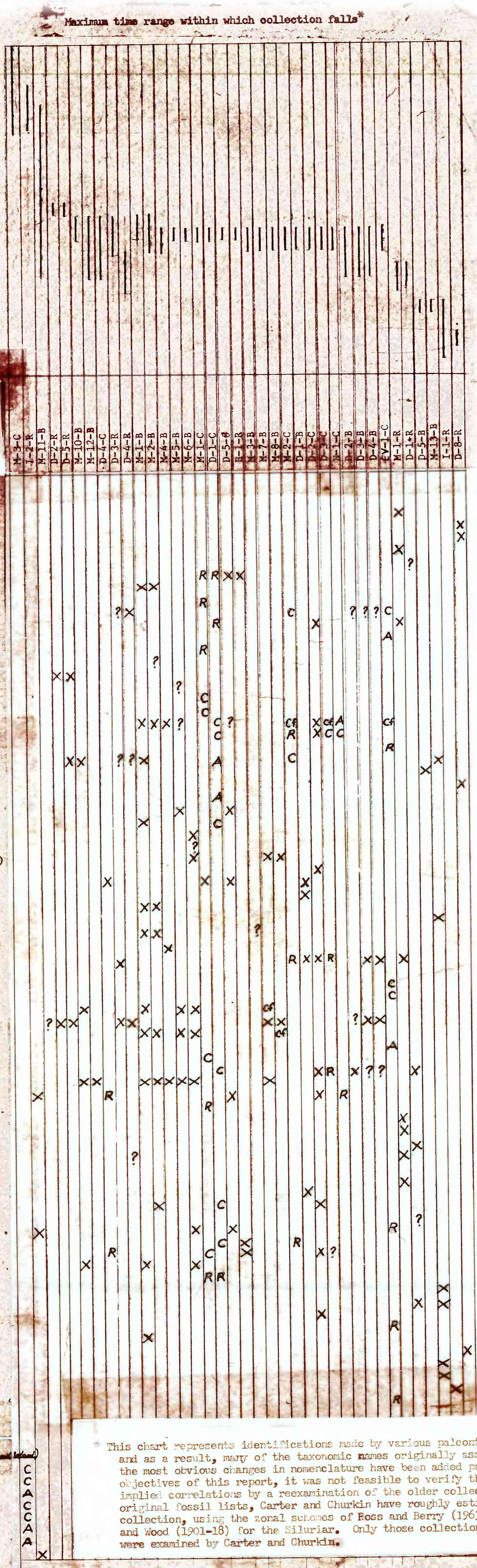
76-637

| Series | Stage | Graptolite zones |
| --- | --- | --- |
| Lower Silurian | Upper Llandoverian | Monograptus crenulatus |
| | | Monograptus griestoniensis |
| | | Monograptus crispus |
| | | Rastrites maximus |
| | | Monograptus sedgwickii |
| | Middle Llandoverian | Monograptus convolutus |
| | | Monograptus gregarius |
| | Lower Llandoverian | Monograptus cyphus |
| | | Cystograptus vesiculosus |
| | | Akidograptus acuminatus |
| | | Glyptograptus persculptus |
| Upper Ordovician | Ashgillian | Dicellograptus complanatus |
| Middle Ordovician | Caradocian | Pleurograptus linearis |
| | | Dicranograptus clingani |
| | | Orthograptus truncatus intermedius (Climacograptus wilsoni) |
| | | Climacograptus bicornis |
| | | Nemagraptus gracilis |
| | Llandeilian | Glyptograptus teretiusculus |
| Lower Ordovician | Llanvirnian | Hallograptus etheridgei |
| | | Isograptus |
| | | Didymograptus bifidus and Didymograptus artus |
| | Arenigian | Didymograptus protobifidis |
| | | Tetragraptus fruticosus (3 and 4 branched) |
| | | Tetragraptus fruticosus (4 branched) |
| | | Tetragraptus approximatus |
| | Tremadocian | Clonograptus-Adelograptus |
| | | Anisograptus-Staurograptus |

Maximum time range within which collection falls*




EXPLANATION OF COLLECTION NUMBERS

First symbol (letter) -- Quadrangle where collected: M = Metaline; D = Deep Creek; I = Inchelium; H = Hunters; N = Northport; EV = Echo Valley.
Second symbol (number) -- Collection number.
Third symbol (letter) -- Paleontologist who determined fossils: B = Josiah Bridge; R = Reuben J. Ross, Jr.; C = Claire Carter and Michael Churkin, Jr.

(ORDOVICIAN)

Amplexograptus sp.
Azygograptus ?
Bryograptus?
Cardiograptus cf. C. crawfordi Harris
Cardiograptus sp.
Climacograptus bicornis (Hall)
Climacograptus parvus (Hall)
Climacograptus n. sp. (Short and broad)
Climacograptus sp.
Cryptograptus sp.
Cryptograptus schäferi Lapworth
Cryptograptus tricornis (Carruthers)
Dicellograptus gurleyi ~~(Hall)~~ Lapworth
Dicellograptus? cf. D. caduceus Lapworth
Dicellograptus divaricatus (Hall)
Dicellograptus cf. D. elegans Carruthers
Dicellograptus cf. D. forchammeri Geinitz
Dicellograptus sextans (Hall)
Dicellograptus cf. D. intortus Lapworth
Dicellograptus (narrow, straight broken stipes)
Dicellograptus sp.
Dichograptus separatus Elles
Dichograptus?
Dicranograptus cf. D. contortus Ruedemann (or D. zigzag)
Dicranograptus contortus
Dicranograptus cf. D. nicholsoni Hopkinson
Dicranograptus nicholsoni var. parvangulus Gurley
Dicranograptus ramosus (Hall)
Dicranograptus spinifer subsp. arkansasensis (Ruedemann, 1947, p. 397)
Dicranograptus?
Dicranograptus
Dictyonema sp.
Didymograptus n. sp. [~~att.~~ D. fasciculatus Nicholson]
Didymograptus nanus Lapworth?
Didymograptus sagitticaulis Gurley
Didymograptus n. sp.
Didymograptus sp.
Didymograptus(?)
Didymograptus sp. (broken stipes, broad--up to 3 mm. wide)
Didymograptus sp. (broken stipes, narrow about 1 mm. wide)
Diplograptus incisus (Lapworth) — Orthograptus calcaratus subsp.
Diplograptus sp.
Glossograptus ciliatus Emmons
Glossograptus cf. G. horridus Ruedemann
Glossograptus n. sp. (9th thecae have longer spines)
Glossograptus sp.
Glyptograptus euglyphus (Lapworth)
Glyptograptus?
Glyptograptus (narrow spine)
Hallograptus sp.
Isograptus cf. I. dumosus Harris
Isograptus furcula Ruedemann (= I. victoriae divergens Harris)
Isograptus sp.
Isograptus or Dicellograptus
Loganograptus sp.
Nemagraptus?
Nemagraptus cf. N. gracilis (Hall)
Onchograptus sp.
Orthograptus sp.
Orthograptus cf. O. calcaratus subsp. acutus ~~(Lapworth)~~ Elles and Wood
Orthograptus calcaratus aff. O. c. subsp. grandis Ruedemann
Orthograptus whitfieldi (Hall)
Orthograptus cf. O. whitfieldi, ~~Elles and Wood~~ (Hall)
Phyllograptus ilicifolius Hall
Phyllograptus? sp.
Reteograptus geinitzianus? J. Hall
Reteograptus sp.
Syndyograptus cf. S. pecten Ruedemann
Temnograptus
Tetragraptus quadribrachiatus (Hall) ~~var.~~ subsp.
Tetragraptus similis (Hall) (= T. bigsbyi Hall)
Tetragraptus sp.
Pseudo-Trigonograptus n. sp.

SILURIAN

~~Diplograptus cf. D. (Orthograptus) truncatus subsp. abbreviatus~~ (Elles and Wood)
Monograptus convolutus (Hisinger)
Monograptus cf. M. lobiferous (McCoy)
Monograptus cf. M. pandus Lapworth
Monograptus cf. M. sedgwickii (Portlock)
Monograptus cf. M. spiralis (Geinitz)
Monograptus sp. indet. (straight, long stipes, simple thecae) of the priodon type
Retiolites geinitzianus ~~(Hall)~~ (Barrande)
Rastrites

U.S. Geological Survey, Menlo Park, JUL 22 1976, Library

LOCALITIES

Metaline quadrangle

M-1-B Pend Oreille River bank, NE of Pend Oreille mine.
M-2-B Pend Oreille River bank, N of Morning mine.
M-3-B Entrance to 500 adit, Pend Oreille m.
M-4-B Mouth of Slate Cr.
M-5-B Prospect in SW ¼ Sec. 30, T.40N, R. 44E.
M-6-B Hwy SW of Ledbetter Lake
M-7-B " " " " "
M-8-B W cent., sec. 2, T. 39N., R.43E.
M-9-B Whiskey Cr. rd. cut
M-10-B Prospect dump, 1mi. S of Old Bella Mae mine
M-11-B W. cent. sec. 12, T.40N., R.44E.
M-12-B Road cut NE¼ sec. 22, T.40N., R.44E.
M-1-R Pend Oreille mine, 1700 level - 1/
M-1-C Z-canyon rd., 1/3 mi. S. Ledbetter Lk. 2/
M-2-C W. side Z-canyon rd., ¼ mi. S. Beatty Lake.
M-3-C ¼ mi. NE of top of Horsefly Hill 3/

Deep Creek area

D-1-B Adit Iroquois mine, 140' from cntc. with Metaline Formation. 4/
D-2-B Stonewall mine, lower tunnel 5/
D-3-B Black Rock Canyon, SE tributary, old rd. to Advance mine 6/
D-4-B On strike 1000 ft. N. of D-3-B 6/
D-5-B Iroquois mine adit, 130 ft. stratigraphically above Metaline F. 7/
D-1-R Adit level, Scandia mine, 30 ft. from contact with Metaline F. 8/
D-2-R Anderson prospect, elev. 3440 ft. 1½ miles NW of Leadpoint 9/
D-3-R Sec. 3, T.39N.R41E.; 2600 ft. S.73°W. from NE cor. of sec. 10/
D-4-R SW¼ NE¼ NW¼ sec. 17, T.39 N., R.41 E. 9/
D-5-R Sec. 3, T.39 N., R.41 E., elev. 3880 ft. S17°E 2600 feet from NW cor sec. 10/
D-8-R NE cor. sec. 30, T.40 N., R. 42 E., portal Iroquois mine 10/
D-1-C Old Advance mine rd., el. 2880 ft., sec. 18, T.39 N., R.41 E., 75 ft. above Metaline F.
D-2-C Same as D-1-C, except at elev. of 3000 ft. and 10 ft. above metaline F.
D-3-C Sec. 17, T.39 N., R. 41 E.; mine rd. elev. 4150 ft.; head of Sherlock Cr.
D-4-C 100 ft. SE of D-3-C
D-5-C Black Rock Canyon rd.; Sec. 7, T.39 N., R.41 E., elev. 2640 Ft.

Miscellaneous quadrangles

I-1-R W. side ridge crest; 3800 ft. elev. Center SE¼, sec. 18, T.33 N., R.38 E. 11/
I-2-R W. side Keedy Hill; 4200 ft. elev., 500 ft. W sec. cor. SE¼, sec. 7, T.33 N. R. 38 E. 11/
H-1-R North nose of Hill 3197, W½ sec. 11, T. 30 N., R. 37 E. 12/
N-1-C N 39° E., 1200 ft. from Brodie Mountain School.
EV-1-C Clugston Creek rd. where it crosses E bdy of Echo Valley quad.

1/ Rpt. by R. J. Ross, Jr. to A. E. Weissenborn, 11/9/61 (USGS coll. D913CO)
2/ Approximately same locality as M-6-B and M-7-B.
3/ Same locality as in Dings and Whitebread (1965, p. 29)
4/ Report by J. Bridge to W. P. Puffett, 5/22/51.
5/ Report by J. Bridge to C. D. Campbell, 5/18/44.
6/ Letter from J.B. Reeside, Jr. to C.D. Campbell, 11/24/44.
7/ Report by J. Bridge to W. P. Puffett, 7/31/52.
8/ Report by R.J. Ross, Jr. to R.G. Yates, 12/10/56.
9/ Report by R.J. Ross, Jr. to R. G. Yates, 1/9/57, (USGS No. 2181)
10/ Report by R.J. Ross, Jr. to R.G. Yates, 11/18/55, (USGS No. 2182)
11/ Report by R.J. Ross, Jr. to A.B. Campbell 9/14/64 (USGS Coll. D1450CO & 1451CO).
12/ Report by R.J. Ross, Jr. to A.B. Campbell 12/9/60, (USGS Coll. D770 CO).

* This chart represents identifications made by various paleontologists over a 30-year period, and as a result, many of the taxonomic names originally assigned are antiquated. Some of the most obvious changes in nomenclature have been added parenthetically. Because of the objectives of this report, it was not feasible to verify the original identifications and implied correlations by a reexamination of the older collections. Without revising the original fossil lists, Carter and Churkin have roughly estimated the zonal range of each collection, using the zonal schemes of Ross and Berry (1963) for the Ordovician and Elles and Wood (1901-18) for the Silurian. Only those collections with the last symbol a "C" were examined by Carter and Churkin.

Figure 19A. -- Age and locations of graptolite collections from Stevens and Pend Oreille Counties, Washington. x = present (abundance not given), A = abundant, C = common, R = rare.