The Origin of Granites and Related Rocks

THIRD HUTTON SYMPOSIUM

A B S T R A C T S

College Park, Maryland
August 26–September 2, 1995

Edited by Michael Brown and
Philip M. Piccoli

U.S. GEOLOGICAL SURVEY CIRCULAR 1129

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
GORDON P. EATON, Director

For sale by U.S. Geological Survey, Information Services
Box 25286, Federal Center, Denver, CO 80225

Published in the Eastern Region, Reston, Va.
Manuscript approved for publication May 25, 1995.

The Taku Transect and its Granitic Rocks, Coast Mountains Complex, Southeastern Alaska

Brew, David A., Drinkwater, James L., Ford, Arthur B. and Himmelberg, Glen R.
U.S. Geological Survey, Branch of Alaskan Geology, MS 904, 345 Middlefield Road, Menlo Park, CA 94025, USA

The Taku transect near Juneau, Alaska, is one of four transects that are currently used, together with reconnaissance field mapping, to define the Coast Mountains Complex. This complex has previously been informally called the Coast Mountains plutonic-metamorphic complex and by other names. The other transects are the Ketchikan and Skagway transects studied by Barker and Arth (1990) and the Stikine River transect studied in part by the present authors. The Taku transect is the only one that contains all of the magmatic, lithostratigraphic-terrane, metamorphic, and structural features that make up the Coast Mountains Complex.

The Taku transect is about 40 km wide and 80 km long, and extends in a NE direction from Douglas and Admiralty Islands on the west to the Alaska-British Columbia boundary on the east. It is made up of these major units and structural features, with their lithotectonic terrane assignments: 1) low-pressure, low-temperature, mafic-composition metavolcanic and lesser amounts of metapelitic sedimentary rocks assigned to the Douglas Island Volcanics of the Stephens Passage Group of the Gravina overlap assemblage; they are intruded by the 95 Ma granodiorite, tonalite, and quartz diorite plutons of the Admiralty-Revillagigedo belt; 2) the Coast Range megalineament, which is here the high-angle Gastineau Channel fault; 3) low- to medium-pressure, low- to medium-temperature, mafic-composition metavolcanic and some metapelitic and metacarbonate sedimentary rocks belonging to the Wrangellia terrane; 4) medium- to high-pressure, medium- to high-temperature, Barrovian series pelitic schists together with minor amphibolitic schist and marble that are presently assigned to the Behm Canal structural zone; they are intruded by Late Cretaceous tonalite and granodiorite sills of the Mount Juneau pluton; 5) well-foliated and locally lineated and mylonitized intermediate-composition granitic rocks of the 69 - 56 Ma Great tonalite sill composite batholith, which was emplaced at or close to the contact between the Behm Canal structural zone to the west and the metamorphic rocks of the Nisling terrane to the east; 6) layered biotite-hornblende gneiss, amphibole gneiss, quartz- and feldspar-rich schist, and multicomponent migmatite intruded by a series of 60 - 55 Ma hornblende-biotite granodiorite sills related to the Great tonalite sill; 7) generally unfoliated and homogeneous 50 Ma sphene-biotite-hornblende granodiorite and granite of the Turner Lake batholith, which contains sporadic screens of metamorphic rocks and local migmatite zones; and, 8) locally hornfelsed intermediate-composition metavolcanic rocks of the Stikine terrane and pelitic and semipelitic schists of the Nisling terrane at and near the international boundary.

The 95 Ma Admiralty-Revillagigedo belt plutons are discrete and discordant, locally well foliated, medium-grained, magnetite-free porphyritic biotite and hornblende quartz diorite and tonalite that contain primary epidote and garnet. The Mount Juneau pluton and the Great tonalite sill both are thick composite sill- or sheet-like bodies of foliated and locally well lineated medium- to coarse-grained tonalite. The Late Cretaceous Mount Juneau pluton is magnetite-free epidote-bearing biotite-hornblende tonalite and the 69 - 56 Ma Great tonalite sill is magnetite-bearing biotite-hornblende tonalite. The 60 - 55 Ma sills to the east of and related to the Great tonalite sill are heterogeneous hornblende-biotite leucotonalite and granodiorite. The 50 Ma Turner Lake batholith consists of homogeneous, massive, porphyritic to equigranular magnetite- bearing sphene- hornblende - biotite granodiorite to the west and

homogeneous, massive, porphyritic, coarse-grained allanite-bearing hornblende -biotite granite to the east.

The metamorphic rocks that occur between these belts are assigned to several lithotectonic terranes and resulted from multiple metamorphic episodes both older than and about the same age as the plutonic events. Taken all together, the rocks of the Coast Mountains Complex record a long history of magmatism and metamorphism first near the converging plate margin between the Insular and Intermontane superterranes and then in a subsequent transtensional to extensional regime.

Barker, F. and Arth, J.G., 1990. Two traverses across the Coast batholith, southeastern Alaska. In Anderson, J.L. (ed), *The Nature and Origin of Cordilleran Magmatism*, Geological Society of America Memoir 174, 395-405.