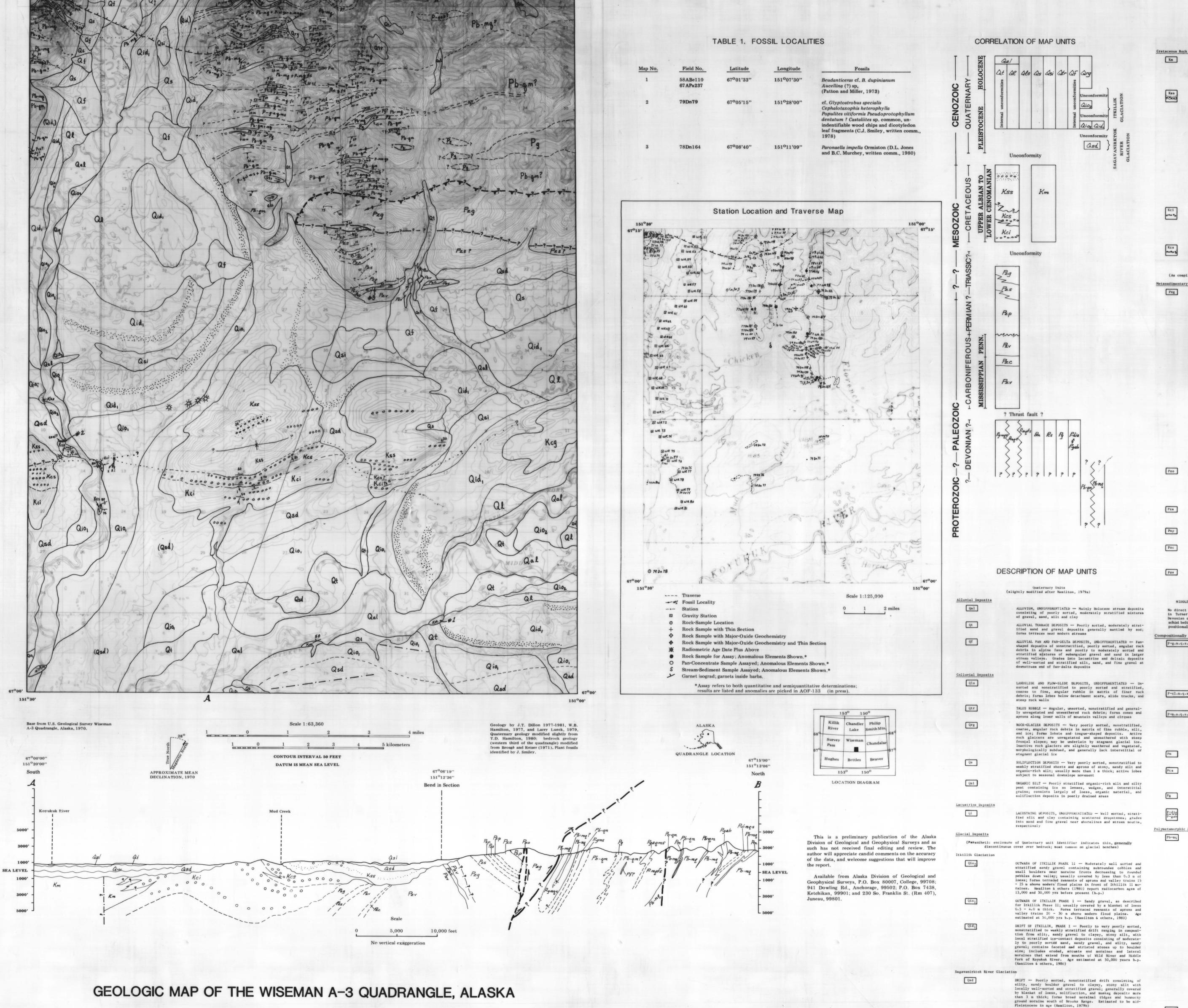
EXPLANATION



By J. T. Dillon, W. B. Hamilton, and Larry Lueck

MESOZOIC ROCKS UNITS Cretaceous Rock Units MARINE GRAYWACKE AND SLATE - Predominantly evenbedded graywacke interlayered with calcareous slate; slate predominates over graywacke locally. Relic sedimentary structures include graded bedding, flutes, tool marks, local shale-chip breccia, and carbonized wood. Patton and Miller (1973) report Early eous (Albian?) ammonites and pelecypods in outcrops along Middle Fork of Koyukuk River (fossil locality 1) SHALE - Predominantly grit (very coarse sandstone with angular grains), sandstone, and conglomerate composed of sub-rounded to rounded clasts of graphitic schist, vein quartz, and quartzite; lesser amounts of siltstone, shale, carbona hatching where differentiated. Planar and trough crossbeds rocks; ripple marks, plant fossils, and fresh water pelecypods found in fine clastic rocks. Sedimentary structures as-sociated with plant fossils provide evidence for rapid deposition near growing plants under conditions that were turbu-lent in some places but not in others (C.J. Smiley, written 1978, 1979) identified several species of conifers and dicotelydons from plant fossils at location 2 and correlates assemblage with late Albian to early Cenomanian floral zone late Albian. Southern limit of unit apparently lies on unit Kcs, perhaps unconformably (Brosge & Reiser, 1971). Northern contact is concealed in Wiseman A-3 Quadrangle but lies unconformably on Upper Paleozoic greenstone, chert, graywacke, and phyllite at its northern limit in the Wiseman A-5 and A-6 Quadrangles; this provides evidence for mid-Cretaceous northward onlap. Clasts are representative of lithologies exposed to north in southern schist belt IGNEOUS CLAST CONGLOMERATE -- Mainly cobble conglomerate evidence for southward flowing paleocurrents dominance of metagraywacke and phyllite clasts UPPER PALEOZOIC ROCK UNITS (As compiled from Brosge and Reiser (1971) in eastern part of map area) Metasedimentary Rock Units quartz + albite + sericite + chlorite + biotite + white mica; semipenetrative cleavage s(1) defined primarily by sericite, chlorite, pyrite, and rare biotite; metamorphic texture chert sequence (units Pzv and Pzc). Well-preserved clastic textures and sedimentary structures, lower greenschist facies Cretaceous time OLISTOSTROME OR TECTONIC MELANGE -- Dark, knobby rock unit about 20 m thick between Pzs and Pzg. Consists of lenses of metagraywacke and siliceous phyllite in scaley, sheared (?) phyllite matrix; rounded pebbles up to large boulder-size clasts (knockers?) have been stretched and twisted int METASILTSTONE -- Orange- to brown-weathering metasiltstone with subordinate interbeds of phyllite and metagraywacke. Generally finer grained than unit Pzg but of similar lithol-CHERT - Red, green, and gray, 10 m-thick chert interbeds in unit Pzv. Radiolaria (Paronaella Impella Ormiston, sample 78 Dn 164, fossil locality 3) are evidence for Late Mississip-pian or Early Pennsylvanian age (D.L. Jones and B.C. Murchey, written comm., 1980) Pillows and agglomeratic structures recognizable in best MIDDLE PALEOZOIC AND PROTEROZOIC (?) POLYMETAMORPHIC ROCK UNITS Compositionally Uniform Polymetamorphic Rock Units schist described below slightly banded gray, medium- to coarse-grained, feldspathic schist; metamorphic mineralogy designated by acronyms in order of increasing abundance defined above. "f" indicates the presence of undifferentiated feldspar; most feldspar is albite; no K-feldspar identified. Locally uniform feldvite-quartz-calcite schist and quartz-muscovite-calcite schist; distinguished from marble by its well developed schistose texture and presence of muscovite + quartz coarse-grained, actinolite-epidote-chlorite-albite schist with relic diabasic or gabbroic texture (as abbreviated) Polymetamorphic Banded Schists BANDED QUARTZITE AND GRAPHITIC SCHIST WITH QUARTZITE slippage and mineral growth have occurred. As a result, where cleavage cuts schistosity at high angles, bands are disrupted into distinctive black and white lenses Great structural complexity of unit Pb-mg is evidence for long metamorphic history involving two and probably three

SYMBOLS

..... Moraine ridge

. _?___ LITHOLOGIC CONTACT — Solid line where contacts located within 100 m; solid Quaternary unit contacts taken with local modifications from Hamilton (1977a); dashed contacts less well located; shorter dashes indicate increased uncertainty of location; dotted where concealed. Queries between dashes indicates inferred sedimentary or transposed uncertain continuity and trend

HIGH-ANGLE FAULT -- Solid line where located within 100 m; shorter dashes and dots as above. Queries between dashes indicate contact is probably high-angle fault. Queries at LOW-ANGLE APPARENT THRUST FAULT - Solid line, dashes queries, and dots as for high-angle fault above. Barbs

Attitude of bedding; top (T) indicates geopetal evidence was

Strike and dip of schistosity and semipenetrative cleavage

Attitude of cleavage surface with pencil lineation (p) plunging 10°

Strike of schistosity and semipenetrative cleavage equal;

Trend and plunge of lineation defined by crenulation (c), plunging 10°; m = mineral lineation, f = small fold; af = asymmetric fold, if = isoclinal fold, p = pencil lineation

Trend and plunge of axis of asymmetric small fold (af) with axis in plane of schistosity and clockwise rotation as viewed down fold axis

Direction of paleocurrents estimated from clast imbrication (i) and crossbeds (x)

Approximate apparent attitude of bedding or cleavage

Plunging anticline defined by folded schistosity; dotted where concealed Plunging syncline defined by folded schistosity; dotted where

Syncline and anticline in bedded rocks Attitude of overturned beds.

Attitude of schistosity

Attitude of vertical schistosity

Garnet isograd; garnet inside barbs.

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We are grateful to G.H. Pessel for participating in the mapping, D.D. Adams for

(indicated by circles where differentiated) with subordinate sandstone. Clasts are rounded cobbles of greenstone and bbro, metagraywacke, red and green chert and a few clasts of phyllite, vein quartz, schist, granodiorite, and marble; clasts of metagraywacke most abundant near contact with unit Kss. Clast imbrication and trough-set crossbeds provide

METASEDIMENTARY CLAST CONGLOMERATE -- Forms interbeds in upper unit Kci; differs from unit Kci only in its pre-

METAMORPHOSED GRAYWACKE AND SILTSTONE - Fine- to medium-grained metagraywacke with subordinate interbeds of locally differentiated dark-gray, graphitic phyllite (Pzp). Wellpreserved relic clastic texture and bedding; possible sole markings on several samples may be relic tool marks. Angular to subangular detrital grains of quartz (40%), albite (8%), biotite (2%), white mica (2%), tourmaline (tr) and rock fragments (35%) occur in microcrystalline matrix of quartz, sericite, and chlorite. No K-feldspar was recognized. Most rock fragments are chert but about 20% are graphitic or chloritic metasediments (?). Metamorphic mineralogy is

> others, 1967); metamorphic textures and structures appear to sample is complexly folded and axial plane of fold parallels No fossils located; contains interbeds of units Pzs and Pzp. Units Pzs, Pzp, and Pzg may be late Paleozoic or Triassic in age because they appear to lie on greenstone with chert interlayers of Late Mississippian to Early Pennsylvanian age (see discussion of unit Pzc below) and Permian carbonates (Patton and Miller, 1973) and are unconformably overlain by Cretaceous conglomerate. Units Pzg, Pzs, and Pzp (Wiseman A-6 Quadrangle) appear to be interlayered with greenstone and

mineralogy, and presence of only one set of metamorph; tectonite fabric, albite-epidote-amphibolite facies minera evonian - Proterozoic?) polymetamorphic schists to north metamorphic structures in the polymetamorphic schist and the S(1) cleavage in the upper Paleozoic rocks is evidence that the metamorphism of both rock units occurred synchronously. hypothesized that the last metamorphism occurred during Early

stubby cigar shapes; metagraywacke clasts similar to Pzg above. May have originated as tectonic melange or olist

PHYLLITE -- Dark-gray graphitic phyllite with subordinate metasiltatone and metagraywacke interbeds which occur as sub-

GREENSTONE -- Amygdaloidal and variolitic basaltic greenstone and chert interlayers of Angayucham Volcanics (Fritts, 1972). Greenstone locally contains megascopic feldspar phenocrysts; oxidized chlorite is only metamorphic mineral identified.

No direct evidence for age of these rock units exists; regional age data summarized in Turner and others (1979) and Dillon and others (1980) are compatible with Devonian or Proterozoic ages. No rocks of intermediate age have been identified in schist belt to west of Baird Mountains. A Devonian age is more likely for com-

UNIFORM POLYMETAMORPHIC GRAPHITIC SCHIST -- Uniform to slightly banded, dark-gray, fine- to medium-grained graphitic, commonly pyritic schist. Metamorphic mineralogy designated by acronyms as follows: g = graphitic; a = black albite; b = biotite; gar = garnet; c = calcite; cl = chlorite; m = muscovite; q = quartz; s = schist; minerals listed in order of increasing abundance. For example, g.m.q.s designates graphitic-muscovite-quartz schist with muscovite subordinate to quartz. In some cases, uniform graphitic schist represents subdivision of polymetamorphic banded

UNIFORM POLYMETAMORPHIC QUARTZ SCHIST - Uniform to slightly banded quartz schist with little or no graphite and pyrite; metamorphic mineralogy designated by acronyms as shown for UNIFORM POLYMETAMORPHIC FELDSPATHIC SCHIST -- Uniform to

spathic schist is subdivision of polymetamorphic banded MARBLE -- Gray, medium-grained marble and quartz marble in layers less than 20 cm thick; grades into calc-schist (unit Pcs) with increasing mica and quartz content

GREENSCHIST -- Medium-grained, epidote-actinolite-chlorite-albite greenschist with accessory calcite, sphene, and METAMORPHOSED DIABASE OR GABBRO -- Green, medium- to

> White, medium-grained, quartzite layers less albite-chlorite-muscovite-quartz schist layers of similar thickness. Accessory minerals are clinozoisite + pyrite + sphene + calcite + tourmaline. Three prominent ages of quartz veins are distinguished by their relationship to metamorphic structures and resulting degree of deformation. Two or more metamorphic episodes have imparted a strong penetrative schistosity; there is equivocal evidence this is not oldest metamorphic structure. It is definitely not the youngest metamorphic structure because the schistosity and banding disrupted and partially transposed by subsequent (Cretaceous?) semipenetrative cleavage along which some

> > and rods which look like knots and streaks in outcrop; this knotty" structure is distinctive of this unit and unit Pb-qm (below), which it grades into southward with decrease in proportion of quartzite. Units Pb-mq and Pb-qm widely referred to as country rock schist of Brooks Range schist belt.

metamorphic events. Greenschist and gabbro layers provide mafic rocks interlayered with country rocks of Brooks Rang young, semipenetrative cleavage is probably Cretaceous i it occurs in Upper Devonian rocks in Wiseman B-3 Quadrangle: Wiseman B-3 Upper-Devonian rocks lack evidence for the third and -qm. Pb-qm and -mq may have pre-Late Devonian metamorphic history; supporting evidence is intrusion of Pb-mq in Wiseman B-3 Quadrangle by the Upper Devonian Wild River Pluton (Dillon and others, 1980). INTERBANDED GRAPHITIC SCHIST AND QUARTZITE WITH QUARTZITE

<25% -- Contains less quartzite than Pb-mq but otherwise similar; grades into Pb-mq to north; quartz veins particularly noticeable because of dark color of unit Pb-qm