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Scientific notes and summaries of investigations prepared by members of the Geologic, Water Resources, and Conservation Divisions in the fields of geology, hydrology, and allied sciences

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FOREWORD

The scientific and economic results of work by the United States Geological Survey during the fiscal year 1961, the 12 months ending June 30, 1961, will be summarized in four volumes of which this is the first. This volume includes 146 short papers on a variety of subjects in the fields of geology, hydrology, and related sciences, prepared by members of the Geologic, Water Resources, and Conservation Divisions of the Survey. These papers are of two kinds. Some are announcements of new discoveries or observations on problems of limited scope, which may or may not be described in greater detail subsequently. Others summarize conclusions drawn from more extensive or continuing investigations, which in large part will be described in greater detail in reports to be published at a later date.

Professional Papers 424–C and –D include additional short papers of the same character as those in the present volume. Professional Paper 424–A provides a synopsis of the more important new findings resulting from work during the fiscal year.

THOMAS B. NOLAN

Director.

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90. RECONNAISSANCE OF THE KANDIK AND NATION RIVERS, EAST-CENTRAL ALASKA

By EARL E. BRABB, Menlo Park, Calif.

The purpose of this report is to describe briefly the rocks and structure along two previously unmapped rivers in east central Alaska. All localities mentioned are shown on Charley River A–2, B–1, B–2, B–3, C–1, C–2 and D–1 quadrangles, scale 1:63,360.

All of the rocks cropping out along the Kandik River are provisionally assigned to the Kandik formation of Early Cretaceous age. They are predominantly shale, mudstone, argillite, slate, and graywacke but include minor amounts of chert-pebble conglomerate, "clean" sandstone, pebbly mudstone, and cherty limestone. These rocks seem to represent one lithogenetic sequence. Graded beds and other features suggestive of turbidity current deposits are common. The rocks are intensely deformed between the mouth of the Kandik River and Easy Moose Creek and between Indian Grave Creek and the United States-Canada border. The beds have a general northeast strike and a moderate northwest dip between Easy Moose Creek and Indian Grave Creek, and an anomalous northwest strike and moderate northeast dip in the vicinity of the border. Pelecypods collected from the formation along the Kandik River about 2 miles upstream from the mouth of Big Sitdown Creek suggest an Early Cretaceous (Valanginian) age according to D. L. Jones (written communication, 1961).

Slate, shale, mudstone, argillite, and minor graywacke and quartzite cropping out along the Nation River between the mouths of Tindir and Jungle Creeks are also provisionally referred to as the Kandik formation. These rocks are moderately to intensely deformed and appear to have an anomalous northwest strike. Several minor southeastward-plunging folds in these rocks can be seen near the mouth of Ettrain Creek. Most of the rocks are not well dated but all of the fossils collected from them indicate an Early Cretaceous age. For example, Foraminifera collected from shale along the Nation River near the mouth of Tindir Creek are possibly of early Neocomian age, according to H. R. Bergquist (written communication, 1961). Megafossils collected from the same beds and from another locality nearby were identified by D. L. Jones (written communication) as *Polyptychites* and *Buchia* cf. *B. crassicollis* and are also suggestive of an early Neocomian (Valanginian) age.

The Kandik formation may be in fault contact with petroliferous shale and limestone of Triassic age, Tahkandit limestone of Permian age, and Nation River formation of Carboniferous (Pennsylvanian?) age, which crop out along the Nation River about 1 mile upstream from the mouth of Waterfall Creek. These late Paleozoic and early Mesozoic rocks have a northeast strike and, for the most part, a northwest dip. Conglomerate, sandstone, siltstone, and minor coal and "red beds" cropping out along the Nation River between Waterfall and Hard Luck Creeks are also provisionally referred to the Nation River formation. These rocks have a northeast strike and southeast dip. They are apparently in fault contact with shale and limestone about 2 miles downstream from the mouth of Hard Luck Creek. Corals from the limestone are of Silurian or Devonian age, according to W. A. Oliver, Jr. (written communication, 1961).

No oil seeps or deposits of economic interest were found.

101. PENNSYLVANIAN ROCKS IN SOUTHEASTERN ALASKA

By J. THOMAS DUTRO, JR., and RAYMOND C. DOUGLASS, Washington, D. C.

The apparent scarcity of marine rocks of Pennsylvanian age in Alaska has been a stratigraphic anomaly that has puzzled geologists for nearly 50 years. In his summary of the geology of Alaska, P. S. Smith (1939, p. 26) emphasized the importance of a limestone at a single locality in Soda Bay, Prince of Wales Island, concluding:

> More detailed examination of the locality will be required before this determination (Pennsylvanian?) can be regarded as definite, but should it be confirmed by that study it would be of special importance, because it would prove the presence of Pennsylvanian rocks, which are unknown not only elsewhere in southeastern Alaska but in any other part of the Territory.

PRINCE OF WALES ISLAND

Material collected from this locality is not sufficiently diagnostic to establish the precise age of the beds in question. A restudy of the coelenterates by Helen Duncan, the gastropods by Ellis Yochelson, and the foraminifers by Douglass has been inconclusive. The fossils could represent a lower Namurian fauna (highest Mississippian equivalent) which might reasonably occur above the Upper Mississippian *Gigantoproductus* beds, present also at Soda Bay. On the other hand, the strata of doubtful age could correlate with the Lower Pennsylvanian beds with *Gastrioceras,* which crop out in Trocadero Bay, just to the north on the west coast of Prince of Wales Island (Gordon, 1955).

Fusuline foraminifers were listed in several collections from southeastern Alaska by G. H. Girty in Buddington and Chapin (1929, p. 112–115). Girty stated that the evidence, although not unequivocal, suggested a Mississippian age. L. G. Henbest (written communication, 1936) called Girty's attention to the significance of the Fusulinellas in a collection from northern Kuiu Island; this information, together with the evidence from crinoids and a reevaluation by Girty of the rest of the fossils, was the basis for Kirk's (1937a, p. 110) Pennsylvanian age assignment. Our detailed reexamination of this collection has resulted in a definite Middle Pennsylvanian age determination.

Field geologists should be alert to the possibility that Pennsylvanian rocks are more widespread in the area than hitherto assumed. Further study is needed to determine the areal extent of these rocks

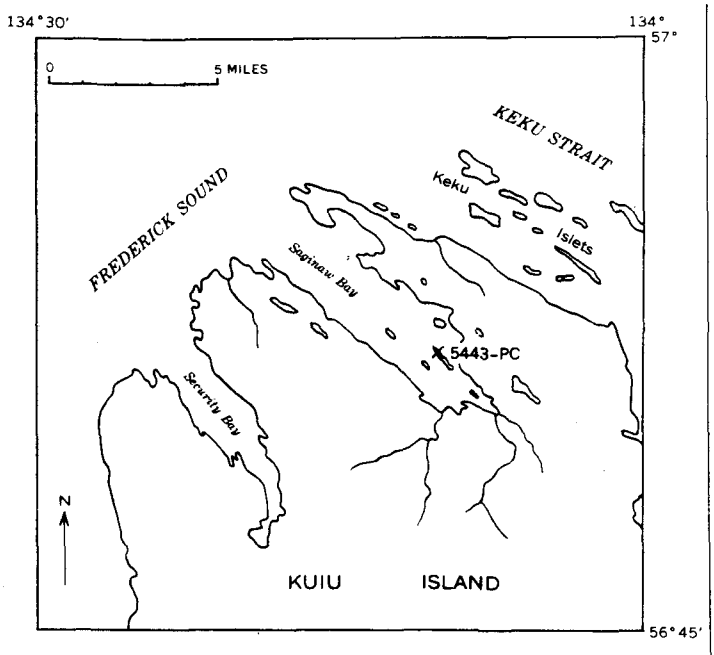

FIGURE 101.1—Locality of Middle Pennsylvanian collection (USGS 5443–PC) near the head of Saginaw Bay, northern Kuiu Island, southeastern Alaska.

and their precise stratigraphic relations with the Mississippian and Permian strata.

KUIU ISLAND LOCALITY

Collection 5443–PC came from a 40-foot thick bed of limestone, intercalated in a series of interlayered chert, quartzite, and chert-bearing limestone, at the northwest end of the long island near the head of Saginaw Bay, Kuiu Island (figure 101.1). Lithologically similar rock sequences are relatively widespread in southeastern Alaska at the top of what was considered Mississippian by Buddington and Chapin (1929, p. 110), and Pennsylvanian fossils should be sought in this part of the section during future field investigations.

Foraminifera identified in this collection (5443–PC = f2277 = Buddington field No. 930) are:

Climacammina sp.
endothyrid foraminifer, undet.
Tetrataxis sp.
Bradyina sp.
Nummulostegina ? sp.
Fusulinella spp.

Probably two species of *Fusulinella* are represented. One is a loosely coiled form with plane septa and small, nearly symmetrical chomata. This form resembles *F. bocki* Möller, 1878. It is smaller and shows less fluting of the septa than is shown by forms referred to this species by Forbes (1960) from Spitzbergen. The species is quite like—and may be referable to—*Fusulinella jamesensis* Thompson, Pitrat, and Sanderson (1953), described from British Columbia.

The other species is more tightly coiled, fusiform to elongate, and has asymmetrical chomata extending along the septa and floors toward the poles, somewhat resembling *Wedekindellina*. *Fusulinella iowensis* Thompson (1936) is similar in many ways to the Alaskan specimens.

The foraminiferal fauna indicates an early Middle Pennsylvanian age, possibly an Atoka equivalent.

Although Girty prepared a long fossil list from this locality, many of the forms either were not determined as to species or were listed as new. A restudy of the collection has resulted in the identification of the following larger fossils:

Clithrocrinus pyriformis Kirk
Synbathocrinus sp.
Delocrinus sp.
Cyathaxonia sp.
aulophylloid corals, genus undet.
horn coral, undet.
Fenestella sp.
"Batostomella" sp.
Cystodictya sp.
rhomboporoid bryozoan, indet.
multifoliate fistuliporoid, undet.
Leioclema ? sp.
Petrocrania? sp.
Rhipidomella aff. *R. nevadensis* (Meek)
Schizophoria aff. *S. resupinoides* (Cox)
Derbyia? sp.
Chonetes sp.
Chonetina? sp. (compare *C. flemingi crassiradiata* Dunbar and Condra)
Juresania aff. *J. ovalis* Dunbar and Condra
Krotovia? sp.
Linoproductus (sensu stricto) spp.
dictyoclostid brachiopod, genus indet.
"Marginifera" sp.
Spirifer aff. *S. rockymontanus* Marcou
Neospirifer sp.
Spiriferella aff. *S. texana* (Shumard)
Martinia? sp.
Composita sp. (small)
Crurithyris sp.
Phricodothyris? sp.
Stenoscisma sp.
Hustedia sp.
Rhynchopora cf. *R. magnicosta* Mather

Crenispirifer? sp.
Punctospirifer? sp.
Dielasma spp.
Aviculopecten sp.
Schizodus sp.
Platyceras sp.
cf. *Straparollus (Euomphalus?) savagei* Knight
euomphalacean gastropod, indet.
pleurotomariacean gastropod, indet.
bellerophontacean gastropod, indet.
ostracodes, indet.

This revised list of megafossils clearly indicates a Pennsylvanian age. Several species to which the Alaskan fossils have been compared are restricted to the lower part of the Pennsylvanian, insofar as their distribution is known at present. For example, *Rhipidomella nevadensis* (Meek), *Chonetina flemingi crassiradiata* Dunbar and Condra, *Spirifer rockymontanus* Marcou, *Rhynchopora magnicosta* Mather, and *Straparollus savagei* Knight are all compatible with the early Middle Pennsylvanian age assignment suggested by the fusulines. The other fossils do not conflict with such an assignment.

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