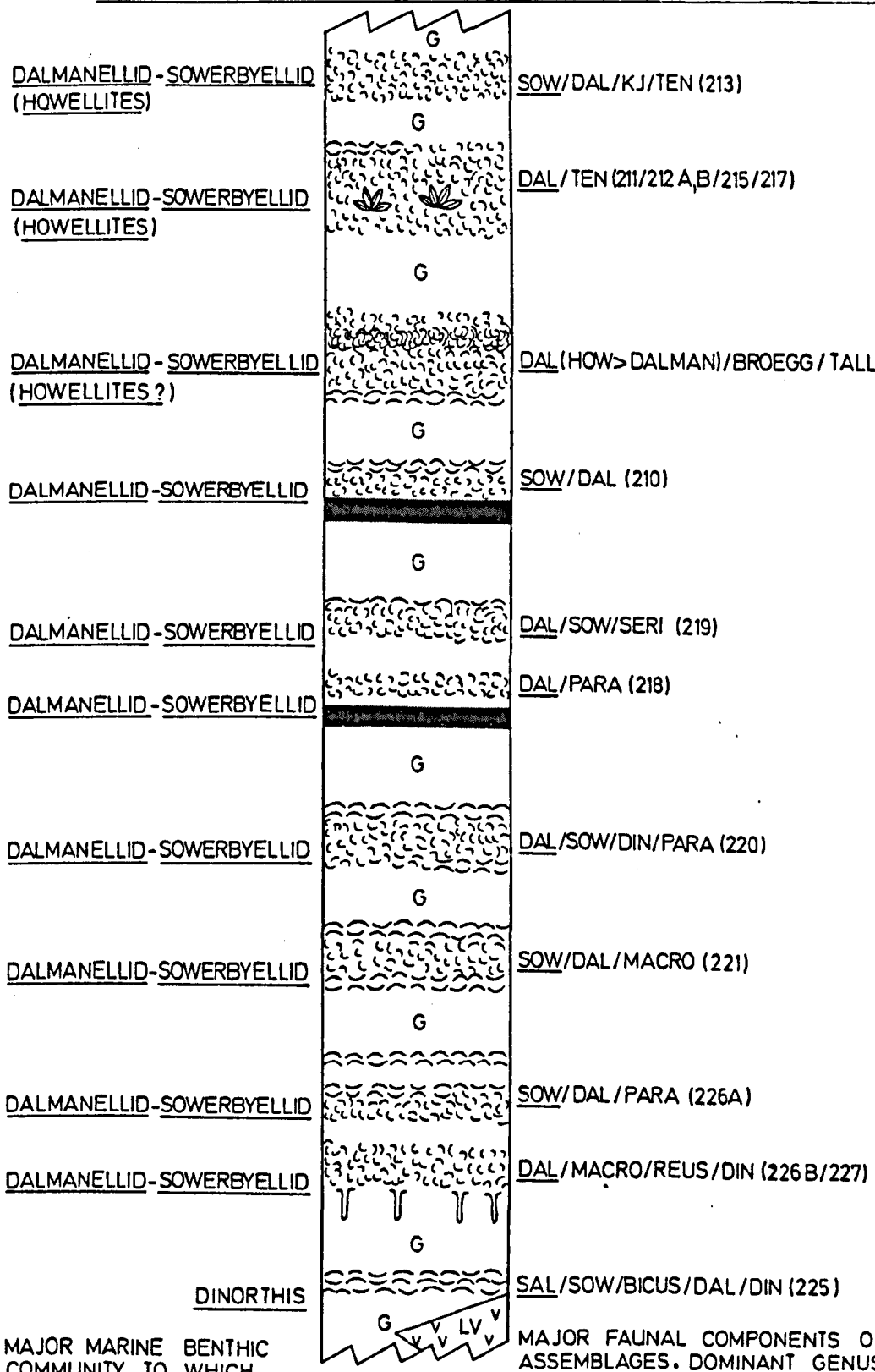
DALMANELLID - SOWERBYELLID — DAL/SOW/DIN (205)

DALMANELLID - SOWERBYELLID — DAL/MACRO (208) (HOW > DALMAN)

MAJOR MARINE BENTHIC COMMUNITY TO WHICH ASSEMBLAGE IS ASSIGNED

MAJOR FAUNAL COMPONENTS OF ASSEMBLAGES. DOMINANT GENUS/GROUP UNDERLINED. NUMBERS IN PARENTHESES REFER TO FIELD LOCALITIES. SEE Fig. 9.2a FOR KEY FAUNAL ABBREVIATIONS.

Fig. 9.5 TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION, AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE STRATIGRAPHIC SUCCESSION OF THE SOUTH EASTERN SEQUENCE, SOUTH EAST OF DOLWYDDELAN



MAJOR MARINE BENTHIC COMMUNITY TO WHICH ASSEMBLAGE IS ASSIGNED

NOT DRAWN TO SCALE. THE VERTICAL THICKNESS OF SOME OF THE FOSSILIFEROUS UNITS HAS BEEN GREATLY EXAGGERATED.

MAJOR FAUNAL COMPONENTS OF ASSEMBLAGES. DOMINANT GENUS/GROUP UNDERLINED. NUMBERS IN PARENTHESES REFER TO FIELD LOCALITIES. SEE, Fig. 9.2a FOR KEY TO FAUNAL ABBREVIATIONS.

Fig.9.5 (cont)

G GLANRAFON BEDS

LV LLEDR VALLEY TUFF FORMATION

SKOLITHOS

RHYOLITIC TUFF INTERCALATED WITHIN THE GLANRAFON BEDS.

KEY TO FAUNAL OCCURRENCE TYPES

RANDOM VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - PREFERRED CONVEX UP VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - PREFERRED CONCAVE UP VALVE ORIENTATION

PLANAR OCCURRENCE TYPE – MIXED VALVE ORIENTATION

"LIFE CLUSTERS"

Fig. 9.6 TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION, AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE STRATIGRAPHIC SUCCESSION OF THE NORTHERN SEQUENCE, DOLWYDDELAN.

G - GLANRAFON BEDS

-GASTROPODS (EITHER DISPERSED OR FORMING MONOSPECIFIC HORIZONS)

NOT DRAWN TO SCALE. THE VERTICAL THICKNESS OF SOME OF THE FOSSILIFEROUS UNITS HAS BEEN GREATLY EXAGGERATED.

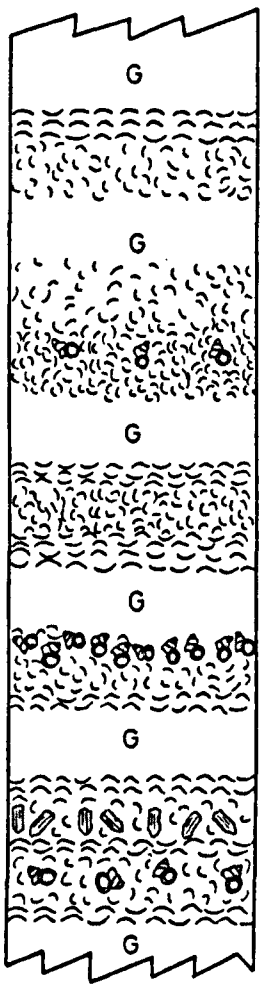
KEY TO FAUNAL OCCURRENCE TYPES

RANDOM VALVE ORIENTATION

PLANAR OCCURRENCE TYPE-PREFERRED CONVEX-UP VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - MIXED VALVE ORIENTATION

OBOLIDS IN LIFE POSITION



MAJOR MARINE BENTHIC COMMUNITY TO WHICH ASSEMBLAGE IS ASSIGNED	MAJOR FAUNAL COMPONENTS OF ASSEMBLAGES. DOMINANT GENUS/GROUP UNDERLINED. NUMBERS IN PARENTHESES REFER TO FIELD LOCALITIES. SEE Fig. 9.2a FOR KEY TO FAUNAL ABBREVIATIONS.
DALMANELLID-SOWERBYELLID	SOW/DAL/KJ (232)
DALMANELLID-SOWERBYELLID	SOW/DAL (232A-SANDSTONE)
DALMANELLID-SOWERBYELLID	DAL/GASTS/BELL/LOPHO/BIV (232A - SILTSTONE)
DALMANELLID-SOWERBYELLID	SOW/DAL/DIN/TALL (231, 237)
DALMANELLID-SOWERBYELLID	DAL/DIN/TALL/GASTS/SOW (236)
DALMANELLID-SOWERBYELLID	DAL/LOPHO/DIN/SOW/BELL (235A,B, C)

Fig.9.7 TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE STRATIGRAPHIC SUCCESSION OF THE MOEL SIABOD (SOUTH) SEQUENCE.

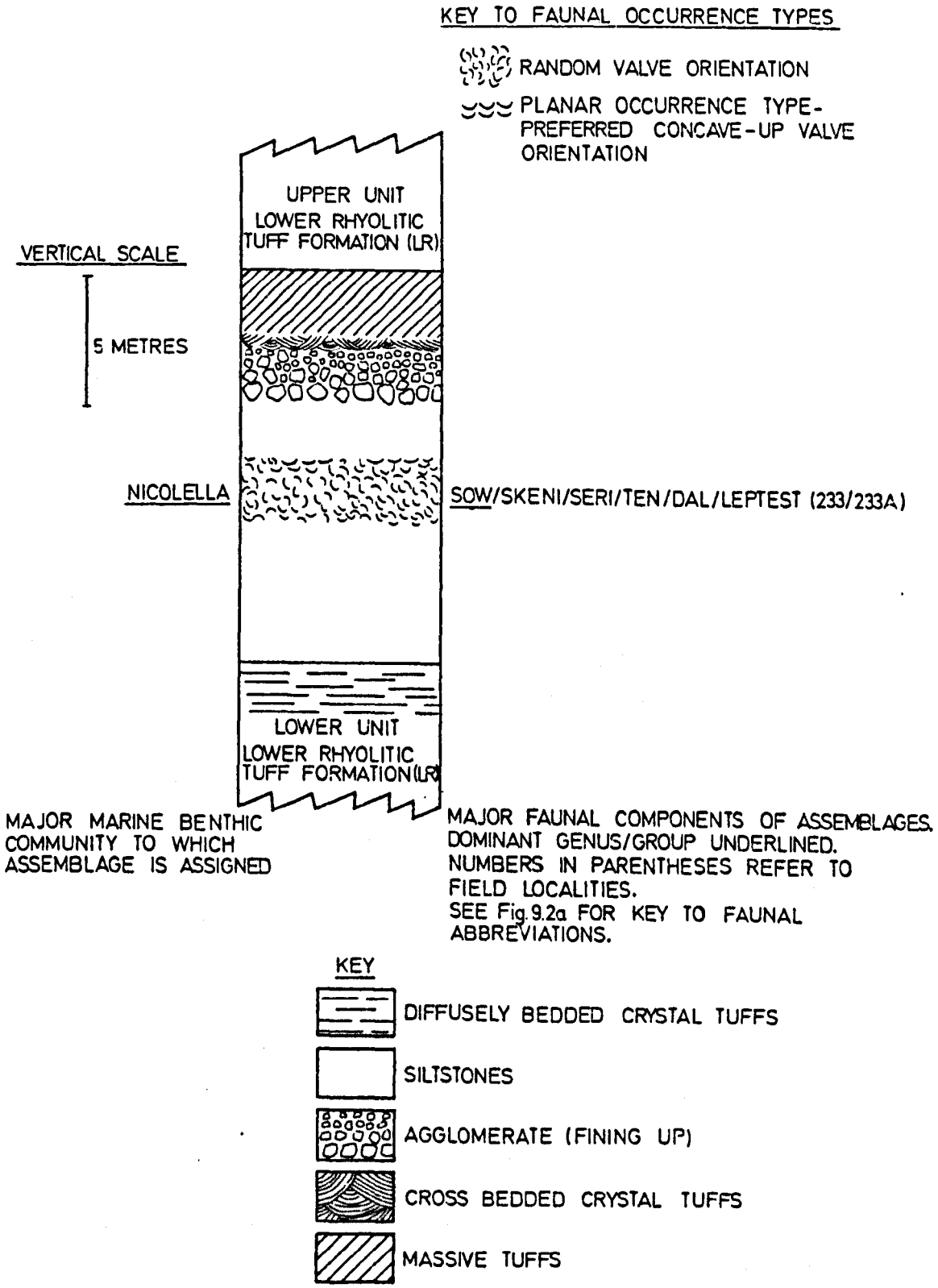
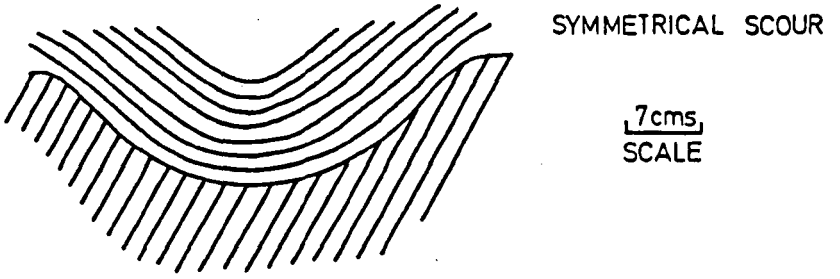
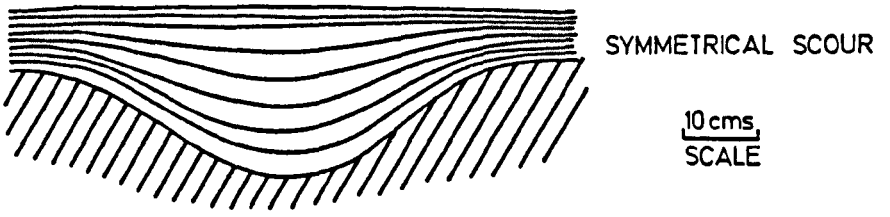


Fig. 9.8 SCOUR AND FILL STRUCTURES

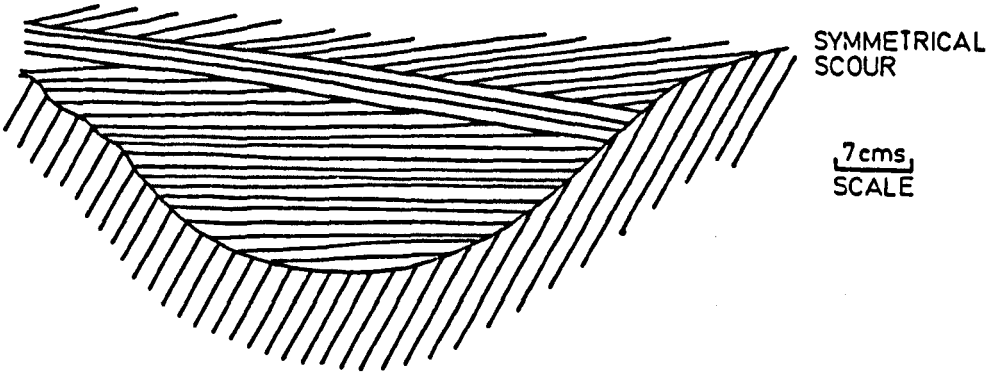
a) SYMMETRICAL INFILL OF LAMINATED SANDS



b) SYMMETRICAL INFILL PASSING UPWARDS INTO PLANAR LAMINATED SANDS



c) INFILL OF PLANAR LAMINATED SANDS PASSING UP INTO LOW ANGLE CROSS BEDS



d) INFILL OF SHELLY COARSE SILTSTONE PASSING UP INTO FINELY LAMINATED SANDS FOLLOWED BY LOW ANGLE CROSS BEDS

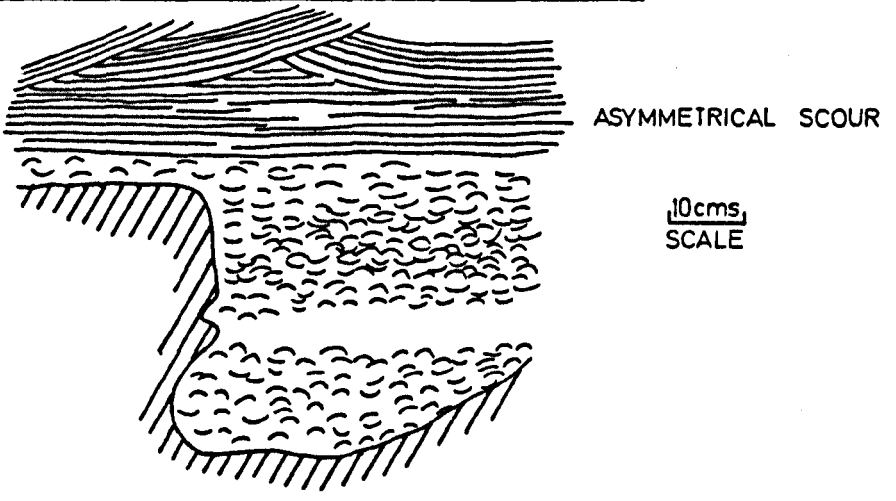


Fig. 9.9

GENICULATE BURROWS PENETRATING FINE GRAIN LAMINATED SANDSTONES (LOCALITY 188 - SH 70945076 - DOLWYDDELAN SOUTH WEST SEQUENCE)

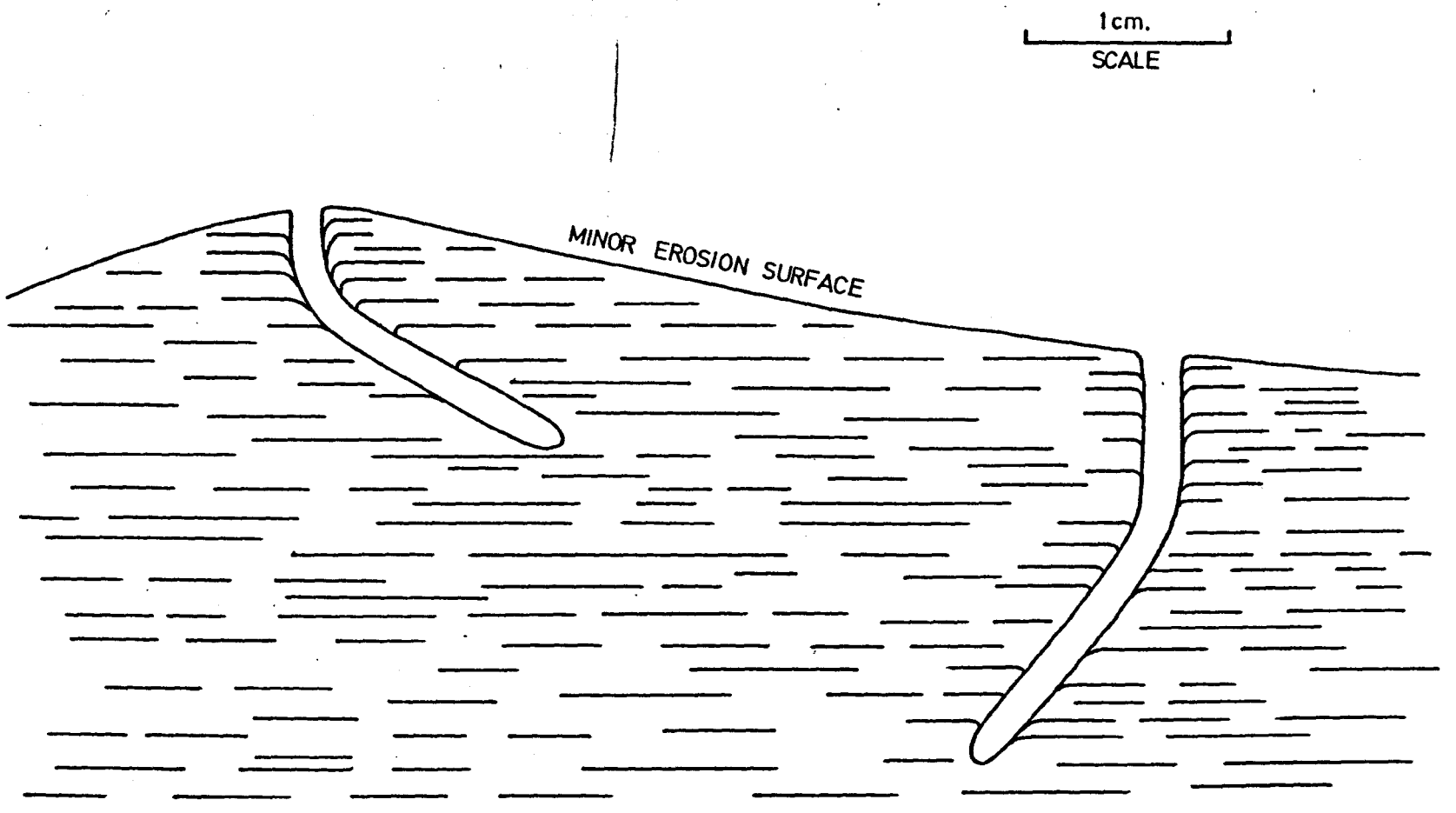


Fig. 9.10

A COMPLEX CONVOLUTED BOUNDARY BETWEEN A RHYOLITIC TUFF UNIT AND AN UNDERLYING SEDIMENTARY UNIT, IN THE UPPER RHYOLITIC TUFF FORMATION, ON THE SOUTHERN LIMB OF THE DOLWYDDELAN SYNCLINE (SH 71965187)

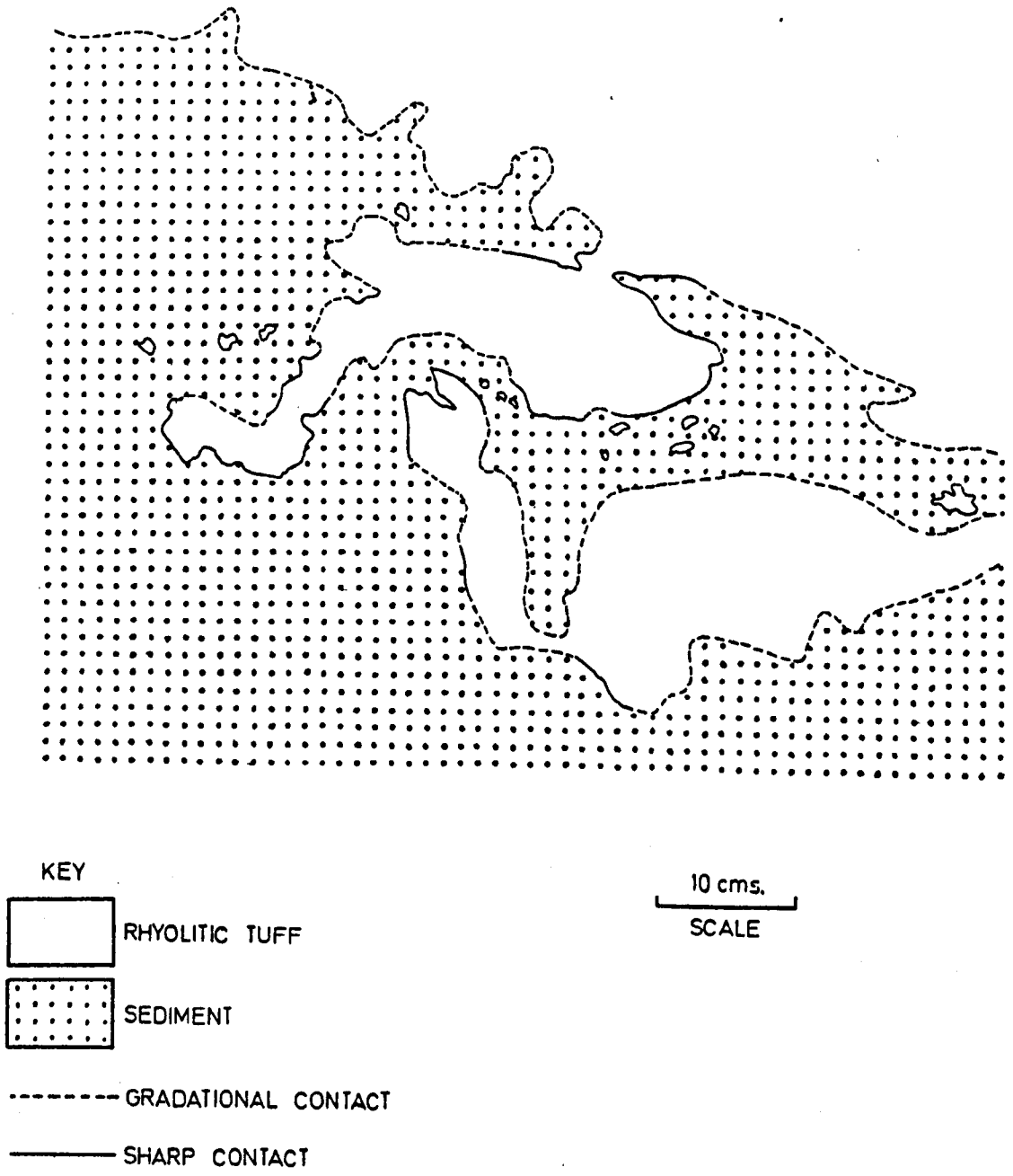


Fig. 9.12 A MODEL TO EXPLAIN THE AGE RELATIONSHIPS WITHIN THE SNOWDON VOLCANIC GROUP AS DEDUCED FROM FAUNAL EVIDENCE

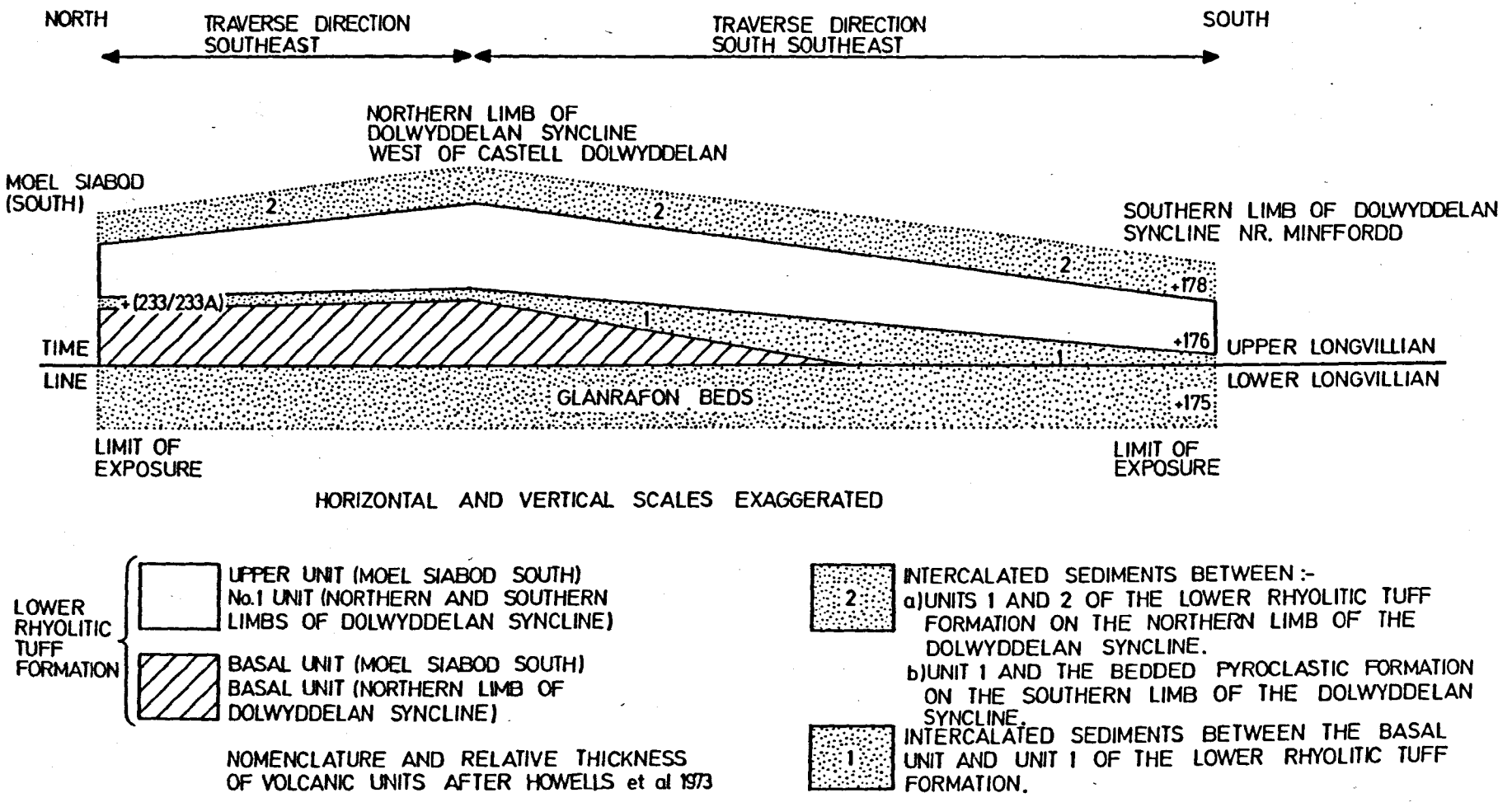


Table 9.1

To show the areal distribution of fauna within the Dolwyddelan district.

+ = present - = absent

Key to areas. See also figs.9.2-9.7

SW - South western area

GB - Glanrafon Beds

SVG - Snowdon Volcanic Group

BS - Black Slates

SC - South central area

(all sampled horizons are within the Glanrafon Beds)

CP - Cwm Penamnen area

(all sampled horizons are within the Glanrafon Beds)

SE - South eastern area

(all sampled horizons are within the Glanrafon Beds)

N - Northern area

(all sampled horizons are within the Glanrafon Beds)

MSS - Moel Siabod (South) area

(all sampled horizons are from intercalated siltstones between the upper and lower units of the Lower Rhyolitic Tuff Formation)

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Bancroftina sp.	+	+	-	+	?	+	-	-
Bellimurina incommoda Williams	-	+	-	-	-	-	-	-
Bellimurina sp.	+	-	-	-	-	-	-	-
Bellimurina sp. (immature)	+	-	-	-	-	-	-	-
Bicuspina spiriferoides (M'Coy)	-	-	-	-	-	+	-	-
B.cf.*spiriferoides* (M'Coy) of Williams 1963	+	+	-	-	-	+	+	-
B.cf.*subquadrata* Williams of Williams 1974	-	-	-	-	-	+	-	-
Bicuspina sp.	+	+	-	-	-	-	-	-
Brachiopods, gen.et sp. indet.	+	+	-	-	-	-	-	-
Brachiopods-immature Genus A	-	-	-	+	-	-	-	-
Genus B	-	-	-	+	-	-	-	-
Bystronema perplexa Williams	-	+	-	+	-	+	+	-
cf.*Caeroplaecia* sp.	?	+	-	-	-	+	-	-
Craniopsids	+	+	-	+	+	+	+	-
Cremnorthis parva Williams	-	+	-	-	-	-	-	-
Cremnorthis sp.	?	-	-	-	-	-	-	-
Dalmanella cf. *horderleyensis*(Whittington) of Bancroft 1945	+	-	-	-	-	-	-	-
D.cf.*indica* Whittington of Bancroft 1945	+	-	-	-	-	+	-	-
D.aff.*lepta* (Bancroft) of Bancroft 1945 (now = D.*indica* Whittington)	+	-	-	-	-	-	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
D.cf.lepta (Whittington) of Bancroft 1945 (now = D.indica Whittington)	+	+	-	+	+	+	+	-
D.cf.salopiensis Williams of Williams 1974	-	-	-	-	-	+	-	-
Dalmanella sp.	+	+	-	+	+	+	+	-
Dalmanellids	+	+	-	+	+	+	+	+
Dalmanellids - immature	+	-	-	+	+	+	+	+
Dinorthis berwynensis (Whittington)	+	-	-	+	-	+	+	-
D.cf.berwynensis (Whittington) of Williams 1963	+	-	-	+	+	+	+	-
D.cf.berwynensis angusta Williams of Williams 1963	+	+	-	+	-	-	-	-
D.(P.)cf.robusta Bancroft of Bancroft 1945 (now = P.robusta Bancroft)	+	-	-	-	-	-	-	-
Dinorthis sp.	+	-	-	+	+	+	+	-
D.sp. - immature	-	-	-	+	+	+	+	-
Dolerorthis duftonensis prolixa Williams	-	+	-	-	-	-	-	-
D.cf.duftonensis prolixa Williams of Williams 1963	+	-	-	-	-	-	-	-
D.cf.tenuicostata Williams of Williams 1955	-	+	-	-	-	-	-	-
Dolerorthis sp.	+	+	-	-	-	-	-	+
Enteletaceans	-	+	-	-	-	-	-	-
Eoplectodonta cf. rhombica (M'Coy) of Williams 1963	-	+	-	-	-	-	-	-
Eoplectodonta sp.	+	+	-	-	-	-	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
cf. *Eostropheodonta* sp.	+	-	-	-	-	-	-	-
Glyptorthis sp.	?	?	-	-	-	-	-	-
Gunnarella sp.	-	+	-	-	-	-	-	-
Harknessellids	+	-	-	-	-	-	-	-
Harknessellids-immature	-	-	-	+	-	-	-	-
Hedstroemina fragilis Bancroft	-	+	-	-	-	-	-	-
H. cf. *fragilis* Bancroft of Bancroft 1929a	-	+	-	-	-	-	-	-
H. parva Bancroft	-	+	-	-	-	-	-	-
H. cf. *robusta* Bancroft of Bancroft 1929a	+	-	-	-	-	-	-	-
Hedstroemina sp.	+	-	-	-	-	-	-	-
Hesperorthis sp.	-	+	-	-	-	-	-	-
cf. *Heterorthis retrorsistria* (M'Coy) of Williams 1963	-	-	-	+	-	-	-	-
Heterorthis sp.	?	-	-	-	-	-	-	-
Horderleyella aff. *plicata* Bancroft of Bancroft 1928b,1945	-	-	-	-	-	+	-	-
H. cf. *plicata* Bancroft of Bancroft 1928b,1945	+	-	-	-	-	-	-	-
Horderleyella sp.	+	-	-	+	+	+	+	-
Howellites cf. *antiquior* (M'Coy) of Williams 1963	+	-	-	+	+	+	+	-
H. cf. *striata* Bancroft of Bancroft 1945 and Williams 1963 (now = *H. striatus*)	+	-	-	-	+	-	-	-
H. cf. *ultima* Bancroft of Bancroft 1945 and Williams 1963 (now = *H. ultimus*)	+	-	-	-	+	+	-	-
Howellites sp.	+	+	-	+	+	+	+	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Inarticulate brachiopods, gen.et sp.indet.	+	+	-	+	-	-	-	-
Kiaromena cf.kjerulfi (Holtedahl) of Williams 1963	+	+	-	-	-	-	-	-
Kiaromena sp.	+	-	-	-	-	+	-	-
Kjaerina cf.bipartita (Salter) of Bancroft 1929a	+	-	-	-	-	-	-	-
K.cf.hedstroemi Bancroft of Bancroft 1929a	+	-	-	-	-	-	-	-
K.cf.horderleyensis Bancroft of Bancroft 1929a	-	-	-	+	-	-	-	-
K.jonesi Bancroft	+	-	-	-	-	+	+	-
K.cf.jonesi Bancroft of Bancroft 1929a	+	-	-	-	-	-	+	-
K.cf.typa Bancroft of Bancroft 1929a	+	-	-	-	-	-	+	-
Kjaerina sp.	+	+	-	+	+	+	+	-
K.sp. - immature	-	+	-	-	-	-	+	-
Kjerulfina sp.	+	+	-	-	-	-	-	-
Leptaena cf.rugosa Dalman of Spjeldnaes 1957, Havlicek 1967 and Mitchell 1977	+	-	-	-	-	-	-	-
L.salopiensis Williams	+	-	-	-	-	-	-	-
L.cf.salopiensis Williams of Williams 1963	+	+	-	-	-	-	-	-
L.ventricosa Williams	+	-	-	-	-	-	-	-
L.cf.ventricosa Williams of Williams 1963	-	-	-	-	-	+	-	-
Leptaena sp.	+	+	-	+	?	+	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
cf.*Leptaena* sp.	-	-	-	-	-	+	-	-
Leptaenids	+	-	-	-	-	-	-	-
Leptestiina oepiki (Whittington)	-	+	-	-	-	?	-	+
Lingulella sp.	?	-	-	-	-	-	-	-
Macrocoelia expansa (J.de C.Sowerby)	+	-	-	+	+	+	+	-
M.cf.*expansa* (J.de C.Sowerby) of Williams 1963	-	-	-	+	-	-	-	-
M.cf.*prolata* Williams of Williams 1963	+	-	-	+	-	+	-	-
Macrocoelia sp.	+	?	-	+	-	+	-	-
Macrocoelia sp.- immature	-	-	-	+	+	+	-	-
Nicolella actoniae obesa Williams	-	+	-	-	-	-	-	-
Nicolella sp.	?	?	-	-	-	-	-	?
cf.*Nicolella* sp.	-	-	-	-	-	+	-	-
Obolids,gen.et sp. indet.	+	+	-	+	-	+	-	-
Obolids,gen.et sp. indet.(in life position)	+	-	-	+	-	-	+	-
Onniella cf.*soudleyensis* (Bancroft) of Williams 1963	+	-	-	-	-	-	-	-
Onniella sp.	+	+	-	-	+	+	-	-
Orthambonites sp.	+	+	-	-	-	-	-	+
cf.*Orthambonites* sp.	-	-	-	-	-	+	-	-
Orthids,gen.et sp. indet.	+	+	-	+	-	-	-	-
Oxoplecia sp.	?	-	-	-	-	-	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Paracraniops sp.	+	-	-	+	-	+	+	-
cf.*Paracraniops* sp.	+	-	-	+	-	-	-	-
Paterula sp.	+	+	-	-	-	+	-	-
cf.*Petrocrania* sp.	-	-	-	-	-	+	-	-
cf.*Plaesiomys* sp.	-	-	-	+	-	+	-	-
Platystrophia sp.	?	?	-	-	-	-	-	-
Plectambonitaceans, gen.et sp.indet.	-	+	-	-	-	-	-	-
Plectorthis sp.	-	-	-	-	-	+	-	-
Plectorthids	-	-	-	-	-	+	-	-
Pseudolingula sp. (in life position)	+	-	-	-	-	-	-	-
Protozyga cf.*diversa* (Reed) of Williams 1962	-	+	-	-	-	-	-	-
Rafinesquina sp.	+	+	-	+	-	+	-	-
Reuschella horderleyensis Bancroft	+	-	-	+	-	+	-	-
R.cf.*horderleyensis* Bancroft of Bancroft 1928 and Williams 1963	+	-	-	+	-	-	-	-
R.cf.*horderleyensis carinata* Williams of Williams 1974	+	-	-	-	-	-	-	-
R.cf.*horderleyensis undulata* Williams of Williams 1963	+	-	-	-	-	-	-	-
Reuschella sp.	+	+	-	+	+	+	+	-
R.sp.-immature	+	-	-	-	-	-	-	-
cf.*R*.sp.	-	-	-	-	-	+	-	-
Rhactorthis crassa Williams	-	+	-	-	-	-	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
R.aff.crassa Williams of Williams 1963	-	+	-	-	-	-	-	-
Rhactorthis sp.	-	+	-	-	-	-	-	-
cf.Rostricellula sp.	-	-	-	-	-	+	-	-
Rugose strophomenids, gen.et sp. indet.	-	+	-	-	-	-	-	-
Salopia globosa (Williams)	-	-	-	-	-	+	-	-
Salopia sp.nov.A	-	-	-	-	-	+	-	-
Salopia sp.nov.B	-	-	-	-	-	+	-	-
Salopia sp.	-	-	-	-	-	+	-	-
Sampo sp.	-	-	-	-	-	-	+	-
Schizocrania sp.	+	-	-	+	-	-	-	-
Sericoidea sp.(aff. Chonetoidea alpha Spjeldnaes of Spjeldnaes 1957)	-	-	-	-	-	-	-	+
Sericoidea sp.	+	+	-	-	-	+	-	+
Skenidioides costatus Cooper	+	+	-	+	-	-	-	+
S.cf.costatus Cooper of Williams 1963	+	-	-	-	-	-	-	-
Skenidioides sp.	+	+	-	+	-	+	-	-
cf.Skenidioides sp.	-	+	-	-	-	-	-	-
Sowerbyella soudleyensis Jones	+	-	-	-	-	-	-	-
Sowerbyellids	+	+	-	+	+	+	+	+
Sowerbyellids - immature	-	-	-	-	+	+	+	+
Stropheodontids,gen. et sp.indet.	+	-	-	-	-	-	-	-
Strophomena sp.	+	-	-	-	-	+	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Strophomenids, gen. et sp. indet.	+	+	-	+	-	+	+	-
Triplesiaceans, gen. et sp. indet.	+	+	-	+	+	+	+	-
Atractopyge sp.	+	-	-	-	-	-	-	-
Asaphid (enrolled), gen. et sp. indet.	-	-	-	-	-	+	-	-
Broeggerolithus cf. *broeggeri* (Bancroft) of Dean 1960a	+	-	-	-	-	-	-	-
B. nicholsoni (Reed)	+	-	-	-	-	-	-	-
B. cf. *nicholsoni* (Reed) of Dean 1962	+	-	-	-	-	-	+	-
B. cf. *soudleyensis* (Bancroft) of Dean 1960a	+	-	-	-	-	-	-	-
Broeggerolithus sp.	+	+	-	+	+	+	+	+
B. sp. (with long genal spine)	-	-	-	+	-	-	-	-
B. sp. (Group 2-Dean 1960a)	+	-	-	-	+	+	-	-
B. sp. (Group 3-Dean 1960a)	+	-	-	-	+	-	-	-
B. sp.-immature	-	-	-	-	-	+	-	-
Brongniartella bisulcata (M'Coy)	+	+	-	-	-	-	-	+
B. cf. *bisulcata* (M'Coy) of Dean 1961	+	-	-	-	-	-	-	-
B. minor (Salter)	+	-	-	+	-	+	+	-
Brongniartella sp.	+	+	-	+	-	+	+	-
B. sp. librigenae	+	-	-	-	-	-	-	-
B. sp. thoracic segments	+	+	-	-	-	-	-	+

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Calymene sp.(s.l.)	+	-	-	+	-	+	+	+
Calymene sp.librigenae	-	-	-	+	-	+	-	+
Cryptolithines,gen.et sp.indet.	-	+	-	-	-	-	-	-
Cybella sp.	-	?	-	-	-	-	-	-
Decoroproteus cf.*calvus* (Whittard)of Owens 1973	+	-	-	-	-	-	-	-
Decoroproteus sp.	+	+	-	-	-	+	+	-
Estoniops alifrons (M'Coy)	-	+	-	-	-	-	-	-
Estoniops sp.librigenae	-	+	-	-	-	-	-	-
Flexicalymene caractaci (Salter)	+	-	-	-	-	-	-	-
F.cf.*caractaci* (Salter) of Whittington 1965	+	-	-	-	-	+	-	-
F.*planimarginata* (Reed)	+	-	-	-	-	+	+	-
F.aff.*planimarginata* (Reed)of Whittington 1965	+	-	-	-	-	-	-	-
F.cf.*planimarginata* (Reed)of Whittington 1965	+	-	-	-	-	+	-	-
cf.*F*.*planimarginata* (Reed)of Whittington 1965	-	-	-	-	-	+	-	-
Flexicalymene sp.	+	-	-	+	-	+	+	-
F.(*Reacalymene*)*limba* (Shirley)	+	-	-	-	-	-	-	-
F.(*R*.)cf.*limba*(Shirley) of Whittington 1965	+	-	-	-	-	-	-	-
Flexicalymene (*Reacalymene*) sp.	+	-	-	-	-	-	-	-
Illaenus davisi(Salter)	-	+	-	-	-	-	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Illaenids, gen. et sp. indet.	+	-	-	-	-	-	-	-
Isotelinids, gen. ind. cf. *powisi* (Murchison) of Whittington 1966	+	-	-	-	-	-	-	-
Isotelinids, gen. et sp. indet.	+	-	-	+	-	+	+	-
Isotelinid librigenae	+	-	-	-	+	-	+	-
Isotelinid thoracic segments	-	-	-	+	+	-	-	-
Kloucekia apiculata (M'Coy)	+	-	-	-	-	+	+	-
Kloucekia sp.	+	+	-	?	-	+	+	-
Lichids, gen. et sp. indet.	+	+	-	-	-	-	-	-
Otarion sp.	?	?	-	-	?	-	-	-
Parabasilicus powisi (Murchison)	+	-	-	-	-	+	+	-
P. cf. *powisi* (Murchison) librigenae of Dean 1963a	-	-	-	+	-	-	-	-
Parabasilicus sp.	+	-	-	-	-	-	+	-
P. sp. librigenae	+	-	-	-	-	-	-	-
Platylichas nodulosus (M'Coy)	-	+	-	-	-	-	-	-
Proetids, gen. et sp. indet.	+	-	-	+	-	+	+	-
Proetid librigenae	+	+	-	-	-	+	-	-
Pseudosphaerexochus sp.	?	-	-	-	-	-	-	-
Pygidia, gen. et sp. indet.	+	+	-	-	-	+	+	-
Thoracic segments	+	+	-	+	+	+	+	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Trinucleids, gen. et sp. indet.	+	+	-	-	-	-	-	-
Aechminids, gen. et sp. indet.	-	-	-	-	-	-	+	-
Dilobella sp.	+	-	-	-	-	+	+	-
Drepanellids, gen. et sp. indet.	-	-	-	-	-	-	+	-
Granulose ostracodes, gen. et sp. indet.	+	-	-	+	-	-	-	-
Hollinaceans, gen. et sp. indet.	+	+	-	-	-	+	-	-
Ostracodes, gen. et sp. indet.	+	+	-	+	-	+	+	-
Pitted ostracodes, gen. et sp. indet.	+	-	-	-	-	-	-	-
Primitia sp.	?	-	-	-	-	-	-	-
Quadrijugatorids, gen. et sp. indet.	+	-	-	+	-	+	+	+
Sigmoopsis sp.	+	-	-	-	-	-	-	-
Sigmoopsid (*Sigmobolbina* sp.)	?	-	-	-	-	-	-	-
Smooth ostracodes, gen et sp. indet.	+	-	-	-	+	+	-	-
Tallinnella sp.	+	-	-	+	+	+	+	-
Tetradella sp.	+	-	-	-	-	-	-	-
Tetradellids, gen. et sp. indet.	+	-	-	-	-	-	-	-
Ulrichia sp.	-	-	-	-	+	-	-	-
Zygobolboides sp.	?	-	-	-	-	-	-	-
cf. *Allonchyia* sp. of Cox et al. 1969	-	-	-	-	-	+	-	-
Ambonychiaceans	+	-	-	-	-	+	+	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Bivalves, gen. et sp. indet.	+	-	-	+	-	+	+	-
Modiomorphids (*Modiolopsis* sp.)	-	-	-	-	-	-	?	-
Modiomorphids, gen. et sp. indet.	+	-	-	-	-	+	+	-
Nuculoids, gen. et sp. indet.	-	-	-	-	-	-	+	-
Nuculaceans, gen. et sp. indet.	-	-	-	-	-	-	+	-
Nuculids, gen. et sp. indet.	+	-	-	-	-	-	-	-
Praenuculids, gen. et sp. indet.	-	+.	-	-	-	-	-	-
Pterineids (*Palaeopteria* sp.)	?	-	-	-	-	-	-	-
Pterineids, gen. et sp. indet.	-	-	-	-	-	-	+	-
Pteriomorphians, gen. et sp. indet.	+	-	-	-	-	-	-	-
Similodonta sp.	-	?	-	-	-	-	?	-
cf. *Vlasta* sp. of Cox et al. 1969	-	-	-	-	-	+	-	-
Bellerophontids, gen. et sp. indet.	+	-	-	+	-	+	+	-
Clathrospira sp.	-	+	-	-	-	-	-	-
Cyclonema sp.	-	+	-	-	-	-	-	-
Cyrtolites sp.	+	+	-	-	-	-	+	-
Donaldiella sp.	+	-	-	-	-	-	-	-
Eotomariids (*Clathrospira* sp.)	-	?	-	-	-	-	-	-
Gastropods, gen. et sp. indet.	+	+	-	+	+	+	+	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Gastropods-immature	-	+	-	-	-	-	-	-
Lesuerilla sp.	-	-	-	-	-	-	+	-
Lophospira sp.	-	+	-	-	-	-	-	-
cf.*Lophospira* sp.	-	-	-	-	-	-	+	-
Lophospirids, gen.et sp.indet.	+	-	-	-	-	+	+	-
Murchisonia sp.	-	+	-	-	-	-	-	-
M.(*Hormotoma*)sp.	-	+	-	-	-	-	-	-
Murchisoniaceans,gen. et sp.indet.	-	-	-	?	-	-	-	-
Pleurotomariaceans, gen.et sp.indet.	-	-	-	+	-	+	+	-
Reudemannia sp.	-	+	-	-	-	-	-	-
Sinuites sp.	+	-	-	+	-	-	-	-
Climacograptus bicornis (Hall)	-	-	+	-	-	-	-	-
Diplograptus multidens (Elles)	-	-	+	-	-	-	-	-
Orthograptus truncatus (Lapworth)	-	-	+	-	-	-	-	-
Orthoconic cephalopods, gen.et sp.indet.	-	-	-	-	-	-	+	-
Corals,gen.et sp. indet.	-	-	-	-	-	+	-	-
Favosites sp.	+	+	-	+	?	+	-	-
Algae,gen.et sp.indet.	+	-	-	-	-	-	-	-
Tentaculites scalaris Schlotheim	+	-	-	-	-	-	-	-
Tentaculites sp.	+	+	-	+	+	+	+	+
FRAGMENTAL REMAINS								
Cyclocyclopa A	+	+	-	+	+	+	+	+

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Cyclocyclopa A pluricolumnals	+	+	-	-	-	-	-	-
Cyclocyclopa A_1	+	-	-	+	-	+	-	+
Cyclocyclopa A_1 pluricolumnals	-	-	-	-	-	+	-	-
Cyclocyclopa B	-	+	-	+	-	-	-	-
Cyclocyclopa C	-	+	-	-	-	+	-	-
Cyclocyclopa D	+	+	-	-	-	+	-	-
Cyclocyclopa D pluricolumnals	-	+	-	-	-	-	-	-
Cyclocyclopa E	+	+	-	+	-	+	-	+
Cyclocyclopa E pluricolumnals	-	+	-	-	-	-	-	-
Cyclocyclopa F	+	+	-	-	-	-	-	-
Cyclocyclopa F pluricolumnals	+	-	-	-	-	-	-	-
Cyclocyclopa G	+	-	-	+	+	+	-	-
Cyclocyclopa G_1	+	-	-	+	+	+	-	-
Cyclocyclopa H	+	-	-	+	+	+	-	-
Cyclocyclopa J	+	-	-	+	+	+	+	+
Cyclocyclopa J pluricolumnals	-	-	-	-	-	+	-	-
Cyclocyclopa J_1	+	-	-	+	+	+	+	-
Cyclocyclopa K	-	-	-	-	-	-	-	+
Cyclocyclopa L	+	-	-	+	-	-	-	-
Cyclocyclopa M	-	-	-	-	-	+	-	-
Cyclocyclopa N	-	-	-	-	-	+	-	+
Cyclopentagonopa A	+	+	-	+	+	+	-	-
Cyclopentagonopa B	+	-	-	+	+	+	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Cyclopentagonopa B pluricolumnals	-	-	-	+	-	-	-	-
Cyclopentagonopa C	+	-	-	+	+	+	-	-
Cyclopentagonopa D	+	-	-	-	-	+	-	-
Cyclopentagonopa E	-	-	-	+	-	-	-	-
Cyclotristellatopa A	-	+	-	-	-	-	-	-
Cyclopentastellatopa A	+	+	-	-	-	-	-	-
Pentagonocyclopa A	+	+	-	-	+	+	-	+
Pentagonocyclopa B	+	+	-	+	+	+	-	-
Pentagonocyclopa B_1	+	-	-	-	-	-	-	-
Pentagonocyclopa C	+	-	-	-	+	-	-	-
Pentagonocyclopa D	-	-	-	+	-	-	-	-
Pentagonocyclopa E	-	-	-	+	-	-	-	-
Pentagonocyclopa F	-	-	-	+	-	-	-	-
Pentagonopentagonopa A	+	+	-	-	-	-	-	-
Pentagonopentagonopa B	+	-	-	-	-	-	-	-
Pentagonopentagonopa C	+	-	-	-	-	-	-	-
Pentagonopentagonopa D	+	-	-	-	+	+	-	-
Pentagonopentastellatopa A	-	-	-	-	-	-	-	+
Pentagonopentastellatopa B	+	-	-	+	-	-	-	-
Pentagonopentastellatopa D	-	-	-	-	-	+	-	-
Pentastellapentastellatopa A	+	-	-	-	-	+	-	-
Hexagonocyclopa A	+	-	-	+	-	-	-	-
Hemicyclocyclopa A	-	+	-	-	-	-	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Calyx cf. *Balacrinus basalis* (M'Coy) of Ramsbottom 1961	+	-	-	-	-	-	-	-
Calyx cf. *Protaxocrinus* sp. of Ramsbottom 1961	-	-	-	+	-	-	-	-
Crinoid calices, gen. et sp. indet.	+	-	-	-	-	-	-	-
Crinoid arm, gen. et sp. indet.	-	-	-	-	-	+	-	-
Cirrals	+	-	-	+	+	+	+	+
Pinnate$_1$	+	+	-	+	+	+	-	+
Pinnate$_2$	+	-	-	+	+	+	-	+
Articulated pinnates	+	-	-	-	-	-	-	-
Pluricolumnals	+	-	-	+	+	+	-	+
Crinoid plates	-	-	-	+	-	-	-	-
Rhombiferan plates	-	+	-	-	-	-	-	-
Rhombiferan pore rhombs	-	+	-	-	-	-	-	-
Diploporite plates	+	-	-	-	-	-	-	-
Cystoid plates	+	+	-	-	-	+	-	-
Cystoid pore rhombs	+	-	-	-	-	-	-	-
Echinoderm plates	+	+	-	+	+	+	-	+
Ramose Bryozoan fragments	+	+	-	+	+	+	+	+
Circular bryozoa, gen. et sp. indet.	+	+	-	+	-	+	+	+
Encrusting bryozoa, gen. et sp. indet.	+	-	-	+	-	+	-	-
Bryozoa, gen. et sp. indet.	-	-	-	-	-	+	-	-

	GB	SW SVG	BS	SC	CP	SE	N	MSS
Algae Incertae Sedis (Rhodophyceae ? - Johnson & Konishi 1959) cf. *Dasyporella norvegica* Hoeg of Johnson 1952	-	-	-	-	-	+	-	-
Dasycladacean algae, cf. *Mastopora* sp. Eichwald of Johnson 1952	-	-	-	-	-	+	-	-
Calcareous anastomosing algae (*Solenopora* sp.?)	-	-	-	-	-	+	-	-
Algal fragments, gen. et sp. indet.	-	-	-	+	-	-	-	-
Cyclocystoides sp.	-	+	-	-	-	+	-	+
Lepidocoleus sp.	+	+	-	+	+	+	+	+

TABLE 9.2

TO SHOW THE STRATIGRAPHIC DISTRIBUTION OF CERTAIN BRACHIOPODS AND TRILOBITES IDENTIFIED AT LOCALITIES 210; 214/216; 211/212 A,B/215/217; 213. S.E. SEQUENCE, DOLWYDDELAN.

STAGES OF THE CARADOC	*Dalmanella* cf. *lepta* (Bancroft) of Bancroft 1945	*Howellites* cf. *antiquior* (M'Coy) of Williams 1963	*Kjaerina jonesi* Bancroft	*Brongniartella minor* (Salter)	*Flexicalymene* cf. *caractaci* (Salter) of Whittington 1965	*Flexicalymene planimarginata* (Reed)	*Kloucekia apiculata* (M'Coy)	*Leptaena* cf. *ventricosa* Williams of Williams 1963
UPPER LONGVILLIAN					?			
LOWER LONGVILLIAN								
SOUDLEYAN						?		
					BALA		BALA	SOUTH SHROPSHIRE

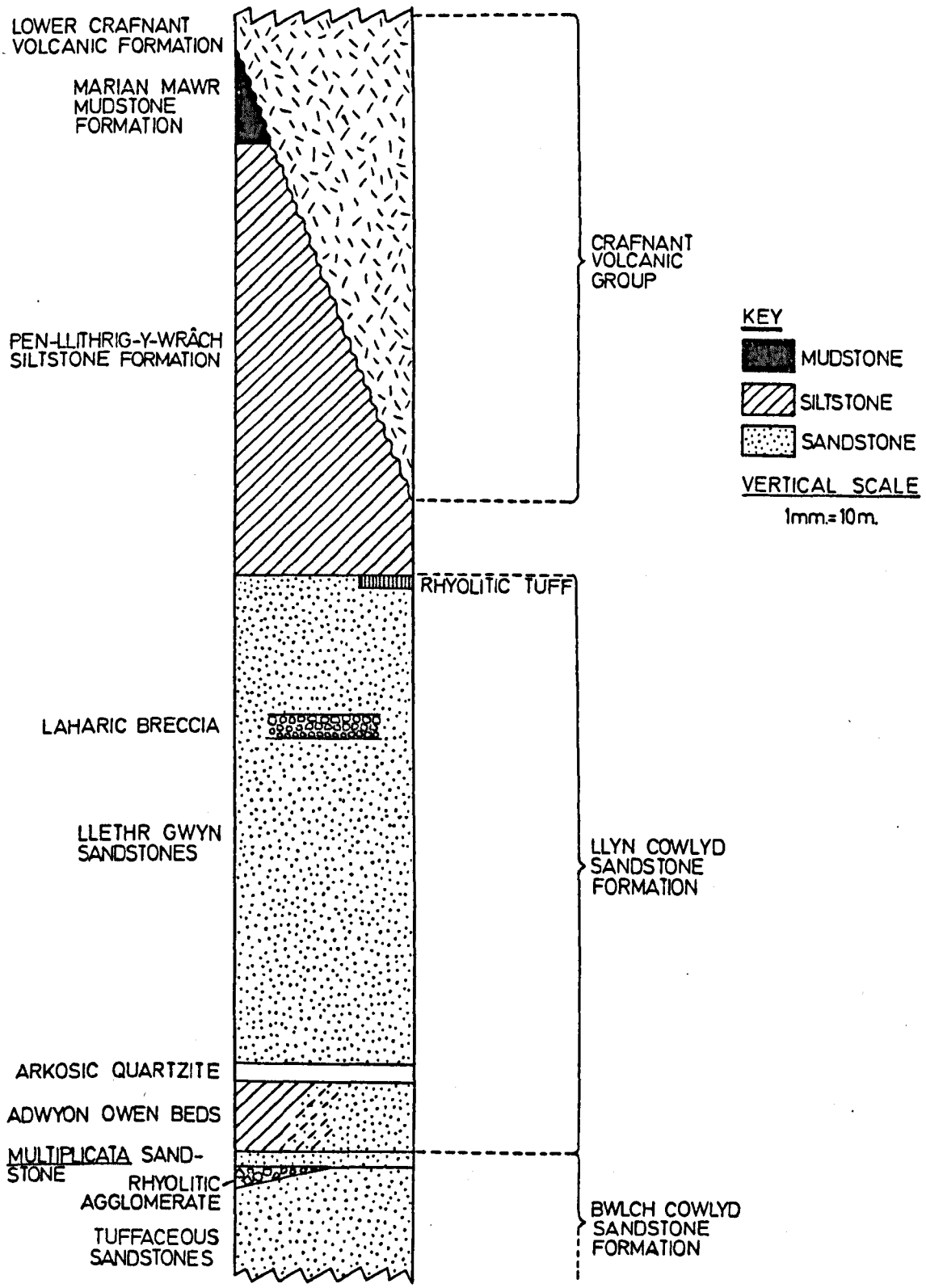
TABLE 9.3

TO SHOW THE STRATIGRAPHIC DISTRIBUTION OF CERTAIN BRACHIOPODS AND TRILOBITES IDENTIFIED AT LOCALITIES 173/173A/174/181(1/1A/2)/196B; 180; 175 S.W. SEQUENCE, DOLWYDDELAN.

STAGES OF THE CARADOC	Bicuspina spiriferoides (M'Coy)	Kjaerina cf. bipartita (Salter) of Bancroft 1929a	Kjaerina cf. hedstroemi Bancroft of Bancroft 1929a	Kjaerina cf. jonesi Bancroft of Bancroft 1929a	Kjaerina cf. typa Bancroft of Bancroft 1929a	Broeggerolithus cf. nicholsoni (Reed) of Dean 1962	Brongniartella minor (Salter)	Brongniartella bisulcata (M'Coy)
UPPER LONGVILLIAN	Rare					?		
LOWER LONGVILLIAN								
SOUDLEYAN								

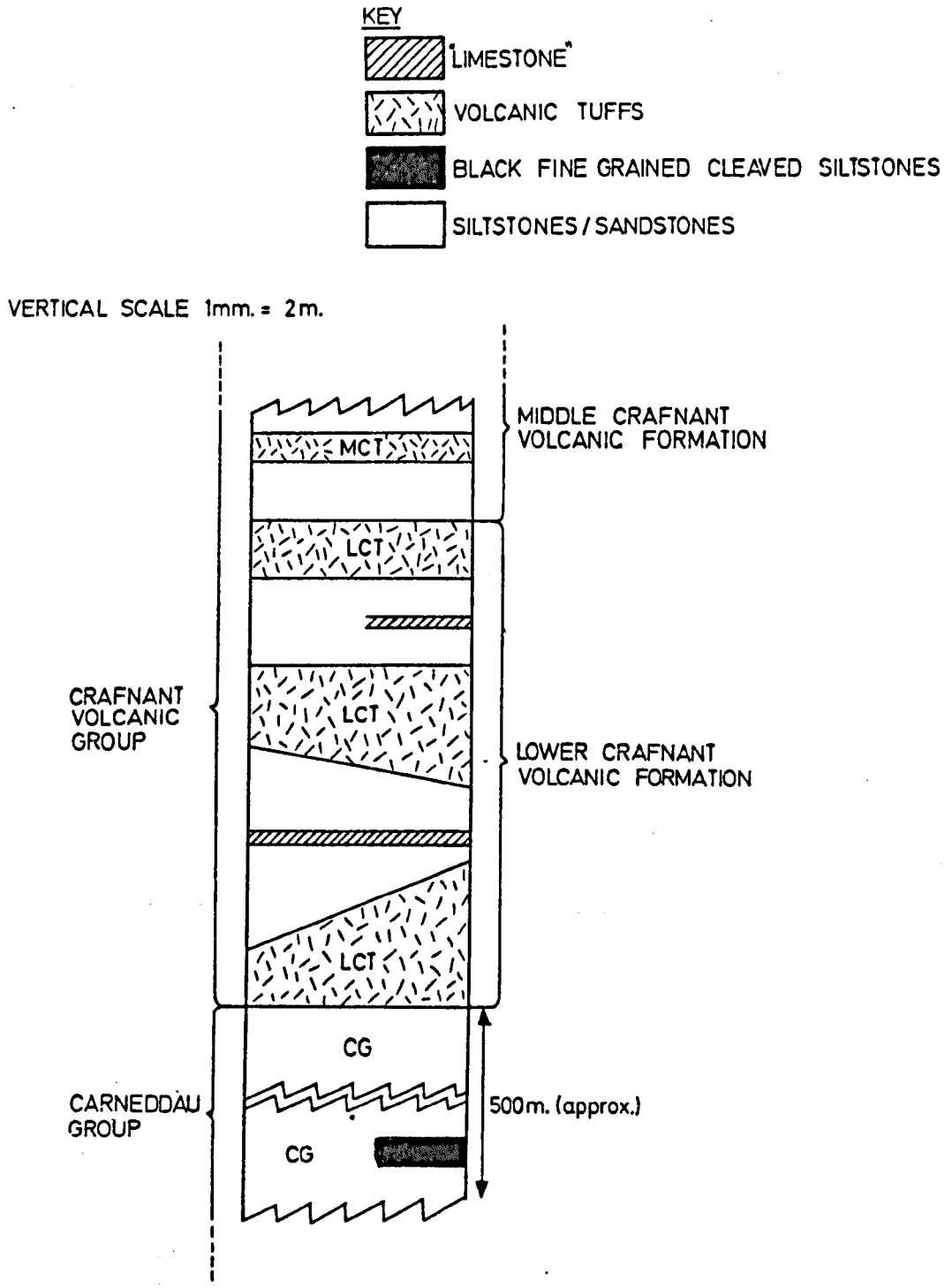
STAGES OF THE CARADOC	Decoroproteus cf. calvus (Whittard) of Owens 1973	Flexicalymene caractaci (Salter)	Flexicalymene planimarginata (Reed)	Kloucekia apiculata (M'Coy)	Parabasilicus powisi (Murchison)
UPPER LONGVILLIAN		?			
LOWER LONGVILLIAN					?
SOUDLEYAN			?		
		BALA	BALA	SOUTH SHROPSHIRE	

Fig. 10.1 THE STRATIGRAPHY OF THE LLYN COWLYD AREA



ADAPTED FROM DIGGENS AND ROMANO (1968)

Fig.10.2 PART OF THE STRATIGRAPHY OF THE AREA WEST OF BETWS-Y-COED



MCT – MIDDLE CRAFNANT VOLCANIC FORMATION
LCT – LOWER CRAFNANT VOLCANIC FORMATION
CG — CARNEDDAU GROUP
PARTLY ADAPTED FROM THE GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND AND WALES) SHEET SH 75, 1:25 000, CAPEL CURIG AND BETWS-Y-COED

Fig. 10.3 THE SEQUENCE AND STRATIGRAPHICAL RELATIONSHIPS IN THE AREA EAST OF BEDDGELERT.

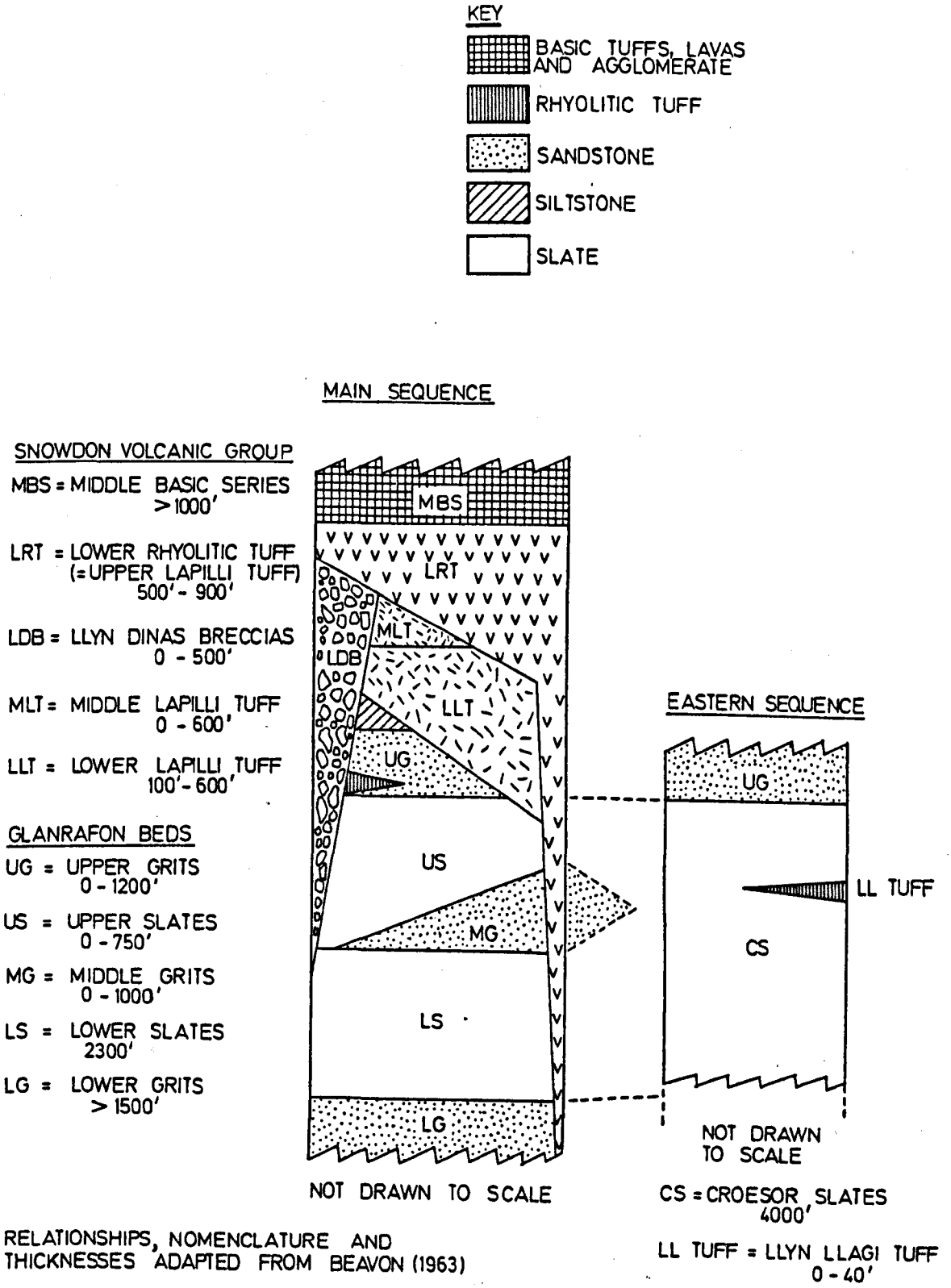


Fig. 10.4a

Key to faunal abbreviations as used in figs. 10.4 - 10.6

BIV	- Bivalves, gen. et sp. indet.
CRAN	- Craniopsids
DAL	- Dalmanellids
DALMAN	- *Dalmanella* sp.
DIN	- *Dinorthis* sp.
GAST	- Gastropods, gen. et sp. indet.
HOLL	- Hollinaceans
HOW	- *Howellites* sp.
KJ	- *Kjaerina* sp.
LEPT	- *Leptaena* sp.
LEPTEST	- *Leptestiina oepiki* (Whittington)
LESU	- *Lesuerilla* sp.
MACRO	- *Macrocoelia* sp.
NIC	- *Nicolella* cf. *actoniae obesa* Williams of Williams 1963
NUC	- Nuculoids, gen. et sp. indet.
ORTH	- *Orthambonites cessata* Williams
PARA	- *Paracraniops* sp.
PROTO	- *Protozyga* cf. *diversa* (Reed) of Williams 1962
RAF	- *Rafinesquina* sp.
REUS	- *Reuschella* sp.
ROSTRI	- *Rostricellula sparsa* Williams
SERI	- *Sericoidea* sp.
SKENI	- *Skenidioides costatus* Cooper
SOW	- Sowerbyellids
TALL	- *Tallinnella* sp.

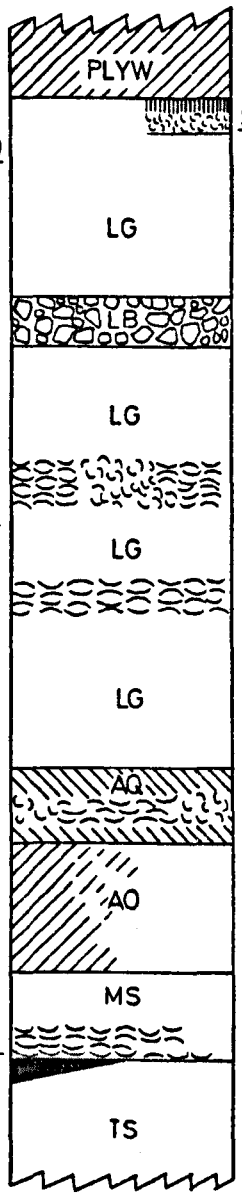
TEN - *Tentaculites* sp.

TET - *Tetradella* sp.

TRIP (BICUS) - Triplesiaceans (*Bicuspina* sp.)

Fig.10.4 TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE STRATIGRAPHIC SUCCESSION IN THE LLYN COWLYD AREA.

NOT DRAWN TO SCALE.
THE VERTICAL THICKNESS OF SOME OF THE FOSSILIFEROUS UNITS HAS BEEN GREATLY EXAGGERATED.



MAJOR MARINE BENTHIC COMMUNITY TO WHICH ASSEMBLAGE IS ASSIGNED	MAJOR FAUNAL COMPONENTS OF ASSEMBLAGES. DOMINANT GENUS/GROUP UNDERLINED. NUMBERS IN PARENTHESES REFER TO FIELD LOCALITIES. SEE Fig.10.4a FOR KEY TO FAUNAL ABBREVIATIONS.
DALMANELLID-SOWERBYELLID	SOW/REUS/DAL/TEN (170/172)
DALMANELLID-SOWERBYELLID	SOW/DAL/GAST/HOLL (166/166A/166B)
DALMANELLID-SOWERBYELLID	SOW/DAL/GAST/TEN (163)
DALMANELLID-SOWERBYELLID	DAL/SOW/GAST/SKENI/LEPT (160/160A/162)
DINORTHIS	DIN/MACRO/SOW/GAST (158/158A/159/159A)

Fig.10.4 (cont.)

KEY

SILTSTONE

SANDSTONE

PLYW PEN-LLITHRIG-Y-WRÂCH SILTSTONE FORMATION

LCSF LLYN COWLYD SANDSTONE FORMATION

BCSF BWLCH COWLYD SANDSTONE FORMATION

RHYOLITIC TUFF

LB LAHARIC BRECCIA

LG LLETHR GWYN SANDSTONES } LCSF

AQ ARKOSIC QUARTZITE

AO ADWYON OWEN BEDS

MS MULTIPLICATA SANDSTONE

RHYOLITIC AGGLOMERATE } BCSF

TS TUFFACEOUS SANDSTONES

KEY TO FAUNAL OCCURENCE TYPES

RANDOM VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - MIXED VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - PREFERRED CONCAVE UP VALVE ORIENTATION

Fig.10.5 TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION, AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE STRATIGRAPHIC SUCCESSION IN THE BETWS-Y-COED AREA.

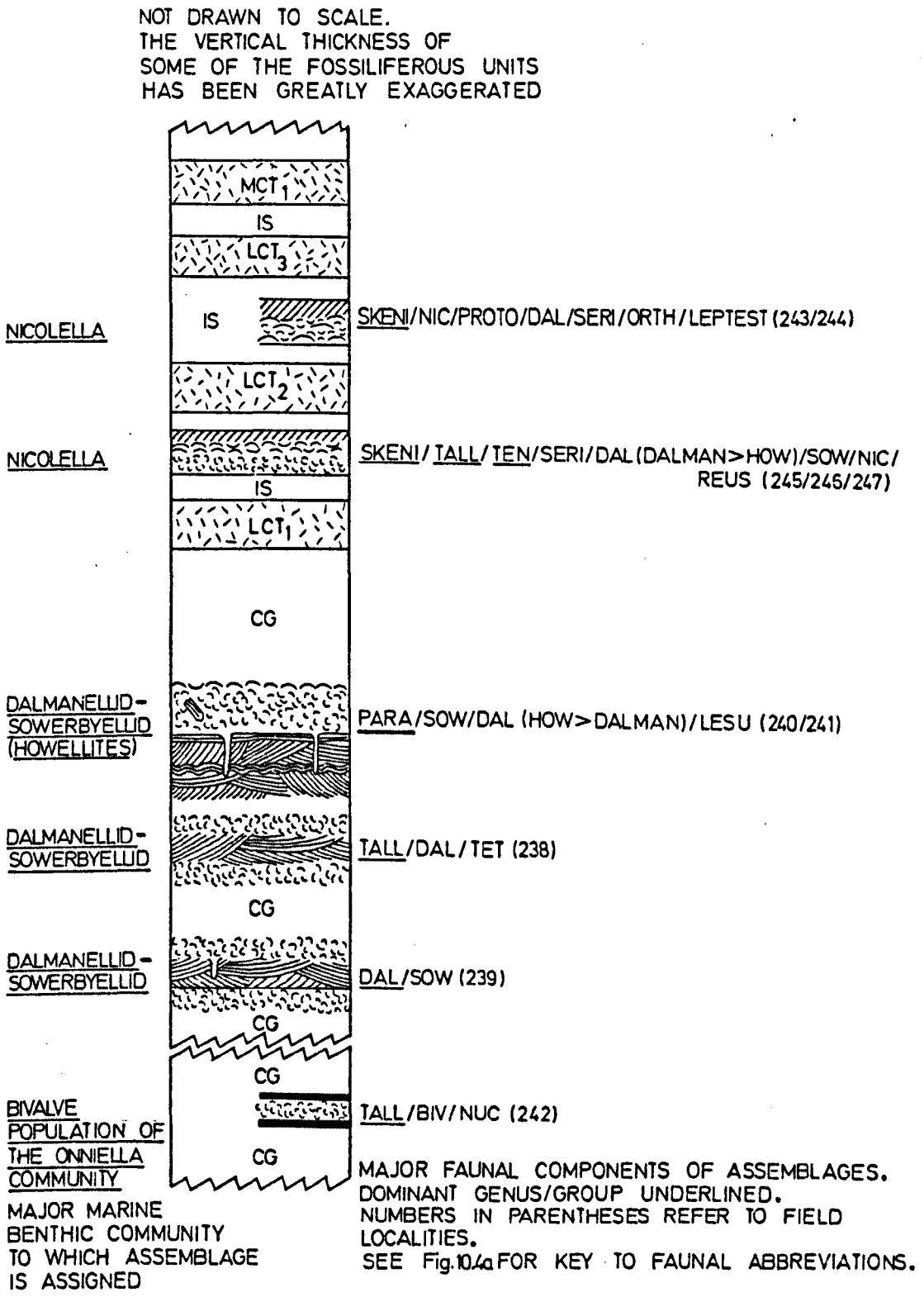


Fig.10.5 (cont.)

KEY

SKOLITHOS

PLANAR BEDDING

RIPPLE DRIFT

TROUGH CROSS BEDDING

VOLCANIC TUFFS

BLACK FINE GRAINED CLEAVED SILTSTONE

SANDSTONES / SILTSTONES

MCT_1 LOWER TUFF OF THE MIDDLE CRAFNANT VOLCANIC FORMATION

LCT_3 UPPER TUFF OF THE LOWER CRAFNANT VOLCANIC FORMATION

"LIMESTONE"

LCT_2 MIDDLE TUFF OF THE LOWER CRAFNANT VOLCANIC FORMATION

"LIMESTONE"

IS INTERCALATED SEDIMENTS

LCT_1 LOWER TUFF OF THE LOWER CRAFNANT VOLCANIC FORMATION

CG CARNEDDAU GROUP (SANDSTONES / SILTSTONES)

KEY TO FAUNAL OCCURRENCE TYPES

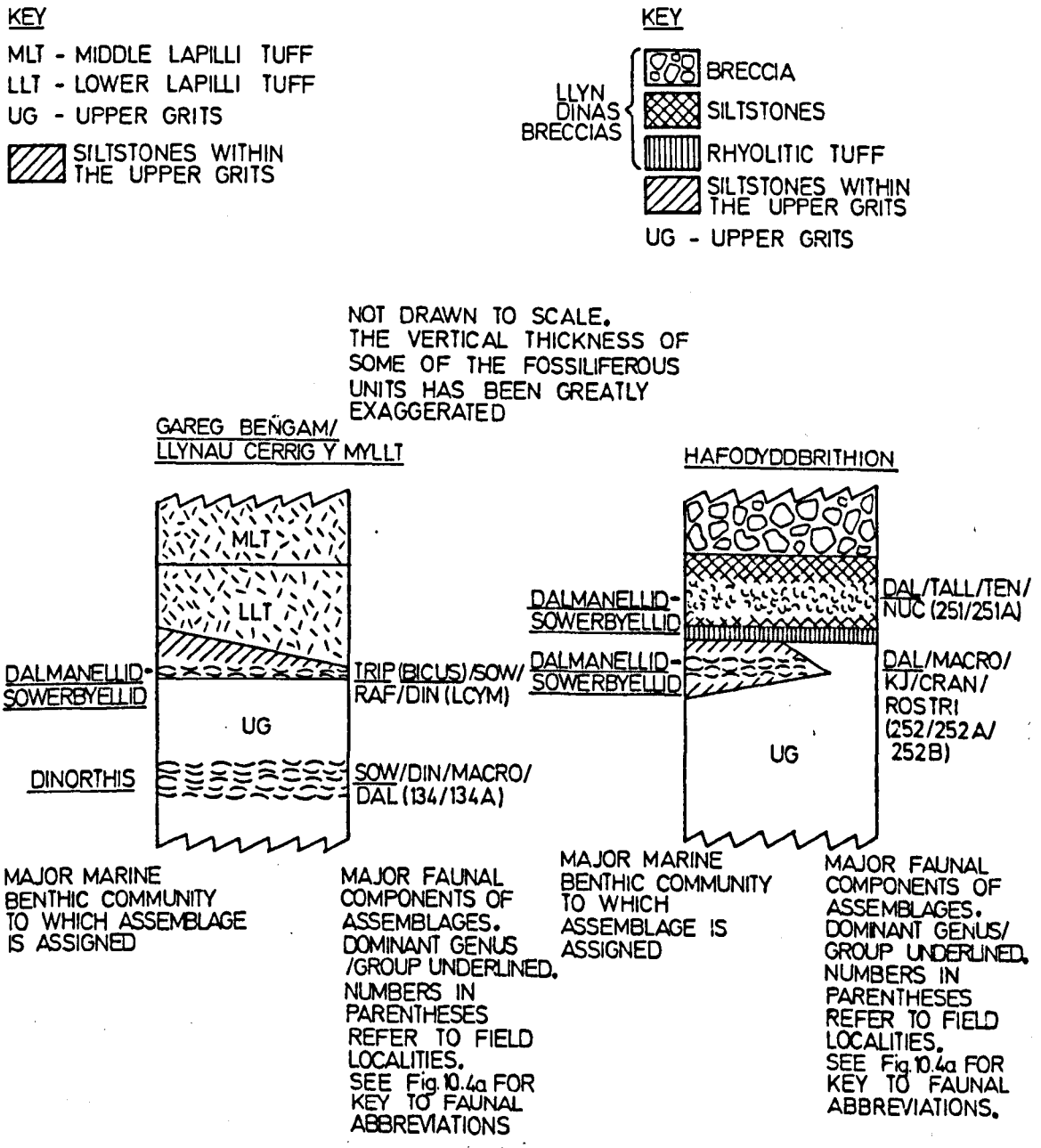
RANDOM VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - PREFERRED CONVEX-UP VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - MIXED VALVE ORIENTATION

OBOLIDS IN LIFE POSITION

Fig. 10.6 TO SHOW FAUNAL COMPOSITION AND DISTRIBUTION, COMMUNITY DISTRIBUTION, AND FAUNAL OCCURRENCE TYPE DISTRIBUTION WITHIN THE STRATIGRAPHIC SUCCESSIONS IN THE AREA EAST OF BEDDGELERT.



KEY TO FAUNAL OCCURRENCE TYPES

RANDOM VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - MIXED VALVE ORIENTATION

PLANAR OCCURRENCE TYPE - PREFERRED CONCAVE-UP VALVE ORIENTATION

Fig. 10.7 TO SHOW A SERIES OF CROSS BEDDED AND PLANAR BEDDED FINE SANDSTONES / COARSE SILTSTONES, PENETRATED BY A SINGLE SKOLITHOS BURROW, AT LOCALITY 241 (SH 78635588) SOUTH WEST OF BETWS-Y-COED

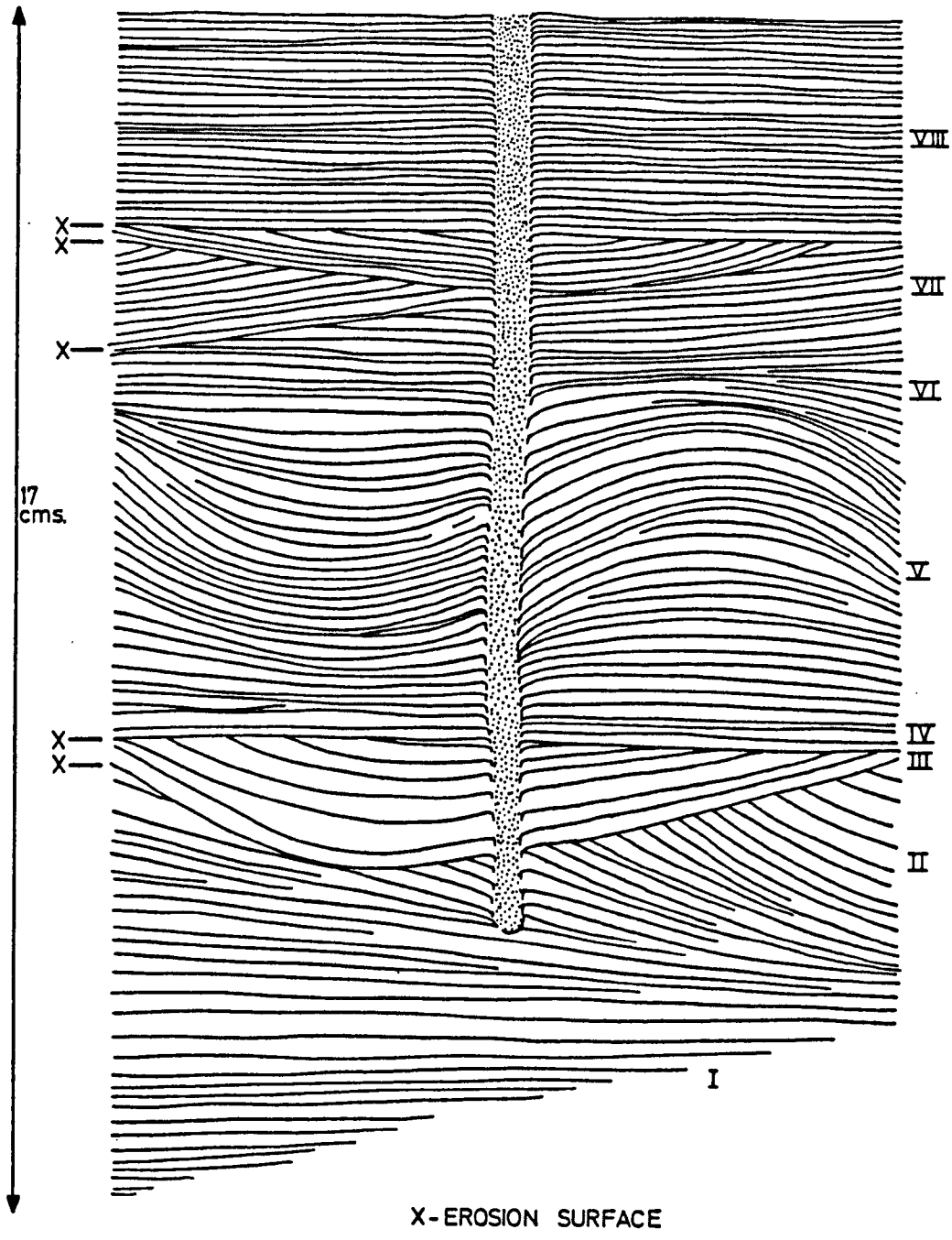
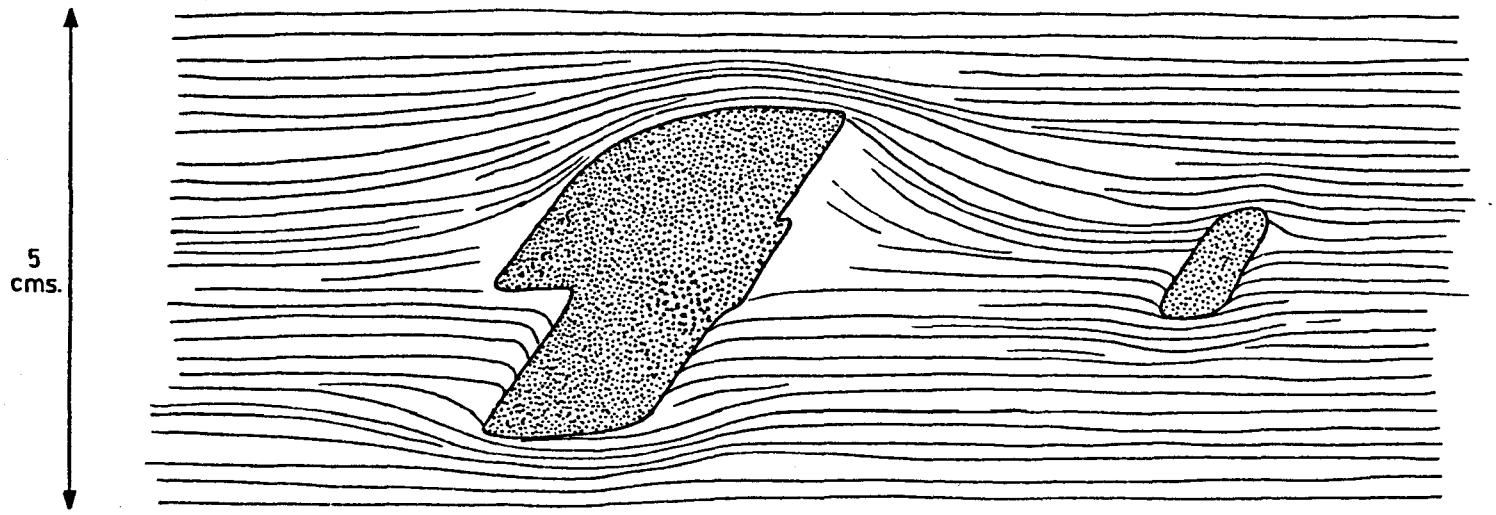


Fig. 10.7 cont.

VIII	-	Planar beds erosively overlying VII
VII	-	Low angle trough cross beds erosively overlying VI
V-VI	-	Symmetrical ripple bedding
IV	-	Thin set of planar beds erosively overlying III
III	-	Trough cross beds erosively cutting II
I-II	-	Planar beds grading vertically into cross beds

Sequence I - III represents a change from plane beds to small scale dune forms, indicative of flow regime variations in a non-barred, high energy environment (Clifton et al. 1971).

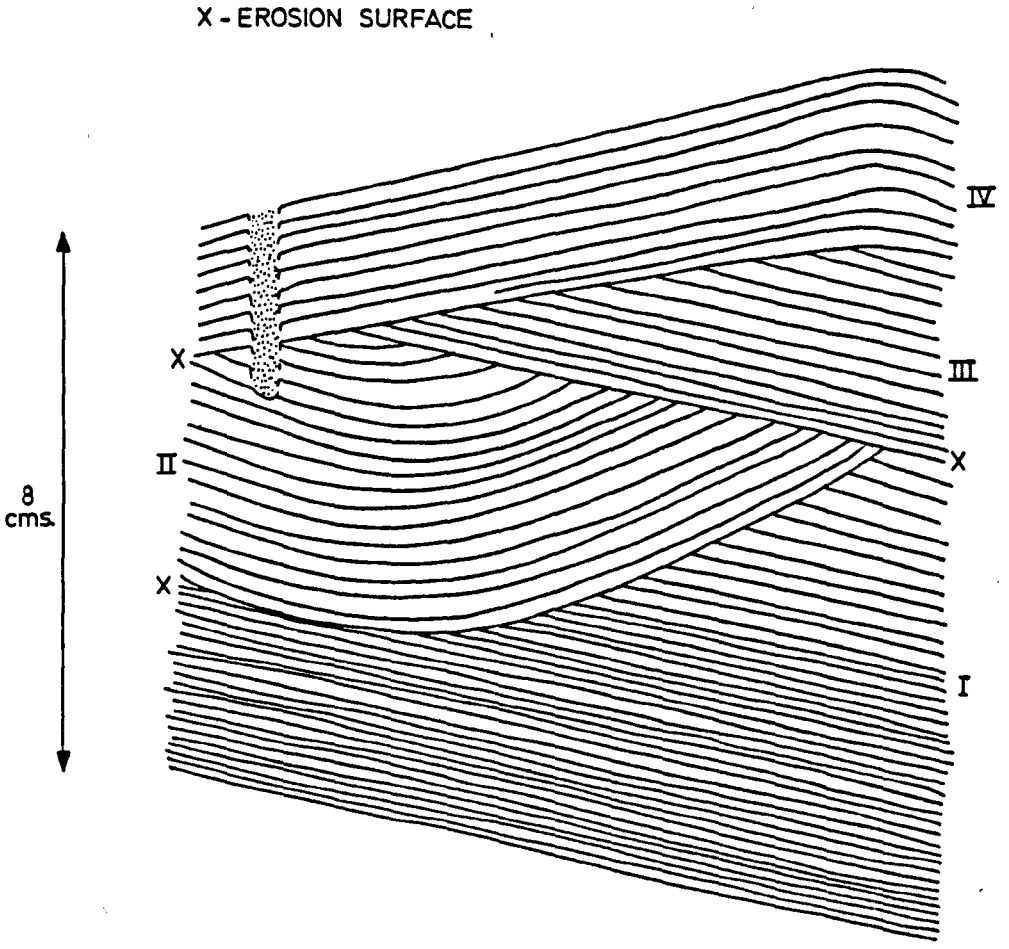
Fig.10.8 DARK FINE GRAINED ANGULAR/SUBROUNDED CLASTS, WITHIN LAMINATED LLETHR GWYN SANDSTONES, SHOWING ISOLATE IMBRICATION, AT LOCALITY 163 (SH 72116219)



DARK, FINE GRAINED LITHOLOGY

NOTE HOW THE LOWER LAMINATIONS ARE TRUNCATED BY THE CLASTS

Fig. 10.9 TO SHOW A SERIES OF CROSS BEDDED AND PLANAR LAMINATED FINE SANDSTONES / COARSE SILTSTONES SHALLOWLY PENETRATED BY A SINGLE SKOLITHOS BURROW, AT LOCALITY 241 (SH 78635588) SOUTH WEST OF BETWS-Y-COED



IV PLANAR LAMINATED SET (RIPPLED?) IN EROSIVE CONTACT WITH II AND III
III PLANAR LAMINATED SET EROSIVELY OVERLYING II
II TROUGH CROSS SET EROSIVELY OVERLYING I
I PLANAR LAMINATIONS GRADUALLY COARSENING UPWARDS

Table 10.1

To show the stratigraphical and areal distribution of fauna within the areas around Llyn Cowlyd, Betws-y-Coed and to the east of Beddgelert.

+ = present - = absent

Key to areas. See also figs.10.4, 10.5 and 10.6.

LC - Llyn Cowlyd area

- MS - Multiplicata Sandstone (Bwlch Cowlyd Sandstone Formation)
- AQ - Arkosic Quartzite (Llyn Cowlyd Sandstone Formation)
- LG - Llethr Gwyn Sandstones (Llyn Cowlyd Sandstone Formation)
- RT - Rhyolitic tuff at the top of the Llyn Cowlyd Sandstone Formation

BYC - Betws-y-Coed area

- BS - Black, fine grained, cleaved siltstone within the Carneddau Group
- CG - Carneddau Group sediments (sandstones/siltstones)
- $LCVF_1$ - Intercalated sediments between the lower and middle tuffs of the Lower Crafnant Volcanic Formation
- $LCVF_2$ - Intercalated sediments between the middle and upper tuffs of the Lower Crafnant Volcanic Formation

EB - <u>The area to the east of Beddgelert</u>

UG(GB) - Upper Grits at Gareg Bengam

UG(LCYM) - Upper Grits at Llynau Cerrig-y-Myllt

UG(H) - Upper Grits at Hafodyddbrithion

LDB(H) - Siltstones of the bedded facies of the Llyn Dinas Breccias at Hafodyddbrithion

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Bancroftina sp.	-	-	-	-	-	-	?	-	-	-	?	+
Bicuspina spiriferoides (M'Coy)	-	-	-	-	-	-	-	-	+	+	-	-
B.cf.spiriferoides (M'Coy) of Williams 1963	-	-	-	-	-	-	+	-	-	-	-	-
Bicuspina sp.	-	-	-	-	-	+	-	-	-	-	-	-
Brachiopods, gen.et sp.indet.	-	-	+	+	-	-	-	-	-	-	-	+
Chonetoidea sp.	-	-	-	-	-	+	-	-	-	-	-	-
cf.C.radiatula (Barrande) of Mitchell 1977	-	-	-	-	-	-	+	-	-	-	-	-
aff. Chonetoidea sp.	-	-	-	-	-	+	-	-	-	-	-	-
C.sp. - immature	-	-	-	-	-	+	-	-	-	-	-	-
cf.Colaptomena sp. of Mitchell 1977	-	-	-	-	-	+	-	-	-	-	-	-
Craniopsids (Lingulapholis sp.)	-	-	-	-	-	-	-	-	-	?	-	-
Craniopsids	-	-	-	-	-	-	+	-	-	-	-	+
Cremnorthis parva Williams	-	-	-	-	-	-	+	+	-	-	-	-
Cremnorthis sp. - immature	-	-	-	-	-	-	-	+	-	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Dalmanella cf. *lepta* (Bancroft) of Bancroft 1945	-	-	-	-	-	-	-	-	-	-	+	-
cf. *D. indica* Whittington of Bancroft 1945	-	-	-	-	-	+	-	-	-	-	-	-
cf. *D. modica* Williams of Williams 1963	-	-	-	-	-	+	-	-	-	-	-	-
Dalmanella sp.	+	+	+	-	-	+	+	+	+	+	+	+
Dalmanellids	+	+	+	+	-	+	+	+	+	+	+	+
Dalmanellids - immature	-	+	+	+	-	+	+	+	+	+	+	+
Dinorthis berwynensis (Whittington)	-	-	-	-	-	+	-	-	-	-	-	-
Dinorthis (*Plaesiomys*) *multiplicata* Bancroft	+	-	-	-	-	-	-	-	+	-	-	-
D. aff. *berwynensis* (Whittington) of Williams 1963	-	-	-	-	-	+	-	-	-	-	-	-
Dinorthis sp.	-	+	+	-	-	+	-	-	-	+	+	-
D. (*Plaesiomys*) sp.	+	+	-	-	-	-	-	-	+	-	-	-
D. sp. - immature	+	-	-	-	-	+	-	-	-	-	-	-
D. (*P.*) sp. - immature	-	-	-	-	-	-	-	-	+	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Diplonorthis sp.	-	-	-	-	-	-	?	-	-	-	-	-
Dolerorthis sp.	-	-	?	?	-	-	+	+	-	-	-	-
cf. *Dolerorthis* sp.	-	-	-	-	-	-	-	+	-	-	-	-
Dolerorthids	-	-	-	-	-	-	+	-	-	-	-	-
Glyptorthis cf. *concinnula* Cooper of Mitchell 1977	-	-	-	-	-	-	+	-	-	-	-	-
Harknessellids - immature	-	-	-	-	-	+	-	-	-	-	-	-
Heterorthis sp.	-	-	-	-	-	-	-	-	+	-	-	-
Horderleyella sp.	-	-	+	-	-	+	-	-	?	-	+	-
cf. *Horderleyella* sp.	-	-	-	-	-	-	-	-	-	-	+	-
H. sp. - immature	-	-	-	-	-	+	-	-	-	-	-	-
Howellites cf. *antiquior* (M'Coy) of Williams 1963	-	-	+	-	-	+	-	-	-	-	-	+
H. cf. *striata* Bancroft of Williams 1963	-	-	-	-	-	+	-	-	-	-	+	-
Howellites sp.	-	-	+	-	-	+	+	-	+	-	+	+
Inarticulate (Obolid)	-	+	-	-	-	+	-	-	-	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Inarticulates, gen.et sp.indet.	+	–	–	–	+	+	+	+	–	+	–	–
Kiaromena cf.kjerulfi (Holtedahl) of Williams 1963	–	–	+	–	–	–	–	–	–	–	–	–
cf. Kiaromena sp.	–	?	–	–	–	?	–	+	–	–	–	–
Kjaerina aff.jonesi Bancroft of Bancroft 1929a	–	–	–	–	–	–	–	–	–	–	+	–
K.cf.jonesi Bancroft of Bancroft 1929a	–	–	+	–	–	+	–	–	–	–	–	–
Kjaerina sp.	–	?	+	–	–	+	–	–	?	–	+	–
cf.Kjerulfina sp.	–	–	–	–	–	–	–	+	–	–	–	–
Leptaena sp.	–	+	–	+	–	+	+	–	+	+	–	–
Leptaenids	–	–	–	–	–	–	–	+	–	–	–	–
Leptestiina oepiki (Whittington)	–	–	–	–	–	–	+	+	–	–	–	–
Lingulella sp.	–	–	–	–	–	–	–	–	–	+	–	–
cf. Lingulella sp.	–	–	–	–	–	–	–	+	–	–	–	–
Macrocoelia expansa(J.de C.Sowerby)	–	–	–	–	–	–	–	–	+	–	–	–
M.cf.expansa (J.de C.Sowerby) of Williams 1963	+	–	–	–	–	–	–	–	–	+	+	–

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Macrocoelia sp.	+	-	-	-	-	+	-	-	-	-	+	-
Mjoesina sp.	-	-	-	-	-	-	-	+	-	-	-	-
Monobolina sp.	-	-	-	-	?	-	-	-	-	-	-	-
Nicolella actoniae obesa Williams	-	-	-	-	-	-	+	+	-	-	-	-
N. cf. *actoniae obesa* Williams of Williams 1963	-	-	-	-	-	-	+	-	-	-	-	-
Nicolella sp.	-	-	-	-	-	-	+	-	-	-	-	-
N. sp. - immature	-	-	-	-	-	-	+	+	-	-	-	-
Obolids in life position	-	-	-	-	-	+	-	-	-	-	-	-
cf. *Onniella* sp.	-	-	-	-	-	?	?	+	-	-	-	-
Orbiculoidea sp.	-	-	-	-	-	-	+	-	-	-	-	-
Orthambonites cessata Williams	-	-	-	-	-	-	+	+	-	-	-	-
Orthambonites sp.	-	-	-	-	-	-	+	-	-	-	-	-
O. sp.nov.	-	-	-	-	-	-	-	+	-	-	-	-
O. sp. - immature	-	-	-	-	-	-	+	+	-	-	-	-
cf. *Palaeoglossa* sp.	-	-	-	-	-	-	-	-	-	-	-	+

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Paracraniops sp.	-	-	-	-	-	+	-	+	-	-	?	+
cf. *Paracraniops* sp.	-	-	-	-	-	-	-	+	-	-	-	-
Paterula cf.*bohemica* Barrande of Williams 1974	-	-	-	-	+	-	-	-	-	-	-	-
Plaesiomys sp.	-	-	-	-	-	?	-	+	-	-	-	-
Plaesiomyids	-	+	-	-	-	-	-	+	-	-	-	-
Platystrophia sp.	-	-	-	-	-	-	+	+	-	-	-	-
cf.*Platystrophia* sp.	-	+	-	-	-	-	-	-	-	-	-	-
Protozyga cf.*diversa* (Reed) of Williams 1962	-	-	-	-	-	-	+	+	-	-	-	-
Protozyga sp. - immature	-	-	-	-	-	-	-	+	-	-	-	-
cf.*Pseudolingula spatula* Williams of Williams 1974	-	-	-	-	+	-	-	-	-	-	-	-
Rafinesquina sp.	-	-	+	-	-	+	-	-	-	+	+	-
cf.*Rafinesquina* sp.	-	-	-	-	-	-	-	-	-	-	+	-
Reuschella horderleyensis Bancroft	-	-	-	-	-	-	+	-	-	-	-	-
R.cf.*horderleyensis* Bancroft of Bancroft 1928b and Williams 1963	-	-	-	-	-	-	+	-	-	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
R.cf.horderleyensis undulata Williams of Williams 1963	-	-	-	-	-	-	+	-	-	-	-	-
Reuschella sp.	+	?	-	+	-	-	+	+	+	-	-	-
Rhactorthis crassa Williams	-	-	-	-	-	-	+	+	-	-	-	-
cf.R.crassa Williams of Williams 1963	-	-	-	-	-	-	-	+	-	-	-	-
Rhactorthis sp.	-	-	-	-	-	?	+	+	-	-	-	-
Rostricellula sparsa Williams	-	-	-	-	-	-	-	-	-	-	+	-
Rostricellula sp.	-	-	-	-	-	-	-	+	-	-	-	-
Rugose strophomenids, gen.et sp.indet.	-	-	-	-	-	+	+	-	-	-	-	-
Salopia sp.	-	-	+	-	-	-	-	-	-	-	-	-
cf.Sampo sp.	-	-	-	-	-	+	-	-	-	-	-	-
cf.Scaporthis sp.	-	-	-	-	-	-	-	+	-	-	-	-
Schizocrania sp.	-	-	-	-	-	?	-	-	-	-	-	-
Sericoidea cf.abdita Williams of Williams 1962	-	-	-	-	-	-	+	-	-	-	-	-
S.cf.restricta (Hadding)of Williams 1962	-	-	-	-	-	-	+	-	-	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
S. sp. (aff. Chonetoidea gamma Spjeldnaes of Spjeldnaes 1957)	-	-	-	-	-	-	-	+	-	-	-	-
S. sp. (cf. C. alpha Spjeldnaes of Spjeldnaes 1957)	-	-	-	-	-	-	+	-	-	-	-	-
S. sp. (cf. C. stoermeri Spjeldnaes of Spjeldnaes 1957)	-	-	-	-	-	-	+	+	-	-	-	-
Sericoidea sp.	-	-	-	+	-	-	+	+	-	-	-	+
S. sp. - immature	-	-	-	-	-	-	+	+	-	-	-	-
Skenidioides costatus Cooper	-	-	-	-	-	-	+	+	-	-	-	-
S. cf. costatus Cooper of Williams 1963	-	+	-	-	-	-	-	-	-	-	-	-
Skenidioides sp.	-	+	-	-	-	?	-	-	-	-	-	-
S. sp. - immature	-	-	-	-	-	-	+	-	-	-	-	-
Sowerbyellids	+	+	+	+	-	+	+	+	+	+	-	+
Sowerbyellids - immature	-	-	+	-	-	+	+	-	+	-	-	-
Strophomena sp.	-	-	-	-	-	?	-	-	-	-	-	-
Strophomenids, gen. et sp. indet.	+	-	-	-	-	-	-	+	-	+	-	-
Triplesiaceans	-	-	?	-	-	+	+	-	+	+	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
cf. *Tyronella* sp. of Mitchell 1977	-	-	-	-	-	-	+	+	-	-	-	-
Broeggerolithus cf. *nicholsoni* (Reed) of Dean 1962	-	-	-	+	-	-	+	-	-	-	-	+
Broeggerolithus sp. (Group 2-Dean 1960a)	-	-	-	-	-	-	-	-	-	-	?	-
B. sp. (Group 3-Dean 1960a)	-	-	-	+	-	+	+	-	-	-	-	+
Broeggerolithus sp.	-	+	+	+	+	+	+	+	-	+	+	+
B. sp. (with long genal spine)	-	-	+	-	-	-	-	-	-	-	-	+
Brongniartella minor (Salter)	-	+	-	-	-	+	-	-	-	-	-	-
B. cf. *bisulcata* (M'Coy) of Dean 1961	-	-	-	-	-	-	+	-	-	-	-	-
B. cf. *minor* (Salter) of Dean 1961	-	-	+	-	-	-	-	-	-	-	-	-
cf. *B. bisulcata* (M'Coy) of Dean 1961	-	-	-	-	-	-	-	+	-	-	-	-
Brongniartella sp.	-	+	-	-	-	-	+	-	?	-	-	-
B. sp. librigenae	-	-	-	-	-	-	-	-	-	-	-	-
B. sp. thoracic segments	-	+	-	-	-	-	-	+	-	-	-	-
Calymene sp. (s.l.)	-	+	+	+	-	+	+	+	+	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Calymenid (aff. *Gravicalymene praecox* (Bancroft) of Dean 1963a)	-	-	-	-	-	-	-	+	-	-	-	-
Calymenid pygidia (cf. *Flexicalymene caractaci* (Salter) of Whittington 1965)	-	-	-	-	-	-	-	+	-	-	-	-
Calymenid pygidia (cf. *Gravicalymene praecox* (Bancroft) of Dean 1963a)	-	-	-	-	-	-	-	+	-	-	-	-
Calymenid librigenae, gen. et sp. indet.	-	+	-	-	-	-	+	+	-	-	-	-
Ceraurinella cf. *intermedia* (Kielan) of Whittington 1965	-	-	-	-	-	-	+	-	-	-	-	-
Decoroproteus sp.	-	-	-	-	-	+	-	-	-	-	-	-
Flexicalymene caractaci (Salter)	-	-	-	-	-	-	+	+	-	-	-	-
F. aff. *caractaci* (Salter) of Whittington 1965	-	-	-	-	-	-	+	+	-	-	-	-
F. cf. *planimarginata* (Reed) of Whittington 1965	-	-	+	-	-	-	-	-	-	-	-	-
cf. *F. caractaci* (Salter) of Whittington 1965	-	-	-	+	-	-	+	-	-	-	-	-
cf. *F. planimarginata* (Reed) of Whittington 1965	-	+	+	-	-	-	+	-	+	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
cf. F. (Reacalymene) limba (Shirley) of Whittington 1965	-	+	+	-	-	-	-	-	-	-	-	-
Flexicalymene sp.	-	-	-	-	-	-	+	+	-	-	-	-
Flexicalymene sp. A	-	-	-	-	-	-	+	+	-	-	-	-
cf. Gravicalymene praecox (Bancroft) of Dean 1963a	-	-	-	-	-	-	+	-	-	-	-	-
cf. Gravicalymene sp.	-	-	-	-	-	-	-	+	-	-	-	-
Illaenus sp. - immature	-	-	-	-	-	-	-	-	-	-	+	-
Isotelinids, gen. et sp. indet.	-	+	-	-	+	+	+	-	-	-	-	-
Isotelinid hypostome, gen. et sp. indet.	-	+	-	-	-	-	-	-	-	-	-	-
Isotelinid librigenae, gen. et sp. indet.	-	+	+	-	-	-	-	-	-	-	+	-
Isotelinid pygidia, gen. et sp. indet.	-	-	-	-	-	-	-	-	-	-	+	-
Isotelinid thoracic segments, gen. et sp. indet.	-	+	+	-	-	-	-	-	-	-	+	-
Kloucekia apiculata (M'Coy)	-	-	-	-	-	-	+	-	-	-	-	+
Kloucekia sp.	-	-	-	-	-	-	-	-	-	-	-	+
K. sp. librigenae	-	-	-	-	-	-	-	-	-	+	-	-
K. sp. - immature	-	-	-	-	-	-	-	-	-	-	-	+

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Lichids, gen.et sp.indet.	-	+	-	-	-	-	-	-	-	-	-	-
Lichid pygidia,gen. et sp.indet.	-	-	-	-	-	-	-	+	-	-	-	-
Meraspid trilobite,gen.et sp.indet.	-	-	-	-	-	-	+	-	-	-	-	-
Meraspid trilobite pygidia,gen.et sp.indet.	-	-	-	-	-	-	-	+	-	-	-	-
Odontopleurid librigenae,gen. et sp.indet.	-	-	-	+	-	-	-	+	-	-	-	-
Parabasilicus powisi (Murchison)	-	-	-	-	+	-	-	-	-	-	-	-
Phacopid librigenae,gen. et sp.indet.	-	-	-	-	-	-	-	+	-	-	-	-
Phacopid pygidia,gen. et sp.indet.	-	-	-	-	-	-	-	?	-	-	-	-
Platylichas nodulosus (M'Coy)	-	-	-	-	-	-	+	+	-	-	-	-
P.aff.nodulosus (M'Coy)of Whittington 1962	-	-	-	-	-	-	-	+	-	-	-	-
Platylichas sp.	-	-	-	-	-	-	+	+	-	-	-	-
P.sp.hypostome	-	-	-	-	-	-	-	+	-	-	-	-
Primaspis sp.	-	-	-	-	-	-	-	+	-	-	-	-
Proetids,gen. et sp.indet.	-	+	-	-	-	-	+	-	-	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Proetid librigenae, gen. et sp. indet.	-	-	-	-	-	+	-	+	-	+	-	-
Proetid pygidia, gen. et sp. indet.	-	-	-	-	-	-	+	-	-	-	-	-
Pygidia, cf. *Estoniops* sp.	-	-	-	-	-	-	-	+	-	-	-	-
Pygidia, cf. *Pseudosphaerexochus* sp.	-	-	-	-	-	-	-	+	-	-	-	-
Pygidia, gen. et sp. indet.	-	-	-	-	-	+	-	-	-	-	-	-
Thoracic segments	-	+	+	+	-	+	+	+	-	+	+	+
Trinucleids, gen. et sp. indet.	-	-	-	+	+	-	-	-	-	-	-	-
Dilobella sp.	-	-	-	-	?	-	+	-	-	-	-	-
Granulose ostracodes, gen. et sp. indet.	-	-	-	-	-	+	-	-	-	-	-	-
Hollinaceans, gen. et sp. indet.	-	+	+	-	-	-	+	+	-	+	-	-
Ostracodes (Podocopids)	-	?	-	-	-	-	-	-	-	-	-	-
Ostracodes, gen. et sp. indet.	-	+	+	-	+	+	+	+	-	-	-	+
Primitia sp.	-	+	-	-	-	+	-	-	-	-	-	-
Quadrijugatorids	-	-	-	-	-	+	+	-	+	-	+	+
Sigmobolbina sp.	-	-	-	-	-	?	-	-	-	?	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Sigmoopsids	-	-	-	-	-	-	?	-	-	-	-	-
Smooth ostracodes (Leperditellaceans)	-	-	-	-	-	-	-	+	-	-	-	-
Smooth ostracodes, gen. et sp. indet.	-	-	-	-	-	-	+	-	-	-	-	-
Tallinnella sp.	-	-	-	-	+	+	+	-	+	+	+	+
cf. *Tetradella marchica* (Krause) of Benson et al. 1961	-	+	-	-	-	-	-	-	-	-	-	-
Tetradella sp.	-	-	-	-	-	+	-	-	-	-	-	-
Zygobolbids	-	-	-	-	-	+	-	-	-	-	-	-
Bellerophontids, gen. et sp. indet.	+	+	+	-	-	+	-	-	+	-	+	-
Bellerophontaceans, gen. et sp. indet.	-	-	-	-	-	+	-	-	-	-	-	-
Cyrtolites sp.	-	-	-	-	-	+	-	-	-	-	+	-
Gastropods, gen. et sp. indet.	+	+	+	-	+	+	+	-	-	-	+	+
Lesuerilla sp.	-	-	+	-	-	+	-	-	-	-	-	-
Lophospirids, gen. et sp. indet.	-	-	+	+	-	+	-	-	?	-	?	-
Pleurotomariaceans, gen. et sp. indet.	+	-	-	-	-	-	-	-	-	-	-	-
Reudemannia sp.	-	-	?	?	-	-	-	-	-	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Sinuites sp.	-	-	-	-	-	?	-	-	-	-	-	-
Ambonychiaceans, gen. et sp. indet.	-	-	-	-	+	+	-	-	-	-	-	-
Bivalves, gen. et sp. indet.	-	-	-	-	+	+	-	-	-	-	+	+
Modiomorphids, gen. et sp. indet.	-	-	-	-	-	-	-	-	+	-	-	-
Nuculoids, gen. et sp. indet.	-	-	-	-	+	+	-	-	-	-	-	+
Nuculaceans, gen. et sp. indet.	-	-	-	-	-	+	-	-	-	-	-	-
Ptereineids, gen. et sp. indet.	-	-	-	-	-	+	-	-	-	-	-	-
Similodonta sp.	-	-	-	-	-	-	-	-	-	-	-	+
Corals, gen. et sp. indet.	-	-	-	-	-	+	-	-	-	+	-	-
Encrusting corals, gen. et sp. indet.	-	-	-	-	-	+	+	+	-	-	-	-
Favosites sp.	-	-	-	-	-	+	-	+	-	-	-	-
Orthoceras sp.	-	-	-	-	-	-	-	-	-	-	+	-
Orthoconic cephalopods, gen. et sp. indet.	-	-	-	-	+	-	-	-	-	-	-	-
Tentaculites ornatus J. de C. Sowerby	-	-	-	-	-	-	+	-	-	-	-	+

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
T. scalaris Schlotheim	–	–	–	–	–	–	–	+	–	–	–	–
Tentaculites sp.	–	+	+	+	–	+	+	+	–	–	+	+
FRAGMENTAL REMAINS												
Cyclocyclopa A	–	–	+	+	–	+	+	+	–	+	+	–
Cyclocyclopa A_1	–	–	+	+	–	+	+	+	+	+	+	–
Cyclocyclopa B	–	–	–	–	–	–	+	–	–	–	–	–
Cyclocyclopa C	–	–	–	–	–	–	–	+	–	–	–	–
Cyclocyclopa E	–	–	–	–	–	–	+	+	–	–	–	–
Cyclocyclopa F	–	–	–	–	–	–	+	+	–	–	–	–
Cyclocyclopa F pluricolumnals	–	–	–	–	–	–	–	+	–	–	–	–
Cyclocyclopa G	–	–	–	–	–	–	–	–	–	+	+	–
Cyclocyclopa G_1	–	–	–	–	–	–	–	–	–	–	+	–
Cyclocyclopa H	–	–	–	–	–	–	–	–	–	–	+	–
Cyclocyclopa J	–	–	–	+	–	+	+	+	+	–	–	–
Cyclocyclopa J_1	–	–	–	–	–	+	+	–	+	–	–	–

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Cyclocyclopa K	-	-	-	-	-	-	+	-	-	-	-	-
Cyclocyclopa K pluricolumnals	-	-	-	-	-	-	+	-	-	-	-	-
Cyclocyclopa L	-	-	-	-	-	-	-	+	-	-	-	-
Cyclocyclopa N	-	-	-	-	-	-	-	+	-	-	-	-
Cyclopentagonopa A	-	-	-	-	-	-	-	-	-	+	+	-
Cyclopentagonopa B	-	-	-	-	-	-	-	-	-	-	+	-
Cyclopentagonopa C	-	-	-	-	-	-	+	+	-	+	-	-
Cyclopentagonopa F	-	-	-	-	-	-	-	+	-	-	-	-
Cyclopentagonopa G	-	-	-	-	-	-	-	+	-	-	-	-
Cyclotristellatopa A	-	-	-	-	-	+	-	+	-	-	-	-
Cyclopentastellatopa A	-	-	-	-	-	-	+	+	-	-	-	-
Cyclopentastellatopa B	-	-	-	-	-	-	+	+	-	-	-	-
Cyclopentastellatopa C	-	-	-	-	-	-	-	+	-	-	-	-
Cyclopentastellatopa D	-	-	-	-	-	-	-	+	-	-	-	-
Pentagonocyclopa A	-	-	-	+	-	+	+	+	+	+	-	-
Pentagonocyclopa A pluricolumnals	-	-	-	-	-	-	+	+	-	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Pentagonocyclopa B	-	-	-	-	-	+	+	+	-	+	-	-
Pentagonocyclopa B_1	-	-	-	-	-	-	-	+	-	-	-	-
Pentagonocyclopa C	-	-	-	-	-	-	+	-	-	-	-	-
Pentagonocyclopa F	-	-	-	-	-	+	+	+	-	-	-	-
Pentagonopentastellatopa B	-	-	-	-	-	+	-	-	-	-	-	-
Pentagonopentastellatopa E	-	-	-	-	-	-	-	+	-	-	-	-
Hexagonocyclopa A	-	-	-	-	-	-	-	+	-	-	-	-
Cirrals	-	-	+	-	-	+	+	+	+	+	+	-
Pluricolumnals	-	-	-	-	-	+	+	+	+	+	+	-
$Pinnate_1$	-	-	-	-	-	+	+	+	-	+	+	-
$Pinnate_2$	-	-	-	-	-	-	+	+	-	+	-	-
Balacrinus sp.plates	-	-	-	-	-	-	+	-	-	-	-	-
Crinoid plates	-	-	-	-	-	-	+	+	-	-	-	-
cf.*Haplosphaeronis multifida* Paul of Paul 1973	-	-	-	-	-	-	+	+	-	-	-	-
Cystoids,gen. et sp.indet.	-	-	-	-	-	-	-	+	-	-	-	-

	LC				BYC				EB			
	MS	AQ	LG	RT	BS	CG	$LCVF_1$	$LCVF_2$	UG (GB)	UG (LCYM)	UG (H)	LDB (H)
Diploporite cystoids, gen. et sp. indet.	-	-	-	-	-	-	+	+	-	-	-	-
Diploporite plates	-	-	-	-	-	-	+	+	-	-	-	-
Cystoid pore rhombs	-	-	-	-	-	-	+	-	-	-	-	-
Echinoderm plates	-	-	-	-	-	+	-	+	-	-	-	-
Ramose bryozoan fragments	+	+	-	+	-	+	+	+	+	+	+	+
Circular bryozoa	-	+	+	+	-	-	+	+	-	-	+	+
Sheet-like bryozoa	-	-	-	-	-	-	+	-	-	-	-	-
Encrusting bryozoa	-	-	-	-	-	-	+	+	+	+	-	+
Bryozoa	-	-	-	-	-	-	+	-	-	-	-	-
Algal fragments	-	-	-	-	-	-	-	+	-	-	-	-
Coral fragments	-	-	-	-	-	-	+	+	-	-	-	-
Cyclocystoides sp. (three-pored plates)	-	-	-	-	-	-	+	-	-	-	-	-
Cyclocystoides sp. (two-pored plates)	-	+	-	?	-	-	-	-	+	-	-	-
Lepidocoleus sp.	-	-	-	+	-	+	+	+	-	+	-	-

Plate 3.1

Distorted brachiopod brachial valve (external mould) : median line parallel to direction of maximum finite elongation. Ribbing parallel/subparallel to elongation direction becomes apparently finer whereas postero-lateral ribbing, which is at right angles to elongation direction, becomes apparently coarser. At postero-lateral margin, accentuated growth lines and tectonic rugae are developed - note lateral diminution towards median line. Valve termed a narrow form and is enclosed in cleaved siltstone. From locality 195 (SH 71465117) - Glanrafon Beds, south-west of Dolwyddelan (south-western sequence - map 3)

Plate 3.2

Part of an assemblage of tectonically distorted brachiopods mostly orientated obliquely to direction of maximum finite elongation (runs north-east - south-west across photograph). Note well developed coarsening and fining of external ribbing shown by *Dinorthis* pedicle valve (bottom left). Distorted moulds of brachial internal valves of sowerbyellids (= *Sowerbyella*) and dalmanellids (= *Dalmanella*) can be distinguished (centre). All valves are oblique forms and are enclosed in medium-coarse sandstone.

From locality 134A (SH 62004523) - Glanrafon Beds, Upper Grits, Gareg Bengam, east of Beddgelert (map 6)

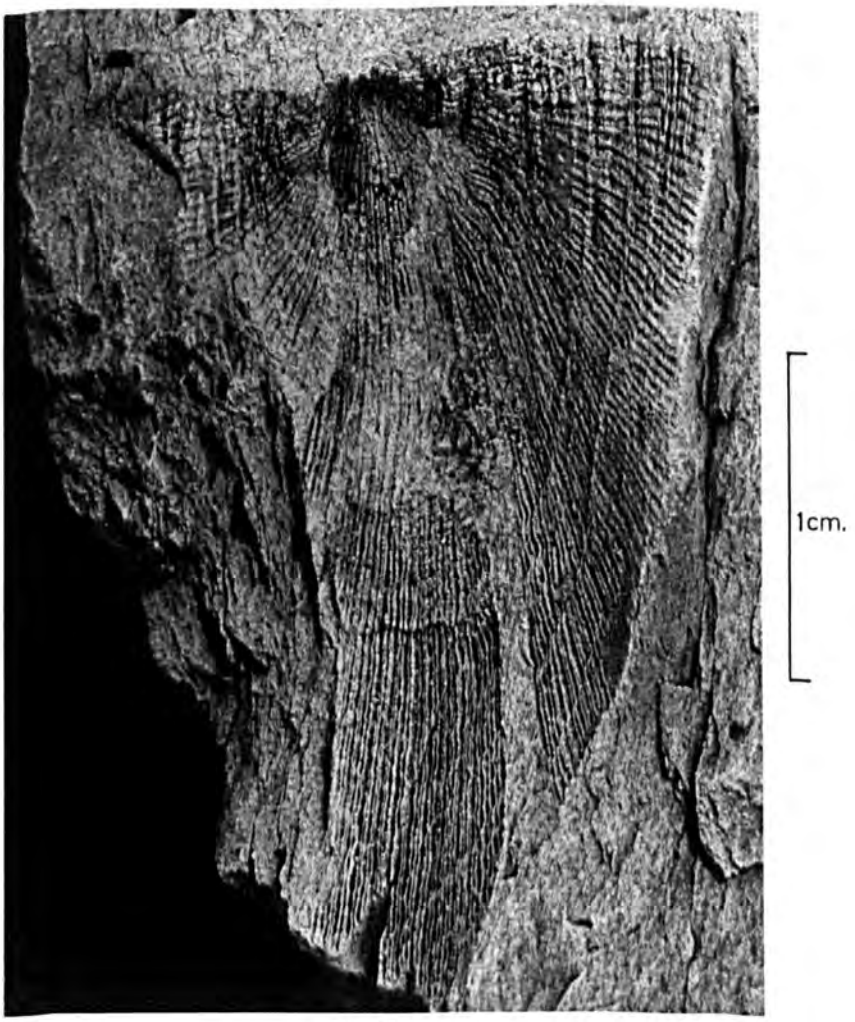


PLATE 3.1

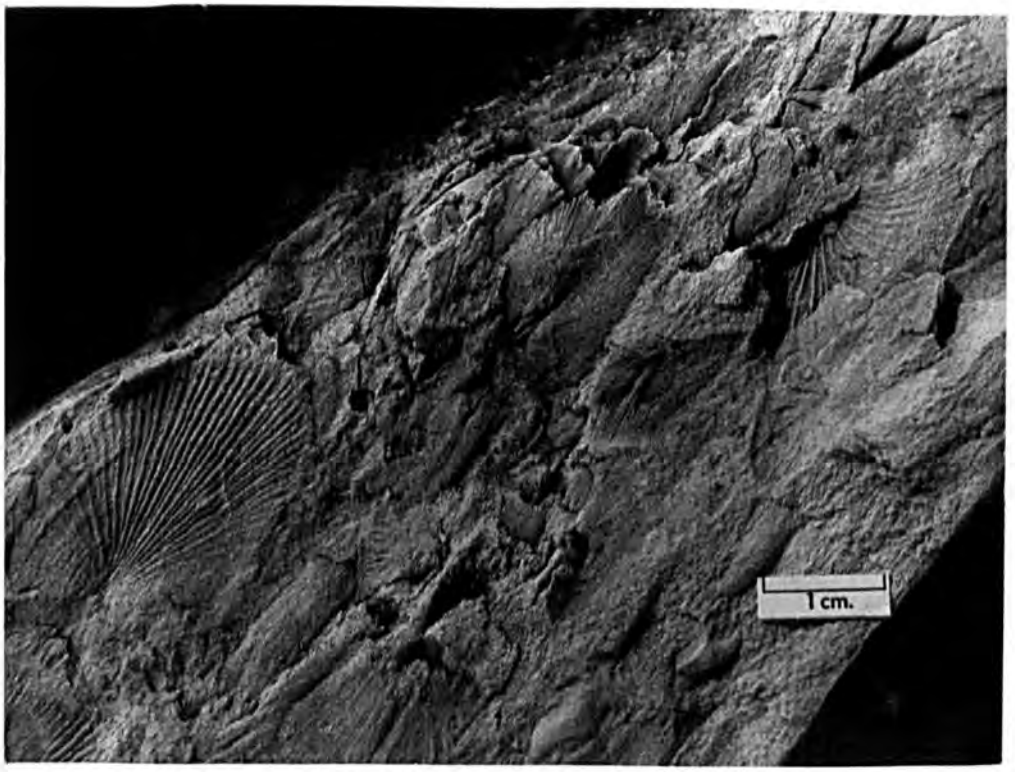


PLATE 3.2

Plate 3.3

A mould of a dalmanellid (Dalmanella) brachial internal valve (oblique form) showing unequal tectonic distortion. In the undeformed valve, the median line passes through the cardinal process and subtends a right angle with the hinge line. After distortion, the median line now subtends an angle of approximately 45° to the hinge line, whereas a line projected through the cardinal process subtends a much greater angle to the hinge line, thus implying unequal distortion. Such non-uniform distortion was probably due to a greater posterior thickness of shell resisting distortion much better than a considerably thinner anterior thickness, consequently implying tectonic distortion occurred prior to decalcification. Note apparent rib coarsening and fining.

Scale x 9

From locality 180 (SH 71995167) - Glanrafon Beds, south-west of Dolwyddelan (south-western sequence - map 3)

Plate 3.4

Tectonically distorted internal mould of a pedicle valve of Dinorthis (Plaesiomys) multiplicata Bancroft (= Plaesiomys multifida (Salter))narrow oblique form. Note apparent fining and coarsening of marginal frill and elongation of adductor muscle field. Direction of maximum finite elongation is approximately north-west - south-east across photograph.

Location as for plate 3.2

PLATE 3.3

1cm.

PLATE 3.4

Plate 3.5

Part of an assemblage of distorted brachiopod valves : broad, oblique and narrow forms can be recognised. Direction of maximum finite elongation runs north-north-east - south-south-west across photograph. Note how valve distortion varies with orientation to elongation direction. Valves are predominantly internal and external moulds of sowerbyellid (=Sowerbyella) pedicle and brachial valves, although internal moulds of Dinorthis pedicle valves, possessing relatively coarse marginal frills, are seen (right side of block).

Location as for plate 3.2

Plate 3.6

A further assemblage of tectonically distorted brachiopod valves. Direction of maximum finite elongation runs approximately north-south.

Note :-

a) broad, oblique and narrow forms

b) Variation in apparent coarseness of marginal frills of two pedicle internal moulds of D. (P.) multiplicata Bancroft (= P. multifida (Salter))with respect to valves' orientation to elongation direction (centre)

c) part of a large distorted pedicle internal mould of Macrocoelia cf. expansa (J.de C.Sowerby) on right edge of block

From locality 134 (SH 62044523) - location as for plate 3.2

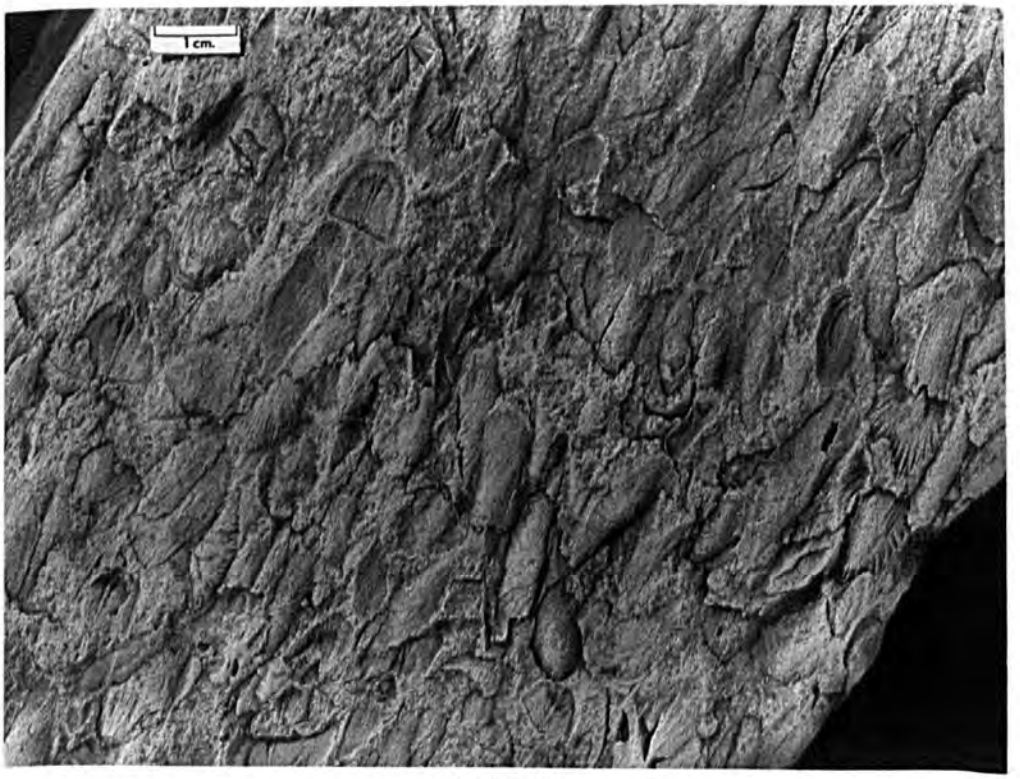


PLATE 3.5

PLATE 3.6

Plate 3.7

The Cwm Idwal syncline, a subsidiary fold within the Snowdon synclinorium. The axial region consists of representatives of the Bedded Pyroclastic Formation (Snowdon Volcanic Group), whereas the precipitous crags (left, right) are formed of tuffs (some welded) assigned to the Lower Rhyolitic Tuff Formation. The curved (folded) contact between the two Formations is clearly visible. The poorly exposed outcrops (centre, bottom left) are sedimentary intercalations within the Lower Rhyolitic Tuff Formation, these intercalations having previously yielded fossils (Williams, D. 1930, p.206). Llyn Idwal is in the foreground.

Location SH 640590 - view approximately towards the south

PLATE 3.7

Plate 3.8

A "stretching lineation" developed upon a distorted trilobite (Angelina sedgwickii Salter). Such a linear structure usually parallels the direction of maximum finite elongation, being more commonly developed within fine grained argillaceous lithologies. One side of the trilobite has become compressed whereas the other side has been stretched. Note how cephalic morphology changes laterally across cephalon.

From SH 59823947 - Tremadocian slates (the Upper Tremadoc Slates (Garth Hill Beds), after Fearnsides & Davies 1944), north of Minfford

Plate 4.1

Internal mould of a pedicle valve of Nicolella showing evidence of epifaunal colonisation. Note :-

a) two circular patches of encrusting bryozoa
b) linear bifurcating structures probably made by stolons of ctenostomate bryozoans (cf. ropalonariids - Ropalonaria; vinellids - Vinella)

As the internal mould has been colonised, one must invoke removal of shelly material prior to epifaunal colonisation. Likewise, selective lithification must account for the internal infilling being firm enough to support such epifauna. The abraded nature of similar valves from this horizon suggests exposure to current action. Presumably, therefore, the valves were exposed to current activity and then shallowly buried, shelly material was lost, selective lithification occurred, the lithified infillings were subsequently re-exposed and epifaunal colonisation, by bryozoans, followed.

Scale x 8.5

From locality 244 (SH 78535755) - sediments between the middle and upper tuffs of the Lower Crafnant Volcanic Formation, south-west of Betws-y-Coed (map 5)

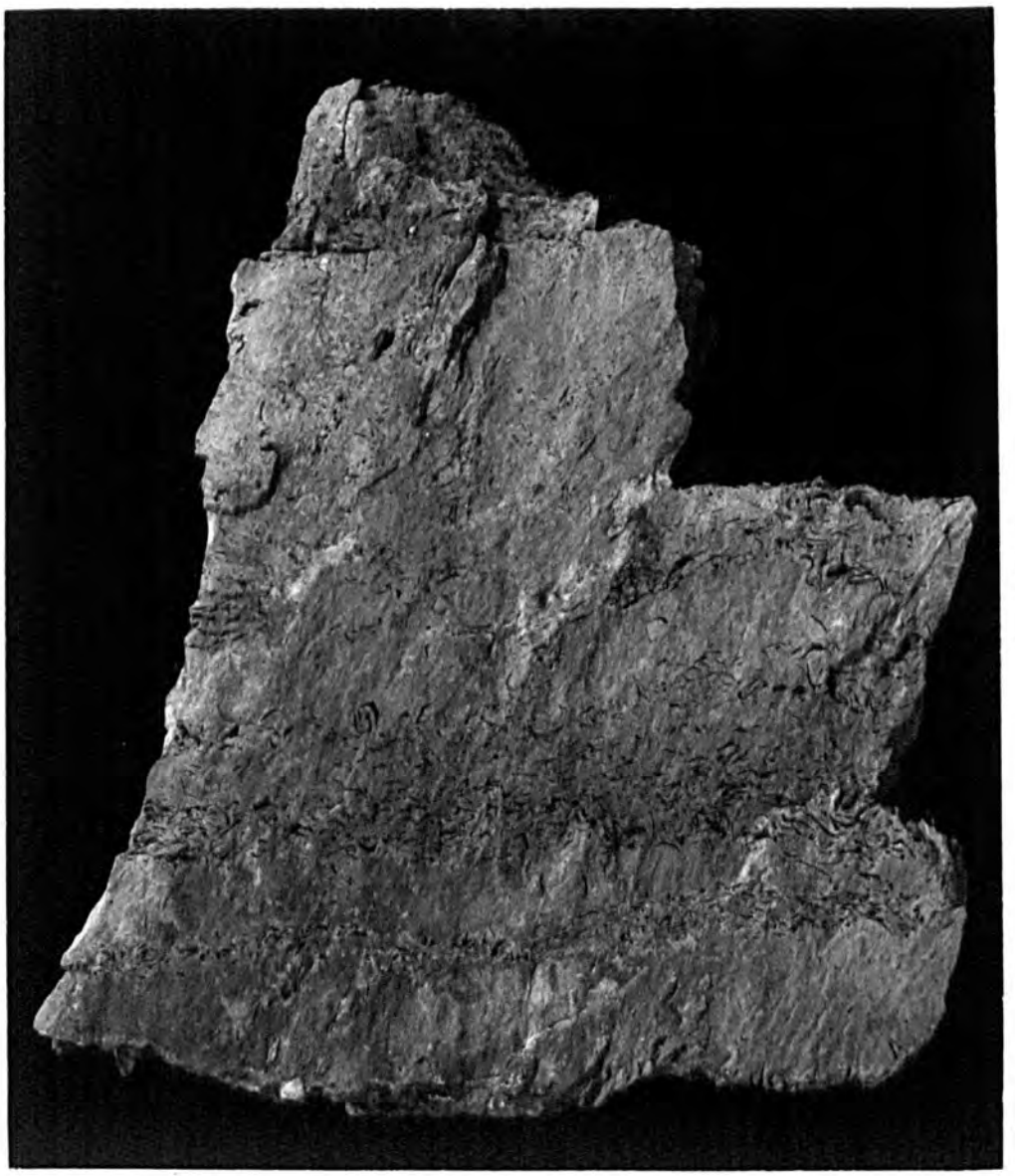
PLATE 3.8

PLATE 4.1

Plate 5.1

Siltstone block displaying planar and random occurrence types. Lowest shelly horizon shows evidence of a rippled top. Broader middle shelly horizon apparently possesses a mixed valve orientation, denser valve packing at base implying a gradual decrease in current velocity and/or sedimentation. Towards the left edge of the block, this horizon bifurcates. Note the relatively unfossiliferous lithology between shelly layers. Bioturbation becomes apparent in the upper part of the block, indicating onset of more stable conditions and reduced sedimentation. Above broad shelly horizon, another shelly horizon has been modified by shallow biogenic activity (possibly implying location within the sublittoral (outer ?) zone) which has produced random valve orientations. The shelly horizons accumulated during periods of relatively reduced sedimentation. A minor erosive surface overlies the bioturbated zone, inferring a slight increase in current activity.

From locality 205 (SH 73655157) - Glanrafon Beds, south of Dolwyddelan (Cwm Penamnen sequence - map 3)



5cm.

PLATE 5.1

Plate 5.2

Detail of bioturbated area in plate 5.1. Note random valve orientations and concentration of some valves into "pockets" - this may be a function of the mode of burrowing of the infaunal organisms.

Location as for plate 5.1

PLATE 5.2

Plate 5.3

Random valve orientations within a sandstone at Capel Curig. Two general valve sizes can be distinguished : large plane valves are Macrocoelia whereas smaller, more convex valves are Dinorthis and Salopia (the latter being the smallest, more globose valves). Note valves are not closely packed and appear broadly confined to a wide planar horizon. Consequently, valve randomness is here interpreted as resulting either from scouring or penecontemporaneous soft sediment deformation (or a combination).

Length of pen = 12.5 cms.

From locality 129 (SH 71445803) Upper Racks Sandstone, Capel Curig West (map 1)

Plate 5.4

Random valve orientations bounded by thin planar occurrence types possessing preferred convex-up valve orientations within a siltstone (see chapter 5, section b, ii, 4 for explanation). The majority of valves are sowerbyellids (Sowerbyella).

Length of pen = 12.5 cms.

From locality 189 (SH 70925081) Glanrafon Beds, south-west of Dolwyddelan (south-western sequence - map 3)

PLATE 5.3

PLATE 5.4

Plate 5.5

Thin planar occurrence type possessing a preferred convex-up valve orientation within a sandstone : probably produced by relatively high velocity currents associated with rapid sedimentation which quickly buried the valves and prevented biogenic reworking. Some net lateral transport of valves was presumably involved.
From locality 155 (SH 72375846) unit p (Glanrafon Beds = Carneddau Group), Capel Curig East (map 1)

Plate 5.6

Thin planar occurrence type possessing a preferred concave-up valve orientation within a sandstone. Note associated underlying, undisturbed sedimentary structures (megaripples ?) which indicate relatively rapid sedimentation.
From locality 141 (SH 71075792) - upper part of the Lower Racks Sandstone, Capel Curig West (map 1)

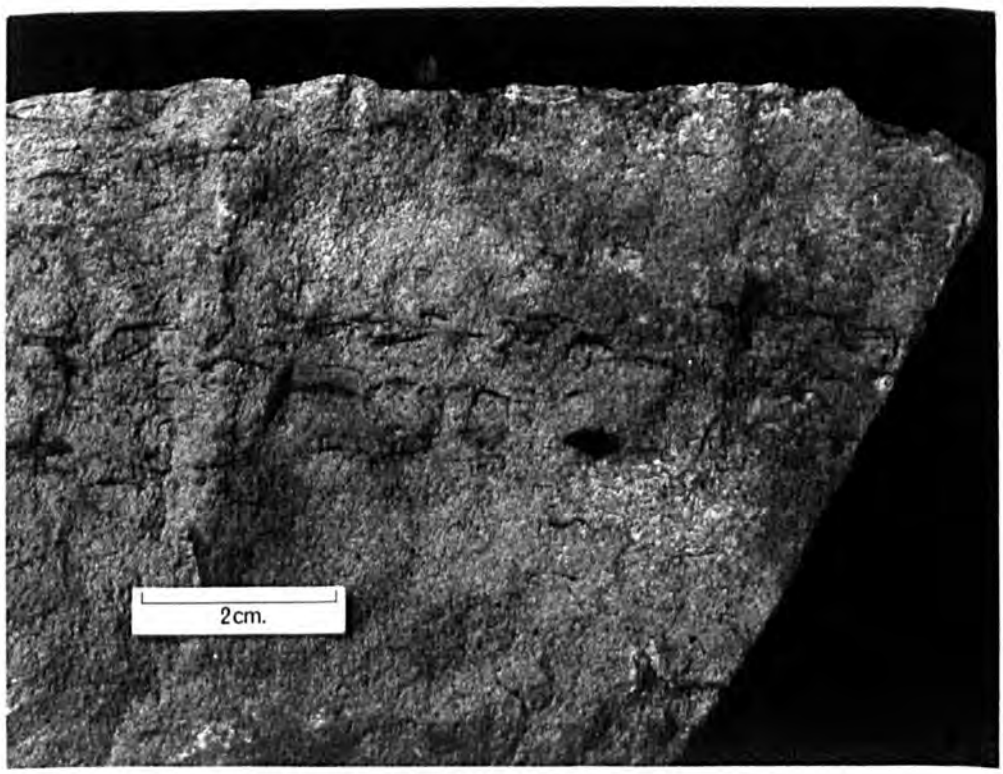


PLATE 5.5

PLATE 5.6

Plate 5.7

Detail of a laterally continuous shelly horizon (= coquina) possessing an apparent mixed valve orientation within a sandstone. Dense valve packing implies reduced sedimentation, whereas their undisturbed nature attests to relatively rapid accumulation. The disarticulated valves are mostly sowerbyellids (Sowerbyella) and Dinorthis (Plaesiomys) multiplicata Bancroft (= Plaesiomys multifida Salter).

From locality 155 (SH 72375846) - unit p (Glanrafon Beds = Carneddau Group), Capel Curig East (map 1)

Plate 5.8

Detail of a laterally continuous shelly horizon possessing an apparent mixed valve orientation within a siltstone. The disarticulated valves are mostly sowerbyellids (Sowerbyella).

Length of pen top = approximately 1.4 cms.

From locality 205 (SH 73655157) - Glanrafon Beds, south of Dolwyddelan (Cwm Penamnen sequence - map 3)

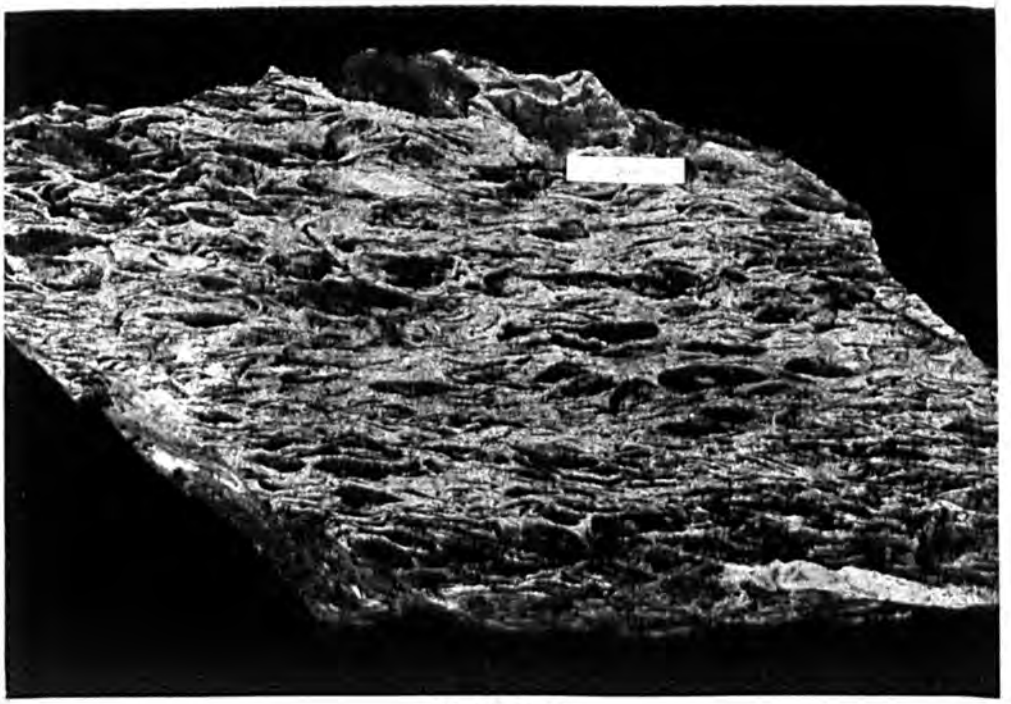


PLATE 5.7

PLATE 5.8

Plate 5.9

Laterally continuous shelly horizons within a sandstone at Capel Curig. Note trifurcating broad horizon (at left); associated overlying and underlying undisturbed planar bedding and laminations (see chapter 7, sections b, ii, 1 and b, iii, 1B for further explanation); spaced cleavage developed within middle and lower parts of outcrop. The form of the shelly horizons and associated, undisturbed sedimentary structures suggest relatively rapid deposition and accumulation within a high energy environment.

Length of hammer = 40 cms.

From locality 143B (SH 70955782) - upper part of the Lower Racks Sandstone, Capel Curig West (map 1)

Plate 5.10

Probable in situ obolid within a siltstone (see chapter 5, section b, v and chapter 9, section b, ii, 5 for discussion).

Scale x 2.9

From locality 187 (SH 70855064) - Glanrafon Beds, south-west of Dolwyddelan (south-western sequence - map 3)

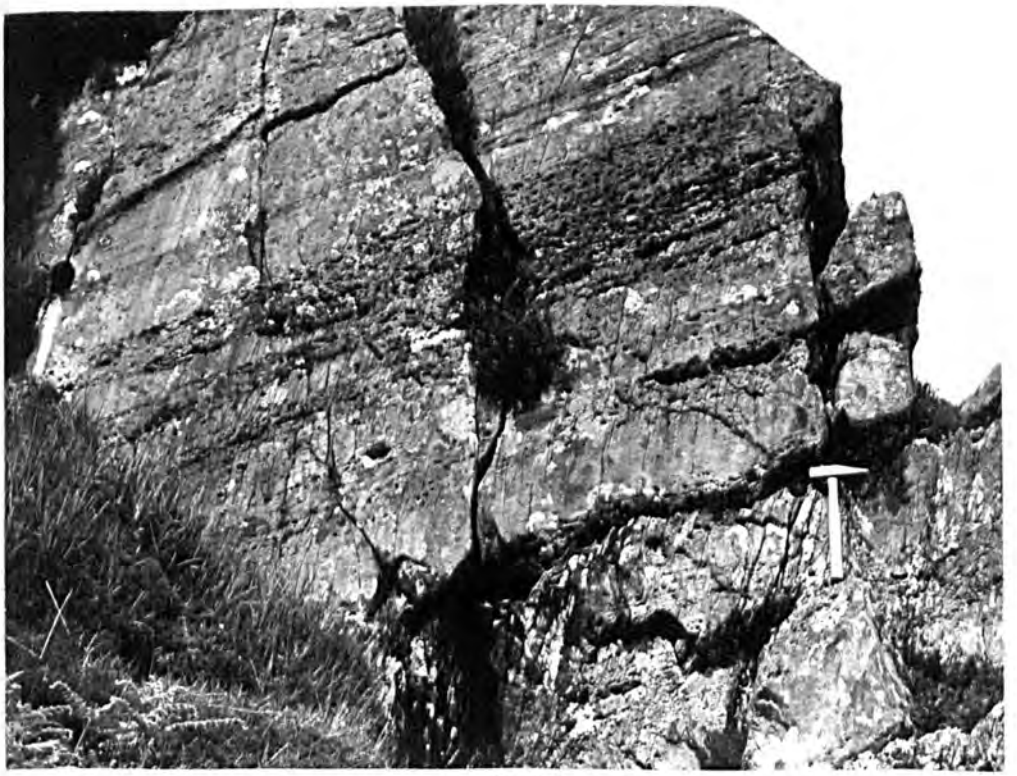


PLATE 5.9

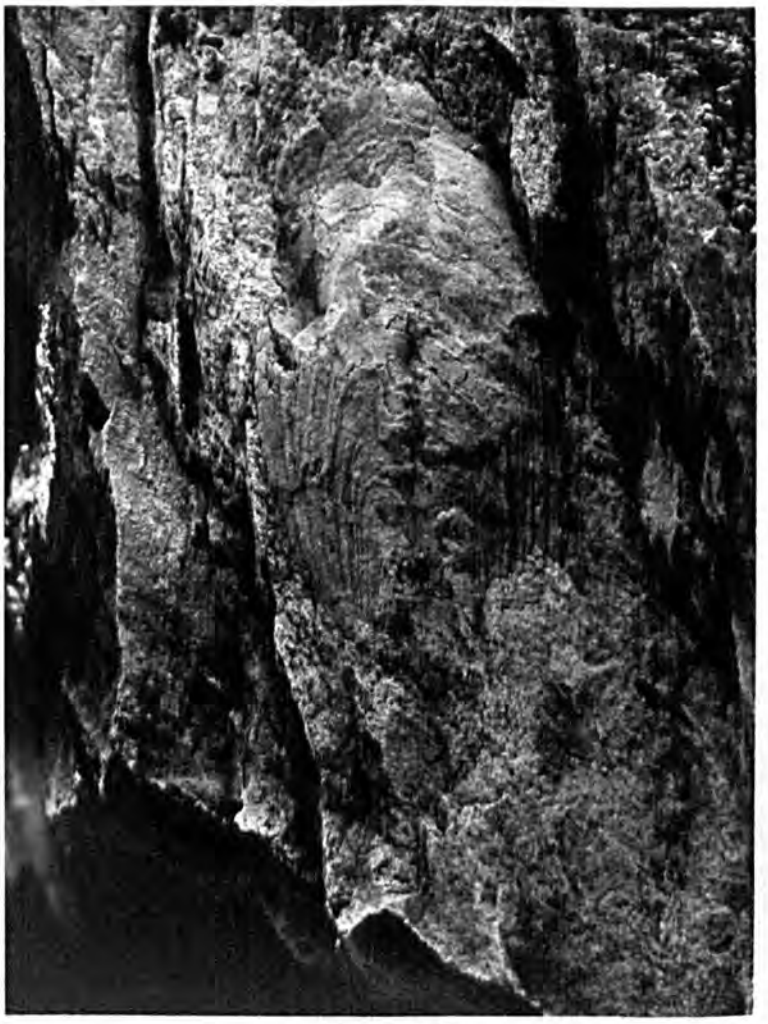


PLATE 5.10

Plate 5.11

Preferred concave-up valve orientations within thin planar occurrence types and laterally continuous shelly horizons displayed on a joint face from a sandstone at Capel Curig. Note related low degree of random valve orientation, resulting either from penecontemporaneous soft sediment deformation or scouring (see chapter 5, section c, ii for explanation).

Length of pen = 12.5 cms.

From locality 129 (SH 71445803) - middle part of the Upper Racks Sandstone, Capel Curig West (map 1)

Plate 5.12

Preferred concave-up valve orientations within a laterally continuous shelly horizon from a sandstone at Capel Curig (see chapter 5, section c, ii for explanation). Note loose packing of valves and incipient spaced cleavage. Two general valve sizes can be discerned : larger, flatter valves are Macrocoelia whereas smaller valves are either Dinorthis or Salopia, the smallest probably being Salopia. Preferred concave-up orientations of even the smallest valves suggest accumulation by the action of relatively low velocity currents.

Length of pen = 12.5 cms.

Location as for plate 5.11

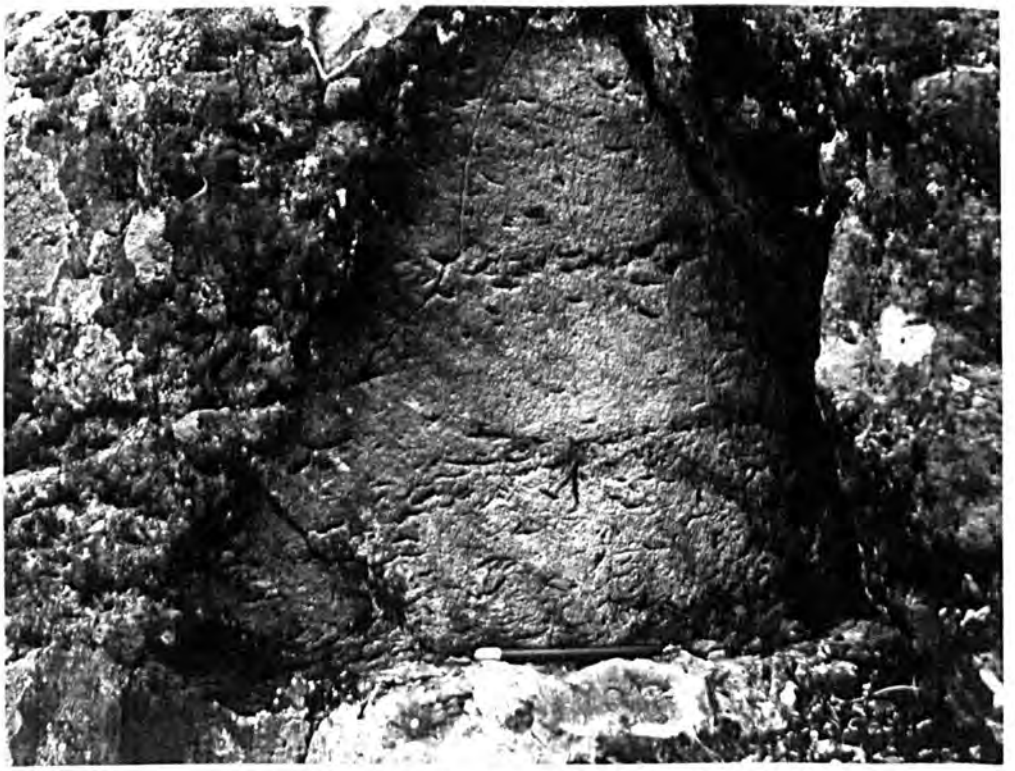


PLATE 5.11

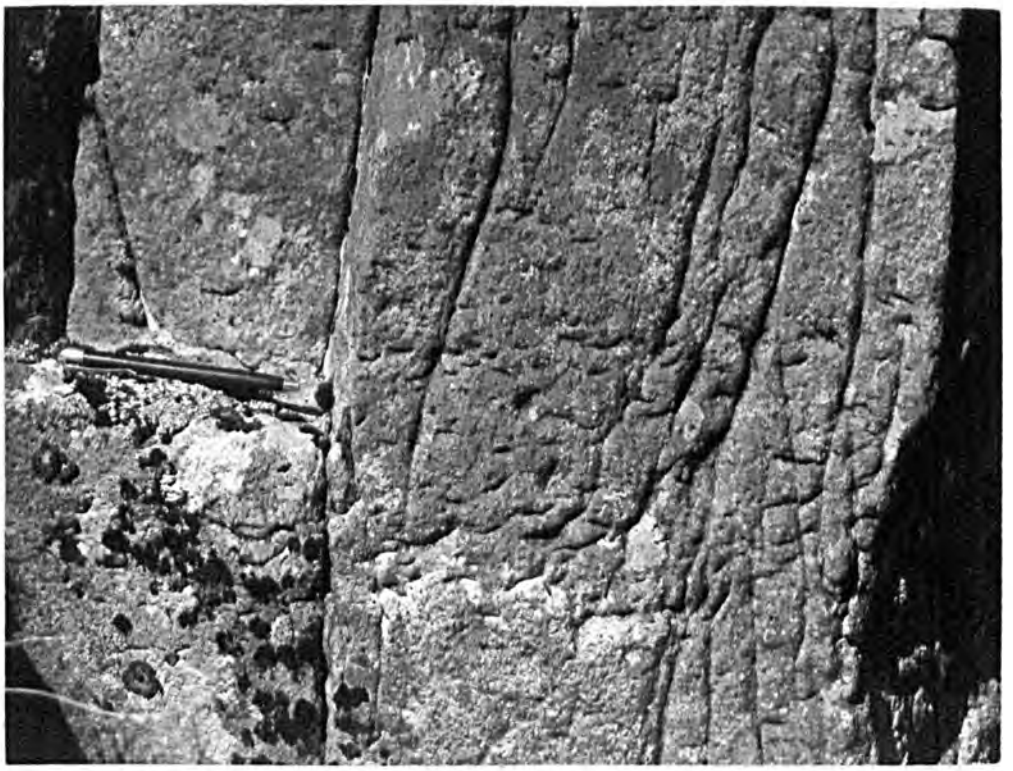


PLATE 5.12

Plate 5.13

Preferred convex-up valve orientations within a laterally continuous shelly horizon from a sandstone at Capel Curig. Dense valve packing in the lower half grading into overlying sparsely fossiliferous, planar bedded sandstones suggests an increase in sedimentation, valve orientations and allied sedimentary structures attesting to relatively high energy conditions. Non-disturbance implies rapid deposition. Such a sequence possibly originated within the inner sublittoral zone.

Width of hammer head = 3.5 cms.

From locality 143B (SH 70955782) - upper part of the Lower Racks Sandstone, Capel Curig West (map 1)

Plate 7.1

Thin planar bedding and parallel laminations within the Lower Racks Sandstone. Certain laminations are undulose which may either reflect original irregularities on the depositional surface or represent ripples, whilst other laminations laterally wedge out. Preservation and non-disturbance of the sedimentary structures implies no biogenic reworking, in turn probably attesting to rapid deposition under upper flow regime conditions in shallow water.

Long edge of notebook = approximately 21.5 cms.

From locality 141 (SH 71075792) - Lower Racks Sandstone, Capel Curig West (map 1)

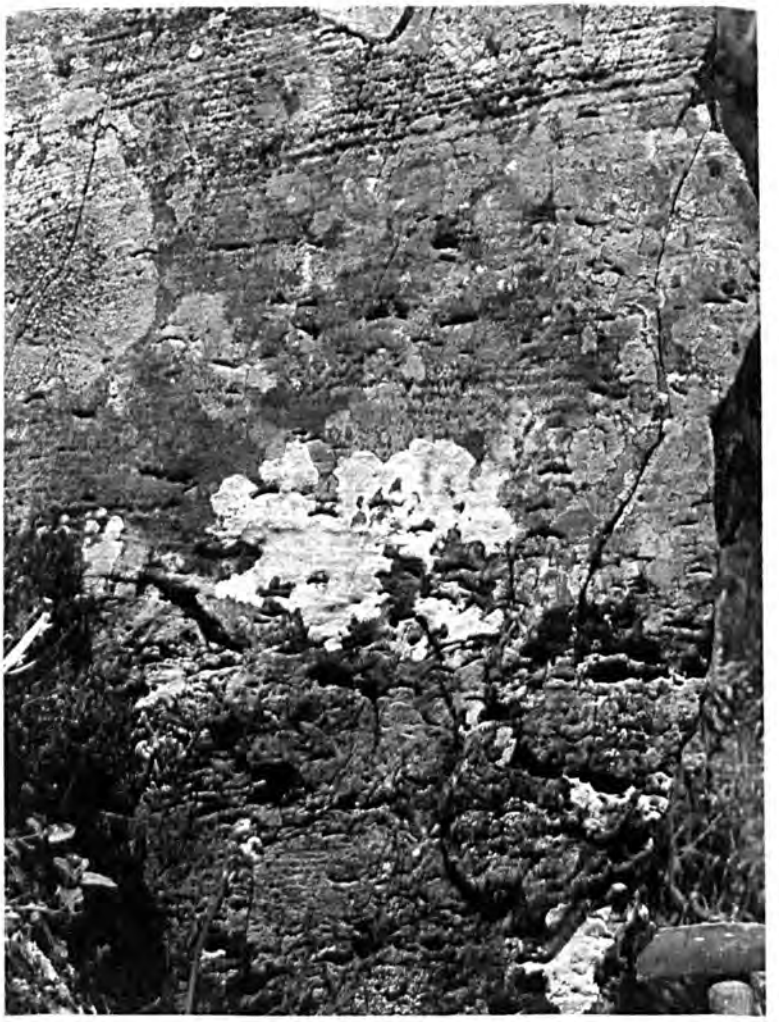


PLATE 5.13

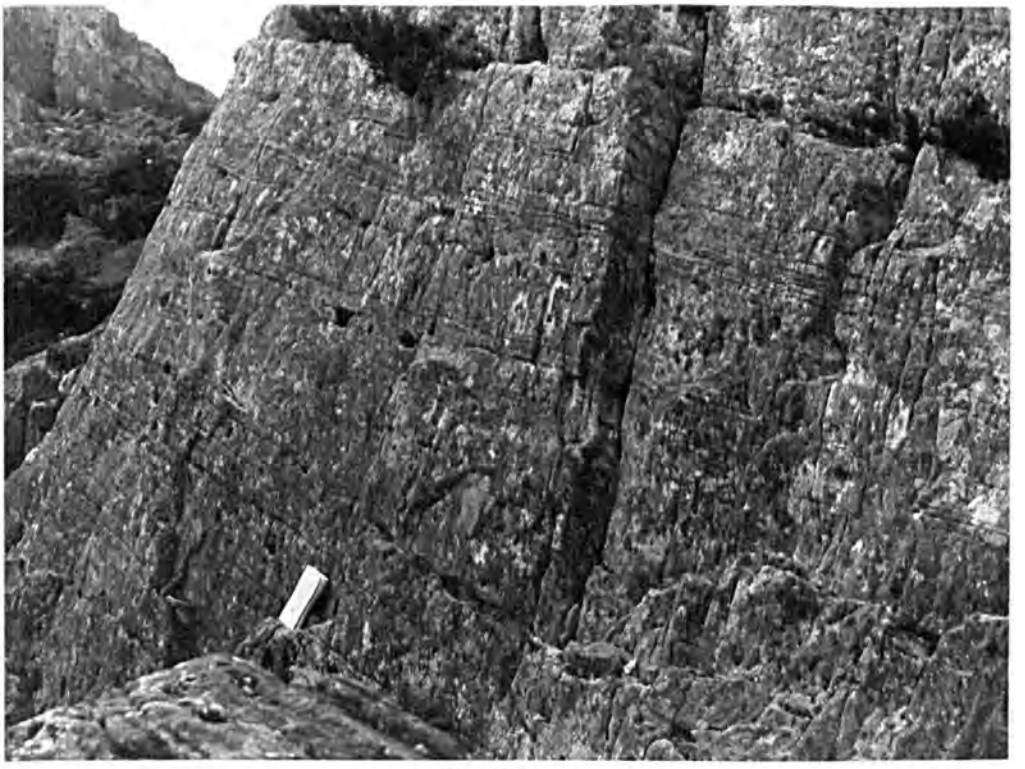


PLATE 7.1

Plate 7.2

One of several discrete horizons of black shaley clasts with intercalated brachiopod valves within the Lower Racks Sandstone. Such horizons are channel floor lag concentrates resulting from lateral migration of tidal channels, possibly on the lowest parts of sandy tidal flats. Note overall imbrication of clasts, a characteristic feature of similar modern-day deposits. Inweathered "thumbnail impressions" within the rockface represent brachiopod valves : large planar valves are Macrocoelia (?) valves which originally accumulated on the channel floor. Undisturbed laminated sandstones above and below clast horizon = point bar sequences.

Length of hammer head = 17.5 cms.

From near locality 141 (SH 71075792) - Lower Racks Sandstone, Capel Curig West (map 1)

PLATE 7.2

Plate 7.3

Detail of clast horizon in plate 7.2. Note appearance of horizon on a joint plane (left) and imbrication of clasts (right), although sparse brachiopod valves appear more randomly orientated. Within similar horizons, brachiopod valves occasionally display preferred concave-up orientations. Note range in size, shape and angularity/ roundness of clasts. The curved shape of some clasts implies deposition while still relatively plastic : however, clast boundaries appear relatively sharp.
For scale, compare with plate 7.2
Location as for plate 7.2

PLATE 7.3

Plate 7.4

Bedding developed in coarse volcaniclastic sandstones overlying the rhyolitic and accretionary lapilli tuffs within the Dyffryn Mymbyr Tuff. Note well-developed planar bedding which frequently displays low angle erosive contacts between individual sets, in addition to discrete horizons of cross-bedding. Such bedform fluctuations indicate rapid current velocity changes in a shallow water, high energy environment, the aforesaid erosive contacts implying recurrent seafloor reworking. Undisturbed sedimentary structures signify rapid deposition. Angular acidic clasts can be distinguished (centre).

Length of pen = 13 cms.

From locality 254 (SH 70775799) - Dyffryn Mymbyr Tuff, Capel Curig West (not included on map 1)

Plate 7.5

Erosive contact between overlying bedded units (megaripple bedding ?) and underlying cross-bedded units, which in turn overlie planar bedded sediments seemingly displaying graded bedding (deposition from suspension ?), from the same sandstone unit as in plate 7.4. Note development of a spaced cleavage within finer grained units (centre/ bottom).

Length of pen = 13 cms.

Location as for plate 7.4

PLATE 7.4

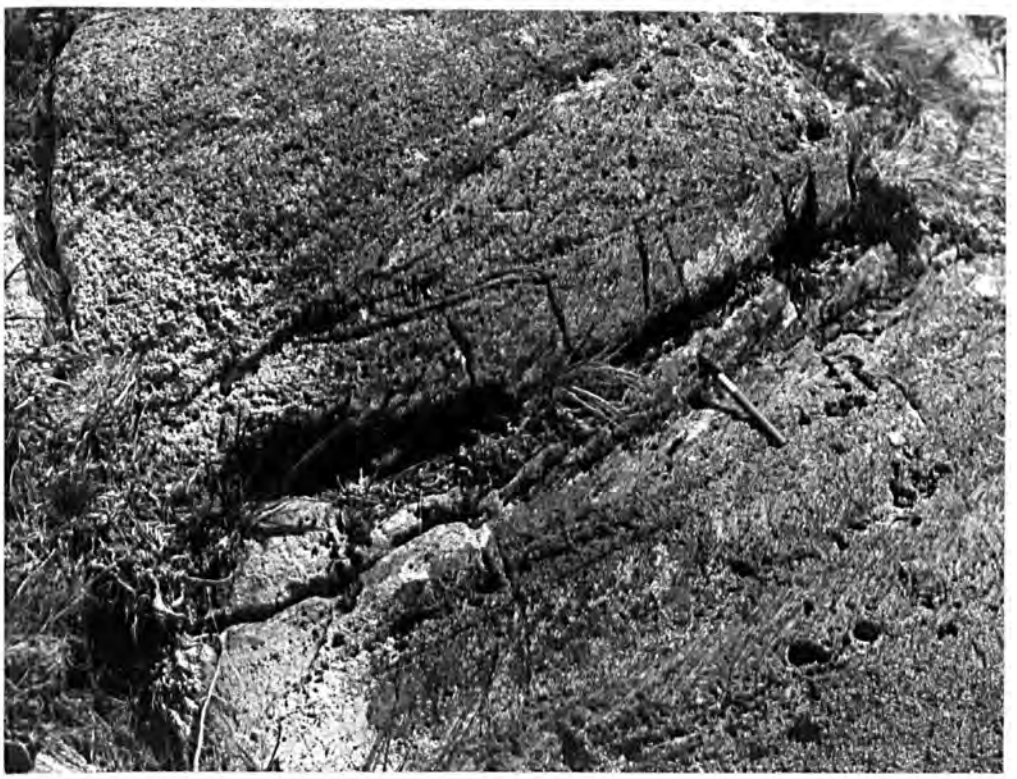


PLATE 7.5

Plate 7.6

Planar laminated sandstones partly incised by a shallow scour infilled by cross-bedded sandstones (upper right centre), consecutively overlain by bedded (rippled ?) sandstones. Note what might be a burrow penetrating lower planar laminated sediments (left centre), such restricted biogenic activity possibly originating during a brief cessation of sedimentation, the burrow infilled by similar material to that overlying the lower laminated sandstones. These structures attest to rapid deposition and both fluctuating sedimentation and current velocities in a shallow water, high energy environment.

Length of pen = 13 cms.

Location as for plate 7.4

Plate 7.7

Well developed bedding in coarse volcaniclastic sandstones within the Dyffryn Mymbyr Tuff. Planar bedded sandstones rest unconformably upon faintly cross-bedded sandstones (bottom right). Bedding displayed in central and upper parts of outcrop attributed to megaripples (?), low-angle erosive contacts being present within these units. Note apparent small low-angle reverse fault (thrust) has offset bedded units, with an intimation of a small drag fold (centre).

Length of pen = 13 cms.

Location as for plate 7.4

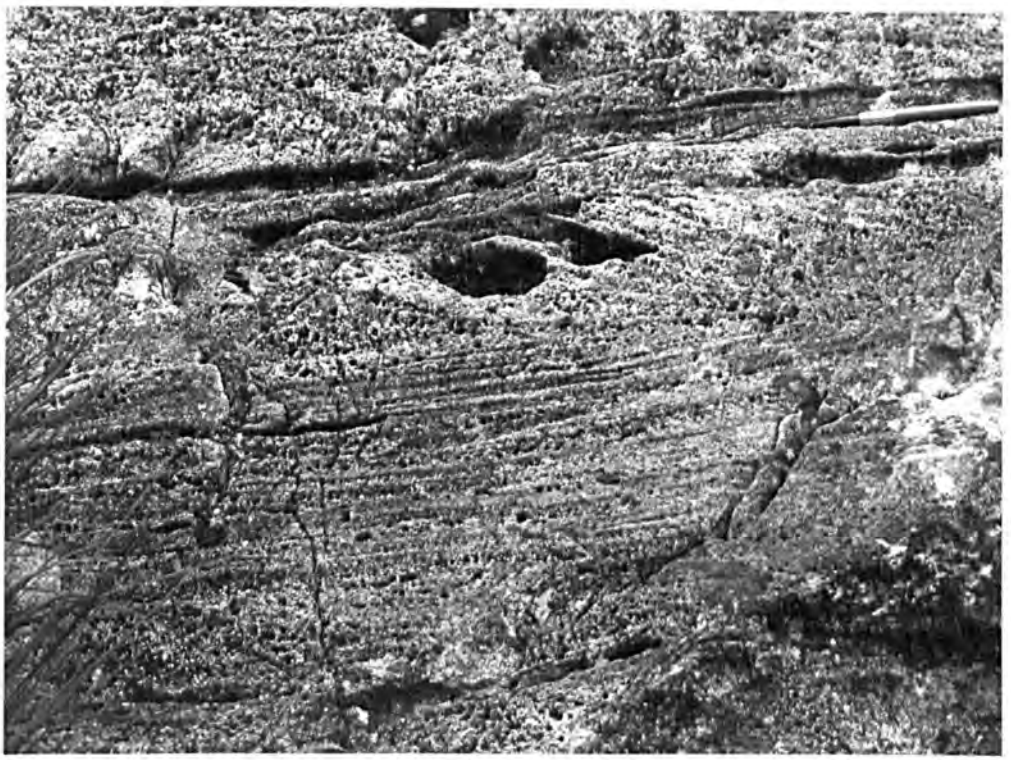


PLATE 7.6

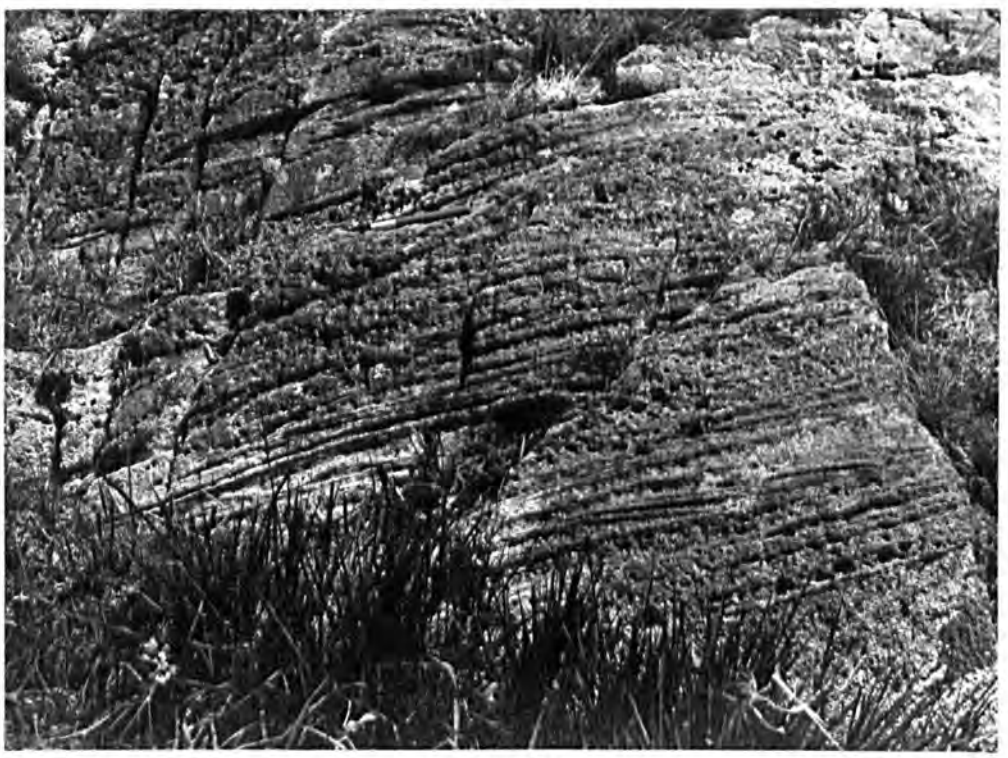


PLATE 7.7

Plate 7.8

Detail of part of plate 7.7 displaying a small-scale sag structure caused by forceful emplacement of a small, angular, acidic clast into laminated coarse sandstones. The clast was either deposited from a waning high velocity current or was of airfall origin. Note the clast has almost penetrated the lamina into which it was emplaced. The upper part of the lamina "drapes" over the upper sides of the clast, suggesting it was emplaced shortly after the commencement of deposition of this lamina. Note the coarse grained lithology and possible small-scale ripple bedding at the base of the illustrated section.
Length of pen included = approximately 12 cms.
Location as for plate 7.4

Plate 7.9

Field appearance of the extremely fine grained rhyolitic tuff (unit 1) overlying the Cefn-y-Capel Siltstone. Note the characteristic bleached white surface weathering colour and the irregularly fractured, uncleaved, massive nature of the tuff. Megascopically bedded horizons represent phases of clastic sedimentation. Such units frequently grade laterally and vertically into purer tuffs, implying synchronous ash and clastic sedimentation. Trough-like depression to left - channel infill?
Length of hammer = 40 cms.
From locality 151 (SH 72295825) - Unit 1 overlying the Cefn-y-Capel Siltstone, Capel Curig East (map 1)

PLATE 7.8

PLATE 7.9

Plate 7.10

Planar bedded and trough cross-bedded sedimentary intercalations within the rhyolitic tuff (unit 1) above the Cefn-y-Capel Siltstone. Massive tuff units underlie the bedded sediments. Note what appears to be convoluted bedding in sediments above and below clinometer. Convoluted bedding is also noted within certain tuff horizons.

Total length of clinometer = 17.5 cms.

Location as for plate 7.9

Plate 7.11

Field appearance of one of several fossiliferous bedding planes within unit m at Capel Curig East (= lateral equivalent of the *Multiplicata* Sandstone from the Llyn Cowlyd area - Diggens & Romano 1968). Bedding planes are covered by external and internal decalcified moulds of pedicle and brachial valves of *Dinorthis* (*Plaesiomys*) *multiplicata* Bancroft (now *Plaesiomys multifida* (Salter) - see Cocks 1978, p.50), showing mixed valve orientations.

Length of pen included = approximately 9 cms.

From locality 152 (SH 72345825) - unit m (Glanrafon Beds = Carneddau Group), Capel Curig East (map 1)

PLATE 7.10

PLATE 7.11

Plate 7.12

An additional view of the bedding plane illustrated in plate 7.11. Two pedicle internal moulds of *Dinorthis* (*Plaesiomys*) *multiplicata* Bancroft (now *Plaesiomys multifida* (Salter) - see Cocks 1978, p.50) are seen. Location as for plate 7.11

Plate 8.1

Laminations of variable thickness within the basal rhyolitic tuff of the Y Glog Volcanic Group. Undisturbed laminations suggest rapid deposition although in this case, such non-disturbance probably resulted from a lack of biogenic reworking : the laminations originated from deposition of fine airfall ash gradually settling out from suspension within a low energy environment. Several laminae appear rippled (centre). Note the spaced pervasive cleavage.
Diameter of filter = approximately 5.0 cms.
From locality 73 (SH 55534157) - the basal rhyolitic tuff of the Y Glog Volcanic Group (see fig. 8.3), south of Moel Hebog (not included on map 2)

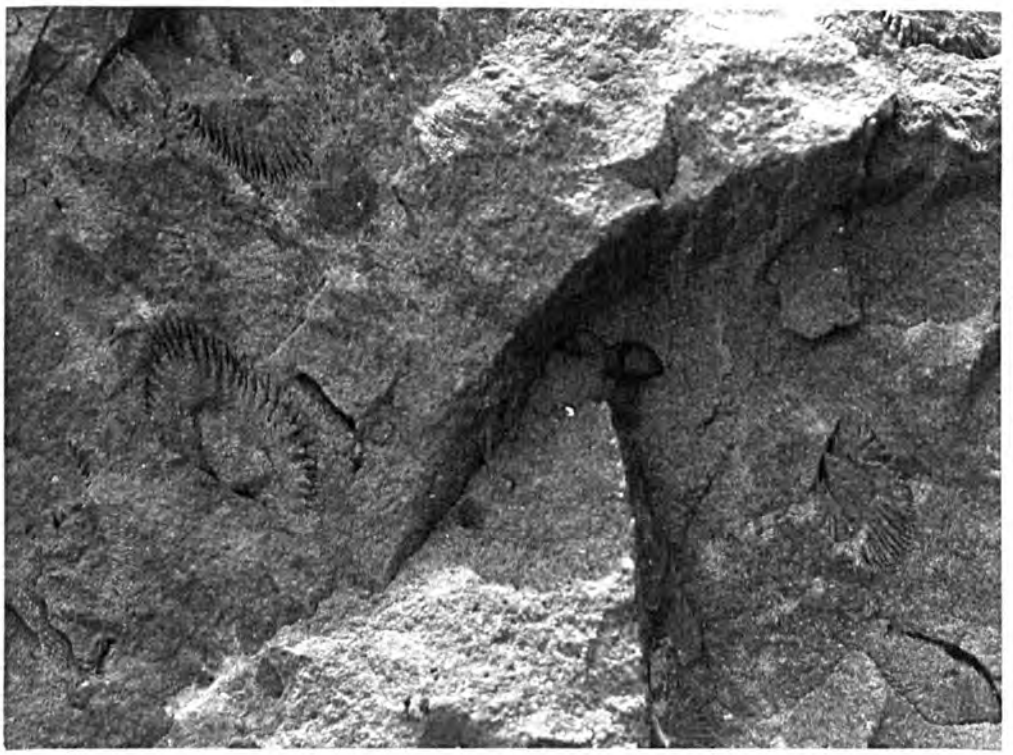


PLATE 7.12

PLATE 8.1

Plate 8.2

"Varve-like" laminae within the aforesaid basal rhyolitic tuff. The variable thickness of the laminae imply variable rates of settling-out from suspension and fluctuating rates of pyroclastic fall-out. Note the conformity of the laminae, what seem to be low amplitude ripples (top) and the development of small-scale jointing. Location as for plate 8.1

Plate 8.3

A conspicuous rippled horizon within the aforementioned tuff, indicating probable deposition under lower flow regime conditions. Note associated undisturbed planar laminations.

Length of pen = 12.5 cms.

From locality 68 (SH 55634141) - horizon as for plate 8.1

PLATE 8.2

PLATE 8.3

Plate 8.4

Convoluted laminations within the basal rhyolitic tuff, the laminations assuming a sigmoidal form. Coarser and finer grained laminae are present. The convolutions possibly resulted from load deformation which was concomitant with sedimentation and possibly localised by rippling (Potter & Pettijohn 1963, p.155).
Diameter of lens cap = 5.4 cms.
Location as for plate 8.3

Plate 8.5

A broad pipe-like structure developed within the lowest part of the above rhyolitic tuff. Although superficially resembling a sand volcano, the structure (albeit incompletely developed) seems best compared with a liquefied intrusion (Lowe 1975) and as such, presumably resulted from liquefaction initiated by seismic shocks which were related to this episode of pyroclastic activity. Note the contact with the underlying slate (see fig. 8.3) and the faint laminations within the upper beds in the disturbed area.
Length of clinometer = 10 cms.
Location as for plate 8.3

PLATE 8.4

PLATE 8.5

Plate 8.6

The irregular contact between the overlying "agglomerate" and an underlying, well cleaved slate within the Y Glog Volcanic Group (see fig. 8.3). Parts of the agglomeratic unit downcut into the slate, attesting to the original erosive emplacement of the "agglomerate". Slate clasts with gradational boundaries, presumably "ripped-up" from the underlying, then unlithified muds, are numerous within the lower horizons of the agglomeratic unit (= subaqueous debris-flow).

Length of hammer = 40 cms.

From locality 69 (SH 55624150) - "agglomerate" within the Y Glog Volcanic Group (see fig. 8.3), south of Moel Hebog (not included on map 2)

Plate 8.7

Planar laminations developed within finer tuffs overlying the "agglomerate" (see fig. 8.3) indicate submarine deposition. The laminations presumably resulted from fine material settling out from suspension following rapid emplacement of the "agglomerate" as a debris-flow. Note the spaced cleavage.

Length of pen included = 8 cms.

From locality 71 (SH 55594167) - fine tuffs which overlie the "agglomerate" within the Y Glog Volcanic Group (see fig. 8.3), south of Moel Hebog (not included on map 2)

PLATE 8.6

PLATE 8.7

Plate 8.8

Poorly exposed trough cross-bedding within a relatively coarse crystal lithic tuff immediately overlying the "agglomerate". Shallow spoon-shaped depression - scour trough (?) with cross-bedded tuffaceous infill. Such sedimentary structures originated under lower flow regime conditions, although the scour trough signifies increased erosive current activity. The tuffaceous material settled out either from suspension following emplacement of the "agglomerate" or through the water body after synchronous pyroclastic activity, consequently becoming reworked on the seafloor.

Length of pen included = 6.5 cms.

Location as for plate 8.7

Plate 8.9

A rippled bedding plane within the finer tuffs overlying the "agglomerate" (see fig.8.3). The ripples are undulatory small-current ripples (Reineck & Singh 1975) and are transitional between lower energy straight crested small-current ripples and higher energy linguoid small-current ripples. Although ripple indices are not determined, the undulatory, non-bifurcating crests imply the ripples were current-generated.

Length of hammer = 40 cms.

From locality 76 (SH 55484198) - fine tuffs overlying the "agglomerate" within the Y Glog Volcanic Group (see fig. 8.3), south of Moel Hebog (not included on map 2)

PLATE 8.8

PLATE 8.9

Plate 8.10

Rippled bedding planes exposed within the same tuff unit as in plate 8.9. Most planes possess undulatory small-current ripples as before. However, one plane displays ripples which may have been wave-generated although ripple indices are necessary for confirmation. As in plate 8.9, these ripples formed under lower flow regime conditions, being part of migrating ripple trains.

Length of hammer head = 17.0 cms.

From locality 72 (SH 55614172) - from fine tuffs overlying the "agglomerate" within the Y Glog Volcanic Group, south of Moel Hebog (not included on map 2)

PLATE 8.10

Plate 8.11

Symmetrical ripples (?) within fine tuffs in the upper part of the Y Glog Volcanic Group. Such ripples may have been wave-generated : typical symmetrical wave ripples possess a distinctive internal structure, i.e., superimposed chevron-like laminations which overlap in an imbricate fashion in a central crotch zone. However, such internal structures are not recognised. The internal laminae may comprise a climbing ripple lamination structure but this remains unconfirmed. Wave-generated ripples signify transitory phases existed when the fine ash on the seafloor was above wave base and was reworked.
Location as for plate 8.9

Plate 8.12

An asymmetrical ripple apparently merging (to the right) into symmetrical ripples. Some internal ripple laminations can be discerned. Here, the asymmetrical ripple was probably wave-generated. Note the thin, finely laminated unit (bottom). Immediately above is a rippled unit, the ripples being asymmetric in profile with a relatively small amplitude (= ripple height) - possibly current-generated ?
Width of key (see bottom right-hand corner) = 7 mms.
Location as for plate 8.9

PLATE 8.11

PLATE 8.12

Plate 8.13

Sedimentary structures developed within the lower horizons of the Gorllwyn Grit. For full interpretation, see chapter 8, section b, iii, 5.

Total length of clinometer = 17.5 cms.

From locality 48 (SH 57614234) - Gorllwyn Grit, Upper Glanrafon Beds, south-south-west of Moel Hebog (not included on map 2, but just north of locality 47)

PLATE 8.13

Plate 8.14

Field appearance of the intra-Pitt's Head conglomerate on the western limb of the Moel Hebog syncline. Note :-

a) rounded outline of constituent pebbles
b) lack of any stratification, bedding, sorting or grading
c) rounded siltstone pebble (bottom left) displaying remanent bedding
d) poor cleavage developed within tuffaceous matrix of conglomerate

For explanation, see chapter 8, section b, iii, 6.
Length of bar included = approximately 60 cms.
From SH 55254646 - intra-Pitt's Head conglomerate, Pitt's Head Rhyolite Group (Shackleton 1959), west-south-west of Moel Hebog summit (not included on map 2)

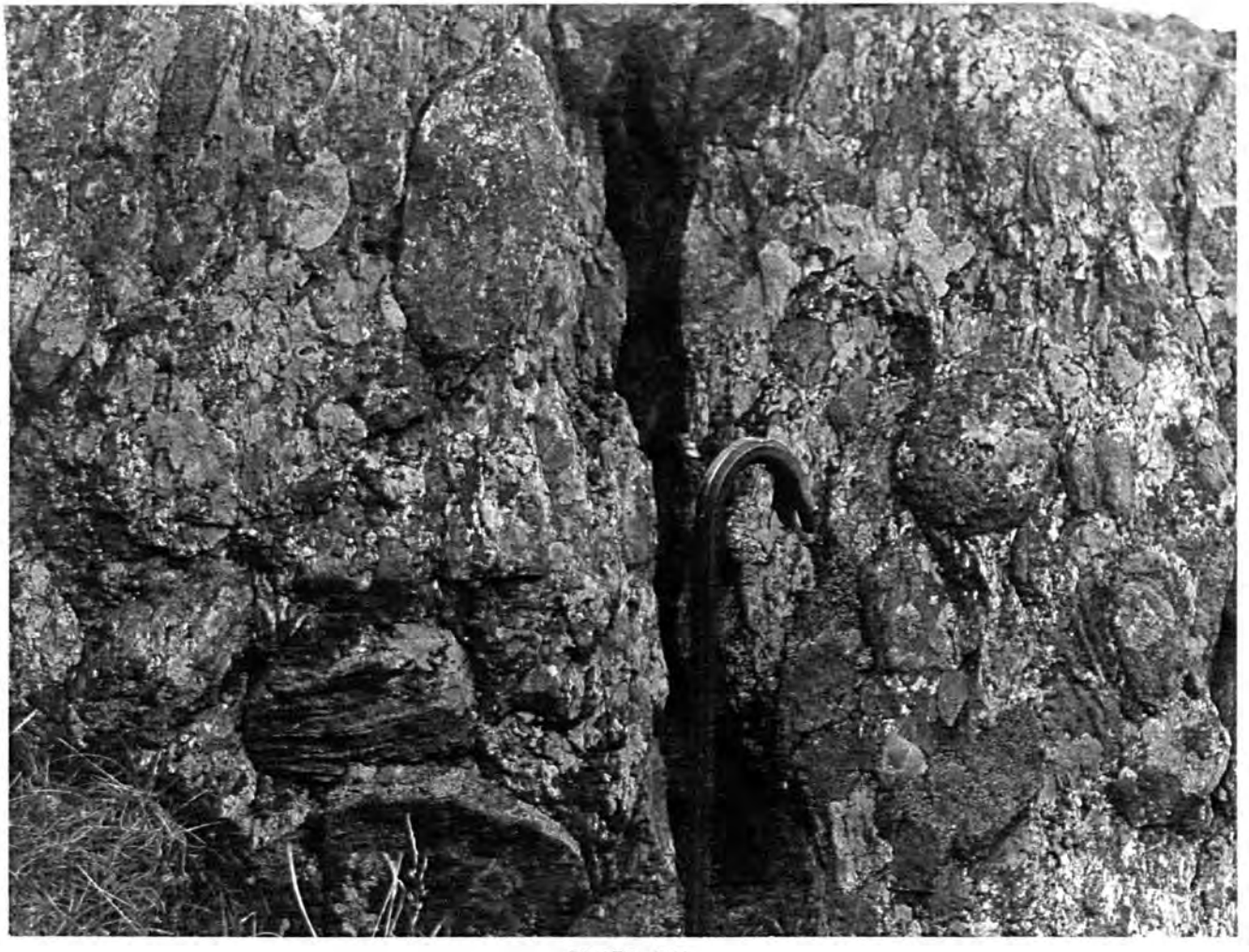


PLATE 8.14

Plate 8.15

Detail of the same conglomerate, showing two rounded rhyolitic pebbles displaying the characteristic bleached white weathering colour developed by rhyolitic rocks, the lower pebble showing perlitic (?) cracks. Note rounded outlines of constituent pebbles and poor sorting. Similar rhyolitic pebbles from the conglomerate are matched with lithologies from the PreCambrian Arvonian Series (Greenly in Shackleton 1959), consequently implying northern or north-western provenance.

Length of hammer handle included = approximately 25 cms.

Location as for plate 8.14

Plate 8.16

One of several small exposures on the eastern limb of the Moel Hebog syncline of probably the same conglomerate horizon as in plates 8.14 and 8.15. Here, constituent pebbles are almost entirely rhyolitic in composition and are, on average, smaller than those from the aforesaid exposures on the western limb of the above syncline. Note rounded pebbles and apparent absence of any grading, stratification, sorting or bedding. These exposures reveal the tuffaceous matrix is more strongly cleaved than in the exposures on the western limb of the syncline.

Width of finger = 1.5 cms.

From locality 105 (SH 56064583) - intra-Pitt's Head conglomerate, Pitt's Head Rhyolite Group (Shackleton 1959), south-south-west of Moel Hebog summit (not included on map 2)

PLATE 8.15

PLATE 8.16

Plate 9.1

"Varve-like" laminations developed within a fine sandstone. Above, bedding becomes less distinct. Preservation of the upper laminae varies laterally, structureless patches of sediment apparently cutting through the laminae (e.g., centre left) - this possibly resulted from reworking attributable to a combination of current and deformative biogenic activity. Undisturbed laminae either imply rapid deposition (lower part of upper flow regime - plane bed phase) or deposition from suspension clouds during lower energy conditions following storm activity. If the overlying sediment was indeed bioturbated, then this would represent post-storm recolonisation of seafloor sediments by infauna.

Length of pen = 12.5 cms.

From locality 188 (SH 70945076) - Glanrafon Beds, Dolwyddelan (south-western sequence - map 3)

Plate 9.2

A shoreface or an upper offshore sequence (after Howard 1971, 1972). The basal sandstone is laminated and is penetrated by occasional Skolithos burrows, in turn succeeded by an unevenly weathering, bioturbated unit, erosively overlain by laminated sandstones possessing a conspicuous scour and fill structure (top right). The laminated sands = storm deposits : upward increase in bioturbation corresponds to re-establishment of infauna during calmer post-storm conditions. The aforesaid erosion plane is covered with storm accumulations of disarticulated brachiopod valves which underwent only minor net lateral transport.

Long edge of notebook = approximately 21.5 cms.

From locality 226B (SH 75705133) - Glanrafon Beds, Bwlch y Groes, south of Dolwyddelan (south-eastern sequence - map 3)

PLATE 9.1

PLATE 9.2

Plate 9.3

Large scale trough cross-bedding (= pi cross-stratification, Allen 1963) developed within sandstones downcutting into siltstones, the cross-bedded unit apparently truncated by planar laminated sandstones themselves truncated by siltstones (infilling (?) a channel to the left). The base of the above trough is fossiliferous, the single layer of brachiopod valves possibly representing a shell lag concentrate within a scour trough. Beneath the cross-bedded unit are bioturbated fossiliferous siltstones.

Length of pen = 12.5 cms.

From locality 204 (SH 73615163) - Glanrafon Beds, Cwm Penamnen, south of Dolwyddelan (Cwm Penamnen sequence - map 3)

Plate 9.4

Small scour and fill (channel) structure developed within coarse, sparsely fossiliferous sandstones and apparently symmetrically infilled by similar coarse, thinly bedded sandstones, attesting to the action of erosive bottom currents.

Length of marker = 14.0 cms.

From locality 210 (SH 74375181) - Glanrafon Beds, Dolwyddelan (south-eastern sequence - map 3)

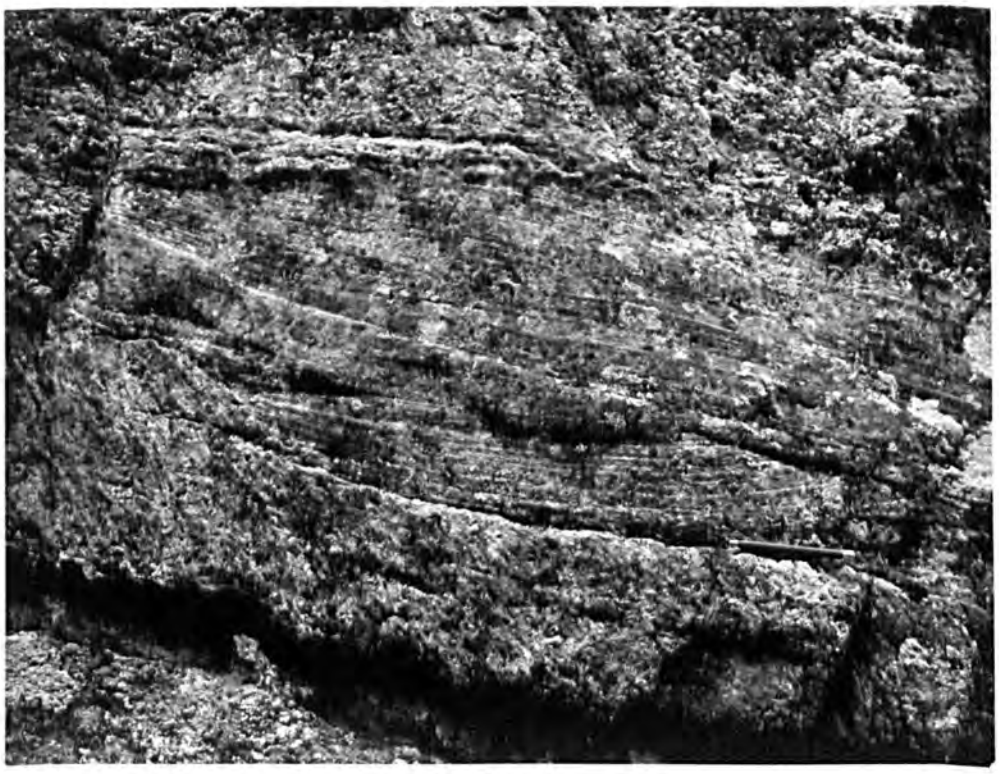


PLATE 9.3

PLATE 9.4

Plate 9.5

Detail of axial region of a scour and fill (channel) structure, displaying an apparent symmetrical infill passing upwards into planar laminated sandstones.
Length of pen = 12.5 cms.
Location as for plate 9.2

Plate 9.6

Steep-sided asymmetrical scour (channel) possessing shell-sand infill, passing up into planar laminated and small-scale cross-bedded fine sandstones (top left) consecutively succeeded by fossiliferous siltstones.
Length of hammer head = 17.5 cms.
From locality 173 (SH 71525147) - Glanrafon Beds, Dolwyddelan (south-western sequence - map 3)

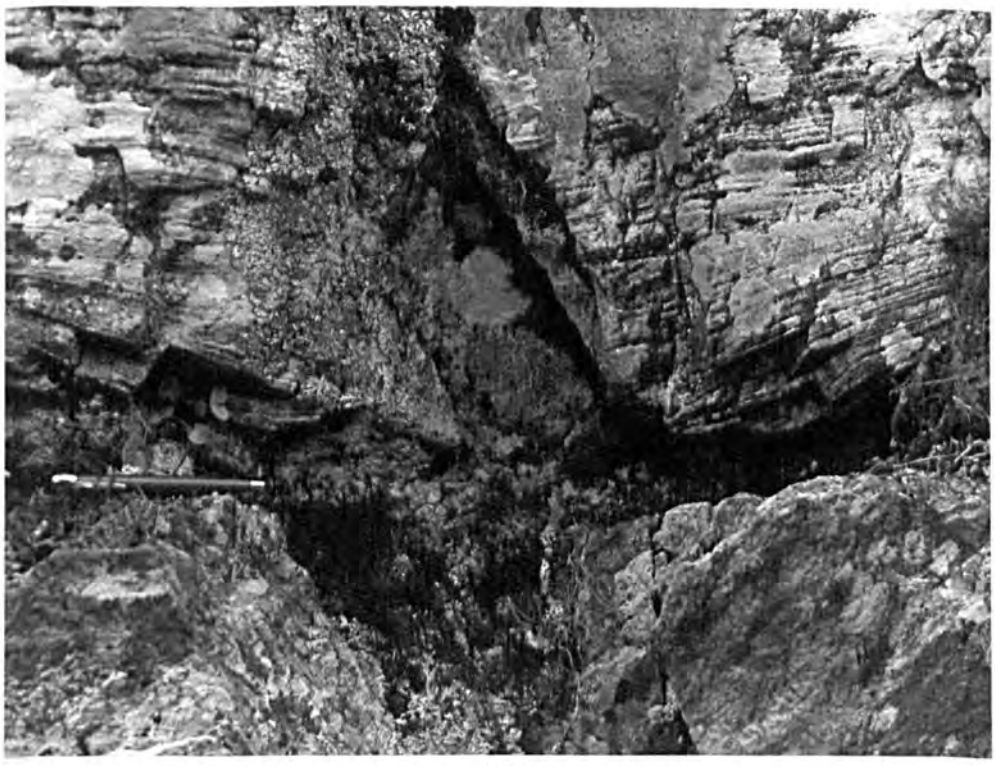


PLATE 9.5

PLATE 9.6

Plate 9.7

A vertical shaft referable to the ichnogenus Skolithos penetrating laminated sandstones (= lower laminated sandstones in plate 9.2) from the shoreface sequence in plate 9.2. A burrow halo is present on the right of the burrow. The burrow walls appear composed of finer grained material, presumably representing an original mud coating that provided support in what were probably relatively unstable sands, the burrow itself occupied by a suspension feeder. Note sparse brachiopod valves (now decalcified moulds) just below the burrow.
Length of pen included = approximately 8 cms.
Location as for plate 9.2

Plate 9.8

Vertical shafts referable to Skolithos penetrating (lower) laminated sandstones (upper shoreface sands) from the shoreface sequence in plate 9.2. Note burrow haloes. Similar burrows characterise high energy environments, such as those in which these sandstones originally accumulated, the suspension feeders burrowing deeply to escape stresses at the sediment-water interface.
Length of pen included = approximately 10 cms.
Location as for plate 9.2

PLATE 9.7

PLATE 9.8

Plate 9.9

An agglomeratic unit, crudely graded with poor stratification, overlain by a cross-bedded crystal tuff, such features implying submarine deposition. Grading resulted either from a combination of airfall grading and settling through water or from emplacement of a type of subaqueous debris-flow in which all size particles are carried and out of which they settle. The rounded nature of some component clasts suggests exposure to current activity and some consequent transport. Underlying the agglomerate are calcareous siltstones (not shown) yielding an assemblage referable to the Nicolella community, thus suggesting the agglomerate and bedded tuff accumulated in an offshore environment.

Long edge of notebook = 21.5 cms.

From locality 233 (SH 71355344) - Snowdon Volcanic Group, Upper Unit of the Lower Rhyolitic Tuff Formation, southern slopes of Moel Siabod (map 3)

PLATE 9.9

Plate 9.10

Planar bedding developed within tuffs from the upper sub-unit of the Upper Unit of the Lower Rhyolitic Tuff Formation on Moel Siabod. Such bedding implies submarine deposition (lower part of the upper flow regime - plane bed phase ?).

South-west of locality 233, location as for plate 9.9

Plate 9.11

Bedding within the Upper Rhyolitic Tuff Formation, the sampled faunal horizon (Appendix Two - locality 179) occurring at the base of the illustrated outcrop. In the basal third, tuffaceous sediments (displaying planar bedding - possibly due to sedimentation from suspension) alternate with bleached white weathering, purer rhyolitic tuffs, some of which laterally pinch and swell. Note capping of extremely fine airfall tuff (as thin white band) on one rhyolitic tuff. The consecutive horizon, which possesses greater sediment admixture, displays a laminated base although mostly appearing contorted and disrupted (downloading/liquefaction ?). Overlying this unit is a purer rhyolitic tuff, pods of which have downloaded into the underlying unit. Succeeding the tuff are graded crystal tuffs displaying varying patterns of grading (Kuenen 1953). See chapter 9, section b, iii, 2 for explanation.

See photograph for scale.

From locality 179 (SH 71965187) - Snowdon Volcanic Group, Upper Rhyolitic Tuff Formation, west-south-west of Dolwyddelan (south-western sequence - map 3)

PLATE 9.10

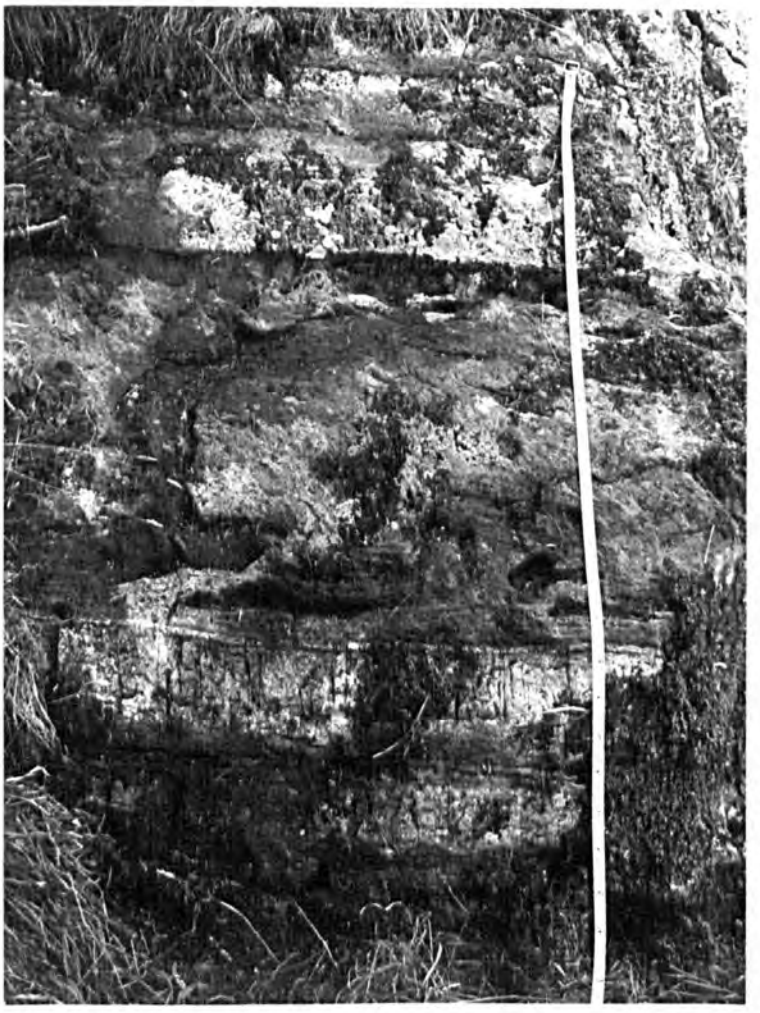


PLATE 9.11

Plate 9.12

One of several black slate clasts, of identical lithology to the Black Slates, found within the upper horizons of the Upper Rhyolitic Tuff Formation.
Length of pen = 12.5 cms.
From locality 228 (SH 70015144) - Black Slates, Ty'n y Ddol quarry, west-south-west of Dolwyddelan (map 3)

Plate 10.1

Cross-bedded fine sandstones overlying well bioturbated fossiliferous siltstones, brachiopod valves within the siltstones being randomly orientated. A vertical shaft referable to Skolithos, with discernable burrow halo, has penetrated the cross-bedded sandstones and underlying siltstones. Such an association of structures suggests some shallowing, perhaps linked with increased current velocities and rapid sedimentation. Separating the bioturbated unit from the bedded unit is an erosion plane.
Diameter of coin = 1.7 cms.
From locality 239 (SH 77325739) - Carneddau Group, west of Betws-y-Coed (map 5)

PLATE 9.12

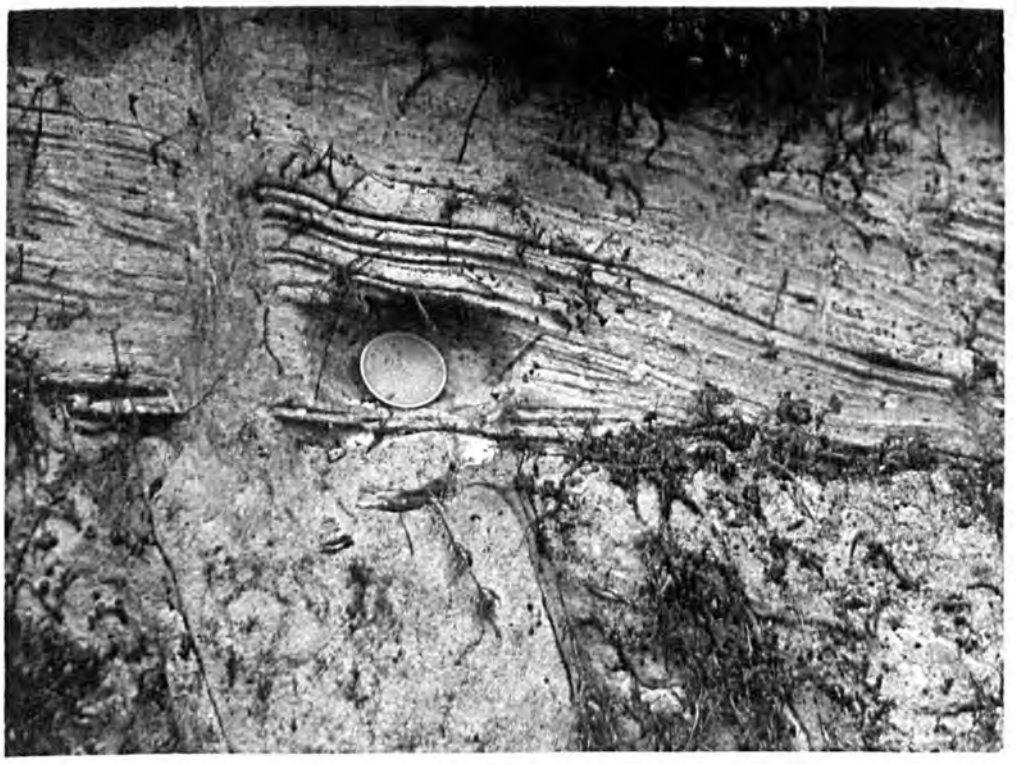


PLATE 10.1

Plate 10.2

Field appearance of fossiliferous horizons from the *Multiplicata* Sandstone. Horizons classed as laterally continuous shelly horizons - valves display apparent mixed orientations. Such horizons probably represent current accumulations within a high energy, shallow water environment. Planar horizons imply little biogenic reworking, whereas the unfossiliferous horizons infer periods of continuous sedimentation (under upper flow regime conditions ?)

Length of hammer head = 17.5 cms.

From locality 159 (SH 71676142) - Glanrafon Beds, *Multiplicata* Sandstone, south-western side of Llyn Cowlyd (map 4)

Plate 10.3

Large-scale trough cross-bedding developed within the Arkosic Quartzite - note its typical bleached white weathering field appearance.

Length of hammer head = 17.5 cms.

From locality 160 (SH 71606157) - Glanrafon Beds, Arkosic Quartzite, south-western side of Llyn Cowlyd (map 4)

PLATE 10.2

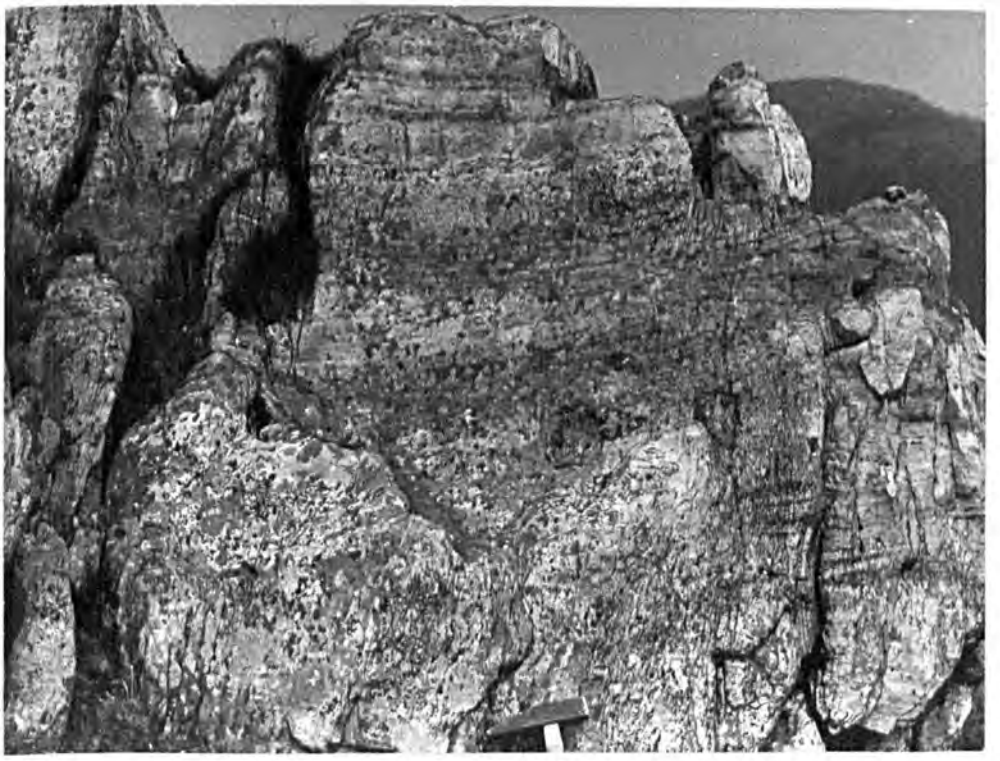


PLATE 10.3

Plate 10.4

Dark, fine grained clasts (appearing lighter due to weathering) intercalated with disarticulated sowerbyellid (= Sowerbyella) valves within a sandstone. The valves possess a mixed orientation. Note :-

a) gradational boundaries of clasts (see clast at upper left)

b) confinement of clasts and valves to a discrete horizon

Such horizons suggest deposition from laterally migrating tidal channels, the clast-valve horizon representing a channel floor lag concentrate.

Length of pen included = 9 cms.

From locality 163 (SH 72116219) - Glanrafon Beds, Llethr Gwyn Sandstones, western side of Llyn Cowlyd (map 4)

Plate 10.5

A similar clast horizon to that above. Clasts seem imbricated although this may be due to interaction with cleavage which although poorly developed, nevertheless appears to be refracted through the clast horizon. Note faint undisturbed laminations within sandstone both above and below clast horizon (point bar deposits ?). Compare with plate 7.2.

Diameter of end of pen = 4 mms.

Location as for plate 10.4

PLATE 10.4

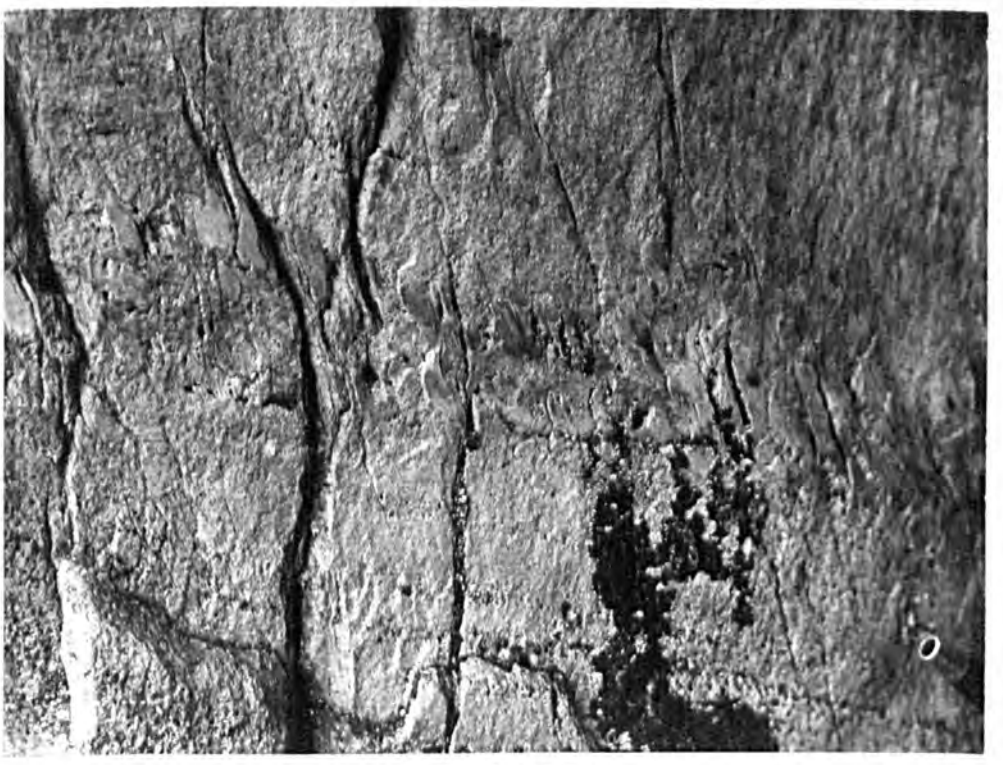


PLATE 10.5

Plate 10.6

A vertical shaft possessing retrusive spreite, from the Llethr Gwyn Sandstones. A second shaft with fainter spreite can be distinguished to the right of the main burrow, whilst additional shafts possibly exist further to the right. Both shafts appear truncated by an erosion plane, above which planar laminae can be discerned. Such figurative bioturbation and retrusive spreite connote responses to relatively rapid sedimentation in a shallow water, high energy environment. These shafts are approximately 50 cms. below the clast-valve horizon in plate 10.4.

Burrow length = approximately 10 cms.

Location as for plate 10.4

Plate 10.7

Field appearance of the laharic breccia. Underlying the breccia horizon are sandstones which possess trough cross-bedded sets with erosive contacts passing up into faintly planar laminated, undisturbed horizons, differential weathering revealing coarse-fine grain alternations within the cross-beds.

For scale, compare with plate 10.8

From locality 161 (SH 71806190) - Glanrafon Beds, laharic breccia within the Llethr Gwyn Sandstones, western side of Llyn Cowlyd (not included on map 4)

PLATE 10.6

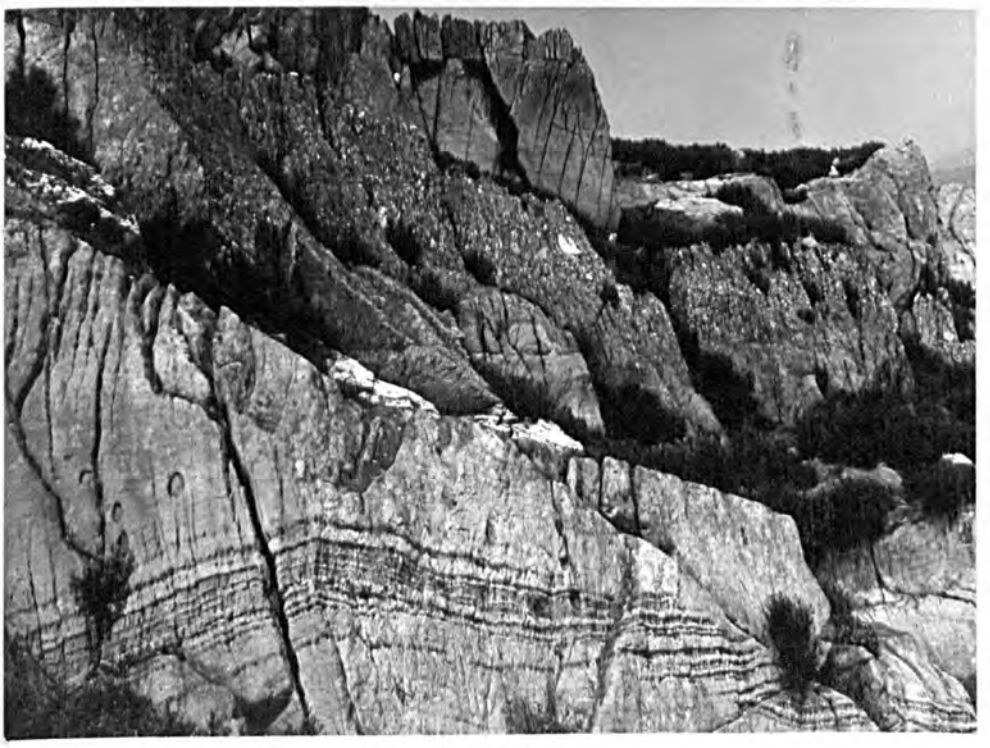


PLATE 10.7

Plate 10.8

A different aspect of the same outcrop as in plate 10.7.

Note -

a) underlying bedded sandstones : three erosive contacts can be distinguished within the trough cross-bedded horizon, coarse-fine grain alternations picked out by differential weathering. These sandstones seem intimately related to the overlying laharic breccia, although their mode of origin is problematical. However, such cross-bedding relationships lend weight to the possibility of a type of "base-surge" depositional mechanism for the sandstones (Fisher 1977). See chapter 9, section b, iii, 4 for further explanation.

b) undisturbed planar laminations succeeding the aforesaid cross-beds (bottom right)

c) fragments within the laharic breccia : note greatest density of fragments is towards the middle and top of the unit; an overall inverse grading of fragments; a large, angular rhyolitic fragment (upper right); what appears to be an irregularly shaped, internally contorted boulder (centre), of a similar lithology to the underlying sandstone, which is incorporated into the lower horizon of the laharic breccia.

d) finely bedded sandstones overlying the laharic breccia (top right)

e) quartz veining (above hammer in centre) related to local thrust plane (?)

Length of hammer head = 17.5 cms.

Location as for plate 10.7

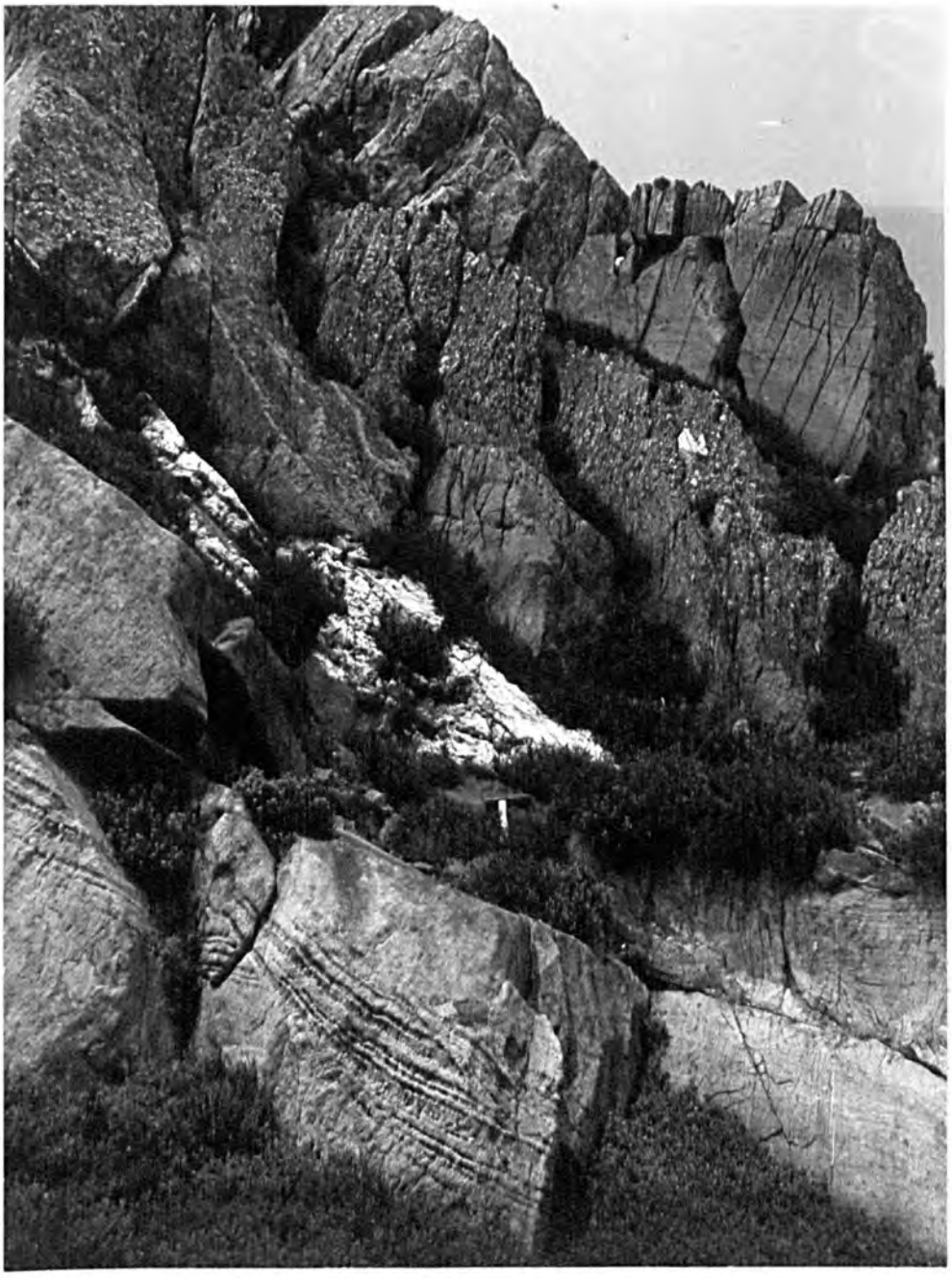


PLATE 10.8

Plate 10.9

Unconformable erosive relationships displayed within lower horizons of the sandstone beneath the laharic breccia. Note coarse-fine grain alternations picked out by differential weathering, and the absence of cleavage. Note individual finer grained (inweathering) units thicken towards the centre of the trough-shaped set, indicative of some kind of channel or large scour infill. Aforesaid coarse-fine grain alternations pass up into coarser laminated sandstones. Within the underlying set, note a small-scale, high-angle reverse fault with minor drag folds (top left).

Length of hammer head = 17.5 cms.

Location as for plate 10.7

Plate 10.10

Inverse grading within part of laharic breccia - although poorly sorted, there is a distinct upward gradation from fine to coarse fragments, a wackestone texture being developed. Inverse grading is indicative of inertia flow. The fragments are enclosed within a muddy matrix which is cleaved, whereas the fragments appear uncleaved. The rounded fragments were probably exotic, but the angular fragments were possibly only locally derived.

Length of hammer handle included = approximately 15 cms.

Location as for plate 10.7

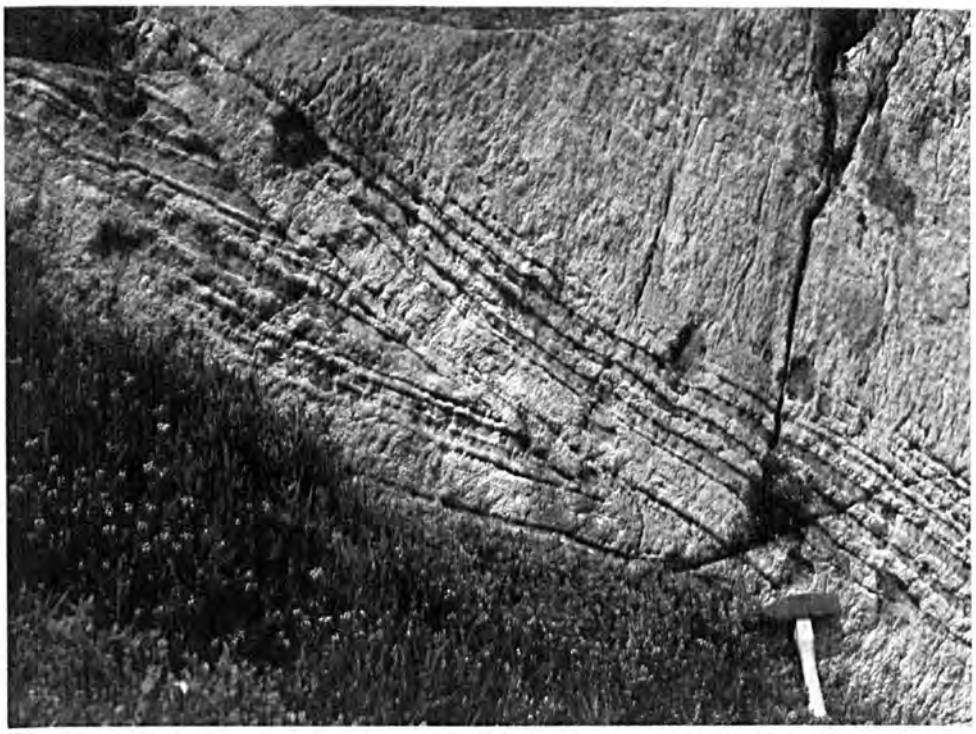


PLATE 10.9

PLATE 10.10

Plate 10.11

Almost entire specimen of Parabasilicus powisi (Murchison) - (closely comparable with P.powisi as figured by Dean (1963a,p.229-233)). Note opisthoparian facial suture, weakly inflated glabella showing no trace of lobation and small, well developed, hollow genal spine. Exoskeleton is relatively smooth with no tuberculation or granulation. An entire exoskeleton often prompts assumption that the fossil represents a dead animal rather than an exuvium. However, this may not always be so (Henningsmoen 1975, p.184, fig.3; p.189), e.g.,

a) possession of open facial sutures - anterior part of facial sutures do appear relatively open (note left suture).

b) thoracic telescoping - the specimen does not possess full asaphid complement of eight thoracic segments (only seven) - possibly eighth segment has been telescoped beneath either pygidium or thorax, although such telescoping may be ascribed to exoskeleton collapse. Pygidium seems slightly sinistrally displaced with respect to thorax (bottom left) although tips of pleurae may be ventrally deflected and not fully exhumed. Cephalon and thorax also seem very slightly displaced with respect to each other.

Henningsmoen (1975,p.181) notes that scavengers and decomposition may open sutures and dismember a dead individual, but the likely environment in which the enclosing black, fine grained siltstone lithology accumulated was probably inimical to most scavengers and would not be likely to disturb any complete exuviae. Does the fossil therefore represent a collapsed exoskeleton of a dead animal or a complete exuvium ? Either are possible, although evidence tentatively implies a complete exuvium.

Scale x 1.3

From locality 242 (SH 77855577) - black siltstone within the Carneddau Group, west of Betws-y-Coed (map 5)

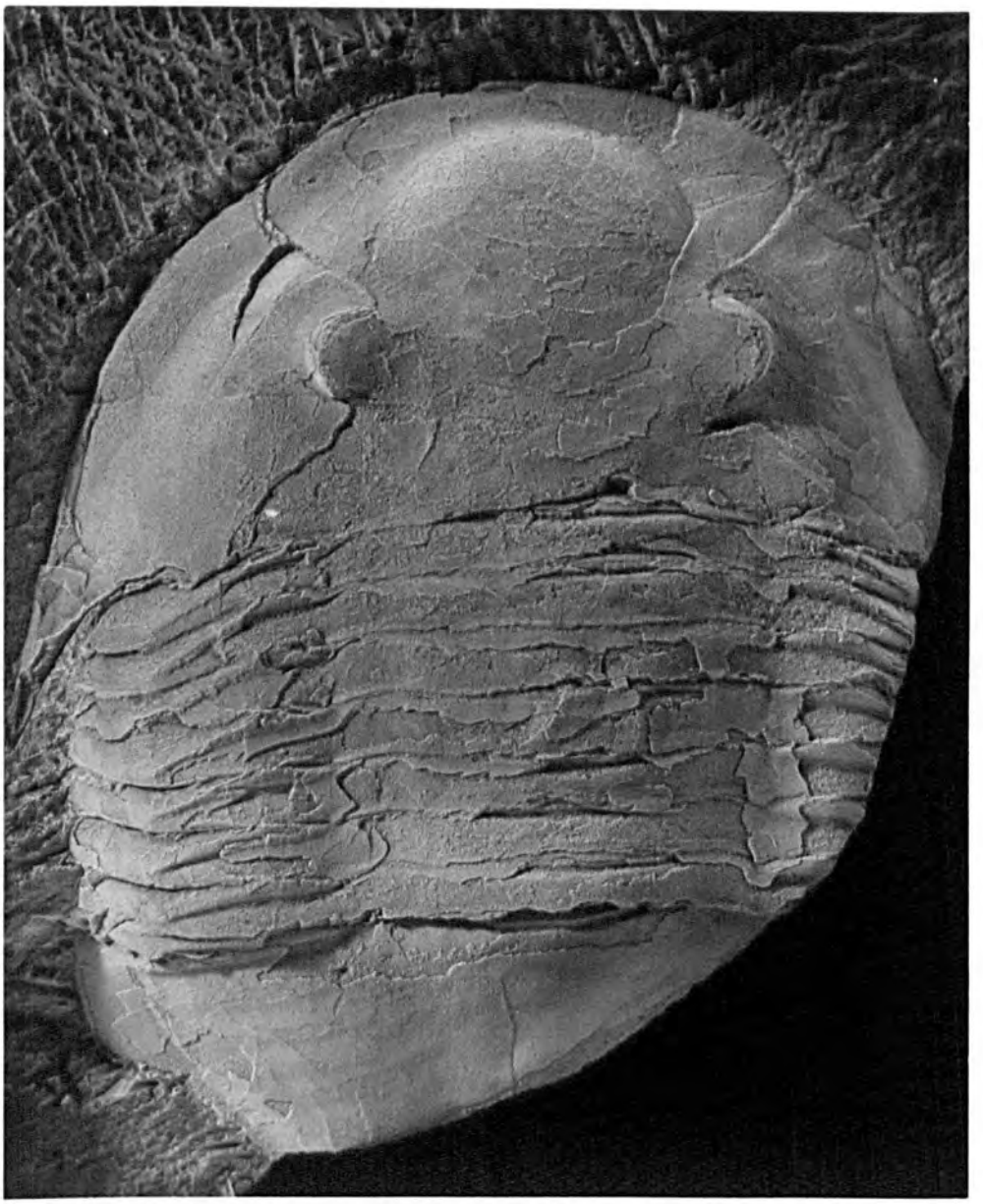


PLATE 10.11

Plate 10.12

Field appearance of a bedded rhyolitic tuff from the top of the Llethr Gwyn Sandstones, the tuff being fossiliferous (fossiliferous horizon lying just below illustrated outcrop). Note bedding within tuff, some horizons seeming rippled. A coarsening in grain size within the Llethr Gwyn Sandstones just below the tuff suggests possible deposition under relatively high energy conditions. The tuff, however, is remarkably pure with little sediment admixture and extremely fine grained. Note "nodular" horizons. The "nodules" are elongated in the bedding, their long axes ranging from 10-30 cms.. Each "nodule" possesses a thin outer shell and a greenish crystalline inner area composed almost entirely of partially altered calcite crystals. Nodule origin uncertain.
Length of hammer = 40 cms.
From locality 170 (SH 71936239) - Glanrafon Beds, waterlain tuff from the top of the Llethr Gwyn Sandstones, western side of Llyn Cowlyd (map 4)

Plate 10.13

Field appearance of one of several fossiliferous horizons within the Upper Grits at Gareg Bengam. Note :-

a) apparent coarsening and fining of ribbing of valves of Dinorthis (Plaesiomys) multiplicata Bancroft (= Plaesiomys multifida (Salter)), these valves being sub-parallel to direction of maximum finite elongation.
b) a "stretching lineation" is faintly developed upon the valves.
c) other organic remains are decalcified external and internal moulds of sowerbyellid valves (= Sowerbyella) and rarer dalmanellids.

Such horizons accumulated in a high energy environment, the valves possibly having undergone some net lateral transport.
From locality 134A (SH 62004523) - Glanrafon Beds, Upper Grits, Gareg Bengam, east of Beddgelert (map 6)

PLATE 10.12

2 cm.

PLATE 10.13

Key to areas cited in explanations of fossil plates

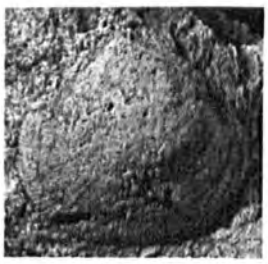
CC(W)	-	Capel Curig (West)
MH	-	Moel Hebog area
D(SW)	-	Dolwyddelan (south-western sequence)
D(SC)	-	Dolwyddelan (south-central sequence)
D(SE)	-	Dolwyddelan (south-eastern sequence)
BYC	-	Betws-y-Coed area
EB	-	East of Beddgelert area

PLATE I

1

2

4


3

5A

5B

5C

5D

6A

6B

6C

6D

6E

7A

7B

PLATE 1

SCHMIDTITES Schuchert & Le Vene

Fig.1 Schmidtites ? sp.indet. Internal mould - pedicle valve. 47/B. Loc.47 (SH 57604220 - see map 2). Gorllwyn Slate, Upper Glanrafon Beds. MH x 4.4

Pseudolingula sp. (spatula Williams ?)

Fig.2 Internal mould of a brachial valve of a pair of conjoined valves, probably in life position. 187/28. Loc.187 (SH 70855064 - see map 3). Glanrafon Beds. D(SW) x 1.4

SCHIZOCRANIA Hall & Whitfield

Fig.3 Schizocrania sp.indet. Exterior - brachial valve. 183 2/52. Loc.183 (SH 71045089 - see map 3). Glanrafon Beds. D(SW) x 3.4

Petrocrania dubia Williams

Fig.4 Internal mould - brachial valve. 145/26. Loc.145 (SH 70665785 - see map 1). Upper Racks Sandstone. CC(W) x 2

ORTHAMBONITES Pander

Fig.5A Orthambonites (exopunctata Williams ? - now O.exopunctatus Williams, after Cocks 1978,p.39). Internal mould - pedicle valve. 243/69. Loc.243 (SH 78655759 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation BYC x 3

Fig.5B O.cessata Williams ?. Internal mould - brachial valve. 244/98. x 3.55

Fig.5C O.cessata Williams. Internal mould - brachial valve. 244/96. x 3.2

Fig.5D O.cessata Williams. Internal mould - pedicle valve. 244/77. x 5.9

(O.cessata = now O.cessatus Williams, after Cocks 1978,p.39).

From loc.244 (SH 78535755 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation BYC

Nicolella actoniae obesa Williams

Fig.6A Brachial valve exterior (cast). 244/96. x 1.45

Plate 1 cont.

Fig.6B Brachial valve exterior (cast). 178/101. x 2.1

Fig.6C Complementary internal mould of brachial valve (as figured in fig.6B). 178/102. x 2.65

Fig.6D Pedicle valve exterior (cast). 178/73. x 1.85

Fig.6E Internal mould - pedicle valve. 244/8. x 1.75

244/8,96 - From loc.244 (SH 78535755 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation. BYC

178/73,101,102 - From loc.178 (SH 71975183 - see map 3). Intercalated tuffaceous sediments between the Lower Rhyolitic Tuff and Bedded Pyroclastic Formations. D(SW)

<u>Dolerorthis</u> <u>duftonensis</u> <u>prolixa</u> Williams

Fig.7A Internal mould - pedicle valve. 117/108. x 1.6

Fig.7B Internal mould - brachial valve. 117/213. x 1

Loc.117 (SH 54394723 - see map 2). Calcareous tuffs, uppermost horizons of Lower Rhyolitic Tuff MH

PLATE 2

7C

8A

8B

8C

8D

8E

8F

9A

9B

11A

10A

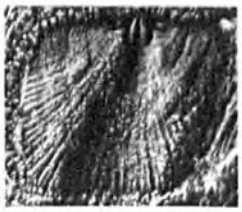
10B

11B

11C

10C

12A


12B

12C

12D

PLATE 2

Dolerorthis duftonensis prolixa Williams

Fig.7C Internal mould - brachial valve. 117/18. Loc.117 (SH 54394723 - see map 2). Calcareous tuffs, uppermost horizons of Lower Rhyolitic Tuff. MH x 1.8

DINORTHIS Hall & Clarke

Fig.8A D.(P.)cf.robusta Bancroft of Bancroft 1945 (now Plaesiomys robusta Bancroft, after Cocks 1978, p.50). Internal mould - brachial valve. 183 2/113. x 2

Fig.8B D.(P.)cf.robusta (= P.robusta). Complementary brachial valve exterior (mould). 183 2/114. x 2.1

Fig.8C D.cf.berwynensis angusta Williams of Williams 1963. Internal mould - brachial valve. 197A/1. x 1.9

Fig.8D D.berwynensis (Whittington). Internal mould - brachial valve. 189/55. x 3.55

Fig.8E D.cf.flabellum (J.de C.Sowerby) of Williams 1963. Internal mould - pedicle valve. 145/30. x 1.9

Fig.8F D.berwynensis (Whittington). Internal mould - pedicle valve. 197A/68. x 2.7

145/30 - Loc.145 (SH 70665785 - see map 1). Upper Racks Sandstone. CC(W)

183 2/113,114 - Loc.183 (SH 71045089 - see map 3). Glanrafon Beds. D(SW)

189/55 - Loc.189 (SH 70925081 - see map 3). Glanrafon Beds. D(SW)

197A/1,68 - Loc.197A (SH 72405057 - see map 3). Glanrafon Beds. D(SC)

Rhactorthis crassa Williams

Fig.9A Internal mould - brachial valve. 179/83. x 2.4

Fig.9B Complementary brachial valve exterior (mould). 179/90. x 2.4

Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW)

Cremnorthis parva Williams

Fig.10A Internal mould - pedicle valve. 244/69. x 8.5

Fig.10B Internal mould - pedicle valve. 178/91. x 8.8

Fig.10C Internal mould - brachial valve. 244/96. x 9.9

Plate 2 cont.

244/69,96 - Loc.244 (SH 78535755 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation. BYC

178/91 - Loc.178 (SH 71975183 - see map 3). Intercalated tuffaceous sediments between the Lower Rhyolitic Tuff and Bedded Pyroclastic Formations. D(SW)

Skenidioides cf.costatus Cooper

Fig.11A Internal mould - pedicle valve. 244/76. x 8.1

Fig.11B Internal mould - brachial valve. 244/76. x 11.35

Fig.11C Internal mould - brachial valve. 244/42. x 7.9

Loc.244 (SH 78535755 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation. BYC

Family DALMANELLIDAE Schuchert

Fig.12A Dalmanella sp. (cf.modica ? Williams of Williams 1963). Internal mould - brachial valve. 180/60. Loc.180 (SH 71995167 - see map 3). Glanrafon Beds. D(SW) x 2.4

Fig.12B Dalmanella cf.lepta (Bancroft) of Bancroft 1945. (D.lepta - now D.indica Whittington, after Cocks 1978,p.61). Internal mould - brachial valve (originally encrusted by bryozoa - cf.McNamara 1978). 175/80. Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW) x 3.3

Fig.12C Dalmanella sp. (cf.modica ? Williams of Williams 1963). Internal mould - brachial valve. 196/34. Loc.196 (SH 71225136 - see map 3). Glanrafon Beds. D(SW) x 3.2

Fig.12D Howellites ? sp.indet. (cf.Resserella (Howellites) striata Bancroft of Bancroft 1945). (H.striata - now H.striatus Bancroft, after Cocks 1978,p.65). Internal mould - brachial valve. 187/29. Loc.187 (SH 70855064 - see map 3). Glanrafon Beds. D(SW) x 3.2

PLATE 3

12E

12F

12G

12H

12I

12J

12K

12L

12M

13A

13B

13C

14A

14B

14C

PLATE 3

Family DALMANELLIDAE Schuchert

Fig.12E Internal moulds of dalmanellid pedicle valves. Bottom left - Onniella sp.indet. Top right - Howellites ? sp.indet. 186/41. Loc.186 (SH 70965074 - see map 3). Glanrafon Beds. D(SW) x 2.2

Fig.12F cf.Howellites antiquior (M'Coy) of Cave & Dean (= Paucicrura sowerbii Cave & Dean). Internal mould - brachial valve. 196A/3. Loc.196A (SH 71225133 - see map 3). Glanrafon Beds. D(SW) x 2.9

Fig.12G Howellites sp.indet. Internal mould - brachial valve. 196B/2. Loc.196B (SH 71185136 - see map 3). Glanrafon Beds. D(SW) x 2.7

Fig.12H Howellites cf.antiquior (M'Coy) of Cave & Dean 1959 (= Paucicrura sowerbii Cave & Dean) and Williams 1963. Internal mould - brachial valve. 180/29. Loc.180 (SH 71995167 - see map 3). Glanrafon Beds. D(SW) x 2.6

Fig.12I Howellites sp.indet. Internal mould - pedicle valve. 186/44. Loc.186 (SH 70965074 - see map 3). Glanrafon Beds. D(SW) x 3.7

Fig.12J Howellites cf.antiquior (M'Coy) of Cave & Dean 1959 (= Paucicrura sowerbii Cave & Dean) and Williams 1963. Internal mould - pedicle valve. 175/61. Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW) x 2.4

Fig.12K Onniella sp.indet. Brachial valve exterior (mould). 8/35. Loc.8 (SH 56914139 - see map 2). Portreuddyn Slate, Upper Glanrafon Beds. MH x 3.2

Fig.12L Onniella ? sp.indet. Internal mould - pedicle valve. 186/133. Loc.186 (SH 70965074 - see map 3). Glanrafon Beds. D(SW) x 3.2

Fig.12M Onniella sp. (cf.ostentata lepida Williams of Williams 1974). 179/17. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 3.2

Reuschella horderleyensis Bancroft

Fig.13A Internal mould - brachial valve. 183 1/87. Loc.183 (SH 71045089 - see map 3). Glanrafon Beds. D(SW) x 1.6

Fig.13B Internal mould - pedicle valve. 197A/65. x 2.2

Fig.13C Complementary pedicle valve exterior (mould). 197A/66. x 2.1

Plate 3 cont.

197A/65,66 - Loc.197A (SH 72405057 - see map 3). Glanrafon Beds. D(SC)

SALOPIA Williams

Fig.14A Salopia globosa (Williams). Internal mould - brachial valve. 225/B. x 2.8

Fig.14B Salopia sp.A (sp.nov. ?) (Corineorthis sp. ?). Internal mould - brachial valve. 225/86. x 2

Loc.225 (SH 76125104 - see map 3). Glanrafon Beds D(SE)

Fig.14C S.globosa (Williams). Internal mould - brachial valve. 145/46. Loc.145 (SH 70665785 - see map 1). Upper Racks Sandstone. CC(W) x 2.85

PLATE 4

14D

14E

14F

14G

14H

14I

15A

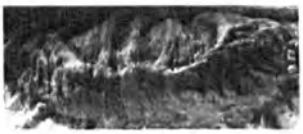
15B

15C

16A

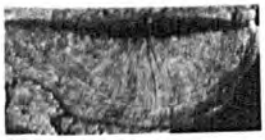
16B

16D


17A

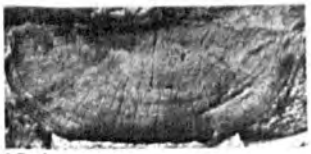
16C

17B


18A

18B

18C


19A

19B

PLATE 4

SALOPIA Williams

Fig.14D S.globosa (Williams). Internal mould - pedicle valve. Right lateral view, showing strongly convex outline and well-developed pedicle muscle field. 225/17. x 2.45

Fig.14E S.globosa (Williams). Internal mould - pedicle valve. Ventral view of same valve as figured in fig.14D, showing possible trace of mantle canal system. 225/17. x 2.1

Fig.14F S.globosa (Williams). Internal mould - pedicle valve. 225/114. x 1.9

Fig.14G S.globosa (Williams). Internal mould - pedicle valve. 145/57. x 2.7

Fig.14H Salopia sp.A (sp.nov. ?). Internal mould - pedicle valve (commonly associated with brachial valves as figured in fig.14B). (Corineorthis sp. ?). 225/106. x 2.3

Fig.14I S.globosa (Williams). Internal mould - pedicle valve. 225/92. x 2.1

225/17,92,106,114 - Loc.225 (SH 76125104 - see map 3). Glanrafon Beds. D(SE)

145/57 - Loc.145 (SH 70665785 - see map 1). Upper Racks Sandstone. CC(W)

Bicuspina spiriferoides (M'Coy)

Fig.15A Internal mould - brachial valve. View of posterior part of strongly distorted internal mould. 175/136. x 1.8

Fig.15B Internal mould - pedicle valve. Note pedicle tube. 175/119. x 1.8

Fig.15C Internal mould - pedicle valve. Ventrolateral view. Note excellent preservation of pedicle tube. 175/137. x 1.7

Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW)

Leptestiina oepiki (Whittington)

Fig.16A Internal mould - brachial valve. 179/92. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 4.3

Fig.16B Internal mould - brachial valve. 244/16. Loc.244 (SH 78535755 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation. BYC x 2.9

Plate 4 cont.

Fig.16C Internal mould - pedicle valve. Posterior view. 243/44. x 2.9

Fig.16D Internal mould - pedicle valve. Ventral view of same valve as figured in fig.16C. 243/44. x 3.2

Loc.243 (SH 78655759 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation. BYC

SAMPO Öpik

Fig.17A Sampo sp. (cf.ruralis (Reed) of Mitchell 1977). Internal mould - pedicle valve. Ventral view of strongly distorted mould, showing possible trace of mantle canal system. 241/97. x 3.7

Fig.17B Posterior view of same valve as figured in fig.17A. 241/97. x 3.5

Loc.241 (SH 78635588 - see map 5). Carneddau Group sediments. BYC

SOWERBYELLA Jones

Fig.18A Sowerbyella sp.indet. - articulated specimen, showing only exterior of brachial valve (mould), pedicle valve lost. Line of articulation can be discerned, as can triangular depression left by deltidial plates. 174/30. Loc.174 (SH 71725155 - see map 3). Glanrafon Beds. D(SW) x 2.75

Fig.18B S.sp.indet. Internal mould - pedicle valve. 56/63. Loc.56 (SH 56854257 - see map 2). Gorllwyn Slate, Upper Glanrafon Beds. MH x 2.8

Fig.18C S.sp.indet. Internal mould - articulated specimen. Dorsal view, showing internal mould of brachial valve. Internal mould of pedicle valve apparently "overlies" and curves away from the brachial valve. Shell probably buried when gaping. 173/94. Loc.173 (SH 71525147 - see map 3). Glanrafon Beds. D(SW) x 2.4

EOPLECTODONTA Kozlowski

Fig.19A Eoplectodonta sp.indet. (cf.rhombica (M'Coy) of Williams 1963). Brachial valve exterior (mould). 241/78. x 2.5

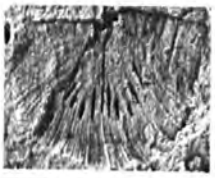
Fig.19B As above. Complementary internal mould, brachial valve (as figured in fig.19A), showing possible trace of mantle canal system. 241/52. x 2.4

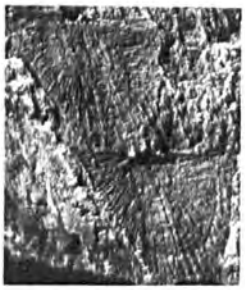
Loc.241 (SH 78635588 - see map 5). Carneddau Group sediments. BYC

(Formerly included within "sowerbyellids" in faunal list, but later identified as Eoplectodonta sp.).

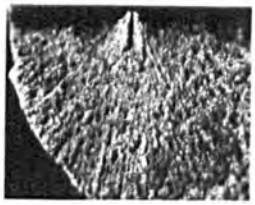
PLATE 5

20A


20B


20C

20D


20E

20F

21A

21B

22

23A

23B

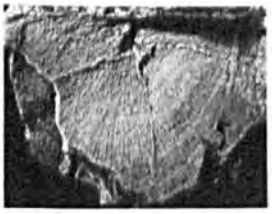
24A

24B

24C

25

26


27A

27B

27C

PLATE 5

SERICOIDEA Lindstrom

Fig.20A Sericoidea sp.indet. (S.cf.restricta (Hadding) of Williams 1962; cf.Chonetoidea alpha Spjeldnaes of Spjeldnaes 1957). Internal mould - brachial valve. 179/90. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 4.3

Fig.20B S.sp.indet. (cf.S.aff.abdita Williams 1962, plate XVIII,fig.13; cf.C.alpha Spjeldnaes of Spjeldnaes 1957). Internal mould - brachial valve. 247/A. Loc.247 (SH 74425788 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation. BYC x 4.8

Fig.20C S.sp.indet. Brachial valve exteriors (moulds). 61/26. Loc.61 (SH 56004300 - see map 2). Portreuddyn Slate, Upper Glanrafon Beds. MH x 2.9

Fig.20D S.sp.indet. Articulated shell, although pedicle valve lost. Brachial valve exterior (mould). Line of articulation can be discerned. 8/102. Loc.8 (SH 56914139 - see map 2). Portreuddyn Slate, Upper Glanrafon Beds. MH x 4.1

Fig.20E S.sp.indet. (cf.S.aff.abdita Williams of Williams 1962). Internal mould - pedicle valve. 112/162. Loc.112 (SH 56124381 - see map 2). Gorllwyn Slate, Upper Glanrafon Beds. MH x 10

Fig.20F S.sp.indet. Internal mould - pedicle valve. 179/81. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 5.25

GUNNARELLA Spjeldnaes

Fig.21A Gunnarella sp.indet. (G.cf.corrugatella (Davidson) of Mitchell 1977). Pedicle valve exterior (mould). 179/98B. x 1.7

Fig.21B As above. Complementary internal mould, pedicle valve (as figured in fig.21A). 179/98A. x 1.5

Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW).

RAFINESQUINA Hall & Clarke

Fig.22 Rafinesquina ? sp.indet. Internal mould - pedicle valve. 175/1. Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW) x 2.2

Plate 5 cont.

HEDSTROEMINA Bancroft

Fig.23A H.parva Bancroft. Internal mould - pedicle valve. 179/120. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 2

Fig.23B H.cf.robusta Bancroft of Bancroft 1929a. 173/74. Loc.173 (SH 71525147 - see map 3). Glanrafon Beds. D(SW) x 1.1

KJAERINA Bancroft

Fig.24A K.cf.hedstroemi Bancroft of Bancroft 1929a,1945. Internal mould - pedicle valve. 173/84. Loc.173 (SH 71525147 - see map 3). Glanrafon Beds. D(SW) x 1

Fig.24B K.cf.hedstroemi Bancroft of Bancroft 1929a,1945. Internal mould - brachial valve. 175/179. Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW) x 2.2

Fig.24C K.jonesi Bancroft. Internal mould - pedicle valve. 173A/8. Loc.173A (SH 71565148 - see map 3). Glanrafon Beds. D(SW) x 3.95

MJOESINA Spjeldnaes

Fig.25 Mjoesina ? sp.indet. (cf.M.rugata Williams of Williams 1962, plate XX, fig.20; also cf. M.mjoesensis (Holtedahl) of Spjeldnaes 1957, plate 8,fig.6). Internal mould - pedicle valve. 243/102. Loc.243 (SH 78655759 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation. BYC x 1.2

COLAPTOMENA Cooper

Fig.26 cf.Colaptomena sp. (concentrica (Portlock) ?) of Muir-Wood and Williams 1965 in Williams et al. 1965, H 389, fig.249,6d. 241/95. Loc.241 (SH 78635588 - see map 5). Carneddau Group sediments. BYC x 1

Macrocoelia expansa (J.de C.Sowerby)

Fig.27A Pedicle valve exterior (mould). 145/70. x 0.9

Fig.27B Complementary internal mould, pedicle valve (as figured in fig.27A). 145/70. x 0.9

Fig.27C Internal mould - brachial valve. 145/30. x 1.4

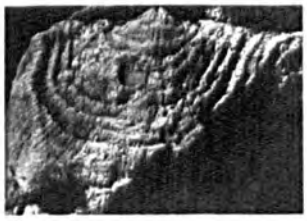
Loc.145 (SH 70665785 - see map 1). Upper Racks Sandstone. CC(W)

PLATE 6

27D

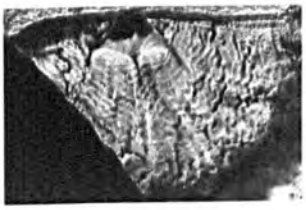
27E

28A



28B

28C



29

30A

30B

30C

31

32A

32C

32B

32D

PLATE 6

Macrocoelia expansa (J.de C.Sowerby)

Fig.27D Internal mould - pedicle valve. 145/59. x 0.95

Fig.27E Internal mould - pedicle valve. 145/46. x 0.9

Loc.145 (SH 70665785 - see map 1). Upper Racks Sandstone. CC(W)

LEPTAENA Dalman

Fig.28A Leptaena sp. (cf.L.rugosa Dalman of Havlíček 1967, Mitchell 1977 and Spjeldnaes 1957). Internal mould - pedicle valve. 183 1/93. x 1.2

Fig.28B L.sp. (cf.L.ventricosa Williams of Williams 1963). Internal mould - pedicle valve. 183 2/65. x 1.3

Fig.28C L.sp.indet. Internal mould - brachial valve. 183 1/93. x 1.8

Loc.183 (SH 71045089 - see map 3). Glanrafon Beds. D(SW)

Bellimurina incommoda Williams

Fig.29 B.incommoda ? Williams. Internal mould - brachial valve. 179/85. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 1.35

Protozyga cf. diversa (Reed) of Williams 1962

Fig.30A P.cf.diversa (but also compare with P.cf.perplexa Williams of Mitchell 1977). Internal mould - pedicle valve. 243/A. c.x 8

Fig.30B As above. Internal mould - brachial valve. 244/38. x 6.9

Fig.30C As for fig.30A. Internal mould - pedicle valve. 243/B. c.x 8

243/A,B - Loc.243 (SH 78655759 - see map 5).

244/38 - Loc.244 (SH 78535755 - see map 5).

Both localities from intercalated sediments within the Lower Crafnant Volcanic Formation. BYC

Remopleurides cf. colbyi Portlock of Whittington 1966

Fig.31 External cast. Glabella and occipital ring. Glabella shows possible traces of remanent ornamentation. 8/153. Loc.8 (SH 56914139 - see map 2). Portreuddyn Slate, Upper Glanrafon Beds. MH x 2.9

Plate 6 cont.

Family ASAPHIDAE Burmeister

Subfamily ISOTELINAE Angelin

Most asaphid material from Snowdonia is fragmented, disarticulated and distorted. Whittington (1966,p.76-77) refers similar material to either "Isotelinid,gen.ind.cf. powisi (Murchison)" or "Isotelinid,gen.et sp.ind.". However, sufficient unfragmented remains cause the author to refer these to species of the genus Parabasilicus as figured by Dean (1963a,p.229-233).

Parabasilicus powisi (Murchison)

Fig.32A Partially enrolled specimen. Probable internal mould - cranidium and part of thorax. 47/17. x 0.9

Fig.32B Dorsolateral view of same specimen, showing marked curvature of thorax. 47/17. x 1

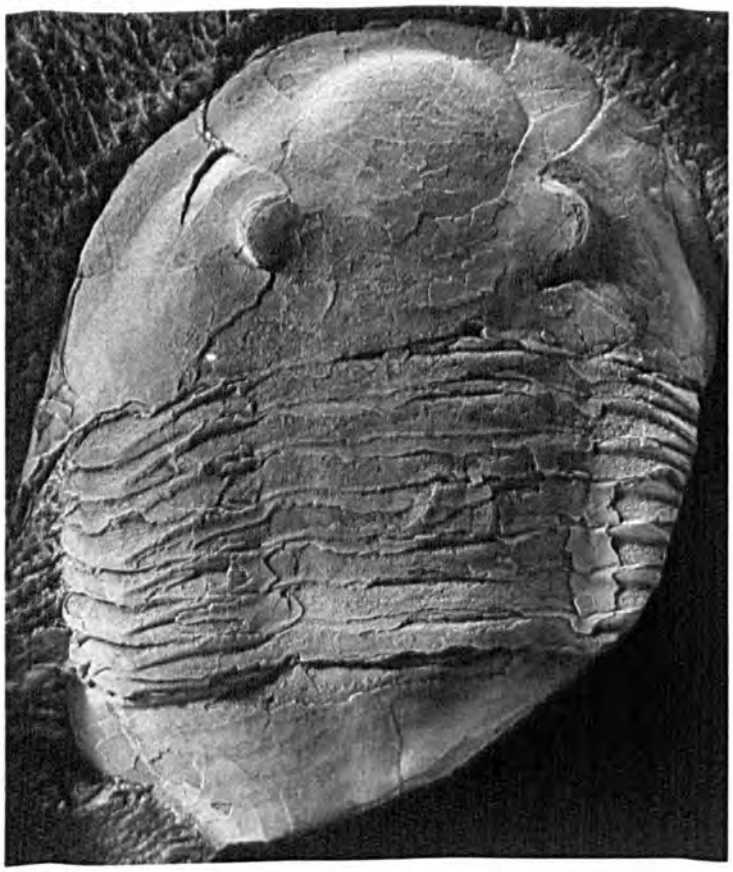
Loc.47 (SH 57604220 - see map 2). Gorllwyn Slate, Upper Glanrafon Beds. MH

Fig.32C Internal mould - pygidium. 56/20. Loc.56 (SH 56854257 - see map 2). Gorllwyn Slate, Upper Glanrafon Beds. MH x 1

Parabasilicus ? cf.marstoni (Salter) of Dean 1963a

Fig.32D Almost complete dorsal exoskeleton : damaged on left side and distorted. Internal mould. (See Salter 1866,p.156-157,pl.23,fig.1). 54/30. Loc.54 (SH 56804270 - see map 2). Gorllwyn Slate, Upper Glanrafon Beds. MH x 1.6

PLATE 7



32E

33

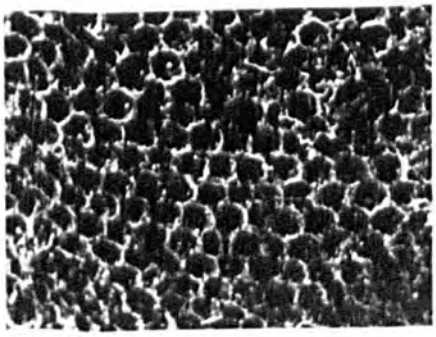
34

35A

32F

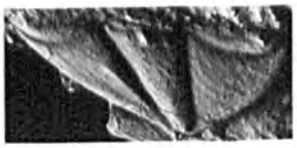
35B

35C



32G

36 B



36C

36 A

PLATE 7

Parabasilicus powisi (Murchison)

Fig.32E Almost entire dorsal exoskeleton. Internal mould, although some test fragments still remain. 242/19. Loc.242 (SH 77865577 - see map 5). Cleaved, fine grained, black siltstone from Carneddau Group sediments. BYC x 1

Parabasilicus sp.

Figs.32F,G SEM (Scanning electron microscope) photographs, at different magnifications, of the holochroal eye of a Parabasilicus specimen. Note extremely tight lensar packing and hexagonal shape of individual lenses (see fig. 32G).

Fig.32F x 25 Fig.32G x80

Illaenus (Parillaenus) davisi (Salter)

Fig.33 Internal mould- pygidium. 179/3. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 1.9

Decoroproteus cf. calvus (Whittard) of Owens 1973

Fig.34 External cast - pygidium. 175/103. Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW) x 5.9

BROEGGEROLITHUS Bancroft in Lamont

Fig.35A B.broeggeri (Bancroft). Internal mould - entire cephalon, partially damaged. 7/24. Loc.7 (SH 57294132 - see map 2). Portreuddyn Slate, Upper Glanrafon Beds. MH x 4.7

Fig.35B B.soudleyensis (Bancroft). Cast of internal mould - entire cephalon. Dorsal view. 53/27. x 3.7

Fig.35C B.soudleyensis (Bancroft). As above. Anterior view. 53/27. x 4.1

Loc.53 (SH 57304240 - see map 2). Gorllwyn Slate, Upper Glanrafon Beds. MH

Ampyx cf. linleyensis Whittard of Whittard 1955

Fig.36A Internal mould - almost complete dorsal exoskeleton (small holaspid ?), although damaged on right side. 8/227. x 4

Plate 7 cont.

Fig.36B Internal mould - lateral view of pygidium to show characteristic terrace lines on posterolateral border. (Note associated brachial valve of Sericoidea). 8/182. x 4

Fig.36C Internal mould - entire, distorted pygidium. Dorsal view.(Same pygidium as figured in fig.36B). 8/182. x 3.3

Loc.8 (SH 56914139 - see map 2). Portreuddyn Slate, Upper Glanrafon Beds. MH

PLATE 8

37A

37C

37D

37B

37F

37E

37G

37H

37I

37J

37K

37L

37M

37N

38

39A

37P

39B

PLATE 8

FLEXICALYMENE Shirley

Fig.37A F.cf.acantha Bancroft of Dean 1963a. Dorsal view of internal mould - entire cranidium. 8/226. x 3

Fig.37B As above. Right lateral view. 8/226. x 5.8

Loc.8 (SH 56914139 - see map 2). Portreuddyn Slate, Upper Glanrafon Beds. MH

Fig.37C F.caractaci (Salter). Dorsal view of external cast - almost entire cranidium (note granulated test). 243/48. x 4.2

Fig.37D F.caractaci (Salter). Dorsal view of external cast - almost entire cranidium. 244/9. x 3.1

Fig.37E F.caractaci (Salter). Left lateral view (as above). 244/9. x 2.8

243/48 - Loc.243 (SH 78655759 - see map 5).

244/9 - Loc.244 (SH 78535755 - see map 5).

Both localities from intercalated sediments from the Lower Crafnant Volcanic Formation. BYC

Fig.37F F.planimarginata (Reed). Dorsal view of internal mould - partially damaged cranidium. Note characteristic straight, transversely directed margin of frontal glabellar lobe. 183 2/127. x 2.3

Fig.37G F.planimarginata (Reed). Right lateral view of internal mould - partially damaged cranidium. No ridge is developed in the preglabellar area. 183 2/A. x 3.5

Fig.37H F.planimarginata (Reed). Dorsal view of internal mould - partially damaged cranidium. Note characteristic straight, transversely directed margin of frontal glabellar lobe. 183 2/101. x 3.7

Fig.37I F.planimarginata (Reed). Right lateral view (same specimen as figured in fig.37H). Note evenly sloping preglabellar area. 183 2/101. x 3

Loc.183 (SH 71045089 - see map 3). Glanrafon Beds. D(SW)

Flexicalymene sp.A (sp.nov.?)

The shape and extension (with relation to the anterior parts of the cheeks) of the frontal lobe of this species seem to negate comparison with either F.planimarginata or F.caractaci although the evenly sloping preglabellar area implies assignment to the genus Flexicalymene. The author consequently chooses to provisionally assign this species to Flexicalymene (Onnicalymene) scabustula Siveter as figured by Siveter

Plate 8 cont.

(1976,p.366-373). Future work is, however, required to determine whether such a comparison is valid : the position of the palprebral lobe with respect to the glabellar lobes is important (op.cit.) - fig.37J shows the lobe (although poorly preserved) apparently opposite lobe 2p (= Flexicalymene (Flexicalymene)), whereas fig.37K shows the palprebral lobe seemingly slightly more posteriorly placed (= Flexicalymene (Omnicalymene)). Forms compared with F. (O.) scabustula (op.cit.,p.372-373, fig.10J,p.375) have been recovered from the Lower Chasmops Limestone (= Lower and Upper Longvillian) which corresponds to the horizon at which these Snowdonian flexicalymenines are found.

Fig.37J Dorsal view of internal mould - partially damaged cranidium. 244/47. x 3.2

Fig.37K Dorsal view of external cast - almost entire cranidium. Note granulated cuticle. 244/12. x 2.5

Fig.37L Left lateral view of internal mould of cranidium - note evenly sloping preglabellar area. 244/58. x 3.2

Fig.37M Right lateral view of internal mould of strongly distorted cranidium - slight ridging in preglabellar area may have resulted from tectonic distortion. 247/83. x 3.1

244/12,47,58 - Loc.244 (SH 78535755 - see map 5).

247/83 - Loc.247 (SH 74425788 - see map 5).

Both localities from intercalated sediments within the Lower Crafnant Volcanic Formation. BYC

(SIVETER, D.J. 1976. The Middle Ordovician of the Oslo Region, Norway. 27. Trilobites of the family Calymenidae. Nor.geol.Tidsskr. 56, 335-396.).

Fig.37N Flexicalymene (Reacalymene) limba (Shirley). Dorsal view of internal mould - entire cranidium. Note angulation of basal glabellar lobe (1p), although margin of frontal glabellar lobe is not as rounded as is usual for F.(R.)limba. 183 2/120. x 3.4

Fig.37P F. (R.) limba (Shirley). Right lateral view of internal mould (as figured in fig.37N). Note distinct characteristic change in slope of preglabellar area. 183 2/120. x 3.6

Loc.183 (SH 71045089 - see map 3). Glanrafon Beds. D(SW)

Plate 8 cont.

Brongniartella bisulcata (M'Coy)

Fig.38 Internal mould - cranidium. Dorsal view. Tectonic distortion has caused fragmentation of the cranidium into seemingly regular shaped "plates". 121/1. Loc.121 (SH 55414696 - see map 2). Calcareous tuffs, uppermost horizons of Lower Rhyolitic Tuff. MH

Kloucekia apiculata (M'Coy)

Fig.39A Internal mould - entire cranidium. Right lateral view. Note characteristic large, schizochroal eye. 173/52. x 5.1

Fig.39B Internal mould - pygidium. 173A/15. x 3.05

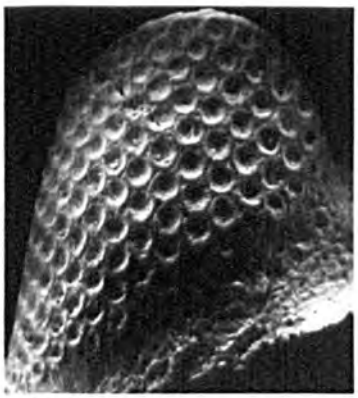
173/52 - Loc.173 (SH 71525147 - see map 3).

173A/15 - Loc.173A (SH 71565148 - see map 3).

Both localities from Glanrafon Beds. D(SW)

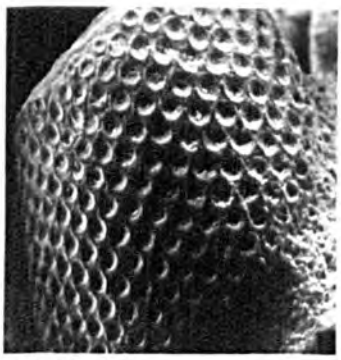
PLATE 9

39C

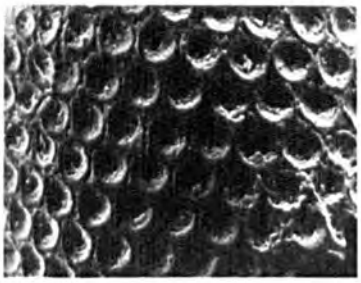


39E

39D

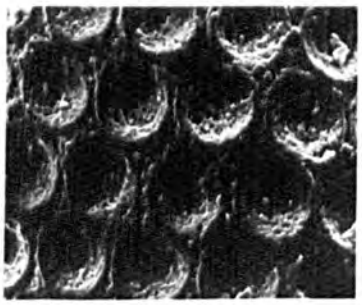


39F



39G

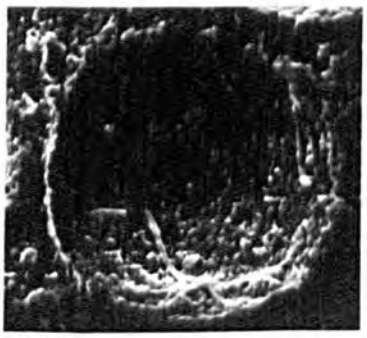
41A



39H

40A

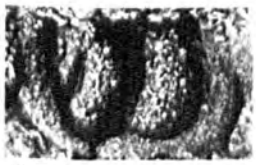
41B



39I

40B

41C



42A

40C

42B

PLATE 9

Kloucekia apiculata (M'Coy)

Fig.39C Dorsal view - internal mould. Almost entire, partially damaged cephalon. Note large schizochroal eyes. 175/A. c.x 5

Fig.39D Internal mould - distorted pygidium. 175/65. x 2.9

Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW)

Figs.39E-I SEM (Scanning electron microscope) photographs of details of a schizochroal eye (right) from the specimen of K.apiculata figured in fig.39C. Figs. 39E and F show two slightly different views of the eye, whereas figs.39G-I illustrate the appearance of individual lenses at increasing magnifications. In the figured eye, each individual lens has been lost, leaving just shallow depressions which represent moulds of the undersurface of the intralensar bowls - as the edges of the bowls (= lensar pits) possess positive relief, it is probable that the shallow sclera between each lens has also been lost (see Clarkson 1968,p.387,fig.1C; see also Levi-Setti 1975,p.34). Note hexagonal close packing of the lenses and the smaller lenses at the terminations of each lens file.

Fig.39E x 17.7

Fig.39F x 17.7

Fig.39G x 34.7

Fig.39H x 67.55

Fig.39I x 230

(LEVI-SETTI, R. 1975. Trilobites - a photographic atlas. University of Chicago Press, Chicago, 213pp.

Estonioos alifrons (M'Coy)

Fig.40A Dorsal view - internal mould. Glabella and part of cranidium. 179/100. x 2.7

Fig.40B Dorsal view - cast taken from external mould. Entire cephalon. Note coarse tubercles on cuticle and large schizochroal eyes. 179/121. x 1.85

Fig.40C E.alifrons ? - pygidium. External cast. 179/103. x 1.3

Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW)

Plate 9 cont.

Platylichas nodulosus (M'Coy)

Fig.41A Platylichas sp. (nodulosus ?). External cast - hypostome (partially damaged). Associated with cast of P.nodulosus as figured in fig.41B. 179/69. x 3.7

Fig.41B Internal mould - glabella. 179/95. x 2.9

Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW)

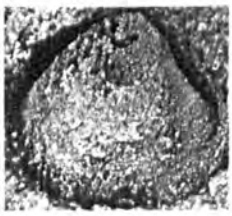
Fig.41C Internal mould - glabella. 243/55. Loc.243 (SH 78655759 - see map 5). Intercalated sediments from the Lower Crafnant Volcanic Formation. BYC x 4.9

TALLINNELLA Öpik

Fig.42A Tallinnella sp.(scripta Harper ?). External mould - right valve. 180/73. Loc.180 (SH 71995167 - see map 3). Glanrafon Beds. D(SW) x 13.5

Fig.42B T.sp.(scripta Harper ?). External cast - left valve. 196/1. Loc.196 (SH 71225136 - see map 3). Glanrafon Beds. D(SW) x 16

PLATE 10

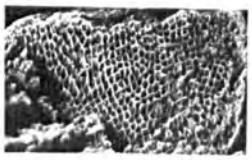

43

44

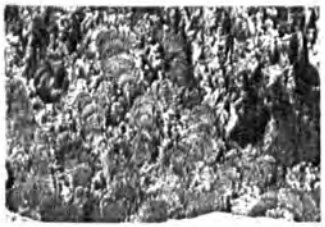
45

48A

46


47

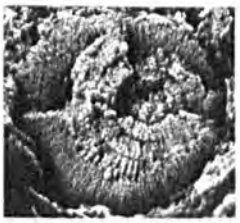
48B


49

50A

51A

52A


50B

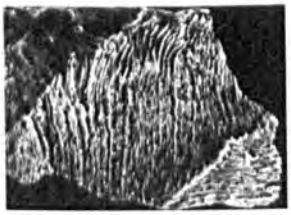
51B

52B

52D

52F

52C


52E

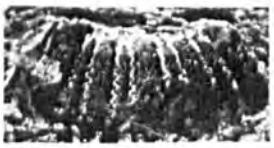

52G

PLATE 10

Nuculoid, gen.et sp.indet.

Fig.43 Internal mould - right valve. Possibly referable to Similodonta sp.? - see Cox et al.1969,N 229, fig.A2/3a,b, N 230; McAlester 1968,p.50,51,plate 11,figs.1-10,p.88-89; also see Soot-Ryen 1960, cf. Ctenodonta spjeldnaesi Soot-Ryen,p.87-89,plate 1, figs.4,6.
The specimen similarly bears a crude superficial resemblance to Ctenodonta varicosa Salter as depicted by Salter (in Ramsay 1866,p.343,fig.13/1).

179/32. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 4.6

Pterineid, gen.et sp.indet.

Fig.44 External cast - left valve. Possibly referable to Palaeopteria sp.indet. (Cox et al.1969, N 300,fig. C 35/2b, N 301). 195/97. Loc.195 (SH 71465117 - see map 3). Glanrafon Beds. D(SW). x 0.9

Orthoconic cephalopod ("Orthoceras" sp.indet.)

Fig.45 Internal mould - conch. 242/A. Loc.242 (SH 77865577 - see map 5). Cleaved, fine grained, black siltstone within Carneddau Group sediments. BYC x 0.8

Bellerophontacean gastropod, gen.et sp.indet.

Fig.46 Small internal mould. 179/124. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 13.2

Orbignyella favulosa (Phillips)

Fig.47 Part of upper surface of zoarium. cf.Spjeldnaes 1957,p.367-368,plate XII,figs.3,7 and Spjeldnaes 1963,p.259,plate 36,fig.3,plate 37,figs.12a,b. 197B/5. Loc.197B (SH 72455056 - see map 3). Glanrafon Beds. D(SC) x 4.6

(This species is not included within the faunal list for loc.197B - initially this specimen was erroneously referred to Favosites sp.).

(SPJELDNAES, N. 1957. A redescription of some Type Specimens of British Ordovician Bryozoa. Geol.Mag. 94, 364-376.

SPJELDNAES, N. 1963. Some silicified Ordovician fossils from South Wales. Palaeontology.London. 6, 254-263.).

Plate 10 cont.

TENTACULITES Schlotheim

Fig.48A T.sp.(ornatus ? J.de C.Sowerby; anglicus ? Salter). Cast of interior within external mould. 173A/33. x 5.1

Fig.48B T.sp. External mould - striated longitudinally. (perhaps better referred to Cornulites Schlotheim - see Boucek 1964). 173A/143. x 6

Loc.173A (SH 71565148 - see map 3). Glanrafon Beds. D(SW)

SOLENOPORA Dybowski

Fig.49 Solenopora ? sp.indet. Thallus (thalli ?), apparently dichotomously branching. Generic assignment tentative at present - could also be compared with either Parachaetetes Deninger or Petrophyton Yabe (see Johnson 1952; Johnson & Hoeg 1961). 225/114. Loc.225 (SH 76125104 - see map 3). Glanrafon Beds. D(SE) x 3.1

(JOHNSON, J.H & HOEG, O.A. 1961. Studies of Ordovician algae. Q.Colorado Sch.Mines. 56, 1-101.).

cf.Dasyporella norvegica Hoeg of Johnson 1952, Johnson & Konishi 1959 and Johnson & Hoeg 1961

Fig.50A Transverse section through cylindrical thallus. Note the peripheral calcareous wall displaying cell rows dispersed perpendicular to the central area as well as to the thallus surface. D.norvegica Hoeg was originally included in the family Dasycladaceae (Johnson 1952) but is now provisionally included within the class Rhodophyceae (Johnson & Konishi 1959; Johnson & Hoeg 1961). 225/114. x 6

Fig.50B As above. 225/108. x 4.35

Loc.225 (SH 76125104 - see map 3). Glanrafon Beds. D(SE)

Lepidocoleus suecicus Moberg

Fig.51A Internal mould - part of single plate. 173A/12. Loc.173A (SH 71565148 - see map 3). Glanrafon Beds. D(SW) x 15.6

Fig.51B External mould - part of single plate. 241/63. Loc.241 (SH 78635588 - see map 5). Carneddau Group sediments. BYC x 6.8

Plate 10 cont.

cf. Balacrinus basalis (M'Coy) of Ramsbottom 1961

Fig.52A Internal mould - part of cup. Note stellate ridges emanating from centre of each plate (radials). 195/78. Loc.195 (SH 71465117 - see map 3). Glanrafon Beds. D(SW) x 1.85

Fig.52B Almost complete calyx with part of stem attached. Stem comes in on left side of specimen; poorly preserved cup - left centre; arm with pinnates - right centre, extending to right edge of specimen. 112/79. x 1.4

Fig.52C Stem segments (pluricolumnals) (top of specimen) associated with arm and pinnates (right centre). 112/67. x 1.1

Fig.52D Part of arm with pinnates. Mould. 112/159. x 2.3

Fig.52E Complementary cast. 112/A. x 2.4

Loc.112 (SH 56124381 - see map 2). Gorllwyn Slate, Upper Glanrafon Beds. MH

Pluricolumnals (Balacrinus sp.?)

Fig.52F Internal cast. Note different thicknesses of columnals ("thick" columnals = nodals; "thin" columnals = internodals) and symplectial articulation. 175/179. x 5.2

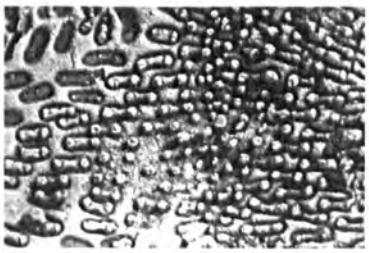
Fig.52G As above. Note well defined symplectial articulation. Same columnal size range and arrangement as in fig. 52F implies both pluricolumnals could be assigned to a form genus. 175/124. x 7

Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW)

PLATE II

53A

53B



53C

54A

54B

54C

55

54D

54E

56

57

58

PLATE 11

Haplosphaeronis multifida Paul

Fig.53A Entire theca. Note part of stem still attached. 243/47. x 2

Fig.53B Detail of diplopores. 243/47. x 6.5

Fig.53C Detail of diplopores. 243/48. x 5.7

Loc.243 (SH 78655759 - see map 5). Intercalated sediments within the Lower Crafnant Volcanic Formation. BYC

Phylum BRYOZOA

Fig.54A Monotrypa sp.?/ Diplotrypa sp.? (see McNamara 1978). 173/121. x 4.1

Fig.54B Brachial valve of Sowerbyella completely encrusted by a bryozoan (gen.et sp.indet.) zoarium (cf. McNamara 1978). The valve, being within the centre of the zoarium, probably provided a hard surface on which the juvenile colony initially developed. 173/11. x 3.2

Fig.54C Bicuspina spiriferoides (M'Coy) (pedicle valve) completely encrusted by cyclostomate bryozoan (gen.et sp.indet.) - post-mortem encrustation. LCYM 9 x 2.3

Fig.54D "Anastomosing bryozoa" (gen.et sp.indet.) 175/13 x 0.7

Fig.54E "Circular bryozoan" representing the base of the zoarium of a trepostome bryozoan (batostomellid ? - Esthoniopora/Orbipora ;trematoporid ? - Monotrypa/Diplotrypa). 175/194. x 1.5

173/11,121 - Loc.173 (SH 71525147 - see map 3).

175/13,194 - Loc.175 (SH 71765161 - see map 3).

Glanrafon Beds. D(SW)

LCYM 9 - Loc.LCYM (SH 63104720 - see map 6). Upper Grits, Glanrafon Beds. EB

CYCLOCYSTOIDES Salter & Billings

Fig.55 Disarticulated, three-faceted submarginal ring plate - sp.indet. (C.caractaci Salter ? ; C.marstoni Salter ?). 178/36. Loc.178 (SH 71975183 - see map 3). Intercalated tuffaceous sediments between the Lower Rhyolitic Tuff and Bedded Pyroclastic Formations. D(SW) x 10.7

Plate 11 cont.

Examples of intra-assemblage generic/specific associations

Fig.56

Left centre	-	Sericoidea pedicle internal mould
Top left	-	Bryozoan zoarium
Middle	-	Onniella pedicle internal mould
Bottom	-	Dalmanella ? brachial internal mould

Sericoidea - Onniella - characteristic association within Sericoidea community.

179/82. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation D(SW) x 2.6

Fig.57

Left centre	-	damaged cephalon of Estoniops alifrons (M'Coy). Internal mould.
Right	-	Nicolella cf.actoniae obesa Williams of Williams 1963. Pedicle internal mould.

Upper Longvillian association.

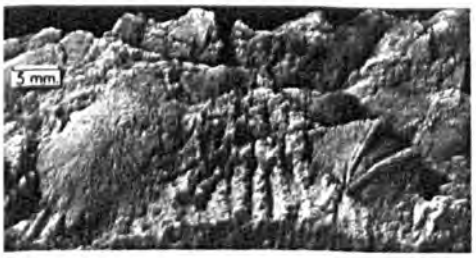
179/138. Locality as for fig.56. x 2.6

Fig.58

Left centre	-	Parabasilicus powisi (Murchison) Pygidium - internal mould.
Centre	-	small Sowerbyella sp.indet. pedicle internal mould.
Right centre	-	Kjaerina jonesi Bancroft. Pedicle internal mould.

Characteristic association within dalmanellid - sowerbyellid "mega"community and possibly for the Lower Longvillian. 175/58. Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW) x 1.2

PLATE 12



59

60

61

62

PLATE 12

Fig.59

Left - Kjaerina jonesi Bancroft. Pedicle internal mould.

Right - Bicuspina spiriferoides (M'Coy), Pedicle internal mould.

Probable Lower Longvillian association.

173/176. Loc.173 (SH 71525147 - see map 3). Glanrafon Beds. D(SW)

Fig.60

Possible Sericoidea "life cluster" (after Pickerill 1974). Many specimens are still articulated. Also characteristic brachiopod for the Sericoidea community. 179/122. Loc.179 (SH 71925193 - see map 3). Lowest part of the Upper Rhyolitic Tuff Formation. D(SW) x 1.6

Fig.61

Left centre	-	Sowerbyella sp.indet. Pedicle internal mould.
Left bottom centre	-	Dalmanella ? sp.indet. Fragment of brachial internal mould.
Bottom	-	Several internal moulds of Tallinnella (scripta Harper ?).
Extreme right bottom	-	Fragments of external moulds of Tentaculites sp.
Top right, centre right	-	Fragments of bryozoa zoaria
Top right, adjacent (left) to bryozoan zoarium fragment	-	Small dalmanellid pedicle internal mould

Probable Lower Longvillian association - also implies assemblage could be assigned to the dalmanellid-sowerbyellid "mega"community.

175/180. Loc.175 (SH 71765161 - see map 3). Glanrafon Beds. D(SW) x 1.8

Fig.62

Algal association.

Left - Solenopora ? sp.indet. Thalli.

Right - Three cylindrical thalli referred to Dasyporella norvegica Hoeg.

Such an association has thus far been identified at only one locality from the Glanrafon Beds (Soudleyan) in Snowdonia. 225/114. Loc.225 (SH 76125104 - see map 3). Glanrafon Beds. D(SE) x 2

Appendix One

A classification of the disarticulated crinoid columnals from the Snowdonian shelly assemblages

The basis for this classification is taken from Moore (1939), Moore & Jeffords (1968), Moore et al. (1968) and Yeltysheva (1956).

The scheme of classification is based on the shape of the columnals itself and the lumen.

The "systematic names" consist of two parts, e.g., Cyclo/cyclopa. The first part of the name refers to the gross external shape of the columnal, e.g.,

Cyclo-	the columnal is circular
Penta-	the columnal is pentagonal
Hexa-	the columnal is hexagonal
Pentastella-	the columnal is stellate(star-shaped) with five radiating arms
Hemicyclo-	the columnal is semi-circular

Elliptical columnals are referred to the Cyclici (Moore et al.1968,p.26), in which is placed the Cyclo-group, as the former columnals are probably tectonically distorted.

The second part of the name refers to the shape of the central canal (lumen) and follows the same scheme as above, which differs from the scheme proposed by Yeltysheva (1956) who refers the first part of the name to the lumen shape and the second part to

the columnal shape.

The terminology for the different groups is after Moore (1939) e.g.,

Cyclocyclopa - columnals with a circular outline and circular lumen

Cyclopentastellatopa - columnals with a circular outline and five-armed stellate lumen

Pentagonocyclopa - columnals with a pentagonal outline and circular lumen, etc..

Division within these groups is based on the patterns and size of the crenulae (Moore et al.1968,p.28), the size of the areola (if developed - op.cit.,p.27) etc..

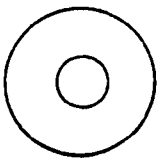
Fragments of articulated crinoid stems are termed Pluricolumnals (op.cit.,p.29). Occasionally the component columnals of a pluricolumnal can be assigned to one of the aforementioned columnal groups. In some pluricolumnals the type of articulation is visible, which is mostly symplectic (op.cit.,p.13,30).

Any ossicle forming part of a cirrus (op.cit.,p.28) is termed a cirral and is usually less than 2-3 mm. in width, with a simple rounded lumen and smooth articulum (op.cit.,p.27).

Arm ossicles are termed Pinnates (Moore 1939,p.242-250) and are divided into two types, primarily on size.

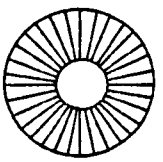
CYCLOCYCLOPA

This group is included within the Cyclici (Moore et al.1968). Columnals assigned to this group are circular -subcircular in shape, and are characterised by the possession of a circular lumen.



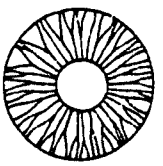
Cyclocyclopa A

Circular lumen;the zygum is completely smooth and undifferentiated.



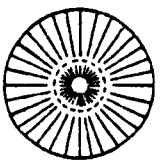
Cyclocyclopa A_1

Circular lumen;a wide crenularium is present,which effectively comprises the whole of the zygum;the radial crenulae are well defined and unbranched;no areola is differentiated.



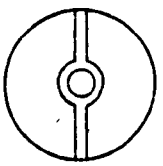
Cyclocyclopa B

Circular lumen;a wide crenularium, effectively comprising the whole of the zygum,is present;the radial culmina commonly bifurcate towards the columnal latus;no areola is differentiated.



Cyclocyclopa C

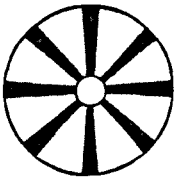
Circular lumen;a wide crenularium is present,which is divisable into an inner and outer part.The inner band of crenulae is narrow,with no branching culminae.The outer band of crenulae is much broader,with frequently branching culmina.A narrow,smooth areola is occasionally developed.



Cyclocyclopa D

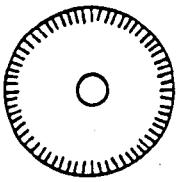
Circular lumen;a median ridge(fulcral ridge)is present,which extends across the zygum.The presence of such a ridge usually indicates some degree of flexible articulation in the crinoid stem (synarthry).The zygum is undifferentiated, but is divided by the ridge into two

smooth bifascial fields.



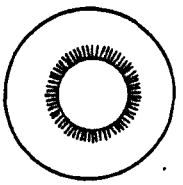
Cyclocyclopa E

Circular lumen;a wide crenularium,with thick culmina,is present.The culmina occasionally bifurcate towards the periphery and thin towards the lumen.No areola is differentiated.



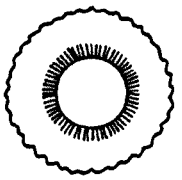
Cyclocyclopa F

Circular lumen;a wide lumen is present, surrounded by a narrow peripheral crenularium,with small,thin,simple culmina; this columnal type possesses granulose latera.



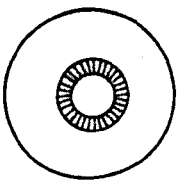
Cyclocyclopa G

Circular lumen of variable size;the zygum is completely smooth,with a narrow band of simple,fine crenulae rimming the central lumen.



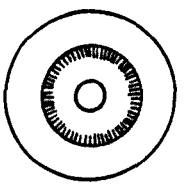
Cyclocyclopa G_1

As for Cyclocyclopa G,except Cyclocyclopa G_1 possesses finely crenulate latera.



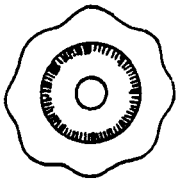
Cyclocyclopa H

As for Cyclocyclopa G,except the narrow, radially ornamented perilumen is depressed within the zygum,forming a narrow circular groove.



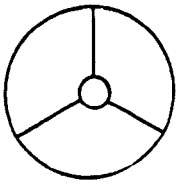
Cyclocyclopa J

Circular lumen of variable size;fairly wide,smooth,flat areola;a narrow crenularium surrounds the areola,which,in turn,is surrounded by a fairly wide, smooth rim.



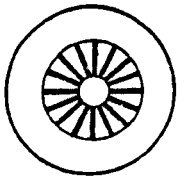
Cyclocyclopa J_1

As for Cyclocyclopa J,except that Cyclocyclopa J_1 possesses broadly crenulate latera.



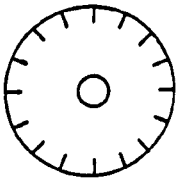
Cyclocyclopa K

Small circular lumen;no crenularium or areola is developed.The smooth articular surface (zygum)is traversed by three,thin radiating ridges.



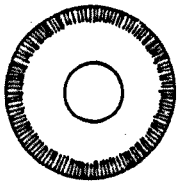
Cyclocyclopa L

Circular lumen of variable size;the crenularium extends to the central lumen and is composed of broad crenulae.The crenularium is surrounded by a wide smooth rim.



Cyclocyclopa M

Very small circular lumen;a broad,peripheral crenularium is developed,with well defined,broad crenulae;a fairly wide, smooth areola surrounds the lumen.

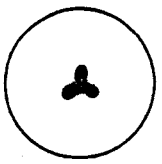


Cyclocyclopa N

Wide circular lumen;a peripheral crenularium is developed,with well defined crenulae,which are slightly finer than those of Cyclocyclopa M;a fairly wide, smooth areola surrounds the lumen.

CYCLOTRISTELLATOPA

This group is included within the Cyclici (Moore et al.1968).Columnals assigned to this group possess a circular - subcircular shape,and are distinguished by a characteristic tristellate or triangular lumen.



Cyclotristellatopa A

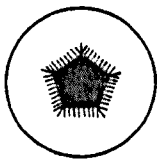
- Tristellate lumen;the zygum is undifferentiated and completely smooth.

Cyclotristellatopa B

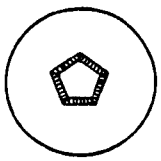
Triangular lumen;the smooth,undifferentiated zygum is traversed by three radiating ridges,each ridge originating at each apex of the triangular lumen.

CYCLOPENTAGONOPA

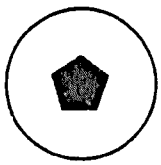
This group is included within the Cyclici (Moore et al.1968).Columnals assigned to this group are circular - subcircular in shape,and are characterised by the possession of a pentagonal lumen.



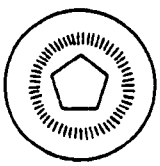
Cyclopentagonopa A
Pentagonal lumen;the zygum is completely smooth and undifferentiated,except for a narrow band of simple,fine crenulae rimming the central lumen.



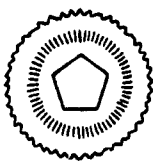
Cyclopentagonopa B
As for Cyclopentagonopa A,except that the narrow lumen rim is depressed within the zygum,forming a narrow groove.



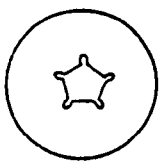
Cyclopentagonopa C
Pentagonal lumen;the zygum is completely smooth and undifferentiated.



Cyclopentagonopa D
Pentagonal lumen;an areola surrounds the lumen;a fairly broad,smooth rim is developed beyond the narrow intermediate crenularium.

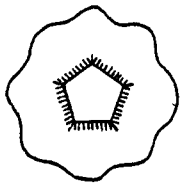


Cyclopentagonopa E
As for Cyclopentagonopa D,except that the latera are finely crenulate.



Cyclopentagonopa F
As for Cyclopentagonopa C,except that a small lobe is developed at each apex of the pentagonal lumen.

Cyclopentagonopa G
Pentagonal lumen;the zygum is undifferentiated and smooth,but is traversed by paired,well defined culmina,with each pair originating from each of the apices of the pentagonal lumen.The culmina of each pair diverge towards the periphery.

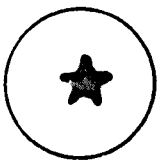


Cyclopentagonopa H

As for Cyclopentagonopa A, except that the latus of each columnal is regularly crenulate.

CYCLOPENTASTELLATOPA

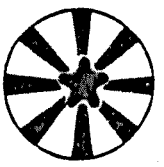
This group is included within the Cyclici (Moore et al.1968). Columnals assigned to this group are circular - subcircular in shape, and are characterised by the possession of a pentastellate lumen.



Cyclopentastellatopa A
Pentastellate lumen;the zygum is completely smooth and undifferentiated.

Cyclopentastellatopa B
Pentastellate lumen;a crenularium is developed,which occupies almost all of the articular surface(zygum);a narrow areola may be developed around the central lumen.

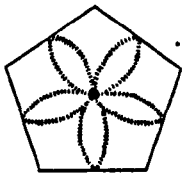
Cyclopentastellatopa C
Pentastellate lumen;a narrow,peripheral, rimming crenularium is developed,with fine,simple crenulae,which surrounds a wide,smooth areola.



Cyclopentastellatopa D
Pentastellate lumen;the zygum consists entirely of a crenularium composed of extremely broad culmina and crenellae, which widen as they radiate towards the latus of the columnal.

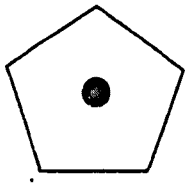
PENTAGONOCYCLOPA

This group is included within the Pentameri (Moore et al,1968). Columnals assigned to this group possess a pentagonal - quinquelobate shape and a variably sized circular lumen.



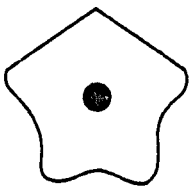
Pentagonocyclopa A

Circular lumen;the zygum is divided into five petaloid areas,each area being bounded by very short,fine crenulae.The floor of each petaloid area is smooth and flat.Smooth flat areas (radial spaces) are noted between the petaloid areas.



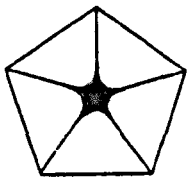
Pentagonocyclopa B

Circular lumen;the zygum is completely smooth and undifferentiated.



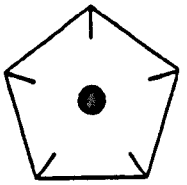
Pentagonocyclopa B_1

As for Pentagonocyclopa B,except that the lower half of the columnal has a lobate form.The overall shape of the columnal appears to be a combination of the pentagonal and quinquelobate forms. It is possible that Pentagonocyclopa B, B_1 and F (see later)are all derived from the same heteromorphic crinoid stem,which perhaps showed a columnal change along the stem from Type B to Type F,or vice versa,with Type B_1 occupying an intermediate position between the two end-members.



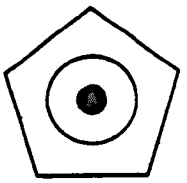
Pentagonocyclopa C

Small circular lumen;the zygum is completely smooth and undifferentiated,but is traversed by five,radiating,fine ridges,which originate at the lumen,and terminate at each apex of the pentagonal columnal.



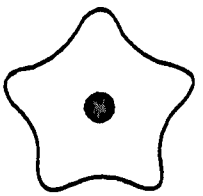
Pentagonocyclopa D

Small circular lumen;the zygum is completely smooth and undifferentiated;five fine ridges originate at each apex of the pentagonal columnal,but are laterally discontinuous across the articular surface,and do not extend to the central lumen.



Pentagonocyclopa E

Small circular lumen;the zygum is completely smooth and undifferentiated,except for a concentric depressed groove, which is found on the articular surface, approximately half way between the periphery and the latus.

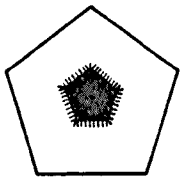


Pentagonocyclopa F

Variably sized circular lumen;the columnal is characterised by a quinquelobate outline.The zygum is smooth and undifferentiated.

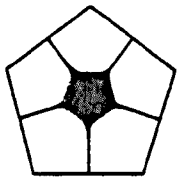
PENTAGONOPENTAGONOPA

This group is included within the Pentameri (Moore et al.1968). Columnals assigned to this group possess a pentagonal or quinquelobate shape,along with a pentagonal or quinquelobate lumen.



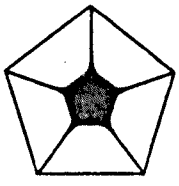
Pentagonopentagonopa A

Pentagonal shape;pentagonal lumen;the zygum is completely smooth and undifferentiated,with a narrow band of simple, fine crenulae rimming the central lumen.



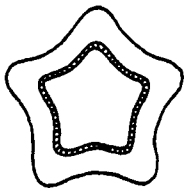
Pentagonopentagonopa B

Pentagonal shape;pentagonal lumen;the lumen is in an "inverted" position in relation to the pentagonal outline of the columnal,in that the orientation of the top apex of the lumen does not correspond with the orientation of the top apex of the pentagonal columnal,as it does in Pentagonopentagonopa C (see later).Five fine ridges originate at each apex of the pentagonal lumen,and they cut the periphery of the columnal approximately midway along each side.



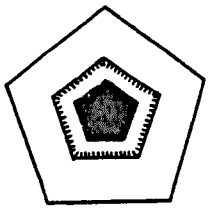
Pentagonopentagonopa C

As for Pentagonopentagonopa B,except the orientation of the lumen coincides with the overall pentagonal shape of the columnal.



Pentagonopentagonopa D

Quinquelobate columnal shape,extremely large quinquelobate lumen;the lumen is bordered by a slightly depressed groove, which follows the general outline of the lumen,and possesses simple,fine crenulae.

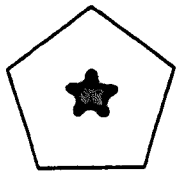


Pentagonopentagonopa E

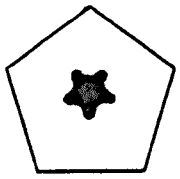
Pentagonal columnal shape;pentagonal lumen;a narrow crenularium,composed of short,fine,simple crenulae,is developed beyond a smooth,flat,narrow areola.The crenularium is surrounded by a moderately broad,smooth rim.

PENTAGONOPENTASTELLATOPA

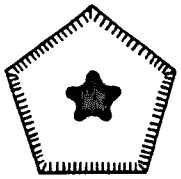
This group is included within the Pentameri (Moore et al.1968). Columnals assigned to this group possess a pentagonal outline,and a well developed pentastellate lumen.



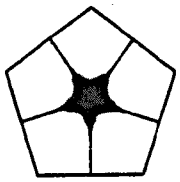
Pentagonopentastellatopa A
Pentastellate lumen;the orientation of the lumen coincides with the overall pentagonal columnal shape (i.e.,the top apex of the lumen coincides with the top apex of the pentagonal lumen).The zygum is completely smooth and undifferentiated



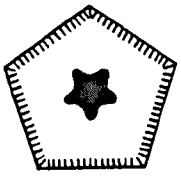
Pentagonopentastellatopa B
As for Pentagonopentastellatopa A,except that the pentastellate lumen is in the "inverted" position.



Pentagonopentastellatopa C
Pentastellate lumen;a narrow peripheral crenularium,composed of simple,fine crenulae,rims a broad,flat,smooth areola.



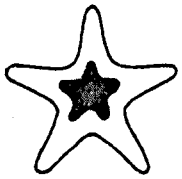
Pentagonopentastellatopa D
As for Pentagonopentastellatopa B,except for five,fine ridges which traverse the otherwise smooth zygum.The ridges originate at each of the apices of the pentastellate lumen,and cut the periphery of the columnal approximately midway along each side.



Pentagonopentastellatopa E
As for Pentagonopentastellatopa C,except that the pentastellate lumen is in the "inverted" position.

PENTASTELLAPENTASTELLATOPA

This group is included within the Pentameri (Moore et al.,1968). Columnals assigned to this group possess a general pentastellate outline, coupled with a pentastellate lumen.

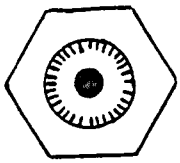


Pentastellapentastellatopa A

Pentastellate lumen;the orientation of the pentastellate lumen corresponds with the overall pentastellate shape of the columnal.The complex zygum is completely smooth and undifferentiated.

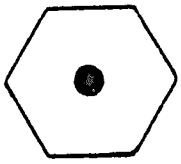
HEXAGONOCYCLOPA

This group is included within the Varii (Moore et al.,1968),as the columnals appear to possess a hexagonal cutline.The lumen is circular,and is moderately wide.



Hexagonocyclopa A

Circular lumen;the moderately wide,flat, smooth areola is surrounded by a narrow intermediate crenularium,possessing simple,fine crenulae.Beyond the crenularium,a smooth,broad rim is developed.

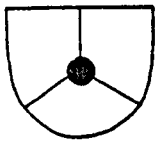


Hexagonocyclopa B

Circular lumen;the zygum is smooth and undifferentiated.

HEMICYCLOCYCLOPA

This group is included within the Varii (Moore et al.1968).Columnals assigned to this rare group are generally semicircular in shape,the actual columnal outline being approximately U-shaped.



Hemicyclocyclopa A

Circular lumen;the zygum is completely smooth and undifferentiated,but is traversed by three thin radiating culmina.

Appendix Two

The following lists show the faunal composition of all the localities sampled during the course of research in Snowdonia. The actual localities are to be found on the locality maps included with this thesis.

For each locality, the faunal data is split into two parts:-

a) All fossil material which was quantitatively assessed, e.g., brachiopods, trilobites, ostracodes, gastropods etc.

b) All fragmental fossil material which was only relatively assessed, e.g., disarticulated crinoid columnals and pinnates, bryozoan fragments etc.

The vertical columns for the quantified data are, from left to right, as follows:-

i) Genus/group

ii) Opposing valve and articulated valve counts

iii) Ratio of opposing valves

iv) Articulation Ratio

v) % of total

i) Genus/group

For each individual genus or species cited, authorship is excluded for the sake of brevity.

An entry such as "*Macrocoelia* cf. *expansa* of Williams 1963" means that this particular species of *Macrocoelia* is compared to *Macrocoelia expansa* as figured by Williams (1963), this reference being given in full in the bibliography.

ii) Opposing valve and articulated valve counts

These are expressed quantitatively, as follows:-

20B:10P:10A

Therefore, for this particular genus, 20 brachial valves, 10 pedicle valves and 10 articulated shells were counted.

When calculating what % of the total this genus represents, the total number, for this genus, is taken as the number of the most abundant disarticulated part (i.e., 20 brachial valves) plus those still articulated (10), thus making the individual total 30. This is the figure used when calculating the % of the total for any particular locality.

iii) Ratio of opposing valves

The opposing valve count is expressed as a ratio, the least abundant part always being represented as unity.

iv) Articulation Ratio

This is the ratio of the articulated shells to the most abundant disarticulated part (brachial or pedicle valve), the latter always being expressed as unity.

The above four categories are applied only to brachiopods.

v) % of total

This is the individual total for each group/genus/species, expressed as a % for the total quantified assemblage (excluding fragmental remains).

Following on from the data regarding the fragmental remains is the :-

a) Genera number

This value represents the total number of individual genera/species noted within a particular assemblage.

b) Total specimen number

This value represents the actual number of fossiliferous specimens which were examined in order to deduce the faunal composition for a particular locality.

c) Diversity Index

This value indicates the relative diversity of an assemblage :-

1 - 5	low diversity
5 - 9	medium diversity
9+	high diversity

Diversity is an important criterion to assess and is a measure of the number of genera/species present within one assemblage, but depends on the sample size, e.g.,

Six species may comprise an assemblage deduced from ten samples.

Twenty species may comprise an assemblage deduced from one hundred samples.

Nevertheless, this does not necessarily indicate that the second assemblage is more diverse than the first, as the individual sample sizes are different.

An initial solution would be to collect equal sized samples from each locality whilst in the field, although

this is not always practical, due to variable induration, outcrop nature, poor preservation, bedding - cleavage relationships, etc.

A second solution would be to examine a fixed number of specimens (e.g.,100) from each locality, although the varying dimensions of each specimen partially negates this method.

The best solution is afforded by calculating the Diversity Index (Ziegler et al. 1968,p.4), :-

$$\text{Diversity Index} = \frac{\text{Number of genera/species in the sample}}{\text{Log. of the total number of individuals in the sample}}$$

The Diversity Index thus allows assemblages of variable sample size to be directly compared.

However, in order to calculate this Index, the total number of individuals needs to be known, which in turn necessitates some assessment of the numbers of those groups represented only by fragmented or disarticulated remains. An arbitrary system is proposed :-

40 crinoid columnals	=	1 complete individual
20 cystoid plates	=	1 complete individual
20 ramose bryozoan fragments	=	1 complete individual
20 machaeridian plates	=	1 complete individual

Any errors introduced will presumably affect all assemblages equally.

Once these groups have been assessed, their totals are added to the totals of the quantified groups and the Diversity Index equation may then be employed.

ERRATA

Within the faunal lists in Appendix Two, the author employs the term "triplesiaceids" for undifferentiated brachiopods of the order Triplesiidina Moore, 1952 (implying either Bicuspina or Oxoplecia).

However, the author now feels that either the term "triplesiaceans" (i.e., anglicisation of the superfamily Triplesiacea Schuchert, 1913) or "triplesiids" (i.e., anglicisation of the family Triplesiidae Schuchert, 1913) would be more correct. The author chooses to employ "triplesiaceans" throughout the text of this thesis.

Subsequent to the completion of the faunal lists, certain taxonomic changes have been implemented with regard to the brachiopods (Cocks 1978). Throughout the text of the thesis, attention is drawn to such changes in the form of footnotes. However, for Appendix Two, reference should be made to Cocks (1978) for further information concerning such modifications, e.g., op.cit., p.39, 50, 61, 65, 66, etc..

LOCALITY 4A	PORTREUDDYN SLATE	FRON OLEU SOUTH EAST OF MOEL HEBOG		
Sericoidea sp.	45B:41P:21A	1.10B:1.00P	0.47/1	60.33%
S.abdita	6B	6B	-	5.48%
Sericoidea sp. (cf.*Chonetoidea alpha* of Spjeldnaes 1957)	2B	2B	-	1.83%
Sowerbyellids	3B: 2P	1.50B:1.00P	-	2.74%
Dalmanellids	12B:10P:5A	1.20B:1.00P	0.42/1	15.54%
Dalmanella sp.	1B: 1P	1.00B:1.00P	-	0.91%
Onniella sp.	5B: 3P:1A	1.66B:1.00P	0.20/1	5.48%
Horderleyella sp.	1B	1B	-	0.91%
Rafinesquina sp.	2P	2P	-	1.83%
Broeggerolithus sp.	1.1	-	-	1.01%
B.cf.harnagensis of Dean 1960	0.1	-	-	0.09%
B.cf.broeggeri of Dean 1960	0.2	-	-	0.18%
Calymene sp.(s.l.)	1.4	-	-	1.28%
Flexicalymene sp.	0.3	-	-	0.27%
F.cf.acantha of Dean 1963	0.1	-	-	0.09%
Ampyx sp.	0.2	-	-	0.18%
Raphiophorids	0.3	-	-	0.27%
Thoracic segments	0.7	-	-	0.64%
Ostracode (?)	1	-	-	0.91%
				99.97

Cyclocyclopa A	15
Cirrals	5
Balacrinus basalis complete arm	1

LOCALITY 4A continued

Pluricolumnals	2	
Genera Number	13	Diversity Index 6.36
Total Specimen Number	100	

LOCALITY 7	PORTREUDDYN SLATE		HENDRE HYWEL SOUTH EAST OF MOEL HEBOG	
Sericoidea sp.	40B:34P:18A	1.18B:1.00P	0.45/1	56.70%
Sericoidea abdita	5B	5B	-	4.89%
Sericoidea sp.(cf. Chonetoidea alpha of Spjeldnaes 1957)	1B	1B	-	0.98%
Dalmanellids	10B:11P:7A	1.00B:1.10P	0.64/1	17.60%
Dalmanella sp.	1P:1A	1P	1/1	1.96%
Onniella sp.	3B: 1P:1A	3.00B:1.00P	0.33/1	3.91%
O.cf.soudleyensis of Williams 1963	1P	1P	-	0.98%
Sowerbyellids	2B: 1A	2B	0.50/1	2.93%
Horderleyella sp.	2P	2P	-	1.96%
Rafinesquina sp.	1P	1P	-	0.98%
Broeggerolithus sp.	1.4	-	-	1.37%
B.cf.broeggeri of Dean 1960	0.2	-	-	0.20%
Calymene sp.(s.l.)	1.1	-	-	1.08%
Flexicalymene (Reacalymene) pusulosa	0.4	-	-	0.39%
F.sp.	0.1	-	-	0.10%
Ampyx sp.	0.1	-	-	0.10%
Proetid librigenae	0.2	-	-	0.20%
Trilobite thorax, gen.et sp.indet.	1	-	-	0.98%
Thoracic segments	0.8	-	-	0.78%
Ostracode	1	-	-	0.98%
Tentaculites sp.	1	-	-	0.98%
				100.05

LOCALITY 7 continued

Cyclocyclopa A	3
Balacrinus basalis complete arms	5
Pluricolumnal	1
Cirrals	6

Genera Number 15 Diversity Index 7.43

Total Specimen Number 100

LOCALITY 8	PORTREUDDYN SLATE			FACH GOCH SOUTH EAST OF MOEL HEBOG		
Sericoidea sp.	612B:402P:642A			1.52B:1.00P	1.05/1	91.29%
S.abdita	23B			23B	-	1.67%
S.aff.restricta of Williams 1962	2B			2B	-	0.15%
Dalmanellids	33B:	37P:	18A	1.00B:1.12P	0.49/1	4.00%
Dalmanella sp.	1B:	1P		1.00B:1.00P	-	0.07%
Onniella sp.	17B:	9P:	9A	1.89B:1.00P	0.53/1	1.89%
Immature dalmanellid (?)		1P		1P	-	0.07%
Horderleyella sp. (?)		2B		2B	-	0.15%
Broeggerolithus sp.		0.4		-	-	0.03%
B.cf.harnagensis of Dean 1960		0.1		-	-	0.01%
Calymene sp.(s.l.)		2.2		-	-	0.16%
Flexicalymene cf. *acantha* of Dean 1963		0.1		-	-	0.01%
Flexicalymene (*Reacalymene*)cf. *pusulosa* of Shirley 1936		0.1		-	-	0.01%
Ampyx.cf.linleyensis of Whittard 1955		3.0		-	-	0.22%
Ampyx sp.		0.8		-	-	0.06%
Raphiophorids		0.8		-	-	0.06%
Remopleurides cf. *colbyi* of Whittington 1966		0.1		-	-	0.01%
Thoracic segments		1.0		-	-	0.07%
Alga		1		-	-	0.07%
						100.00

LOCALITY 8 continued

Cyclocyclopa A	4
Pluricolumnal	1
Ramose Bryozoan fragments	4

Genera Number	14	Diversity Index 4.46
Total Specimen Number	270	

LOCALITY 47	GORLLWYN SLATE	MYNYDD GORLLWYN SOUTH EAST OF MOEL HEBOG		
Dalmanellids	8B:5P:7A	1.60B:1.00P	0.88/1	30.49%
Dalmanella sp.	4B:1P	4.00B:1.00P	-	8.13%
Howellites sp.	1B	1B	-	2.03%
Onniella sp.	1B	1B	-	2.03%
Sowerbyellids	8B:3P:5A	2.66B:1.00P	0.63/1	26.42%
Skenidioides sp.	2A	-	-	4.07%
Kjaerina sp.	1P	1P	-	2.03%
Orthid, gen. et sp. indet.	1P	1P	-	2.03%
Strophomenid, gen. et sp. indet.	1P	1P	-	2.03%
Schmidtites sp.(?)	2	-	-	4.07%
Broeggerolithus sp.	1.1	-	-	2.24%
Flexicalymene (*Reacalymene*) cf. *limba* of Whittington 1965	0.1	-	-	0.20%
Calymene sp.(s.l.)	0.1	-	-	0.20%
Parabasilicus powisi	1.0	-	-	2.03%
Parabasilicus sp.(?)	0.2	-	-	0.41%
Isotelinid, gen. et sp. indet. (enrolled)	1	-	-	2.03%
Isotelinid, gen. et sp. indet.	0.1	-	-	0.20%
Isotelinid librigena	0.1	-	-	0.20%
Isotelinid thoracic segments	0.4	-	-	0.81%
Thoracic segment	0.1	-	-	0.20%
Bivalve, gen. et sp. indet.	1	-	-	2.03%

LOCALITY 47 continued

Algae	2	-	-	4.07%
Favosites sp.	1	-	-	2.03%
				99.98

Cyclocyclopa A	4
Cyclocyclopa A_1	3
Cyclocyclopa J	2
Cyclocyclopa J_1	52
Cyclocyclopa J_1 pluricolumnals	5
Cirrals	3
$Pinnate_1$	14
$Pinnate_2$	1
Cystoid plate	1
Ramose Bryozoan fragments	19

Genera Number	18	Diversity Index 10.43
Total Specimen Number	70	

LOCALITY 53	GORLLWYN SLATE	MYNYDD GORLLWYN SOUTH EAST OF MOEL HEBOG		
Sowerbyellids	8B:3P:2A	2.66B:1.00P	0.25/1	39.53%
Kjaerina sp.(?)	1B:1P	1.00B:1.00P	-	3.95%
K.cf.horderleyensis of Bancroft 1929a	1P	1P	-	3.95%
K.cf.latericostata of Bancroft 1929a	1P	1P	-	3.95%
Orthids,gen.et sp. indet.	1P:1A	1P	1/1	7.91%
Broeggerolithus sp.	2.0	-	-	7.91%
Broeggerolithus sp. (enrolled)	1.0	-	-	3.95%
Broeggerolithus sp. (Group 2-Dean 1960)	0.2	-	-	0.79%
B.cf.broeggeri of Dean 1960	0.2	-	-	0.79%
B.cf.soudleyensis of Dean 1960	0.2	-	-	0.79%
Parabasilicus cf. *powisi* of Dean 1963a	0.4	-	-	1.58%
cf.*Flexicalymene planimarginata* of Whittington 1965	0.1	-	-	0.40%
Calymene sp.(s.l.)	0.2	-	-	0.79%
Brongniartella cf. *bisulcata* of Dean 1961	0.1	-	-	0.40%
Thoracic segments	0.9	-	-	3.56%
Primitia sp.(?)	1	-	-	3.95%
Sigmoopsid	1	-	-	3.95%
Gastropods,gen.et sp.indet.	2	-	-	7.91%
Alga	1	-	-	3.95%
				100.01

LOCALITY 53 continued

Cyclocyclopa A	3
Cyclocyclopa J_1	6
Cyclocyclopa K	2
Cyclocyclopa L	1
Pentagonopentagonopa A	1
Cirrals	5
$Pinnate_1$	3
$Pinnate_2$	1
Echinoderm plates	3
Ramose Bryozoan fragments	11

Genera Number	15	Diversity Index 10.55
Total Specimen Number	50	

<u>Ichnofauna</u>

Skolithid burrow	1

LOCALITY 54	GORLLWYN SLATE	MYNYDD GORLLWYN SOUTH EAST OF MOEL HEBOG		
Sowerbyellids	1B:1P:2A	1.00B:1.00P	2/1	15.08%
Horderleyella sp.	1A	-	-	5.03%
Kjaerina sp.	1P	1P	-	5.03%
Paracraniops sp.	5	-	-	25.13%
Inarticulates, gen. et sp. indet.	2	-	-	10.05%
Broeggerolithus sp.	0.8	-	-	4.02%
Broeggerolithus sp. (enrolled)	2	-	-	10.05%
B. cf. *broeggeri* of Dean 1960	0.1	-	-	0.50%
B. cf. *soudleyensis* of Dean 1960	0.1	-	-	0.50%
Parabasilicus cf. *marstoni*? of Dean 1963a	0.1	-	-	0.50%
Isotelinid librigena	0.1	-	-	0.50%
Isotelinid thoracic segment	0.1	-	-	0.50%
Calymene sp. (s.l.)	0.1	-	-	0.50%
Trilobite, gen. et sp. indet.	0.1	-	-	0.50%
Thoracic segments	0.4	-	-	2.01%
Gastropods, gen. et sp. indet.	2	-	-	10.05%
Orthoconic cephalopod	1	-	-	5.03%
Tentaculites sp.	1	-	-	5.03%
				100.01

Cyclocyclopa A	2
Cyclocyclopa A_1	1

LOCALITY 54 continued

Cyclocyclopa J	4
Cyclocyclopa J_1	3
Cyclocyclopa J_1 Pluricolumnal	1
Cyclocyclopa L	1
Cyclopentagonopa C	1
Cyclopentagonopa D	1
Pentagonopentagonopa D	1
Cirrals	16
Pinnate$_1$	13
Crinoid calyx	1
Pluricolumnal	1
Cystoid plate	1
Echinoderm plate	1
Ramose Bryozoan fragments	8

Genera Number	15	Diversity Index 11.16
Total Specimen Number	50	

MYNYDD GORLLWYN
SOUTH EAST OF
MOEL HEBOG

LOCALITY 55 GORLLWYN SLATE

Sowerbyellids	6B: 3P	2.00B:1.00P	-	32.26%
Dalmanellid	1A	-	-	5.38%
Paracraniops sp.(?)	1	-	-	5.38%
Broeggerolithus sp.	1.5	-	-	8.07%
B.sp.(Group 2 - Dean 1960)	0.2	-	-	1.08%
Parabasilicus sp.	0.3	-	-	1.61%
Isotelinid librigenae	0.8	-	-	4.30%
Brongniartella sp.	0.1	-	-	0.54%
Thoracic segments	0.7	-	-	3.76%
Sinuites sp.	1	-	-	5.38%
Bellerophontid (cf.*Tetranota* sp.)	1	-	-	5.38%
Bellerophontid (cf.*Tropidodiscus* sp.)	1	-	-	5.38%
Lophospira sp.(?)	3	-	-	16.13%
Tentaculites sp.	1	-	-	5.38%
				100.03

Cyclocyclopa J	5
Cyclocyclopa J_1	1
Cyclocyclopa K	1
Pentagonocyclopa A	1
Pentagonocyclopa C	1
Cirrals	3
$Pinnate_1$	6
$Pinnate_2$	1
Pluricolumnals	5

LOCALITY 55 continued

Echinoderm plates	3	
Ramose Bryozoan fragment	1	
Genera Number	13	Diversity Index 9.89
Total Specimen Number	50	

LOCALITY 56	GORLLWYN SLATE		PEN PANT-ENGAN SOUTH EAST OF MOEL HEBOG	
Sowerbyellids	223B:119P:76A	1.87B:1.00P	0.34/1	90.01%
Dalmanellids	7B: 6P	1.17B:1.00P	-	2.11%
Dalmanella sp.	2B: 1P	2.00B:1.00P	-	0.60%
D.cf.salopiensis gregaria of Williams 1974	1B	1B	-	0.30%
Onniella sp.	1A	-	-	0.30%
Kjaerina sp.	1B: 1P	1.00B:1.00P	-	0.30%
Skenidioides sp.	2B: 1P	2.00B:1.00P	-	0.60%
Horderleyella sp.(?)	1P	1P	-	0.30%
Paracraniops sp.	1	-	-	0.30%
Orthid,gen.et sp. indet.	1P	1P	-	0.30%
Strophomenid,gen. et sp.indet.	1P	1P	-	0.30%
Broeggerolithus sp.	0.3	-	-	0.09%
Calymene sp.(s.l.)	0.2	-	-	0.06%
Parabasilicus powisi	0.1	-	-	0.06%
Isotelinid librigenae	0.2	-	-	0.06%
Isotelinid thoracic segment	0.1	-	-	0.03%
Isotelinid pygidium	0.1	-	-	0.03%
Thoracic segments	0.2	-	-	0.06%
Tentaculites sp.	10	-	-	3.01%
Alga	1	-	-	0.30%
Encrusting coral	2	-	-	0.60%
Coral	1	-	-	0.30%
				99.99

LOCALITY 56 continued

Cyclocyclopa A	2
Cyclocyclopa G	3
Cyclocyclopa G_1	1
Cyclocyclopa J	9
Cyclocyclopa J_1	17
Cyclocyclopa L	2
Cyclopentagonopa D	1
Pentagonocyclopa B	2
Cirrals	10
$Pinnate_1$	14
$Pinnate_2$	3
Pluricolumnals	10
Echinoderm plates	4
Ramose Bryozoan fragments	16
Encrusting bryozoan	1

Genera Number	16	Diversity Index 6.34
Total Specimen Number	150	

LOCALITY 58	GORLLWYN SLATE	MYNYDD GORLLWYN SOUTH EAST OF MOEL HEBOG		
Sowerbyellid	1A	-	-	8.13%
Skenidioides sp.	1A	-	-	8.13%
Palaeoglossa sp.	1P	1P	-	8.13%
Paracraniops sp.	2	-	-	16.26%
Schizocrania sp.(?)	1	-	-	8.13%
Inarticulates, gen. et sp. indet.	2	-	-	16.26%
Broeggerolithus sp.	0.9	-	-	7.32%
B. broeggeri	0.1	-	-	0.81%
Isotelinid librigena	0.1	-	-	0.81%
Thoracic segments	0.2	-	-	1.63%
Sinuites sp.(?)	1	-	-	8.13%
Orthoconic cephalopod	1	-	-	8.13%
Encrusting coral	1	-	-	8.13%
				100.00

Cirral	1
Pinnate$_1$	4
Ramose Bryozoan fragments	8

Genera Number 12 Diversity Index 10.39

Total Specimen Number 50

LOCALITY 59	GORLLWYN SLATE	PEN PANT-ENGAN SOUTH EAST OF MOEL HEBOG		
Sowerbyellids	2B	2B	-	20%
Brachiopod, gen. et sp. indet.	1A	-	-	10%
Obolid(*Lingulella* sp.?)	1	-	-	10%
Obolid, gen. et sp. indet.	1	-	-	10%
Broeggerolithus sp.	0.9	-	-	9%
Parabasilicus sp.	0.1	-	-	1%
Lophospira sp.	2	-	-	20%
Gastropods, gen. et sp. indet.	2	-	-	20%
				100

Cyclocyclopa J	1
Pinnate$_1$	1
Ramose Bryozoan fragments	4
Genera Number	8
Total Specimen Number	30

Diversity Index 7.41

Ichnofauna

Skolithos	2
Obolid burrow (?)	1

LOCALITY 61	PORTREUDDYN SLATE	MAES-Y-LLECH-GANOL SOUTH OF MOEL HEBOG		
Sericoidea sp.	126B:80P:2A	1.58B:1.00P	0.02/1	75.25%
Sericoidea restricta	1B	1B	-	0.59%
Sericoidea aff. *abdita* of Williams 1962(cf.*Chonetoidea gamma* of Spjeldnaes 1957)	1B	1B	-	0.59%
Sericoidea aff. *abdita* of Williams 1962	1B: 1P	1.00B:1.00P	-	0.59%
Sericoidea sp.(cf. *Chonetoidea gamma* of Spjeldnaes 1957)	1B	1B	-	0.59%
Sericoidea sp.(cf. *Chonetoidea iduna* of Spjeldnaes 1957)	2B	2B	-	1.18%
Sowerbyellids	19B:22P:2A	1.00B:1.16P	0.15/1	14.11%
Dalmanellids	1B: 1P	1.00B:1.00P	-	0.59%
Dalmanella sp.(?)	1P	1P	-	0.59%
Onniella sp.(?)	1A	-	-	0.59%
Bancroftina sp.(?)	1A	-	-	0.59%
Horderleyella sp.	2B: 3P	1.00B:1.50P	-	1.76%
*H.*cf.*plicata* of Bancroft 1928,1945	1B	1B	-	0.59%
Orthids,gen.et sp. indet.	1B: 3P	1.00B:3.00P	-	1.76%
Immature orthid, gen.et sp.indet.	1P	1P	-	0.59%
Broeggerolithus sp.	0.1	-	-	0.06%
				100.02

LOCALITY 61 continued

Cyclocyclopa A	1
Cirrals	2
Pluricolumnal	1

Genera Number 11 Diversity Index 4.93

Total Specimen Number 80

LOCALITY 91 GORLLWYN GRIT SOUTH OF MOEL HEBOG

Sowerbyellids	12B:10P:3A	1.20B:1.00P	0.25/1	52.63%
Dalmanellids	2B: 1A	2B	0.50/1	10.53%
Kjaerina sp.	4B: 5P	1.00B:1.25P	-	17.54%
*K.*aff.*jonesi* of Bancroft 1929a	1P	1P	-	3.51%
Heterorthis sp.	1B	1B	-	3.51%
Paracraniops sp.	2	-	-	7.02%
Broeggerolithus sp.	0.4	-	-	1.40%
Calymene sp.(cf. *Flexicalymene* (*Reacalymene*)*pusulosa* of Shirley 1936)	0.1	-	-	0.35%
Alga	1	-	-	3.51%
				100.00

Cyclocyclopa A	2
Cyclocyclopa J	1
Ramose Bryozoan fragments	2
Lepidocoleus sp.	1

Genera Number 11 Diversity Index 6.74

Total Specimen Number 70

LOCALITY 111	PORTREUDDYN SLATE		YNYS WEN SOUTH OF MOEL HEBOG	
Sowerbyellids	7B:4P	1.75B:1.00P	-	36.08%
Dalmanellids	1B	1B	-	5.15%
Sericoidea sp.	1P	1P	-	5.15%
Dinorthis sp.(?)	1B	1B	-	5.15%
Horderleyella sp.(?)	1P	1P	-	5.15%
Broeggerolithus sp.	4.1	-	-	21.13%
B.cf.broeggeri of Dean 1960	0.3	-	-	1.55%
B.cf.soudleyensis of Dean 1960	0.1	-	-	0.52%
Broeggerolithus sp. (with long genal spine)	0.1	-	-	0.52%
Calymene sp.(s.l.)	0.1	-	-	0.52%
Calymenid thoracic segment	0.1	-	-	0.52%
Parabasilicus sp.	1.0	-	-	5.15%
Isotelinid librigenae	0.2	-	-	1.03%
Thoracic segments	0.4	-	-	2.06%
Hollinaceans	2	-	-	10.31%
				99.99

Cyclocyclopa A	6
Cyclocyclopa G	1
Cyclocyclopa J_1	3
Pentagonocyclopa B	3
Pluricolumnal	1
Pinnate$_1$	2
Cirrals	9

LOCALITY 111 continued

Genera Number	11	Diversity Index	8.40
Total Specimen Number	70		

LOCALITY 111A	PORTREUDDYN SLATE		YNYS WEN SOUTH OF MOEL HEBOG	
Sowerbyellids	8B:5P	1.60B:1.00P	-	45.45%
Dalmanellids	1B:1P	1.00B:1.00P	-	5.68%
Sericoidea sp.	2B	2B	-	11.36%
Horderleyella sp.	1B:1P	1.00B:1.00P	-	5.68%
Broeggerolithus sp.	2.7	-	-	15.34%
B.cf.broeggeri of Dean 1960	0.1	-	-	0.57%
B.cf.soudleyensis of Dean 1960	0.3	-	-	1.70%
Calymene sp.(s.l.)	0.2	-	-	1.14%
Parabasilicus sp.	0.6	-	-	3.41%
Isotelinid librigenae	0.3	-	-	1.70%
Isotelinid thoracic segments	0.4	-	-	2.27%
Ostracode	1	-	-	5.68%
				99.98

Cyclocyclopa A	8
Cyclocyclopa J	2
Pentagonocyclopa B	2
Pluricolumnals	2
Pinnate$_1$	1
Cirrals	15
Genera Number	10
Total Specimen Number	50

Diversity Index 7.88

LOCALITY 112	GORLLWYN SLATE	YNYS WEN SOUTH OF MOEL HEBOG		
Dalmanellids	2B:1P:3A	2.00B:1.00P	1.50/1	10.99%
Onniella cf. soudleyensis of Williams 1963	1B:1P	1.00B:1.00P	-	2.20%
Sowerbyellids	3B	3B	-	6.59%
Sericoidea aff. abdita of Williams 1962	1P	1P	-	2.20%
Sericoidea sp.	1B	1B	-	2.20%
Orthid, gen. et sp. indet.	1P	1P	-	2.20%
Paracraniops sp.	9	-	-	19.78%
Obolid, gen. et sp. indet.	1	-	-	2.20%
Inarticulate, gen. et sp. indet.	1	-	-	2.20%
Brachiopod, gen. et sp. indet.	1B:1P	1.00B:1.00P	-	2.20%
Broeggerolithus sp.	5.3	-	-	11.65%
B. cf. harnagensis of Dean 1960	0.6	-	-	1.32%
B. cf. soudleyensis of Dean 1960	0.2	-	-	0.44%
B. cf. broeggeri of Dean 1960	0.1	-	-	0.22%
Broeggerolithus sp. (Group 2-Dean 1960)	0.5	-	-	1.10%
Calymene sp. (s.l.)	1.4	-	-	3.08%
Flexicalymene cf. acantha of Dean 1963	0.1	-	-	0.22%
Brongniartella minor	0.4	-	-	0.88%
B. sp.	0.1	-	-	0.22%

LOCALITY 112 continued

B.sp.thoracic segment	0.1	-	-	0.22%
Parabasilicus sp.	4.0	-	-	8.79%
P.powisi	0.1	-	-	0.22%
P.cf.marstoni? of Dean 1963	1.4	-	-	3.08%
Parabasilicus sp. librigenae	0.3	-	-	0.66%
P.sp.thoracic segment	0.1	-	-	0.22%
Proetid librigenae	0.1	-	-	0.22%
Encrinurid(?)	0.1	-	-	0.22%
Thoracic segments	1.6	-	-	3.52%
Ostracode	1	-	-	2.20%
Hyolithes sp.	1	-	-	2.20%
Tentaculites sp.	3	-	-	6.59%
				100.03

Cyclocyclopa A	7
Cyclocyclopa F	4
Cyclocyclopa H	2
Cyclocyclopa J	24
Cyclocyclopa J_1	8
Cyclocyclopa L	3
Cyclopentagonopa D	1
Cyclopentagonopa E	1
Pentagonocyclopa B	4
Pentagonocyclopa D	1
Pentagonopentagonopa E	1

LOCALITY 112 continued

Pentagonopentagonopa F	2
Hexagonocyclopa A	1
cf. *Balacrinus basalis* of Ramsbottom 1961	2
cf. *Balacrinus basalis* arms of Ramsbottom 1961	8
Crinoid calyx	1
Pluricolumnals	19
Pinnate$_1$	17
Cirrals	26
Crinoid plates	2
Echinoderm plates	7
Ramose Bryozoan fragments	152
Circular Bryozoa	6

Genera Number	23	Diversity Index 12.66
Total Specimen Number	250	

LOCALITY 112A	GORLLWYN SLATE	SOUTH OF MOEL HEBOG		
Sowerbyellids	2B:1P	2.00B:1.00P	-	8.06%
Dalmanellids	1B:1P	1.00B:1.00P	-	4.03%
Onniella sp.	1P	1P	-	4.03%
Sericoidea sp.	2B	2B	-	8.06%
Paracraniops sp.	5	-	-	20.16%
Obolid, gen. et sp. indet.	1	-	-	4.06%
Broeggerolithus sp.	3.7	-	-	14.92%
B. cf. *broeggeri* of Dean 1960	0.2	-	-	0.81%
B. cf. *soudleyensis* of Dean 1960	0.1	-	-	0.40%
B. sp. (Group 2-Dean 1960)	0.3	-	-	1.21%
Parabasilicus sp.	2.8	-	-	11.29%
P. cf. *marstoni*? of Dean 1963a	0.6	-	-	2.42%
Isotelinid librigenae	0.4	-	-	1.61%
Calymene sp. (s.l.)	0.9	-	-	3.63%
Brongniartella minor	0.3	-	-	1.21%
Brongniartella sp.	0.2	-	-	0.81%
Thoracic segments	1.3	-	-	5.24%
Tentaculites sp.	2	-	-	8.06%
				99.98

Cyclocyclopa A	3
Cyclocyclopa F	1
Cyclocyclopa J	17
Cyclocyclopa J_1	11
Cyclocyclopa L	3

LOCALITY 112A continued

Cyclopentagonopa E	1
Pentagonocyclopa B	2
Pentagonopentagonopa E	4
Pentagonopentagonopa F	4
cf. *Balacrinus basalis* arms of Ramsbottom 1961	4
Pluricolumnals	10
Pinnate$_1$	11
Cirrals	19
Echinoderm plates	4
Ramose Bryozoan fragments	76
Circular Bryozoa	3

Genera Number	14	Diversity Index 9.24
Total Specimen Number	100	

LOCALITY PA1	GORLLWYN SLATE	PONT ABER DUNANT SOUTH EAST OF MOEL HEBOG		
Sowerbyellids	28B:22P:7A	1.27B:1.00P	0.25/1	60.55%
Dalmanellids	6B: 5P	1.20B:1.00P	-	10.38%
Dalmanella sp.(?)	1P	1P	-	1.73%
Onniella sp.	2B: 2P	1.00B:1.00P	-	3.46%
Kjaerina sp.	1B: 1P	1.00B:1.00P	-	1.73%
Horderleyella sp.	1P	1P	-	1.73%
Craniopsids	3	-	-	5.19%
Broeggerolithus sp.	1.7	-	-	2.94%
*B.*cf.*broeggeri* of Dean 1960	0.2	-	-	0.35%
*B.*cf.*soudleyensis* of Dean 1960	0.1	-	-	0.17%
Calymene sp.(s.l.)	0.8	-	-	1.38%
Flexicalymene sp.	0.1	-	-	0.17%
Parabasilicus sp.	0.2	-	-	0.35%
Isotelinid librigenae	0.3	-	-	0.52%
Isotelinid thoracic segments	0.5	-	-	0.87%
Brongniartella cf. *bisulcata* of Dean 1961	0.2	-	-	0.35%
Thoracic segments	0.6	-	-	1.04%
Pygidium,gen.et sp.indet.	0.1	-	-	0.17%
Gastropod,gen.et sp.indet.	1	-	-	1.73%
Orthoconic cephalopods (?)	2	-	-	3.46%

LOCALITY PA1 continued

Tentaculites sp.	1	-	-	1.73%
				100.00

Cyclocyclopa A	7
Cyclocyclopa A_1	3
Cyclocyclopa G	1
Cyclocyclopa J	11
Cyclocyclopa J_1	7
Cyclocyclopa L	5
Cyclopentagonopa D	4
Pentagonocyclopa B	1
Pentagonopentagonopa A	1
Pentagonopentagonopa D	2
Cirrals	15
$Pinnate_1$	7
$Pinnate_2$	6
Pluricolumnals	1
Echinoderm plates	2
Ramose Bryozoan fragments	7

Genera Number	16	Diversity Index 9.01
Total Specimen Number	70	

LOCALITY PA2	GORLLWYN SLATE	PONT ABER DUNANT SOUTH EAST OF MOEL HEBOG		
Sowerbyellids	15B:13P:4A	1.15B:1.COP	0.27/1	53.37%
Dalmanellids	3B: 1P	3.00B:1.COP	-	8.43%
Onniella sp.	1P	1P	-	2.81%
Kjaerina sp.	1P	1P	-	2.81%
Craniopsids	4	-	-	11.24%
Broeggerolithus sp.	1.2	-	-	3.37%
B.cf.broeggeri of Dean 1960	0.2	-	-	0.56%
Calymene sp.(s.l.)	0.6	-	-	1.69%
Parabasilicus sp.	0.1	-	-	0.28%
Isotelinids,gen.et sp.indet.	0.2	-	-	0.56%
Isotelinid librigenae	0.3	-	-	0.84%
Isotelinid thoracic segments	0.2	-	-	0.56%
Brongniartella cf. *bisulcata* of Dean 1961	0.1	-	-	0.28%
Thoracic segments	0.7	-	-	1.97%
Gastropods,gen.et sp.indet.	2	-	-	5.62%
Tentaculites sp.	2	-	-	5.62%
				100.01

Cyclocyclopa A	4
Cyclocyclopa A_1	1
Cyclocyclopa J	12
Cyclocyclopa J_1	10
Cyclocyclopa L	3

LOCALITY PA2 continued

Cyclopentagonopa C	1	
Cyclopentagonopa D	3	
Pentagonopentagonopa A	4	
Pentagonopentagonopa D	3	
Cirrals	9	
$Pinnate_1$	2	
$Pinnate_2$	2	
Pluricolumnal	1	
Echinoderm plate	1	
Ramose Bryozoan fragments	4	
Genera Number	12	Diversity Index 7.62
Total Specimen Number	50	

LOCALITY PA3	GORLLWYN SLATE	PONT ABER DUNANT SOUTH EAST OF MOEL HEBOG		
Sowerbyellids	21B:18P:3A	1.17B:1.00P	0.14/1	54.30%
Dalmanellids	4B: 4P	1.00B:1.00P	-	9.05%
Howellites sp.(?)	2B: 1P	2.00B:1.00P	-	4.52%
Onniella sp.	2B: 1P	2.00B:1.00P	-	4.52%
Kjaerina sp.(?)	3P	3P	-	6.79%
Craniopsid	1	-	-	2.26%
Broeggerolithus sp.	1.5	-	-	3.39%
B.cf.broeggeri of Dean 1960	0.3	-	-	0.68%
B.cf.soudleyensis of Dean 1960	0.2	-	-	0.45%
Calymene sp.(s.l.)	0.4	-	-	0.90%
Flexicalymene sp.(?)	0.1	-	-	0.23%
Parabasilicus sp.	0.2	-	-	0.45%
Isotelinid librigena	0.1	-	-	0.23%
Isotelinid thoracic segments	0.4	-	-	0.90%
Brongniartella sp.	0.2	-	-	0.45%
Thoracic segments	0.8	-	-	1.81%
Gastropods,gen.et sp. indet.	2	-	-	4.52%
Orthoconic cephalopod (?)	1	-	-	2.26%
Tentaculites sp.	1	-	-	2.26%
				99.97

Cyclocyclopa A	11
Cyclocyclopa A_1	3
Cyclocyclopa G	5

LOCALITY PA3 continued

Cyclocyclopa J	12	
Cyclocyclopa J_1	6	
Cyclocyclopa L	6	
Cyclopentagonopa C	2	
Cyclopentagonopa D	2	
Pentagonocyclopa B	4	
Pentagonopentagonopa D	2	
Cirrals	7	
Pinnate$_1$	2	
Pluricolumnals	2	
Ramose Bryozoan fragments	3	
Genera Number	15	Diversity Index 9.01
Total Specimen Number	70	

LOCALITY PA4	GORLLWYN SLATE	PONT ABER DUNANT SOUTH EAST OF MOEL HEBOG		
Sowerbyellids	17B:15P:5A	1.13B:1.00P	0.29/1	58.51%
Dalmanellids	4B: 3P	1.33B:1.00P	-	10.64%
Onniella sp.	2B: 1P	2.00B:1.00P	-	5.32%
Kjaerina sp.	1P	1P	-	2.66%
Craniopsid	1	-	-	2.66%
Broeggerolithus sp.	1.2	-	-	3.19%
B.cf.broeggeri of Dean 1960	0.1	-	-	0.27%
Calymene sp.(s.l.)	0.5	-	-	1.33%
Flexicalymene sp.(?)	0.1	-	-	0.27%
Parabasilicus sp.	0.1	-	-	0.27%
Isotelinid librigenae	0.2	-	-	0.53%
Isotelinid thoracic segments	0.6	-	-	1.60%
Brongniartella cf. *bisulcata* of Dean 1961	0.1	-	-	0.27%
Thoracic segments	0.6	-	-	1.60%
Gastropod,gen.et sp. indet.	1	-	-	2.66%
Orthoconic cephalopod (?)	1	-	-	2.66%
Tentaculites sp.	3	-	-	7.98%
				100.03

Cyclocyclopa A	12
Cyclocyclopa A_1	3
Cyclocyclopa G	3
Cyclocyclopa J	2

LOCALITY PA4 continued

Cyclocyclopa J_1	4
Cyclopentagonopa D	4
Pentagonopentagonopa A	2
Pentagonopentagonopa D	4
Cirrals	10
Pinnate$_1$	4
Pinnate$_2$	1
Pluricolumnals	2
Ramose Bryozoan fragments	5

Genera Number	13	Diversity Index 8.14
Total Specimen Number	50	

LOCALITY 117	LOWER RHYOLITIC TUFF		CWM LLEFRITH WEST OF MOEL HEBOG	
Dolerorthis duftonensis prolixa	89B:46P:3A	1.93B:1.00P	0.03/1	30.76%
Sowerbyellids	43B:40P:2A	1.08B:1.00P	0.05/1	15.05%
Reuschella sp.	34B:22P	1.55B:1.00P	-	11.31%
Dalmanellids	7B: 5P:1A	1.40B:1.00P	0.14/1	2.67%
Nicolella actoniae obesa	6B: 5P	1.20B:1.00P	-	2.01%
Kjaerina sp.	4B: 6P	1.00B:1.50P	-	2.01%
Strophomena cf. *grandis* of Williams 1963	4B: 2P	2.00B:1.00P	-	1.34%
Macrocoelia sp.(?)	2P	2P	-	0.67%
Kiaromena sp.	2P	2P	-	0.67%
Plaesiomyids	2B: 1P	2.00B:1.00P	-	0.67%
Howellites sp.	1A	-	-	0.33%
Rafinesquina sp.(?)	1P	1P	-	0.33%
Eoplectodonta sp.	1B	1B	-	0.33%
Bancroftina sp.(?)	1B	1B	-	0.33%
cf.*Palaeoglossa attenuata* of Williams 1974	2	-	-	0.67%
Obolid,gen.et sp. indet.	1	-	-	0.33%
Proetids	0.3	-	-	0.10%
Platylichas sp.	0.2	-	-	0.07%
Brongniartella bisulcata	0.3	-	-	0.10%
Chasmops sp.	0.4	-	-	0.13%

LOCALITY 117 continued

Estoniops alifrons	0.2	-	-	0.07%
Broeggerolithus sp.	0.3	-	-	0.10%
Atractopyge sp.	0.1	-	-	0.03%
Trinucleid	0.2	-	-	0.07%
Thoracic segments	2.1	-	-	0.70%
Praectenodonta sp.	1	-	-	0.33%
Bivalve, gen. et sp. indet.	1	-	-	0.33%
Gastropods, gen. et sp. indet.	19	-	-	6.35%
Ostracodes	21	-	-	7.02%
Tentaculites sp.	45	-	-	15.05%
				99.99

Cyclocyclopa A	199
Cyclocyclopa A_1	36
Cirrals	30
Echinoderm plate	1
Ramose Bryozoan fragments	30
Coral fragments	60
Lepidocoleus sp.	5

Genera Number	30	Diversity Index	12.04
Total Specimen Number	400		

LOCALITY 121	LOWER RHYOLITIC TUFF		WEST OF MOEL HEBOG	
Dalmanellids	7B:9P:5A	1.00B:1.29P	0.56/1	15.14%
Dalmanella sp.	1B	1B	-	1.08%
D.cf.lepta of Bancroft 1945	1B	1B	-	1.08%
D.cf.modica of Williams 1963	1B	1B	-	1.08%
Sowerbyellids	3B:14P:1A	1.00B:4.67P	0.07/1	16.22%
Kjaerina sp.	1B: 1P	1.00B:1.00P	-	1.08%
K.bipartita	1P	1P	-	1.08%
K.cf.hedstroemi of Bancroft 1929a	1P	1P	-	1.08%
Dolerorthis sp.	1P	1P	-	1.08%
Cremnorthis sp.	1P:1A	1P	1/1	2.16%
Desmorthis sp.(?)	1A	-	-	1.08%
Dolerorthid	1B	1B	-	1.08%
Orthids,gen.et sp.indet.	2P	2P	-	2.16%
Skenidioides sp.	1P:2A	1P	2/1	3.24%
Reuschella sp.(?)	1P	1P	-	1.08%
Platystrophia sp.	1P	1P	-	1.08%
Strophomena sp.	1P	1P	-	1.08%
Strophomenids,gen. et sp.indet.	1B:1P	1.00B:1.00P	-	1.08%
Paracraniops sp.	1	-	-	1.08%
Palaeoglossa sp.	2	-	-	2.16%
Obolids,gen.et sp. indet.	2	-	-	2.16%
Inarticulates,gen. et sp.indet.	9	-	-	9.73%

LOCALITY 121 continued

Brachiopod, gen. et sp. indet.	1B	1B	-	1.08%
Brongniartella bisulcata	0.5	-	-	0.54%
Brongniartella (*bisulcata*?) thoracic segments	1.5	-	-	1.62%
Estonions alifrons	0.2	-	-	0.22%
Chasmops sp.	0.1	-	-	0.11%
Pterygometopid cheek fragment	0.1	-	-	0.11%
Thoracic segments	0.2	-	-	0.22%
Gastropod, gen. et sp. indet.	1	-	-	1.08%
Bellerophontids (*Tropidodiscus* sp.?)	2	-	-	2.16%
Tallinnella sp.	1	-	-	1.08%
Hollinaceans	2	-	-	2.16%
Ostracode	1	-	-	1.08%
Bivalve, gen. et sp. indet.	1	-	-	1.08%
Tentaculites scalaris	3	-	-	3.24%
Tentaculites sp.	10	-	-	10.81%
Favosites sp.	4	-	-	4.32%
				99.97

Cyclocyclopa A	11
Cyclocyclopa A_1	2
Cyclocyclopa E	2
Cyclocyclopa F	2

LOCALITY 121 continued

Cyclocyclopa H	1
Cyclocyclopa K	22
Cyclopentastellatopa A	1
Pentagonocyclopa A	1
Pluricolumnals	9
Pinnate$_1$	6
Cirrals	61
Ramose Bryozoan fragments	10
Circular Bryozoan	1
Lepidocoleus sp.	1

Genera Number	30	Diversity Index 15.15
Total Specimen Number	70	

LOCALITY 129	UPPER RACKS	SANDSTONE	CAPEL CURIG WEST	
Salopia globosa	35B:31P:5A	1.13B:1.00P	0.14/1	26.79%
Salopia sp.	12B:10P	1.20B:1.00P	-	8.04%
Dinorthis sp.	25B:18P:1A	1.39B:1.00P	0.04/1	17.41%
D.cf.berwynensis of Williams 1963	6B	6B	-	4.02%
Immature *Dinorthis* sp.	5B:3P	1.66B:1.00P	-	3.35%
Macrocoelia expansa	2B:10P	1.00B:5.00P	-	6.70%
Macrocoelia sp.	6P	6P	-	4.02%
Rafinesquina sp.(?)	6B:4P	1.50B:1.00P	-	4.02%
Dalmanellids	12B:15P:1A	1.00B:1.25P	0.07/1	10.72%
Dalmanella sp.	7B:2P	3.50B:1.00P	-	4.69%
Sowerbyellids	3B:2P	1.50B:1.00P	-	2.01%
Rostricellula sp.	3B	3B	-	2.01%
Reuschella sp.	4B:3P	1.33B:1.00P	-	2.68%
Harknessellid	1B	1B	-	0.67%
Broeggerolithus sp. (?)	0.2	-	-	0.13%
Pygidium,gen.et sp.indet.	0.1	-	-	0.07%
Corals	4	-	-	2.68%
				100.01

Cyclocyclopa A	19
Pentagonocyclopa B	9
Ramose Bryozoan fragments	10
Genera Number	13
Total Specimen Number	100

Diversity Index 5.96

LOCALITY 134	UPPER GRIT (GORLLWYN GRIT)		GAREG BENGAM SOUTH EAST OF BEDDGELERT	
Sowerbyellids	211B:178P:6A	1.19B:1.00P	0.03/1	47.45%
Immature sowerbyellids	33B: 19P	1.74B:1.00P	-	7.22%
Dalmanellids	18B: 15P	1.20B:1.00P	-	3.94%
Immature dalmanellids	4B: 3P	1.33B:1.00P	-	0.87%
Dalmanella sp.	5B: 1P	5.00B:1.00P	-	1.09%
Howellites sp.	3P	3P	-	0.66%
Dinorthis (*Plaesiomys*) sp.	77B: 63P	1.22B:1.00P	-	16.84%
D.(*P.*) *multiplicata*	38B: 28P	1.36B:1.00P	-	8.31%
Macrocoelia expansa	8B: 36P	1.00B:4.50P	-	7.87%
Triplesiaceids	2B: 3P	1.00B:1.50P	-	0.66%
Bicuspina spiriferoides	8P	8P	-	1.75%
Reuschella sp.	2B: 5P	1.00B:2.50P	-	1.09%
Horderleyella sp.(?)	2P	2P	-	0.44%
Brongniartella sp.(?)	0.2	-	-	0.04%
cf. *Flexicalymene planimarginata* of Whittington 1965	0.1	-	-	0.02%
Quadrijugatorid	1	-	-	0.22%
Tallinnella sp.	1	-	-	0.22%
Gastropod (Lophospirid ?)	1	-	-	0.22%
Modiomorphids	5	-	-	1.09%
				100.00

Cyclocyclopa A_1 8

LOCALITY 134 continued

Cyclocyclopa J	16	
Cyclocyclopa J_1	3	
Pentagonocyclopa A	6	
Ramose Bryozoan fragments	11	
Encrusting Bryozoa	2	
<u>Cyclocystoides</u> sp.plates	4	
Genera Number	17	Diversity Index 6.38
Total Specimen Number	150	

LOCALITY 134A	UPPER GRIT (GORLLWYN GRIT)	GAREG BENGAM SOUTH EAST OF BEDDGELERT		
Sowerbyellids	281B:203P:13A	1.38B:1.00P	0.05/1	55.65%
Immature sowerbyellids	22B: 9P	2.44B:1.00P	-	4.16%
Dinorthis (Plaesiomys) sp.	69B: 56P: 5A	1.23B:1.00P	0.07/1	14.01%
D.(P.) multiplicata	48B: 41P	1.70B:1.00P	-	9.09%
Immature D.(P.)sp.	2B: 2P	1.00B:1.00P	-	0.38%
Macrocoelia expansa	6B: 41P	1.00B:6.83P	-	7.76%
Dalmanellids	27B: 17P: 2A	1.59B:1.00P	0.07/1	5.49%
Howellites sp.	3P	3P	-	0.57%
Reuschella sp.	1B	1B	-	0.19%
Leptaena sp.	1P	1P	-	0.19%
Heterorthis sp.	1B	1B	-	0.19%
Bicuspina spiriferoides	1P	1P	-	0.19%
Horderleyella sp.(?)	2P	2P	-	0.38%
Kjaerina sp.(?)	2P	2P	-	0.38%
Calymene sp.(s.l.)	0.3	-	-	0.06%
Bellerophontids	7	-	-	1.33%
				100.02

Cyclocyclopa A_1	1
Cirrals	14
Pluricolumnal	1
Ramose Bryozoan fragments	42
Cyclocystoides sp.plates	9

Genera Number 16 Diversity Index 5.87
Total Specimen Number 150

LOCALITY 141A	LOWER RACKS SANDSTONE		CAPEL CURIG WEST	
Macrocoelia sp.	10B:19P:1A	1.00B:1.90P	0.05/1	22.94%
M.cf.*expansa* of Williams 1963	2B:17P	1.00B:8.50P	-	19.50%
Dinorthis sp.	19B:18P	1.06B:1.00P	-	21.79%
D.cf.*berwynensis* of Williams 1963	2B:1P	2.00B:1.00P	-	2.29%
Salopia globosa	15B:13P:2A	1.15B:1.00P	0.13/1	19.50%
Dalmanellids	2B:4P:1A	1.00B:2.00P	0.25/1	5.73%
Dalmanella sp.	1P	1P	-	1.15%
Sowerbyellids	2B:1P	2.00B:1.00P	-	2.29%
Reuschella sp.	1B	1B	-	1.15%
Broeggerolithus sp.	0.2	-	-	0.23%
Coral (*Favosites* sp.?)	3	-	-	3.44%
				100.01

Cyclocyclopa A	4		
Pentagonocyclopa B	1		
Pinnate$_1$	6		
Ramose Bryozoan fragments	2		
Genera Number	10	Diversity Index	5.13
Total Specimen Number	60		

LOCALITY 141B LOWER RACKS SANDSTONE CAPEL CURIG WEST

Macrocoelia sp.	9B:17P:2A	1.00B:1.89P	0.12/1	19.57%
M.cf.expansa of Williams 1963	3B:16P	1.00B:5.33P	-	16.48%
M.cf.prolata of Williams 1963	4P	4P	-	4.12%
Immature *Macrocoelia* sp.	1P	1P	-	1.03%
Dinorthis sp.	15B:17P:3A	1.00B:1.13P	0.18/1	20.60%
D.cf.berwynensis of Williams 1963	4B:2P	2.00B:1.00P	-	4.12%
Immature *Dinorthis* sp.	2B	2B	-	2.06%
Salopia globosa	17B:17P:2A	1.00B:1.00P	0.12/1	19.57%
Dalmanellids	5B:7P	1.00B:1.40P	-	7.21%
Dalmanella sp.	1B	1B	-	1.03%
Sowerbyellid	1P	1P	-	1.03%
Reuschella sp.	2B:1P	2.00B:1.00P	-	2.06%
Broeggerolithus sp.	0.1	-	-	0.10%
Favosites sp.	1	-	-	1.03%
				100.01

Cyclocyclopa A	10
Pentagonocyclopa B	4
Pinnate$_1$	7
Pinnate$_2$	2
Ramose Bryozoan fragments	10
Genera Number	11
Total Specimen Number	60

Diversity Index 5.51

LOCALITY 143A	REWORKED TOP OF THE GARTH TUFF	CAPEL CURIG WEST		
Macrocoelia sp.	6B:10P	1.00B:1.66P	-	55.56%
Macrocoelia cf. *expansa* of Williams 1963	1B:6P	1.00B:6.00P	-	33.33%
Salopia sp.	1B	1B	-	5.56%
Immature *Dinorthis* sp.	1P	1P	-	5.56%
				100.01

Cyclocyclopa A	1	
Pinnate$_1$	1	
Genera Number	4	Diversity Index 3.13
Total Specimen Number	20	

LOCALITY 143B	LOWER RACKS SANDSTONE		CAPEL CURIG WEST	
Macrocoelia sp.	17B:25P:2A	1.00B:1.47P	0.08/1	26.14%
*M.*cf.*expansa* of Williams 1963	1B:21P	1.00B:21.00P	-	20.33%
Salopia globosa	20B:19P:1A	1.05B:1.00P	0.05/1	20.33%
Dinorthis sp.	17B:16P:1A	1.06B:1.00P	0.06/1	17.42%
*D.*cf.*berwynensis* of Williams 1963	1P	1P	-	0.97%
Immature *Dinorthis* sp.	1B	1B	-	0.97%
Dalmanellids	3B:6P:1A	1.00B:2.00P	0.17/1	6.78%
Sowerbyellid	1P	1P	-	0.97%
Broeggerolithus sp.	0.1	-	-	0.10%
cf.*Platylichas* sp.	0.1	-	-	0.10%
Pygidium,gen.et sp.indet.	0.1	-	-	0.10%
Coral,cf.*Favosites* sp.	6	-	-	5.81%
				100.02

Cyclocyclopa A	2
Pentagonocyclopa B	2
Pinnate$_1$	3
Ramose Bryozoan fragments	7
Genera Number	11
Total Specimen Number	80

Diversity Index 5.44

LOCALITY 143C	MIDDLE RACKS SILTSTONE		CAPEL CURIG WEST	
Dalmanellids	60B:60P:38A	1.00B:1.00P	0.60/1	63.55%
Dalmanella sp.	5B:1A	5B	0.20/1	3.89%
Sowerbyellids	15B:2P:5A	7.50B:1.00P	0.33/1	12.97%
Dinorthis sp.	9B:6P:3A	1.50B:1.00P	0.33/1	7.78%
Horderleyella sp.	7B:8P:1A	1.00B:1.14P	0.13/1	5.84%
Triplesiaceids	5B	5B	-	3.24%
Harknessellid	1P	1P	-	0.65%
cf.*Schizophorella* sp.	1P	1P	-	0.65%
cf.*Salopia* sp.	1B	1B	-	0.65%
Broeggerolithus sp.	0.2	-	-	0.13%
Hollinacean	1	-	-	0.65%
				100.00

Cyclocyclopa A	1
Cyclocyclopa A_1	21
Cyclocyclopa J	2
Pentagonocyclopa B	4
Pentagonocyclopa D	1
Pinnate$_1$	1
Cirrals	8
Pluricolumnal	1
Ramose Bryozoan fragments	313
Genera Number	10
Total Specimen Number	70

Diversity Index 4.43

LOCALITY 143D	UPPER RACKS SANDSTONE		CAPEL CURIG WEST	
Dalmanellids	18B:12P	1.50B:1.00P	-	54.55%
Sowerbyellids	7B:4P:2A	1.75B:1.00P	0.29/1	27.27%
Macrocoelia sp.	1B:2P	1.00B:2.00P	-	6.06%
Dinorthis sp.	2B	2B	-	6.06%
Horderleyella sp.	1P	1P	-	3.03%
Triplesiaceid	1P	1P	-	3.03%
				100.00

Cyclocyclopa A	1	
Cyclocyclopa A_1	1	
Cirrals	2	
Pinnate$_1$	1	
Genera Number	7	Diversity Index 4.57
Total Specimen Number	40	

LOCALITY 144A UPPER RACKS SANDSTONE CAPEL CURIG WEST

Macrocoelia sp.	6B:21P	1.00B:3.50P	-	25.55%
M.expansa	4B:12P	1.00B:3.00P	-	14.60%
M.cf.prolata of Williams 1963	1B:4P	1.00B:4.00P	-	4.87%
Salopia globosa	19B:6P:1A	3.17B:1.00P	0.05/1	24.33%
Dalmanellids	7B:4P	1.75B:1.00P	-	8.52%
Dalmanella sp.	3P	3P	-	3.65%
Howellites sp.	1P	1P	-	1.22%
Dinorthis sp.	6B:4P	1.50B:1.00P	-	7.30%
Rafinesquina sp. (?)	1B:4P	1.00B:4.00P	-	4.87%
Reuschella sp.	1B	1B	-	1.22%
R.cf.horderleyensis of Bancroft 1928 & Williams 1963	1B	1B	-	1.22%
Petrocrania sp.	2B	2B	-	2.43%
Broeggerolithus sp.	0.2	-	-	0.24%
				100.02

Cyclocyclopa A	14
Cyclocyclopa B	1
Cyclocyclopa C	2
Cyclocyclopa J	1
Cyclocyclopa J_1	2
Cyclopentastellatopa A	1
Cirrals	10
Ramose Bryozoan fragments	3
Genera Number	12
Total Specimen Number	50

Diversity Index 6.23

LOCALITY 144B	UPPER RACKS SANDSTONE		CAPEL CURIG WEST	
Macrocoelia sp.	16B:56P	1.00B:3.50P	-	35.85%
M.expansa	8B:22P	1.00B:2.75P	-	14.08%
M.cf.prolata of Williams 1963	2B:9P	1.00B:4.50P	-	5.76%
Salopia globosa	31B:17P:3A	1.82B:1.00P	0.09/1	21.77%
Dinorthis sp.	5B:12P	1.00B:2.40P	-	7.68%
D.cf.flabellum of Williams 1963	1B:1P	1.00B:1.00P	-	0.64%
Dalmanellids	7B:5P:1A	1.40B:1.00P	0.14/1	5.12%
Dalmanella sp.	2B:2P	1.00B:1.00P	-	1.28%
Howellites sp.(?)	1B:1P	1.00B:1.00P	-	0.64%
Rafinesquina sp.	6P	6P	-	3.84%
Reuschella sp.	2B	2B	-	1.28%
Leptaena sp.	2P	2P	-	1.28%
Petrocrania sp.	1B	1B	-	0.64%
Broeggerolithus sp.	0.1	-	-	0.06%
Isotelinid fragment	0.1	-	-	0.06%
				99.98

Cyclocyclopa A	21
Cyclocyclopa C	2
Cyclocyclopa J	3
Cyclocyclopa J_1	1
Cyclopentagonopa A	2
Cyclopentagonopa B	1
Cyclopentagonopa C	2
Cyclopentastellatopa A	2
Cirrals	14

LOCALITY 144B continued

Ramose Bryozoan fragments	10	
Circular Bryozoa	2	
Lepidocoleus sp.	1	
Genera Number	15	Diversity Index 6.80
Total Specimen Number	100	

LOCALITY 145	UPPER RACKS	SANDSTONE	CAPEL CURIG WEST	
Macrocoelia sp.	25B:77P	1.00B:3.08P	-	33.45%
M.expansa	11B:35P	1.00B:3.18P	-	15.20%
M.cf.prolata of Williams 1963	5P	5P	-	2.17%
Salopia globosa	59B:27P:2A	2.19B:1.00P	0.03/1	26.50%
Dinorthis sp.	6B:12P:1A	1.00B:2.00P	0.08/1	5.65%
D.cf.flabellum of Williams 1963	3B:2P	1.50B:1.00P	-	1.30%
Dalmanellids	10B:10P	1.00B:1.00P	-	4.34%
Dalmanella sp.	2B:6P	1.00B:3.00P	-	2.61%
Howellites sp.	1B:2P	1.00B:2.00P	-	0.87%
Rafinesquina sp. (?)	2B:11P	1.00B:5.50P	-	4.78%
Reuschella sp.	1B	1B	-	0.43%
Rostricellula sp.	1B	1B	-	0.43%
Petrocrania sp.	4B	4B	-	1.74%
Trinucleid,gen.et sp.indet.	0.1	-	-	0.04%
Isotelinid librigena	0.1	-	-	0.04%
Coral	1	-	-	0.43%
				99.98

Cyclocyclopa A	26
Cyclocyclopa C	1
Cyclocyclopa J	2
Cyclopentagonopa C	2
Cyclopentastellatopa A	1
Cirrals	18
Ramose Bryozoan fragments	18

LOCALITY 145 continued

Circular Bryozoan	1	
Lepidocoleus sp.	1	
Genera Number	17	Diversity Index 7.17
Total Specimen Number	100	

LOCALITY 149	CEFN-Y-CAPEL SILTSTONE		CREIGIAU'R GELLI CAPEL CURIG EAST	
Dalmanellids	83B:61P:8A	1.36B:1.00P	0.10/1	67.91%
Immature dalmanellids	11B:8P	1.38B:1.00P	-	8.21%
Dalmanella sp.	9B:6P	1.50B:1.00P	-	6.72%
Howellites sp.	5B:2P	2.50B:1.00P	-	3.73%
Sowerbyellids	6B:13P:2A	1.00B:2.16P	0.15/1	11.19%
Broeggerolithus sp.	0.2	-	-	0.15%
Calymene sp.(s.l.)	0.1	-	-	0.08%
Brongniartella sp. thoracic segments	0.7	-	-	0.52%
Tallinnella sp.	1	-	-	0.75%
Bellerophontid	1	-	-	0.75%
				100.01

Cyclocyclopa A	7
Cyclocyclopa G	2
Cyclopentagonopa C	3
Cyclopentagonopa D	1
Cirrals	3
Lepidocoleus sp.	1
Genera Number	10
Total Specimen Number	60

Diversity Index 4.69

LOCALITY 150	CEFN-Y-CAPEL SILTSTONE		CREIGIAU'R GELLI CAPEL CURIG EAST	
Dalmanellids	173B:137P:13A	1.26B:1.00P	0.08/1	75.40%
Immature dalmanellids	17B:15P	1.13B:1.00P	-	6.89%
Dalmanella sp.	17B:12P	1.42B:1.00P	-	6.89%
Howellites sp.	10B:2P	5.00B:1.00P	-	4.05%
Sowerbyellids	3B:8P:1A	1.00B:2.66P	0.13/1	3.65%
Leptaena sp.(?)	1P	1P	-	0.41%
Calymene sp.(s.l.)	0.3	-	-	0.12%
Brongniartella sp. thoracic segments	1.4	-	-	0.57%
Tallinnella sp.	2	-	-	0.81%
Bivalves,gen. et sp.indet.	2	-	-	0.81%
Bellerophontid	1	-	-	0.41%
				100.01

Cyclocyclopa A	5
Cyclocyclopa G	4
Cyclopentagonopa C	2
Cyclopentagonopa D	2
Echinoderm plates	2
Lepidocoleus sp.	3
Genera Number	11
Total Specimen Number	70

Diversity Index 4.59

LOCALITY 151	TOPMOST HORIZON OF THE CEFN-Y-CAPEL SILTSTONE		CAPEL CURIG EAST	
Sowerbyellids	23B:13P	1.77B:1.00P	-	67.65%
Dalmanellids	5B:8P	1.00B:1.60P	-	23.53%
Dinorthis sp.	2B	2B	-	5.88%
Macrocoelia sp.(?)	1P	1P	-	2.94%
				100.00

Cirral 1

Genera Number 5 Diversity Index 3.24

Total Specimen Number 30

LOCALITY 155	GLANRAFON BEDS UNIT p CAPEL CURIG EAST		NORTH OF THE PINNACLES CAPEL CURIG EAST	
Sowerbyellids	365B:279P:23A	1.31B:1.00P	0.06/1	64.35%
Immature sowerbyellids	24B:17P	1.41B:1.00P	-	3.98%
Sowerbyella cf. *soudleyensis* of Williams 1963	2P	2P	-	0.33%
Dinorthis(*Plaesiomys*) cf. *multiplicata* of Bancroft 1945	83B:66P:6A	1.26B:1.00P	0.07/1	14.75%
Dinorthis sp.	19B:12P	1.58B:1.00P	-	3.15%
Immature *Dinorthis* sp.	15B:13P	1.15B:1.00P	-	2.49%
Plaesiomys sp.	24B:18P	1.33B:1.00P	-	3.98%
Dalmanellids	9B:16P:2A	1.00B:1.77P	0.13/1	2.99%
Howellites sp.(?)	2B:2P	1.00B:1.00P	-	0.33%
Horderleyella sp.(?)	2B:5P	1.00B:2.50P	-	0.83%
Reuschella sp.	2B	2B	-	0.33%
Macrocoelia expansa	1B:12P	1.00B:12.00P	-	1.99%
Immature *Macrocoelia* sp.	2P	2P	-	0.33%
Leptaena sp.(?)	1P	1P	-	0.17%
				100.00

Genera Number 9 Diversity Index 3.24

Total Specimen Number 100

LOCALITY 158 MULTIPLICATA SANDSTONE SOUTH WEST OF LLYN COWLYD

Dinorthis (Plaesiomys) sp.	83B:91P:6A	1.00B:1.10P	0.07/1	64.24%
Immature D.(P.) sp.	6B: 6P	1.00B:1.00P	-	3.97%
D.(P.) multiplicata	33B:28P	1.18B:1.00P	-	21.85%
Macrocoelia sp.	2B: 2P	1.00B:1.00P	-	1.32%
M.cf.expansa of Williams 1963	1B: 4P	1.00B:4.00P	-	2.65%
Strophomenids, gen. et sp.indet.	2P	2P	-	1.32%
Reuschella sp.	2B	2B	-	1.32%
Sowerbyellids	1B: 2P	1.00B:2.00P	-	1.32%
Dalmanellid	1B	1B	-	0.66%
Gastropod, gen. et sp.indet.	1	-	-	0.66%
Bellerophontid	1	-	-	0.66%
				99.97

Genera Number 6 Diversity Index 2.75

Total Specimen Number 80

LOCALITY 158A MULTIPLICATA SANDSTONE SOUTH WEST OF LLYN COWLYD

Dinorthis (Plaesiomys) sp.	119B:107P:8A	1.11B:1.00P	0.07/1	62.25%
Immature D. (P.) sp.	13B: 10P	1.30B:1.00P	-	6.37%
D.(P.)multiplicata	51B:44P	1.16B:1.00P	-	25.00%
Macrocoelia sp.	3P	3P	-	1.47%
M.cf.expansa of Williams 1963	1B: 3P	1.00B:3.00P	-	1.47%
Dalmanellids	2B: 1P	2.00B:1.00P	-	0.98%
Sowerbyellids	2B: 2P	1.00B:1.00P	-	0.98%
Reuschella sp.	1B	1B	-	0.49%
Bellerophontids	2	-	-	0.98%
				99.99

Genera Number 6 Diversity Index 2.60

Total Specimen Number 80

LOCALITY 159	MULTIPLICATA SANDSTONE		SOUTH WEST OF LLYN COWLYD	
Dinorthis (*Plaesiomys*) sp.	107B:96P:5A	1.11B:1.00P	0.05/1	59.26%
Immature *D.*(*P.*)sp.	4B: 2P	2.00B:1.00P	-	2.12%
D.(*P.*)*multiplicata*	44B:33P	1.33B:1.00P	-	23.28%
Sowerbyellids	11B: 4P	2.75B:1.00P	-	5.82%
Macrocoelia sp.	3P	3P	-	1.59%
*M.*cf.*expansa* of Williams 1963	1B: 3P	1.00B:3.00P	-	1.59%
Strophomenids,gen. et sp.indet.	3P	3P	-	1.59%
Dalmanellids	1B: 2P	1.00B:2.00P	-	1.06%
Dalmanella sp.	1B	1B	-	0.53%
Inarticulate,gen.et sp.indet.	1	-	-	0.53%
Bellerophontids	2	-	-	1.06%
Pleurotomariacean	1	-	-	0.53%
Gastropods,gen.et sp.indet.	2	-	-	1.06%
				100.02

Ramose Bryozoan fragment 1

Genera Number 8 Diversity Index 3.51

Total Specimen Number 80

LOCALITY 159A	MULTIPLICATA SANDSTONE	SOUTH WEST OF LLYN COWLYD		
Dinorthis (Plaesiomys) sp.	97B:79P:3A	1.23B:1.00P	0.03/1	57.14%
Immature D.(P.)sp.	7B: 6P	1.17B:1.00P	-	4.00%
D.(P.)multiplicata	40B:34P	1.18B:1.00P	-	22.86%
Sowerbyellids	10B: 6P	1.67B:1.00P	-	5.71%
Macrocoelia sp.	1B: 6P	1.00B:6.00P	-	3.43%
M.cf.expansa of Williams 1963	2P	2P	-	1.14%
Strophomenids,gen. et sp.indet.	2P	2P	-	1.14%
Dalmanellids	3B: 3P	1.00B:1.00P	-	1.71%
Bellerophontids	2	-	-	1.14%
Pleurotomariaceans	2	-	-	1.14%
Gastropod ,gen.et sp.indet.	1	-	-	0.57%
				99.98

Ramose Bryozoan fragments 4

Genera Number 7 Diversity Index 3.12

Total Specimen Number 80

LOCALITY 160	ARKOSIC QUARTZITE		SOUTH WEST OF LLYN COWLYD	
Dalmanellids	8B:18P	1.00B:2.25P	-	34.55%
Immature dalmanellid	1P	1P	-	1.92%
Sowerbyellids	5B: 5P	1.00B:1.00P	-	9.60%
Skenidioides cf. *costatus* of Williams 1963	4B	4B	-	7.68%
Leptaena sp.	3P	3P	-	5.76%
Kiaromena sp.(?)	2P	2P	-	3.84%
Kjaerina sp.(?)	2P	2P	-	3.84%
Dinorthis sp.	1B: 1P	1.00B:1.00P	-	1.92%
D.(*Plaesiomys*)sp.	1B	1B	-	1.92%
*D.*sp.(?)	1B: 1P	1.00B:1.00P	-	1.92%
cf.*Platystrophia* sp.	2B	2B	-	3.84%
Reuschella sp.(?)	1B	1B	-	1.92%
Isotelinid librigenae	0.9	-	-	1.73%
Isotelinid pygidia	0.5	-	-	0.96%
Isotelinid thoracic segment	0.1	-	-	0.19%
Brongniartella sp.	0.5	-	-	0.96%
B.minor	0.1	-	-	0.19%
Brongniartella sp. thoracic segments	0.3	-	-	0.58%
Calymene sp.(s.l.)	0.3	-	-	0.58%
Calymene sp.(s.l.) librigena	0.1	-	-	0.19%
cf.*Flexicalymene* (*Reacalymene*) *limba* of Whittington 1965	0.1	-	-	0.19%
Proetids	0.2	-	-	0.38%

LOCALITY 160 continued

Thoracic segments	1.0	-	-	1.92%
Ostracode	1	-	-	1.92%
Gastropods, gen. et sp. indet.	3	-	-	5.76%
Bellerophontid	1	-	-	1.92%
Tentaculites sp.	2	-	-	3.84%
				100.02

Ramose Bryozoan fragments	4
Circular Bryozoa	2
Cyclocystoides sp.	2

Genera Number	18	Diversity Index	10.29
Total Specimen Number	100		

LOCALITY 160A	ARKOSIC QUARTZITE	SOUTH WEST OF LLYN COWLYD		
Dalmanellids	5B:11P	1.00B:2.20P	-	28.42%
Immature dalmanellids	1B: 1P	1.00B:1.00P	-	2.58%
Sowerbyellids	6B: 4P	1.50B:1.00P	-	15.50%
Dinorthis sp.	2B	2B	-	5.17%
Leptaena sp.	2P	2P	-	5.17%
Skenidioides sp.	2B: 1P	2.00B:1.00P	-	5.17%
Kjaerina sp.(?)	1B: 1P	1.00B:1.00P	-	2.58%
Kiaromena sp.(?)	1P	1P	-	2.58%
Reuschella sp.(?)	1B	1B	-	2.58%
cf.*Platystrophia* sp. of Williams 1963	3B	3B	-	7.75%
Isotelinid librigenae	0.6	-	-	1.55%
Isotelinid pygidia	0.4	-	-	1.03%
Brongniartella sp.	0.2	-	-	0.52%
B.minor	0.2	-	-	0.52%
B.sp.thoracic segment	0.1	-	-	0.26%
Calymene sp.(s.l.)	0.2	-	-	0.52%
Calymene sp.(s.l.) librigenae	0.2	-	-	0.52%
Proetid	0.1	-	-	0.26%
Thoracic segments	0.7	-	-	1.81%
Gastropods,gen.et sp. indet.	1	-	-	2.58%
Bellerophontids	3	-	-	7.75%
Tentaculites sp.	2	-	-	5.17%
				99.99

LOCALITY 160A continued

Ramose Bryozoan fragments	3	
Circular Bryozoa	3	
Cyclocystoides sp.	1	
Genera Number	17	Diversity Index 10.36
Total Specimen Number	70	

LOCALITY 162	ARKOSIC QUARTZITE		WEST OF LLYN COWLYD	
Dalmanellids	13B:13P	1.00B:1.00P	-	34.48%
Dalmanella sp.	1B: 1P	1.00B:1.00P	-	2.65%
Immature dalmanellid	1P	1P	-	2.65%
Sowerbyellids	2B: 1P:2A	2.00B:1.00P	1/1	10.61%
Plaesiomyid	1B	1B	-	2.65%
Inarticulate(Obolid, gen.et sp.indet.)	1	-	-	2.65%
Isotelinid librigenae	1.4	-	-	3.71%
Isotelinid pygidium	0.1	-	-	0.27%
Isotelinid hypostome	0.2	-	-	0.53%
Isotelinid thoracic segments	0.8	-	-	2.12%
Brongniartella sp.	0.2	-	-	0.53%
B.sp.thoracic segments	0.4	-	-	1.06%
Calymene sp.(s.l.)	0.3	-	-	0.80%
cf.*Flexicalymene planimarginata* of Whittington 1965	0.1	-	-	0.27%
Broeggerolithus sp.	0.1	-	-	0.27%
Lichid,gen.et sp. indet.	0.1	-	-	0.27%
Hollinaceans	2	-	-	5.31%
Primitia sp.	1	-	-	2.65%
cf.*Tetradella marchica* of Benson et al.1961	1	-	-	2.65%
Ostracodes(Podocopids?)	3	-	-	7.96%
Ostracodes	3	-	-	7.96%
Gastropods,gen.et sp.indet.	3	-	-	7.96%
				100.01

LOCALITY 162 continued

Ramose Bryozoan fragments	7	
Circular Bryozoan	1	
Genera Number	15	Diversity Index 9.38
Total Specimen Number	100	

LOCALITY 163	LLETHR GWYN BEDS	WEST OF LLYN COWLYD		
Sowerbyellids	185B:137P:13A	1.35B:1.00P	0.07/1	63.85%
Immature sowerbyellids	23B: 14P	1.64B:1.00P	-	7.42%
Dalmanellids	42B: 27P: 2A	1.56B:1.00P	0.05/1	14.19%
Immature dalmanellids	6B: 3P	2.00B:1.00P	-	1.93%
Dalmanella sp.	2B: 2P	1.00B:1.00P	-	0.64%
Howellites sp.	7B: 1P	7.00B:1.00P	-	2.26%
H.cf.antiquior of Williams 1963	1B: 1P	1.00B:1.00P	-	0.32%
Kjaerina sp.	2B: 2P	1.00B:1.00P	-	0.64%
Leptaena sp.	1B	1B	-	0.32%
Kiaromena cf.*kjerulfi* of Williams 1963	1P	1P	-	0.32%
Dinorthis sp.	1P	1P	-	0.32%
Triplesiaceid (?)	1P	1P	-	0.32%
Rafinesquina sp.(?)	1P	1P	-	0.32%
Broeggerolithus sp.	0.1	-	-	0.03%
Calymene sp.(s.l.)	0.2	-	-	0.06%
cf.*Flexicalymene* (*Reacalymene*) *limba* of Whittington 1965	0.2	-	-	0.06%
Isotelinid librigenae	0.2	-	-	0.06%
Isotelinid thoracic segments	0.4	-	-	0.13%
Gastropods,gen.et sp.indet.	8	-	-	2.58%
Lophospirids	3	-	-	0.97%
Bellerophontid	1	-	-	0.32%
Ostracode	1	-	-	0.32%

LOCALITY 163 continued

Tentaculites sp.		2.58%
		99.96

Cyclocyclopa A	2	
Cyclocyclopa A_1	2	
Cirral	1	
Circular Bryozoan	1	
Genera Number	18	Diversity Index 7.22
Total Specimen Number	100	

LOCALITY 166 LLETHR GWYN SANDSTONE WEST OF LLYN COWLYD

Sowerbyellids	7B:5P:4A	1.40B:1.00P	0.57/1	64.71%
Immature sowerbyellids	1B	1B	-	5.88%
Dalmanellids	4B: 1A	4B	0.25/1	29.41%
				100.00

Genera Number 2 Diversity Index 1.63

Total Specimen Number 20

LOCALITY 166A LLETHR GWYN SANDSTONE WEST OF LLYN COWLYD

Sowerbyellids	32B:18P:3A	1.78B:1.00P	0.09/1	84.95%
Dalmanellids	1B: 1P	1.00B:1.00P	-	2.43%
cf. *Flexicalymene planimarginata* of Whittington 1965	0.1	-	-	0.24%
Thoracic segment	0.1	-	-	0.24%
Hollinaceans	2	-	-	4.85%
Gastropods, gen. et sp. indet.	2	-	-	4.85%
Lophospirid (*Reudemannia* sp.?)	1	-	-	2.43%
				99.99

Cirrals 4

Genera Number 7 Diversity Index 4.31

Total Specimen Number 40

LOCALITY 166B LLETHR GWYN SANDSTONE WEST OF LLYN COWLYD

Sowerbyellids	193B:130P:29A	1.48B:1.00P	0.15/1	79.37%
Dalmanellids	38B: 31P	1.23B:1.00P	-	13.59%
Dalmanella sp.	2P	2P	-	0.72%
Howellites sp.	1B: 1P	1.00B:1.00P	-	0.36%
Horderleyella sp.	5B: 2P	2.50B:1.00P	-	1.79%
Kjaerina sp.(?)	1B: 1P	1.00B:1.00P	-	0.36%
Dinorthis sp.	1B	1B	-	0.36%
Rafinesquina sp.	1P	1P	-	0.36%
Salopia sp.	1B	1B	-	0.36%
Broeggerolithus sp.	0.1	-	-	0.04%
*B.*sp.(with long genal spine)	0.1	-	-	0.04%
Calymene sp.(s.l.)	0.2	-	-	0.07%
Flexicalymene cf. *planimarginata* of Whittington 1965	0.1	-	-	0.04%
Brongniartella cf. *minor* of Dean 1961	0.1	-	-	0.04%
Thoracic segment	0.1	-	-	0.04%
Hollinacean	1	-	-	0.36%
Gastropod,gen.et sp.indet.	1	-	-	0.36%
Bellerophontids	3	-	-	1.07%
Lesuerilla sp.(?)	1	-	-	0.36%
				100.05

Cirrals	3
Bryozoan	1
Genera Number	16
Total Specimen Number	100

Diversity Index 6.53

LOCALITY 170	RHYOLITIC TUFF WITHIN THE LLYN COWLYD SANDSTONE FORMATION		WEST OF LLYN COWLYD	
Sowerbyellids	18B:8P:20A	2.25B:1.00P	1.11/1	48.41%
Dalmanellids	8B:1P: 4A	8.00B:1.00P	0.50/1	15.29%
Immature dalmanellid	1P	1P	-	1.27%
Reuschella sp.	10B: 3P	3.33B:1.00P	-	12.74%
Dolerorthis sp.(?)	4P:1A	4P	0.25/1	6.37%
Brachiopods, gen. et sp. indet.	1P:1A	1P	1/1	2.55%
Broeggerolithus sp.	0.8	-	-	1.02%
Broeggerolithus sp. (Group 3 - Dean 1960)	0.1	-	-	0.13%
B. cf. *nicholsoni* of Dean 1962	0.1	-	-	0.13%
Calymene sp.(s.l.)	0.1	-	-	0.13%
cf. *Flexicalymene caractaci* of Whittington 1965	0.1	-	-	0.13%
Odontopleurid librigena	0.1	-	-	0.13%
Thoracic segments	0.2	-	-	0.25%
Lophospirid	1	-	-	1.27%
Reudemannia sp.(?)	2	-	-	2.55%
Tentaculites sp.	6	-	-	7.64%
				100.01

Cyclocyclopa A_1	1
Cyclocyclopa J	3
Bryozoa	2
Circular Bryozoan	1
Cyclocystoides sp.(?)	1

LOCALITY 170 continued

Genera Number	13	Diversity Index	6.78
Total Specimen Number	60		

LOCALITY 172	RHYOLITIC TUFF WITHIN THE LLYN COWLYD SANDSTONE FORMATION		WEST OF LLYN COWLYD	
Sowerbyellids	8B:1P:7A	8.00B:1.00P	0.88/1	47.62%
Reuschella sp.	6B:8P	1.00B:1.33P	-	25.40%
Reuschella sp.(?)	1B	1B	-	3.17%
Sericoidea sp.	1B	1B	-	3.17%
Dalmanellid	1P	1P	-	3.17%
Leptaena sp.(?)	2P	2P	-	6.35%
Brachiopods,gen.et sp.indet.	3P	3P	-	9.52%
Broeggerolithus sp. (Group 3 - Dean 1960)	0.1	-	-	0.32%
Trinucleid,gen.et sp. indet.	0.1	-	-	0.32%
Calymene sp.(s.l.)	0.2	-	-	0.63%
Thoracic segment	0.1	-	-	0.32%
				99.99

Cyclocyclopa A	1
Pentagonocyclopa A pluricolumnal	1
Ramose Bryozoan fragments	2
Bryozoan	1
Lepidocoleus sp.	1
Genera Number	12
Total Specimen Number	30

Diversity Index 7.74

LOCALITY 173	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Sowerbyellids	470B:363P:9A	1.29B:1.00P	0.02/1	62.88%
Sowerbyella cf. *soudleyensis* of Williams 1963	10B:4P	2.50B:1.00P	-	1.31%
Dalmanellids	128B:110P:2A	1.16B:1.00P	0.02/1	17.06%
Dalmanella sp.	21B:16P	1.31B:1.00P	-	2.76%
Howellites sp.	11B:16P	1.00B:1.45P	-	2.10%
Onniella sp.	1B:3P	1.00B:3.00P	-	0.39%
Kjaerina cf. *jonesi* of Bancroft 1929a	3P	3P	-	0.39%
Kjaerina cf. *hedstroemi* of Bancroft 1929a	1P	1P	-	0.13%
Kjaerina sp.	1B:10P	1.00B:10.00P	-	1.31%
Hedstroemina cf. *robusta* of Bancroft 1929a	1P	1P	-	0.13%
Eoplectodonta sp.	2B:2P	1.00B:1.00P	-	0.26%
Bicuspina cf. *spiriferoides* of Williams 1963	3P	3P	-	0.39%
Triplesiaceid	1P	1P	-	0.13%
Sericoidea sp.	1B	1B	-	0.13%
Skenidioides cf. *costatus* of Williams 1963	1P	1P	-	0.13%
Dinorthis sp. (?)	1B	1B	-	0.13%
Broeggerolithus cf. *nicholsoni* of Dean 1962	0.2	-	-	0.03%
Broeggerolithus sp.	6.7	-	-	0.88%
Brongniartella minor	0.2	-	-	0.03%
Brongniartella sp.	0.1	-	-	0.01%

LOCALITY 173 continued

Brongniartella sp. thoracic segments	0.5	-	-	0.07%
Flexicalymene cf. *planimarginata* of Whittington 1965	0.3	-	-	0.04%
Flexicalymene cf. *caractaci* of Whittington 1965	0.1	-	-	0.01%
Flexicalymene sp.	0.2	-	-	0.03%
Calymene sp.(s.l.)	0.4	-	-	0.05%
Kloucekia apiculata	0.5	-	-	0.07%
Kloucekia sp.	0.1	-	-	0.01%
Thoracic segments	1.4	-	-	0.18%
Pygidium,gen.et sp. indet.	0.1	-	-	0.01%
Hollinaceans	5	-	-	0.66%
Ostracodes	8	-	-	1.05%
Bivalves,gen.et sp. indet.	6	-	-	0.79%
Tentaculites scalaris	28	-	-	3.68%
Favosites sp.	21	-	-	2.76%
				99.99

Cyclocyclopa A	101
Pentagonocyclopa B	15
Ramose Bryozoan fragments	50
Circular Bryozoa	2
Genera Number	26
Total Specimen Number	200

Diversity Index 9.02

LOCALITY 173A	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Sowerbyellids	91B:85P:9A	1.07B:1.00P	0.10/1	38.83%
Dalmanellids	41B:77P:3A	1.00B:1.77P	0.04/1	31.07%
Dalmanella sp.	6B: 4P	1.50B:1.00P	-	2.33%
Onniella sp.	5P	5P	-	1.94%
Kjaerina jonesi	14B:12P	1.17B:1.00P	-	5.44%
Kjaerina sp.	2B:23P	1.00B:11.50P	-	8.93%
Bellemurina sp.	2P	2P	-	0.78%
Skenidioides sp.	1B	1B	-	0.39%
Dolerorthis sp.(?)	1P	1P	-	0.39%
Triplesiaceid	1B	1B	-	0.39%
Brachiopod,gen.et sp. indet.	1B	1B	-	0.39%
Broeggerolithus cf. *nicholsoni* of Dean 1962	0.1	-	-	0.04%
Broeggerolithus sp.	1.9	-	-	0.74%
Kloucekia apiculata	0.4	-	-	0.16%
Calymene sp.(s.l.)	0.2	-	-	0.08%
Proetid librigenae	0.3	-	-	0.12%
Isotelinid,gen.et sp.indet.	0.2	-	-	0.08%
Thoracic segments	0.4	-	-	0.16%
Ostracodes	4	-	-	1.55%
Tentaculites sp.	10	-	-	3.88%
Favosites sp.	2	-	-	0.78%
				100.02
Cyclocyclopa A	105			
Pentagonocyclopa A	37			

LOCALITY 173A continued

Pentagonocyclopa B	7	
Pentastellapenta stellatopa A	1	
Ramose Bryozoan fragments	46	
Circular Bryozoan	1	
Lepidocoleus sp.	4	
Genera Number	22	Diversity Index 9.11
Total Specimen Number	100	

LOCALITY 174	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Sowerbyellids	39B:51P:10A	1.00B:1.31P	0.20/1	61.31%
Dalmanellids	18B:18P:3A	1.00B:1.00P	0.17/1	21.11%
Dalmanella sp.	1B:3P	1.00B:3.00P	-	3.02%
Howellites sp.	2P	2P	-	2.01%
Eoplectodonta sp.	2B	2B	-	2.01%
Dolerorthis sp.	1P	1P	-	1.01%
Broeggerolithus sp.	0.4	-	-	0.40%
Calymene sp.(s.l.)	0.1	-	-	0.10%
Tallinnella sp.	1	-	-	1.01%
Tentaculites sp.	8	-	-	8.04%
				100.02

Cyclocyclopa A	17
Ramose Bryozoan fragments	4
Genera Number	12
Total Specimen Number	38

Diversity Index 5.98

LOCALITY 175	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Sowerbyellids	303B:234P:42A	1.29B:1.00P	0.14/1	33.06%
Dalmanellids	163B:199P:21A	1.00B:1.22P	0.11/1	21.08%
Dalmanella sp.	11B:9P	1.22B:1.00P	-	1.05%
Dalmanella cf. *lepta* of Bancroft 1945	5B	5B	-	0.48%
Howellites sp.	13B:9P	1.44B:1.00P	-	1.25%
Howellites cf. *antiquior* of Williams 1963	1B	1B	-	0.10%
Onniella sp.	2B:2P:3A	1.00B:1.00P	1.50/1	0.48%
Bancroftina sp.	1B	1B	-	0.10%
Kjaerina cf. *jonesi* of Bancroft 1929a	4B:17P	1.00B:4.25P	-	1.63%
Kjaerina cf. *hedstroemi* of Bancroft 1929a	6B:11P	1.00B:1.83P	-	1.05%
Kjaerina cf. *typa* of Bancroft 1929a	3P	3P	-	0.29%
Kjaerina cf. *bipartita* of Bancroft 1929a	1P	1P	-	0.10%
Kjaerina sp.	38B:76P	1.00B:2.00P	-	7.28%
Hedstroemina cf. *robusta* of Bancroft 1929a	6P	6P	-	0.57%
Hedstroemina sp.	3P	3P	-	0.29%
Rafinesquina sp.	4B:20P	1.00B:5.00P	-	1.92%
Strophomenids, gen.et sp.indet.	14B:42P	1.00B:3.00P	-	4.02%
Bicuspina spiriferoides	5B:5P	1.00B:1.00P	-	0.48%
Oxoplecia sp.(?)	1P	1P	-	0.10%

LOCALITY 175 continued

Triplesiaceids	2B:3P	1.00B:1.50P	-	0.29%
Eoplectodonta sp.	5B:1P	5.00B:1.00P	-	0.48%
Dolerorthis cf. *duftonensis prolixa* of Williams 1963	1B	1B	-	0.10%
Leptaena salopiensis	1P	1P	-	0.10%
Leptaena ventricosa	1P	1P	-	0.10%
Skenidioides sp.	1B	1B	-	0.10%
Strophomena sp.	2P	2P	-	0.19%
Macrocoelia cf. *prolata* of Williams 1963	1P	1P	-	0.10%
Dinorthis sp.(?)	1B	1B	-	0.10%
Stropheodontids, gen. et sp. indet.	2P	2P	-	0.19%
Heterorthis sp.	1B	1B	-	0.10%
Paterula sp.	2	-	-	0.19%
Obolid, gen. et sp. indet.	1	-	-	0.10%
Broeggerolithus cf. *nicholsoni* of Dean 1962	0.7	-	-	0.07%
Broeggerolithus sp.	16.2	-	-	1.55%
Kloucekia apiculata	3.0	-	-	0.29%
Kloucekia sp.	2.1	-	-	0.20%
Decoroproteus cf. *calvus* of Owens 1973	0.3	-	-	0.03%
Proetid librigenae	0.6	-	-	0.06%
Flexicalymene planimarginata	0.4	-	-	0.04%
Flexicalymene caractaci	0.1	-	-	0.01%

LOCALITY 175 continued

Flexicalymene sp.	0.2	-	-	0.02%
Calymene sp.(s.l.)	0.2	-	-	0.02%
Brongniartella cf. *bisulcata* of Dean 1961	0.2	-	-	0.02%
Brongniartella sp.	0.3	-	-	0.03%
Parabasilicus powisi	0.1	-	-	0.01%
Parabasilicus sp.	0.1	-	-	0.01%
Isotelinids,gen.et sp.indet.	0.2	-	-	0.02%
Atractopyge sp.(?)	0.1	-	-	0.01%
Lichid,gen. et sp. indet.	0.1	-	-	0.01%
Pygidium,gen.et sp. indet.	0.1	-	-	0.01%
Thoracic segments	5.7	-	-	0.55%
Hollinaceans	83	-	-	7.95%
Tallinnella sp.	50	-	-	4.79%
Quadrijugatorid	1	-	-	0.10%
Dilobella sp.	2	-	-	0.19%
Tetradella sp.	1	-	-	0.10%
Bellerophontid	1	-	-	0.10%
Cyrtolites sp.	7	-	-	0.67%
Donaldiella sp.	2	-	-	0.19%
Modiomorphids	2	-	-	0.19%
Favosites sp.	12	-	-	1.15%
				100.08

LOCALITY 175 continued

Cyclocyclopa A	345
Pentagonocyclopa A	121
Pentagonocyclopa B	34
Ramose Bryozoan fragments	201
Circular Bryozoa	2
Lepidocoleus sp.	44

Genera Number	48	Diversity Index 15.90
Total Specimen Number	200	

LOCALITY 176	LOWER RHYOLITIC TUFF FORMATION		SOUTH WEST OF DOLWYDDELAN Horizon 1	
Dalmanellids	8B:20P:1A	1.00B:2.50P	0.05/1	46.56%
Dalmanella sp.	2B: 2P	1.00B:1.00P	-	4.43%
D.cf.lepta of Bancroft 1945	1B	1B	-	2.22%
Howellites sp.	1B: 2P	1.00B:2.00P	-	4.43%
Bancroftina sp.	1B	1B	-	2.22%
Onniella sp.	1B	1B	-	2.22%
Sowerbyellids	10B: 6P	1.67B:1.00P	-	22.17%
Nicolella sp.	1B: 2P	1.00B:2.00P	-	4.43%
Skenidioides sp.	1B: 1P	1.00B:1.00P	-	2.22%
Rafinesquina sp.	1P	1P	-	2.22%
Orthid,gen.et sp. indet.	1P	1P	-	2.22%
Brachiopod,gen.et sp.indet.	1P	1P	-	2.22%
Broeggerolithus sp.	0.1	-	-	0.22%
				100.01

Cyclocyclopa A	24
Pentagonocyclopa B	1
Cystoid plate	1
Ramose Bryozoan fragments	2
Lepidocoleus sp.	1
Genera Number	15
Total Specimen Number	70

Diversity Index 8.92

LOCALITY 176	LOWER RHYOLITIC TUFF FORMATION	SOUTH WEST OF DOLWYDDELAN Horizon 2		
Sowerbyellids	8B:18P:2A	1.00B:2.25P	0.11/1	26.99%
Dalmanellids	2B: 8P:2A	1.00B:4.00P	0.25/1	13.50%
Howellites sp.	1A	-	-	1.35%
Eoplectodonta sp.	1B: 6P	1.00B:6.00P	-	8.10%
Sericoidea sp.	1B: 2P	1.00B:2.00P	-	2.70%
Skenidioides sp.	1B: 1P	1.00B:1.00P	-	1.35%
Rafinesquina sp.	1P	1P	-	1.35%
Plectambonitacean	1P	1P	-	1.35%
Immature *Kjaerina* sp.	1P	1P	-	1.35%
Obolids, gen. et sp. indet.	3	-	-	4.05%
Paterula sp.(?)	1	-	-	1.35%
Broeggerolithus sp.	0.7	-	-	0.94%
Cryptolithines, gen. et sp. indet.	0.3	-	-	0.40%
Brongniartella cf. *bisulcata* of Dean 1961	0.3	-	-	0.40%
Brongniartella sp.	0.3	-	-	0.40%
Decoroproteus sp.	0.1	-	-	0.13%
Kloucekia sp.	0.1	-	-	0.13%
Otarion sp.	0.1	-	-	0.13%
Large thoracic segments (*Brongniartella* sp.?)	2.1	-	-	2.83%
Thoracic segments	2.1	-	-	2.83%
Hollinaceans	4	-	-	5.40%
Ostracodes	4	-	-	5.40%
Gastropods, gen. et sp. indet.	2	-	-	2.70%
				100.00

LOCALITY 176 continued Horizon 2

Cyclocyclopa B	2
Cyclopentagonopa A	3
Pentagonocyclopa A	10
Pentagonocyclopa B	3
Echinoderm plates	4
Ramose Bryozoan fragment	1
Circular Bryozoan	1
Lepidocoleus sp.	11

Genera Number	23	Diversity Index 12.19
Total Specimen Number	150	

LOCALITY 178	BEDDED PYROCLASTIC FORMATION	SOUTH WEST OF DOLWYDDELAN		
Dolerorthis duftonensis prolixa	49B:31P:2A	1.58B:1.00P	0.04/1	23.51%
Skenidioides costatus	37B:15P	2.47B:1.00P	-	17.06%
cf. Skenidioides sp.	2B	2B	-	0.92%
Nicolella actoniae obesa	23B:31P	1.00B:1.35P	-	14.29%
Sowerbyellids	12B: 8P	1.50B:1.00P	-	5.53%
Dalmanellids	15B: 8P	1.88B:1.00P	-	6.92%
D. cf. lepta of Bancroft 1945	1B	1B	-	0.46%
Howellites sp.	2P	2P	-	0.92%
Bancroftina sp.	1B: 1P	1.00B:1.00P	-	0.46%
Onniella sp.(?)	1B	1B	-	0.46%
Sericoidea sp.	12B:10P	1.20B:1.00P	-	5.53%
Protozyga cf. diversa of Williams 1962	6B	6B	-	2.77%
Cremnorthis parva	2B: 5P	1.00B:2.50P	-	2.31%
Reuschella sp.	3P	3P	-	1.38%
Orthambonites sp.	2P	2P	-	0.92%
Kiaromena cf. kjerulfi of Williams 1963	2P	2P	-	0.92%
Rhactorthis sp.	2P	2P	-	0.92%
Bicuspina cf. spiriferoides of Williams 1963	1P	1P	-	0.46%
Dinorthis cf. berwynensis angusta of Williams 1963	1P	1P	-	0.46%

LOCALITY 178 continued

Hesperorthis sp.	1P	1P	-	0.46%
Kjaerina sp.	1P	1P	-	0.46%
Rugose Strophomenid, gen.et sp.indet.	1B	1B	-	0.46%
Enteletaceans	3B	3B	-	1.38%
Orthids,gen. et sp.indet.	1B: 2P: 1A	1.00B:2.00P	0.50/1	1.38%
Inarticulates,gen. et sp.indet.	3	-	-	1.38%
Brachiopods,gen. et sp.indet.	4B:5P	1.00B:1.25P	-	2.31%
Brongniartella sp.	0.1	-	-	0.05%
Decoroproteus sp.	0.1	-	-	0.05%
Proetid librigena	0.1	-	-	0.05%
Kloucekia sp.(?)	0.1	-	-	0.05%
Thoracic segments	0.5	-	-	0.23%
Tentaculites sp.	8	-	-	3.69%
Favosites sp.	4	-	-	1.84%
				99.99

Cyclocyclopa A	317
Cyclocyclopa B	8
Cyclocyclopa C	3
Cyclotristellatopa A	6
Cyclopentastellatopa A	24
Pentagonocyclopa A	67
Hemicyclocyclopa A	1
Pinnate$_1$	9

LOCALITY 178 continued

Rhombiferan cystoid plates	10	
Ramose Bryozoan fragments	67	
Lepidocoleus sp.	9	
Cyclocystoides sp.	10	
Genera Number	30	Diversity Index 12.65
Total Specimen Number	220	

LOCALITY 179	UPPER RHYOLITIC TUFF FORMATION	SOUTH WEST OF DOLWYDDELAN		
Sericoidea sp.	89B:77P:5A	1.16B:1.00P	0.06/1	21.98%
Immature Sericoidea sp.	1B: 1P	1.00B:1.00P	-	0.23%
Dalmanellids	27B:17P:1A	1.59B:1.00P	0.04/1	6.34%
Dalmanella sp.	6B	6B	-	1.36%
Onniella sp.	4B:10P	1.00B:2.50P	-	2.27%
Howellites sp.	1B	1B	-	0.23%
Sowerbyellids	4B: 5P:3A	1.00B:1.25P	0.60/1	1.81%
Skenidioides costatus	9B:15P	1.00B:1.67P	-	3.40%
Nicolella actoniae obesa	15B:19P	1.00B:1.27P	-	4.37%
Bellemurina incommoda	5B:15P	1.00B:3.00P	-	3.40%
Rhactorthis crassa	4B: 1P:1A	4.00B:1.00P	0.25/1	1.13%
Rhactorthis aff. crassa of Williams 1963	4B:14P	1.00B:3.50P	-	3.24%
Cremnorthis parva	2B: 2P:1A	1.00B:1.00P	0.50/1	0.68%
Kiaromena cf. kjerulfi of Williams 1963	8P	8P	-	1.81%
Eoplectodonta cf. rhombica of Williams 1963	4P	4P	-	0.91%
Kjerulfina sp.	1B: 6P	1.00B:6.00P	-	1.36%
Rugose strophomenids, gen.et sp.indet.	13P	13P	-	2.95%
Strophomenid,gen. et sp.indet.	1P	1P	-	0.23%
Hedstroemina fragilis	1B: 1P	1.00B:1.00P	-	0.23%

LOCALITY 179 continued

Hedstroemina cf. *fragilis* of Bancroft 1929a	1P	1P	-	0.23%
Hedstroemina parva	1P	1P	-	0.23%
Leptaena cf. *salopiensis* of Williams 1963	1P	1P	-	0.23%
Leptaena sp.	6P	6P	-	1.36%
Bicuspina sp.	1P	1P	-	0.23%
Triplesiaceid	1B	1B	-	0.23%
Platystrophia sp.(?)	2P	2P	-	0.45%
Bancroftina sp.(?)	1P	1P	-	0.23%
Caeroplecia sp.(?)	1B	1B	-	0.23%
Glyptorthis sp.(?)	1P	1P	-	0.23%
Reuschella sp.(?)	1B	1B	-	0.23%
Leptestiina oepiki	1B	1B	-	0.23%
Macrocoelia sp.(?)	1P	1P	-	0.23%
Bystronema perplexa	1B	1B	-	0.23%
Dolerorthis cf. *tenuicostata* of Williams 1955	1P	1P	-	0.23%
Dolerorthis sp.	4B	4B	-	0.91%
Gunnarella sp.	1P	1P	-	0.23%
Enteletacean	1B:1P	1.00B:1.00P	-	0.23%
Orthids, gen. et sp. indet.	2B:2P	1.00B:1.00P	-	0.45%
Craniopsid(?)	1	-	-	0.23%
Praenuculid	12:3A	-	0.25/1	3.40%
Estoniops alifrons	3.2	-	-	0.72%

LOCALITY 179 continued

Estoniops sp. librigenae	0.4	-	-	0.09%
Illaenus davisi	0.4	-	-	0.09%
Platylichas nodulosus	0.3	-	-	0.07%
Lichids, gen. et sp. indet.	0.2	-	-	0.05%
Broeggerolithus sp. (Group 3 - Dean 1960)	0.1	-	-	0.02%
Trinucleid fragment	0.1	-	-	0.02%
Decoroproteus sp.	0.2	-	-	0.05%
Proetid librigenae	0.4	-	-	0.09%
Cybella sp.(?)	0.2	-	-	0.05%
Brongniartella sp.(?)	0.1	-	-	0.02%
Pygidium, gen. et sp. indet.	0.1	-	-	0.02%
Thoracic segments	2.7	-	-	0.61%
Cyrtolites sp.	28	-	-	6.34%
Murchisonia sp.	13	-	-	2.95%
Murchisonia (Hormotoma) sp.	1	-	-	0.23%
Cyclonema sp.	16	-	-	3.68%
Lophospira sp.	5	-	-	1.13%
Clathrospira sp.	2	-	-	0.45%
Eotomariid (Clathrospira sp.?)	1	-	-	0.23%
Reudemannia sp.	4	-	-	0.91%
Gastropods, gen. et sp. indet.	19	-	-	4.30%
Immature gastropod, gen. et sp. indet.	1	-	-	0.23%

LOCALITY 179 continued

Ostracode	1	-	-	0.23%
Tentaculites sp.	6	-	-	1.36%
Favosites sp.	21	-	-	4.76%
				100.09

Cyclocyclopa A	189
Cyclocyclopa A pluricolumnals	3
Cyclocyclopa C	2
Cyclocyclopa D	30
Cyclocyclopa D pluricolumnals	3
Cyclocyclopa E	47
Cyclocyclopa E pluricolumnals	15
Cyclocyclopa F	14
Cyclopentastellatopa A	10
Pentagonocyclopa A	1
Pentagonopentagonopa A	1
Pinnate$_1$	4
Rhombiferan pore rhombs	4
Rhombiferan plates	23
Ramose Bryozoan fragments	70
Circular Bryozoa	25
Genera Number	53
Total Specimen Number	200

Diversity Index 20.01

LOCALITY 180	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Dalmanellids	134B:187P:38A	1.00B:1.40P	0.20/1	57.60%
Immature dalmanellids	1B:5P:1A	1.00B:5.00P	0.20/1	1.54%
Howellites sp.	71B:53P:20A	1.34B:1.00P	0.28/1	23.30%
H.cf.antiquior of Williams 1963	2B:1P	2.00B:1.00P	-	0.51%
Dalmanella sp.	23B:16P:3A	1.44B:1.00P	0.13/1	6.66%
D.cf.lepta of Bancroft 1945	1B:1P	1.00B:1.00P	-	0.26%
Onniella sp.	1B:3P:1A	1.00B:3.00P	0.33/1	1.02%
O.cf.soudleyensis of Williams 1963	1B	1B	-	0.26%
Bancroftina sp.	2B	2B	-	0.51%
Sowerbyellids	1B:2P	1.00B:2.00P	-	0.51%
Obolid,gen et sp.indet.	1	-	-	0.26%
Brachiopod,gen.et sp.indet.	1A	-	-	0.26%
Broeggerolithus sp.	1.4	-	-	0.36%
Parabasilicus sp.	0.1	-	-	0.03%
Kloucekia sp.	0.1	-	-	0.03%
Tallinnella sp.	3	-	-	0.77%
Hollinaceans	12	-	-	3.07%
Sinuites sp.	6	-	-	1.54%
Tentaculites scalaris	1	-	-	0.26%
Tentaculites sp.	5	-	-	1.28%
				100.03

LOCALITY 180 continued

Cystoid plate	1	
Ramose Bryozoan fragments	6	
Genera Number	16	Diversity Index 6.17
Total Specimen Number	200	

LOCALITY 181	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN Horizon 1		
Sowerbyellids	23B:14P:3A	1.64B:1.00P	0.13/1	49.34%
Dalmanellids	7B: 7P:4A	1.00B:1.00P	0.57/1	20.87%
Dalmanella sp.	1B: 1P	1.00B:1.00P	-	1.90%
Howellites sp.	1B: 5P	1.00B:5.00P	-	9.40%
Onniella sp.	1P	1P	-	1.90%
Kjaerina cf. *hedstroemi* of Bancroft 1929a	1P	1P	-	1.90%
Rafinesquina sp.	1P	1P	-	1.90%
Hedstroemina sp.	1P	1P	-	1.90%
Bicuspina sp.(?)	1P	1P	-	1.90%
Broeggerolithus sp.	0.4	-	-	0.76%
Kloucekia sp.	0.3	-	-	0.57%
Hollinacean	1	-	-	1.90%
Tentaculites sp.	3	-	-	5.69%
				100.02

Cyclocyclopa A	12
Cyclocyclopa A pluricolumnal	1
Pinnate$_1$	3
Genera Number	14
Total Specimen Number	20

Diversity Index 8.09

LOCALITY 181	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN Horizon 1A		
Sowerbyellids	46B:28P:7A	1.64B:1.00P	0.15/1	40.43%
Dalmanellids	16B:26P:6A	1.00B:1.63P	0.23/1	24.41%
Dalmanella sp.	4B:2P	2.00B:1.00P	-	3.05%
Howellites cf. *antiquior* of Williams 1963	1B	1B	-	0.76%
Howellites sp.	2B:4P	1.00B:2.00P	-	3.05%
Kjaerina cf. *hedstroemi* of Bancroft 1929a	1P	1P	-	0.76%
Kjaerina sp.	2B:6P	1.00B:3.00P	-	4.58%
Rafinesquina sp.	1B:3P	1.00B:3.00P	-	2.29%
Reuschella sp.	1P	1P	-	0.76%
Skenidioides sp.	1B	1B	-	0.76%
Orthid, gen. et sp. indet.	1B	1B	-	0.76%
Inarticulates, gen. et sp. indet.	4	-	-	3.05%
Broeggerolithus sp.	1.9	-	-	1.45%
B. cf. *nicholsoni* of Dean 1962	0.1	-	-	0.08%
Kloucekia sp.	0.7	-	-	0.53%
Brongniartella minor	0.1	-	-	0.08%
Otarion sp.(?)	0.1	-	-	0.08%
Isotelinid, gen. et sp. indet.	0.1	-	-	0.08%
Thoracic segment	0.1	-	-	0.08%
Hollinaceans	8	-	-	6.10%
Tallinnella sp.	3	-	-	2.29%

LOCALITY 181 - Horizon 1A continued

Pteriomorphian, gen. et sp. indet.	1	-	-	0.76%
<u>Tentaculites</u> sp.	5	-	-	3.81%
				100.00

Cyclocyclopa A	13
Cyclocyclopa A pluricolumnal	1
Cyclocyclopa F	4
Cyclocyclopa F pluricolumnal	1
Pentagonocyclopa B	1
Pentagonocyclopa C	1
Pinnate$_1$	4
Cirrals	12
Ramose Bryozoan fragments	11

Genera Number	20	Diversity Index 9.41
Total Specimen Number	70	

LOCALITY 181	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN Horizon 2		
Sowerbyellids	160B:98P:11A	1.63B:1.00P	0.07/1	53.44%
Dalmanellids	58B:75P:12A	1.00B:1.29P	0.16/1	27.19%
Dalmanella sp.	11B: 5P	2.20B:1.00P	-	3.44%
D.aff. lepta of Bancroft 1945	1B	1B	-	0.31%
Howellites sp.	1B:6P:2A	1.00B:6.00P	0.33/1	2.50%
Salopia sp. (?)	2B: 1P	2.00B:1.00P	-	0.63%
Eoplectodonta sp.	1B	1B	-	0.31%
Harknessellid	1P	1P	-	0.31%
Obolid (*Pseudolingula* sp.?)	1	-	-	0.31%
Broeggerolithus sp.	2.4	-	-	0.75%
Brongniartella minor	0.1	-	-	0.03%
B. bisulcata (?)	0.1	-	-	0.03%
*B.*sp. librigenae	1.0	-	-	0.31%
Parabasilicus sp.	0.3	-	-	0.09%
Isotelinid pygidia	0.5	-	-	0.16%
Isotelinid fragments	6.7	-	-	2.09%
Kloucekia sp.	1.0	-	-	0.31%
Flexicalymene planimarginata	0.2	-	-	0.06%
F.cf.planimarginata of Whittington 1965	0.2	-	-	0.06%
*F.*sp.	0.2	-	-	0.06%
Calymene sp. (s.l.)	1.2	-	-	0.38%
Pseudosphaerexochus sp. (?)	0.1	-	-	0.03%
Ostracodes	3	-	-	0.94%

LOCALITY 181 - Horizon 2 continued

Hollinaceans	7	-	-	2.19%
Tallinnella sp.	1	-	-	0.31%
Bivalves, gen. et sp. indet.	2	-	-	0.63%
Tentaculites sp.	10	-	-	3.13%
				100.00

Cyclocyclopa A	13
Cyclocyclopa F	3
Pinnate$_1$	1
Cirral	1
Ramose Bryozoan fragments	105
Genera Number	20
Total Specimen Number	100

Diversity Index 7.98

LOCALITY 183	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN Horizon 1		
Dalmanellids	32B:28P:10A	1.14B:1.00P	0.31/1	22.96%
Dalmanella sp.	5B: 2P	2.50B:1.00P	-	2.73%
Howellites sp.	1B: 1P	1.00B:1.00P	-	0.55%
Onniella cf. *soudleyensis* of Williams 1963	1B	1B	-	0.55%
Horderleyella cf. *plicata* of Bancroft 1928,1945	4B:11P:2A	1.00B:2.75P	0.18/1	7.11%
Reuschella sp.	8B:13P:1A	1.00B:1.63P	0.08/1	7.65%
Reuschella cf. *horderleyensis* of Bancroft 1928 and Williams 1963	2B: 2P	1.00B:1.00P	-	1.09%
*R.*cf.*horderleyensis carinata* of Williams 1974	1P	1P	-	0.55%
Immature *Reuschella* sp.	1P	1P	-	0.55%
Leptaena sp.	5B:11P:1A	1.00B:2.20P	0.09/1	6.56%
Leptaena cf.*rugosa* of Havlíček 1967	1B	1B	-	0.55%
Leptaena cf. *salopiensis* of Williams 1963	1P	1P	-	0.55%
Leptaenid	3P	3P	-	1.64%
Dinorthis sp.	2B: 1P:1A	2.00B:1.00P	0.50/1	1.64%
Dinorthis cf. *berwynensis* of Williams 1963	3B: 7P:2A	1.00B:2.33P	0.29/1	4.92%
Triplesiaceids	7B: 8P:1A	1.00B:1.14P	0.13/1	4.92%
Bicuspina spiriferoides	2B: 1P	2.00B:1.00P	-	1.09%

LOCALITY 183 continued Horizon 1

Caeroplecia sp.(?)	1B	1B	-	0.55%
Macrocoelia sp.(?)	3B: 6P:1A	1.00B:2.00P	0.17/1	3.83%
Rafinesquina sp.	2P	2P	-	1.09%
Kiaromena cf. kjerulfi of Williams 1963	3P	3P	-	1.64%
Kjerulfina sp.	1P	1P	-	0.55%
Immature Bellemurina sp.(?)	1P	1P	-	0.55%
Paracraniops sp.	1	-	-	0.55%
Inarticulates,gen. et sp.indet.	8:1A	-	0.13/1	4.92%
Brachiopod,gen.et sp.indet.	1B: 1P	1.00B:1.00P	-	0.55%
Broeggerolithus sp.	1.0	-	-	0.55%
Broeggerolithus sp. (Group 2 -Dean 1960)	0.2	-	-	0.11%
Flexicalymene caractaci	0.1	-	-	0.05%
Flexicalymene planimarginata	0.1	-	-	0.05%
Flexicalymene (Reacalymene)limba	0.1	-	-	0.05%
Calymene sp.(s.l.)	0.4	-	-	0.22%
Brongniartella cf. minor of Dean 1961	0.1	-	-	0.05%
Brongniartella sp.	0.1	-	-	0.05%
Proetid librigenae	0.2	-	-	0.11%
Thoracic segments	0.6	-	-	0.33%
Hollinaceans	5	-	-	2.73%
Dilobella sp.	1	-	-	0.55%

LOCALITY 183 continued Horizon 1

Tetradella sp.	2	-	-	1.09%
Sigmoopsis sp.	1	-	-	0.55%
Zygobolboides sp.(?)	1	-	-	0.55%
Pteriomorphians	2	-	-	1.09%
Ambonychiacean	1	-	-	0.55%
Bivalve,gen.et sp, indet.	1A	-	-	0.55%
Gastropods,gen.et sp.indet.	2	-	-	1.09%
Tentaculites sp.	8	-	-	4.37%
				99.95

Cyclocyclopa A	58
Cyclocyclopa A_1	1
Cyclocyclopa G	59
Cyclocyclopa J	9
Cyclopentagonopa A	98
Cyclopentagonopa B	24
Cyclopentagonopa D	3
Cyclopentastellatopa A	1
Pentagonocyclopa A	3
Pentagonocyclopa B	1
Pentagonopentagonopa A	4
Pentagonopentagonopa B	1
Pentagonopentagonopa C	1
Pentagonopentastellatopa A	1
Cirrals	52
$Pinnate_1$	52

LOCALITY 183 continued Horizon 1

Pinnate$_2$	49
Echinoderm plates	14
Crinoid calyx	1
Pluricolumnals	22
Ramose Bryozoan fragments	19
Lepidocoleus sp.	8

Genera Number	36	Diversity Index 15.85
Total Specimen Number	100	

LOCALITY 183	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN Horizon 2		
Dalmanellids	128B:123P:30A	1.04B:1.00P	0.23/1	34.82%
Dalmanella sp.	33B: 19P	1.74B:1.00P	-	7.27%
*D.*cf.*indica* of Bancroft 1945	1B	1B	-	0.22%
*D.*cf.*lepta* of Bancroft 1945	1P	1P	-	0.22%
Howellites sp.	3B	3B	-	0.66%
Bancroftina sp.	1B: 1P	1.00B:1.00P	-	0.22%
Onniella sp.	1P	1P	-	0.22%
Dinorthis sp.	40B: 47P:7A	1.00B:1.18P	0.15/1	11.90%
D.(*P.*) cf.*robusta* of Bancroft 1945	4B: 4P	1.00B:1.00P	-	0.88%
D.berwynensis	1B: 1P	1.00B:1.00P	-	0.22%
*D.*cf.*berwynensis angusta* of Williams 1963	1B: 4P	1.00B:4.00P	-	0.88%
Reuschella sp.	16B: 12P:6A	1.33B:1.00P	0.38/1	4.85%
R.horderleyensis	1P	1P	-	0.22%
Horderleyella cf. *plicata* of Bancroft 1928,1945	5B:14P	1.00B:2.80P	-	3.09%
Rafinesquina sp.	5P	5P	-	1.10%
Macrocoelia sp.	6B:16P	1.00B:2.67P	-	3.53%
M.expansa	1B: 6P:1A	1.00B:6.00P	0.17/1	1.54%
Leptaena sp.	4B: 9P	1.00B:2.25P	-	1.98%
*L.*cf.*rugosa* of Havlíček 1967	1B: 2P	1.00B:2.00P	-	0.44%
Leptaenids	2B	2B	-	0.44%
Triplesiaceids	3B: 5P:1A	1.00B:1.67P	0.20/1	1.32%

LOCALITY 183 continued Horizon 2

Skenidioides sp.	3B: 1P	3.00B:1.00P	-	0.66%
Cremnorthis sp.(?)	1P	1P	-	0.22%
Nicolella sp.(?)	2P	2P	-	0.44%
Platystrophia sp.(?)	1P	1P	-	0.22%
Strophomenids,gen. et sp.indet.	1B: 6P	1.00B:6.00P	-	1.32%
Orthid,gen.et sp.indet.	1B	1B	-	0.22%
Schizocrania sp.	3	-	-	0.66%
Lingulella sp.(?)	1	-	-	0.22%
Inarticulates,gen. et sp.indet.	5	-	-	1.10%
Broeggerolithus sp.	5.7	-	-	1.26%
B.cf.soudleyensis of Dean 1960	0.1	-	-	0.02%
Calymene sp.(s.l.)	2.9	-	-	0.64%
Flexicalymene planimarginata	1.1	-	-	0.24%
F.cf.planimarginata of Whittington 1965	0.4	-	-	0.09%
Flexicalymene (Reacalymene)limba	0.3	-	-	0.07%
Flexicalymene (Reacalymene)cf.limba of Whittington 1965	0.1	-	-	0.02%
Flexicalymene sp.	0.1	-	-	0.02%
Brongniartella cf. minor of Dean 1961	0.2	-	-	0.04%
Isotelinid librigena	0.1	-	-	0.02%
Isotelinid fragments	0.6	-	-	0.13%
Kloucekia sp.	0.1	-	-	0.02%

LOCALITY 183 continued Horizon 2

Proetid librigenae	0.4	-	-	0.09%
Thoracic segments	2.7	-	-	0.59%
Ostracode	1	-	-	0.22%
Hollinaceans	8	-	-	1.76%
Quadrijugatorid	1	-	-	0.22%
Tallinnella sp.	1	-	-	0.22%
Tetradella sp.	5	-	-	1.10%
Dilobella sp.(?)	2	-	-	0.44%
Tetradellids	5	-	-	1.10%
Bivalves,gen.et sp. indet.	3	-	-	0.66%
Ambonychiaceans	3	-	-	0.66%
Gastropod,gen.et. sp.indet.	1	-	-	0.22%
Tentaculites sp.	22	-	-	4.85%
				99.97

Cyclocyclopa A	77
Cyclocyclopa E	1
Cyclocyclopa G	66
Cyclocyclopa H	5
Cyclocyclopa J	23
Cyclopentagonopa A	303
Cyclopentagonopa B	60
Pentagonocyclopa A	23
Pentagonocyclopa B	14
Pentagonopentagonopa B	1
Pinnate$_1$	130

LOCALITY 183 continued Horizon 2

Pinnate$_2$	144
Articulated pinnates	2
Cirrals	107
Pluricolumnals	63
Echinoderm plates	139
Crinoid calices	2
Ramose Bryozoan fragments	120
Dendritic Bryozoa	2
Circular Bryozoa	10
Lepidocoleus sp.	18

Genera Number	40	Diversity Index 14.93
Total Specimen Number	200	

LOCALITY 185 GLANRAFON BEDS SOUTH WEST OF DOLWYDDELAN

Dalmanellids	18B:17P:4A	1.06B:1.00P	0.22/1	55.00%
Dalmanella sp.	3B:2P	1.50B:1.00P	-	7.50%
Immature dalmanellid	1B	1B	-	2.50%
Horderleyella cf. *plicata* of Bancroft 1928,1945	1B:3P	1.00B:3.00P	-	7.50%
Leptaena sp.	2B	2B	-	5.00%
Glyptorthis sp.(?)	1B	1B	-	2.50%
Strophomenids,gen. et sp.indet.	2B	2B	-	5.00%
Orthid,gen.et sp. indet.	1P	1P	-	2.50%
Paracraniops sp.	4	-	-	10.00%
Gastropod,gen.et sp.indet.	1	-	-	2.50%
				100.00

Cyclocyclopa A	13
Cyclocyclopa A_1	1
Cyclocyclopa E	1
Cyclocyclopa G	5
Cyclocyclopa J	2
Cyclopentagonopa A	10
Cyclopentagonopa B	8
Cyclopentagonopa C	1
Pentagonocyclopa B	1
Pentagonopentastellatopa B	3
Pinnate$_1$	3

LOCALITY 185 continued

$Pinnate_2$	1	
Cirrals	133	
Pluricolumnal	1	
Ramose Bryozoan fragments	74	
Genera Number	11	Diversity Index 6.73
Total Specimen Number	20	

LOCALITY 186	GLANRAFON BEDS	SOUTH WEST OR DOLWYDDELAN		
Dalmanellids	340B:344P:19A	1.00B:1.01P	0.05/1	58.93%
Dalmanella sp.	64B: 40P	1.60B:1.00P	-	10.39%
D.cf.horderleyensis of Bancroft 1945	1P	1P	-	0.16%
D.cf.indica of Bancroft 1945	1B	1B	-	0.16%
D.cf.lepta of Bancroft 1945	1B	1B	-	0.16%
Howellites sp.	33B: 33P	1.00B:1.00P	-	5.36%
H.cf.striata of Williams 1963	1B	1B	-	0.16%
Onniella sp.	2B: 4P	1.00B:2.00P	-	0.65%
O.cf.soudleyensis of Williams 1963	1B	1B	-	0.16%
Bancroftina sp.	3B	3B	-	0.49%
Macrocoelia sp.	17B: 34P	1.00B:2.00P	-	5.52%
M.expansa	5P	5P	-	0.81%
Rafinesquina sp.	3B: 16P	1.00B:5.33P	-	2.60%
Strophomenids,gen. et sp.indet.	1B: 4P	1.00B:4.00P	-	0.65%
Horderleyella cf. plicata of Bancroft 1928, 1945	4B: 10P	1.00B:2.50P	-	1.62%
Reuschella sp.	1B	1B	-	0.16%
R.horderleyensis	1B	1B	-	0.16%
Dinorthis sp.	5B: 7P	1.00B:1.40P	-	1.14%
Heterorthis sp.	1B	1B	-	0.16%
Orthambonites sp.	3P	3P	-	0.49%
Orthid,gen.et sp. indet.	1B	1B	-	0.16%

LOCALITY 186 continued

Paracraniops sp.	13	-	-	2.11%
Paterula sp.	2	-	-	0.32%
Obolid,gen.et sp. indet.	1	-	-	0.16%
Nuculid,gen.et sp. indet.	1	-	-	0.16%
Inarticulate,gen.et sp.indet.	1	-	-	0.16%
Brachiopod,gen.et sp.indet.	1A	-	-	0.16%
Broeggerolithus sp.	2.3	-	-	0.37%
Proetid librigenae	0.3	-	-	0.05%
Isotelinid librigena	0.1	-	-	0.02%
Thoracic segments	0.3	-	-	0.05%
Ambonychiaceans	19	-	-	3.08%
Bivalves,gen.et sp. indet.	5	-	-	0.81%
Gastropod,gen.et sp.indet.	1	-	-	0.16%
Tallinnella sp.	3	-	-	0.49%
Tentaculites sp.	2	-	-	0.32%
Algae	6	-	-	0.97%
Coral(*Favosites* sp.?)	1	-	-	0.16%
				99.96

Cyclocyclopa A	151
Cyclocyclopa A_1	20
Cyclocyclopa G	335
Cyclocyclopa H	7

LOCALITY 186 continued

Cyclocyclopa J	32	
Cyclopentagonopa A	804	
Cyclopentagonopa B	21	
Cyclopentagonopa C	19	
Cyclopentagonopa D	3	
Cyclopentastellatopa A	5	
Pentagonocyclopa C	2	
Pluricolumnals	8	
Pinnate$_1$	301	
Pinnate$_2$	134	
Cirrals	650	
Echinoderm plates	97	
Ramose Bryozoan fragments	51	
Circular Bryozoan	1	
Lepidocoleus sp.	2	
Genera Number	32	Diversity Index 11.41
Total Specimen Number	139	

LOCALITY 187	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Dalmanellids	259B:275P: 41A	1.00B:1.06P	0.15/1	88.00%
Immature dalmanellid	1P	1P	-	0.29%
Dalmanella sp.	7B:2P	3.50B:1.00P	-	2.05%
Howellites sp.	2B:1P	2.00B:1.00P	-	0.59%
H.cf.striata of Williams 1963	1B	1B	-	0.29%
Onniella sp.	2B:1P	2.00B:1.00P	-	0.59%
Skenidioides costatus	3B	3B	-	0.88%
Macrocoelia sp.	2B:2P	1.00B:1.00P	-	0.59%
Rafinesquina sp.	6B:3P	2.00B:1.00P	-	1.76%
Strophomenids,gen. et sp.indet.	1B:2P	1.00B:2.00P	-	0.59%
Horderleyella cf. *plicata* of Bancroft 1928,1945	1B:2P	1.00B:2.00P	-	0.59%
Orthids,gen.et sp.indet.	2B	2B	-	0.59%
Pseudolingula sp. (in life position)	1	-	-	0.29%
Obolids (in life position)	2	-	-	0.59%
Broeggerolithus sp.	0.6	-	-	0.18%
Brongniartella sp.	0.1	-	-	0.03%
Illaenid	0.1	-	-	0.03%
Kloucekia sp.(?)	0.1	-	-	0.03%
Nuculids	3	-	-	0.88%
Ambonychiacean	1	-	-	0.29%
Bivalve,gen.et sp. indet.	2	-	-	0.59%

LOCALITY 187 continued

Zygobolboides sp.(?)	1	-	-	0.29%
				100.01

Cyclocyclopa A	54
Cyclocyclopa A_1	6
Cyclocyclopa G	40
Cyclocyclopa G_1	4
Cyclocyclopa H	1
Cyclocyclopa J	4
Cyclocyclopa J_1	1
Cyclopentagonopa A	93
Cyclopentagonopa B	2
Cyclopentagonopa C	25
Cyclopentagonopa D	3
Cyclopentastellatopa A	3
Pentagonocyclopa A	1
$Pinnate_1$	51
$Pinnate_2$	37
Cirrals	168
Echinoderm plates	29
Pluricolumnals	4
Ramose Bryozoan fragments	7

General Number	20	Diversity Index 7.88
Total Specimen Number	100	

LOCALITY 187 continued

Ichnofauna

Lockeia (*Pelecypodichnus*) *siliquaria*	1

LOCALITY 188	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Dalmanellids	17B:20P:3A	1.00B:1.18P	0.15/1	39.52%
Dalmanella sp.	2B:2P	1.00B:1.00P	-	3.44%
Sowerbyellid	1P	1P	-	1.72%
Horderleyella cf. *plicata* of Bancroft 1928,1945	1P	1P	-	1.72%
Orthid,gen.et sp.indet.	1P	1P	-	1.72%
Strophomenid,gen. et sp.indet.	1P	1P	-	1.72%
Paracraniops sp.	5	-	-	8.59%
Paterula sp.	1	-	-	1.72%
Obolids,gen.et sp. indet.	2	-	-	3.44%
Broeggerolithus sp.	0.6	-	-	1.03%
Broeggerolithus sp. (Group 3 - Dean1960)	0.1	-	-	0.17%
Parabasilicus powisi	0.1	-	-	0.17%
Illaenid	0.1	-	-	0.17%
Thoracic segments	0.3	-	-	0.52%
Tallinnella sp.	6	-	-	10.31%
Hollinaceans	4	-	-	6.87%
Pitted ostracodes	3	-	-	5.15%
Granulose ostracode	1	-	-	1.72%
Bellerophontid	1	-	-	1.72%
Tentaculites sp.	4	-	-	6.87%
Alga	1	-	-	1.72%
				100.01

LOCALITY 188 continued

Cyclocyclopa A	1
Cyclocyclopa J	1
Cyclopentagonopa A	2
Cyclopentagonopa C	1
Pentagonocyclopa B	1
$Pinnate_1$	6
Cirrals	11
Echinoderm plates	2
Ramose Bryozoan fragments	5

Genera Number	20	Diversity Index 11.24
Total Specimen Number	30	

<u>Ichnofauna</u>

Skolithid burrows	3

LOCALITY 189	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Sowerbyellids	331B:167P:26A	1.90B:1.00P	0.08/1	75.13%
Dalmanellids	25B:24P:7A	1.04B:1.00P	0.28/1	6.73%
Dalmanella sp.	5B:4P	1.25B:1.00P	-	1.05%
Howellites sp.	3B:2P	1.50B:1.00P	-	0.63%
Onniella sp.	3P	3P	-	0.63%
Bancroftina sp.	1B:1P	1.00B:1.00P	-	0.21%
Dinorthis sp.	6B:2P	3.00B:1.00P	-	1.26%
D.berwynensis	2B	2B	-	0.42%
Horderleyella sp.	3P	3P	-	0.63%
Reuschella sp.	4B:1P:2A	4.00B:1.00P	0.50/1	1.26%
R.cf.horderleyensis undulata of Williams 1963	1B	1B	-	0.21%
Harknessellid, gen. et sp.indet.	2B:1P	2.00B:1.00P	-	0.42%
Skenidioides sp.	1B	1B	-	0.21%
S.cf.costatus of Williams 1963	1B	1B	-	0.21%
Bicuspina sp.	3B:2P	1.50B:1.00P	-	0.63%
Triplesiaceid	1B:1P	1.00B:1.00P	-	0.21%
Rafinesquina sp.	1P	1P	-	0.21%
Leptaena sp.(?)	2B:1P	2.00B:1.00P	-	0.42%
Heterorthis sp.(?)	1P	1P	-	0.21%
Kjaerina sp.(?)	1P	1P	-	0.21%
Macrocoelia cf. *prolata* of Williams 1963	1B	1B	-	0.21%
Stropheodontid,gen. et sp.indet.	1B	1B	-	0.21%

LOCALITY 189 continued

Orthid, gen. et sp. indet	1B	1B	-	0.21%
Paracraniops sp.	1	-	-	0.21%
Inarticulate, gen. et sp. indet.	1	-	-	0.21%
Broeggerolithus sp.	1.4	-	-	0.29%
B. cf. *broeggeri* of Dean 1960	0.1	-	-	0.02%
Trinucleid fragments	0.2	-	-	0.04%
Flexicalymene planimarginata	0.4	-	-	0.08%
Flexicalymene cf. *caractaci* of Whittington 1965	0.1	-	-	0.02%
F. (*Reacalymene*) sp.	0.1	-	-	0.02%
Calymene sp. (s.l.)	0.3	-	-	0.06%
Brongniartella minor	0.5	-	-	0.11%
Decoroproteus sp.	0.1	-	-	0.02%
Proetid librigenae	0.3	-	-	0.06%
Proetid pygidium	0.1	-	-	0.02%
Isotelinid, gen. ind. cf. *powisi*	0.1	-	-	0.02%
Thoracic segments	1.5	-	-	0.32%
Hollinaceans	9	-	-	1.89%
Tallinnella sp.	1	-	-	0.21%
Tetradella sp.	1	-	-	0.21%
Primitia sp. (?)	2	-	-	0.42%
Granulose ostracodes	3	-	-	0.63%
Ostracode	1	-	-	0.21%

LOCALITY 189 continued

Gastropod, gen. et sp. indet.	1	-	-	0.21%
Bivalves, gen. et sp. indet.	2	-	-	0.42%
Tentaculites sp.	5	-	-	1.05%
				99.95

Cyclocyclopa A	43
Cyclocyclopa A_1	1
Cyclocyclopa F	3
Cyclocyclopa G	45
Cyclocyclopa G_1	1
Cyclocyclopa H	9
Cyclopentagonopa A	156
Cyclopentagonopa B	9
Cyclopentagonopa C	71
Cyclopentagonopa D	7
Pentagonocyclopa A	7
Pentagonocyclopa B	5
Pentagonocyclopa B_1	3
Pentagonocyclopa C	1
Pentagonopentagonopa D	2
Hexagonocyclopa A	1
$Pinnate_1$	73
$Pinnate_2$	60
Cirrals	269
Pluricolumnals	27

LOCALITY 189 continued

Echinoderm plates	24	
Cystoid pore rhomb	1	
Diploporite plates	3	
Ramose Bryozoan fragments	11	
Circular Bryozoan	1	
Lepidocoleus sp.	8	
Genera Number	36	Diversity Index 13.40
Total Specimen Number	100	

LOCALITY 195	GLANRAFON BEDS	SOUTH OF ROMAN BRIDGE SOUTH WEST OF DOLWYDDELAN		
Sowerbyellids	150B:107P:56A	1.40B:1.00P	0.37/1	54.99%
Dalmanellids	33B: 37P:12A	1.00B:1.12P	0.32/1	13.08%
Dalmanella sp.	4B: 4P	1.00B:1.00P	-	1.07%
D.cf.indica of Bancroft 1945	1B	1B	-	0.27%
Howellites sp.	3B	3B	-	0.80%
Dinorthis sp.	10B: 12P:1A	1.00B:1.20P	0.08/1	3.47%
Dinorthis berwynensis	1B: 1P	1.00B:1.00P	-	0.27%
D.cf.berwynensis angusta of Williams 1963	1B: 2P	1.00B:2.00P	-	0.53%
Macrocoelia sp.	5P: 1A	5P	0.20/1	1.60%
M.expansa	2P	2P	-	0.53%
Triplesiaceids	3B: 8P:1A	1.00B:2.67P	0.13/1	2.40%
Bicuspina spiriferoides	2P	2P	-	0.53%
Reuschella sp.	3B: 5P	1.00B:1.67P	-	1.33%
R.cf.horderleyensis of Bancroft 1928 and Williams 1963	1P	1P	-	0.27%
Horderleyella sp.(?)	1P	1P	-	0.27%
Leptaena sp.	1B: 3P	1.00B:3.00P	-	0.80%
Kiaromena sp.(?)	1P	1P	-	0.27%
Kjaerina sp.(?)	1P	1P	-	0.27%
Skenidioides sp.	3B	3B	-	0.80%
Hedstroemina cf. *robusta* of Bancroft 1929a	1B: 2P	1.00B:2.00P	-	0.53%
Hedstroemina sp.(?)	1B	1B	-	0.27%

cf. *Eostropheodonta* sp.	2P:1A	2P	0.50/1	0.80%
Stropheodontid, gen. et sp. indet.	1P	1P	-	0.27%
Orthids, gen. et sp. indet.	2P	2P	-	0.53%
Paracraniops sp.	1	-	-	0.27%
Broeggerolithus sp.	2.8	-	-	0.75%
Flexicalymene planimarginata	0.2	-	-	0.05%
Flexicalymene sp.	0.1	-	-	0.03%
Calymene sp. (s.l.)	0.3	-	-	0.03%
Parabasilicus sp. librigena	0.1	-	-	0.03%
Isotelinid fragments	0.2	-	-	0.05%
Brongniartella minor	0.1	-	-	0.03%
Proetid (*Decoroproteus* sp.?)	0.2	-	-	0.05%
Thoracic segments	0.6	-	-	0.16%
Tallinnella sp.	1	-	-	0.27%
Hollinaceans	5	-	-	1.33%
Sigmoopsid (*Sigmobolbina* sp.?)	1	-	-	0.27%
Granulose ostracode	1	-	-	0.27%
Ostracode	2	-	-	0.53%
Sinuites sp.	3	-	-	0.80%
Pterineid bivalves (cf. Palaeopteria sp.?)	24	-	-	6.41%
Tentaculites sp.	3	-	-	0.80%
				100.00

LOCALITY 195 continued

Cyclocyclopa A	100
Cyclocyclopa A_1	1
Cyclocyclopa G	52
Cyclocyclopa H	3
Cyclocyclopa J	32
Cyclocyclopa J_1	6
Cyclocyclopa L	1
Cyclopentagonopa A	214
Cyclopentagonopa B	6
Cyclopentagonopa C	18
Pentagonocyclopa A	5
Pentagonocyclopa B	21
Pentagonopentagonopa D	10
Complete calyx cf. *Balacrinus basalis* of Ramsbottom 1961	3
Pluricolumnals	24
$Pinnate_1$	63
$Pinnate_2$	228
Cirrals	265
Echinoderm plates	59
Cystoid plates	2
Ramose Bryozoan fragments	12
Encrusting Bryozoa	2
Circular Bryozoan	1
Lepidocoleus sp.	7

LOCALITY 195 continued

Genera Number	33	Diversity Index 12.75
Total Specimen Number	110	

<u>Ichnofauna</u>

Skolithid Burrow	1

LOCALITY 196	GLANRAFON BEDS		DINAS SOUTH WEST OF DOLWYDDELAN	
Sowerbyellids	299B:265P:92A	1.13B:1.00P	0.31/1	55.09%
Dalmanellids	96B:121P:29A	1.00B:1.26P	0.24/1	21.14%
Dalmanella sp.	32B: 12P	2.67B.1.00P	-	4.51%
D.cf.lepta of Bancroft 1945	5B	5B	-	0.70%
Howellites sp.	39B: 7P: 1A	5.57B:1.00P	0.03/1	5.64%
Bancroftina sp.	6B	6B	-	0.85%
Onniella sp.	1P	1P	-	0.14%
Kjaerina sp.	4B: 12P	1.00B:3.00P	-	1.69%
Kjaerina aff.jonesi of Bancroft 1929a	3P	3P	-	0.42%
cf.Paracraniops sp.	1	-	-	0.14%
Obolids,gen.et sp. indet.	2	-	-	0.28%
Inarticulate,gen.et sp.indet.	1	-	-	0.14%
Broggerolithus sp.	1.0	-	-	0.14%
B.cf.nicholsoni of Dean 1962	0.1	-	-	0.01%
Broeggerolithus sp. (Group 3-Dean 1960)	0.2	-	-	0.03%
Kloucekia sp.	1.4	-	-	0.20%
K.apiculata	0.5	-	-	0.07%
Isotelinids (Parabasilicus sp.)	0.5	-	-	0.07%
Isotelinid thoracic segments	0.2	-	-	0.03%
Flexicalymene planimarginata	0.1	-	-	0.01%
F.aff.planimarginata of Whittington 1965	0.1	-	-	0.01%

LOCALITY 196 continued

Calymene sp.(s.l.)	0.1	-	-	0.01%
Proetid librigena	0.1	-	-	0.01%
Proetid (*Decoroproteus* sp.?)	0.1	-	-	0.01%
Illaenid	0.1	-	-	0.01%
Brongniartella minor	0.3	-	-	0.04%
B.minor(enrolled)	1.0	-	-	0.14%
Brongniartella sp.	0.1	-	-	0.01%
Thoracic segments	2.3	-	-	0.32%
Hollinaceans	10	-	-	1.41%
Tallinnella sp.	5	-	-	0.70%
Smooth ostracode	1	-	-	0.14%
Modiomorphid	1A	-	-	0.14%
Gastropod,gen.et. sp.indet.	1	-	-	0.14%
Bellerophontid	1	-	-	0.14%
Lophospirids	2	-	-	0.28%
Tentaculites sp.	19	-	-	2.68%
Favosites sp.	14	-	-	1.97%
				99.95

Cyclocyclopa A	2
Cyclocyclopa A_1	2
Cyclocyclopa D	1
Cyclocyclopa F	3
Cyclocyclopa J	6
Pentagonocyclopa A	1
Cirrals	6

LOCALITY 196 continued

Pinnate$_1$	4
Ramose Bryozoan fragments	40
Circular Bryozoa	4
<u>Lepidocoleus</u> sp.	1

Genera Number 26 Diversity Index 9.11

Total Specimen Number 150

<u>Ichnofauna</u>

Skolithid (vertical)burrows	2

LOCALITY 196A	GLANRAFON BEDS	DINAS SOUTH WEST OF DOLWYDDELAN		
Sowerbyellids	18B:5P:4A	3.60B:1.00P	0.22/1	26.10%
Dalmanellids	28B:16P:9A	1.75B:1.00P	0.32/1	43.89%
Dalmanella sp.	1B:5P	1.00B:5.00P	-	5.93%
Howellites sp.	8B:10P	1.00B:1.25P	-	11.86%
H.cf.antiquior of Williams 1963	1P	1P	-	1.19%
Kjaerina sp.	2P	2P	-	2.37%
Brongniartella sp.	0.1	-	-	0.12%
Kloucekia sp.	0.1	-	-	0.12%
Isotelinid (*Parabasilicus* sp.)	0.1	-	-	0.12%
Gastropods,gen.et sp.indet.	2	-	-	2.37%
Lophospirids,gen.et sp.indet.	4	-	-	4.74%
Tentaculites sp.	1	-	-	1.19%
				100.00

Cirral	1
Ramose Bryozoan fragment	1
Circular Bryozoan	1
Genera Number	13
Total Specimen Number	40
Diversity Index	6.70

LOCALITY 196B	GLANRAFON BEDS	DINAS SOUTH WEST OF DOLWYDDELAN		
Sowerbyellids	134B:103P:47A	1.30B:1.00P	0.35/1	43.35%
Dalmanellids	80B:59P:23A	1.36B:1.00P	0.29/1	23.67%
Dalmanella sp.	20B:13P:1A	1.54B:1.00P	0.05/1	5.03%
Howellites sp.	29B:15P:3A	1.93B:1.00P	0.10/1	7.66%
Bancroftina sp.	3B:1P	3.00B:1.00P	-	0.72%
Onniella sp.	1B:2P	1.00B:2.00P	-	0.48%
Kjaerina sp.	1B:7P	1.00B:7.00P	-	1.68%
K.aff.jonesi of Bancroft 1929a	1P	1P	-	0.24%
Obolid,gen.et sp. indet.	1	-	-	0.24%
Inarticulate,gen. et sp.indet.	1	-	-	0.24%
Broeggerolithus sp.	0.6	-	-	0.14%
B.nicholsoni	0.2	-	-	0.05%
Broeggerolithus sp. (Group 3-Dean 1960)	0.2	-	-	0.05%
Kloucekia sp.	0.9	-	-	0.22%
K.apiculata	0.3	-	-	0.07%
Isotelinid (*Parabasilicus* sp.?)	0.3	-	-	0.07%
Flexicalymene planimarginata	0.2	-	-	0.05%
Calymene sp.(s.l.)	0.2	-	-	0.05%
Proetid (*Decoroproteus* sp.?)	0.2	-	-	0.05%
Brongniartella minor	0.2	-	-	0.05%
B.bisulcata	0.4	-	-	0.10%
Thoracic segments	1.8	-	-	0.43%
Hollinaceans	15	-	-	3.59%

LOCALITY 196B continued

Tallinnella sp.	11	-	-	2.63%
Gastropod, gen. et sp. indet.	1	-	-	0.24%
Lophospirid	1	-	-	0.24%
Tentaculites sp.	14	-	-	3.35%
Favosites sp.	8	-	-	1.92%
				100.01

Cyclocyclopa A	1
Cyclocyclopa D	1
Cyclocyclopa E	1
Cyclocyclopa F	2
Cyclocyclopa J	4
Pentagonocyclopa A	1
Cirrals	3
Pinnate$_1$	2
Ramose Bryozoan fragments	31
Circular Bryozoa	2
Lepidocoleus sp.	10
Genera Number	22
Total Specimen Number	80

Diversity Index 8.38

LOCALITY 197	GLANRAFON BEDS		FRON EITHION SOUTH OF DOLWYDDELAN	
Dinorthis sp.	2B: 3P	1.00B:1.50P	-	16.48%
D.berwynensis	1P	1P	-	5.49%
Reuschella horderleyensis	2B	2B	-	10.99%
Triplesiaceids	2B	2B	-	10.99%
Sowerbyellids	1B: 2P:1A	1.00B:2.00P	0.50/1	16.48%
Macrocoelia sp.	1P	1P	-	5.49%
Obolid,gen.et sp. indet.	1	-	-	5.49%
Schizocrania sp.	1	-	-	5.49%
Paracraniops sp.	1	-	-	5.49%
Inarticulate,gen.et sp.indet.	1	-	-	5.49%
Brongniartella minor	0.1	-	-	0.55%
Proetid (*Decoroproteus* sp.?)	0.1	-	-	0.55%
Favosites sp.	2	-	-	10.99%
				99.96

Cyclocyclopa A	1
Cyclocyclopa A_1	2
Cyclocyclopa G	3
Cyclocyclopa G_1	5
Cyclocyclopa H	2
Cyclocyclopa J	1
Cyclocyclopa J_1	6
Cyclopentagonopa A	2
Pentagonocyclopa E	1

LOCALITY 197 continued

Pinnate$_1$	27
Pinnate$_2$	7
Cirrals	46
Echinoderm plates	3
Ramose Bryozoan fragments	1

Genera Number	13	Diversity Index 9.96
Total Specimen Number	30	

LOCALITY 197A	GLANRAFON BEDS		FRON EITHION SOUTH OF DOLWYDDELAN	
Sowerbyellids	3B:5P:1A	1.00B:1.66P	0.20/1	5.93%
Dalmanellids	1B:1P:1A	1.00B:1.00P	1/1	1.98%
Dalmanella sp.	1B	1B	-	0.99%
Dinorthis sp.	16B:23P:4A	1.00B:1.44P	0.17/1	26.68%
D.berwynensis	6B:5P	1.20B:1.00P	-	5.93%
D.cf.berwynensis angusta of Williams 1963	2B:3P	1.00B:1.50P	-	2.96%
Immature *Dinorthis* sp.	5B:2P	2.50B:1.00P	-	4.94%
cf.*Plaesiomys* sp.	1P	1P	-	0.99%
Reuschella sp.	13B:15P:2A	1.00B:1.15P	0.13/1	16.80%
R.cf.horderleyensis of Bancroft 1928 and Williams 1963	4B:1P	4.00B:1.00P	-	3.95%
Immature Harknessellid	2B	2B	-	1.98%
Horderleyella sp.(?)	1B:2P	1.00B:2.00P	-	1.98%
Macrocoelia sp.	1B:4P	1.00B:4.00P	-	3.95%
M.expansa	2P	2P	-	1.98%
M.cf.prolata of Williams 1963	1P	1P	-	0.99%
Rafinesquina sp.	1P	1P	-	0.99%
Kjaerina sp.	3P	3P	-	2.96%
Orthid,gen.et sp. indet.	1P	1P	-	0.99%
Immature brachiopod, gen.et sp.indet.(A)	1P	1P	-	0.99%
Immature brachiopod, gen.et sp.indet.(B)	1P	1P	-	0.99%
Paracraniops sp.	6	-	-	5.93%

LOCALITY 197A continued

Thoracic segments	0.2	-	-	0.20%
Ostracode	1	-	-	0.99%
Gastropod, gen. et sp. indet.	1	-	-	0.99%
Sinuites sp.	2	-	-	1.98%
Favosites sp.	1	-	-	0.99%
				100.03

Cyclocyclopa A	31
Cyclocyclopa A_1	12
Cyclocyclopa G	10
Cyclocyclopa G_1	8
Cyclocyclopa H	2
Cyclocyclopa J	16
Cyclocyclopa J_1	34
Cyclocyclopa L	4
Cyclopentagonopa A	20
Cyclopentagonopa C	1
Cyclopentagonopa E	9
Pentagonocyclopa B	6
Pentagonocyclopa E	5
Cirrals	195
$Pinnate_1$	122
$Pinnate_2$	23
Echinoderm plates	27
Crinoid plates	1
Ramose Bryozoan fragments	8
Circular Bryozoan	1

Genera Number 20 Diversity Index 9.89

Total Specimen Number 100

LOCALITY 197B	GLANRAFON BEDS		FRON EITHION SOUTH OF DOLWYDDELAN	
Dinorthis sp.	28B:16P:2A	1.75B:1.00P	0.07/1	31.09%
D.berwynensis	11B: 1P	11.00B:1.00P	-	11.40%
D.cf.berwynensis angusta of Williams 1963	1B	1B	-	1.04%
Immature Dinorthis sp.	3P	3P	-	3.11%
Reuschella sp.	11B:8P:4A	1.38B:1.00P	0.36/1	15.54%
R.horderleyensis	1B	1B	-	1.04%
R.cf.horderleyensis of Bancroft 1928 and Williams 1963	7B: 1P	7.00B:1.00P	-	7.26%
Macrocoelia sp.	2B: 5P:1A	1.00B:2.50P	0.20/1	6.22%
M.cf.expansa of Williams 1963	1P	1P	-	1.04%
M.cf.prolata of Williams 1963	1B: 1P	1.00B:1.00P	-	1.04%
Sowerbyellids	3B: 1P	3.00B:1.00P	-	3.11%
Triplesiaceid	1B: 1P	1,00B:1.00P	-	1.04%
Kjaerina sp.	1P	1P	-	1.04%
Skenidioides sp.	1A	-	-	1.04%
Strophomenid,gen. et sp.indet.	1B	1B	-	1.04%
cf.Paracraniops sp.	5	-	-	5.18%
Brongniartella minor	0.2	-	-	0.21%
Broeggerolithus sp. (Group 3-Dean 1960)	0.1	-	-	0.10%
Thoracic segments	0.2	-	-	0.21%
Granulose ostracode	1	-	-	1.04%
Tallinnella sp.	1	-	-	1.04%

LOCALITY 197B continued

Bellerophontid	1	-	-	1.04%
Favosites sp.	5	-	-	5.18%
				100.05

Cyclocyclopa A	58
Cyclocyclopa A_1	12
Cyclocyclopa G	16
Cyclocyclopa G_1	3
Cyclocyclopa H	8
Cyclocyclopa J	16
Cyclocyclopa J_1	4
Cyclocyclopa L	5
Cyclopentagonopa A	55
Cyclopentagonopa C	4
Cyclopentagonopa E	5
Pentagonocyclopa B	5
Pentagonocyclopa D	1
Pentagonocyclopa E	8
Pentagonopentastellatopa B	1
Hexagonocyclopa B	1
Calyx.cf.*Protaxocrinus* sp. of Ramsbottom 1961	1
Pluricolumnals	7
Cirrals	194
$Pinnate_1$	222
$Pinnate_2$	25

LOCALITY 197B continued

Echinoderm plates	35	
Crinoid plates	3	
Ramose Bryozoan fragments	6	
Genera Number	19	Diversity Index 9.49
Total Specimen Number	100	

LOCALITY 198	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Reuschella sp.	2P	2P	-	13.89%
R. cf. *horderleyensis* of Bancroft 1928 and Williams 1963	1P	1P	-	6.94%
Skenidioides costatus	1B	1B	-	6.94%
Dalmanellids	2P	2P	-	13.89%
Dinorthis cf. *berwynensis* of Williams 1963	1B:1A	1B	1/1	13.89%
Triplesiaceid	1B	1B	-	6.94%
Sowerbyellids	1B:1P	1.00B:1.00P	-	6.94%
cf. *Heterorthis retrorsistria* of Williams 1963	1B	1B	-	6.94%
Broeggerolithus sp.	0.4	-	-	2.78%
Quadrijugatorids	2	-	-	13.89%
Bivalve, gen. et sp. indet.	1	-	-	6.94%
				99.98

Cyclocyclopa A	4
Pentagonocyclopa A	17
Echinoderm plates	2
Ramose Bryozoan fragments	28
Lepidocoleus sp.	5
Genera Number	13
Total Specimen Number	30

Diversity Index 10.28

LOCALITY 199	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Dalmanellids	8B:6P:2A	1.33B:1.00P	0.25/1	28.25%
Triplesiaceids	5B:1A	5B	0.20/1	16.95%
Bicuspina spiriferoides	1P	1P	-	2.82%
Sowerbyellids	4P	4P	-	11.30%
Macrocoelia expansa	4P	4P	-	11.30%
Dinorthis sp.	2B:2P:1A	1.00B:1.00P	0.50/1	8.47%
Dinorthis cf. *berwynensis* of Williams 1963	1P	1P	-	2.82%
Leptaena sp.	2B:1P	2.00B:1.00P	-	5.65%
Reuschella sp.	1B	1B	-	2.82%
Strophomenids, gen. et sp. indet.	2P	2P	-	5.65%
Broeggerolithus sp.	0.3	-	-	0.85%
Kloucekia sp.(?)	0.1	-	-	0.28%
Bivalve, gen. et sp. indet.	1	-	-	2.82%
				99.98

Cyclocyclopa A	5
Cyclocyclopa A_1	2
Cyclocyclopa J	8
Cirrals	11
Pluricolumnals	3
Pinnate$_1$	4
Ramose Bryozoan fragments	7
Genera Number	12
Total Specimen Number	50

Diversity Index 7.57

LOCALITY 201A	GLANRAFON BEDS		SOUTH WEST OF DOLWYDDELAN Fine/medium Sandstone	
Dalmanellids	47B:34P:4A	1.38B:1.00P	0.09/1	36.59%
Dalmanella sp.	10B:6P	1.67B:1.00P	-	7.17%
Howellites sp.	7B:6P	1.17B:1.00P	-	5.02%
H.cf.antiquior of Williams 1963	3B	3B	-	2.15%
Macrocoelia expansa	2B:9P	1.00B:4.50P	-	6.46%
Craniopsid (?)	5	-	-	3.59%
Obolids in life position (in medium grain siltstone immediately below sandstone horizon)	3	-	-	2.15%
Broggerolithus sp.	1.4	-	-	1.00%
Bellerophontids	17	-	-	12.20%
Pleurotomariaceans	19	-	-	13.63%
Bivalves,gen.et sp.indet.	10	-	-	7.17%
Tentaculites sp.	4	-	-	2.87%
				100.00

Cyclopentagonopa A	39		
Cirrals	23		
Echinoderm plates	12		
Encrusting sheet-like bryozoan fragments	9		
Genera Number	12	Diversity Index	5.57
Total Specimen Number	60		

* 5cms. below sandstone horizon - thin horizon in coarse grain siltstone is entirely composed of poorly preserved gastropods.

LOCALITY 201A continued

Ichnofauna

Vertical burrows (Obolid burrows) in underlying siltstone	17

LOCALITY 201B	GLANRAFON BEDS		SOUTH WEST OF DOLWYDDELAN	
Dalmanellids	63B:48P:7A	1.31B:1.00P	0.11/1	56.73%
Howellites sp.	13B:8P	1.63B:1.00P	-	10.53%
H.cf.antiquior of Williams 1963	4B	4B	-	3.24%
Leptaena sp.	4P	4P	-	3.24%
Triplesiaceids	1B:1P:1A	1.00B:1.00P	1/1	1.62%
Dinorthis sp.	3B:6P	1.00B:2.00P	-	4.86%
Dinorthis cf. *berwynensis* of Williams 1963	1P	1P	-	0.81%
Reuschella sp.	1B:3P:1A	1.00B:3.00P	0.33/1	3.24%
Macrocoelia expansa	1P	1P	-	0.81%
Rafinesquina sp.	1P	1P	-	0.81%
Kjaerina sp.	1P	1P	-	0.81%
Obolids,gen.et sp.indet.	2	-	-	1.62%
Craniopsids,gen. et sp.indet.	2	-	-	1.62%
Broeggerolithus sp. (Group 3-Dean 1960)	0.8	-	-	0.65%
Calymene sp.(s.l.)	1.7	-	-	1.38%
Flexicalymene sp.	0.1	-	-	0.08%
Calymenid librigenae	0.6	-	-	0.49%
Brongniartella sp.(?)	0.1	-	-	0.08%
Large thoracic segments(Isotelinid?)	0.7	-	-	0.57%
Thoracic segments	0.4	-	-	0.32%
Gastropod (Murchisoniacean?)	1	-	-	0.81%

LOCALITY 201B continued

Tentaculites sp.	7	-	-	5.67%
				99.99

Cyclocyclopa A	11
Cyclocyclopa G	67
Cyclocyclopa G_1	55
Cyclocyclopa J	89
Cyclocyclopa J_1	4
Cyclopentagonopa A	27
Cyclopentagonopa B	4
Cyclopentagonopa B pluricolumnal	1
Cyclopentagonopa C	41
Pentagonocyclopa F	2
Pluricolumnals	19
$Pinnate_1$	10
$Pinnate_2$	7
Cirrals	113
Echinoderm plates	7
Ramose Bryozoan fragments	34
Circular bryozoa	4
Sheet-like encrusting bryozoan fragments	6
Lepidocoleus sp.	6

Genera Number	21	Diversity Index 9.78
Total Specimen Number	80	

LOCALITY 201C	GLANRAFON BEDS		SOUTH WEST OF DOLWYDDELAN	
Dalmanellids	33B:22P:4A	1.50B:1.00P	0.12/1	50.34%
Howellites sp.	3B:1P	3.00B:1.00P	-	4.08%
Dalmanella sp.	2B	2B	-	2.72%
Leptaena sp.	2P	2P	-	2.72%
Triplesiaceids	3B:2P	1.50B:1.00P	-	4.08%
Dinorthis sp.	5B:4P	1.25B:1.00P	-	6.80%
D.cf.berwynensis of Williams 1963	2B:2P	1.00B:1.00P	-	2.72%
Reuschella sp.	3B	3B	-	4.08%
Macrocoelia expansa	2P	2P	-	2.72%
Kjaerina sp.	2P	2P	-	2.72%
Craniopsid	1	-	-	1.36%
Broeggerolithus sp.	0.6	-	-	0.82%
Broeggerolithus sp. (Group 3 -Dean 1960)	0.4	-	-	0.54%
Calymene sp. (s.l.)	1.0	-	-	1.36%
Calymenid librigenae	0.3	-	-	0.41%
Isotelinid thoracic segments	0.4	-	-	0.54%
Thoracic segments	0.8	-	-	1.09%
Gastropods,gen.et sp.indet.	2	-	-	2.72%
Tentaculites sp.	6	-	-	8.16%
				99.98

Cyclocyclopa A	4
Cyclocyclopa G	27
Cyclocyclopa G_1	8

LOCALITY 201C continued

Cyclocyclopa J	48	
Cyclopentagonopa A	17	
Cyclopentagonopa C	22	
Pluricolumnals	8	
Pinnate$_1$	5	
Cirrals	52	
Echinoderm plates	3	
Ramose Bryozoan fragments	18	
Circular Bryozoan	1	
Lepidocoleus sp.	2	
Genera Number	18	Diversity Index 9.39
Total Specimen Number	50	

LOCALITY 203	GLANRAFON BEDS	SOUTH WEST OF DOLWYDDELAN		
Dalmanellids	77B:56P:19A	1.38B:1.00P	0.25/1	38.48%
Immature dalmanellids	12B:9P	1.33B:1.00P	-	4.81%
Dalmanella sp.	19B:16P:2A	1.19B:1.00P	0.11/1	8.42%
D.cf.lepta of Bancroft 1945	7B:3P	2.33B:1.00P	-	2.81%
Howellites sp.	8B:5P:1A	1.60B:1.00P	0.13/1	3.61%
Bancroftina sp.(?)	1P	1P	-	0.40%
Macrocoelia expansa	11B:40P	1.00B:3.64P	-	16.03%
M.cf.prolata of Williams 1963	12P	12P	-	4.81%
Immature *Macrocoelia* sp.	9P	9P	-	3.61%
Kjaerina sp.	6B:22P	1.00B:3.67P	-	8.82%
K.cf.horderleyensis of Bancroft 1929a	7P	7P	-	2.81%
Broeggerolithus sp.	1.3	-	-	0.52%
Broeggerolithus sp. (Group 3 - Dean 1960)	0.2	-	-	0.08%
Broeggerolithus sp. (with long genal spine)	0.1	-	-	0.04%
Parabasilicus cf. *powisi librigenae* of Dean 1963a	0.5	-	-	0.20%
Isotelinid fragments	1.2	-	-	0.48%
Isotelinid thoracic segments	1.4	-	-	0.56%
Thoracic segments	0.8	-	-	0.32%
Tallinnella sp.	4	-	-	1.60%
Quadrijugatorids	4	-	-	1.60%
				100.01

LOCALITY 203 continued

Cyclocyclopa A	53	
Cyclocyclopa B	28	
Cyclocyclopa E	7	
Cyclocyclopa G	78	
Cyclocyclopa G_1	13	
Cyclocyclopa H	41	
Pentagonocyclopa B	39	
$Pinnate_1$	4	
Cirrals	266	
Pluricolumnals	2	
Echinoderm plates	6	
Ramose Bryozoan fragments	35	
Circular Bryozoa	5	
Algal fragments	4	
Anastamosing algal fragments	2	
Genera Number	13	Diversity Index 5.36
Total Specimen Number	100	

LOCALITY 204	GLANRAFON BEDS	LLOCHES ANGHARAD CWM PENAMNEN SOUTH OF DOLWYDDELAN		
Dalmanellids	137B:94P:12A	1.46B:1.00P	0.09/1	35.16%
Immature dalmanellids	24B:17P:4A	1.41B:1.00P	0.17/1	6.61%
Dalmanella sp.	28B:21P	1.33B:1.00P	-	6.61%
D.cf.lepta of Bancroft 1945	5B: 2P:2A	2.50B:1.00P	0.40/1	1.65%
Howellites sp.	26B:18P	1.44B:1.00P	-	6.13%
H.cf.antiquior of Williams 1963	1B	1B	-	0.24%
Bancroftina sp.(?)	1P	1P	-	0.24%
Sowerbyellids	37B:27P:6A	1.37B:1.00P	0.16/1	10.15%
Immature sowerbyellids	10B: 6P	1.66B:1.00P	-	2.36%
Dinorthis sp.	39B:32P:5A	1.22B:1.00P	0.13/1	10.38%
Immature *Dinorthis* sp.	12B: 8P	1.50B:1.00P	-	2.83%
D.cf.berwynensis of Williams 1963	1P	1P	-	0.24%
Macrocoelia expansa	4B:22P	1.00B:5.50P	-	5.19%
Immature *Macrocoelia* sp.	7P	7P	-	1.65%
Triplesiaceid	1P	1P	-	0.24%
Leptaena sp.(?)	1P	1P	-	0.24%
Kjaerina sp.(?)	1P	1P	-	0.24%
Craniopsids	34	-	-	8.02%
Broeggerolithus sp.	2.1	-	-	0.50%
Thoracic segments (large)	0.7	-	-	0.17%

LOCALITY 204 continued

Gastropods, gen. et sp. indet.	2	-	-	0.47%
Tentaculites sp.	3	-	-	0.71%
				100.03

Cyclocyclopa A	21
Cyclocyclopa G	159
Cyclocyclopa H	29
Cyclopentagonopa A	79
Cyclopentagonopa B	170
Cyclopentagonopa C	223
Pentagonopentagonopa D	6
Pluricolumnals	17
Pinnate$_1$	12
Pinnate$_2$	41
Echinoderm plates	38
Ramose Bryozoan fragments	8
Lepidocoleus sp.	6

Genera Number	16	Diversity Index 6.04
Total Specimen Number	100	

Ichnofauna

Skolithid burrows	3

LOCALITY 205	GLANRAFON BEDS	SOUTH OF PENTRE BONT SOUTH OF DOLWYDDELAN		
Dalmanellids	115B:85P:27A	1.35B:1.00P	0.23/1	31.19%
Immature dalmanellids	19B:13P	1.46B:1.00P	-	4.17%
Dalmanella sp.	26B:14P	1.86B:1.00P	-	5.71%
D.cf.lepta of Bancroft 1945	3B: 5P	1.00B:1.66P	-	1.10%
Howellites sp.	23B:18P	1.28B:1.00P	-	5.05%
H.cf.striata of Williams 1963	1B	1B	-	0.22%
Sowerbyellids	128B:91P:18A	1.41B:1.00P	0.14/1	32.07%
Immature sowerbyellids	26B:19P	1.37B:1.00P	-	5.71%
Dinorthis sp.	34B:26P:9A	1.31B:1.00P	0.26/1	9.44%
D.cf.berwynensis of Williams 1963	6B:11P	1.00B:1.83P	-	2.42%
Macrocoelia expansa	7P	7P	-	1.54%
Horderleyella sp.	1P	1P	-	0.22%
Broeggerolithus sp. (Group 3 - Dean 1960)	0.2	-	-	0.04%
Otarion sp.(?)	0.1	-	-	0.02%
Tallinnella sp.	4	-	-	0.88%
Coral (*Favosites* sp.?)	1	-	-	0.22%
				100.00

Cyclocyclopa A	193
Cyclocyclopa G	111
Cyclocyclopa G_1	61
Cyclopentagonopa A	179
Cyclopentagonopa C	70

LOCALITY 205 continued

Pinnate$_2$	88
Echinoderm plates	42
Cirrals	309

Genera Number 11 Diversity Index 4.11

Total Specimen Number 100

Ichnofauna

Skolithid burrows	7

LOCALITY 208	GLANRAFON BEDS	CWM PENAMNEN SOUTH OF DOLWYDDELAN		
Dalmanellids	85B:63P:21A	1.35B:1.00P	0.25/1	47.81%
Immature dalmanellids	13B: 9P	1.44B:1.00P	-	5.86%
Dalmanella sp.	22B:18P	1.22B:1.00P	-	9.92%
D.cf.lepta of Bancroft 1945	4B	4B	-	1.80%
Howellites sp.	34B:25P	1.36B:1.00P	-	15.34%
H.cf.ultima of Bancroft 1945	6B	6B	-	2.71%
Onniella sp.	1P	1P	-	0.45%
Macrocoelia expansa	8B:20P	1.00B:2.50P	-	9.02%
Kjaerina sp.	3B: 3P	1.00B:1.00P	-	1.35%
Reuschella sp.	1P	1P	-	0.45%
Dinorthis sp.(?)	1P	1P	-	0.45%
Broeggerolithus sp.	0.7	-	-	0.32%
Broeggerolithus sp. (Group 2-Dean 1960)	0.1	-	-	0.05%
Broeggerolithus sp. (Group 3-Dean 1960)	0.3	-	-	0.14%
Isotelinid thoracic segments	0.5	-	-	0.23%
Isotelinid librigenae	0.3	-	-	0.14%
Thoracic segments	0.8	-	-	0.36%
Ulrichia sp.	3	-	-	1.35%
Smooth ostracode	1	-	-	0.45%
Tentaculites sp.	4	-	-	1.80%
				100.00

LOCALITY 208 continued

Cyclocyclopa G	111
Cyclocyclopa G_1	7
Cyclocyclopa H	24
Cyclocyclopa J	13
Cyclocyclopa J_1	2
Cyclopentagonopa A	267
Cyclopentagonopa C	41
Pentagonocyclopa A	10
Pentagonocyclopa B	17
Pentagonocyclopa C	2
Cirrals	395
$Pinnate_1$	89
$Pinnate_2$	14
Pluricolumnals	3
Echinoderm plates	29
Ramose Bryozoan fragments	47

Genera Number	14	Diversity Index 5.90
Total Specimen Number	100	

LOCALITY 210	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT SOUTH OF DOLWYDDELAN Bed A		
Sowerbyellids	192B:159P:39A	1.21B:1.00P	0.20/1	55.89%
Immature sowerbyellids	27B: 14P	1.93B:1.00P	-	6.53%
Dalmanellids	69B: 57P:16A	1.21B:1.00P	0.23/1	20.57%
Immature dalmanellids	14B: 12P	1.17B:1.00P	-	3.39%
Dalmanella sp.	19B: 17P	1.12B:1.00P	-	4.60%
D.cf.lepta of Bancroft 1945	1P	1P	-	0.24%
Howellites sp.	16B: 11P	1.45B:1.00P	-	3.87%
H.cf.antiquior of Williams 1963	1B	1B	-	0.24%
Onniella sp.(?)	1P	1P	-	0.24%
Horderleyella sp.	2P	2P	-	0.48%
Immature *Dinorthis* sp.	1B	1B	-	0.24%
Broeggerolithus sp.	0.8	-	-	0.19%
B.sp.(Group 3-Dean 1960)	0.2	-	-	0.05%
Calymene sp.(s.l.)	0.2	-	-	0.05%
Flexicalymene cf. *caractaci* of Whittington 1965	0.1	-	-	0.02%
Calymenid librigenae	0.2	-	-	0.05%
Kloucekia sp.	0.2	-	-	0.05%
K.apiculata	0.1	-	-	0.02%
Brongniartella sp.	0.1	-	-	0.02%
Isotelinid fragments	0.2	-	-	0.05%
Thoracic segments	0.2	-	-	0.05%

LOCALITY 210 continued

Quadrijugatorid	1	-	-	0.24%
Hollinaceans	2	-	-	0.48%
Gastropods, gen. et sp. indet.	3	-	-	0.73%
Tentaculites sp.	6	-	-	1.45%
Coral(*Favosites* sp.?)	1	-	-	0.24%
				99.98

Cyclocyclopa A_1 pluricolumnal	1
Cyclocyclopa J	26
Cyclocyclopa J pluricolumnal	1
Cyclocyclopa N	5
Pentagonocyclopa A	7
Cirrals	36
Pluricolumnals	4
Ramose Bryozoan fragments	9
Circular Bryozoa	2
Cyclocystoides sp.	3

Genera Number	19	Diversity Index 7.24
Total Specimen Number	100	

LOCALITY 210	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN Junction of Beds C and D		
Dalmanellids	26B:21P:1A	1.24B:1.00P	0.04/1	51.63%
Dalmanella sp.	1B	1B	-	1.91%
Sowerbyellids	24B:15P	1.60B:1.00P	-	45.89%
Kloucekia sp.	0.1	-	-	0.19%
Calymene sp.(s.l.)	0.1	-	-	0.19%
Thoracic segment (large)	0.1	-	-	0.19%
				100.00

Cyclocyclopa J	9
Ramose Bryozoan fragments	2
Genera Number	6
Total Specimen Number	20

Diversity Index 3.46

Bed D

Sowerbyellids	33B:21P:6A	1.57B:1.00P	0.18/1	88.64%
Dalmanellids	5B	5B	-	11.36%
				100.00

Ramose Bryozoan fragments	3
Genera Number	3
Total Specimen Number	20

Diversity Index 1.81

LOCALITY 211	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT SOUTH OF DOLWYDDELAN		
Dalmanellids	83B:77P:17A	1.08B:1.00P	0.20/1	69.74%
Immature dalmanellids	8B: 6P	1.33B:1.00P	-	5.58%
Dalmanella sp.	3B: 2P	1.50B:1.00P	-	2.09%
D.cf.indica of Bancroft 1945	1B	1B	-	0.70%
Howellites sp.	10B: 1P:1A	10.00B:1.00P	0.10/1	7.67%
H.cf.antiquior of Williams 1963	1B	1B	-	0.70%
Broeggerolithus sp.	1.9	-	-	1.32%
Broeggerolithus sp. (Group 3-Dean 1960)	0.1	-	-	0.07%
Brongniartella minor	0.2	-	-	0.14%
Brongniartella sp.	0.1	-	-	0.07%
Thoracic segment	0.1	-	-	0.07%
Hollinacean	1	-	-	0.70%
Ostracode	1	-	-	0.70%
Bellerophontid	1	-	-	0.70%
Pleurotomariacean	1	-	-	0.70%
Tentaculites sp.	13	-	-	9.07%
				100.02

Cyclocyclopa A	2
Pentagonocyclopa A	1
Pluricolumnal	1
Bryozoan	1
Ramose Bryozoan fragment	1

LOCALITY 211 continued

Circular bryozoa	3	
Cyclocystoides sp.(?)	1	
Genera Number	13	Diversity Index 5.98
Total Specimen Number	100	

Ichnofauna

Skolithid burrow	1

LOCALITY 212A	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN		
Dalmanellids	127B:116P:58A	1.09B:1.00P	0.46/1	53.89%
Immature dalmanellids	43B: 29P:16A	1.48 :1.00P	0.37/1	17.19%
Dalmanella sp.	27B: 19P	1.42B:1.00P	-	7.86%
Howellites sp.	41B: 31B	1.32B:1.00P	-	11.94%
H.cf.ultima of Bancroft 1945	3B	3B	-	0.87%
H.cf.antiquior of Williams 1963	3B: 1P	3.00B:1.00P	-	0.87%
Onniella sp.	8B: 6P	1.33B:1.00P	-	2.33%
Broeggerolithus sp.	0.1	-	-	0.03%
Parabasilicus sp.	0.2	-	-	0.06%
Tallinnella sp.	7	-	-	2.04%
Quadrijugatorids	6	-	-	1.75%
Tentaculites sp.	4	-	-	1.17%
				100.00

Cyclocyclopa A	9
Cirrals	7
Circular bryozoan	1
Genera Number	9
Total Specimen Number	80

Diversity Index 3.55

Ichnofauna

Skolithid burrows	11

LOCALITY 212B	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN		
Dalmanellids	112B:98P:41A	1.14B:1.00P	0.37/1	54.80%
Immature dalmanellids	37B:27P:11A	1.37B:1.00P	0.30/1	17.19%
Dalmanella sp.	19B:14P	1.36B:1.00P	-	6.81%
Howellites sp.	32B:28P	1.14B:1.00P	-	11.46%
H.cf.antiquior of Williams 1963	4B	4B	-	1.43%
Onniella sp.	17B:14P	1.21B:1.00P	-	6.09%
Bancroftina sp.(?)	1P	1P	-	0.36%
Broeggerolithus sp.	0.1	-	-	0.04%
*B.*sp.(Group 3 - Dean 1960)	0.1	-	-	0.04%
Bivalves,gen.et sp.indet.	2	-	-	0.72%
Quadrijugatorid	1	-	-	0.36%
Gastropod,gen.et sp.indet.	1	-	-	0.36%
Tentaculites sp.	1	-	-	0.36%
				100.02

Cyclocyclopa A	12
Genera Number	10
Total Specimen Number	70

Diversity Index 4.09

LOCALITY 213	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN		
Sowerbyellids	58B:37P:6A	1.57B:1.00P	0.10/1	43.16%
Immature sowerbyellids	8B:10P	1.00B:1.25P	-	6.74%
Dalmanellids	31B:29P:8A	1.07B:1.00P	0.26/1	26.30%
Immature dalmanellids	7B: 7P	1.00B:1.00P	-	4.72%
Howellites sp.	6B: 2P	3.00B:1.00P	-	4.05%
H.cf.antiquior of Williams 1963	1B	1B	-	0.67%
Dalmanella sp.	1B: 1P	1.00B:1.00P	-	0.67%
Triplesiaceids	1B: 3P	1.00B:3.00P	-	2.02%
Kjaerina sp.	4P	4P	-	2.70%
Kjaerina jonesi	2P	2P	-	1.35%
Horderleyella sp.	1P	1P	-	0.67%
Leptestiina oepiki	(?)1P	1P	-	0.67%
Broeggerolithus sp.	0.6	-	-	0.40%
Flexicalymene planimarginata	0.1	-	-	0.07%
Proetid librigenae	0.2	-	-	0.13%
Thoracic segments	1.4	-	-	0.94%
Gastropods,gen.et sp.indet.	3	-	-	2.02%
Tentaculites sp.	4	-	-	2.70%
				99.98

Cyclocyclopa A	6
Cyclocyclopa A_1	2
Cyclocyclopa J	10

LOCALITY 213 continued

Cyclocyclopa J pluricolumnal	1	
Pluricolumnals	4	
Ramose Bryozoan fragments	9	
Circular Bryozoa	2	
<u>Cyclocystoides</u> sp. plates	2	
Genera Number	16	Diversity Index 7.31
Total Specimen Number	100	

LOCALITY 214	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN		
Dalmanellids	165B:121P:36A	1.36B:1.00P	0.22/1	59.63%
Immature dalmanellids	22B: 17P	1.29B:1.00P	-	6.53%
Dalmanella sp.	29B: 24P	1.21B:1.00P	-	8.60%
D.cf.lepta of Bancroft 1945	5B: 3P	1.66B:1.00P	-	1.48%
Howellites sp.	34B: 31P	1.10B:1.00P	-	10.09%
H.cf.antiquior of Williams 1963	6B	6B	-	1.78%
Bancroftina sp.	1B	1B	-	0.30%
Sowerbyellid	1P	1P	-	0.30%
Reuschella sp.	6B: 4P	1.50B:1.00P	-	1.78%
Broeggerolithus sp.	6.3	-	-	1.87%
Broeggerolithus sp. (Group 3 - Dean 1960)	0.5	-	-	0.15%
Kloucekia apiculata	0.2	-	-	0.06%
Kloucekia sp.	0.1	-	-	0.03%
Brongniartella minor	0.3	-	-	0.09%
Brongniartella sp.	0.3	-	-	0.09%
Flexicalymene sp.	0.1	-	-	0.03%
Calymene sp.(s.l.)	0.1	-	-	0.03%
Decoroproteus sp.	0.1	-	-	0.03%
Isotelinid fragments	0.4	-	-	0.12%
Thoracic segments	0.7	-	-	0.21%
Tallinnella sp.	3	-	-	0.89%
Quadrijugatorids	5	-	-	1.48%
Dilobella sp.	2	-	-	0.59%

LOCALITY 214 continued

Ostracode	1	-	-	0.30%
Gastropods, gen. et sp. indet.	5	-	-	1.48%
Tentaculites sp.	7	-	-	2.08%
				100.02

Pluricolumnals	2
Cirrals	17
Ramose Bryozoan fragments	10

Genera Number	17	Diversity Index	6.72
Total Specimen Number	100		

LOCALITY 215	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN		
Dalmanellids	183B:168P:39A	1.09B:1.00P	0.21/1	51.47%
Immature dalmanellids	37B: 26P: 6A	1.42B:1.00P	0.16/1	9.97%
Dalmanella sp.	35B: 32P: 4A	1.09B:1.00P	0.11/1	9.04%
D.cf.lepta of Bancroft 1945	1P	1P	-	0.23%
Howellites sp.	48B: 39P: 7A	1.23B:1.00P	0.15/1	12.75%
H.cf.antiquior of Williams 1963	4B: 1P	4.00B:1.00P	-	0.93%
Onniella sp.(?)	11B: 7P	1.57B:1.00P	-	2.55%
Reuschella sp.	8B: 4P	2.00B:1.00P	-	1.85%
Sowerbyellids	2B	2B	-	0.46%
Leptaena sp.	1B: 3P	1.00B:3.00P	-	0.70%
L.cf.ventricosa of Williams 1963	3P	3P	-	0.70%
Craniopsid	1	-	-	0.23%
Broeggerolithus sp.	8.6	-	-	1.99%
Broeggerolithus sp. (Group 3 - Dean 1960)	1.0	-	-	0.23%
Immature *Broeggerolithus* sp.	0.2	-	-	0.05%
Brongniartella sp.	0.1	-	-	0.02%
B.minor	0.1	-	-	0.02%
Proetid	0.1	-	-	0.02%
Kloucekia sp.(?)	0.1	-	-	0.02%
Thoracic segments (large)	0.2	-	-	0.05%
Thoracic segments	0.9	-	-	0.21%
Tallinnella sp.	7	-	-	1.62%

LOCALITY 215 continued

Quadrijugatorids	3	-	-	0.70%
Gastropod, gen. et sp. indet.	1	-	-	0.23%
Tentaculites sp.	16	-	-	3.71%
Coral (*Favosites* sp.?)	1	-	-	0.23%
				99.98

Cyclocyclopa A	17
Cyclopentagonopa C	11
Pentagonocyclopa A	8
Pentagonocyclopa B	19
Ramose Bryozoan fragments	6
Circular Bryozoa	2

Genera Number	18	Diversity Index 6.82
Total Specimen Number	100	

LOCALITY 216	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN		
Dalmanellids	132B:101P:23A	1.31B:1.00P	0.17/1	54.60%
Immature dalmanellids	26B: 15P	1.73B:1.00P	-	9.16%
Dalmanella sp.	24B: 19P	1.26B:1.00P	-	8.45%
D.cf.lepta of Bancroft 1945	2B	2B	-	0.70%
Howellites sp.	31B: 17P	1.82B:1.00P	-	10.92%
H.cf.antiquior of Williams 1963	3B: 2P	1.50B:1.00P	-	1.06%
Sowerbyellids	3B: 2P	1.50B:1.00P	-	1.06%
Reuschella sp.	4B: 2P	2.00B:1.00P	-	1.41%
Broeggerolithus sp.	8.1	-	-	2.85%
Broeggerolithus sp. (Group 3 - Dean 1960)	1.6	-	-	0.56%
Kloucekia apiculata	0.1	-	-	0.04%
Kloucekia sp.	0.6	-	-	0.21%
Brongniartella minor	0.8	-	-	0.28%
Brongniartella sp.	0.5	-	-	0.18%
Flexicalymene sp.	0.2	-	-	0.07%
Calymene sp.(s.l.)	0.2	-	-	0.07%
Decoroproteus sp.	0.1	-	-	0.04%
Isotelinid fragments	0.6	-	-	0.21%
Thoracic segments	1.1	-	-	0.39%
Tallinnella sp.	7	-	-	2.47%
Quadrijugatorids	3	-	-	1.06%
Dilobella sp.	8	-	-	2.82%
Gastropod,gen.et sp.indet.	1	-	-	0.35%

LOCALITY 216 continued

Tentaculites sp.	3	-	-	1.06%
				100.02

Pluricolumnal	1
Cirrals	29
Ramose Bryozoan fragments	5
Lepidocoleus sp.	2

Genera Number	17	Diversity Index 6.92
Total Specimen Number	100	

LOCALITY 217	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN		
Dalmanellids	117B:96P:43A	1.22B:1.00P	0.37/1	55.52%
Immature dalmanellids	19B:16P	1.19B:1.00P	-	6.59%
Dalmanella sp.	17B:13P:5A	1.31B:1.00P	0.29/1	7.63%
D.cf.lepta of Bancroft 1945	1B: 1P	1.00B:1.00P	-	0.35%
Howellites sp.	34B:26P:11A	1.31B:1.00P	0.32/1	15.61%
H.cf.antiquior of Williams 1963	2B: 1P	2.00B:1.00P	-	0.69%
Onniella sp.	6B: 4P	1.50B:1.00P	-	2.08%
Reuschella sp.	4B: 3P	1.33B:1.00P	-	1.39%
Sowerbyellids	1B: 1P	1.00B:1.00P	-	0.35%
Leptaena sp.	2P	2P	-	0.69%
L.cf.ventricosa of Williams 1963	1P	1P	-	0.35%
Broeggerolithus sp.	6.7	-	-	2.32%
Broeggerolithus sp. (Group 3 - Dean 1960)	0.4	-	-	0.14%
Brongniartella sp.	0.2	-	-	0.07%
B.minor	0.2	-	-	0.07%
Kloucekia apiculata	0.1	-	-	0.03%
Thoracic segments	0.6	-	-	0.21%
Tallinnella sp.	4	-	-	1.39%
Quadrijugatorid	1	-	-	0.35%
Gastropods,gen.et sp.indet.	2	-	-	0.69%
Tentaculites sp.	10	-	-	3.47%
				99.99

LOCALITY 217 continued

Cyclocyclopa A_1	10	
Cyclopentagonopa C	3	
Pentagonocyclopa A	2	
Pentagonocyclopa B	11	
Ramose Bryozoan fragments	4	
Circular Bryozoan	1	
Genera Number	15	Diversity Index 6.09
Total Specimen Number	70	

LOCALITY 218	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT. SOUTH OF DOLWYDDELAN		
Dalmanellids	63B:57P:22A	1.11B:1.00P	0.35/1	63.15%
Immature dalmanellids	14B: 9P	1.56B:1.00P	-	10.40%
Dalmanella sp.	2B: 1P	2.00B:1.00P	-	1.49%
Howellites sp.	1A	-	-	0.74%
H.cf.antiquior of Williams 1963	4P	4P	-	2.97%
Onniella sp.	2P	2P	-	1.49%
Bancroftina sp.(?)	1P	1P	-	0.74%
Sowerbyellids	2A	-	-	1.49%
Paracraniops sp.	3	-	-	2.23%
Kiaromena sp.	1P	1P	-	0.74%
Rafinesquina sp.(?)	1P	1P	-	0.74%
Paterula sp.(?)	1	-	-	0.74%
Broeggerolithus sp.	0.3	-	-	0.22%
Brongniartella sp.	0.1	-	-	0.07%
Thoracic segments	0.2	-	-	0.15%
Tallinnella sp.	3	-	-	2.23%
Quadrijugatorids	9	-	-	6.69%
Smooth ostracodes	3	-	-	2.23%
cf.*Vlasta* sp.of Cox et al.1969	1	-	-	0.74%
Bellerophontid (?)	1	-	-	0.74%
				99.99

Ramose Bryozoan fragments	46
Genera Number	16
Total Specimen Number	70

Diversity Index 7.48

LOCALITY 219	GLANRAFON BEDS	EAST SOUTH EAST OF PENTRE BONT SOUTH OF DOLWYDDELAN		
Dalmanellids	89B:68P:22A	1.31B:1.00P	0.25/1	36.85%
Immature dalmanellids	28B:23P	1.22B:1.00P	-	9.30%
Dalmanella sp.	21B:17P	1.24B:1.00P	-	6.97%
D.cf.lepta of Bancroft 1945	2B	2B	-	0.66%
Howellites sp.	37B:29P	1.28B:1.00P	-	12.28%
H.cf.antiquior of Williams 1963	1B: 2P	1.00B:2.00P	-	0.66%
H.cf.ultima of Bancroft 1945	1B	1B	-	0.33%
Sowerbyellids	47B:31P:10A	1.52B:1.00P	0.21/1	18.92%
Immature sowerbyellids	19B: 9P	2.11B:1.00P	-	6.31%
Paracraniops sp.	3	-	-	1.00%
Kiaromena sp.	1P	1P	-	0.33%
Leptaena sp.	1B: 1P	1.00B:1.00P	-	0.33%
Reuschella sp.(?)	1B: 1P	1.00B:1.00P	-	0.33%
Sericoidea sp.	4P	4P	-	1.33%
Horderleyella sp.	1P	1P	-	0.33%
Macrocoelia expansa	1B	1B	-	0.33%
Broeggerolithus sp.	1.8	-	-	0.60%
B.sp.(Group 3 - Dean 1960)	0.1	-	-	0.03%
Calymene sp.(s.l.)	0.6	-	-	0.20%
Flexicalymene planimarginata	0.1	-	-	0.03%
Calymenid librigenae	1.2	-	-	0.40%
Brongniartella minor	0.3	-	-	0.10%

LOCALITY 219 continued

Decoroproteus sp.	0.2	-	-	0.07%
Thoracic segments	0.9	-	-	0.30%
Quadrijugatorid (?)	1	-	-	0.33%
Gastropod, gen. et sp. indet.	1	-	-	0.33%
Lophospirid	1	-	-	0.33%
Tentaculites sp.	2	-	-	0.66%
Coral (?)	1	-	-	0.33%
				99.97

Cyclocyclopa A	12
Cyclocyclopa D	8
Cyclocyclopa H	7
Cyclocyclopa J	39
Pentagonocyclopa A	6
Cirrals	29
Pinnate$_1$	11
Pluricolumnals	4
Echinoderm plates	15
Ramose Bryozoan fragments	5
Genera Number	21
Total Specimen Number	100

Diversity Index 8.46

LOCALITY 220	GLANRAFON BEDS	NORTH WEST OF BWLCH Y GROES. SOUTH EAST OF DOLWYDDELAN		
Dalmanellids	64B:49P:6A	1.31B:1.00P	0.09/1	41.94%
Immature dalmanellids	12B:10P	1.20B:1.00P	-	7.19%
Dalmanella sp.	7B: 3P	2.33B:1.00P	-	4.19%
D.cf.lepta of Bancroft 1945	3B	3B	-	1.80%
Howellites sp.	1B	1B	-	0.60%
Sowerbyellids	27B:23P:6A	1.17B:1.00P	0.22/1	19.77%
Immature sowerbyellids	6B: 4P	1.50B:1.00P	-	3.59%
Dinorthis sp.	6B: 1A	6B	0.17/1	4.19%
D.cf.berwynensis of Williams 1963	1B	1B	-	0.60%
Strophomena sp.	2P:1A	2P	0.50/1	1.80%
Leptaena sp.	3P	3P	-	1.80%
L.cf.ventricosa of Williams 1963	1P	1P	-	0.60%
Paracraniops sp.	7	-	-	4.19%
Broeggerolithus sp.	3.0	-	-	1.80%
*B.*sp.(Group 2-Dean 1960)	0.6	-	-	0.36%
*B.*sp.(Group 3-Dean 1960)	0.4	-	-	0.24%
Calymene sp.(s.l.)	0.3	-	-	0.18%
Calymenid librigenae	0.2	-	-	0.12%
Flexicalymene sp.	0.1	-	-	0.06%
Proetids	C.3	-	-	0.18%
Brongniartella minor	0.2	-	-	0.12%
Thoracic segments	1.8	-	-	1.08%
Tallinnella sp.	2	-	-	1.20%

LOCALITY 220 continued

Quadrijugatorids	3	-	-	1.80%
Modiomorphid	1	-	-	0.60%
				100.00

Cyclocyclopa J	11
Cyclocyclopa J_1	3
Cirrals	8
Ramose Bryozoan fragments	31
Encrusting Bryozoa	6

Genera Number	17	Diversity Index 7.56
Total Specimen Number	100	

LOCALITY 221	GLANRAFON BEDS	300 METRES WEST OF BWLCH Y GROES SOUTH EAST OF DOLWYDDELAN		
Sowerbyellids	84B:77P:12A	1.09B:1.COP	0.14/1	51.84%
Immature sowerbyellids	35B:21P	1.67B:1.COP	-	18.90%
Dalmanellids	13B: 8P:3A	1.63B:1.COP	0.23/1	8.64%
Immature dalmanellids	4B: 1P	4.COB:1.COP	-	2.16%
Dalmanella sp.	1B	1B	-	0.54%
Howellites sp.	1B	1B	-	0.54%
Leptaena sp.	3P	3P	-	1.62%
Triplesiaceids	1B: 1P	1.COB:1.COP	-	0.54%
Bicuspina cf. *spiriferoides* of Williams 1963	1P	1P	-	0.54%
Kjaerina sp.	1B: 1P	1.00B:1.COP	-	0.54%
Kjaerina sp.(?)	2P	2P	-	1.08%
Paracraniops sp.	4	-	-	2.16%
Macrocoelia expansa	4P	4P	-	2.16%
Immature *Macrocoelia* sp.	1P	1P	-	0.54%
Strophomenids, gen. et sp.indet.	6P	6P	-	3.24%
Reuschella sp.	1B	1B	-	0.54%
Broeggerolithus sp.	0.2	-	-	0.11%
Calymene sp.(s.l.)	0.5	-	-	0.27%
cf. *Flexicalymene planimarginata* of Whittington 1965	0.1	-	-	0.05%
Thoracic segments	0.4	-	-	0.22%
Ostracodes	2	-	-	1.08%

LOCALITY 221 continued

Bivalve, gen. et sp. indet.	1	-	-	0.54%
Ambonychiacean (*Allonchyia* sp.)	1	-	-	0.54%
Tentaculites sp.(?)	1	-	-	0.54%
Favosites sp.	3	-	-	1.08%
				100.01

Cyclocyclopa A	18
Cyclocyclopa G	161
Cyclocyclopa H	107
Cyclopentagonopa A	218
Pentagonopentagonopa D	2
Pinnate$_1$	39
Pinnate$_2$	7
Cirrals	171
Echinoderm plates	14
Crinoid arm	1
Circular Bryozoa	5
Lepidocoleus sp.	3

Genera Number	18	Diversity Index 7.79
Total Specimen Number	100	

LOCALITY 225	GLANRAFON BEDS	PIGYN ESGOB/ROWLYD SOUTH EAST OF DOLWYDDELAN		
Sowerbyellids	89B/60P	1.48B:1.00P	-	24.31%
Salopia globosa	68B:50P:1A	1.36B:1.00P	0.01/1	18.85%
Salopia sp.	19B:18P	1.06B:1.00P	-	5.19%
Salopia sp.nov.(A)	8B	8B	-	2.19%
Salopia sp.nov.(B)	1B	1B	-	0.27%
Triplesiaceids	47B:28P:1A	1.68B:1.00P	0.02/1	13.11%
Bicuspina sp.	1B: 8P	1.00B:8.00P	-	2.19%
Bicuspina cf. *spiriferoides* of Williams 1963	2B: 4P	1.00B:2.00P	-	1.09%
Bicuspina cf. *subquadrata* of Williams 1974	1B: 1P	1.00B:1.00P	-	0.27%
Dalmanellids	23B:15P:2A	1.53B:1.00P	0.09/1	6.83%
Dalmanella sp.	2B: 3P	1.00B:1.50P	-	0.82%
Dalmanella cf. *salopiensis* of Williams 1974	2B: 4P	1.00B:2.00P	-	1.09%
Howellites sp.	3B	3B	-	0.82%
Glyptorthis sp.	17B: 8P	2.13B:1.00P	-	4.64%
Plectorthis sp.	3B: 6P	1.00B:2.00P	-	1.64%
Plectorthids	1B: 4P	1.00B:4.00P	-	1.09%
Dinorthis sp.	7B:20P	1.00B:2.86P	-	5.46%
Dinorthis berwynensis	2B	2B	-	0.55%
Horderleyella aff. *plicata* of Bancroft 1928,1945	1P	1P	-	0.27%
Horderleyella sp.	1B: 3P	1.00B:3.00P	-	0.82%
Skenidioides sp.	5B: 1P	5.00B:1.00P	-	1.37%

LOCALITY 225 continued

Rafinesquina sp.	1P	1P	-	0.27%
cf.*Plaesiomys* sp.	2P	2P	-	0.55%
cf.*Orthambonites* sp.	2B:6P	1.00B:3.00P	-	1.64%
cf.*Nicolella* sp.	1B	1B	-	0.27%
cf.*Rostricellula* sp.	1P	1P	-	0.27%
cf.*Reuschella* sp.	1B:1P	1.00B:1.00P	-	0.27%
cf.*Leptaena* sp.	1B:1P	1.00B:1.00P	-	0.27%
cf.*Caeroplecia* sp.	1B	1B	-	0.27%
cf.*Petrocrania* sp.	4	-	-	1.09%
Pygidium,gen.et sp. indet.	0.1	-	-	0.05%
Gastropod,gen.et sp. indet.	2	-	-	0.55%
Coral	6	-	-	1.64%
				99.99

Algae Incertae Sedis (Rhodophyceae ? - Johnson & Konishi 1959) cf.*Dasyporella norvegica* Hoeg of Johnson 1952	207
Calcareous anastomosing algae (*Solenopora* ?)	30
Dasycladacean algae cf.*Mastopora* sp. Eichwald of Johnson 1952	11
Cyclocyclopa A	23
Cyclocyclopa A_1	98
Cyclocyclopa A_1 pluricolumnals	5
Cyclocyclopa C	2
Cyclocyclopa E	7
Cyclocyclopa M	20
Pentagonocyclopa B	5
Pentagonopentastellatopa D	1

LOCALITY 225 continued

Cirrals	15	
Pluricolumnals	6	
Cystoid plates	2	
Echinoderm plates	8	
Ramose Bryozoan fragments	200	
Genera Number	32	Diversity Index 12.12
Total Specimen Number	150	

LOCALITY 226A	GLANRAFON BEDS		BWLCH Y GROES SOUTH EAST OF DOLWYDDELAN	
Sowerbyellids	83B:61P:8A	1.36B:1.00P	0.10/1	60.15%
Immature sowerbyellids	11B: 5P	2.20B:1.00P	-	7.27%
Dalmanellids	19B:14P:3A	1.36B:1.00P	0.16/1	14.54%
Immature dalmanellids	5B: 4P	1.25B:1.00P	-	3.30%
Paracraniops sp.	6	-	-	3.97%
Triplesiaceids	2B	2B	-	1.32%
Bicuspina sp.	1P	1P	-	0.66%
Rafinesquina sp.(?)	1B	1B	-	0.66%
Glyptorthis sp.(?)	1P	1P	-	0.66%
Broeggerolithus sp.	0.8	-	-	0.53%
Calymene sp.(s.l.)	0.2	-	-	0.13%
Flexicalymene cf. *planimarginata* of Whittington 1965	0.2	-	-	0.13%
Enrolled asaphid,gen. et sp.indet.	1.0	-	-	0.66%
Thoracic segments	1.1	-	-	0.73%
Ambonychiaceans	2	-	-	1.32%
cf.*Allonchyia* sp.of Cox et al.1969	1	-	-	0.66%
Modiomorphids	2	-	-	1.32%
Tentaculites sp.	2	-	-	1.32%
Coral (?)	1	-	-	0.66%
				99.99

Cyclocyclopa A	26
Cyclocyclopa G	52
Cyclocyclopa H	38

LOCALITY 226A continued

Cyclocyclopa J	44
Cyclocyclopa J_1	7
Cyclocyclopa M	9
Cyclopentagonopa A	12
Cyclopentagonopa B	7
Cyclopentagonopa C	10
Pentagonopentagonopa A	5
Cirrals	88
$Pinnate_1$	27
$Pinnate_2$	16
Pluricolumnals	3
Echinoderm plates	17
Ramose Bryozoan fragments	2
Encrusting Bryozoa	3

Genera Number	16	Diversity Index 7.25
Total Specimen Number	80	

LOCALITY 226B	GLANRAFON BEDS	BWLCH Y GROES SOUTH EAST OF DOLWYDDELAN		
Dalmanellids	37B:28P:5A	1.32B:1.00P	0.14/1	74.47%
Dalmanella sp.	1A	-	-	1.77%
Howellites sp.	1B	1B	-	1.77%
Sowerbyellids	3B	3B	-	5.32%
Macrocoelia sp.	2B:3P:2A	1.00B:1.50P	0.66/1	8.87%
Reuschella sp.(?)	1A	-	-	1.77%
Dinorthis cf. *berwynensis* of Williams 1963	1B	1B	-	1.77%
Broeggerolithus sp.	0.1	-	-	0.18%
Brongniartella sp.	0.1	-	-	0.18%
Parabasilicus powisi	0.1	-	-	0.18%
Isotelinid fragments	0.4	-	-	0.71%
Large thoracic segments	0.7	-	-	1.24%
Modiomorphid	1	-	-	1.77%
				100.00

Cyclocyclopa G	18
Cyclocyclopa J	23
Cyclopentagonopa A	49
Cirrals	57
Pinnate$_2$	13
Echinoderm plates	16
Genera Number	11
Total Specimen Number	50

Diversity Index 6.23

LOCALITY 227	GLANRAFON BEDS	BWLCH Y GROES SOUTH EAST OF DOLWYDDELAN		
Dalmanellids	66B:59P:7A	1.12B:1.00P	0.11/1	65.77%
Immature dalmanellids	7B: 6P	1.17B:1.00P	-	6.31%
Dalmanella sp.	1P	1P	-	0.90%
Reuschella sp.	4B: 1P:2A	4.00B:1.00P	0.50/1	5.41%
R.horderleyensis	3B	3B	-	2.70%
Macrocoelia sp.	4P	4P	-	3.60%
M.expansa	1P	1P	-	0.90%
M.cf.prolata of Williams 1963	1P	1P	-	0.90%
Dinorthis sp.	1B: 2P	1.00B:2.00P	-	1.80%
D.cf.berwynensis of Williams 1963	1B	1B	-	0.90%
Sowerbyellid	1P	1P	-	0.90%
Triplesiaceid	1P	1P	-	0.90%
Obolid,gen.et sp. indet.	1	-	-	0.90%
Broeggerolithus sp.	0.4	-	-	0.36%
B.sp.(Group 3-Dean 1960)	0.1	-	-	0.09%
Decoroproteus sp.	0.1	-	-	0.09%
Thoracic segments	0.4	-	-	0.36%
Tallinnella sp.	3	-	-	2.70%
Modiomorphids	5	-	-	4.50%
				99.99

Cyclocyclopa G	37
Cyclocyclopa G_1	21
Cyclocyclopa J	15

LOCALITY 227 continued

Cyclocyclopa J_1	36
Cyclopentagonopa A	59
Cyclopentagonopa C	10
Cyclopentagonopa D	38
Pentagonocyclopa A	17
Pentagonopentagonopa D	3
Pentagonopentastellatopa A	1
Pinnate$_1$	19
Pinnate$_2$	16
Cirrals	55
Echinoderm plates	18
Pluricolumnals	17
Ramose Bryozoan fragments	6
Lepidocoleus sp.	6

Genera Number	13	Diversity Index 6.26
Total Specimen Number	65	

LOCALITY 231	GLANRAFON BEDS	APPROX. 600 METRES NORTH OF TY'N Y DDOL WEST OF BLAENAU DOLWYDDELAN		
Sowerbyellids	74B:59P:7A	1.25B:1.00P	0.09/1	46.15%
Immature sowerbyellids	11B: 7P	1.57B:1.00P	-	6.27%
Dalmanellids	33B:31P:7A	1.06B:1.00P	0.21/1	22.79%
Immature dalmanellids	6B: 5P	1.20B:1.00P	-	3.42%
Dalmanella sp.	2B	2B	-	1.14%
Howellites sp.	5B: 2P	2.50B:1.00P	-	2.85%
Dinorthis sp.	8B: 5P	1.60B:1.00P	-	4.56%
D.cf.berwynensis of Williams 1963	3B: 1P	3.00B:1.00P	-	1.71%
Reuschella sp.	2B: 2P	1.00B:1.00P	-	1.14%
Craniopsids	5	-	-	2.85%
Broeggerolithus sp.	0.3	-	-	0.17%
Thoracic segments	0.2	-	-	0.11%
Tallinnella sp.	3	-	-	1.71%
Quadrijugatorids	6	-	-	3.42%
Gastropods,gen.et sp. indet.	2	-	-	1.14%
Bivalve (?)	1	-	-	0.57%
				100.00

Cyclocyclopa A	4
Cyclocyclopa J	12
Cirrals	20
Ramose Bryozoan fragments	28
Genera Number	12
Total Specimen Number	70

Diversity Index 5.35

LOCALITY 232	GLANRAFON BEDS		APPROX. 500 METRES NORTH OF TY'N DDOL WEST OF BLAENAU DOLWYDDELAN	
Sowerbyellids	217B:197P:34A	1.10B:1.00P	0.16/1	42.52%
Immature sowerbyellids	37B: 24P	1.54B:1.00P	-	6.27%
Dalmanellids	139B:108P:23A	1.29B:1.00P	0.17/1	27.44%
Immature dalmanellids	24B: 19P	1.26B:1.00P	-	4.07%
Dalmanella sp.	21B: 14P	1.50B:1.00P	-	3.56%
Howellites sp.	41B: 34P	1.21B:1.00P	-	6.95%
H.cf.antiquior of Williams 1963	6B: 3P	2.00B:1.00P	-	1.02%
Kjaerina sp.	1B: 10P	1.00B:10.00P	-	1.69%
Immature *Kjaerina* sp.	1P	1P	-	0.17%
K.jonesi	3P	3P	-	0.51%
Bicuspina spiriferoides	1P	1P	-	0.17%
Sampo sp.	2P	2P	-	0.34%
Strophomenid,gen.et sp.indet.	1P	1P	-	0.17%
Craniopsids	12	-	-	2.03%
Broeggerolithus sp.	1.6	-	-	0.27%
Broeggerolithus sp. (Group 3 - Dean 1960)	0.5	-	-	0.08%
Kloucekia sp.	0.2	-	-	0.03%
K.apiculata	0.1	-	-	0.02%
Flexicalymene planimarginata	0.1	-	-	0.02%
Isotelinid librigenae	1.7	-	-	0.29%
Parabasilicus sp.	0.1	-	-	0.02%

LOCALITY 232 continued

Tallinnella sp.	3	-	-	0.51%
Ostracode	1	-	-	0.17%
Bellerophontids	3	-	-	0.51%
Gastropods, gen. et sp. indet.	2	-	-	0.34%
Orthoconic cephalopod	1	-	-	0.17%
Tentaculites sp.	4	-	-	0.68%
				100.02

Cyclocyclopa A	7
Cyclocyclopa J	10
Pentagonocyclopa A	6
Cirrals	14
Ramose Bryozoan fragments	7

Genera Number	18	Diversity Index 6.49
Total Specimen Number	120	

LOCALITY 232A GLANRAFON BEDS

APPROX. 450 METRES NORTH OF TY'N DDOL WEST OF BLAENAU DOLWYDDELAN

		Medium grain siltstone (Underlies fine grain sandstone)		
Dalmanellids	58B:48P:8A	1.21B:1.00P	0.14/1	23.85%
Immature dalmanellids	12B:10P	1.20B:1.00P	-	4.34%
Howellites sp.	27B:19P:3A	1.42B:1.00P	0.11/1	10.84%
H.cf.antiquior of Williams 1963	12B: 8P	1.50B:1.00P	-	4.34%
Sowerbyellids	7B: 4P	1.75B:1.00P	-	2.53%
Isotelinid fragments	1.6	-	-	0.58%
Brongniartella sp.	0.1	-	-	0.04%
Nuculaceans	13	-	-	4.70%
Modiomorphid (*Modiolopsis* sp.?)	1A	-	-	0.36%
Bivalves,gen.et sp. indet.	10	-	-	3.61%
Bellerophontids (*Sinuites* sp.?)	27	-	-	9.76%
Pleurotomariaceans	25	-	-	9.04%
Lophospirids	17	-	-	6.14%
Gastropods,gen.et sp.indet.	45	-	-	16.26%
Orthoconic cephalopods	7	-	-	2.53%
Tentaculites sp.	3	-	-	1.08%
				100.00

Cyclocyclopa A	8
Cirrals	5
Genera Number	13
Total Specimen Number	70

Diversity Index 5.32

LOCALITY 232A	GLANRAFON BEDS	APPROX.450 METRES NORTH OF TY'N-Y-DDOL.WEST OF BLAENAU DOLWYDDELAN Fine grain sandstone		
Sowerbyellids	125B:109P:12A	1.15B:1.00P	0.10/1	55.76%
Immature sowerbyellids	34B: 19P	1.79B:1.00P	-	13.84%
Dalmanellids	47B: 33P:8A	1.42B:1.00P	0.17/1	22.39%
Dalmanella sp.	10B: 6P	1.67B:1.00P	-	4.07%
Kjaerina sp.(?)	3P	3P	-	1.22%
Broeggerolithus sp.	1.2	-	-	0.49%
Broeggerolithus sp. (Group 3-Dean 1960: *B.cf.nicholsoni* of Dean 1962)	0.3	-	-	0.12%
Flexicalymene sp.	0.2	-	-	0.08%
Calymene sp.(s.l.)	0.4	-	-	0.16%
Isotelinid fragments	0.6	-	-	0.24%
Gastropods,gen.et sp.indet.	4	-	-	1.63%
				100.00

Cyclocyclopa A	17
Ramose Bryozoan fragments	36

Genera Number	9	Diversity Index	3.76
Total Specimen Number	70		

LOCALITY 233	SEDIMENTS BETWEEN THE UPPER AND LOWER UNITS OF THE LOWER RHYOLITIC TUFF FORMATION		MOEL SIABOD SOUTH	
Sowerbyellids	43B:37P:6A	1.16B:1.00P	0.14/1	32.30%
Immature sowerbyellids	7B: 5P	1.40B:1.00P	-	4.61%
Skenidioides costatus	35B:13P:2A	2.69B:1.00P	0.06/1	24.39%
Sericoidea sp.	12B:11P:2A	1.09B:1.00P	0.17/1	9.23%
Sericoidea sp. (aff. *Chonetoidea alpha* of Spjeldnaes 1957)	4B	4B	-	2.64%
Dalmanellids	7B: 3P	2.33B:1.00P	-	4.61%
Immature dalmanellids	2B: 2P	1.00B:1.00P	-	1.32%
Leptestiina oepiki	2B: 6P	1.00B:3.00P	-	3.96%
Nicolella sp.	2B: 3P	1.00B:1.50P	-	1.98%
Orthambonites sp.	1B	1B	-	0.66%
Dolerorthis sp.(?)	1B	1B	-	0.66%
Brongniartella bisulcata	0.6	-	-	0.40%
Brongniartella bisulcata thoracic segments	2.3	-	-	1.52%
Calymene sp.(s.l.)	0.8	-	-	0.53%
Calymenid librigenae	0.6	-	-	0.40%
Broeggerolithus sp.	0.4	-	-	0.26%
Quadrijugatorids	5	-	-	3.30%
Tentaculites sp.	11	-	-	7.25%
				100.02

Cyclocyclopa A	22
Cyclocyclopa A_1	15

LOCALITY 233 continued

Cyclocyclopa E	21
Cyclocyclopa J	123
Cyclocyclopa K	367
Cyclocyclopa N	37
Pentagonocyclopa A	101
Pentagonopentastellatopa A	28
Pluricolumnals	5
Cirrals	250
Pinnate$_1$	87
Pinnate$_2$	12
Echinoderm plates	33
Ramose Bryozoan fragments	43
Circular Bryozoa	6
Lepidocoleus sp.	248
Cyclocystoides sp. (two pored plates)	7

Genera Number	18	Diversity Index 7.75
Total Specimen Number	100	

LOCALITY 233A	SEDIMENTS BETWEEN THE UPPER AND LOWER UNITS OF THE LOWER RHYOLITIC TUFF FORMATION			MOEL SIABOD SOUTH
Sowerbyellids	30B:26P:3A	1.15B:1.00P	0.10/1	35.14%
Immature sowerbyellids	3B	3B	-	3.19%
Skenidioides costatus	23B: 8P:1A	2.88B:1.00P	0.04/1	25.56%
Sericoidea sp.	7B: 5P:1A	1.40B:1.00P	0.14/1	8.52%
Sericoidea sp.(aff. *Chonetoidea alpha* of Spjeldnaes 1957)	2B	2B	-	2.13%
Leptestiina oepiki	4P	4P	-	4.26%
Dalmanellids	3B: 1P	3.00B:1.00P	-	3.19%
Immature dalmanellids	1B	1B	-	1.06%
Nicolella sp.	1B: 1P	1.00B:1.00P	-	1.06%
Orthambonites sp.	1B	1B	-	1.06%
Brongniartella bisulcata	0.4	-	-	0.43%
Brongniartella bisulcata thoracic segments	1.3	-	-	1.38%
Calymene sp.(s.l.)	0.5	-	-	0.53%
Calymenid librigenae	0.4	-	-	0.43%
Broeggerolithus sp.	0.3	-	-	0.32%
Quadrijugatorids	3	-	-	3.19%
Tentaculites sp.	8	-	-	8.52%
				99.97

Cyclocyclopa A	10
Cyclocyclopa A_1	7
Cyclocyclopa E	23

LOCALITY 233A continued

Cyclocyclopa J	88
Cyclocyclopa K	197
Cyclocyclopa N	20
Pentagonocyclopa A	71
Pentagonopentastellatopa A	17
Pluricolumnal	1
Cirrals	151
Pinnate$_1$	50
Pinnate$_2$	4
Echinoderm plates	12
Ramose Bryozoan fragments	29
Circular Bryozoa	1
Lepidocoleus sp.	203
Cyclocystoides sp. (two pored plates)	3
Genera Number	17
Total Specimen Number	100

Diversity Index 8.04

LOCALITY 235A	GLANRAFON BEDS	APPROX.650 METRES NORTH OF TY'N Y DDOL WEST OF BLAENAU DOLWYDDELAN		
Dalmanellids	110B:96P:12A	1.15B:1.00P	0.11/1	27.19%
Immature dalmanellids	23B:15P	1.53B:1.00P	-	5.13%
Dalmanella sp.	9B: 7P	1.29B:1.00P	-	2.01%
D.cf.lepta of Bancroft 1945	3B	3B	-	0.67%
Howellites sp.	24B:16P	1.50B:1.00P	-	5.35%
Dinorthis sp.	48B:44P:8A	1.09B:1.00P	0.17/1	12.48%
D.cf.berwynensis of Williams 1963	17B:10P	1.70B:1.00P	-	3.79%
Sowerbyellids	47B:37P:3A	1.27B:1.00P	0.06/1	11.14%
Immature sowerbyellids	17B:11P	1.55B:1.00P	-	3.79%
Macrocoelia expansa	1P	1P	-	0.22%
Strophomenids,gen. et sp.indet.	4P	4P	-	0.89%
Paracraniops sp.	8	-	-	1.78%
Obolid,gen.et sp. indet.(in life position)	1	-	-	0.22%
Broeggerolithus sp.	2.6	-	-	0.58%
Broeggerolithus sp. (Group 3-Dean 1960)	0.8	-	-	0.18%
Parabasilicus powisi	0.2	-	-	0.04%
Decoroproteus sp.	0.3	-	-	0.07%
Brongniartella minor	0.1	-	-	0.02%
Calymene sp.(s.l.)	0.9	-	-	0.20%
Kloucekia apiculata	0.3	-	-	0.07%

LOCALITY 235A continued

Thoracic segments (large)	0.5	-	-	0.11%
Bivalves, gen. et sp. indet.	2	-	-	0.45%
Ptereineid	1	-	-	0.22%
Ambonychiaceans	3	-	-	0.67%
Nuculoid	1	-	-	0.22%
Lophospirids	51	-	-	11.37%
Bellerophontids	43	-	-	9.58%
Tallinnella sp.	3	-	-	0.67%
Quadrijugatorids	2	-	-	0.45%
Tentaculites sp.	2	-	-	0.45%
				100.01

Cyclocyclopa J	17
Cirrals	24
Ramose Bryozoan fragments	12
Circular Bryozoa	3
Lepidocoleus sp.	7

Genera Number	24	Diversity Index 9.03
Total Specimen Number	150	

Ichnofauna

Skolithid burrows	2

LOCALITY 235B	GLANRAFON BEDS	APPROX. 650 METRES NORTH OF TY'N DDOL WEST OF BLAENAU DOLWYDDELAN		
Dalmanellids	73B:56P:10A	1.30B:1.00P	0.14/1	23.37%
Immature dalmanellids	11B:14P	1.00B:1.27P	-	3.94%
Dalmanella sp.	5B: 2P	2.50B:1.00P	-	1.41%
D.cf.lepta of Bancroft 1945	1B	1B	-	0.28%
Howellites sp.	23B:15P	1.53B:1.00P	-	6.48%
Sowerbyellids	29B:20P:6A	1.45B:1.00P	0.21/1	9.85%
Immature sowerbyellids	13B:12P	1.08B:1.00P	-	3.66%
Dinorthis sp.	22B:17P:7A	1.29B:1.00P	0.32/1	8.16%
D.berwynensis	11B: 4P	2.75B:1.00P	-	3.10%
Macrocoelia expansa	1B: 5P	1.00B:5.00P	-	1.41%
Paracraniops sp.	3	-	-	0.84%
Obolids,gen.et sp. indet.(in life position)	2	-	-	0.56%
Broeggerolithus sp.	1.4	-	-	0.39%
Broeggerolithus sp. (Group 3-Dean 1960)	0.4	-	-	0.11%
Parabasilicus powisi	0.1	-	-	0.03%
Decoroproteus sp.	0.4	-	-	0.11%
Brongniartella minor	0.1	-	-	0.03%
Calymene sp.(s.l.)	0.7	-	-	0.20%
Kloucekia apiculata	0.1	-	-	0.03%
Bivalves,gen.et sp. indet.	3	-	-	0.84%
Ambonychiaceans	4	-	-	1.13%

LOCALITY 235B continued

Nuculoids	4	-	-	1.13%
Lophospirids	63	-	-	17.74%
Bellerophontids	40	-	-	11.26%
Tallinnella sp.	6	-	-	1.69%
Quadrijugatorids	7	-	-	1.97%
Tentaculites sp.	1	-	-	0.28%
				100.00

Cyclocyclopa A	6
Cyclocyclopa J	14
Cyclocyclopa J_1	3
Cirrals	12
Ramose Bryozoan fragments	9
Circular Bryozoan	1
Lepidocoleus sp.	12

Genera Number	23	Diversity Index 9.00
Total Specimen Number	100	

LOCALITY 235C	GLANRAFON BEDS	APPROX.650 METRES NORTH OF TY'N Y DDOL WEST OF BLAENAU DOLWYDDELAN		
Dalmanellids	97B:69P:19A	1.41B:1.00P	0.20/1	21.92%
Immature dalmanellids	19B:15P	1.27B:1.00P	-	3.59%
Dalmanella sp.	8B: 3P	2.67B:1.00P	-	1.51%
D.cf.lepta of Bancroft 1945	6B: 2P	3.00B:1.00P	-	1.13%
Howellites sp.	29B:17P	1.71B:1.00P	-	5.48%
Sowerbyellids	39B:34P:7A	1.15B:1.00P	0.18/1	8.69%
Immature sowerbyellids	14B:12P	1.70B:1.00P	-	2.65%
Dinorthis sp.	43B:38P:12A	1.13B:1.00P	0.28/1	10.39%
D.cf.berwynensis of Williams 1963	14B:14P	1.00B:1.00P	-	2.65%
Macrocoelia expansa	3P	3P	-	0.57%
Paracraniops sp.	13	-	-	2.46%
Obolids,gen.et sp.indet.	7	-	-	1.32%
Bivalves,gen.et sp.indet.	6	-	-	1.13%
Ptereineids	3	-	-	0.57%
Ambonychiaceans	3	-	-	0.57%
Nuculoids	4	-	-	0.76%
Broeggerolithus sp.	3.1	-	-	0.59%
Broeggerolithus sp. (Group 3-Dean 1960)	1.3	-	-	0.25%
Brongniartella minor	0.3	-	-	0.06%
Calymene sp.(s.l.)	0.5	-	-	0.09%
Kloucekia apiculata	0.7	-	-	0.13%

LOCALITY 235C continued

Parabasilicus powisi	0.1	-	-	0.02%
Thoracic segments (large)	0.3	-	-	0.06%
Lophospirids	89	-	-	16.81%
Bellerophontids	71	-	-	13.41%
Tallinnella sp.	5	-	-	0.94%
Quadrijugatorids	2	-	-	0.38%
Tentaculites sp.	10	-	-	1.89%
				100.02

Cyclocyclopa J	12
Cirrals	8
Ramose Bryozoan fragments	23
Lepidocoleus sp.	13

Genera Number	21	Diversity Index 7.70
Total Specimen Number	150	

Ichnofauna

Skolithid burrows	8

LOCALITY 236	GLANRAFON BEDS	APPROX. 600 METRES NORTH OF TY'N Y DDOL WEST OF BLAENAU DOLWYDDELAN		
Dalmanellids	62B:49P:9A	1.27B:1.00P	0.15/1	19.54%
Immature dalmanellids	13B:11P	1.18B:1.00P	-	3.58%
Dalmanella sp.	8B: 5P	1.60B:1.00P	-	2.20%
Howellites sp.	9B: 7P	1.29B:1.00P	-	2.48%
Sowerbyellids	15B:14P:4A	1.07B:1.00P	0.27/1	5.23%
Immature sowerbyellids	4B: 2P	2.00B:1.00P	-	1.10%
Dinorthis sp.	37B:30P:6A	1.23B:1.00P	0.16/1	11.83%
D.cf.berwynensis of Williams 1963	14B:11P	1.27B:1.00P	-	3.85%
Immature *Dinorthis* sp.	6B: 6P	1.00B:1.00P	-	1.65%
Kjaerina cf.*jonesi* of Bancroft 1929a	2P	2P	-	0.55%
K.cf.typa of Bancroft 1929a	1P	1P	-	0.28%
Kjaerina sp.	5B: 8P	1.00B:1.60P	-	2.20%
Horderleyella sp.	2B: 1P	2.00B:1.00P	-	0.55%
Reuschella sp.	3P	3P	-	0.83%
Triplesiaceid	1B	1B	-	0.28%
Macrocoelia expansa	2P	2P	-	0.55%
Strophomenids,gen.et sp.indet.	2P	2P	-	0.55%
Craniopsids	5	-	-	1.38%
Obolids,gen.et sp. indet.(in life position)	4	-	-	1.10%
Broeggerolithus sp.	3.7	-	-	1.02%

LOCALITY 236 continued

Broeggerolithus sp. (Group 3-Dean 1960)	0.5	-	-	0.14%
B.cf.nicholsoni of Dean 1962	0.1	-	-	0.03%
Calymene sp.(s.l.)	0.6	-	-	0.17%
Flexicalymene planimarginata	0.1	-	-	0.03%
Isotelinid fragments	1.3	-	-	0.36%
Brongniartella sp.(?)	0.1	-	-	0.03%
Proetids,gen.et sp. indet.	0.2	-	-	0.06%
Thoracic segments	1.7	-	-	0.47%
Pygidium,gen.et sp. indet.	0.1	-	-	0.03%
Nuculaceans	12	-	-	3.30%
Similodonta sp.(?)	1	-	-	0.28%
Modiomorphids (?)	2	-	-	0.55%
Gastropods,gen.et sp. indet.	38	-	-	10.46%
Bellerophontids	4	-	-	1.10%
Cyrtolites sp.	6	-	-	1.65%
Lesuerilla sp.	17	-	-	4.68%
cf.*Lophospira* sp.	7	-	-	1.93%
Tallinnella sp.	39	-	-	10.73%
Dilobella sp.	9	-	-	2.48%
Drepanellid	2	-	-	0.55%
Aechminid	1	-	-	0.28%
				100.06

LOCALITY 236 continued

Cyclocyclopa A	11	
Cyclocyclopa J	8	
Cirrals	24	
Ramose Bryozoan fragments	74	
Genera Number	29	Diversity Index 11.30
Total Specimen Number	100	

LOCALITY 237	GLANRAFON BEDS	APPROX. 600 METRES NORTH OF TY'N Y DDOL WEST OF BLAENAU DOLWYDDELAN		
Dalmanellids	47B:41P:9A	1.15B:1.00P	0.19/1	23.52%
Immature dalmanellids	15B:11P	1.36B:1.00P	-	6.30%
Dalmanella sp.	8B: 5P	1.60B:1.00P	-	3.36%
Howellites sp.	19B:17P:1A	1.12B:1.00P	0.05/1	8.40%
Sowerbyellids	34B:23P:4A	1.48B:1.00P	0.12/1	15.96%
Immature sowerbyellids	10B: 6P	1.67B:1.00P	-	4.22%
Dinorthis sp.	12B: 9P	1.33B:1.00P	-	5.04%
D.cf.berwynensis of Williams 1963	9B: 9P	1.00B:1.00P	-	3.78%
Immature *Dinorthis* sp.	5B: 4P	1.25B:1.00P	-	2.10%
Strophomenids,gen. et sp.indet.	2P	2P	-	0.84%
Craniopsids	6	-	-	2.52%
Broeggerolithus sp.	0.7	-	-	0.29%
Thoracic segments	0.4	-	-	0.17%
Tallinnella sp.	22	-	-	0.24%
Quadrijugatorids	13	-	-	5.46%
Ostracodes	8	-	-	3.36%
Gastropods,gen.et sp. indet.	9	-	-	3.78%
Bivalves,gen.et sp. indet.	4	-	-	1.68%
				100.00

Cyclocyclopa J	13
Ramose Bryozoan fragments	6

LOCALITY 237 continued

Genera Number	12	Diversity Index 5.04
Total Specimen Number	60	

LOCALITY 238	CARNEDDAU GROUP (GLANRAFON BEDS)		COED MAES-NENYDDION WEST OF BETWS-Y-COED	
Dalmanellids	73B:64P:31A	1.14B:1.00P	0.42/1	23.10%
Immature dalmanellids	3B: 3P	1.00B:1.00P	-	0.67%
Howellites sp.	7B: 1P	7.00B:1.00P	-	1.55%
cf.*H.antiquior* of Williams 1963	1P	1P	-	0.22%
Dalmanella sp.	1B	1B	-	0.22%
cf.*D.indica* of Bancroft 1945	1B	1B	-	0.22%
cf.*D.modica* of Williams 1963	1B	1B	-	0.22%
Onniella sp. (?)	1P	1P	-	0.22%
Kjaerina sp.	1P	1P	-	0.22%
Sowerbyellid	1B	1B	-	0.22%
Kiaromena sp. (?)	1P	1P	-	0.22%
Plaesiomys sp.(?)	1P	1P	-	0.22%
Rugose strophomenid, gen.et sp.indet.	1P	1P	-	0.22%
Broeggerolithus sp.	2.6	-	-	0.58%
*B.*sp.(Group 3-Dean 1960)	0.2	-	-	0.04%
Isotelinid,gen.et sp.indet.	0.1	-	-	0.02%
Thoracic segments	0.3	-	-	0.07%
Tallinnella sp.	286	-	-	63.53%
Tetradella sp.	16	-	-	3.55%
Primitia sp.	1	-	-	0.22%
Zygobolbid (?)	1	-	-	0.22%
Lesuerilla sp. (?)	1	-	-	0.22%

LOCALITY 238 continued

Bellerophontids	2	-	-	0.44%
Gastropods, gen. et sp. indet.	5	-	-	1.11%
Bivalve (?)	1	-	-	0.22%
Favosites sp.	1	-	-	0.22%
Tentaculites sp.	9	-	-	2.00%
				99.96

Cyclocyclopa A	4
Cyclocyclopa J_1	25
Pentagonocyclopa A	2
Pentagonocyclopa B	2
Pentagonocyclopa F	1
Pluricolumnals	3
Ramose Bryozoan fragments	5

Genera Number	21	Diversity Index	7.91
Total Specimen Number	100		

LOCALITY 239	CARNEDDAU GROUP (GLANRAFON BEDS)		COED MAES - NEWYDDION. WEST OF BETWS-Y-COED	
Dalmanellids	119B:98P:64A	1.21B:1.00P	0.54/1	72.88%
Immature dalmanellids	6B: 1P	6.00B:1.00P	-	2.39%
Howellites sp.	8B: 2P	4.00B:1.00P	-	3.19%
H.cf.antiquior of Williams 1963	3B: 1P	3.00B:1.00P	-	1.19%
H.cf.striata of Bancroft 1945	2B	2B	-	0.80%
Dalmanella sp.	7B: 2P	3.50B:1.00P	-	2.79%
Onniella sp.	7B: 3P	2.33B:1.00P	-	2.79%
Sowerbyellids	11B: 4P:6A	2.75B:1.00P	0.55/1	6.77%
Immature sowerbyellid	1B	1B	-	0.40%
Kjaerina sp.	1B: 2P	1.00B:2.00P	-	0.80%
K.cf.jonesi of Bancroft 1929a	1P	1P	-	0.40%
*K.*sp. (?)	1P	1P	-	0.40%
Plaesiomys sp. (?)	2B	2B	-	0.80%
Thoracic segment	0.1	-	-	0.04%
Ostracodes	2	-	-	0.80%
Sinuites sp. (?)	1	-	-	0.40%
Bellerophontacean	1	-	-	0.40%
Gastropods,gen.et sp.indet.	2	-	-	0.80%
Tentaculites sp.	5	-	-	1.99%
				100.03

LOCALITY 239 continued

Ramose Bryozoan fragments	2		
Genera Number	11	Diversity Index	4.58
Total Specimen Number	100		

LOCALITY 240	GLANRAFON BEDS		SOUTH WEST OF BETWS-Y-COED	
Paracraniops sp.	167	-	-	46.15%
Sowerbyellids	38B:25P:1A	1.52B:1.00P	0.03/1	10.78%
Dalmanellids	20B:16P:2A	1.25B:1.00P	0.10/1	6.08%
Immature dalmanellids	3B: 1P	3.00B:1.00P	-	0.55%
Dalmanella sp.	2B	2B	-	0.83%
Howellites sp.	6B: 1P	6.00B:1.00P	-	1.66%
Onniella sp.(?)	1B	1B	-	0.28%
Dinorthis sp.	18B:12P	1.50B:1.00P	-	4.97%
Horderlevella sp.	3B: 3P	1.00B:1.00P	-	0.83%
Triplesiaceids	7B: 2P	3.50B:1.00P	-	1.93%
Bicuspina sp.	1P	1P	-	0.28%
Leptaena sp.	3B: 5P	1.00B:1.66P	-	1.38%
Macrocoelia sp.	3P	3P	-	0.83%
Chonetoidea sp. of Spjeldnaes 1957	1B	1B	-	0.28%
Rafinesquina sp.	1P	1P	-	0.28%
Skenidioides sp.(?)	1P	1P	-	0.28%
cf.*Colaptomena* sp. of Mitchell 1977	1B	1B	-	0.28%
Obolid(in life position)	1	-	-	0.28%
Inarticulates,gen. et sp.indet.	2	-	-	0.55%
Broeggerolithus sp.	3.7	-	-	1.02%
B.sp.(Group 3 - Dean 1960)	0.2	-	-	0.06%
Brongniartella minor	0.1	-	-	0.03%
Calymene sp.(s.l.)	0.1	-	-	0.03%

LOCALITY 240 continued

Proetid librigenae	0.6	-	-	0.17%
Thoracic segments	2.2	-	-	0.61%
Ostracodes	3	-	-	0.83%
Tallinnella sp.	2	-	-	0.55%
Quadrijugatorid	1	-	-	0.28%
Zybobolbids	3	-	-	0.83%
Sigmoopsid (?)	1	-	-	0.28%
Gastropods, gen. et sp. indet.	7	-	-	1.93%
Lesuerilla sp.	26	-	-	7.18%
Cyrtolites sp.	9	-	-	2.49%
Lophospirid	1	-	-	0.28%
Ambonychiaceans	4	-	-	1.11%
Nuculaceans	7	-	-	1.93%
Ptereineid	1	-	-	0.28%
Corals	5	-	-	1.38%
Encrusting coral	1	-	-	0.28%
				100.05

Cyclocyclopa A	5
Cyclocyclopa A_1	11
Cyclocyclopa J	3
Pentagonopentastellatopa B	1
Cirrals	66
Pinnate$_1$	1
Echinoderm plates	3
Ramose Bryozoan fragments	29
Lepidocoleus sp.	34

LOCALITY 240 continued

Genera Number 33 Diversity Index 12.87

Total Specimen Number 100

LOCALITY 241	GLANRAFON BEDS	SOUTH WEST OF BETWS-Y-COED		
Paracraniops sp.	202	-	-	42.47%
Sowerbyellids	50B:30P:1A	1.66B:1.00P	0.02/1	10.72%
Dalmanellids	27B:21P:3A	1.29B:1.00P	0.11/1	6.31%
Dalmanella sp.	4B: 3P	1.33B:1.00P	-	0.84%
Howellites sp.	8B	8B	-	1.68%
Onniella sp.(?)	1P	1P	-	0.21%
Immature dalmanellids	2B	2B	-	0.42%
Dinorthis sp.	19B:15P:1A	1.27B:1.00P	0.05/1	4.21%
*D.*aff.*berwynensis* of Williams 1963	1B: 3P	1.00B:3.00P	-	0.63%
*D.*sp.(?)	1P	1P	-	0.21%
Immature *Dinorthis* sp.	1B: 2P	1.00B:2.00P	-	0.42%
Horderleyella sp.	4B: 8P	1.00B:2.00P	-	1.68%
*H.*sp.(?)	1P	1P	-	0.21%
Immature *Horderleyella* sp.	1B: 1P	1.00B:1.00P	-	0.21%
Triplesiaceids	8B: 2P	4.00B:1.00P	-	1.68%
Leptaena sp.	4B: 6P	1.00B:1.50P	-	1.26%
aff.*Chonetoidea* sp. of Spjeldnaes 1957	2B	2B	-	0.42%
Chonetoidea sp.(?)	3P	3P	-	0.63%
Immature *Chonetoidea* sp.	1P	1P	-	0.21%
Rhactorthis sp.(?)	2P	2P	-	0.42%
Macrocoelia sp.	2P	2P	-	0.42%
Rafinesquina sp.	2P	2P	-	0.42%
Strophomena sp.(?)	1P:1A	1P	1/1	0.42%

LOCALITY 241 continued

Skenidioides sp.(?)	1B	1B	-	0.21%
cf.*Colaptomena* sp. of Mitchell 1977	1B	1B	-	0.21%
cf. *Sampo* sp.	1P	1P	-	0.21%
Immature Harknessillid	1B	1B	-	0.21%
Schizocrania sp.(?)	1	-	-	0.21%
Obolid,gen.et sp. indet.	1	-	-	0.21%
Inarticulate (Obolid ?)	1	-	-	0.21%
Broeggerolithus sp.	4.8	-	-	1.01%
Broggerolithus sp. (Group 3-Dean 1960)	0.4	-	-	0.08%
Brongniartella minor	0.2	-	-	0.04%
Calymene sp.(s.l.)	0.2	-	-	0.04%
Decoroproteus sp.	0.1	-	-	0.02%
Proetid librigenae	0.4	-	-	0.02%
Pygidium,gen.et sp. indet.	0.1	-	-	0.02%
Thoracic segments	1.4	-	-	0.29%
Tallinnella sp.	3	-	-	0.63%
Quadrijugatorid	1	-	-	0.21%
Zygobolbids	10	-	-	2.10%
Sigmoopsid (*Sigmobolbina* sp.?)	1	-	-	0.21%
Ostracode	1	-	-	0.21%
Granulose ostracode	1	-	-	0.21%
Cyrtolites sp.	14	-	-	2.94%

LOCALITY 241 continued

Lesuerilla sp.	34	-	-	7.15%
Lophospirids	2	-	-	0.42%
Gastropod sp.A	5	-	-	1.05%
Gastropod sp.B	3	-	-	0.63%
Nuculaceans	2	-	-	0.42%
Nuculoids	4	-	-	0.84%
Ambonychiaceans	3	-	-	0.63%
Ptereineids	2	-	-	0.42%
Bivalve,gen.et sp. indet.	1	-	-	0.21%
Favosites sp.	1	-	-	0.21%
Corals	7	-	-	1.47%
Encrusting corals	2	-	-	0.42%
Tentaculites sp.	1	-	-	0.21%
				99.74

Cyclocyclopa A	6
Cyclocyclopa A_1	7
Cyclocyclopa J	3
Cyclotristellatopa A	1
Pentagonopentastellatopa B	2
Cirrals	91
Pinnate$_1$	5
Echinoderm plate	1
Ramose Bryozoan fragments	47
Lepidocoleus sp.	40

Genera Number	40	Diversity Index 14.91
Total Specimen Number	120	

LOCALITY 242	GLANRAFON BEDS		SOUTH WEST OF BETWS-Y-COED	
cf. *Pseudolingula spatula* of Williams 1974	3B	3B	-	3.79%
Paterula cf. *bohemica* of Williams 1974	5	-	-	6.32%
Monobolina sp.(?)	1	-	-	1.26%
Inarticulate, gen. et sp. indet.	1	-	-	1.26%
Parabasilicus powisi	1.0	-	-	1.26%
Isotelinid fragments	0.4	-	-	0.51%
Broeggerolithus sp.	0.1	-	-	0.13%
Trinucleids	0.6	-	-	0.76%
Tallinnella sp.	24	-	-	30.34%
Dilobella sp.(?)	1	-	-	1.26%
Ostracodes	5	-	-	6.32%
Gastropods, gen. et sp. indet.	7	-	-	8.85%
Nuculoids	11	-	-	13.91%
Ambonychiacean	1	-	-	1.26%
Bivalves, gen. et sp. indet.	13	-	-	16.43%
Orthoconic cephalopods	5	-	-	6.32%
				99.98

Genera Number 11 Diversity Index 5.79

Total Specimen Number 70

LOCALITY 243	LIMESTONE BETWEEN THE MIDDLE AND UPPER TUFFS OF THE LOWER CRAFNANT VOLCANIC FORMATION		PEN-Y-ALLT-UCHAF. NORTH WEST OF BETWS-Y-COED	
Skenidioides costatus	129B:68P:2A	1.90B:1.00P	0.02/1	26.57%
Nicolella actoniae obesa	59B:79P:20A	1.00B:1.34P	0.25/1	20.08%
Immature *Nicolella* sp.	1P	1P	-	0.20%
Leptestiina oepiki	12B:29P:8A	1.00B:2.42P	0.28/1	7.50%
Orthambonites cessata	11B:24P:3A	1.00B:2.18P	0.13/1	5.48%
Dalmanellids	7B: 5P:4A	1.40B:1.00P	0.57/1	2.23%
Immature dalmanellids	22P	22P	-	4.46%
Dalmanella sp.	3B: 1P	3.00B:1.00P	-	0.61%
cf.*Onniella* sp.	1P	1P	-	0.20%
Sericoidea sp.	21B: 8P	2.63B:1.00P	-	4.26%
Sericoidea sp.(aff. *Chonetoidea stoermeri* of Spjeldnaes 1957)	3B	3B	-	0.61%
Reuschella sp.	13B: 3P	4.33B:1.00P	-	2.64%
Protozyga cf. *diversa* of Williams 1962	2B:11P	1.00B:5.50P	-	2.23%
Rhactorthis crassa	10B:5P	2.00B:1.00P	-	2.03%
Rhactorthis sp.	5P	5P	-	1.01%
Sowerbyellids	1B: 1P:2A	1.00B:1.00P	2/1	0.61%
Cremnorthis parva	5B: 7P	1.00B:1.40P	-	1.42%
Dolerorthis sp.	5B: 2P:2A	2.50B:1.00P	0.40/1	1.42%
Platystrophia sp.	7B: 2P	3.50B:1.00P	-	1.42%
cf.*Orthis* sp.	3P	3P	-	0.61%
Mjoesina sp.	2P	2P	-	0.41%

LOCALITY 243 continued

Plaesiomys sp.	1P	1P	-	0.20%
Leptaenid	1P	1P	-	0.20%
cf.*Kjerulfina* sp.	1B: 1P	1.00B:1.00P	-	0.20%
cf.*Kiaromena* sp.	1P	1P	-	0.20%
Strophomenid,gen.et sp.indet.	1P	1P	-	0.20%
cf.*Lingulella* sp.	1	-	-	0.20%
cf.*Paracraniops* sp.	1	-	-	0.20%
Inarticulate,gen. et sp.indet.	1	-	-	0.20%
Calymene sp.(s.l.)	2.4	-	-	0.49%
Flexicalymene caractaci	0.7	-	-	0.14%
F.aff.*caractaci* of Whittington 1965	0.1	-	-	0.02%
F.sp.	0.1	-	-	0.02%
Calymenid pygidium cf. *Gravicalymene praecox* of Dean 1963a	0.1	-	-	0.02%
Calymenid librigenae	0.4	-	-	0.08%
Platylichas sp.	0.2	-	-	0.04%
Platylichas nodulosus	0.1	-	-	0.02%
Broeggerolithus sp.	0.1	-	-	0.02%
Brongniartella sp. librigenae	0.2	-	-	0.04%
Proetid librigenae	0.5	-	-	0.10%
Meraspid pygidium, gen.et sp.indet.	0.1	-	-	0.02%
Thoracic segments	3.1	-	-	0.63%
Hollinaceans	2	-	-	0.41%

LOCALITY 243 continued

Smooth ostracodes (Leperditellaceans)	2	-	-	0.41%
Favosites sp.	15	-	-	3.04%
Encrusting coral	19	-	-	3.85%
Tentaculites sp.	11	-	-	2.23%
T.scalaris	4	-	-	0.81%
				99.99

Cyclocyclopa A	31
Cyclocyclopa A_1	21
Cyclocyclopa E	8
Cyclocyclopa F	7
Cyclocyclopa J	4
Cyclocyclopa L	1
Cyclotristellatopa A	5
Cyclopentastellatopa A	7
Cyclopentastellatopa B	1
Cyclopentagonopa F	1
Cyclopentagonopa G	1
Pentagonocyclopa A	69
Pentagonocyclopa A pluricolumnals	2
Pentagonocyclopa B	19
Pentagonocyclopa B_1	1
Pentagonocyclopa F	2
Pentagonopentastellatopa E	1
Hexagonocyclopa A	1

LOCALITY 243 continued

Pluricolumnals	4
Cirrals	346
Pinnate$_1$	26
Pinnate$_2$	1
Crinoid plates	9
Echinoderm plates	65
cf. *Haplosphaeronis multifida* of Paul 1973	1
Diploporite cystoids	2
Diploporite cystoid plates	2
Coral fragments	62
Algal fragments	6
Ramose Bryozoan fragments	143
Circular Bryozoa	11
Lepidocoleus sp.	146

Genera Number	39	Diversity Index 14.24
Total Specimen Number	150	

LOCALITY 244	LIMESTONE BETWEEN THE MIDDLE AND UPPER TUFFS OF THE LOWER CRAFNANT VOLCANIC FORMATION		PEN-YR-ALLT-UCHAF NORTH WEST OF BETWS-Y-COED	
Skenidioides costatus	162B:104P:5A	1.56B:1.00P	0.03/1	25.83%
Immature *Skenidioides* sp.	33B: 17P	1.94B:1.00P	-	5.10%
Protozyga cf. *diversa* of Williams 1962	63B: 97P:1A	1.00B:1.54P	0.01/1	15.16%
Immature *Protozyga* sp.	1B: 5P	1.00B:5.00P	-	0.77%
Nicolella actoniae obesa	20B:34P:14A	1.00B:1.70P	0.41/1	7.42%
Immature *Nicolella* sp.	1B	1B	-	0.15%
Cremnorthis parva	26B: 38P:5A	1.00B:1.46P	0.13/1	6.65%
Immature *Cremnorthis* sp.	3B: 1P	3.00B:1.00P	-	0.46%
Sericoidea sp.	42B:31P	1.35B:1.00P	-	6.50%
Sericoidea sp.(aff. *Chonetoidea stormeri* of Spjeldnaes 1957)	6B	6B	-	0.93%
Sericoidea sp.(aff. *Chonetoidea gamma* of Spjeldnaes 1957)	2B	2B	-	0.31%
Orthambonites cessata	19B: 24P:3A	1.00B:1.26P	0.13/1	4.18%
Orthambonites sp. nov.	2P	2P	-	0.31%
Immature *Orthambonites* sp.	3P	3P	-	0.46%
Dalmanellids	28B: 20P:1A	1.40B:1.00P	0.04/1	4.49%
Immature dalmanellids	3B: 10P	1.00B:3.33P	-	1.55%
Dalmanella sp.	1B	1B	-	0.15%
cf.*Onniella* sp.	1P	1P	-	0.15%

LOCALITY 244 continued

Leptestiina oepiki	8B: 13P:6A	1.00B:1.63P	0.46/1	2.94%
cf. Rhactorthis crassa of Williams 1963	1B: 6P	1.00B:6.00P	-	0.93%
Platystrophia sp.	4B: 1P	4.00B:1.00P	-	0.62%
cf. Tyronella sp. of Mitchell 1977	4B	4B	-	0.62%
cf. Orthis sp.	2P	2P	-	0.31%
cf. Scaporthis sp.	1B	1B	-	0.15%
Reuschella sp.	1B	1B	-	0.15%
Rostricellula sp.	1B: 1P	1.00B:1.00P	-	0.15%
cf. Kiaromena sp.	1P	1P	-	0.15%
Plaesiomyid	1P	1P	-	0.15%
cf. Dolerorthis sp.	1B: 1P	1.00B:1.00P	-	0.15%
Paracranions sp.	27	-	-	4.18%
Calymene sp.(s.l.)	10.9	-	-	1.69%
Flexicalymene caractaci	0.9	-	-	0.14%
Calymenid pygidia cf. Flexicalymene caractaci of Whittington 1965	1.3	-	-	0.20%
Flexicalymene sp.	0.5	-	-	0.08%
Flexicalymene sp.A	0.7	-	-	0.11%
Calymenid(aff. Gravicalymene praecox of Dean 1963a)	0.1	-	-	0.20%
Calymenid pygidia(cf. Gravicalymene sp. of Dean 1963a)	0.2	-	-	0.30%
Calymenid librigenae	4.7	-	-	0.73%
Platylichas nodulosus	0.1	-	-	0.02%

LOCALITY 244 continued

*P.*aff.*nodulosus* of Whittington 1962	0.1	-	-	0.02%
Platylichas sp.	0.9	-	-	0.14%
Platylichas sp. hypostome	0.1	-	-	0.02%
Lichid pygidium, gen. et sp.indet.	0.1	-	-	0.02%
Phacopid librigena	0.1	-	-	0.02%
Phacopid pygidia(?)	0.2	-	-	0.03%
Pygidium cf. *Estoniops* sp.	0.2	-	-	0.03%
cf.*Brongniartella bisulcata* of Dean 1961	0.1	-	-	0.02%
Brongniartella sp. thoracic segment	0.1	-	-	0.02%
Pygidium cf. *Pseudosphaerexochus* sp.of Dean 1961 and Whittington 1965	0.1	-	-	0.02%
Odontopleurid librigena	0.1	-	-	0.02%
Primaspis sp.	0.1	-	-	0.02%
Thoracic segments	6.9	-	-	1.07%
Hollinaceans (*Tallinnella* sp.)	2	-	-	0.31%
Ostracode	1	-	-	0.15%
Favosites sp.	1	-	-	0.15%
Encrusting coral	8	-	-	1.24%
Tentaculites scalaris	6	-	-	0.93%
Tentaculites sp.	3	-	-	0.46%
				100.02

LOCALITY 244 continued

Cyclocyclopa A	36
Cyclocyclopa A_1	3
Cyclocyclopa C	5
Cyclocyclopa E	8
Cyclocyclopa F	32
Cyclocyclopa F pluricolumnals	3
Cyclocyclopa J	2
Cyclocyclopa N	3
Cyclopentagonopa C	1
Cyclotristellatopa A	1
Cyclopentastellatopa A	14
Cyclopentastellatopa B	4
Cyclopentastellatopa C	3
Cyclopentastellatopa D	4
Pentagonocyclopa A	20
Pentagonocyclopa A pluricolumnal	1
Pentagonocyclopa B	10
Pentagonopentastellatopa E	2
Cirrals	501
Pinnate$_1$	7
Pluricolumnals	20
Crinoid plates	21
Echinoderm plates	209
cf. *Haplosphaeronis multifida* of Paul 1973	7
Cystoids, gen. et sp. indet.	4
Diploporite plates	71

LOCALITY 244 continued

Coral fragments	71
Ramose Bryozoan fragments	25
Encrusting Bryozoan	1
Lepidocoleus sp.	169

Genera Number	41	Diversity Index 14.47
Total Specimen Number	200	

LOCALITY 245	LIMESTONE BETWEEN THE LOWER AND MIDDLE TUFFS OF THE LOWER CRAFNANT VOLCANIC FORMATION		SOUTH OF CRAIG FORRIS WEST OF BETWS-Y-COED	
Sowerbyellids	36B:21P:13A	1.71B:1.00P	0.36/1	7.26%
Immature sowerbyellids	6B: 4P	1.50B:1.00P	-	0.89%
Dalmanellids	18B:14P:14A	1.29B:1.00P	0.78/1	4.74%
Immature dalmanellids	3B: 1P	3.00B:1.00P	-	0.44%
Howellites sp.	3B	3B	-	0.44%
Onniella sp. (?)	2P:1A	2P	0.50/1	0.44%
Bancroftina sp. (?)	1B	1B	-	0.15%
Skenidioides costatus	20B:14P	1.43B:1.00P	-	2.96%
Nicolella sp.	5B: 5P	1.00B:1.00P	-	0.74%
N.cf.*actoniae obesa* of Williams 1963	2P	2P	-	0.30%
Platystrophia sp.	3B: 4P	1.00B:1.33P	-	0.59%
Sericoidea sp.	3B: 1P	3.00B:1.00P	-	0.44%
S.cf. *abdita* of Williams 1955	4B	4B	-	0.59%
S.cf.*restricta* of Williams 1962	1B: 1P	1.00B:1.00P	-	0.15%
Sericoidea sp.(cf. *Chonetoidea stoermeri* of Spjeldnaes 1957)	1B	1B	-	0.15%
cf.*Chonetoidea radiatula* of Mitchell 1977	1B	1B	-	0.15%
Glyptorthis cf. *concinnula* of Mitchell 1977	2P	2P	-	0.30%
Orthambonites sp.	2P	2P	-	0.30%

LOCALITY 245 continued

Immature *Orthambonites* sp.(?)	1P	1P	-	0.15%
Reuschella horderleyensis	1B	1B	-	0.15%
cf.*Tyronella* sp. of Mitchell 1977	1P	1P	-	0.15%
Leptestiina oepiki (?)	1B	1B	-	0.15%
Orbiculoidea sp.	1	-	-	0.15%
Inarticulates,gen. et sp.indet.	4	-	-	0.59%
Calymene sp.(s.l.)	2.1	-	-	0.31%
Calymene sp. librigena	0.1	-	-	0.01%
Flexicalymene caractaci	0.1	-	-	0.01%
cf.*F.caractaci* of Whittington 1965	0.1	-	-	0.01%
cf.*F.planimarginata* of Whittington 1965	0.2	-	-	0.03%
cf.*Gravicalymene praecox* of Dean 1963a	0.2	-	-	0.03%
Broeggerolithus sp.	1.7	-	-	0.25%
*B.*sp.(Group 3-Dean 1960)	0.2	-	-	0.03%
*B.*cf.*nicholsoni* of Dean 1962	0.1	-	-	0.01%
Isotelinids,gen.et sp.indet.	0.2	-	-	0.03%
Platylichas sp.	0.2	-	-	0.03%
Kloucekia apiculata	0.1	-	-	0.01%
Brongniartella sp.(?)	0.1	-	-	0.01%
Thoracic segments	0.2	-	-	0.03%

LOCALITY 245 continued

Tallinnella sp.	378	-	-	56.03%
Quadrijugatorids	57	-	-	8.45%
Hollinaceans	21	-	-	3.11%
Dilobella sp.	1	-	-	0.15%
Sigmoopsid (?)	1	-	-	0.15%
Smooth ostracodes	17	-	-	2.52%
Tentaculites sp.	35	-	-	5.19%
T.ornatus	8	-	-	1.19%
				99.96

Cyclocyclopa A	8
Cyclocyclopa A_1	4
Cyclocyclopa B	2
Cyclocyclopa J	17
Cyclocyclopa J_1	5
Pentagonocyclopa A	49
Pentagonocyclopa A pluricolumnals	10
Pentagonocyclopa F	3
Pluricolumnals	2
$Pinnate_2$	3
Cirrals	18
Ramose bryozoan fragments	4
Circular bryozoa	2
Sheet-like encrusting bryozoan	1
Cyclocystoides sp. (three pored plates)	7
Lepidocoleus sp.	28

LOCALITY 245 continued

Genera Number	35	Diversity Index	12.34
Total Specimen Number	120		

LOCALITY 246 — LIMESTONE BETWEEN THE LOWER AND MIDDLE TUFFS OF THE LOWER CRAFNANT VOLCANIC FORMATION — SOUTH WEST OF BETWS-Y-COED

Skenidioides costatus	73B:51P:3A	1.43B:1.00P	0.04/1	19.37%
Nicolella actoniae obesa	36B:49P:14A	1.00B:1.36P	0.29/1	16.06%
Immature Nicolella sp.	1B: 4P	1.00B:4.00P	-	1.02%
Reuschella sp.	30B:25P:6A	1.20B:1.00P	0.20/1	9.18%
R.cf.horderleyensis of Williams 1963	2P	2P	-	0.51%
Sericoidea sp.	23B:19P:5A	1.21B:1.00P	0.22/1	7.14%
Sericoidea sp. (Chonetoidea cf. alpha of Spjeldnaes 1957)	1B	1B	-	0.25%
Immature Sericoidea sp.	2B: 1P	2.00B:1.00P	-	0.51%
Dalmanellids	19B:15P:2A	1.26B:1.00P	0.11/1	5.35%
Immature dalmanellids	5B: 4P	1.25B:1.00P	-	1.27%
Dalmanella sp.	2B	2B	-	0.51%
Howellites sp.	1B: 1P	1.00B:1.00P	-	0.25%
Orthambonites cessata	6B:17P:1A	1.00B:2.83P	0.06/1	4.59%
Dolerorthis sp.	15B:14P	1.07B:1.00P	-	3.82%
Triplesiaceids	12B:10P:2A	1.20B:1.00P	0.16/1	3.57%
Bicuspina cf. spiriferoides of Williams 1963	5P	5P	-	1.27%
Leptestiina oepiki	5B: 9P:2A	1.00B:1.80P	0.22/1	2.80%
Protozyga cf. diversa of Williams 1962	4B: 9P	1.00B:2.25P	-	2.29%

LOCALITY 246 continued

Sowerbyellids	6B: 4P	1.50B:1.00P	-	1.53%
Cremnorthis parva	4B: 3P	1.33B:1.00P	-	1.02%
Rhactorthis crassa	2B: 4P	1.00B:2.00P	-	1.02%
Craniopsids	4	-	-	1.02%
Rugose strophomenids	3P	3P	-	0.76%
Leptaena sp.	2P	2P	-	0.51%
cf.*Tyronella* sp. of Mitchell 1977	2B	2B	-	0.51%
Calymene sp.(s.l.)	5.3	-	-	1.35%
Flexicalymene aff. *caractaci* of Whittington 1965	0.2	-	-	0.08%
Flexicalymene sp.	0.4	-	-	0.10%
Flexicalymene sp.A	0.2	-	-	0.05%
Calymenid librigenae	1.7	-	-	0.43%
Broeggerolithus sp.	1.1	-	-	0.28%
Broeggerolithus sp. (Group 3-Dean 1960)	0.4	-	-	0.10%
Platylichas nodulosus	0.1	-	-	0.03%
Platylichas sp.	0.4	-	-	0.10%
Brongniartella sp.	0.1	-	-	0.03%
B.cf.*bisulcata* of Dean 1961	0.1	-	-	0.03%
Proetids	0.3	-	-	0.08%
Thoracic segments	1.9	-	-	0.48%
Ostracodes	5	-	-	1.27%
Quadrijugatorids (?)	2	-	-	0.51%
Gastropods,gen.et sp.indet.	2	-	-	0.51%
Encrusting coral	2	-	-	0.51%

LOCALITY 246 continued

Tentaculites sp.	31	-	-	7.90%
				99.97

Cyclocyclopa A	26
Cyclocyclopa A_1	8
Cyclocyclopa E	4
Cyclocyclopa F	7
Cyclocyclopa J	10
Cyclocyclopa K	12
Cyclopentastellatopa A	5
Cyclopentastellatopa B	1
Pentagonocyclopa A	39
Pentagonocyclopa A pluricolumnals	2
Pentagonocyclopa B	7
Pluricolumnals	6
Cirrals	255
$Pinnate_1$	13
$Pinnate_2$	3
Crinoid plates	20
cf. *Haplosphaeronis multifida* of Paul 1973	2
Diploporite plates	20
Ramose Bryozoan fragments	151
Circular Bryozoa	5
Coral fragments	13

LOCALITY 246 continued

Lepidocoleus sp.	205

Genera Number	31	Diversity Index 11.79
Total Specimen Number	150	

LOCALITY 247	LIMESTONE BETWEEN THE LOWER AND MIDDLE TUFFS OF THE LOWER CRAFNANT VOLCANIC FORMATION		DOL GAM, WEST OF BETWS-Y-COED	
Sericoidea sp.	47B:43P:10A	1.09B:1.00P	0.21/1	14.93%
Sericoidea sp. (cf. *Chonetoidea alpha* of Spjeldnaes 1957)	3B	3B	-	0.79%
Immature *Sericoidea* sp.	3P	3P	-	0.79%
Dalmanellids	26B:37P:6A	1.00B:1.42P	0.16/1	11.26%
Immature dalmanellids	1B: 6P	1.00B:6.00P	-	1.57%
Dalmanella sp.	3B: 1P	3.00B:1.00P	-	0.79%
Howellites sp.	2B: 1P	2.00B:1.00P	-	0.52%
Skenidioides costatus	44B:25P	1.76B:1.00P	-	11.52%
Immature *Skenidioides* sp.	3B: 3P	1.00B:1.00P	-	0.79%
Sowerbyellids	24B:31P:6A	1.00B:1.29P	0.19/1	9.69%
Reuschella sp.	28B:20P:2A	1.40B:1.00P	0.07/1	7.86%
R. cf. *horderleyensis* of Williams 1963	1P	1P	-	0.26%
R. cf. *horderleyensis undulata* of Williams 1963	1B	1B	-	0.26%
Orthambonites cessata	3B:11P	1.00B:3.66P	-	2.88%
Nicolella actoniae obesa	9B: 4P:3A	2.25B:1.00P	0.33/1	3.14%
Immature *Nicolella* sp.	2P	2P	-	0.52%
Dolerorthis sp.	7B: 3P	2.33B:1.00P	-	1.83%
Dolerorthid	1B	1B	-	0.26%
Protozva cf. *diversa* of Williams 1962	2B: 8P	1.00B:4.00P	-	2.09%

LOCALITY 247 continued

Leptestiina oepiki	2B: 4P	1.00B:2.00P	-	1.05%
Cremnorthis parva	1B: 2P:1A	1.00B:2.00P	0.50/1	0.79%
Leptaena sp.	2P	2P	-	0.52%
Rhactorthis sp.	1B	1B	-	0.26%
Diplonorthis sp.(?)	1P	1P	-	0.26%
cf.*Tyronella* sp. of Mitchell 1977	1B	1B	-	0.26%
Rugose strophomenid	1P	1P	-	0.26%
Craniopsids(?)	3	-	-	0.79%
Calymene sp.(s.l.)	10.0	-	-	2.62%
Flexicalymene aff. *caractaci* of Whittington 1965	0.6	-	-	0.16%
Flexicalymene sp.	0.7	-	-	0.18%
Flexicalymene sp.A	0.3	-	-	0.08%
Calymene sp.librigenae	2.2	-	-	0.58%
Broeggerolithus sp.	3.3	-	-	0.86%
Broeggerolithus sp. (Group 3-Dean 1960)	0.3	-	-	0.08%
Platylichas nodulosus	0.3	-	-	0.08%
Platylichas sp.	0.5	-	-	0.13%
Brongniartella sp.	0.1	-	-	0.03%
Ceraurinella cf. *intermedia* of Whittington 1965	0.1	-	-	0.03%
Proetid pygidium	0.1	-	-	0.03%
Meraspid trilobite, gen.et sp.indet.	0.1	-	-	0.03%
Thoracic segments	3.3	-	-	0.86%

LOCALITY 247 continued

Ostracodes (?)	2	-	-	0.52%
Gastropods, gen. et sp. indet.	3	-	-	0.79%
Encrusting coral	1	-	-	0.26%
Tentaculites sp.	64	-	-	16.76%
				100.20

Cyclocyclopa A	30
Cyclocyclopa A_1	19
Cyclocyclopa E	1
Cyclocyclopa F	1
Cyclocyclopa J	13
Cyclocyclopa K	20
Cyclocyclopa K pluricolumnal	1
Cyclopentagonopa C	1
Cyclopentastellatopa A	2
Cyclopentastellatopa B	1
Pentagonocyclopa A	41
Pentagonocyclopa A pluricolumnals	2
Pentagonocyclopa B	1
Pentagonocyclopa C	1
Balacrinus sp. plates	44
Pluricolumnals	11
Cirrals	192
$Pinnate_1$	15
$Pinnate_2$	1

LOCALITY 247 continued

Cystoid pore rhombs	9
Ramose Bryozoan fragments	236
Circular bryozoa	4
Encrusting bryozoa	2
Coral fragments	8
Lepidocoleus sp.plates	249

Genera Number	35	Diversity Index 13.26
Total Specimen Number	150	

LOCALITY 251	BASE OF THE STRATIFIED FACIES OF THE TRANSITION GROUP (BEAVON 1960) (TRANSITION GROUP = LLYN DINAS BRECCIAS - BEAVON 1963)			HAFODYDD-BRITHION NORTH EAST OF BEDDGELERT
Dalmanellids	61B:34P:32A	1.79B:1.00P	0.52/1	60.27%
Immature dalmanellids	1B: 3P	1.00B:3.00P	-	1.94%
Howellites sp.	14B: 5P	1.80B:1.00P	-	9.07%
H.cf.antiquior of Williams 1963	1B: 2P	1.00B:2.00P	-	1.30%
Dalmanella sp.	1B	1B	-	0.65%
Bancroftina sp.	1B	1B	-	0.65%
Sowerbyellids	2B	2B	-	1.30%
Sericoidea sp.	1B	1B	-	0.65%
Paracraniops sp.	2	-	-	1.30%
Craniopsids	2	-	-	1.30%
cf.*Palaeoglossa* sp. of Williams 1974	3	-	-	1.94%
Brachiopod,gen.et sp.indet.	1B	1B	-	0.65%
Broeggerolithus sp.	0.8	-	-	0.52%
*B.*sp.(Group 3 - Dean 1960)	0.1	-	-	0.06%
*B.*sp.(with long genal spine - cf.*B. nicholsoni* of Dean 1962)	0.8	-	-	0.52%
B.cf.nicholsoni of Dean 1962	0.1	-	-	0.06%
Kloucekia sp.	0.2	-	-	0.13%
K.apiculata	0.7	-	-	0.45%
Immature *Kloucekia* sp.	0.2	-	-	0.13%
Thoracic segments	0.3	-	-	0.19%

LOCALITY 251 continued

Thoracic segment(large)	0.1	-	-	0.06%
Ostracodes	3	-	-	1.94%
Quadrijugatorids	2	-	-	1.30%
Tallinnella sp.	6	-	-	3.89%
Bivalves, gen. et sp. indet.	3	-	-	1.94%
Nuculoids	3	-	-	1.94%
Similodonta sp.	4	-	-	2.59%
Gastropod, gen. et sp. indet.	1	-	-	0.65%
Tentaculites sp.	3	-	-	1.94%
T. scalaris	1	-	-	0.65%
				99.98

Ramose Bryozoan fragments	4
Circular Bryozoan	1
Encrusting Bryozoa	2

Genera Number	18	Diversity Index 8.18
Total Specimen Number	150	

LOCALITY 251A	BASE OF THE STRATIFIED FACIES OF THE TRANSITION GROUP (BEAVON 1960) (TRANSITION GROUP = LLYN DINAS BRECCIAS BEAVON 1963)		HAFODYDDBRITHION NORTH EAST OF BEDDGELERT	
Dalmanellids	53B:39P:21A	1.36B:1.00P	0.40/1	61.67%
Immature dalmanellids	2B	2B	-	1.67%
Howellites sp.	9B: 4P	2.25B:1.00P	-	7.50%
H.cf.antiquior of Williams 1963	1B	1B	-	0.83%
Dalmanella sp.	2B: 1P	2.00B:1.00P	-	1.67%
Sowerbyellid	1B: 1P	1.00B:1.00P	-	0.83%
Paracraniops sp.	3	-	-	2.50%
Craniopsid	1	-	-	0.83%
cf.*Palaeoglossa* sp. of Williams 1974	2	-	-	1.67%
Broeggerolithus sp.	0.5	-	-	0.42%
*B.*sp.(Group 3-Dean 1960)	0.2	-	-	0.17%
*B.*sp.(with long genal spines-cf.*B.nicholsoni* of Dean 1962)	0.3	-	-	0.25%
Kloucekia sp.	0.3	-	-	0.25%
K.apiculata	0.4	-	-	0.33%
Thoracic segments	0.3	-	-	0.25%
Ostracode	1	-	-	0.83%
Quadrijugatorids	2	-	-	1.67%
Tallinnella sp.	4	-	-	3.33%
Bivalves,gen.et sp.indet.	2	-	-	1.67%
Nuculoids	5	-	-	4.17%

LOCALITY 251A continued

Similodonta sp.	2	-	-	1.67%
Gastropods, gen. et sp. indet.	2	-	-	1.67%
Tentaculites sp.	5	-	-	4.17%
				100.02

Ramose Bryozoan fragments	2
Circular Bryozoa	2

Genera Number	13	Diversity Index 6.22
Total Specimen Number	100	

LOCALITY 252	UPPER GRIT (GORLLWYN GRIT)	HAFODYDDBRITHION NORTH EAST OF BEDDGELERT		
Dalmanellids	67B:42P:12A	1.60B:1.00P	0.18/1	30.80%
Immature dalmanellids	10B: 7P	1.43B:1.00P	-	3.90%
Dalmanella sp.	3B	3B	-	1.17%
D.cf.lepta of Bancroft 1945	2B: 1P	2.00B:1.00P	-	0.78%
Howellites sp.	7B: 1P	7.00B:1.00P	-	2.73%
H.cf.striata of Williams 1963	1B	1B	-	0.39%
Bancroftina sp.(?)	1B	1B	-	0.39%
Kjaerina sp.	3B:27P	1.00B:9.00P	-	10.53%
K.aff.jonesi of Bancroft 1929a	6P	6P	-	2.34%
K.sp.(?)	5P	5P	-	1.95%
Rostricellula sparsa	6B:3P	2.00B:1.00P	-	2.34%
cf.*Horderleyella* sp.	5P	5P	-	1.95%
cf.*Rafinesquina* sp.	4P	4P	-	1.56%
Craniopsids (*Paracranions* sp.?)	34	-	-	13.26%
Macrocoelia sp.	5B:29P	1.00B:5.80P	-	11.31%
M.cf.expansa of Williams 1963	6P	6P	-	2.34%
Dinorthis sp.	1B	1B	-	0.39%
Broeggerolithus sp.	1.5	-	-	0.58%
B.sp.(Group 2?- Dean 1960)	0.2	-	-	0.08%
Isotelinid pygidium	0.1	-	-	0.04%
Isotelinid thoracic segment	0.1	-	-	0.04%

LOCALITY 252 continued

Isotelinid librigenae	0.2	-	-	0.08%
Immature *Illaenus* sp. pygidium	0.1	-	-	0.04%
Thoracic segments	0.2	-	-	0.08%
Quadrijugatorids	2	-	-	0.78%
Tallinnella sp.	8	-	-	3.12%
Bellerophontids	4	-	-	1.56%
Cyrtolites sp.	2	-	-	0.78%
Lophospirids ?	3	-	-	1.17%
Gastropods, gen. et sp. indet.	2	-	-	0.78%
Orthoceras sp.	5	-	-	1.95%
Bivalve, gen. et sp. indet.	1	-	-	0.39%
Tentaculites sp.	1	-	-	0.39%
				100.03

Cyclocyclopa A	39
Cyclocyclopa A_1	18
Cyclocyclopa G	42
Cyclocyclopa G_1	15
Cyclocyclopa H	3
Cyclopentagonopa A	7
Cyclopentagonopa B	1
Cirrals	24
Pinnate$_1$	3
Pluricolumnal	1
Ramose Bryozoan fragments	2
Circular Bryozoa	4

LOCALITY 252 continued

Genera Number	22	Diversity Index 9.08
Total Specimen Number	200	

LOCALITY 252A	UPPER GRIT (GORLLWYN GRIT)	HAFODYDDBRITHION NORTH EAST BEDDGELERT		
Dalmanellids	49B:27P:5A	1.81B:1.00P	0.10/1	31.32%
Immature dalmanellids	4B: 1P	4.00B:1.00P	-	2.32%
Dalmanella sp.	1B: 1P	1.00B:1.00P	-	0.58%
Howellites sp.	4B: 2P	2.00B:1.00P	-	2.32%
H.cf.striata of Williams 1963	2B	2B	-	1.16%
Macrocoelia sp.	2B:19B	1.00B:9.50P	-	11.02%
M.cf.expansa of Williams 1963	8P	8P	-	4.64%
Kjaerina sp.	2B:21P	1.00B:10.50P	-	12.18%
K.aff.jonesi of Bancroft 1929a	2P	2P	-	1.16%
Rostricellula sparsa	9B: 6P	1.50B:1.00P	-	5.22%
Horderleyella sp.	3B: 2P	1.50B:1.00P	-	1.74%
cf.*Rafinesquina* sp.	1P	1P	-	0.58%
Craniopsids (*Paracraniops* sp.)	22	-	-	12.76%
Broeggerolithus sp.	0.9	-	-	0.52%
B.sp.(Group 2?- Dean 1960)	0.1	-	-	0.06%
Isotelinid thoracic segments	0.3	-	-	0.17%
Thoracic segment	0.1	-	-	0.06%
Quadrijugatorid	1	-	-	0.58%
*Tallinnella*sp.	6	-	-	3.48%
Gastropod,gen.et sp.indet.	1	-	-	0.58%
Bellerophontid	1	-	-	0.58%

LOCALITY 252A

Cyrtolites sp.	4	-	-	2.32%
Lophospirids (?)	5	-	-	2.90%
Orthoceras sp.	1	-	-	0.58%
Tentaculites sp.	2	-	-	1.16%
				99.99

Cyclocyclopa A	28
Cyclocyclopa A_1	5
Cyclocyclopa G	53
Cyclocyclopa G_1	12
Cyclocyclopa H	1
Cyclopentagonopa A	4
Cirrals	15
Pinnate$_1$	6
Ramose Bryozoan fragment	1
Circular Bryozoan	1

Genera Number	18	Diversity Index	8.02
Total Specimen Number	100		

LOCALITY 255 GORLLWYN SLATE EAST OF MOEL HEBOG

Sowerbyellids	23B:17P:5A	1.35B:1.00P	0.22/1	57.03%
Dalmanellids	4B: 3P	1.33B:1.00P	-	8.15%
Onniella sp.	1B: 2P	1.00B:2.00P	-	4.07%
Howellites sp.(?)	1B	1B	-	2.04%
Kjaerina sp.(?)	2P	2P	-	4.07%
Horderleyella sp.(?)	1B	1B	-	2.04%
Orthids,gen.et sp. indet.	2B	2B	-	4.07%
Broeggerolithus sp.	1.3	-	-	2.65%
*B.*cf.*broeggeri* of Dean 1960	0.1	-	-	0.20%
*B.*sp.(Group 2-Dean 1960)	0.3	-	-	0.61%
Parabasilicus powisi	0.3	-	-	0.61%
Isotelinid librigenae	0.2	-	-	0.41%
Isotelinid thoracic segments	0.7	-	-	1.43%
Calymene sp.(s.l.)	0.3	-	-	0.61%
Flexicalymene sp.	0.1	-	-	0.20%
Thoracic segments	0.8	-	-	1.63%
Gastropods,gen.et sp.indet.	2	-	-	4.07%
Tentaculites sp.	3	-	-	6.11%
				100.00

Cyclocyclopa A	5
Cyclocyclopa A_1	2
Cyclocyclopa J	7
Cyclocyclopa J_1	5
Cyclocyclopa L	2

LOCALITY 255 continued

Cyclopentagonopa C	1
Cyclopentagonopa D	4
Pentagonocyclopa A	1
Pentagonocyclopa B	2
Pentagonopentagonopa A	2
Pentagonopentagonopa D	1
Pluricolumnals	3
$Pinnate_1$	6
$Pinnate_2$	1
Echinoderm plates	2
Ramose Bryozoan fragments	6

Genera Number	12	Diversity Index 7.02
Total Specimen Number	60	

LOCALITY 256	GORLLWYN SLATE	WEST OF PONT CERIG RHWYDWR. SOUTH EAST OF MOEL HEBOG		
Sowerbyellids	10B:7P:2A	1.43B:1.00P	0.20/1	66.30%
Dalmanellids	2B:1P	2.00B:1.00P	-	11.05%
Craniopsid	1	-	-	5.52%
Broeggerolithus sp.	0.7	-	-	3.87%
Trinucleids	0.3	-	-	1.66%
Calymene sp.(s.l.)	0.2	-	-	1.10%
Parabasilicus sp.	0.1	-	-	0.55%
Isotelinid librigenae	0.3	-	-	1.66%
Brongniartella sp.(?)	0.2	-	-	1.10%
Thoracic segments	0.3	-	-	1.66%
Tentaculites sp.	1	-	-	5.52%
				99.99

Cyclocyclopa A	4
Cyclocyclopa A_1	1
Cyclocyclopa J	5
Cyclocyclopa J_1	3
Cyclopentagonopa C	2
Pentagonopentagonopa A	1
Cirrals	7
Pinnate$_1$	2
Pluricolumnal	1
Ramose Bryozoan fragments	6
Genera Number	10
Total Specimen Number	50

Diversity Index 7.67

LOCALITY LCYM	GLANRAFON BEDS	LLYNAU CERRIG Y MYLLT EAST OF BEDDGELERT		
Sowerbyellids	17B:3P:5A	5.67B:1.00P	0.29/1	23.18%
Bicuspina spiriferoides	8B:14P:1A	1.00B:1.75P	0.07/1	15.81%
Triplesiaceids	15B:10P	1.50B:1.00P	-	15.81%
Rafinesquina sp.	4B:10P	1.00B:2.50P	-	10.54%
Macrocoelia cf. *expansa* of Williams 1963	2P	2P	-	2.11%
Dinorthis sp.	6B:7P:1A	1.00B:1.17P	0.14/1	8.43%
D.berwynensis	2P	2P	-	2.11%
Dalmanellids	1A	-	-	1.05%
Immature dalmanellids	1B:1P	1.00B:1.00P	-	1.05%
Dalmanella sp.	1P	1P	-	1.05%
Leptaena sp.	1B	1B	-	1.05%
Strophomenid,gen.et sp.indet.	1P	1P	-	1.05%
Lingulella sp.	1	-	-	1.05%
Craniopsid (*Lingulamholis* sp.?)	1	-	-	1.05%
Inarticulate,gen.et sp.indet.	1	-	-	1.05%
Broeggerolithus sp.	0.4	-	-	0.42%
Kloucekia sp.librigena	0.1	-	-	0.11%
Proetid librigena	0.1	-	-	0.11%
Thoracic segments	0.3	-	-	0.32%
Hollinaceans	5	-	-	5.27%
Tallinnella sp.	4	-	-	4.21%
Sigmobolbina sp.(?)	1	-	-	1.05%

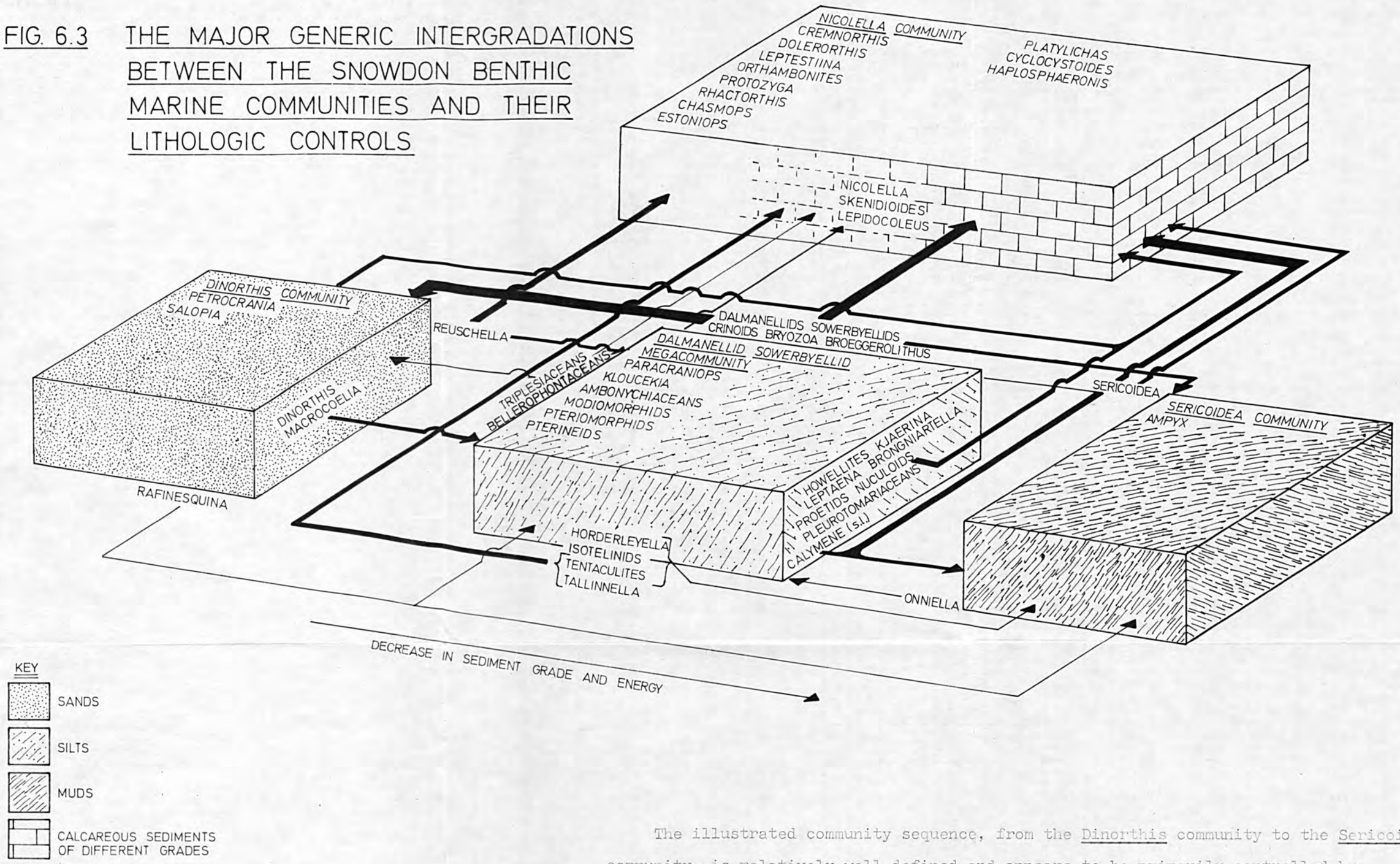
LOCALITY LCYM continued

Coral	1	-	-	1.05%
				99.98

Cyclocyclopa A	17
Cyclocyclopa A_1	4
Cyclocyclopa G	1
Cyclopentagonopa A	12
Cyclopentagonopa C	13
Pentagonocyclopa A	2
Pentagonocyclopa B	2
Cirrals	25
$Pinnate_1$	5
$Pinnate_2$	4
Pluricolumnal	1
Ramose Bryozoan fragments	28
Encrusting Bryozoan	1
Lepidocoleus sp.(?)	1

Genera Number	19	Diversity Index 9.52
Total Specimen Number	40	

FIG. 6.3 THE MAJOR GENERIC INTERGRADATIONS BETWEEN THE SNOWDON BENTHIC MARINE COMMUNITIES AND THEIR LITHOLOGIC CONTROLS



KEY

- SANDS
- SILTS
- MUDS
- CALCAREOUS SEDIMENTS OF DIFFERENT GRADES

THE THICKNESSES OF THE INTERGRADATION LINES REFLECT THE DEGREE OF INTERGRADATION — THE THINNEST LINES INDICATE RELATIVELY MINOR (RARE) INTERGRADATION WHEREAS THE THICKER THE LINE BECOMES, THE GREATER RELATIVE DEGREE OF INTERGRADATION IS IMPLIED.

The illustrated community sequence, from the Dinorthis community to the Sericoidea community, is relatively well defined and appears to be primarily controlled by the sediment grade, which, in turn, partly reflects the overall "energy of the environment". However, one should not immediately assume that such a sequence necessarily implies changes in water depth.

The exact placement of the Nicolella community within this proposed scheme is not totally clear, as this community seems primarily related to sediment composition (calcareous) rather than sediment grade, and for this reason the Nicolella community is offset in the above diagram, the larger size of the "box" indicating a greater range in sediment grade. The greatest intergradation into the Nicolella community stems from the dalmanellid - sowerbyellid "mega"community, which possibly indicates an original intimate spatial association between the two communities. As the Nicolella community possesses greater average diversity indices (> 10 - suggestive of offshore conditions - Bretsky & Lorenz 1970), placement between the dalmanellid - sowerbyellid "mega"community and the Sericoidea community seems most suitable.

FIG. 9.11

A PROPOSED CORRELATION OF THE FAUNAL SEQUENCES AT DOLWYDDELAN, IN RELATION TO SOUDLEYAN / LOWER LONGVILLIAN AND LOWER LONGVILLIAN / UPPER LONGVILLIAN STAGE BOUNDARIES OF THE CARADOC.

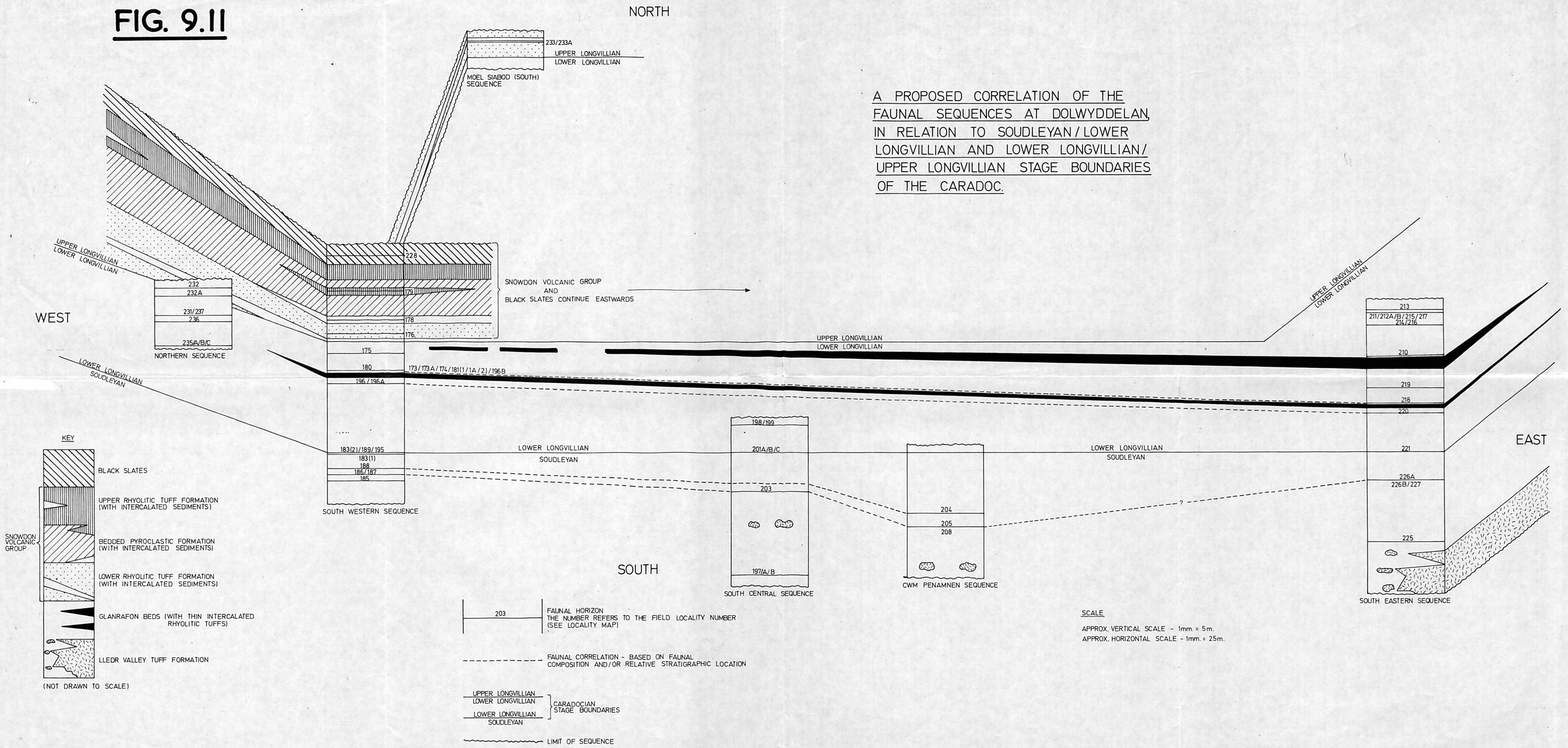
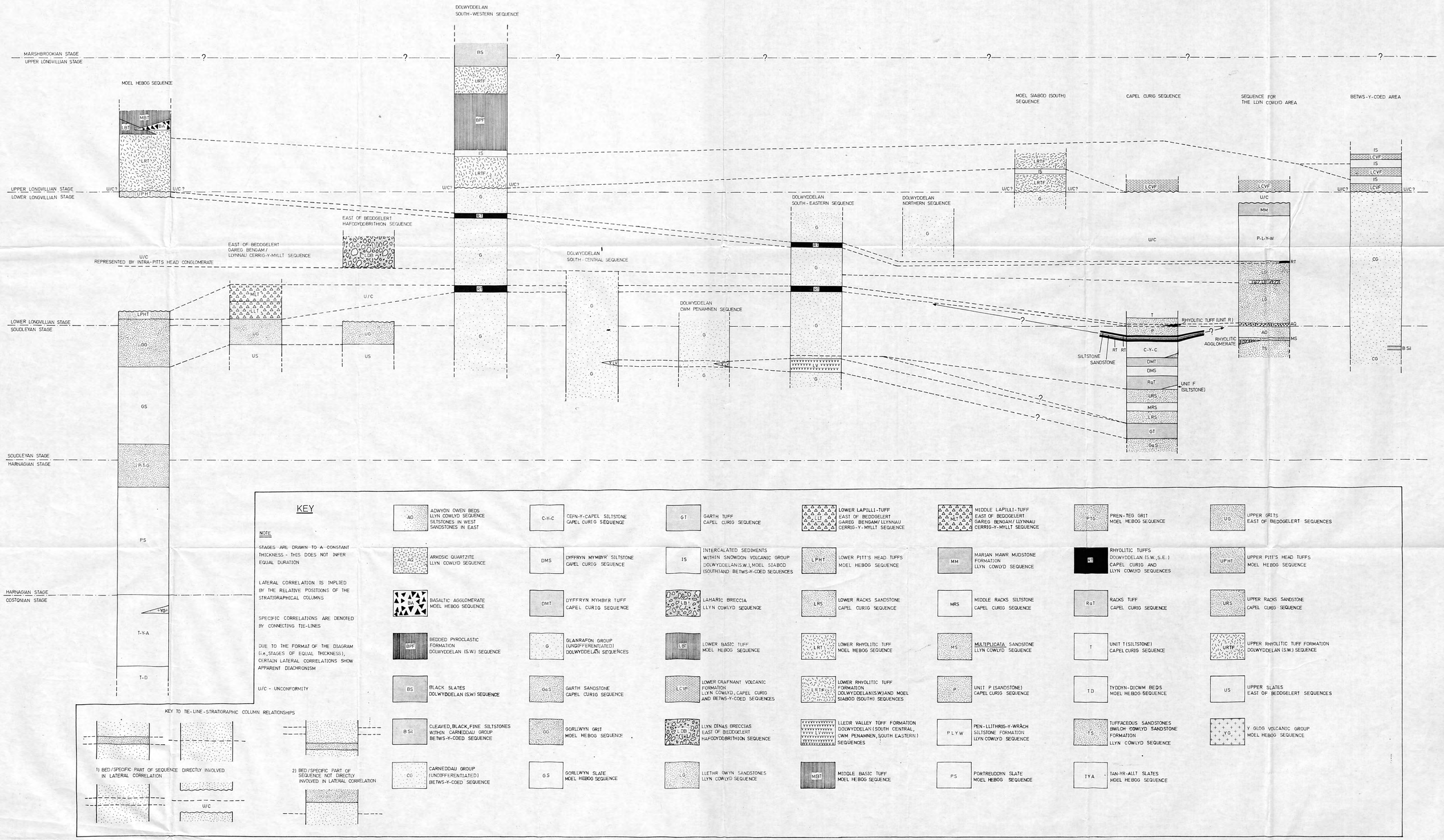


FIG 11.1 A PROPOSED CORRELATION IN RELATION TO THE CARADOC STAGES OF ALL THE SAMPLED SEQUENCES IN SNOWDONIA

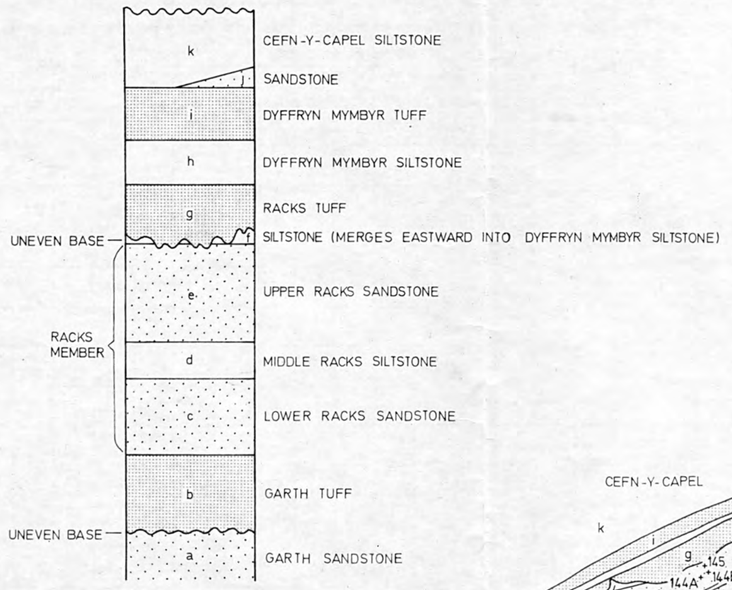


MAP I

CAPEL CURIG WEST SEQUENCE

(BASED ON THE EXPOSED SEQUENCE ON THE NORTHERN LIMB OF THE CAPEL CURIG ANTICLINE, ADAPTED FROM FRANCIS AND HOWELLS 1973)

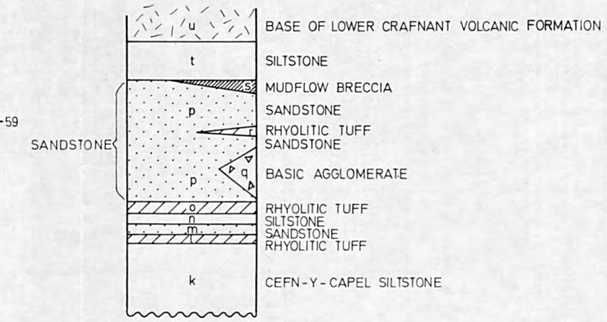
(Not drawn to scale)

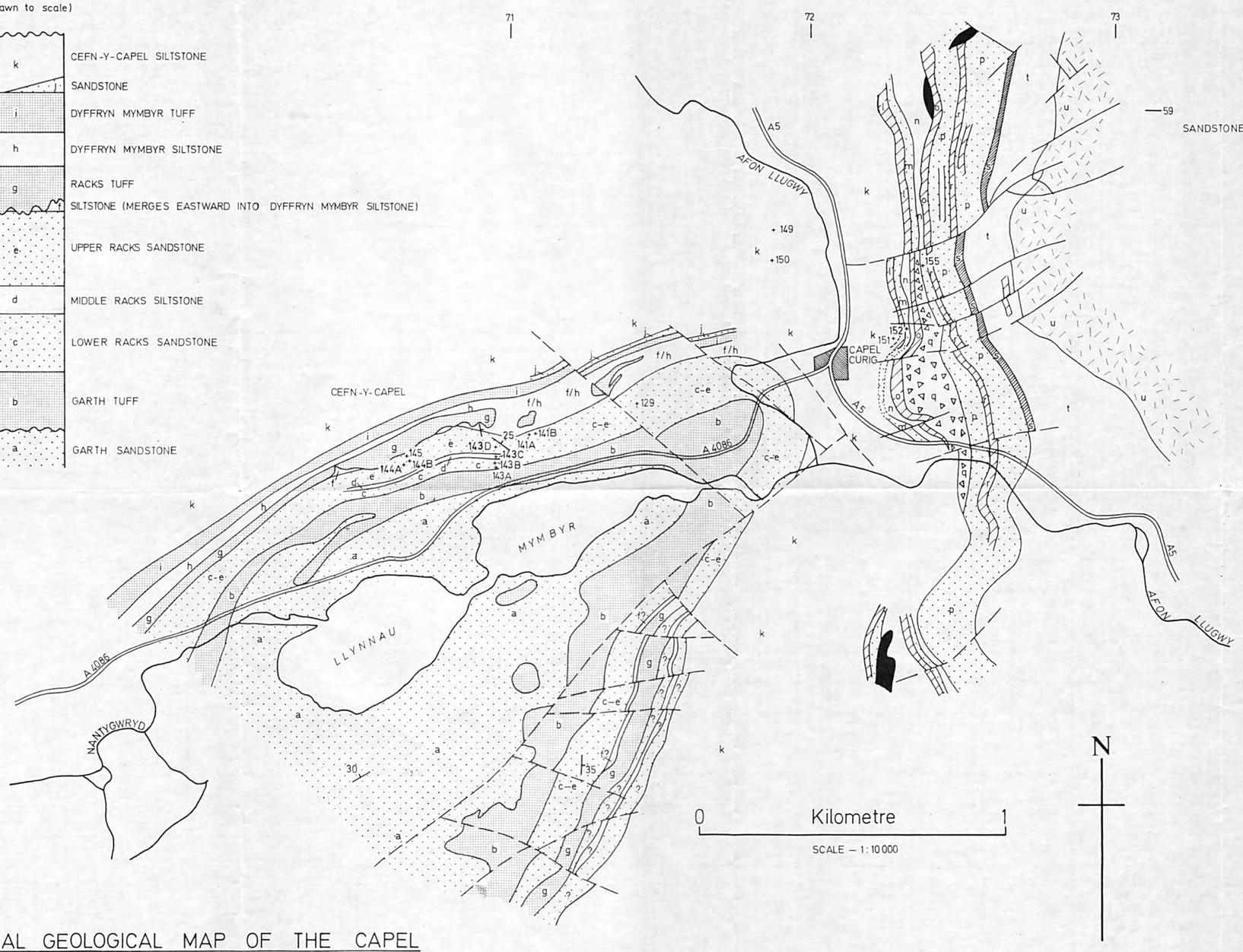


CAPEL CURIG EAST SEQUENCE

(ADAPTED FROM THE GEOLOGICAL SURVEY OF GREAT BRITAIN, SPECIAL SHEET SH.75 BETWS-Y-COED + CAPEL CURIG 1:25000, 1976)

(Not drawn to scale)





KEY

- CAPEL CURIG VOLCANIC FORMATION
- DOLERITE
- RHYOLITIC TUFFS
- BASE OF LOWER CRAFNANT VOLCANIC FORMATION
- SANDSTONE
- MUDFLOW BRECCIA
- BASIC AGGLOMERATE
- CLEAVED SILTSTONE

DRIFT OMITTED

+129 – FOSSIL LOCALITY NUMBER

FAULT

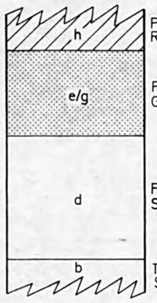
GENERAL GEOLOGICAL MAP OF THE CAPEL CURIG AREA TO SHOW THE SAMPLED FOSSILIFEROUS LOCALITIES AND THEIR STRATIGRAPHICAL RELATIONSHIPS

69 70 71 72 73

MAP 2

GENERAL STRATIGRAPHY FOR THE WESTERN PART OF THE MOEL HEBOG AREA

NOT DRAWN TO SCALE
(ADAPTED FROM SHACKLETON 1959)



INTRUSIVE IGNEOUS

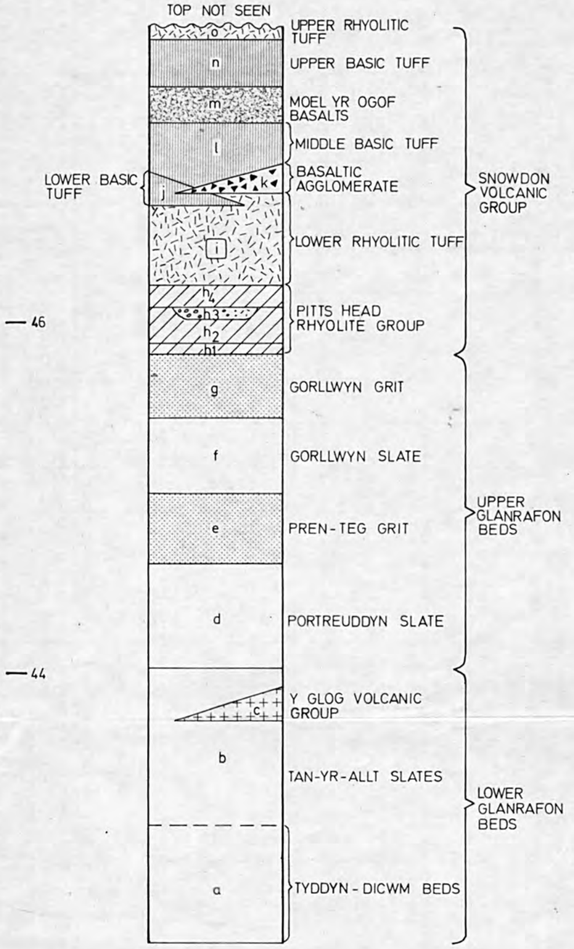
- DOLERITE
- RHYOLITE
- MICROGRANITE

DRIFT

- ALLUVIUM
- +47 FOSSIL LOCALITY NUMBER
- +S864 FOSSIL LOCALITY NUMBER OF SHACKLETON (1959)
- FAULT

GENERALISED STRATIGRAPHIC SUCCESSION

NOT DRAWN TO SCALE
(ADAPTED FROM SHACKLETON 1959)



L_V — LLANVIRN

T_C — TREMADOC

UC — UNDIVIDED UPPER CAMBRIAN

GENERAL GEOLOGICAL MAP OF THE MOEL HEBOG AREA TO SHOW THE SAMPLED FOSSILIFEROUS LOCALITIES AND THEIR STRATIGRAPHICAL RELATIONSHIPS

0 1 2 Kilometres

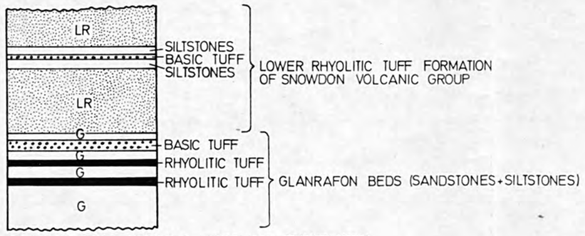
SCALE 1:25 000

MAP 3

GENERAL GEOLOGICAL MAP OF THE DOLWYDDELAN AREA TO SHOW THE SAMPLED FOSSILIFEROUS LOCALITIES AND THEIR STRATIGRAPHICAL RELATIONSHIPS

SEQUENCE TO THE SOUTH OF MOEL SIABOD

VERTICAL SCALE 4mm. = 10m.



ADAPTED FROM HOWELLS, LEVERIDGE + EVANS (1973)

0 1 2 Kilometres

SCALE 1:25 000

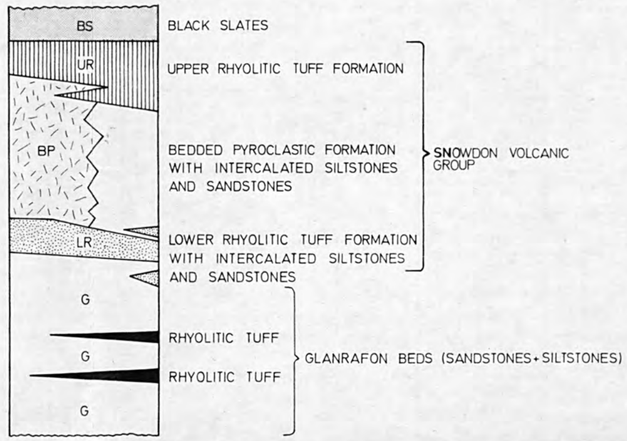
INTRUSIVE IGNEOUS

DOLERITE

RHYOLITE

MAIN SEQUENCE IN THE DOLWYDDELAN SYNCLINE

VERTICAL SCALE 1mm. = 5m.



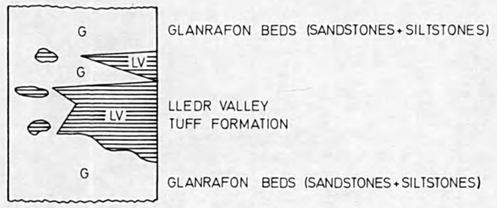
ADAPTED FROM THE GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND + WALES) SHEET SH 75, 1:25 000, CAPEL CURIG AND BETWS Y COED.
ADDITIONAL INFORMATION FROM WILLIAMS + BULMAN (1931)

KEY TO PLACE NAMES

A - DOLWYDDELAN
B - CASTELL DOLWYDDELAN
C - MINFFORDD
D - BLAENAU DOLWYDDELAN
E - ROMAN BRIDGE
F - PENTRE BONT

SEQUENCE IN THE SOUTH EAST OF THE DOLWYDDELAN AREA

VERTICAL SCALE 1mm. = 5m.



ADAPTED FROM THE GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND + WALES) SHEET SH 75, 1:25 000, CAPEL CURIG AND BETWS Y COED.
ADDITIONAL INFORMATION FROM FRANCIS + HOWELLS (1973)

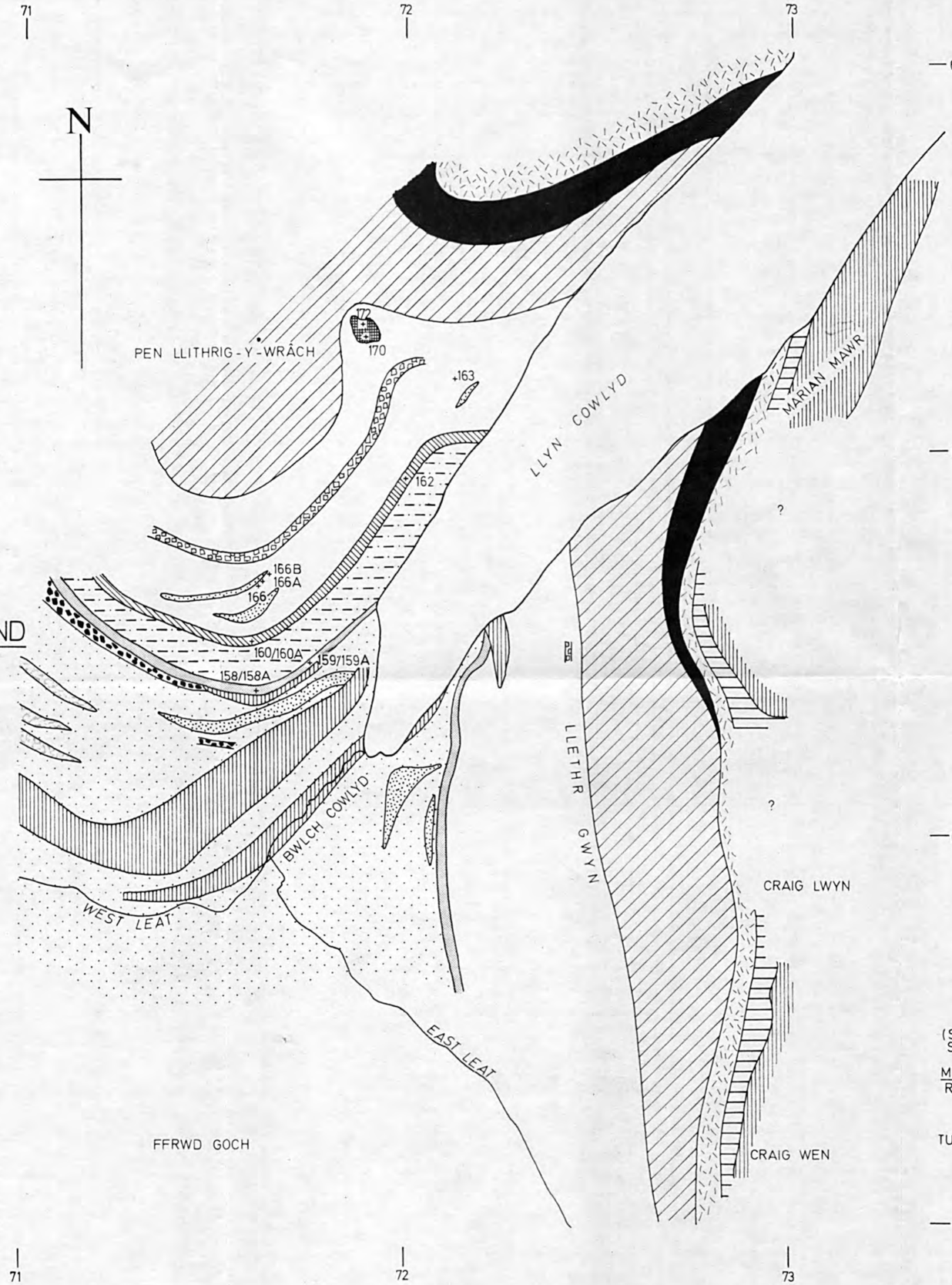
DRIFT OMITTED

•210 — FOSSIL LOCALITY NUMBER

FAULTS

MAP 4

GENERAL GEOLOGICAL MAP OF THE LLYN COWLYD AREA TO SHOW THE SAMPLED FOSSILIFEROUS LOCALITIES AND THEIR STRATIGRAPHICAL RELATIONSHIPS



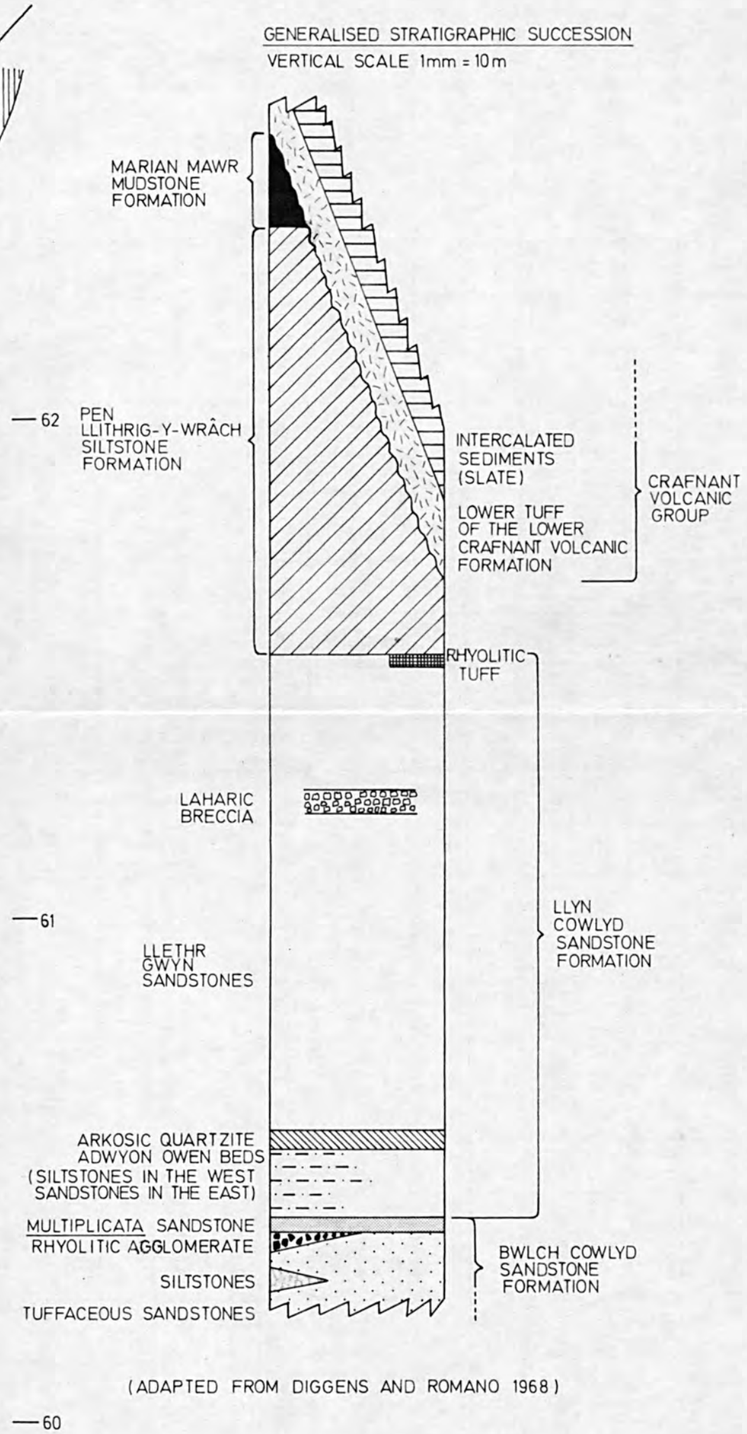
INTRUSIVE IGNEOUS

DOLERITE

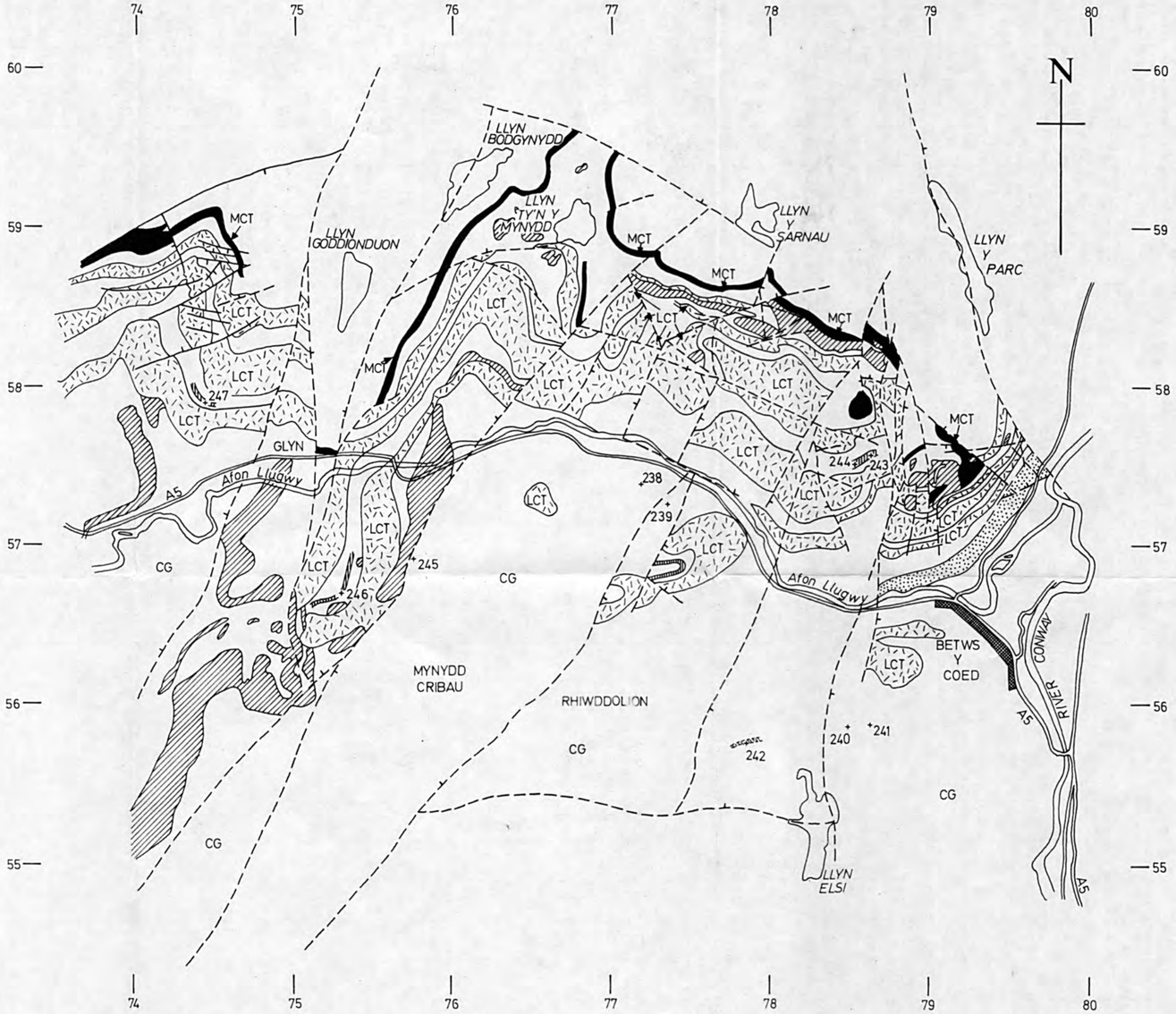
RHYOLITE

DRIFT OMITTED

*158 FOSSIL LOCALITY NUMBER



MAP 5



IGNEOUS INTRUSIVE

DOLERITE

DRIFT OMITTED

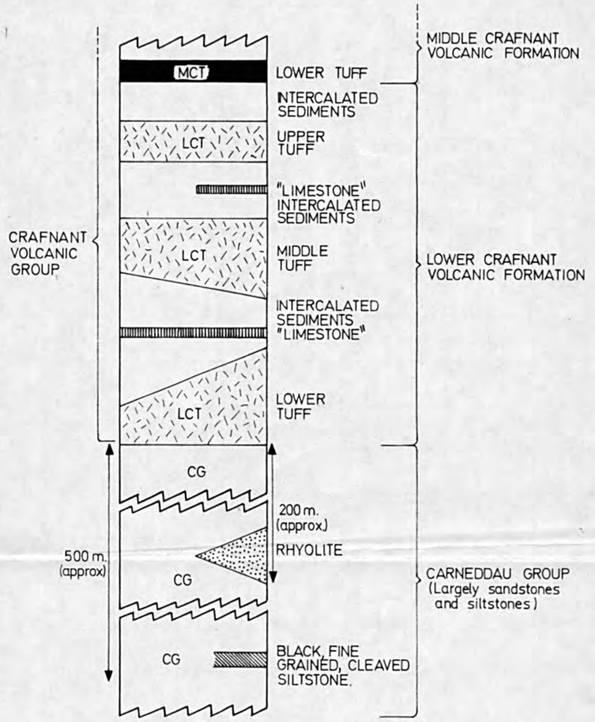
+240 FOSSIL LOCALITY NUMBER

ALL UNITS ABOVE THE LOWER TUFF OF THE MIDDLE CRAFNANT VOLCANIC FORMATION, OF THE CRAFNANT VOLCANIC GROUP, ARE OMITTED FOR CLARITY.

FAULT

* GENERALISED STRATIGRAPHIC SUCCESSION

VERTICAL SCALE 1mm. = 2m.



ADAPTED FROM THE GEOLOGICAL SURVEY OF GREAT BRITAIN (ENGLAND AND WALES) SHEET SH 75 1:25 000, CAPEL CURIG AND BETWS-Y-COED, 1976

GENERAL GEOLOGICAL MAP OF THE BETWS-Y-COED AREA TO SHOW THE SAMPLED FOSSILIFEROUS LOCALITIES AND THEIR STRATIGRAPHICAL RELATIONSHIPS

0 1 2 KILOMETRES

SCALE 1:25 000

MAP 6

GENERAL GEOLOGICAL MAP OF PART OF THE AREA TO THE EAST OF BEDDGELERT TO SHOW THE SAMPLED FOSSILIFEROUS LOCALITIES AND THEIR STRATIGRAPHICAL RELATIONSHIPS

SNOWDON VOLCANIC GROUP

MBS = MIDDLE BASIC SERIES
> 1000′
(NOT SHOWN ON MAP)
LRT = LOWER RHYOLITIC TUFF (INCLUDES UPPER LAPILLI-TUFF OF BEAVON 1960, 1963)
500′-900′
LDB = LLYN DINAS BRECCIAS
0′-500′
MLT = MIDDLE LAPILLI-TUFF
0′-600′
LLT = LOWER LAPILLI-TUFF
100′-600′
(LLT + MLT = PITT'S HEAD TUFFS)

GLANRAFON GROUP

UG (5) = UPPER GRITS (WITH UPPER SILTSTONE AND A LOWER RHYOLITIC TUFF)
0′-1200′
US (4) = UPPER SLATES
0′-750′
MG (3) = MIDDLE GRITS
0′-1000′
LS (2) = LOWER SLATES
2300′
LG (1) = LOWER GRITS
> 1500
(NOT SHOWN ON MAP)

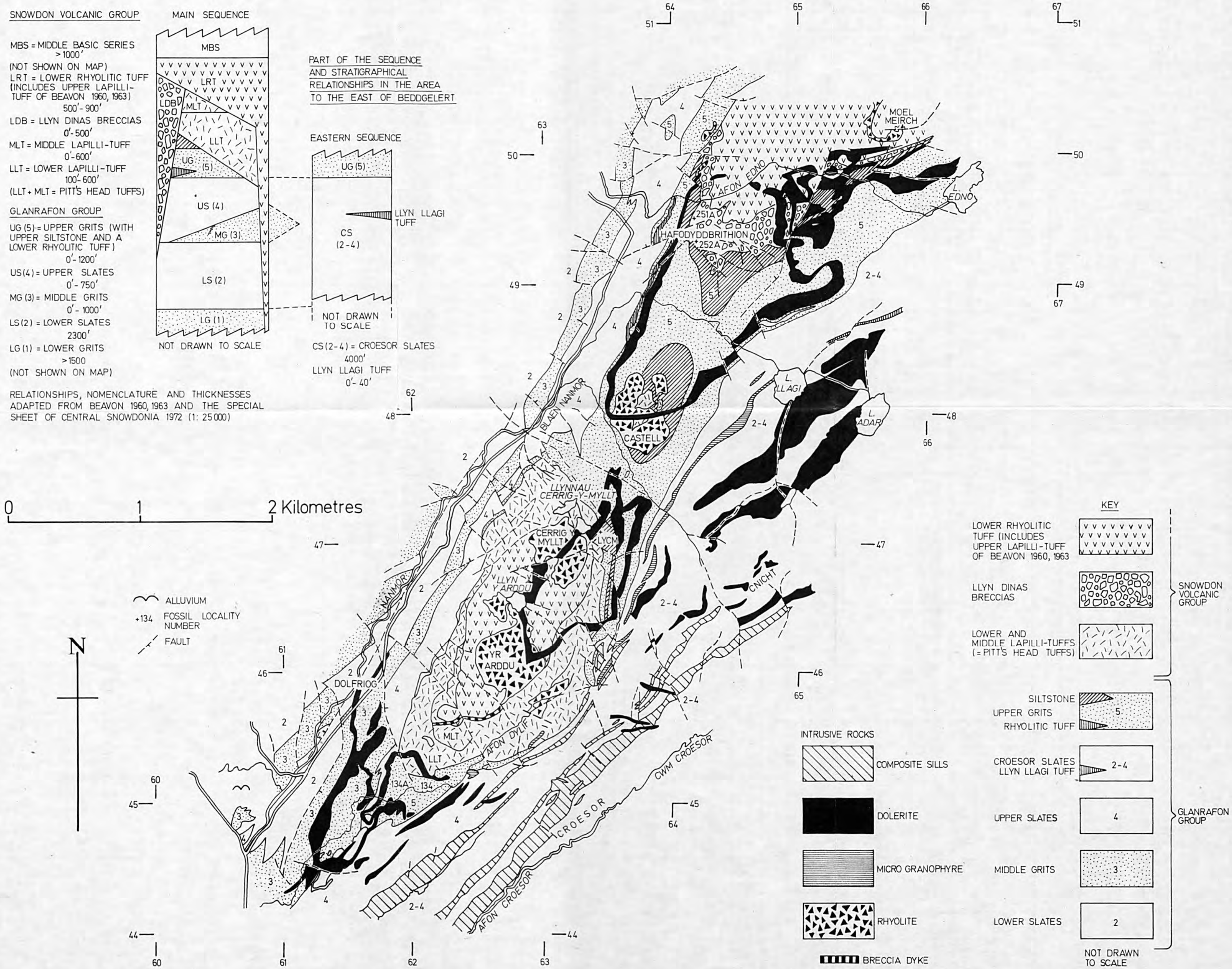
RELATIONSHIPS, NOMENCLATURE AND THICKNESSES ADAPTED FROM BEAVON 1960, 1963 AND THE SPECIAL SHEET OF CENTRAL SNOWDONIA 1972 (1: 25000)

MAIN SEQUENCE

NOT DRAWN TO SCALE

PART OF THE SEQUENCE AND STRATIGRAPHICAL RELATIONSHIPS IN THE AREA TO THE EAST OF BEDDGELERT

EASTERN SEQUENCE

NOT DRAWN TO SCALE

CS (2-4) = CROESOR SLATES
4000′
LLYN LLAGI TUFF
0′-40′