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U-Pb AGE OF ZIRCONS FROM THE TALKEETNA FORMATION, JOHNSON RIVER AREA, ALASKA

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The Johnson River area is located approximately 180 kilometers southwest of Anchorage on the west side of Cook Inlet (fig. 1). Detailed geologic evaluation of the Jurassic Talkeetna Formation in this area was conducted from 1981 to 1984 by Anaconda Minerals Company on lands held by Cook Inlet Region, Inc. (CIRI). This report provides a U-Pb age of 180 ± 2 Ma on a synvolcanic intrusion within the previously undated section of the Talkeetna Formation on the west side of Cook Inlet.

The Talkeetna Formation is part of a Jurassic calc-alkaline volcano-plutonic arc assemblage in south-central Alaska that extends from east of Becharof Lake on the Alaska Peninsula through Cook Inlet, to the eastern Talkeetna Mountains and along the north front of the Chugach Mountains (Grantz and others, 1963; Burk, 1965; Winkler and others, 1981) (fig. 1). The formation is fossiliferous in the type area in the Talkeetna Mountains and contains fauna of Early Jurassic (Sinemurian, Pliensbachian, and Toarcian) age (Grantz and others, 1963). On the west side of Cook Inlet from Kamishak Bay to the north side of Tuxedni Bay, the Talkeetna Formation is poorly fossiliferous and is correlated with the type section based on lithologic similarities (Detterman and Hartsock, 1966). To the south on the lower west side of Cook Inlet, sedimentary and volcaniclastic rocks are correlated with the Talkeetna Formation based on a conformable stratigraphic relationship with the underlying Triassic Kamishak Formation and on Early Jurassic (Sinemurian) fauna from Puale Bay (Burk, 1965).

Unconformably overlying the Talkeetna Formation in the Johnson River area is the Middle Jurassic Red Glacier Formation which forms the base of the Tuxedni Group (Detterman, 1963). Good stratigraphic control and closely spaced samples of ammonites and pelecypods from the middle to upper part of this formation provide a reliable age of early Bajocian (Detterman and Hartsock, 1966) (fig. 2). Thus the upper age limit of the Talkeetna Formation is defined by early Middle Jurassic fossil ages.

On the west side of Cook Inlet, including the Johnson River area, Reed and others (1983) report concordant K-Ar ages ranging from 158 to 174 Ma on co-existing biotite and hornblende in the plutonic rocks of the Alaska-Aleutian Range batholith. The oldest concordant age of 174 Ma is measured on a granodiorite on the north side of Tuxedni Bay, east of the Bruin Bay fault (Reed and Lanphere, 1973; Reed and others, 1983) (fig. 3).

Conformably overlying the Red Glacier Formation is the fossiliferous lower middle Bajocian Gaikema Sandstone Member of the Tuxedni Group (Detterman and Hartsock, 1966). Cobble-boulder conglomerate beds within the Gaikema Sandstone, 780 to 1,530 meters above the top of the Talkeetna Formation, contain volcanic detritus derived from the Talkeetna Formation and a few granitic boulders, possibly derived from the Aleutian Range batholith. These boulders mark the first occurrence of granitic clasts in the Middle Jurassic on the west side of Cook Inlet (Detterman and Hartsock, 1966).

One sample of quartz feldspar porphyry, considered to be coeval with the pyroclastic rocks in the Johnson River area,

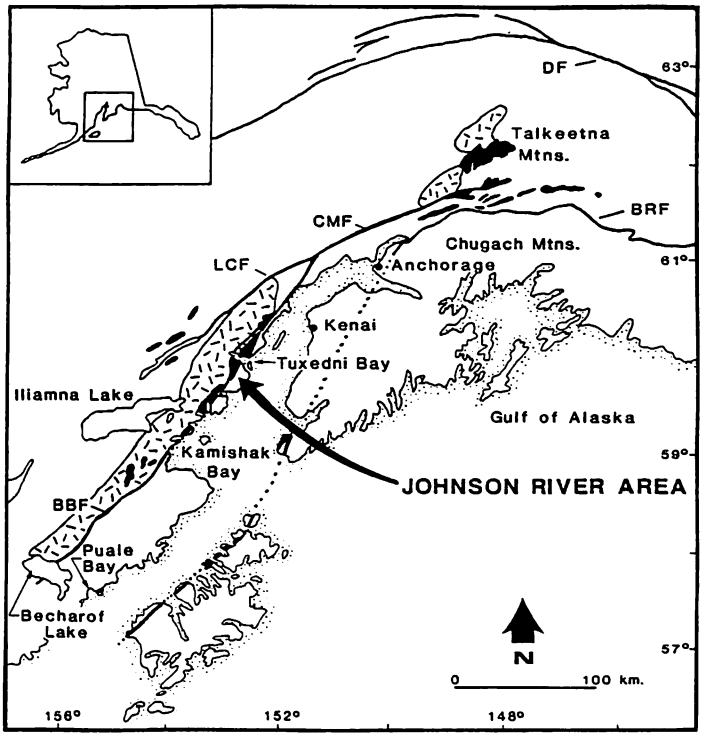

FIGURE 1. Location of the Johnson River area. Areas delineated in solid black show distribution of the Talkeetna Formation. Hatchered area shows the Jurassic Aleutian Range-Talkeetna Mountains batholith. BBF = Bruin Bay fault; LCF = Lake Clark fault; CMF = Castle Mountain fault; BRF = Border Ranges fault; DF = Denali fault. Geology compiled from Grantz (1961), Burk (1965), Reed and Lanphere (1973), Magoon and others (1976), Detterman and Reed (1980), Winkler and others (1981), and Nelson and others (1983).

yielded concordant U-Pb ages on zircon of 180 ± 2 Ma (see discussion below). The porphyry intrudes andesitic rocks and dacitic tuffaceous sediments and locally the porphyry exhibits a brecciated top, suggesting autobreccia or pillow breccia at the top of a flow. Crosscutting the andesitic rocks and dacitic sediments are pebble dikes, containing fragments of the porphyry, which are interpreted to be feeders for upper pyroclastic units (Carter, 1984; Harris, 1984). Fragments of the porphyry are also found in overlying tuffaceous sediments, approximately 1,800 to 2,100 meters stratigraphically below the top of the Talkeetna Formation in the Johnson River area.

This U-Pb age determination provides an age for a previously undated section of the Talkeetna Formation on the west side of Cook Inlet and supports its correlation with fossiliferous Lower Jurassic rocks elsewhere in south-central Alaska.

This age determination also provides an apparent older limit of 180 ± 2 Ma for the beginning of Bajocian time.

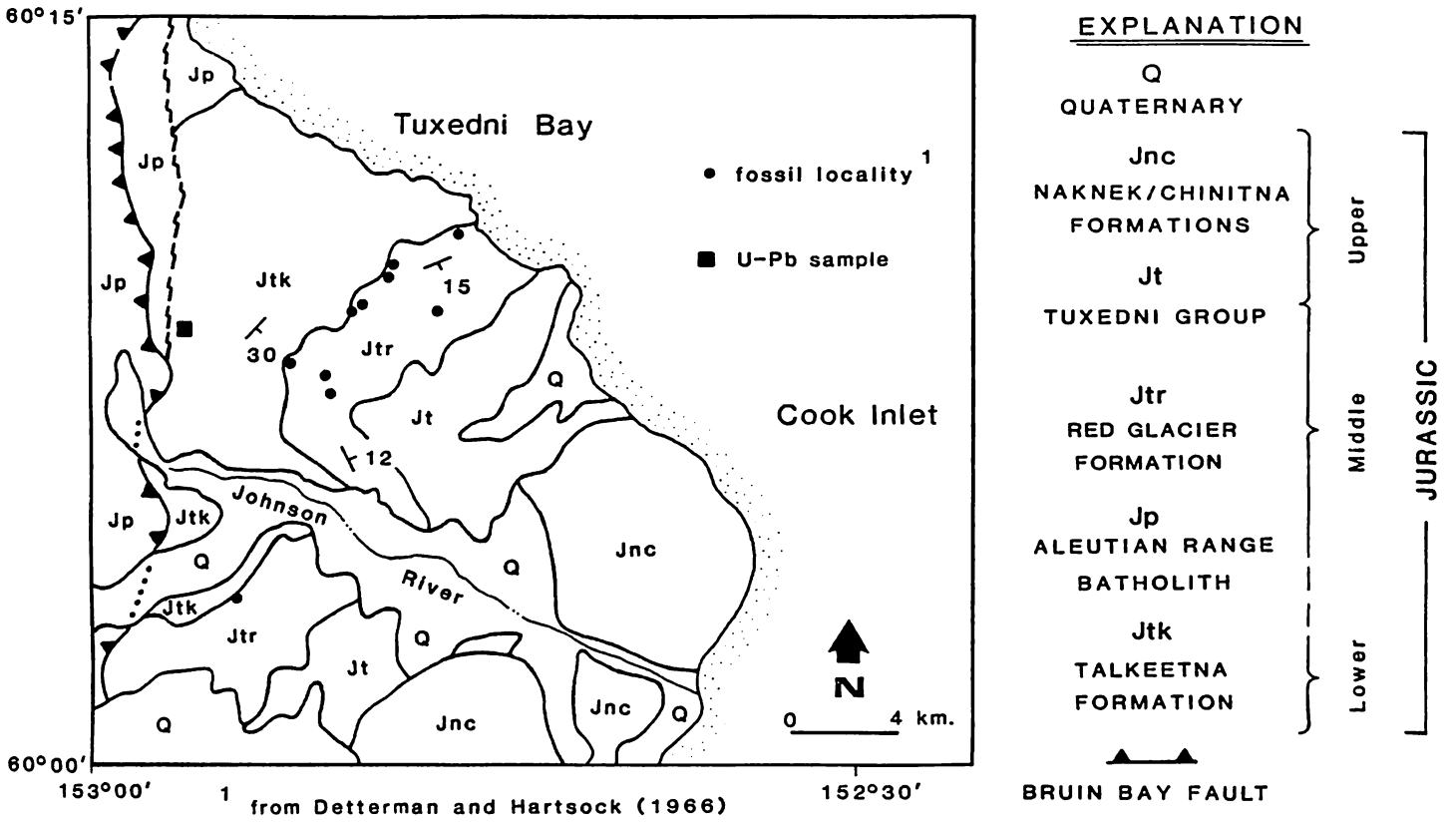

FIGURE 2. Johnson River area showing location of the U-Pb sample and Bajocian fossil localities. Geology from Magoon and others (1976).

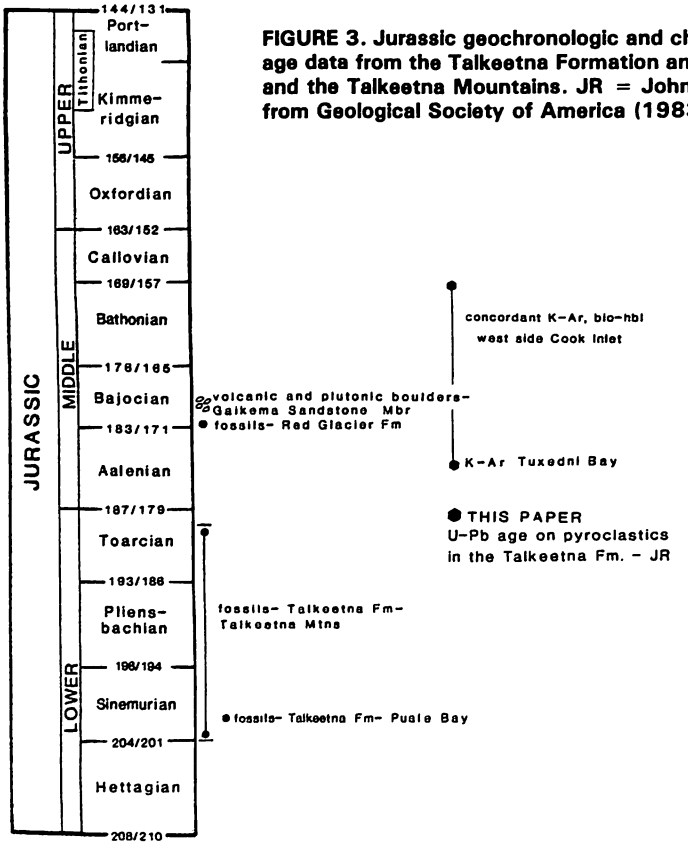

FIGURE 3. Jurassic geochronologic and chronostratigraphic units showing distribution of fossil and radiometric age data from the Talkeetna Formation and the Alaska-Aleutian Range batholith on the west side of Cook Inlet and the Talkeetna Mountains. JR = Johnson River. Age assignments, as shown 208/210, give the first age from Geological Society of America (1983) and the second age from Haq and others (1987).

AGE DETERMINATION

Two size fractions of zircon were analyzed at University of California-Santa Barbara. Both fractions have very low U concentrations, suggestive of minimal radiation damage and low susceptibility to Pb loss. The coarse fraction contained an unusually large amount of common Pb, causing a large uncertainty in the calculated 207*/206* age for that fraction. Nevertheless, both coarse and fine fractions are concordant within uncertainties (internal discordance), and in agreement with each other within uncertainties (external discordance). Considering the low U concentrations, and "internal" and "external" concordance of the zircons, we take the 206*Pb/238U ages as the age of crystallization of the porphyry. Weighing in favor of the better-determined fine fraction, we obtain an age of 180 ± 2 Ma.

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SAMPLE DESCRIPTION

Quartz feldspar porphyry (60°08'40"N,152°56'35"W; Kenai A-8 quadrangle, Alaska). Very light gray, leucocratic, with 5 to 15% (1–6 mm) euhedral quartz phenocrysts and 15% (2–4 mm) euhedral plagioclase phenocrysts in a pale green to white fine-grained matrix of quartz, white mica, and feldspar. *Analytical data:*

	Fraction	
	coarse	fine
Concentration (ppm)		
206 PbT	4.073	4.011
238 U	147.4	163.9
Isotopic Composition		
208/206 Pb	0.2919	0.1196
207/206 Pb	0.1256	0.05516
204/206 Pb	0.005173	0.000353
Age (Ma)		
206*/238	182.9 ±4	178.6 ±2
207*/235	183 ±10	180 ±4
207*/206*	184 ±65	194 ±20

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