

SHORT NOTES ON ALASKAN GEOLOGY  
1979-80

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GEOLOGIC REPORT 63

*Recent research on Alaskan geology*



STATE OF ALASKA

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'Short Note' Editorial Policy

This document comprises short contributions on recent investigations of a limited scope on Alaskan geology. Manuscripts are accepted for review with certain qualifications: that manuscripts must not have been published or submitted for publication elsewhere; that all persons listed as authors have given their approval for submission of the paper; and that any person cited as a source of personal communication has approved such a citation.

Two copies of the manuscript, typed double spaced including references and figure captions, should be submitted to Editor, Alaska Division of Geological & Geophysical Surveys, Box 80007, College, AK 99708. No more than seven double-spaced manuscript pages (2000 words), including references, figures, and tables, will be accepted. All figures should be camera ready and suitable for black-and-white reproduction at a maximum size of 6-1/2 by 8-1/2 inches—foldout or color art will not be accepted. Contributors should keep one copy of material submitted. All manuscripts will be examined and approved by Alaska DGGs reviewers. *Substantial changes by the author—whether scientific or editorial—will not be allowed once the manuscript is in galley form.*

Deadline for manuscripts for the next Short Notes on Alaska Geology is May 1, 1981.

Cover photo: Active(?) rock glacier, headwaters of Ganes Creek, Iditarod Quadrangle, Alaska.

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### METRIC CONVERSION FACTORS

To convert feet to meters, multiply by 0.3048. To convert inches to centimeters, multiply by 2.54.

## FOSSIL ALGAE IN LOWER DEVONIAN LIMESTONES, EAST-CENTRAL ALASKA

By James G. Clough<sup>1</sup>

### INTRODUCTION

Two genera of calcareous fossil algae, *Girvanella* and *Renalcis*, have been identified in thin sections of rocks from the Ogilvie Formation located in the Charley River Quadrangle, east-central Alaska and at one locality in the Yukon Territory (fig. 1). These fossil algae are important paleoenvironmental indicators of shallow-shelf lagoonal (*Girvanella*) and reef or bank-edge (*Renalcis*) deposition within a carbonate platform. Strata of the Ogilvie Formation were deposited during Early Devonian time on the southern part of the Yukon Stable Block (Lenz, 1972), an area of shallow-water carbonate sedimentation throughout much of the early Paleozoic.

### CHARACTERISTICS AND PALEONTOLOGY

#### *GIRVANELLA*

*Girvanella* consists of tubular filaments 7 to 30 microns in diameter entwined in loose irregular masses (fig. 2) and encrusting or perforating fossil fragments (Machielse, 1972). The filament walls are fine grained and dark in thin section. Differentiation of species within this genus is based on wall thickness and tube diameter. The *Girvanella* filaments shown in figure 2 have a tube diameter of 22.8 to 26.6 microns and a wall thickness of 5 to 7 microns.

The genus *Girvanella*, established by Nicholson and Etheridge (1880), is considered a blue-green (Schizophyta) alga referred to the Family Porostromata on the basis of similar morphologic characteristics (Machielse, 1972).

It commonly occurs in a lagoonal back-reef setting (Wray, 1972) in limestones "representing a quiet, slightly restricted subtidal environment" (Machielse, 1972, p. 214). *Girvanella* has also been observed in voids between stromatoporoid skeletons in Devonian reefs (Konishi, 1958). It is found in rocks of Cambrian to Cretaceous age.

#### *RENALCIS*

*Renalcis* consists of chambered algae ranging in size from 30 to 300 microns in diameter that occur in grape-

like clusters (fig. 3) in a fan-shaped pattern (Machielse, 1972).

The genus lacks diagnostic characteristics readily related to living algae, and *Renalcis* has been referred to the red algae (Rhodophyta) by Vologdin (1962) and to the blue-green algae (Schizophyta) by Johnson (1964) and Wray (1967), and is more recently considered a problematical blue-green alga (Machielse, 1972; Wray, 1977).

*Renalcis* commonly grew in "voids beneath laminar stromatoporoids, and separately in lime-mudstone intervals" (Cheshire and Keith, 1977, p. 30), where they often formed the core of Devonian reefs. Wray (1972) reports that their presence indicates deposition in reef and bank-edge environments. The genus is reported from Cambrian- through Devonian-age limestones.

### DISCUSSION

Fossil *Girvanella* is present in some intervals of limestone from all three localities shown in figure 1. At localities 1 and 2, *Girvanella* occurs in association with abundant crinoidal debris and less commonly with ostracod, brachiopod, and trilobite fragments. At locality 1 this alga occurs with the ostracod *Moellerita canadensis* (identified by R.B. Blodgett, 1978), which has been described in restricted paleoenvironments within the Ogilvie Formation by Lenz (1972). At locality 3, *Girvanella* is found in interskeletal voids between colonial corals and stromatoporoids. This occurrence is similar to that reported by Konishi (1958), and suggests a shelf-margin biohermal paleoenvironment.

The fossil alga *Renalcis* is present in one interval of limestone from locality 2, and a single intraclast containing this genus was observed in a sample of limestone from locality 3. The genus occurs in a 1.8-m interval of *Renalcis* lime-mudstone capped by the tabular stromatoporoid *Trupetostroma* (identified by R.B. Blodgett, 1978) at locality 2, indicating a biohermal environment (Cheshire and Keith, 1977). There, the limestones form a part of the 30-m-thick massive reef complex observed 0.6 km to the southwest by Blodgett (1978).

These genera of fossil algae are the westernmost recognized in upper Emsian strata of the region. Their presence and the associated biota that indicate a shelf-margin and shallow-shelf environment agree with the findings of Blodgett (1978) on the Ogilvie Formation in this area.

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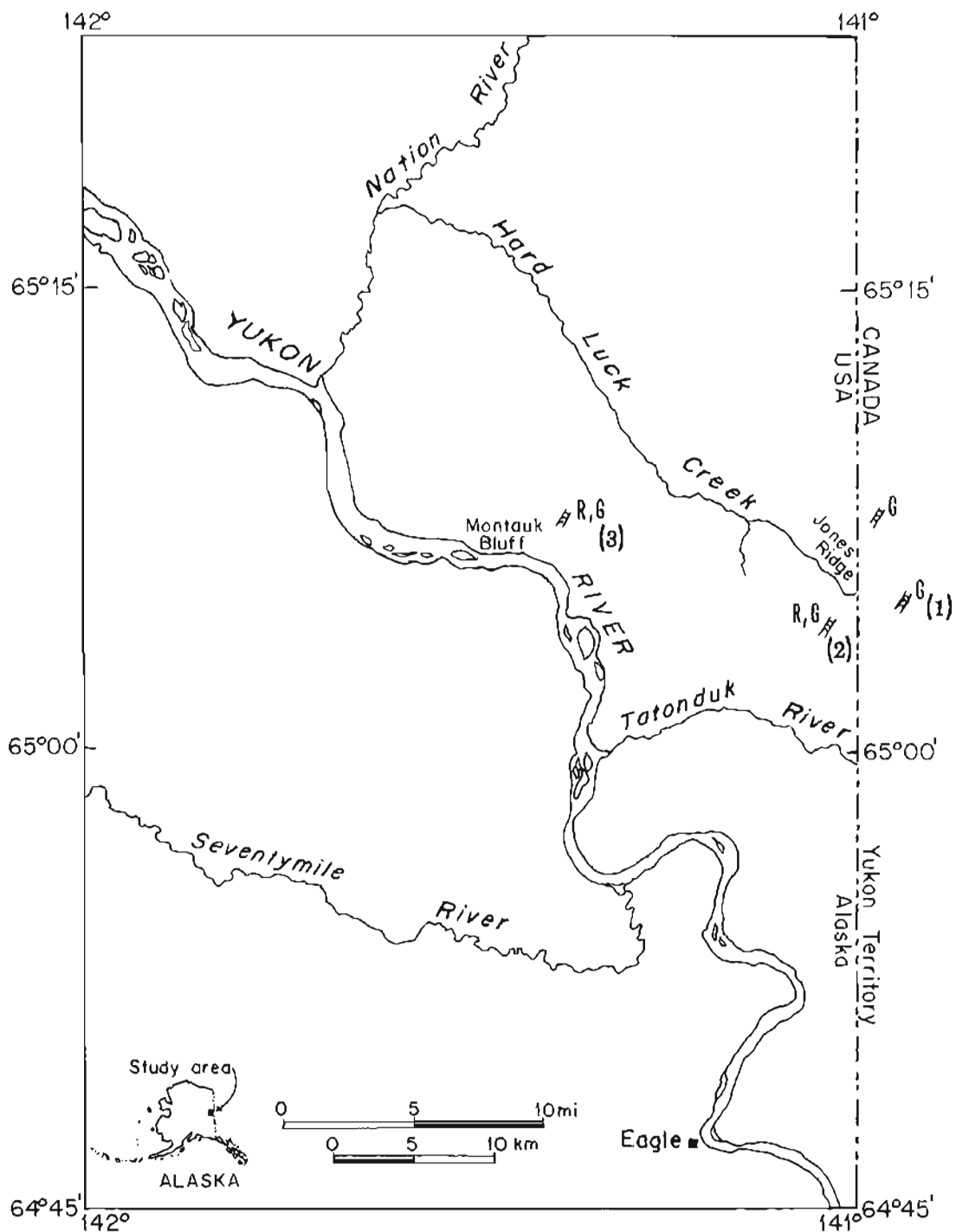


Figure 1. Map showing microfossil localities in east-central Alaska (G - *Girvanella*, R - *Renalcis*).  
 Locality 1 - 1.4 km east of International Boundary in Yukon Territory, Canada.  
 Locality 2 - NE 1/4 of NW 1/4 sec. 22, T. 3 N., R. 33 E., Charley River A-1 Quadrangle.  
 Locality 3 - Center of sec. 34, T. 4 N., R. 31 E., Charley River A-1 Quadrangle.

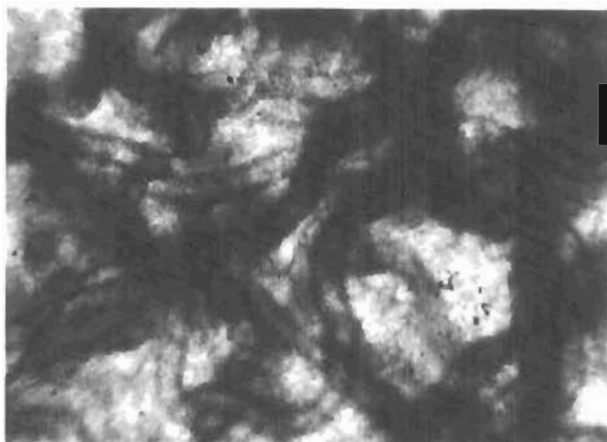


Figure 2. Photomicrograph of entwined *Girvanella* filaments in micrite (X160)

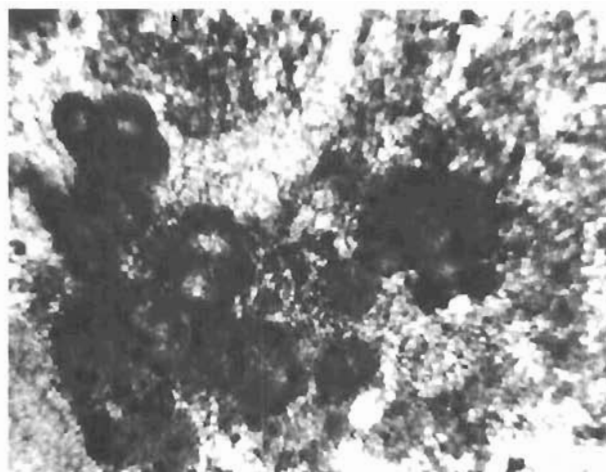


Figure 3. Photomicrograph of grapelike clusters of *Renalcis* surrounded by micrite and microspar. Dark grains are hematite (X75).

#### ACKNOWLEDGMENTS

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