Rocky Mountain Paleogeography Through Geologic Time

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The main basins and uplifts of the Rocky Mountain region are outlined by a generalized thickness map of the total Phanerozoic sedimentary cover. Twelve maps showing thickness, generalized sedimentary facies, and probable emergent terrigenous clastic source areas are presented, covering the late Precambrian, Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, Permian, Triassic, Jurassic, Cretaceous, and Cenozoic.

In this paper we present thickness and facies maps that we have compiled from many sources over a period of several years. These maps include one that shows the present-day positions of basins and uplifts in the Rocky Mountains (Figure 1), followed by the twelve maps showing the thickness, sedimentary facies, and paleotectonic elements of the Rocky Mountains from late Precambrian to Cenozoic time (Figures 2–13). A lengthy discussion of each map is not included; each is presented at face value for interpretation by the interested observer. Detailed discussions, presentation of data, and analyses of sedimentary and tectonic processes can be found in the references cited below for each map (listed in Bibliography). Additional papers not cited here but that are relevant to topics relating to Rocky Mountain paleogeography are also given in the Bibliography.

In addition to personal data files, the main sources of information for the maps are as follows:

Rocky Mountain Basins and Uplifts (Figure 1): Haun and Kent (1965), Peterson (1965), and Jensen (1972).

Late Precambrian (Figure 2): Williams (1953), Hansen (1957), Wallace and Crittenden (1969), Crittenden et al. (1971), Stewart (1972), Beus et al. (1974), Ruppel (1975), Ruppel et al. (1975), Stewart and Suczek (1977), Reynolds and Lindsey (1979), Sears et al. (1982), Dutch (1983), and Winston (this volume).

Cambrian (Figure 3): Kottlowski (1965), Adler (1971), Crittenden et al. (1971), Balk (1972), Hintze (1973), Greenwood et al. (1977), Stewart and Suczek (1977), Peterson (1977a, 1981, 1984b), and Ross and Ross (this volume).

Ordovician (Figure 4): Kottlowski (1965), Adler (1971), Foster (1972), Hintze (1973), Greenwood et al. (1977), Ross (1977), Peterson (1977a, 1981, 1984b), Witzke (1980), and Ross and Ross (this volume).

Silurian (Figure 5): Kottlowski (1965), Adler (1971), Gibbs (1972), Hintze (1973), Greenwood et al. (1977), Poole and Sandberg (1977), Peterson (1977a, 1981, 1984b), and Ross and Ross (this volume).

Devonian (Figure 6): Kottlowski (1965), Adler (1971), Baars (1972), Hintze (1973), Greenwood et al. (1977), Loucks (1977), Poole and Sandberg (1977), Peterson (1977a, 1981, 1984b), Beus (1980), and Ross and Ross (this volume).

Mississippian (Figure 7): Kottlowski (1965), Adler (1971), Craig (1972), Hintze (1973), Rose (1976), Sando (1976), Poole and Sandberg (1977), Greenwood et al. (1977), Peterson (1977a, 1981, 1984b), Armstrong and Mamet (1978), Craig and Connor (1979), Armstrong et al. (1980), Skipp and Hall (1980), and Ross and Ross (this volume).

Pennsylvanian (Figure 8): Kottlowski (1965), Roberts et al. (1965), Adler (1971), Mallory (1972), Hintze (1973), McKee et al. (1975), Greenwood et al. (1977), Rich (1977), Peterson (1977a, 1981, 1984b), Skipp and Hall (1980), De Voto (1980), and Ross and Ross (this volume).

Permian (Figure 9): Kottlowski (1965), Roberts et al. (1965), McKee et al. (1967), Adler (1971), Rascoe and Baars (1972), Hintze (1973), Greenwood et al. (1977), Peterson (1977b), Skipp and Hall (1980), Peterson (1980, 1981, 1984a, b), Wardlaw (1980), and Ross and Ross (this volume).

Triassic (Figure 10): McKee et al. (1959), MacLachlan (1972), Hintze (1973), and Peterson (1981, 1984b).

Jurassic (Figure 11): McKee et al. (1956), Peterson (1972, 1981), Hintze (1973), and Imlay (1980).

[1]Deceased, July 1983.

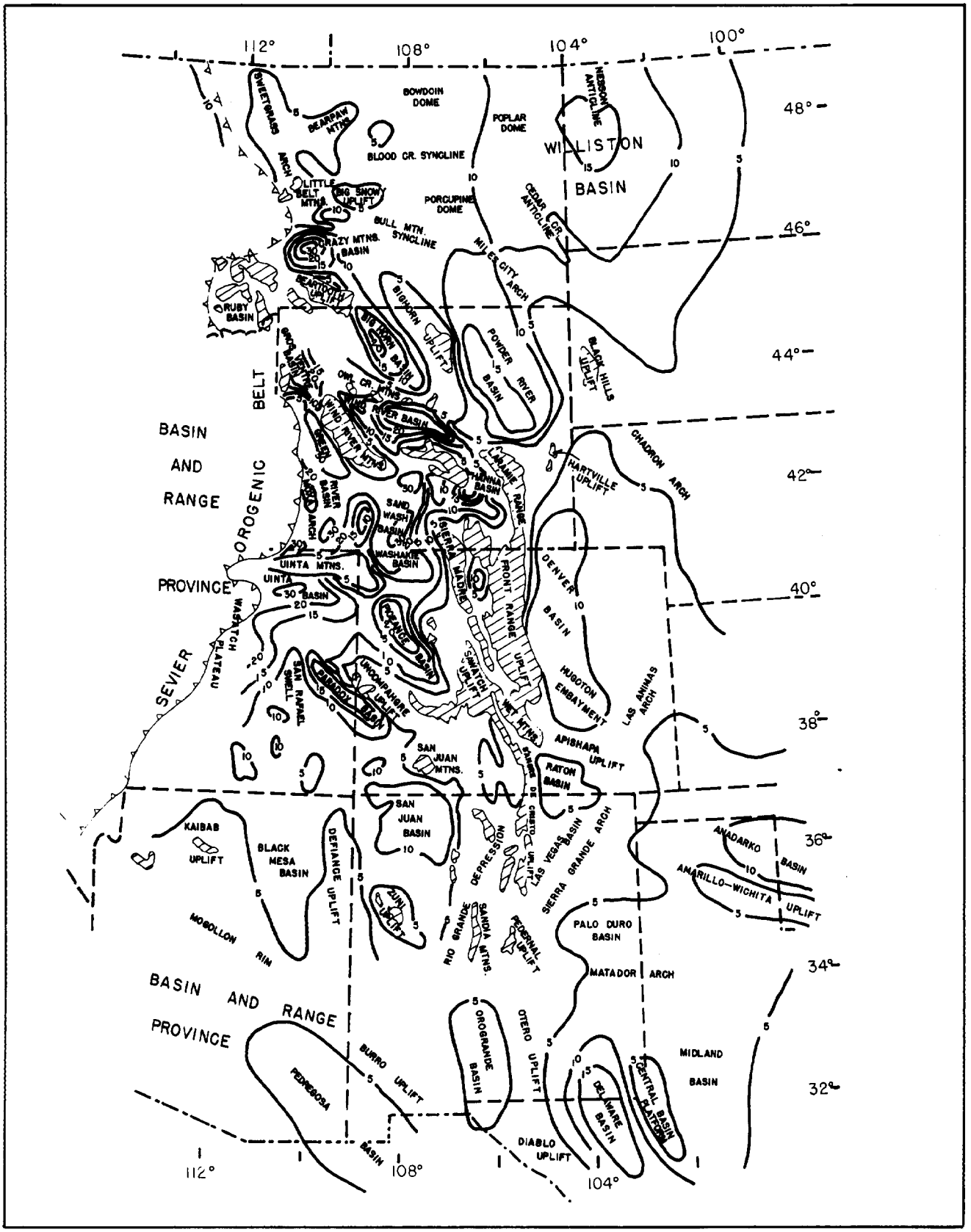

Figure 1—Basins and uplifts of the Rocky Mountains, showing approximate thickness of total Phanerozoic sedimentary cover in thousands of feet. Areas of exposed Archaean rocks east of the thrust belt are shown by cross-hatching; eastern edge of thrust belt is shown by barbed line.

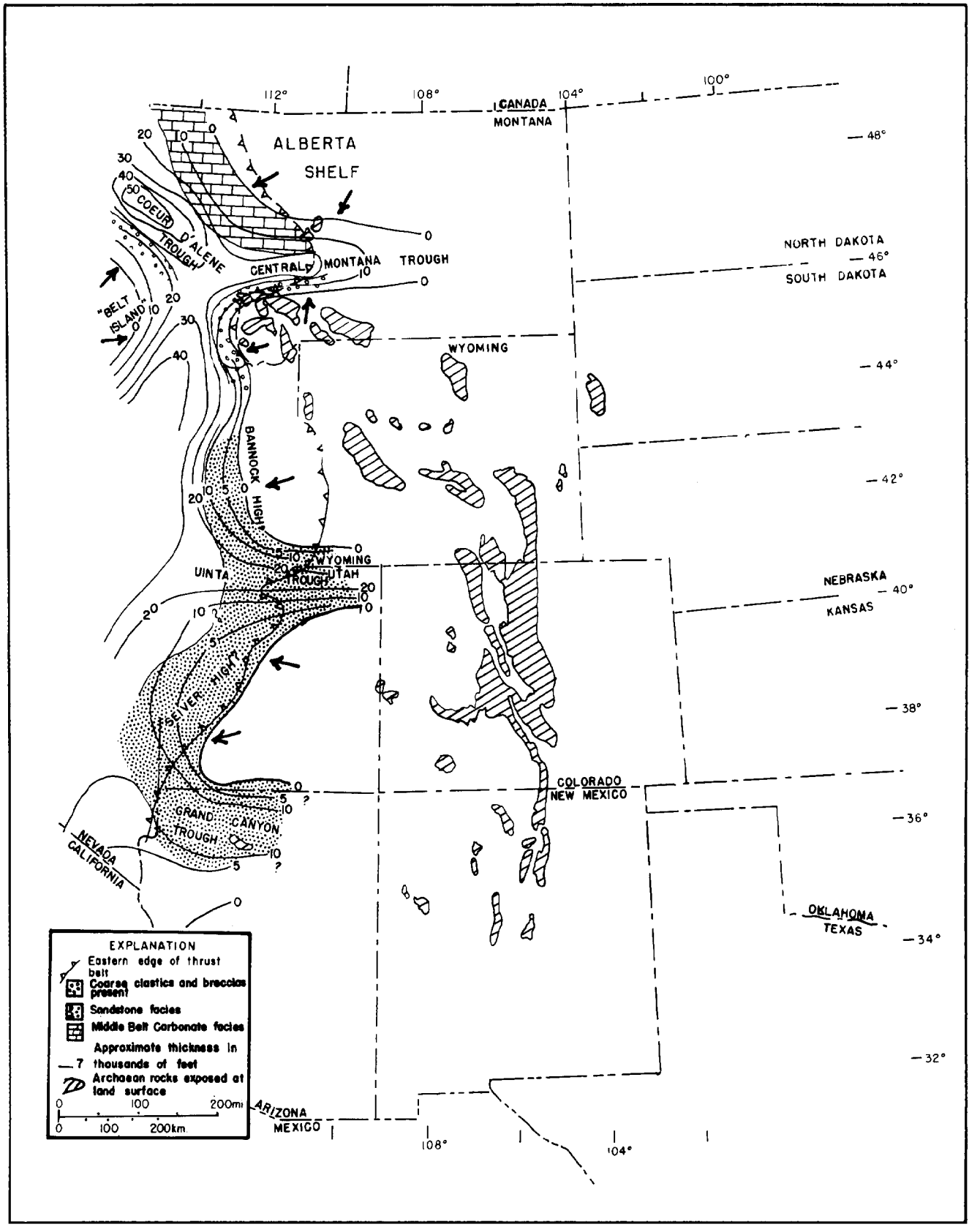

Figure 2—Late Precambrian, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments.

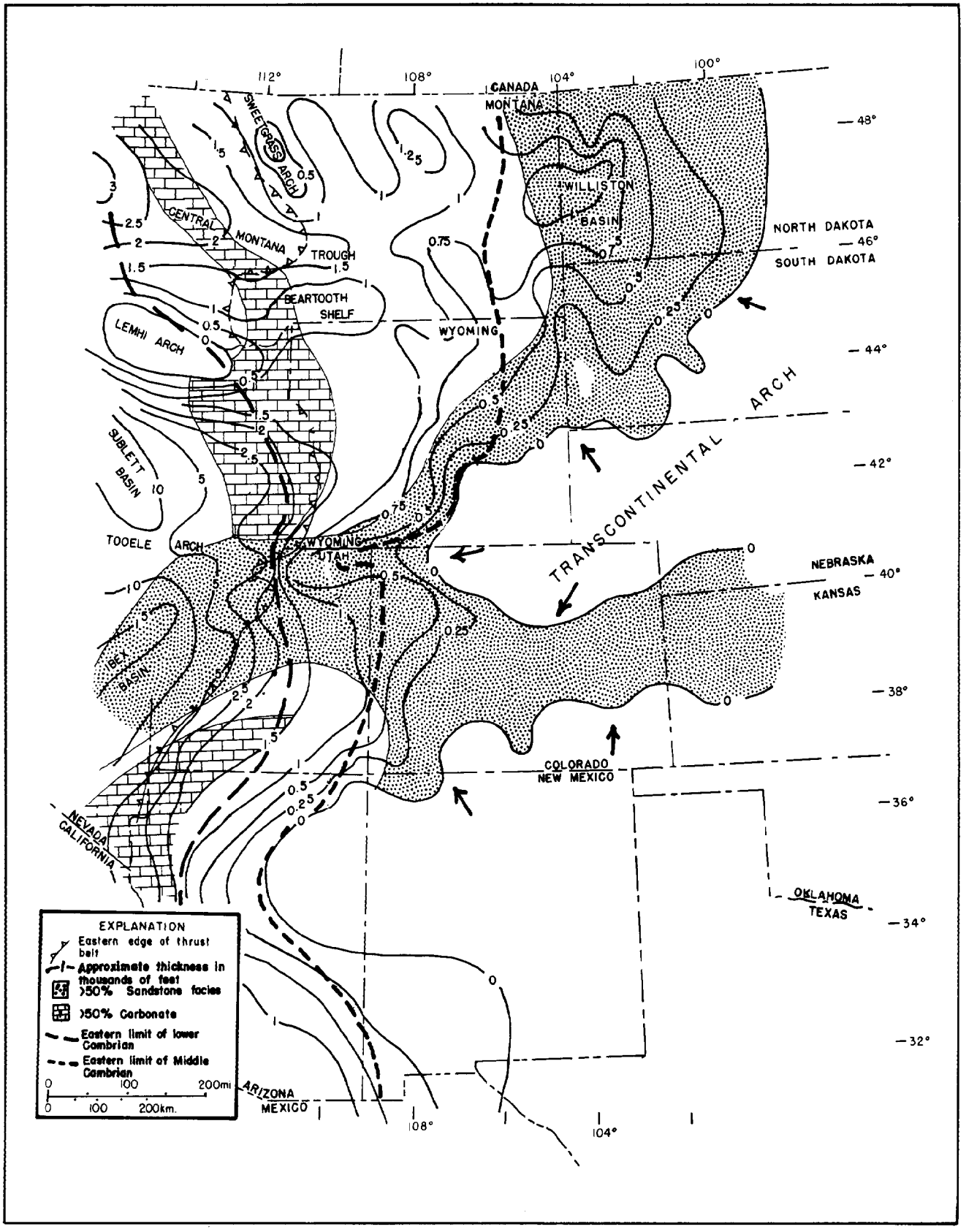

Figure 3—Cambrian System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments. Approximate eastern limits of Lower and Upper Cambrian sedimentary rocks are shown by dashed lines.

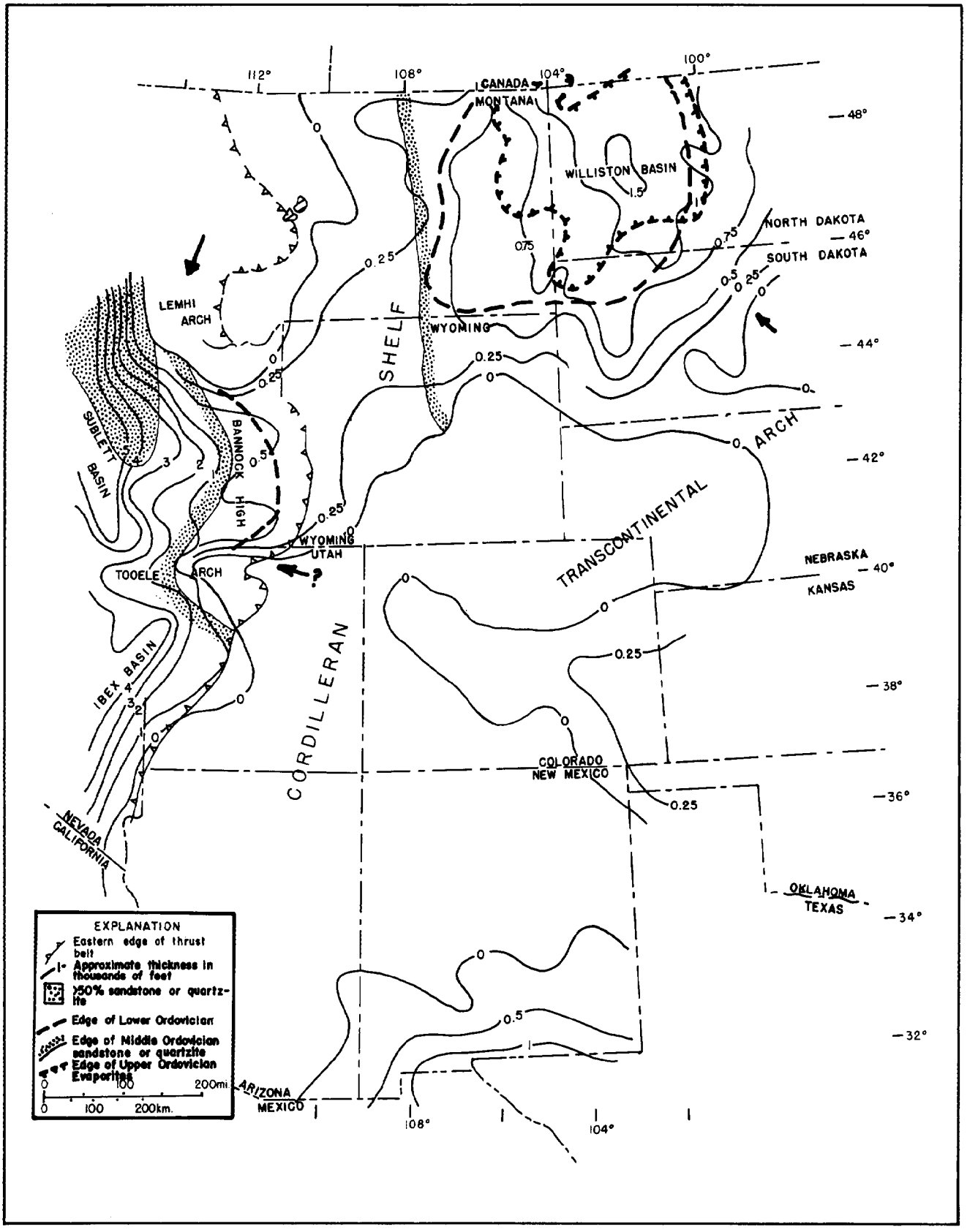

Figure 4—Ordovician System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments.

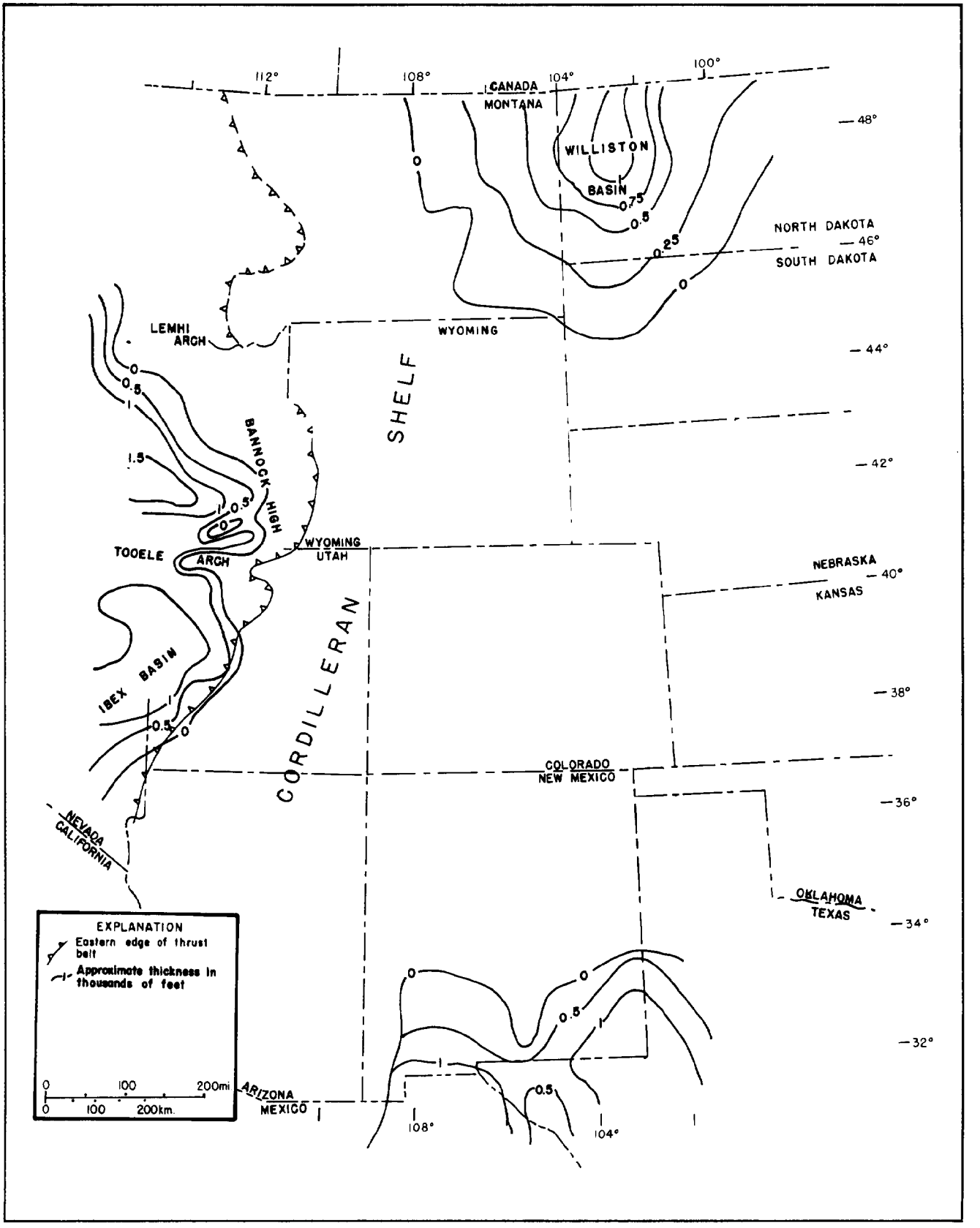

Figure 5—Silurian System, showing approximate thickness and main paleotectonic elements. Rocks are primarily marine dolomite in most areas. Data are palinspastically restored in the western thrust belt.

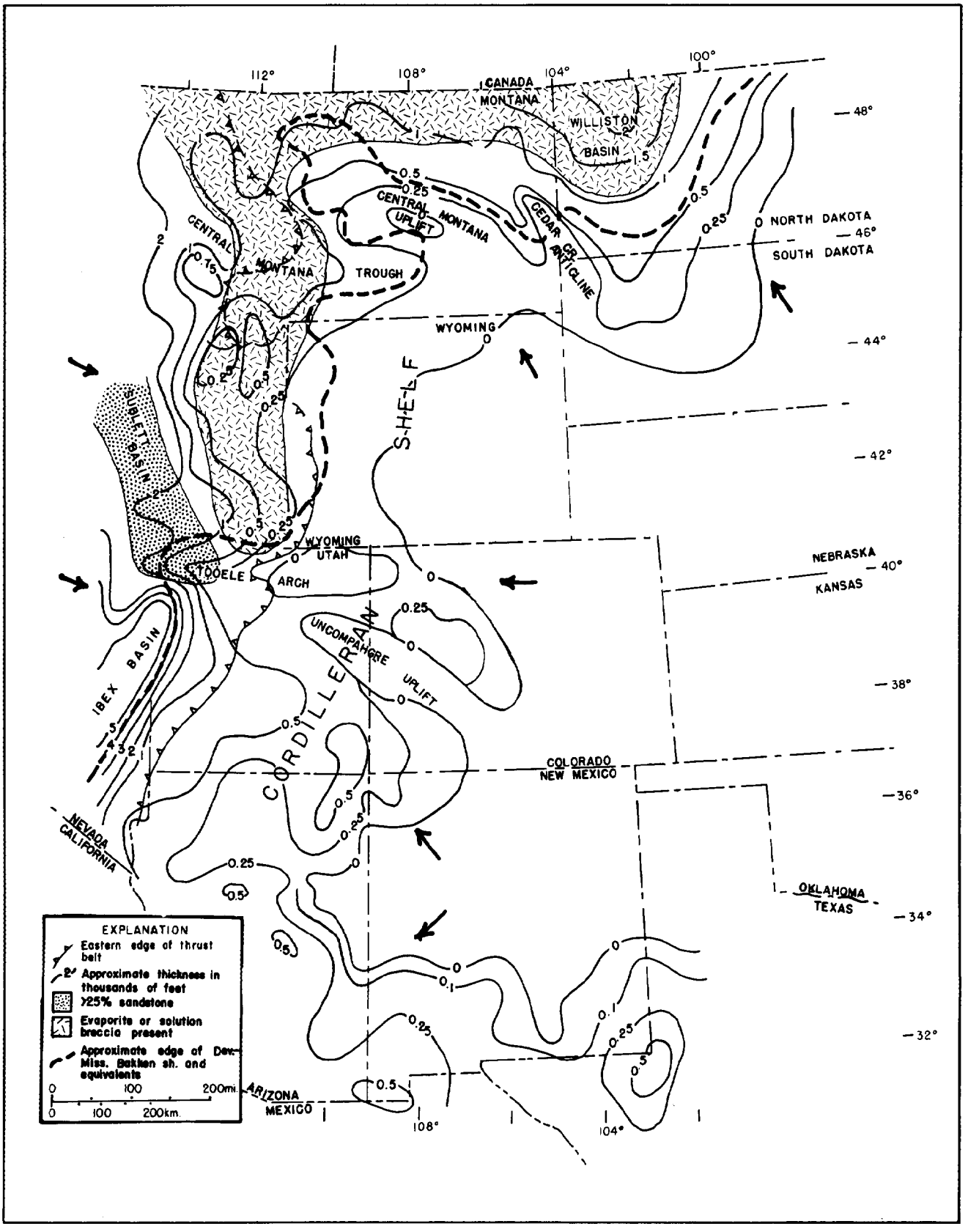

Figure 6—Devonian System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments.

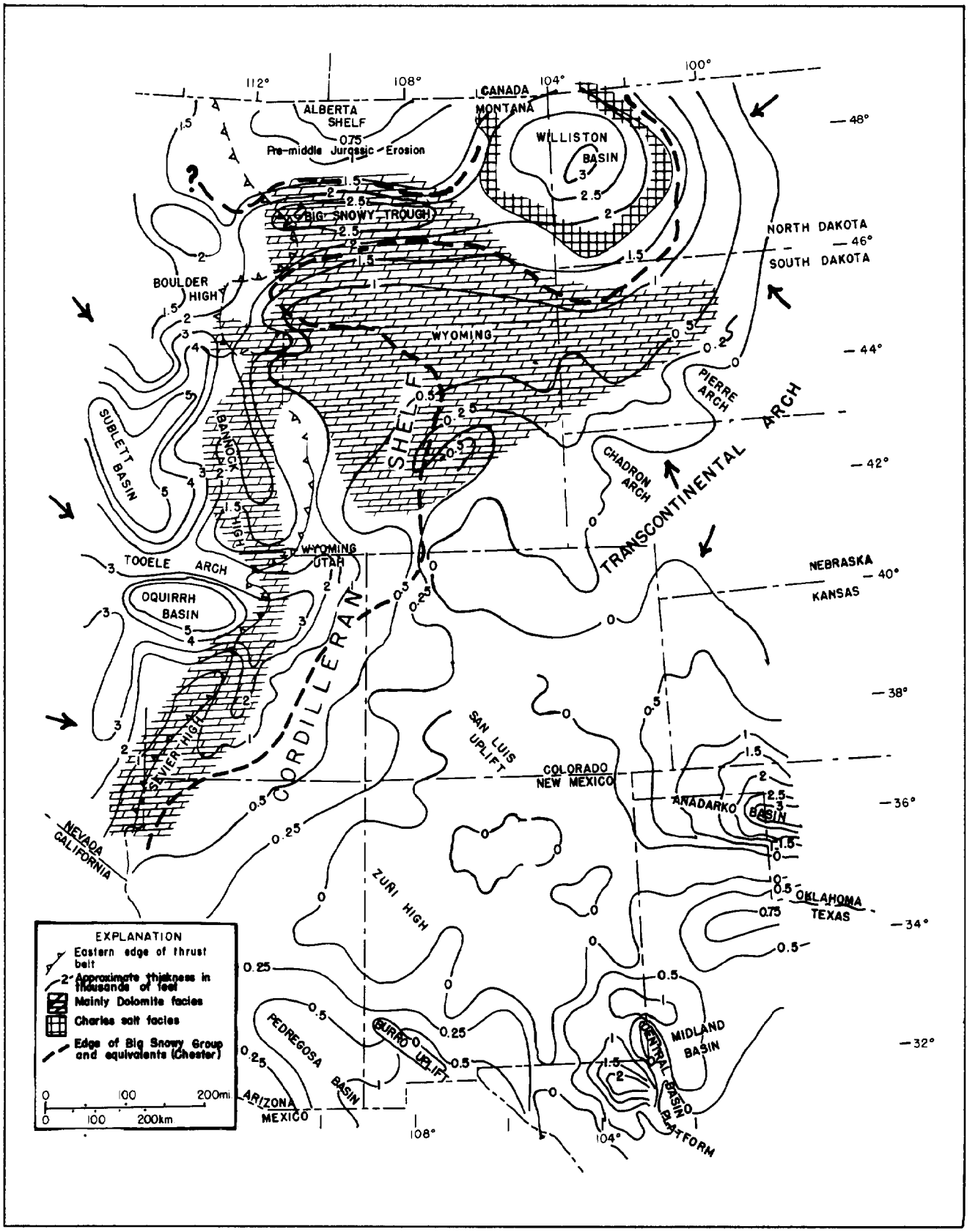

Figure 7—Mississippian System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments.

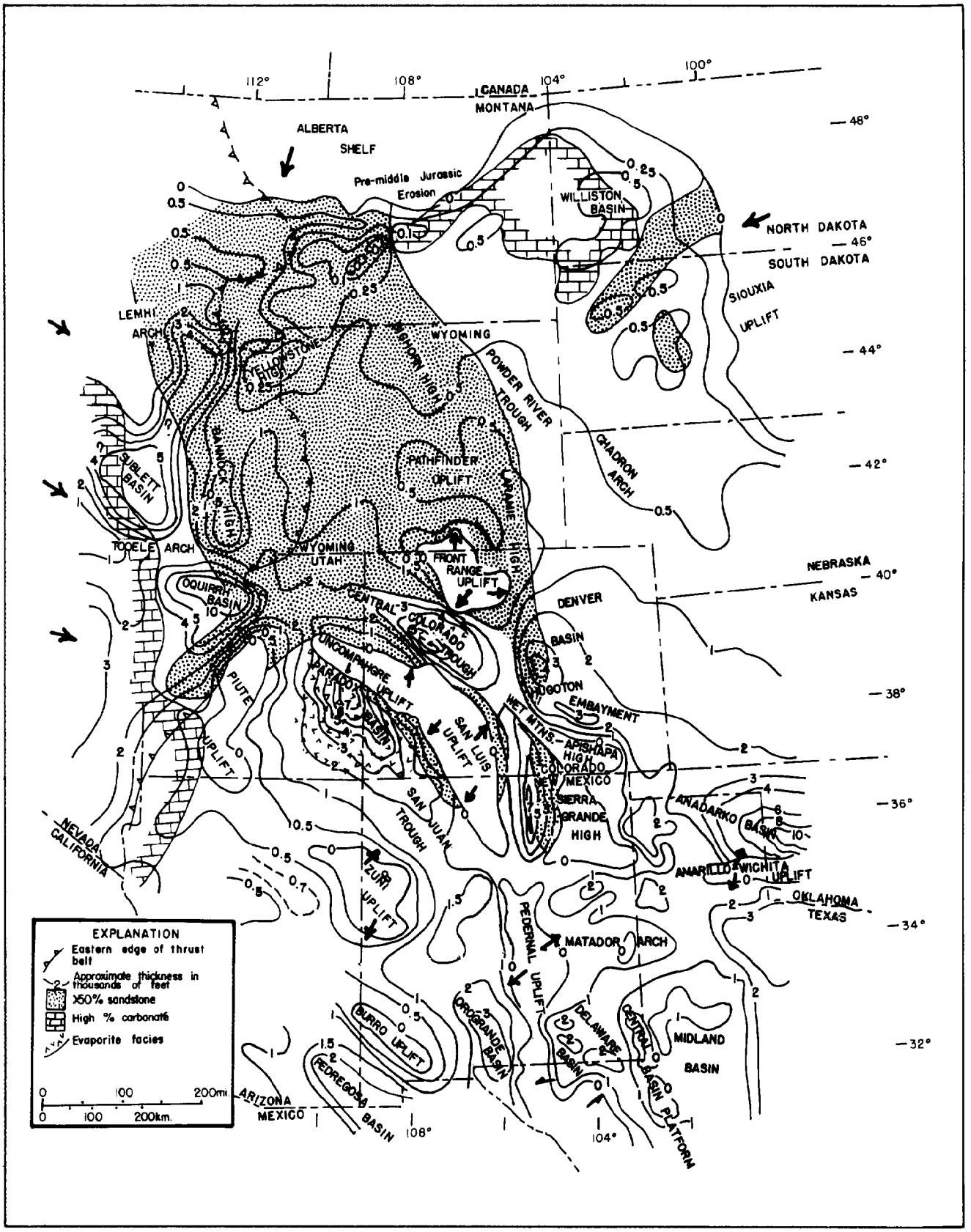

Figure 8—Pennsylvanian System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments.

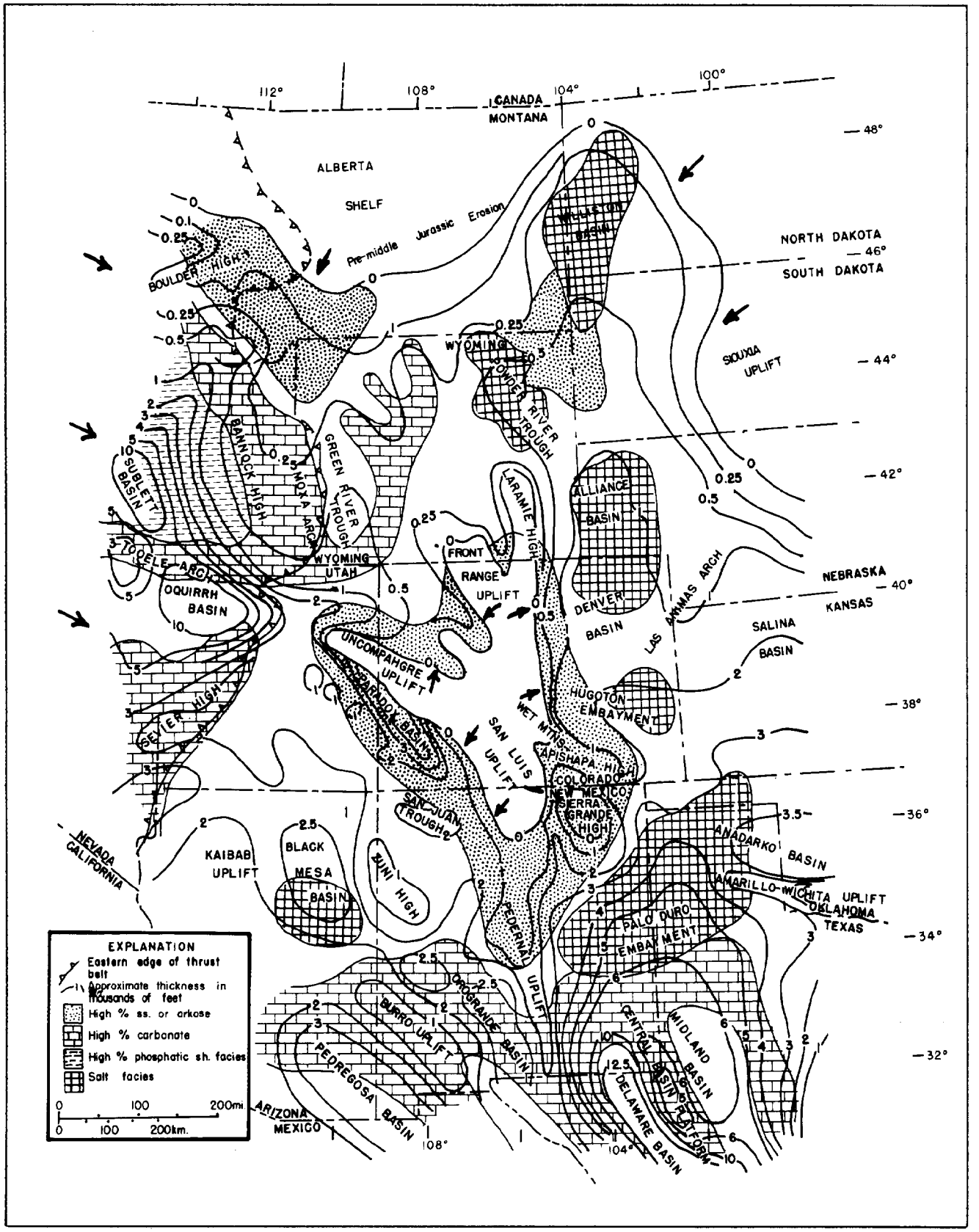

Figure 9—Permian System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments.

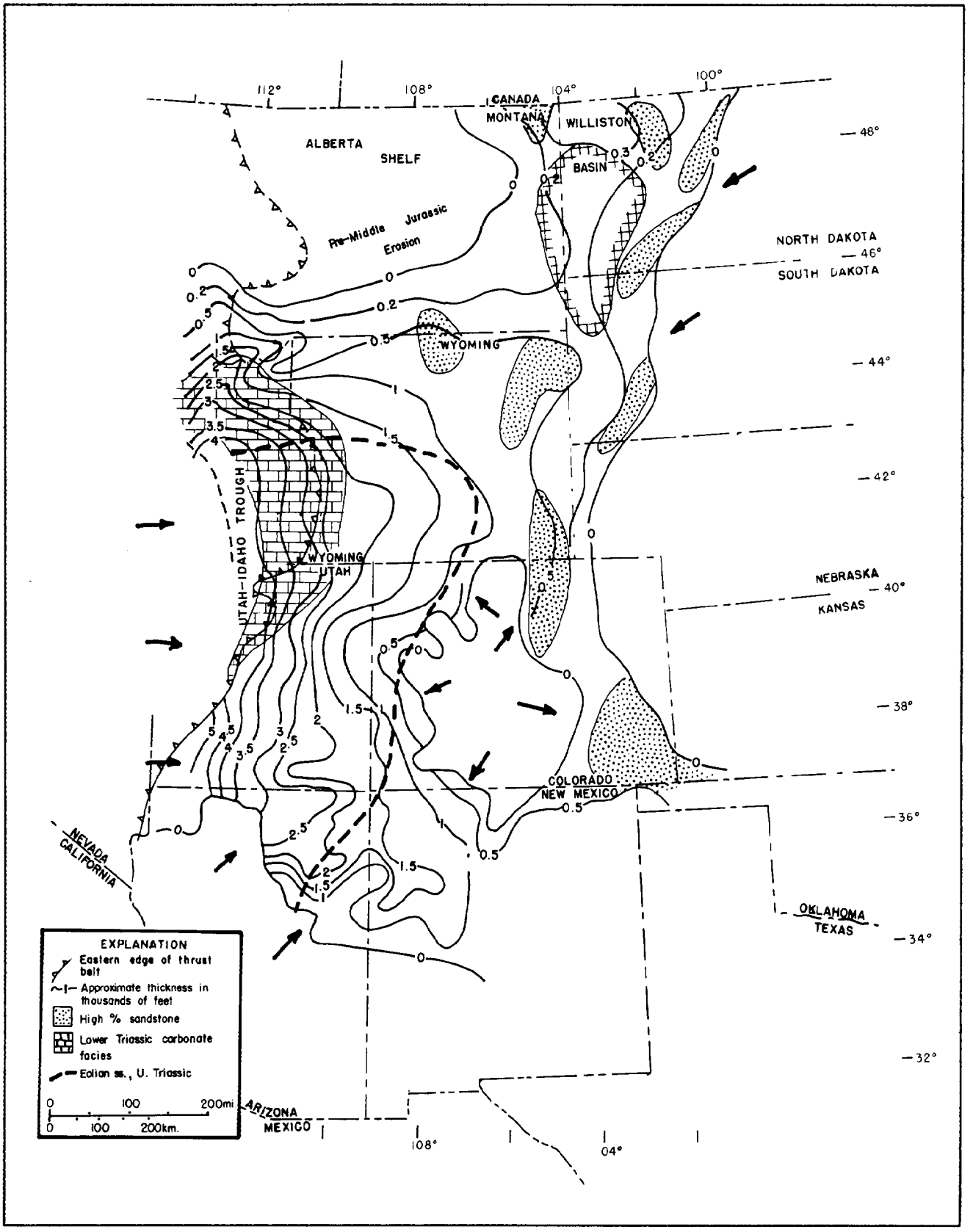

Figure 10—Triassic System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments. Approximate western limit of known Triassic sedimentary rocks in Idaho is shown by dashed line.

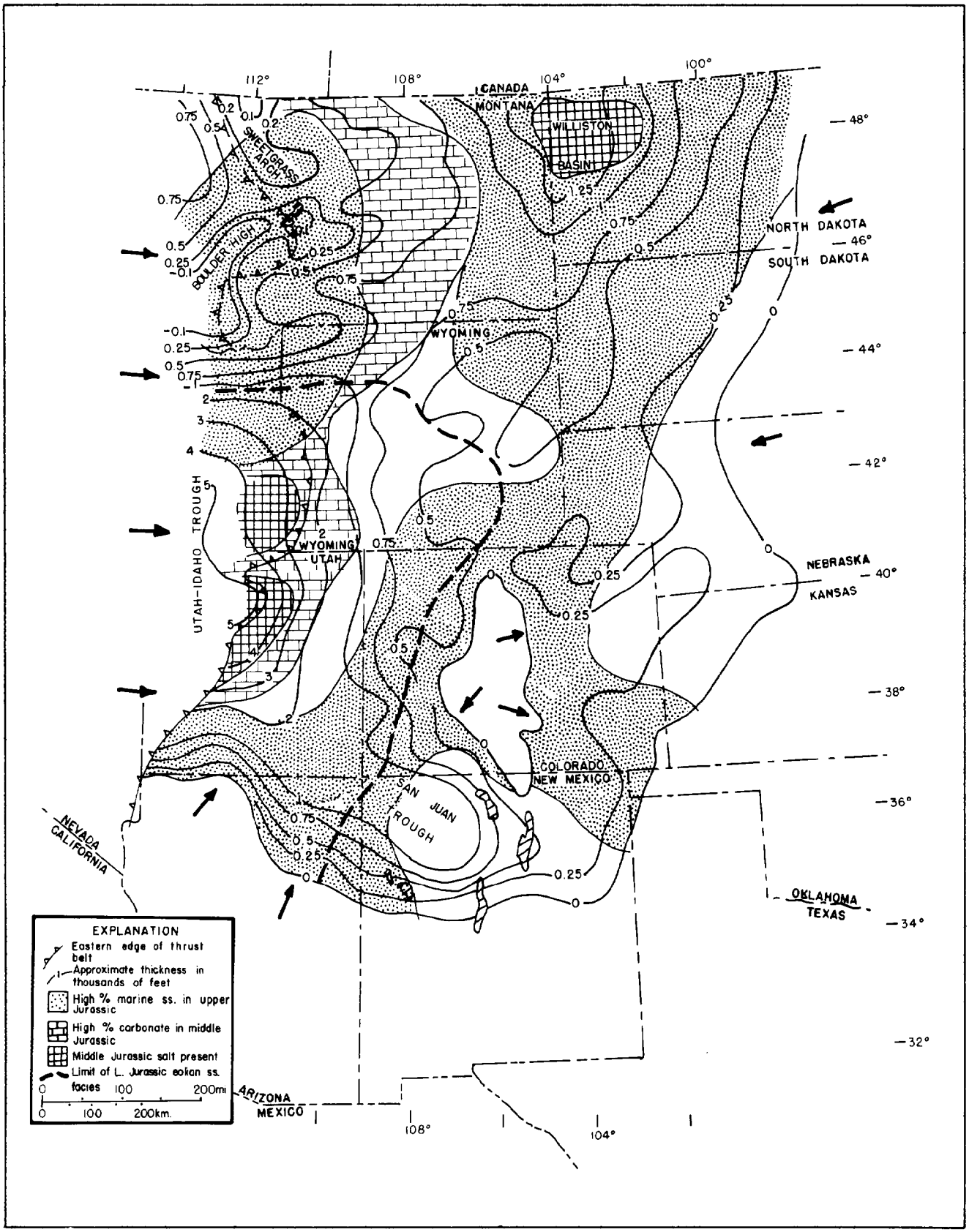

Figure 11—Jurassic System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Data are palinspastically restored in the western thrust belt; arrows indicate probable transport directions of terrigenous clastic sediments.

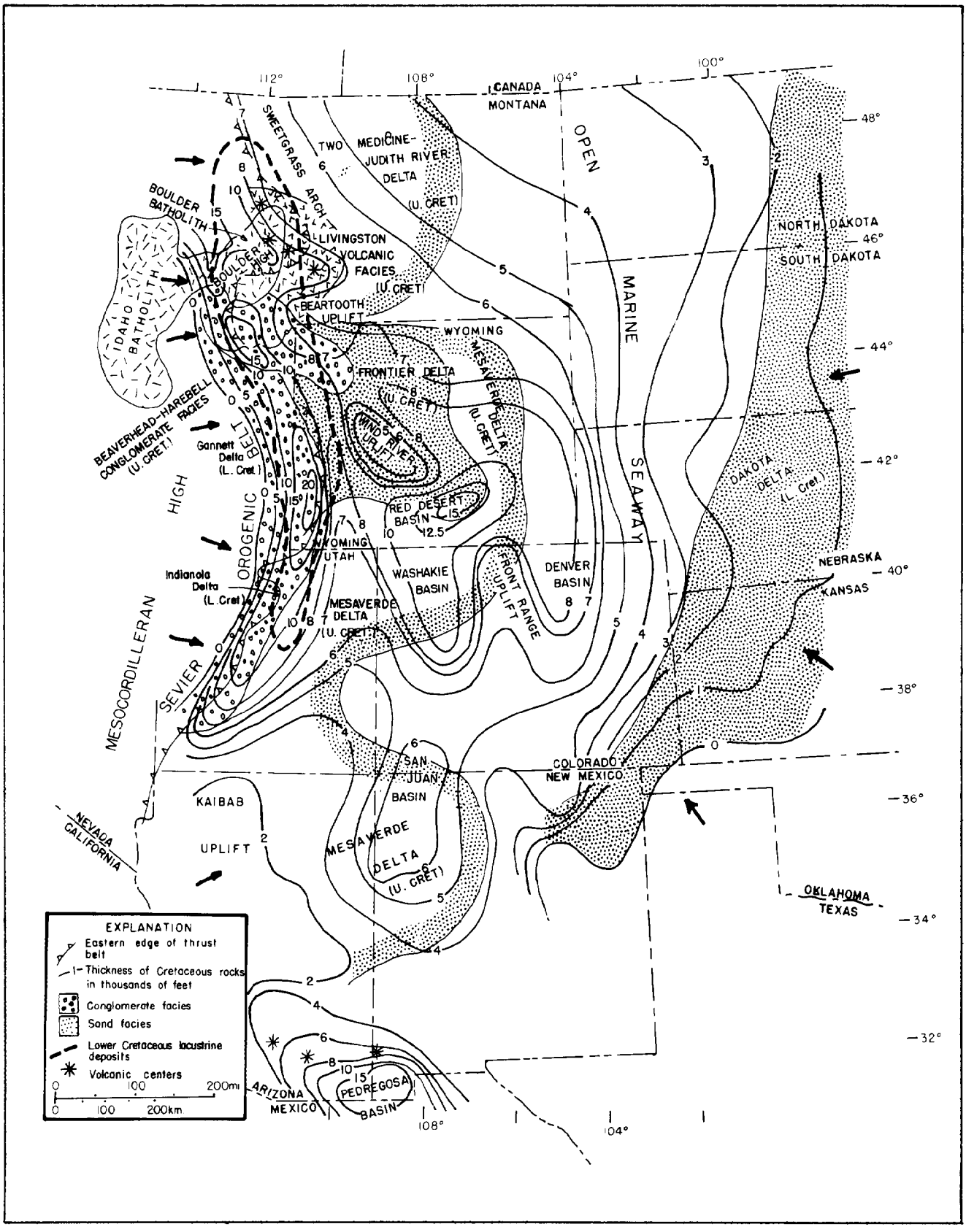

Figure 12—Cretaceous System, showing approximate thickness, general sedimentary facies, and main paleotectonic elements. Arrows indicate probable transport directions of terrigenous clastic sediments.

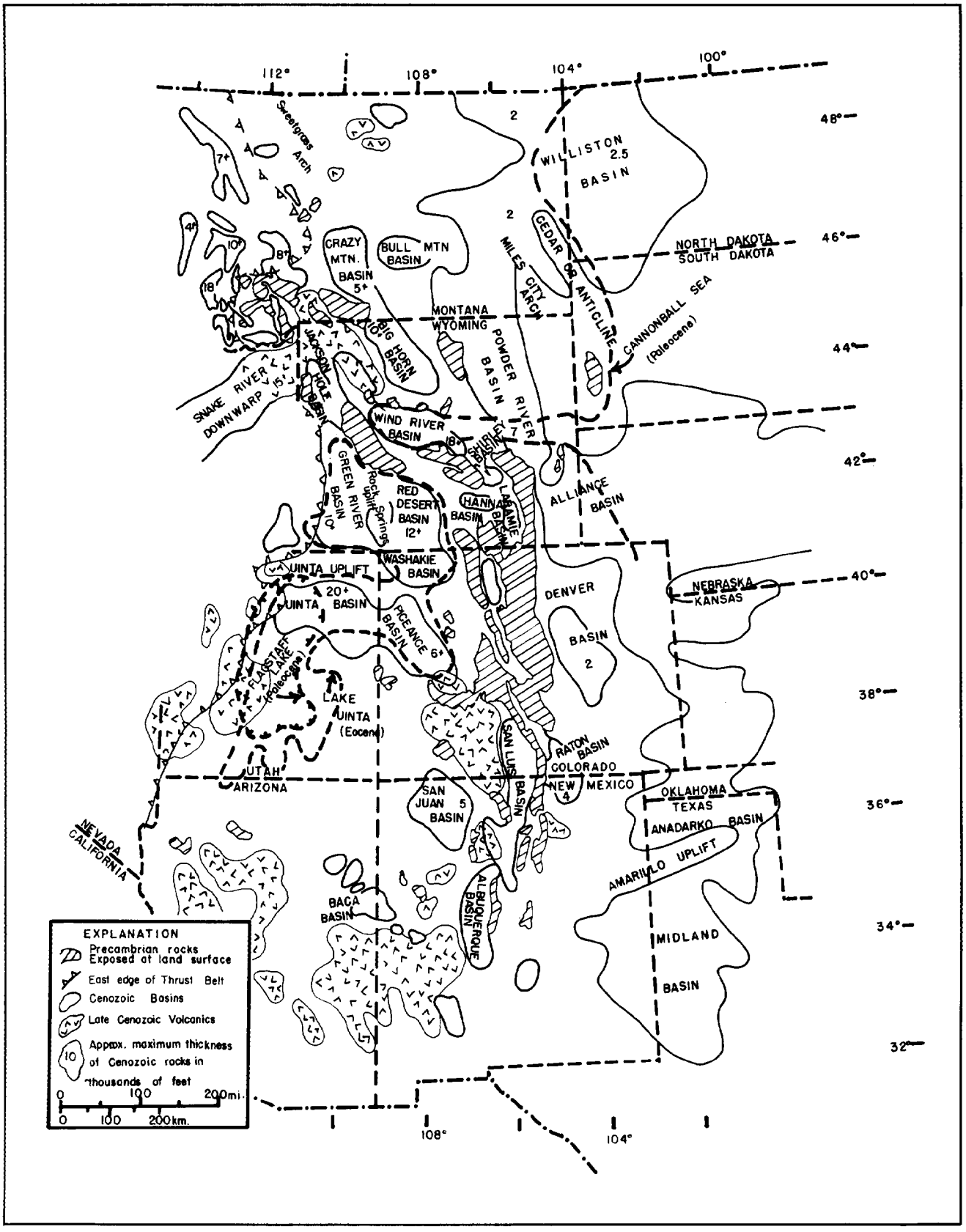

Figure 13—Cenozoic Basins, showing location of basins, approximate thickness of Cenozoic rocks, and areas of late Cenozoic volcanism.

Cretaceous (Figure 12): Kottlowski (1965), Armstrong and Oriel (1965), Adler (1971), McGookey et al. (1972), Greenwood et al. (1977), and Peterson (1981).

Cenozoic (Figure 13): Kuenzi and Fields (1971), McDonald (1972), and Chapin and Cather (1981).

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