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GENERAL GEOLOGY OF THE CENTRAL ALASKA RANGE BETWEEN THE NENANA RIVER AND MOUNT DEBORAH

By

K.W. Sherwood and Campbell Craddock

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GENERAL GEOLOGY OF THE CENTRAL ALASKA RANGE BETWEEN THE NENANA RIVER AND MOUNT DEBORAH

By K.W. Sherwood[1] and C. Craddock[2]

During the summers of 1970-1974 personnel of the University of Wisconsin-Madison conducted geologic field investigations in the central Alaska Range as part of a continuing study aimed at documentation of the structural histories of the Hines Creek and McKinley strands of the Denali fault system. About 1,000 square miles (2,560 sq. km) in the Healy B-3, B-4, C-3, C-4, D-3, and D-4 Quadrangles were mapped at a 1:63,360 scale (pl. 1). The geologic maps and cross sections presented with this report (pl. 1-3) synthesize the work of previous investigators (U.S. Geological Survey, Alaska DGGS, University of Wisconsin) and of additional mapping conducted by the above authors from 1972 to 1974.

FOSSIL LOCALITIES

Worthy of special comment here are some controversial fossil localities shown (designated "?") on the map of the Wood River drainage basin (pl. 2). These localities represent exposures of map unit Trlg, which contains black carbonaceous fossil imprints that exhibit distinct branching morphologies somewhat resembling plant material. Specimens containing these fossils have been examined by W.B.N. Berry (Univ. Calif. - Berkeley), who advised (pers. comm., 1973, 1975) that "although cell structures are not preserved, branching morphologies in various specimens resemble the graptolites Inocaulis sp., Ptilograptus sp., and Dendrograptus sp.," and that "a number of specimens resemble possible or probable dendroid graptolites." N.J. Silberling (USGS) subsequently examined extensive field localities and specimens of these possible graptolites and advises that almost all of them are the common trace fossil Chondrites. His comments are excerpted below from a letter dated 12 October 1978 to Campbell Craddock.

> "Some of the reasons for regarding these structures as trace fossils rather than graptolites are:
>
> 1) They are abundant from widely scattered localities to the exclusion of any kind of recognizable body fossil such as non-dendroid graptolites.
>
> 2) Where well preserved, the elaborately branching pattern never shows any overlap of crossing of one branch by another. This is characteristic of feeding tracks but would require a very unusual coincidence of preservation for a flexible, branching 3-D body fossil such as a dendroid graptolite.

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3) Some of the branching Chondrites patterns are well preserved on cleavage surfaces at a low, but appreciable angle to the plane of stratification. This seeming impossibility for a body-fossil impression is characteristic for Chondrites whose branches in three dimensions form an inverted funnel, their main axes coming together in a common axis that projects upward perpendicularly through the bedding. The branches thus slope down as they project outward through the sediment, flattening out into the particular layer of sediment that was mined out by the organism whose feeding activity produced the pattern."

Until very recently, the actual stratigraphic age of the rocks containing these controversial fossils remained unknown. However, we have recently been informed (pers. comm., Mar., 1979) by Paul Umhoefer of the University of Wisconsin that fragments of Triassic conodonts have now been recovered from specimens from exposures of rocks also containing the "graptolitic" carbonaceous imprints. These highly significant new fossil localities are found in: 1), NE/4, sec. 25, T. 14 S., R. 2 W.; and 2), NW/4, sec. 19, T. 14 S., R. 1 W., Healy C-2 Quadrangle. This new information appears to support and confirm Silberling's interpretation of the carbonaceous imprints as trace fossils, and further indicates that these rocks are most appropriately included with the lithologically similar Upper Triassic metasedimentary sequence (map unit Trlg).

Data for specimen localities, radiometric age dates, chemical analyses, and fossil localities are given in appendixes 1-4.

ACKNOWLEDGMENTS

Gratitude is extended to University of Wisconsin paleontologists Professor David L. Clark, Laurel Babcock, and John Larson, who generously provided technical assistance and advice in the tedious search for identifiable microfossil material in many rock specimens. Drs. William A. Oliver (U.S. National Museum), Norman J. Silberling, C.K. Chamberlain (Cities Service Co.) and W.B.N. Berry kindly examined and provided valuable perspective on a number of fossil specimens. Special thanks is extended to Paul Umhoefer of the University of Wisconsin, who provided (pers. comm., Jan., Mar., 1979) important additional data on Triassic fossil localities. Fond appreciation is extended to Mr. and Mrs. Lynn Castle and other personnel of Camp Alaska, Wood River, Alaska, for their friendly accommodations and substantial logistical assistance during the field phase of this study. The liason and encouragement of Wyatt G. Gilbert of the Alaska DGGS is hereby gratefully acknowledged. The reproduction facilities of Amoco Production Company, Denver, Colorado, provided technical assistance in the preparation of copies of the maps and cross sections. Financial support for this work was provided through NSF Grant GA-28966 to Craddock.

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_____, 1970e, Geologic map of the Fairbanks A-2 Quadrangle, Alaska: U.S. Geol. Survey Geol. Quad. Map GQ-808.

_____, 1970f, Geologic map of the Fairbanks A-3 Quadrangle, Alaska: U.S. Geol. Survey Geol. Quad. Map GQ-809.

_____, 1970g, Geologic map of the Fairbanks A-4 Quadrangle, Alaska: U.S. Geol. Survey Geol. Quad. Map GQ-810.

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APPENDIX 1

LOCATIONS OF SPECIMENS REFERRED TO ON GEOLOGIC MAPS

All specimens are filed with the Curator of the Geological Museum, University of Wisconsin, Madison, Wisconsin 53706. University of Wisconsin specimen number prefixes are referenced as follows:

U.W.1553/ Hickman, R.G., 1971. The Denali fault near Cantwell, Alaska. M.S. thesis, 76 p.

U.W.1563/ Bultman, T.R., 1972. The Denali fault (Hines Creek strand) near the Nenana River, Alaska. M.S. thesis, 161 p.

U.W.1574/ Hickman, R.G., 1974. Structural geology and stratigraphy along a segment of the Denali fault system, central Alaska Range, Alaska. Ph.D. thesis, 276 p.

U.W.1580/ Anderson, R.L., 1973. The Denali fault (Hines Creek strand) in the Wood River area, central Alaska Range. M.S. thesis, 114 p.

U.W.1583/ Sherwood, K.W., 1973. Geologic structure along the Hines Creek fault west of the Wood River, north-central Alaska Range. M.S. thesis, 131 p.

U.W.1596/ Rautman, C.A., 1974. The Denali fault system in the Dick Creek - Wells Creek area, central Alaska Range, Alaska. M.S. thesis, 141 p.

U.W.1622/ Cota, T.F., 1975. Stratigraphy and structural geology of the Yanert Glacier area, east-central Alaska Range, Alaska. M.S. thesis, 195 p.

U.W.1631/ Newell, K.D., 1975. Stratigraphy and structural geology of the Moose Creek area, central Alaska Range, Alaska. M.S. thesis, 177 p.

U.W.1633/ Sherwood, K.W., 1979. Stratigraphy, metamorphic geology, and structural geology of the central Alaska Range, Alaska. Ph.D. thesis.

U.W. SPECIMEN NUMBER	FIELD NUMBER	MAP UNIT	ROCK TYPE	MAP LOCATION
1553/04	CTW134	Tgd	granodiorite	63°28'57" N.Lat.; 148°36'45" W.Long., HEALY B-4.
1553/07	CTW69	Tgd	granodiorite	63°27'54" N.Lat.; 148°43'57" W.Long. HEALY B-4.
1553/09	CTW14	JKa	argillite	63°25'15" N.Lat.; 148°52'30" W.Long. HEALY B-4.
1553/10	CTW139	SDms	phyllite	63°23'50" N.Lat.; 148°44'39" W.Long. HEALY B-4.
1553/11	CTW141	Trlg	limestone	63°27'16" N.Lat.; 148°54'03" W.Long. HEALY B-4.
1563/01	BA60	mgb	metagabbro	NW, NW, SW, Sec.31, T13S, R7W, HEALY C-4.
1563/02	BB03	Tcv	basalt	SE, NW, SW, Sec.03, T14S, R6W, HEALY C-4.
1563/03	BA39	Tdb	diabase	NE, SW, SW, Sec.27, T13S, R7W, HEALY D-4.
1563/04	BA57	Tdb	diabase	SE, SE, SW, Sec.18, T14S, R6W, HEALY C-4.
1563/13	BA73	Tcs	shale	SW, SW, NE, Sec.21, T14S, R7W, HEALY C-4.
1563/14	BA48	Tcs	shale	NE, NW, SW, Sec.19, T14S, R6W, HEALY C-4.
1563/15	BA47	Tcs	cobble in cgl.	SW, SE, SE, Sec.19, T14S, R6W, HEALY C-4.
1574/01	MP224	PTrms	limestone	63°29'07" N.Lat.; 148°55'45" W.Long., HEALY B-4.
1574/02	CTW88	SDl	limestone	63°27'15" N.Lat.; 148°39'30" W.Long., HEALY B-4.
1574/03	MP56	TKgd	granodiorite	SE, SW, SW, Sec.06, T15S, R6W, HEALY C-4.
1574/04	MP91A	Tan	andesite	NE, NE, SE, Sec.32, T15S, R6W, HEALY C-4.
1574/06	MP208	Jmg	metagabbro	63°29'01" N.Lat.; 148°57'15" W.Long., HEALY B-4.
1574/07	MP290	TKgd	granodiorite	SW, SE, NE, Sec.35, T15S, R8W, HEALY C-5.
1574/11	YF423A	PTrmt	limestone	NW, SW, NE, Sec.30, T16S, R8W, HEALY C-5.
1574/12	YF423	PTrmt	cobble in cgl.	SW, NE, SW, Sec.30, T16S, R8W, HEALY C-5.
1574/13	YF338	PTrmt	cobble in cgl.	SE, NE, NE, Sec.29, T16S, R8W, HEALY C-5.
1574/14	YF362	PTrmt	limestone	NE, SE, NE, Sec.33, T16S, R8W, HEALY B-5.
1574/15	YF376	Jmg	metagabbro	NE, SW, SW, Sec.36, T16S, R8W, HEALY B-5.
1574/17	YF181	Tqd	quartz diorite	SW, SW, SE, Sec.03, T15S, R5W, HEALY C-3.
1574/18	TC7	TKgr	granite	SW, SW, SW, Sec.12, T17S, R5W, HEALY B-3.
1574/19	YF497	Tqm	quartz monzonite	NW, SE, SE, Sec.28, T16S, R2W, HEALY B-2.
1574/20	FP107	SDl	limestone	SW, SW, NE, Sec.28, T17S, R9W, HEALY B-5.
1574/21	MP45	Tcs	shale	63°29'34" N.Lat.; 148°40'13" W.Long., HEALY B-4.
1574/22	MPCC1	Tcs	shale	NW, NE, SW, Sec.20, T16S, R6W, HEALY C-4.

U.W. SPECIMEN NUMBER	FIELD NUMBER	MAP UNIT	ROCK TYPE	MAP LOCATION
1574/24	YF174	Dmf	schist	NW, SE, SE, Sec.8, T13S, R4W, HEALY D-3.
1574/25	MP54/3	PTrgs	greenstone	63°29'31" N.Lat.; 148°47'12" W.Long., HEALY B-4.
1580/03	RLA213	Jmg	metagabbro	NW, SW, SW, Sec.12, T14s, R2W, HEALY C-2.
1580/06	7-1-6	TKda	dacite	SW, NE, NE, Sec.08, T13S, R2W, HEALY D-2.
1580/09	RLA118A	Dmf	schist	NE, SW, NW, Sec.22, T13S, R2W, HEALY D-2.
1580/15	RLA227	Jmg	metagabbro	NE, NW, NW, Sec.16, T14S, R2W, HEALY C-2.
1580/16	7-2-3	Dms	phyllite	NW, SW, NW, Sec.17, T13S, R2W, HEALY D-2.
1580/42	YF242	TKgd	granodiorite	SW, SE, SW, Sec.10, T13S, R1W, HEALY D-2.
1580/47	YF236	Dmg	greenstone	NE, SW, NE, Sec.22, T13S, R1W, HEALY D-2.
1580/51	YF235	Dmg	greenstone	NE, SW, NE, Sec.22, T13S, R1W, HEALY D-2.
1580/53	RLA156	Trlg	argillite	NW, SE, NE, Sec.09, T14S, R2W, HEALY C-2.
1583/05	KL1	Dmg	greenstone	NW, SW, NW, Sec.15, T13S, R3W, HEALY D-3.
1583/12	YF72	Dms	limestone	SW, NW, NW, Sec.24, T13S, R5W, HEALY D-3.
1583/17	KK2	Km	monzonite	NW, NE, NW, Sec.25, T13S, R3W, HEALY D-3.
1583/18	KF1	Tcv	dacite	NW, NE, NW, Sec.17, T14S, R3W, HEALY C-3.
1583/26	KQ4	Tan	andesite	NW, NW, NE, Sec.12, T14S, R3W, HEALY C-3.
1583/30	KB8	Kb	basalt	NE, SW, SW, Sec.12, T13S, R4W, HEALY D-3.
1583/32	KB7	Kb	basalt	NW, SE, SE, Sec.11, T13S, R4W, HEALY D-3.
1583/33	KP8	Tdb	diabase	NE, NE, SE, Sec.03, T14S, R3W, HEALY C-3.
1596/10	CR317	Tr	rhyolite	NW, SE, SE, Sec.30, T16S, R3W, HEALY B-3.
1596/13	CR302	PTrgs	greenstone	SE, NE, NW, Sec.12, T16S, R3W, HEALY C-3.
1596/22	CR58	Jmg	metagabbro	NE, SW, NW, Sec.06, T15S, R2W, HEALY C-3.
1596/26	TT49	TKqm	quartz monzonite	NE, SW, NW, Sec.16, T17S, R2W, HEALY B-2.
1596/27	TT4A	TKga	gabbro	SW, NW, SE, Sec.03, T17S, R2W, HEALY B-2.
1596/30	CR83	Tdb	diabase	NE, SE, NE, Sec.09, T14S, R3W, HEALY C-3.
1596/31	TT39	Tdb	diabase	NW, NW, SW, Sec.08, T17S, R2W, HEALY B-2.
1596/33	CR323	Tan	andesite	NW, SE, SE, Sec.10, T16S, R3W, HEALY C-3.

U.W. SPECIMEN NUMBER	FIELD NUMBER	MAP UNIT	ROCK TYPE	MAP LOCATION
1622/17	TC20	PTrgs	greenstone	SE, SW, SW, Sec.35, T15S, R3W, HEALY C-3.
1622/18	TC201	PTrgs	greenstone	NW, NE, SE, Sec.36, T15S, R3W, HEALY C-3.
1622/19	TC180	PTrgs	greenstone	NW, SE, SE, Sec.31, T15S, R2W, HEALY C-3.
1622/23	TC231B	Trlg	limestone	SW, NE, NW, Sec.08, T16S, R2W, HEALY C-2.
1622/30	TC357A	Trlg	argillite	SE, NW, NW, Sec.19, T14S, R1W, HEALY C-2.
1622/31	TC357B	Trlg	argillite	SE, NW, NW, Sec.19, T14S, R1W, HEALY C-2.
1631/01	DN38	Jmg	metagabbro	NW, NE, SW, Sec.34, T15S, R4W, HEALY C-3.
1631/02	DN39	Jmg	metagabbro	SW, SE, NW, Sec.34, T15S, R4W, HEALY C-3.
1631/03	DN68	Jmg	metagabbro	SE, SE, SE, Sec.22, T15S, R4W, HEALY C-3.
1631/21	DN66	PTrgs	greenstone	NW, NE, SE, Sec.25, T15S, R4W, HEALY C-3.
1631/35	DN17	Jmg	metagabbro	SE, NW, NW, Sec.02, T16S, R5W, HEALY C-3.
1631/49	DN14	Tda	dacite	SW, NE, NW, Sec.11, T15S, R5W, HEALY C-3.
1633/03	K1522	kp	marble	SE, SE, NE, Sec.08, T13S, R4W, HEALY D-3.
1633/04	K482	Dms	marble	NW, NW, SE, Sec.26, T13S, R1E, HEALY D-1.
1633/12	K327	Dmf	schist	NW, NE, SW, Sec.19, T13S, R1E, HEALY D-2.
1633/13	K327A	Dmf	schist	NW, NE, SW, Sec.19, T13S, R1E, HEALY D-2.
1633/14	K484	Dmg	greenstone	NW, SW, NW, Sec.26, T13S, R1E, HEALY D-2.
1633/15	K486	Dmf	schist	SW, SE, SW, Sec.23, T13S, R1E, HEALY D-2.
1633/16	K547	Dmf	schist	NW, NE, SE, Sec.18, T13S, R2E, HEALY D-1.
1633/17	K573	Dmf	schist	NW, SE, SW, Sec.27, T13S, R3E, HEALY D-1.
1633/18	K1422	Dmg	greenstone	NW, SE, SW, Sec.24, T13S, R3W, HEALY D-3.
1633/19	K1428	Dmg	greenstone	NW, SW, SE, Sec.23, T13S, R3W, HEALY D-3.
1633/20	K1432	Dmf	schist	SE, NE, NE, Sec.23, T13S, R3W, HEALY D-3.
1633/21	K1479	Dmg	greenstone	SE, SE, SW, Sec.11, T13S, R3W, HEALY D-3.
1633/22	K1500	Dmf	schist	NW, SE, SW, Sec.10, T13S, R3W, HEALY D-3.
1633/23	K1500A	Dmg	greenstone	NW, SE, SW, Sec.10, T13S, R3W, HEALY D-3.
1633/24	CTW6	SD1	limestone	NW, NE, NW, Sec.17, T17S, R7W, HEALY B-4.
1633/25	K58D	Trlg	argillite	SW, NW, NW, Sec.18, T14S, R2W, HEALY C-3.
1633/26	K61	Trlg	argillite	NE, NW, NE, Sec.13, T14S, R3W, HEALY C-3.

U.W. SPECIMEN NUMBER	FIELD NUMBER	MAP UNIT	ROCK TYPE	MAP LOCATION
1633/27	K214A	Trlg	argillite	SE, SE, SE, Sec.31, T13S, R1E, HEALY C-2.
1633/28	TC265	Trlg	argillite	SE, NW, NE, Sec.19, T14S, R1W, HEALY C-2.
1633/29	TC328	Trlg	argillite	SW, SW, SE, Sec.18, T14S, R1W, HEALY C-2.
1633/30	TC357D,E, G	Trlg	argillite	SE, NW, NW, Sec.19, T14S, R1W, HEALY C-2.
1633/31	K212	Trlg	argillite	NW, NW, NE, Sec.06, T14S, R1E, HEALY C-2.
1633/32	TT34	Trlg	limestone	SE, SE, SE, Sec.12, T17S, R1W, HEALY B-3.
1633/33	L13A	Trlg	limestone	SW, SW, SW, Sec.25, T14S, R11W, HEALY C-6.
1633/34	K466	Trlg	limestone	SW, SE, NE, Sec.34, T13S, R1E, HEALY D-2.
1633/35	R22	Trlg	limestone	NE, NW, SE, Sec.29, T14S, R8W, HEALY C-5.
1633/36	K285B	Trlg	limestone	NE, NW, SW, Sec.05, T14S, R1E, HEALY C-2.
1633/37	K230	Trlg	limestone	SE, SW, NE, Sec.36, T13S, R1W, HEALY C-2.
1633/38	K483	Dmg	marble	NW, NE, SE, Sec.26, T13S, R1E, HEALY D-1.
1633/39	X9	Trlg	limestone	NW, NW, SE, Sec.29, T14S, R11W, HEALY C-6.
1633/40	CTW56	PMs	limestone	63°25'57" N.Lat.; 148°41'00" W.Long., HEALY B-4.
1633/43	K426D	Pzcp	phyllite	SW, NW, SE, Sec.17, T14S, R1W, HEALY C-2.
1633/47	K450	Trlg	argillite	SE, NW, SE, Sec.08, T14S, R1W, HEALY C-2.
1633/77	K503	Jmg	metagabbro	NW, SW, SW, Sec.12, T14S, R1E, HEALY C-1.
1633/87	K520	Kgd	quartz monzonite	NE, SW, SE, Sec.31, T13S, R2E, HEALY C-1.

APPENDIX 2

POTASSIUM-ARGON RADIOMETRIC AGE DETERMINATION DATA

Analyses performed by: Krueger Enterprises, Inc.
Geochron Laboratories Division
24 Blackstone Street
Cambridge, Massachusetts 02139

Constants Used:

$$\lambda_B = 4.72 \cdot 10^{-10}/\text{year}$$

$$\lambda_e = 0.585 \cdot 10^{-10}/\text{year}$$

$$K^{40}/K = 1.22 \cdot 10^{-4} \text{g/g}$$

$$\text{AGE (m.y.)} = 1/\lambda_e + \lambda_B \ln(((\lambda_B+\lambda_e)/\lambda_e)(Ar^{40*}/K^{40}) + 1)$$

Ar^{40*} refers to radiogenic Ar^{40}

* /date considered suspect or performed on altered material.

*min./date performed on plutonic or altered feldspar and can only be considered a minimum age.

Specimen	Rock Type	Unit	Material Analyzed	Ave. Ar^{40*}, ppm.	K^{40}, ppm.	Calculated Age
UW1574/17	Quartz Diorite	Tqd	Amphibole	0.000699	0.426	35.7 ± 2.8 m.y.
UW1553/4	Granodiorite	Tgd	Biotite	0.014600	6.476	38.1 ± 1.4
UW1553/7	Granodiorite	TKgd	Biotite	0.022700	6.561	58.3 ± 2.0
UW1563/3	Diabase	Tdb	Whole Rock	0.007426	2.353	53.2 ± 2.3
UW1563/4	Diabase	Tdb	Whole Rock	0.003210	0.919	58.6 ± 3.0
UW1563/2	Basalt	Tcv	Whole Rock	0.007153	2.438	49.5 ± 2.1
UW1583/18	Dacite	Tcv	Hornblende	0.003343	0.893	62.9 ± 3.3
UW1574/18	Granite	TKgr	Biotite	0.018090	5.629	55.7 ± 2.2
UW1574/19	Granite	Tqm	Biotite	0.001928	0.450	71.8 ± 4.6 *
UW1583/30	Basalt	Kb	Hornblende	0.001407	0.306	77.0 ± 5.9
UW1574/4	Andesite	Tan	Hornblende	0.003806	0.770	82.6 ± 4.3
UW1574/7	Granodiorite	TKgd	Biotite	0.028610	6.860	70.0 ± 2.6
UW1580/42	Granodiorite	TKgd	Biotite	0.015250	3.717	68.9 ± 2.8
UW1574/3	Granodiorite	TKgd	Biotite	0.006644	1.453	76.6 ± 3.5
UW1583/17	Monzonite	Km	Hornblende	0.003359	0.568	98.4 ± 5.5
UW1580/15	Gabbro	Jmg	Feldspar	0.008530	1.033	136.0 ± 6.0 *min.
UW1574/6	Gabbro	Jmg	Pyroxene	0.002079	0.106	307.0 ± 42 *
UW1580/16	Phyllite	Dms	Muscovite	0.019210	2.853	112.0 ± 5
UW1563/1	Metagabbro	mgb	Actinolite	0.004405	0.224	309.0 ± 25
UW1574/15	Gabbro	Jmg	Hornblende	0.002138	0.252	139.0 ± 11
UW1633/43	Phyllite	Pzcp	Muscovite	0.025940	4.132	104.0 ± 4.0
UW1633/77	Gabbro	Jmg	Pyroxene	0.029990	0.057	3295.0 ± 296 *
UW1633/87	Qtz. Monzonite	Kgd	Hornblende	0.006592	1.107	99.1 ± 4.6
UW1631/02	Gabbro	Jmg	Pyroxene	0.003817	0.049	1001.0 ± 96 *
UW1631/03	Gabbro	Jmg	Pyroxene	0.002236	0.048	662.0 ± 65 *
UW1596/10	Rhyolite	Tr	Feldspar	0.005055	3.744	22.9 ± 1.0 *min.
UW1596/27	Gabbro	TKga	Biotite	0.011290	3.045	62.3 ± 2.6
UW1596/26	Qtz. Monzonite	TKqm	Biotite	0.015330	4.595	56.2 ± 2.2

APPENDIX 3

CHEMICAL ANALYSES OF ROCK SPECIMENS

Analyses performed by: Technical Services Laboratory
355 King Street West
Toronto 2B, Ontario
CANADA

Unit	Specimen No.	An.	SiO_2	Al_2O_3	CaO	MgO	Fe_2O_3	FeO	TiO_2	MnO	Na_2O	K_2O	CO_2	P_2O_5	H_2O^-	H_2O^+	Total
Dmf	U.W.1574/24	TSL	67.22	16.21	0.48	1.66	1.27	2.84	0.75	0.01	6.02	0.34	0.84	0.22	0.01	1.56	99.43
		DUP	66.88	16.43	0.56	1.76	1.36	2.71	0.68	0.01	5.98	0.30	0.90	0.20	0.01	1.43	99.21
Dmg	U.W.1580/47	TSL	45.90	20.94*	3.23*	9.29	3.41	8.64	2.09	0.07	1.98	0.22	0.45	0.57	0.01	2.76	99.56
		DUP	45.86	21.20*	3.28*	9.11	3.59	8.51	2.07	0.05	1.99	0.24	0.50	0.50	0.01	2.50	99.41
Dmg	U.W.1580/51	TSL	46.26	30.09*	3.30*	5.15	2.84	4.51	0.91	0.03	2.01	0.04	1.28	0.20	0.01	2.78	99.41
		DUP	46.68	29.71*	3.21*	5.20	2.76	4.64	0.86	0.05	2.00	0.06	1.40	0.18	0.01	2.70	99.46
Dmg	U.W.1583/05	TSL	45.98	22.55	6.25	5.97	3.26	7.60	1.83	0.03	3.11	0.09	0.32	0.49	0.01	1.72	99.21
		DUP	46.34	22.78	6.15	5.84	3.33	7.61	1.71	0.03	3.04	0.10	0.36	0.41	0.01	1.80	99.51
Dmf	U.W.1633/12	TSL	67.11	13.76	1.50	1.16	2.94	2.84	0.69	0.06	5.60	2.60	0.20	0.11	0.15	1.13	99.85
		DUP	67.24	13.50	1.41	1.26	2.84	2.90	0.74	0.06	5.68	2.55	0.19	0.13	0.17	1.14	99.81
Dmf	U.W.1633/13	TSL	73.44	11.06	1.68	0.83	1.98	3.74	0.45	0.04	2.62	2.00	0.65	0.10	0.12	1.09	99.80
		DUP	73.61	10.70	1.70	0.81	2.07	3.71	0.49	0.03	2.70	2.08	0.70	0.08	0.13	1.16	99.97
Dmg	U.W.1633/14	TSL	48.75	19.12	8.12	6.97	1.42	7.61	1.32	0.11	2.50	1.22	0.51	0.19	0.12	1.95	99.91
		DUP	49.00	18.98	8.08	6.90	1.31	7.74	1.40	0.12	2.58	1.18	0.58	0.19	0.10	1.87	100.03
Dmf	U.W.1633/15	TSL	73.42	11.78	1.54	0.99	0.42	3.48	0.47	0.03	5.00	1.40	0.27	0.13	0.11	0.96	100.00
		DUP	73.22	12.00	1.55	0.87	0.50	3.45	0.50	0.02	5.02	1.29	0.29	0.17	0.13	0.90	99.91
Dmf	U.W.1633/16	TSL	74.11	11.58	1.26	1.00	1.27	1.29	0.49	0.02	4.98	2.42	0.36	0.11	0.21	0.80	99.90
		DUP	74.32	11.38	1.35	1.02	1.21	1.30	0.47	0.03	4.80	2.50	0.35	0.15	0.23	0.88	99.99
Dmf	U.W.1633/17	TSL	69.58	11.75	3.78	1.10	0.56	4.12	0.27	0.03	3.90	2.68	1.42	0.01	0.18	0.64	100.02
		DUP	69.40	12.00	3.61	1.15	0.60	3.99	0.28	0.04	3.87	2.72	1.46	0.02	0.17	0.65	99.96
Dmg	U.W.1633/18	TSL	48.53	14.49	8.12	7.96	1.27	8.51	2.50	0.16	5.01	0.16	0.36	0.24	0.23	2.26	99.80
		DUP	48.42	14.75	8.18	7.80	1.36	8.40	2.53	0.17	5.05	0.15	0.30	0.23	0.21	2.10	99.65
Dmg	U.W.1633/19	TSL	47.88	16.66	8.12	1.49	1.84	9.28	1.93	0.19	3.41	3.30	2.52	0.32	0.28	2.70	99.92
		DUP	47.54	16.70	8.32	1.52	1.76	9.40	1.99	0.16	3.28	3.48	2.60	0.33	0.20	2.68	99.96
Dmf	U.W.1633/20	TSL	82.80	8.71	0.84	0.16	0.14	0.65	0.29	0.01	3.90	1.25	0.25	0.01	0.18	0.32	99.51
		DUP	82.74	8.80	0.80	0.12	0.13	0.70	0.30	0.01	4.11	1.35	0.25	0.01	0.17	0.40	99.89
Dmg	U.W.1633/21	TSL	38.01	23.05	17.86	0.49	1.56	5.67	2.14	0.14	4.00	0.50	4.61	0.27	0.20	1.30	99.80
		DUP	38.16	22.99	17.91	0.50	1.67	5.54	2.20	0.13	4.09	0.45	4.39	0.30	0.23	1.44	100.00
Dmf	U.W.1633/22	TSL	78.58	8.30	1.35	0.15	0.28	0.77	0.14	0.03	2.00	7.28	0.69	0.02	0.11	0.27	99.97
		DUP	78.43	8.65	1.30	0.18	0.25	0.80	0.15	0.02	2.10	7.20	0.62	0.02	0.11	0.21	100.04
Dmg	U.W.1633/23	TSL	59.96	13.59	0.56	1.32	8.09	5.41	0.16	0.11	0.60	6.65	0.29	0.01	0.27	2.53	99.55
		DUP	59.52	13.70	0.61	1.40	8.00	5.42	0.15	0.12	0.69	6.73	0.21	0.02	0.28	2.60	99.45
Dmf	U.W.1580/09	TSL	82.20	8.41	0.84	0.49	0.26	0.90	0.10	0.01	3.11	2.59	0.60	0.01	0.10	0.29	99.91
		DUP	82.50	7.90	0.78	0.50	0.21	0.91	0.13	0.01	3.25	2.70	0.69	0.01	0.10	0.29	99.98
PTrgs	U.W.1574/25	TSL	50.36	22.07*	3.17*	4.98	2.41	7.61	1.42	0.03	3.65	0.06	1.20	0.18	0.01	2.26	99.41
		DUP	50.14	22.29*	3.21*	4.79	2.60	7.48	1.39	0.02	3.78	0.06	1.24	0.21	0.01	2.24	99.46
		PRB	51.35	15.13	8.99	5.50	---	12.26	1.65	0.15	3.74	0.15	1.08	----	----	----	100.00

Unit	Specimen No.	An.	SiO_2	Al_2O_3	CaO	MgO	Fe_2O_3	FeO	TiO_2	MnO	Na_2O	K_2O	CO_2	P_2O_5	H_2O^-	H_2O^+	Total
PTrgs	U.W.1622/17	TSL	60.18	14.08	2.66	3.80	5.25	4.12	1.66	0.03	2.40	2.51	0.29	0.43	0.13	2.14	99.66
		DUP	60.02	14.27	2.61	3.72	5.11	4.13	1.71	0.02	2.45	2.60	0.28	0.47	0.10	2.21	99.70
PTrgs	U.W.1622/18	TSL	42.14	17.46	11.14	8.63	1.70	7.74	1.61	0.17	2.50	1.68	1.77	0.28	0.06	2.87	99.75
		DUP	42.00	17.69	10.92	8.70	1.77	7.70	1.68	0.15	2.48	1.70	1.80	0.30	0.05	2.79	99.73
PTrgs	U.W.1622/19	TSL	48.54	15.41	7.98	7.13	2.20	8.77	1.54	0.24	4.60	0.50	0.27	0.19	0.12	2.52	100.01
		DUP	48.38	15.47	8.08	7.03	2.13	8.70	1.49	0.21	4.70	0.48	0.29	0.23	0.11	2.59	99.69
PTrgs	U.W.1596/13	TSL	49.54	18.06	6.72	4.96	1.20	8.25	1.29	0.12	4.17	0.20	2.34	0.20	0.11	2.36	99.52
		DUP	49.52	17.89	6.82	5.08	1.12	8.38	1.36	0.11	4.29	0.22	2.48	0.21	0.10	2.40	99.90
PTrgs	U.W.1631/21	TSL	47.56	18.02	5.04	6.14	1.76	9.00	1.86	0.11	6.42	0.13	0.25	0.23	0.12	3.15	99.79
		DUP	47.38	18.40	5.06	6.17	1.84	9.01	1.78	0.12	6.13	0.14	0.30	0.21	0.14	3.09	99.77
Jmg	U.W.1631/35	TSL	47.74	13.98	7.84	5.81	2.10	11.48	2.02	0.22	4.99	0.10	0.80	0.18	0.08	2.41	99.75
		DUP	47.85	13.93	8.00	5.68	1.98	11.40	2.03	0.24	4.70	0.11	0.90	0.15	0.09	2.47	99.53
Jmg	U.W.1631/01	TSL	46.83	16.28	11.06	5.80	2.34	9.03	2.13	0.18	2.91	0.90	0.36	0.18	0.10	1.99	100.09
		DUP	46.59	15.96	11.24	5.81	2.27	9.00	2.20	0.18	2.85	0.95	0.37	0.20	0.08	2.13	99.83
Jmg	U.W.1580/03	TSL	46.84	26.26*	4.87*	6.97	2.55	6.57	0.93	0.05	1.40	0.30	0.29	0.35	0.01	1.82	99.21
		DUP	47.10	26.51*	4.94*	7.00	2.65	6.45	1.00	0.04	1.35	0.25	0.36	0.28	0.01	1.80	99.74
		PRB	48.41	15.99	12.59	9.02	----	10.69	1.23	0.19	1.46	0.50	----	----	----	----	100.08
Jmg	U.W.1596/22	TSL	48.60	13.67	8.03	5.71	2.69	12.12	1.35	0.18	2.95	1.10	0.18	0.19	0.14	2.78	99.69
		DUP	48.94	13.12	8.23	5.90	2.78	12.00	1.33	0.20	2.96	1.18	0.16	0.20	0.13	2.80	99.93
Tdb	U.W.1580/06	TSL	46.12	25.45*	2.63*	5.48	2.13	7.22	2.03	0.06	2.62	0.22	2.45	0.46	0.25	2.08	99.20
		DUP	46.36	25.63*	2.71*	5.40	2.27	7.22	2.19	0.06	2.60	0.23	2.34	0.39	0.18	1.95	99.53
Kb	U.W.1583/32	TSL	48.14	19.72*	1.85*	6.64	1.56	3.99	0.82	0.03	2.00	0.33	12.26	0.30	0.01	1.94	99.59
		DUP	47.86	19.86*	2.00*	6.42	1.49	4.20	0.85	0.05	2.00	0.36	11.89	0.26	0.01	1.86	99.11
Tdb	U.W.1583/33	TSL	46.66	24.02*	2.23*	3.98	2.98	7.48	2.19	0.09	3.49	1.40	3.40	0.68	0.01	1.56	100.17
		DUP	46.86	23.65*	2.25*	4.07	2.84	7.48	2.12	0.10	3.40	1.05	3.47	0.59	0.01	1.58	99.47
Tdb	U.W.1596/30	TSL	55.66	14.28	5.62	8.21	1.42	5.80	0.69	0.09	1.70	0.21	3.07	0.49	0.12	2.14	99.50
		DUP	55.90	14.61	5.52	8.04	1.33	5.79	0.70	0.10	1.78	0.20	2.93	0.43	0.10	2.18	99.61
Tdb	U.W.1596/31	TSL	50.26	17.73	6.92	5.17	2.05	6.19	1.14	0.13	2.85	1.76	1.83	0.57	0.26	2.44	99.30
		DUP	50.36	18.00	7.02	5.30	1.97	6.27	1.06	0.14	2.76	1.84	1.76	0.60	0.24	2.39	99.71
TKga	U.W.1596/27	TSL	46.70	17.86	15.61	9.11	1.21	5.68	0.34	0.11	1.13	0.27	0.31	0.12	0.08	1.08	99.61
		DUP	46.42	17.91	15.76	9.26	1.27	5.78	0.33	0.10	1.09	0.28	0.30	0.14	0.06	1.10	99.80

APPENDIX 3, CONTINUED.

Unit	Specimen No.	An.	SiO_2	Al_2O_3	CaO	MgO	Fe_2O_3	FeO	TiO_2	MnO	Na_2O	K_2O	CO_2	P_2O_5	H_2O^-	H_2O^+	Total
Tda	U.W.1631/49	TSL	59.86	14.50	3.08	4.31	0.80	4.90	0.61	0.11	5.86	2.31	1.18	0.21	0.14	2.19	100.06
		DUP	60.06	14.30	3.10	4.25	0.85	4.77	0.62	0.10	5.78	2.40	1.17	0.21	0.15	2.21	99.97
Tan	U.W.1583/26	TSL	62.68	19.17*	0.55*	2.26	0.99	2.96	0.58	0.03	4.57	2.55	1.27	0.28	0.01	1.56	99.46
		DUP	62.54	19.50*	0.60*	2.34	0.85	3.09	0.64	0.05	4.38	2.59	1.40	0.24	0.01	1.60	99.83
Tan	U.W.1596/33	TSL	55.54	16.22	4.82	2.16	0.99	9.41	0.58	0.15	3.69	1.75	1.20	0.77	0.14	1.88	99.30
		DUP	55.46	16.01	4.91	2.22	1.08	9.50	0.60	0.17	3.80	1.80	1.24	0.75	0.12	1.94	99.60
Tr	U.W.1596/10	TSL	72.86	11.95	0.95	0.79	1.06	1.93	0.47	0.04	4.05	3.99	0.15	0.12	0.12	1.22	99.70
		DUP	72.42	12.13	0.76	0.83	1.05	1.90	0.41	0.05	4.16	4.03	0.18	0.13	0.11	1.28	99.44
TKgd	U.W.1580/42	TSL	60.16	20.07*	2.33*	3.32	2.56	5.99	0.80	0.02	2.98	3.23	0.29	0.27	0.01	0.68	102.71
		DUP	60.20	19.64*	2.45*	3.21	1.56	4.10	1.90	0.03	2.92	3.35	0.25	0.23	0.01	0.78	100.63
Tcv	U.W.1583/18	TSL	59.62	18.56	1.35	4.81	0.85	4.38	0.66	0.06	4.58	2.58	0.57	0.27	0.01	1.26	99.56
		DUP	60.12	18.05	1.40	4.69	1.00	4.39	0.70	0.05	4.56	2.54	0.60	0.25	0.01	1.15	99.51

TSL: Analysis by Technical Services Laboratory, 355 King St. West, Toronto 2B, Ontario, Canada.

DUP: Duplicate analysis, Technical Services Laboratory.

PRB: Analysis performed on Electron Microprobe, Dept. of Geology, University of Wisconsin, Madison.

* value considered suspect ; an entire suite of specimens analyzed by Technical Services Laboratory in 1972 possess unusually high reported values of Al_2O_3 and unusually low reported values of CaO; compare TSL and U.W. probe analyses of specimens U.W.1574/25 and U.W.1580/03.

APPENDIX 4.
Fossil Locality Data

SPECIMEN NUMBER U.W., (FIELD)	MAP UNIT	FOSSILS PRESENT	STRATIGRAPHIC AGE	PALEONTOLOGIST AND REFERENCE
1633/24 (CTW6) (USGS 9524-SD) also USGS 1	SD1	Stromatoporoids: Clavidictyon sp.(ramose) Amphipora sp.(?) Rugose Corals: Tryplasma sp.(phaceloid) cf.Lyrielasma sp. cf.Zelophyllum (?) sp.	Silurian to Devonian	William A. Oliver U.S. Nat. Museum Washington, D.C. (letter to Sherwood, 23 April 1975). Jean M. Berdan, U.S.G.S. (Moxham et al., 1959)
USGS 2	SD1	Cladopora sp., pseudamplexoid coral, stromatoporoids. Coenites ? sp., unidentified horn coral.	Silurian to Devonian	Jean M. Berdan, U.S.G.S. (Moxham et al., 1959)
USGS 3	Trlg	Pelecypods: Megalodus sp. Mysidia sp. Belemnites.	Upper Triassic	Ralph W. Imlay, U.S.G.S. (Moxham et al., 1959)
U.W.1553/09 (CTW14)	JKa	Inoceramus scraps, brachiopods, belemnites.	Jurassic to Cretaceous	Dr. L.R. Laudon Univ. Wisconsin D.L. Jones, U.S.G.S. A.K. Armstrong, U.S.G.S. (Hickman, 1974, p.273)
U.W.1553/10 (CTW139)	SDms	gastropods, crinoids, bryozoans, corals, Astraeospongia spicules.	Silurian ?	L.R. Laudon, Univ. Wisc. J.K. Rigby, Brigham Young U. (Hickman, 1974, p.273)

SPECIMEN NUMBER U.W., (FIELD)	MAP UNIT	FOSSILS PRESENT	STRATIGRAPHIC AGE	PALEONTOLOGIST AND REFERENCE
U.W.1553/11 (CTW141)	Trlg	Sagenites (?) sp., clams, belemnites.	Upper Triassic	L.R. Laudon, Univ. Wisc. (Hickman, 1974, p.273)
U.W.1563/13 (BA73)	Tcs	Dennstaedtia cf. D. americana; Metasequoia cf. M. occidentalis (Newb.) Chan.; Quercophyllum groenlandicus (Heer) Kock; Platanus sp.; Grewiopsis auriculae cordatus (Holl) Wolfe.	Paleocene	Dr. J. Wolfe, U.S.G.S. (Hickman, 1974, p.273)
U.W.1563/14 (BA48)	Tcs	Metasequoia Hamamelidacae	Paleocene	Dr. J. Wolfe, U.S.G.S. (Hickman, 1974, p.273)
U.W.1563/15 (BA47)	Tcs	Gryphaea in cobble in Paleocene Cantwell Fm.	Jurassic to Triassic	D.L. Jones, U.S.G.S. (Hickman, 1974, p.273)
U.W.1580/53 (RLA156)	PMms	possible Didymograptid graptolites; plant material ?	Mid-Paleozoic ?	D.L. Clark, Univ. Wisc. (Hickman, 1974, p.273)
U.W.1574/1 (MP224)	PTrgs	Productid brachiopods.	Pennsylvanian to Permian	L.R. Laudon, Univ. Wisc. (Hickman, 1974, p.274)
U.W.1574/02 (CTW88)	SDl	solitary corals, bryozoans.	Paleozoic	L.R. Laudon, Univ. Wisc. (Hickman, 1974, p.274)
U.W.1574/11 (YF423A)	PTrmt	Productid brachiopods.	Pennsylvanian to Permian	L.R. Laudon, Univ. Wisc. (Hickman, 1974, p.274)

SPECIMEN NUMBER U.W., (FIELD)	MAP UNIT	FOSSILS PRESENT	STRATIGRAPHIC AGE	PALEONTOLOGIST AND REFERENCE
U.W.1574/12 (YF423)	PTrmt	From conglomerate cobble: echinoderm and brachiopod fragments, bryozoa, tetracorals, echinoid spines, Thamnopora sp. cf. T. cervicornis de Blainville.	lower Upper or Middle Devonian	T. DeKeyser, Univ. Wisc. (Hickman, 1974, p.274)
U.W.1574/13 (YF338)	PTrmt	From conglomerate cobble: Amphipora sp. cf. A. ramosa Phillips; Anostylostroma ? sp.; Hammatostroma sp. cf. H. albertende Stein.	lower Upper or Middle Devonian	T. DeKeyser, Univ. Wisc. (Hickman, 1974, p.274)
U.W.1574/14 (YF362)	PTrmt	echinoderm and brachiopod fragments, bryozoa.	Paleozoic or Mesozoic	T. DeKeyser, Univ. Wisc. (Hickman, 1974, p.274)
U.W.1574/20 (FP107)	SDl	crinoid fragments.	Paleozoic or Mesozoic	T. DeKeyser, Univ. Wisc. (Hickman, 1974, p.274)
U.W.1574/21 (MP45)	Tcs	Metasequoia Dicotylophyllum alaskana (Holl.) Wolfe.	Paleocene (?)	Dr. J. Wolfe, U.S.G.S. (Hickman, 1974, p.274)
U.W.1574/22 (MPCC1)	Tcs	Metasequoia Dicotylophyllum flexuosa (Newb.) Wolfe.	Paleocene (?)	Dr. J. Wolfe, U.S.G.S. (Hickman, 1974, p.274)

SPECIMEN NUMBER U.W., (FIELD)	MAP UNIT	FOSSILS PRESENT	STRATIGRAPHIC AGE	PALEONTOLOGIST AND REFERENCE
U.W.1583/12 (YF72)	Dms	Conodont fauna: 40 specimens of *Palmatolepis* sp., with at least 3 species resembling *P. Marginata*; 1 specimen of *Icriodus*, resembling either *I. symmetricus* or *I. alternatus*; 2 or 3 specimens of *Polygnathus* sp.	upper lower Upper Devonian, corresponding approximately to the *Palmatolepis triangularis* zone of the Upper Devonian.	D.L. Clark, Univ. Wisc. Laurel Babcock, Univ. Wisc. (Hickman, 1974, p.275)
U.W.1633/25 (K58D)	PMms	Graptolites (?): *Inocaulis* sp. (?)	Ordovician to Silurian ?	W.B.N. Berry, Berkeley, Calif. (letter to D.L. Clark, 27 November 1973)
U.W.1633/47 (K450)	PMms	Graptolites (?): *Ptilograptus* sp.(?)	Upper Cambrian to Carboniferous ?	W.B.N. Berry, Berkeley, Calif. (letter to D.L. Clark, 27 November 1973).
		ALTERNATE INTERPRETATION trace fossil *Chondrites*	Mesozoic or Paleozoic or	N.J. Silberling, U.S.G.S. (letter to Craddock, 12 October 1978)
U.W.1633/26 (K61)	PMms	Graptolites (?): *Inocaulis* sp. (?)	Ordovician to Silurian ?	W.B.N. Berry, Berkeley, Calif. (letter to D.L. Clark, 27 November 1973)
U.W.1633/27 (K214A)	PMms	possible dendroid graptolites (?)	Upper Cambrian to Devonian ?	W.B.N. Berry, Berkeley, Calif. (letter to D.L. Clark, 27 November 1973)

SPECIMEN NUMBER U.W., (FIELD)	MAP UNIT	FOSSILS PRESENT	STRATIGRAPHIC AGE	PALEONTOLOGIST AND REFERENCE
U.W.1633/28 (TC265)	PMms	possible fragments of dendroid graptolites (?)	Upper Cambrian to Devonian ?	W.B.N. Berry, Berkeley, Calif. (letter to Sherwood, 03 November 1975)
U.W.1633/29 (TC328A,B,C,E, F,G)	PMms	Graptolites (?): Possible dendroid graptolite fragments (?); possible Dendrograptus sp. (?).	Upper Cambrian to Carboniferous ?	W.B.N. Berry, Berkeley, Calif. (letter to Sherwood, 03 November 1975)
		ALTERNATE INTERPRETATION Probable trace fossils: Chondrites (all) Helminthoida (TC328C) Phycosiphon (TC328G)	Paleozoic or Mesozoic	N.J. Silberling, U.S.G.S. (letter to Craddock, 12 October 1978) C.K. Chamberlain, Cities Service Co., Denver, Colo. (letter to Craddock 20 October 1978)
U.W.1633/30 (TC357A,D,E,G)	PMms	possible Graptolites (?): dendroid graptolites ? Ptilograptus sp. (?)	Upper Cambrian to Carboniferous (?)	W.B.N. Berry, Berkeley, Calif. (letter to Sherwood, 03 November 1975)
		ALTERNATE INTERPRETATION Probable trace fossils: Chondrites	Paleozoic or Mesozoic	N.J. Silberling, U.S.G.S. (letter to Craddock, 12 October 1978)
U.W.1622/31 (TC357B)	PMms	possible graptolites (?)	Upper Cambrian to Carboniferous (?)	D.L. Clark, Univ. Wisconsin (Cota, 1975, p.195)
U.W.1633/31 (K212)	PMms	possible graptolites (?)	Upper Cambrian to Carboniferous (?)	

SPECIMEN NUMBER U.W., (FIELD)	MAP UNIT	FOSSILS PRESENT	STRATIGRAPHIC AGE	PALEONTOLOGIST AND REFERENCE
U.W.1622/23 (TC231B)	Trlg	Conodonts: Epigondolella bidentata	Upper Triassic (Norian)	David L. Clark University of Wisconsin
U.W.1633/32 (TT34)	Trlg?	Conodonts: possible Epigondolella sp.	Pennsylvanian to Upper Triassic	David L. Clark University of Wisconsin
U.W.1633/33 (L13A)	Trlg	Conodonts: Epigondolella abneptis	Upper Triassic	David L. Clark University of Wisconsin
U.W.1633/34 (K466)	Trlg	Conodonts: Epigondolella sp.	Middle to Upper Triassic	David L. Clark University of Wisconsin
U.W.1633/35 (R22)	Trlg	Conodonts: Epigondolella sp.	Middle to Upper Triassic	David L. Clark University of Wisconsin
U.W.1633/36 (K285B)	Trlg	Conodonts: Epigondolella sp.	Middle to Upper Triassic	David L. Clark University of Wisconsin
U.W.1633/37 (K230)	Trlg	Conodonts: Epigondolella sp. Gladigondolella sp.	Upper Triassic	David L. Clark University of Wisconsin
U.W.1633/38 (K483)	Dmg/ Dms	Conodonts: questionable fragments of Polygnathus sp.	Silurian to Triassic (Devonian ?)	David L. Clark University of Wisconsin
U.W.1633/39 (X9)	Trlg	unidentifiable conodont fragments	Ordovician to Upper Triassic (Upper Triassic ?)	David L. Clark University of Wisconsin

SPECIMEN NUMBER U.W., (FIELD)	MAP UNIT	FOSSILS PRESENT	STRATIGRAPHIC AGE	PALEONTOLOGIST AND REFERENCE
U.W.1633/40 (CTW56)	PMs	possible conodont fragment.	Ordovician to Triassic	David L. Clark University of Wisconsin
U.W.1633/04 (K482)	Dms	unidentifiable conodont fragment.	Ordovician to Triassic	David L. Clark University of Wisconsin
U.W.1633/03 (K1522)	kp?	scolecodonts	Post-Paleozoic	David L. Clark University of Wisconsin