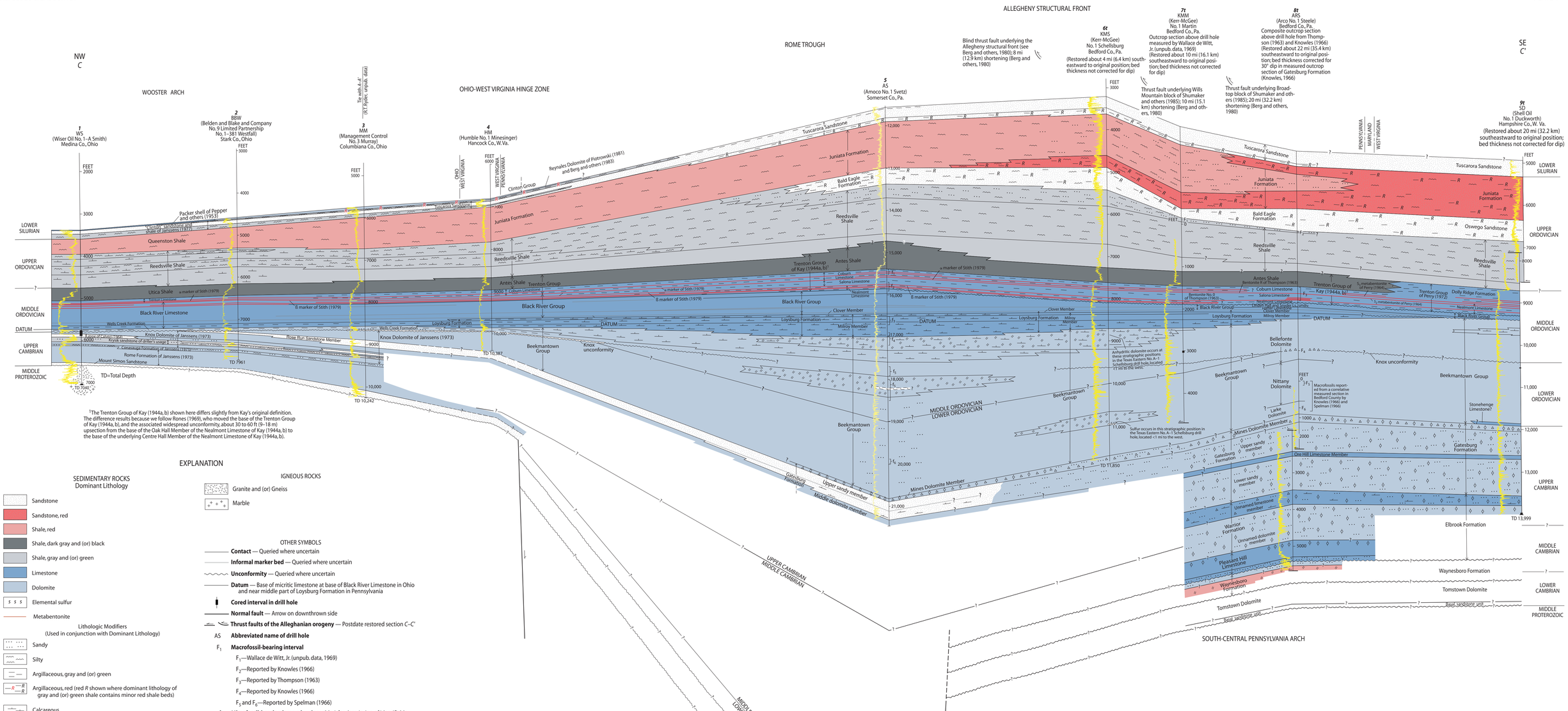

[1]The Trenton Group of Kay (1944a, b) shown here differs slightly from Kay's original definition. The difference results because we follow Rones (1969), who moved the base of the Trenton Group of Kay (1944a, b), and the associated widespread unconformity, about 30 to 60 ft (9–18 m) upsection from the base of the Oak Hall Member of the Nealmont Limestone of Kay (1944a, b) to the base of the underlying Centre Hall Member of the Nealmont Limestone of Kay (1944a, b).

EXPLANATION

SEDIMENTARY ROCKS
Dominant Lithology

- Sandstone
- Sandstone, red
- Shale, red
- Shale, dark gray and (or) black
- Shale, gray and (or) green
- Limestone
- Dolomite
- Elemental sulfur
- Metabentonite

Lithologic Modifiers
(Used in conjunction with Dominant Lithology)

- Sandy
- Silty
- Argillaceous, gray and (or) green
- Argillaceous, red (red *R* shown where dominant lithology of gray and (or) green shale contains minor red shale beds)
- Calcareous
- Dolomitic
- Anhydritic
- Cherty
- Oolitic

IGNEOUS ROCKS

- Granite and (or) Gneiss
- Marble

OTHER SYMBOLS

- **Contact** — Queried where uncertain
- **Informal marker bed** — Queried where uncertain
- **Unconformity** — Queried where uncertain
- **Datum** — Base of micritic limestone at base of Black River Limestone in Ohio and near middle part of Loysburg Formation in Pennsylvania
- **Cored interval in drill hole**
- **Normal fault** — Arrow on downthrown side
- **Thrust faults of the Alleghanian orogeny** — Postdate restored section *C–C'*
- AS **Abbreviated name of drill hole**
- F_1 **Macrofossil-bearing interval**
  - F_1—Wallace de Witt, Jr. (unpub. data, 1969)
  - F_2—Reported by Knowles (1966)
  - F_3—Reported by Thompson (1963)
  - F_4—Reported by Knowles (1966)
  - F_5 and F_6—Reported by Spelman (1966)
- f_1 **Microfossil-bearing interval** — See table 2 for description of identifiable conodonts
- GR 200 Gamma-ray curve.—Log scale generally from 0 to 200 API units

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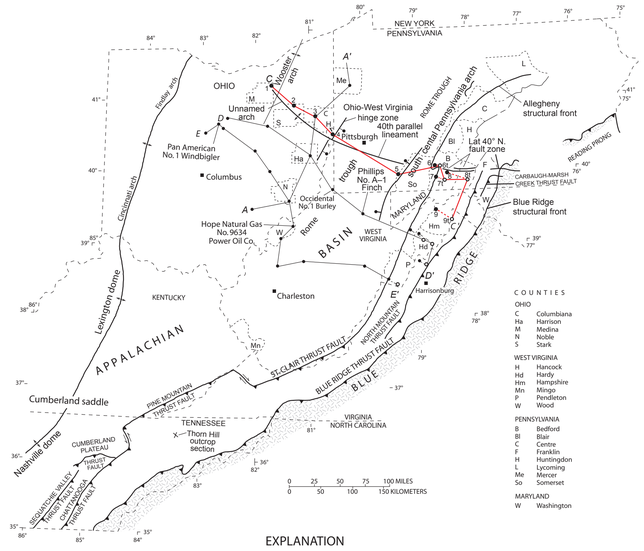

Figure 1. Tectonics of Ohio, Pennsylvania, West Virginia, and adjoining States showing the Appalachian basin, section *C–C'*, selected drill holes, and selected counties. Lines of sections *E–E'* and *D–D'* (Ryder, 1992, 1991) and *A–A'* (R.T. Ryder, unpub. data) are also identified on the map. Base from Wallace and de Witt (1975). Major tectonic and geologic features are from Cooper (1945), Calver and Hobbs (1963), Swingle and others (1966), Rodgers (1970), Wallace and de Witt (1975), Root and Hoskins (1977), Berg and others (1980), Shumaker and others (1985), and Coogan and Maki (1988a). Recent studies (for example, Wickstrom, 1990) indicate that the structure of the Cincinnati and Findlay arches is more complex than shown in this figure and by Wallace and de Witt (1975). Numbered drill holes in section *C–C'* are identified in table 1.

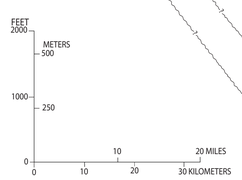

Table 1. Drill holes used in section *C-C'*

[Locations shown on figure 1]

Identification no.	Name used in text (abbreviation)	Location	Permit no.	Lithologic log[1]	Cored intervals (ft) and formation	Total depth (ft)	Age of oldest rocks penetrated (formation)
1	Wiser Oil No. 1–A Smith (WS).	Hinckley Township, Medina County, Ohio.	1143	GSLC, J	5,700–5,714; Black River Limestone. 5,742–5,746; Wells Creek Formation. 5,759–5,890; Wells Creek Formation, Knox Dolomite of Janssens (1973). 7,028–7,040; basement rocks of Middle Proterozoic age.	7,040	Middle Proterozoic.
2	Belden and Blake and Company No. 9 Limited Partnership No. 1–381 Westfall (BBW).	Marlboro Township, Stark County, Ohio.	1080	GSLC, J		7,961	Late Cambrian (Rome Formation of Janssens, 1973).
3	Management Control No. 3 Murray (MM).	Hanover Township, Columbiana County, Ohio.	648	GSLC, J		10,242	Middle Proterozoic(?).
4	Humble No. 1 Minesinger (HM).	Clay District, Hancock County, W. Va.	80	GSLC		10,387	Late Ordovician (part of Beekmantown Group).
5	Amoco No. 1 Svetz (AS)	Middle Creek Township, Somerset County, Pa.	45	GSLC		21,460	Late Cambrian (Gatesburg Formation).
6	Kerr-McGee No. 1 Schellsburg (KMS).	Napier Township, Bedford County, Pa.	34	GSLC		11,850	Late Cambrian (Gatesburg Formation).
7	Kerr-McGee No. 1 Martin (KMM).	Harrison Township, Bedford County, Pa.	13	GSLC, W	3,000–3,027; Beekmantown Group. 5,002–5,025; Beekmantown Group. 6,671–6,676; Juniata Formation.	6,676	Early and Middle Ordovician (Beekmantown Group) thrust over Early Middle and Late Ordovician (Beekmantown Group, Reedsville Shale, Bald Eagle Formation, and Juniata Formation).
8	Arco No. 1 Steele (ARS)	Snake Spring Township, Bedford County, Pa.	009–20060	GSLC		15,500	Early(?) and Middle Cambrian (Waynesboro Formation) thrust over Middle and Late Cambrian and Early and early Middle Ordovician (Warrior Formation, Gatesburg Formation, and Beekmantown Group).
9	Shell Oil No. 1 Duckworth (SD).	Springfield District, Hampshire County, W. Va.	12	GSLC, W	10,522–10,528; Beekmantown Group. 13,958–13,999; Elbrook Formation	13,999	Middle and Late Cambrian (Elbrook Formation).

[1]Lithologic logs from Geological Sample Log Company (GSLC) Pittsburgh, Pa., Janssens (1973) (J), and Wagner (1966) (W).

Table 2. Conodonts from the Amoco No. 1 Svetz drill hole, Somerset County, Pa.

[100- to 200-g cuttings taken at 100-ft intervals between 15,000 and 21,000 ft were processed for conodonts; only the productive samples are listed. Well collar at 2,480-ft elevation; total depth 21,460 ft. Conodont color alteration index (CAI) is a measure of organic maturation (Epstein and others, 1977)]

Sample interval (ft)	USGS collection no.	Conodonts	Age	CAI
		Coburn Limestone		
15,400–15,500	10750–CO	1 P (dichognathiform) element of *Phragmodus* sp. indet. or *Plectodina* sp. indet.	Middle Ordovician, no older than early Chazyan [no older than *Phragmodus tangshanensis* Zone (= *P. prefleuosus* Zone of Sweet and Bergstrom (1986)]	5
		Trenton Group		
15,700–15,800	10751–CO	1 P (dichognathiform) element of *Phragmodus* sp. indet. or *Plectodina* sp. indet. 1 M element, unassigned.	do.	5
		Trenton and Black River Groups		
15,800–15,900	10752–CO	1 P (dichognathiform) element of *Phragmodus* sp. indet. or *Plectodina* sp. indet.	do.	5
		Loysburg Formation		
16,500–16,600	10753–CO	1 M element, unassigned. 1 indeterminate fragment.	do.	5
16,600–16,700	10754–CO	1 robust hyaline ramiform fragment.	do.	5
16,900–17,000	10755–CO	do.	do.	5
		Beekmantown Group		
17,000–17,100	10756–CO	1 Pb element of *Curtognathus* sp. indet.	do.	5
17,100–17,200	10757–CO	1 Pb element of *Curtognathus* sp. indet. 1 robust hyaline ramiform fragment.	do.	5
17,700–17,800	10758–CO	1 indeterminate fragment.	do.	5
17,800–17,900	10759–CO	1 M element of *Phragmodus* sp. indet. 1 fragment of *Multioistodus* ? sp. 7 indeterminate fragments.	Middle Ordovician, interval of *P. tangshanensis Zone–Cahabagnathus friendsvillensis Zone.*	5
18,000–18,100	10759–CO	1 indeterminate fragment.	do.	5
18,100–18,200	10760–CO	1 P (dichognathiform) element of *Phragmodus* sp. indet.	do.	5
18,200–18,300	10760–CO	2 indeterminate fragments.	do.	5
18,400–18,500	10760–CO	1 indeterminate hyaline fragment.	do.	5
19,900–20,000	10760–CO	1 poorly preserved panderodontacean? element. 1 hyaline coniform fragment.	Middle(?) Ordovician, probably downhole contamination.	5

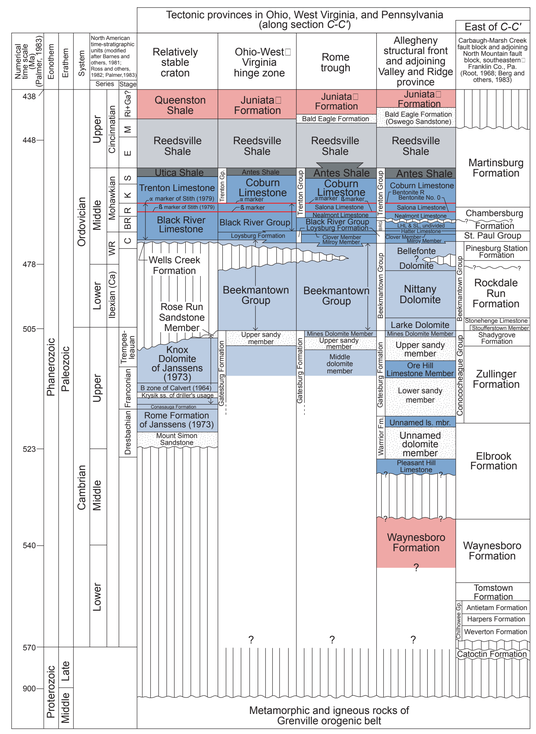

Figure 2.—Correlation chart of Middle Proterozoic, Cambrian, and Ordovician rocks along section *C-C'* and in the adjoining Franklin County, Pa. Absolute age (in Ma) is taken from the geologic time scale compiled by Palmer (1983). The time scale is nonlinear. North American chronostratigraphic units are modified after Barnes and others (1981), Ross and others (1982), and Palmer (1983). Series and Stage names: BR, Blackriveran; Ca, Canadian; C, Chazyan; E, Edenian; Ga, Gamachian; K, Kirkfieldian; M, Maysvillian; R, Rocklandian; Ri, Richmondian; S, Shermanian; WR, Whiterockian. Group name: BRG, Black River Group. Formation names: LF, Loysburg Formation; LHL, Linden Hall Limestone; SL, Snyder Limestone.

RESTORED STRATIGRAPHIC SECTION *C-C'* FROM MEDINA COUNTY, OHIO, THROUGH SOUTHWESTERN AND SOUTH-CENTRAL PENNSYLVANIA TO HAMPSHIRE COUNTY, WEST VIRGINIA, SHOWING THE CAMBRIAN AND ORDOVICIAN SEQUENCE

By
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1992

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2002