NEW DEVONIAN BRACHIOPODS AND A NEW DEVONIAN FORMATION FROM THE SHELLABARGER PASS AREA, DENALI NATIONAL PARK & PRESERVE, SOUTH-CENTRAL ALASKA

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The Shellabarger Pass area is situated in the Talkeetna C-6 quadrangle in the western part of Denali National Park & Preserve (DENA) of south-central Alaska (Fig. 1). The region preserves a stratigraphic record of rocks belonging to both the Dillinger and Mystic sequences of the Farewell terrane (Decker et al., 2004). Due to the remote nature of and limited access to Shellabarger Pass, limited geologic research has been undertaken in this portion of DENA. The geologic maps of the Talkeenta quadrangle by Reed et al. (1977, 1980) did not formally name any Paleozoic or Mesozoic stratigraphic units in the area of Shellabarger Pass. In this short note we outline recent research on the distinctive fauna of the recently established Emsian-age (Late Early Devonian) Shellabarger Limestone (Blodgett et al., 2022). The brachiopod fauna is very diverse and has been the subject of several focused studies (Blodgett and Brease, 1997; Blodgett, 1998; Blodgett and Boucot, 1999; Garcia-Alcalde and Blodgett, 2001; Blodgett et al. 2002, 2021, 2022; Baranov and Blodgett, 2022. Most interesting is distinctly Eurasian character of the brachiopod fauna, suggesting a probably origin by rifting from the Siberian craton during Late Devonian-early Carboniferous time like many of the other accretionary terranes of Alaska (see Blodgett et al., 2002 and 2010). Other elements of the fauna are found here as well (notably rugose corals, trilobites), but none (with the exception of the sponges by Rigby et al., 2009) have been studied in detail.

The Shellabarger Limestone was recently established (Blodgett et al., 2022) as a new litho-stratigraphic unit in the Shellabarger Pass region, Talkeetna C-6 1:63,360 scale quadrangle (Denali National Park & Preserve), south-central Alaska. The north-south trending stratigraphic section was measured along the eastern side of a small hillock situated near the center of the NE¼, SW¼, NE¼, sec. 15, T28N, R18W, Talkeetna C-6 1:63,360 scale quadrangle, latitude 62°31’21”N., longitude 152°35’32” W. (Fig. 2), at an elevation slightly above 700 m (2,400 feet). Photographs of the type section are provided in Figs. 3 and 4. The formation is the only Paleozoic age lithostratigraphic unit described and named date within Denali National Park & Preserve. Only three other units have stra-totypes within this park unit: Cantwell Formation, Teklanika Formation and Mount Galen Volcanics,

these latter units range in age from Cretaceous to Cenozoic (Henderson et al., 2022).

The Shellabarger Limestone type section, consisting of 38.7 m (127 ft) of lime mudstone and wackestone, was measured in a then unnamed late Emsian-age limestone unit (Fig. 2). See Blodgett and Boucot (1999) and Blodgett et al. (2002) for a description of the locality. In addition, the new formation has equivalent strata which appear to be present to the west and northwest in the Lime Hills 1:250,000 scale Quadrangle. This lithologic unit locally forms the base of the Mystic sequence of the Alaska Range (Blodgett and Gilbert, 1992; Gilbert and Bundtzen, 1984, Savage and Blodgett, 1995). Typically, the unit appears to be ~50 m (164 ft) thick through much of the central Alaska Range from Shellabarger Pass and to the west into Lime Hills C-5, C-6, D-4, and D-5, 1:63,360 scale quadrangles (Blodgett and Gilbert, 1992; Bundtzen et al., 1994; Blodgett et al., 2002). The Emsian limestone is closely associated with underlying strata of the Dillinger sequence in the Lime Hills D-4, 1-63,360 scale quadrangle, composed of deep-water turbiditic sandstone, siltstone, shale, and sparse limestones; however, a direct contact with the overlying Mystic sequence has not been observed (Blodgett and Gilbert, 1992). The youngest fauna in the local underlying Dillinger sequence is found in a limestone containing a predominately pelagic fauna consisting of abundant dacryoconarid tentaculitids, orthoconic natutiloids, and undetermined bivalves. A single species of conodont, *Pandorinellina optima*, was found, indicative of a Lochkovian (but not earliest Lochkovian) to Pragian age (Blodgett and Gilbert, 1992).

Among the brachiopod taxa of the Shellabarger Limestone, the gypiduloids are the most conspicuous, including *Carinagypa robecki* Blodgett et al., 2021 (Fig. 5), *Ivdelinia (Ivdelinia) tweeti* Blodgett et al., 2022 (Fig. 6), and the clorindid *Clorinda cappsi* Blodgett et al., 2022 (Fig. 7). Rhynchonellid brachiopods appear to be limited a single species, *Sibirirhynchia alata* (Khodalevich, 1951) (see Fig. 8) noted by Baranov and Blodgett (2022) to also be known from the Urals, the Siberian craton (Kuznetsk Basin), and Northeast Russia. Atrypid brachiopods, like the gypiduloids, are also extremely abundant in the Shellabarger Limestone. Illustrated examples here include *Atrypa* sp, *Variatrypa* sp., *Spinatrypa* (*Spinatrypa*) sp. and *Spinatrypina* sp. (all shown in Fig. 9). In addition, another common atrypid is the flattish and rather handsome *Carinatina* sp. (Fig. 10). Two eospiriferinid taxa are also present in the fauna: *Janius* cf. *J. vetulus* (Eichwald, 1860) (Fig. 11) and *Myriospirifer breasei* Garcia-Alcalde and Blodgett, 2001 (Fig. 12). Other brachiopod genera found in the Shellabarger Limestone, but not illustrated here, include *Opsicondion*, *Teichertina*, *Schizophoria*, *Undatrypa* and possibly *Warrenella*. It is most worthy to note that this fauna is typically Eurasian (close to described fauna from Taimyr, the Siberian Craton, the Urals, and Northeast Russia). In terms of Lower Devonian brachiopod biogeographic units the Shellabarger fauna is distinctly part of the Uralian Region of the Old World Realm (Boucot and Blodgett, 2001, p. 342; see Fig. 13). As noted therein “In this vast Region *Karpinskia*, *Ivdelinia*, *Sibirirhynchia*, certain endemic uncinuloids and gypiduloid, *Janius* and other eospiriferinids are characteristic forms. The abundance of these brachiopods clearly distinguish this unit from the otherwise similar Cordillerian Region, where these taxa are notably absent or are very rare in comparison.” None of these illustrated Shellabarger species have yet been recognized in age equivalent strata of the Ogilvie Formation or the Salmontrout

Limestone of east-central Alaska, which represented the northwestern extremity of cratonic North America (part of the Cordilleran Region of the Old World Realm) during Devonian time.

It is our objective to finish completion of the taxonomic study of the brachiopod fauna of the Shellabarger Limestone, with special attention being given to the paleobiogeographic affinities of the overall fauna. We have initiated a detailed taxonomic analysis and description of the brachiopod fauna from the unnamed overlying Frasnian (Early Late Devonian) stratal units in Shellabarger Pass, again with same objectives.

Blodgett expresses his thanks to the Committee for Research and Exploration of the National Geographic Society for providing funds in 1996 which permitted five days of fieldwork in the Shellabarger Pass area of south-central Alaska in late July of the same year. He also thanks Phil F. Brease (deceased) and Pam Sousanes of the U.S. National Park Service, Denali National Park & Preserve, for their able assistance with field work. Carl Bentley, helicopter pilot for Era Helicopters, capably got us into and out of the remote and beautiful area of the central Alaska Range. The Alaska Division of Geological & Geophysical Surveys of Alaska is also acknowledged for providing several brief reconnaissance helicopter trips into the Shellabarger Pass area to Blodgett in the early 1980s.

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Figure 1. Index map of Alaska showing location of Shellabarger Pass (from Blodgett et al., 2021).

Figure 3. Outcrop of the upper part of the type section of the Shellabarger Limestone (Emsian, =Late Early Devonian) in Shellabarger Pass (view looking east-northeast). The two people in the photo are Pam Sousanes (NPS) (left) and one of the authors, Robert B. Blodgett (on right). [from Blodgett et al., 2022]

Figure 4. Another slightly differing view of the same outcrop in the previous figure, view looking east-northeast. View well demonstrates the rugged mountainous terrain surrounding Shellabarger Pass. The geologist in the view is the late Phil F. Brease (deceased, former NPS geologist, who was an extremely great supporter of paleontology within the park). [from Blodgett et al., 2022]

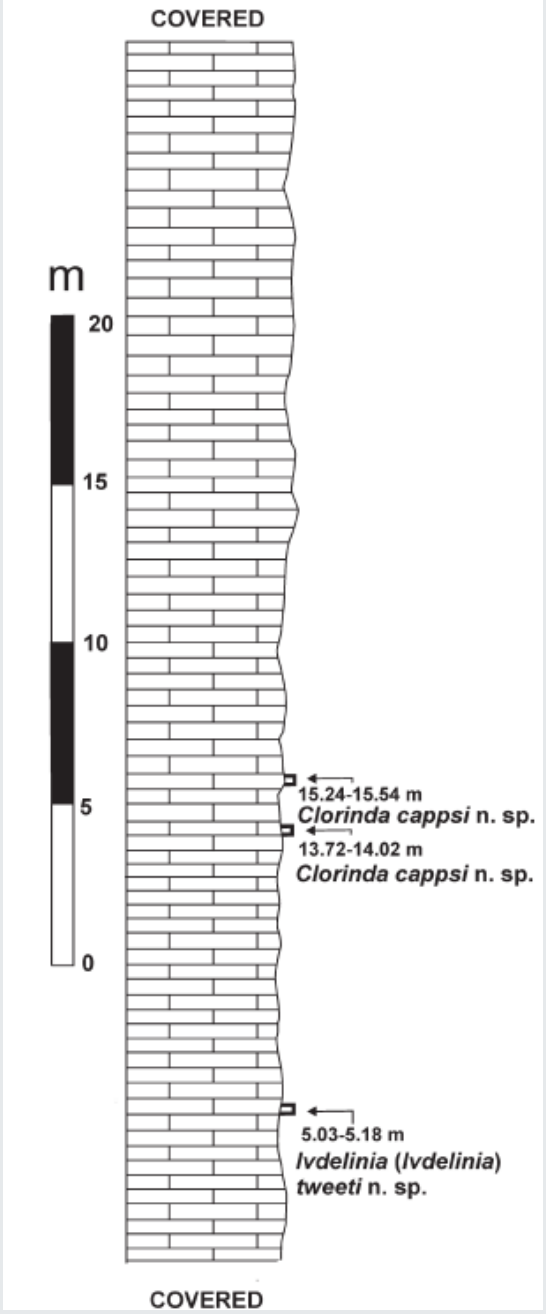


Figure 2. Measured type section of the Shellabarger Limestone. Situated at a single isolated limestone outcrop, it constitutes the oldest Devonian interval within the DI unit of Reed and Nelson (1977, 1980). It forms the oldest stratigraphic interval within the Mystic sequence of Gilbert and Bundtzen (1984). This outcrop is situated on the eastern side of a small hillock situated near the center of the NE¼, SW¼, NE¼, sec. 15, T28N, R18W, Talkeetna C-6 1:63,360 scale quadrangle, latitude 62°31'21"N., longitude 152°35'32" W. The measured section of the outcrop indicates a minimum thickness of 38.7 m (127 ft) of lime mudstone and wackestone for the unit (Blodgett et al., 2021). The location of two of the here described brachiopod are indicated on the stratigraphic column of the type section (from Blodgett et al., 2022).

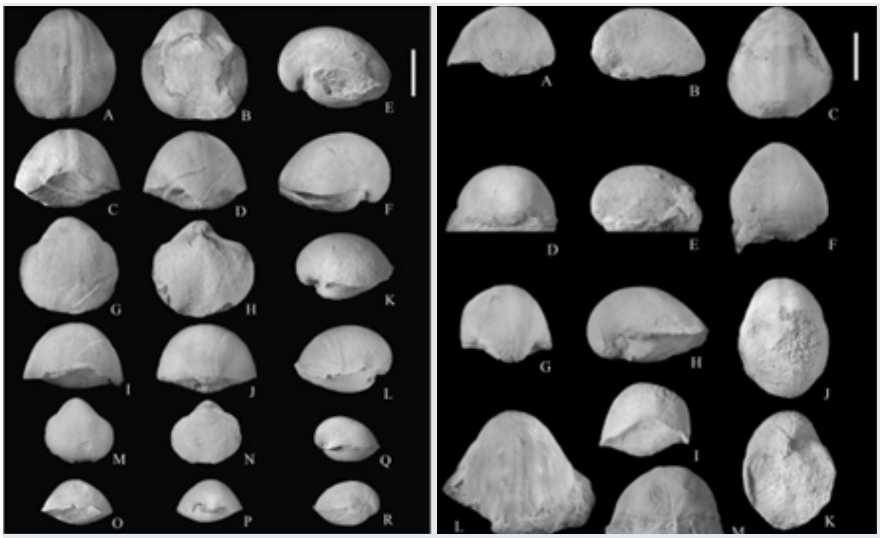


Figure 5. Two plates of the gypidulid Carinagypa robecki Blodgett, Santucci, Baranov, and Hodges, 2021. Scale bar = 10 mm.

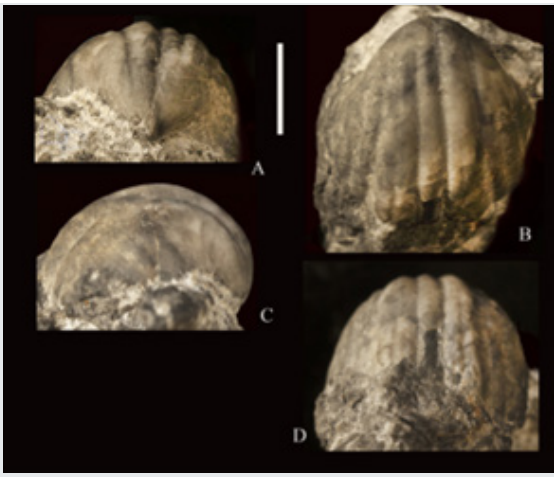


Figure 6. The gypidulid Ivdelinia (Ivdelinia) tweeti Blodgett, Baranov, and Santucci, 2022. Scale bar = 10 mm. Plate on left from Blodgett et al. (2022), and that on right is from Blodgett and Boucot, 1999).

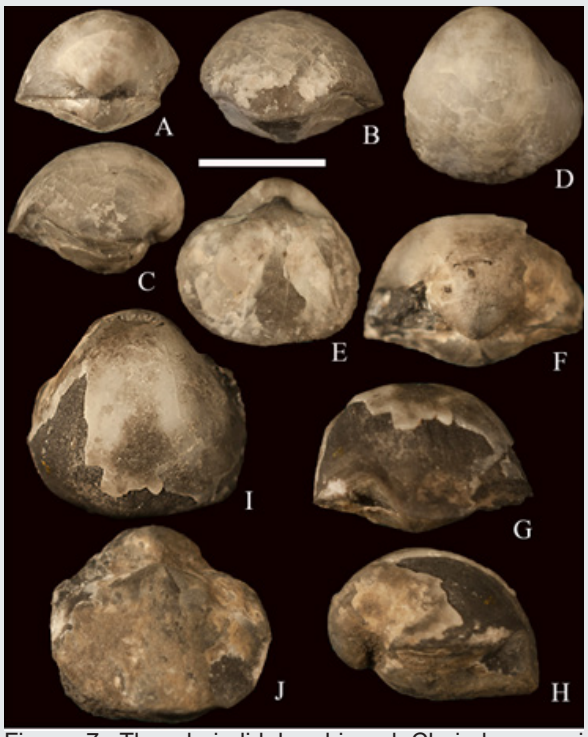


Figure 7. The clorindid brachiopod Clorinda cappsi Blodgett, Baranov, and Santucci, 2022. (from Blodgett et al., 2022). Scale bar = 10 mm.

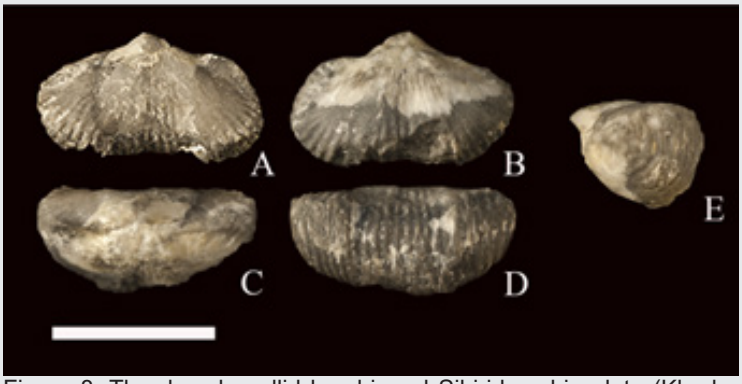


Figure 8. The rhynchonellid brachiopod Sibirirhynchia alata (Khodalevich, 1951). Scale bar = 10 mm. (from Baranov and Blodgett, 2022). This species is also known from the Urals, Siberian craton (Kuznetsk Basin), and Northeast Russia.

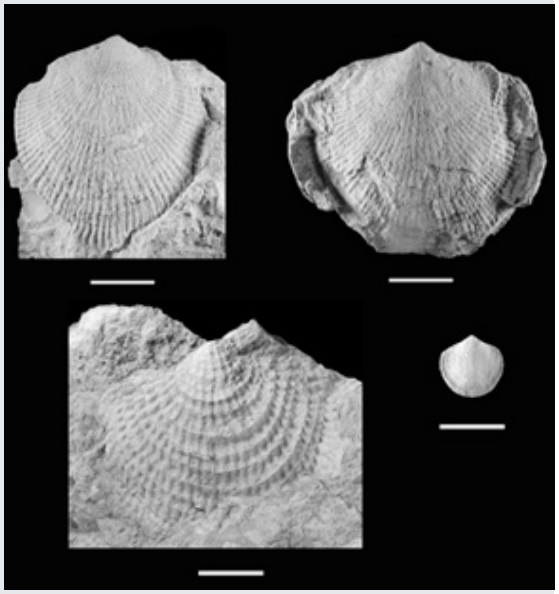


Figure 9. Ventral valves of four genera of atrypid brachiopods (left to right in two rows): *Atrypa* sp., *Variatypa* sp., *Spinatrypa* (Spinatrypa) and *Spinatrypina* sp. Scale bar = 10 mm.

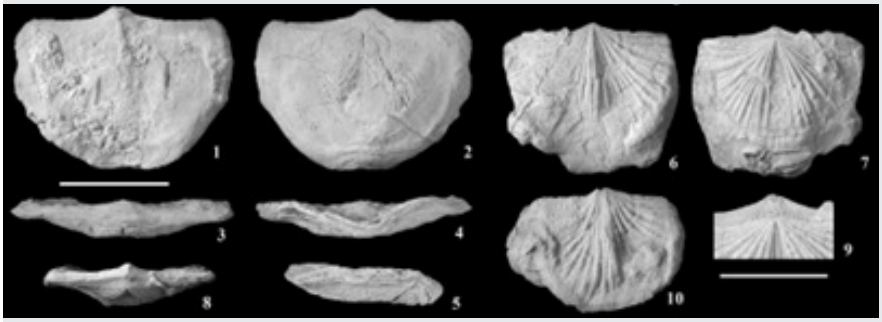
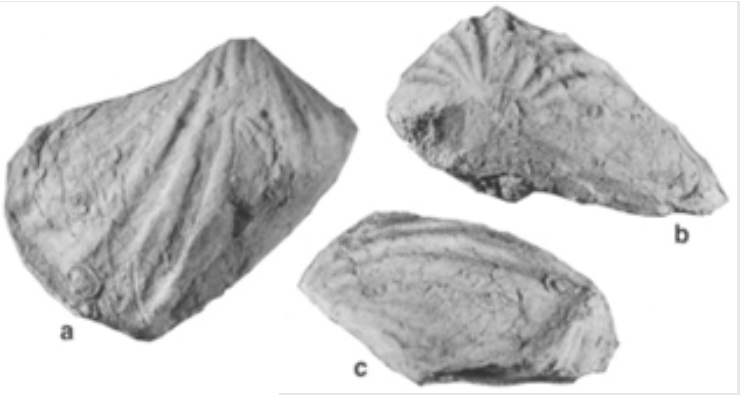


Figure 10. Several specimens of the atrypid *Carinatina* sp. (to be formally studied). Scale bar = 10 mm.



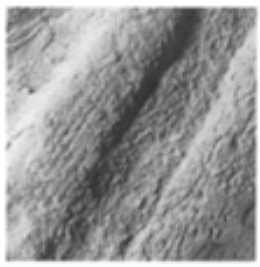


Figure 11. The eospiriferid brachiopod *Janius* cf. *J. vetulus* (Eichwald 1860) (from Blodgett and Boucot, 1999).

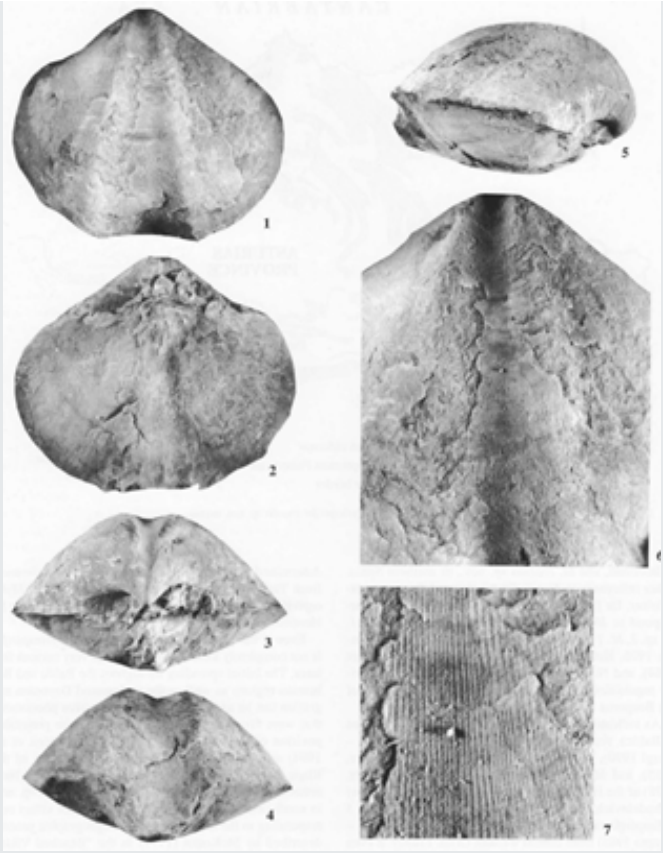


Figure 12. The eospiriferinid brachiopod *Myriospirifer breasei* Garcia-Alcalde and Blodgett, 2001 (from Garcia-Alcalde and Blodgett, 2001).

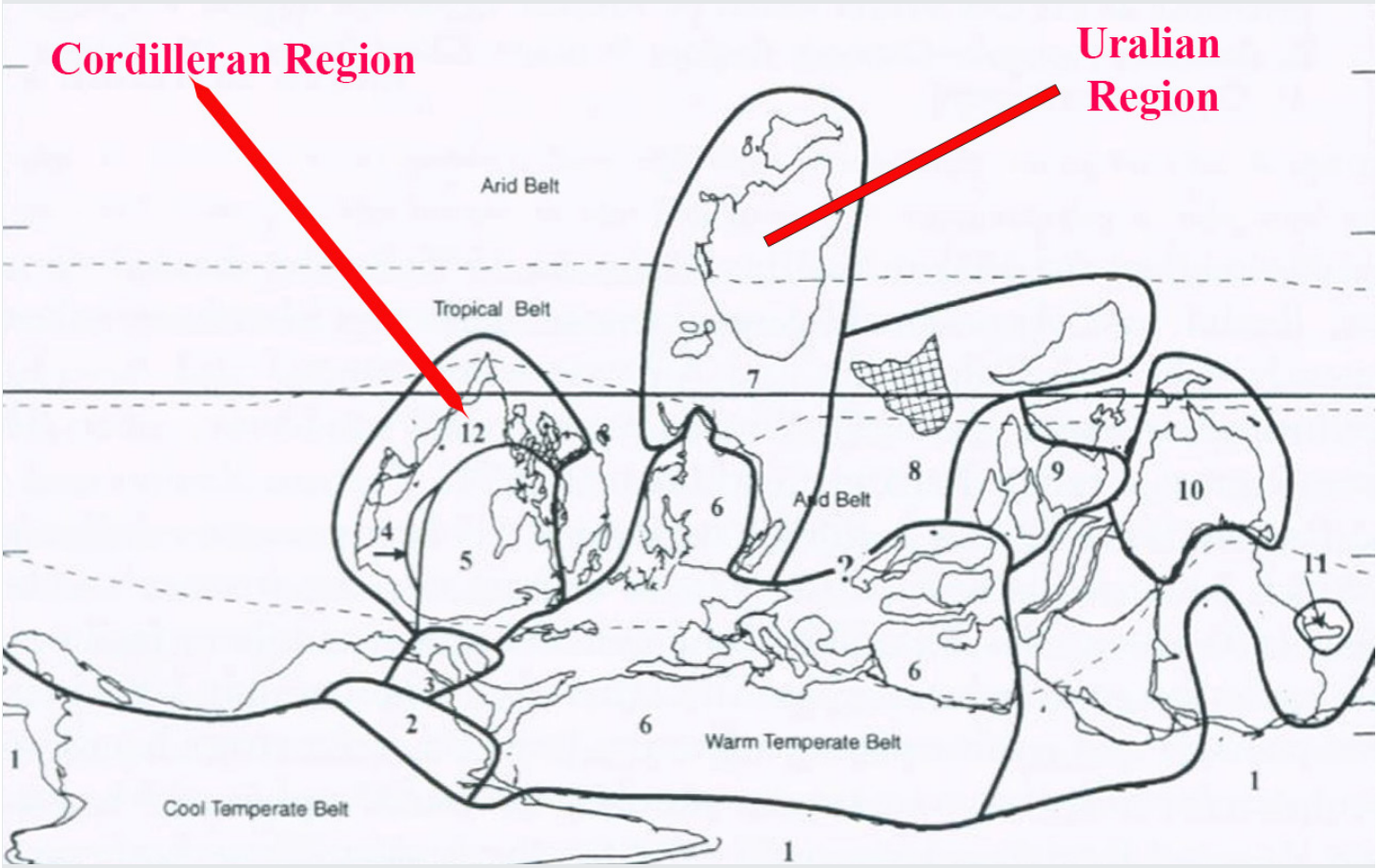


Figure 13. Early Devonian biogeographic units (from Boucot and Blodgett, 2001, Fig. 34.2). 1: Malvinokaffiric Realm; 2-5, Eastern Americas Realm (2: Amazon Subprovince; 3: Colombian Subprovince; 4: Nevadan Subprovince; 5: Appohimchi Subprovice); 6-12, Old World Realm (6: Rhenish Bohemian Region; 7: Uralian Region; 8: Balkhash-Mongolo-Okhotsk Region; 9: South China Region; 10: Tasman Region; 11: New Zealand Region; 12: Cordilleran Region). The Uralian Region appears to be the site of origin of many of Alaska's accretionary terranes (i.e. Arctic Alaska, Farewell, Alexander, and Woodchopper terranes).