STRATIGRAPHIC SECTION FROM THE JURASSIC ASHCROFT FORMATION AND TRIASSIC NICOLA GROUP CONTIGUOUS TO THE GUICHON CREEK BATHOLITH

(92I/11E)

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INTRODUCTION

As part of a continuing study of the Guichon Creek batholith, its ore deposits, and its surrounding terrain, stratigraphic sections were measured in the Ashcroft Formation and the Nicola Group.

The Ashcroft Formation, which is of Jurassic age, unconformably overlies rocks of both the Nicola Group and the Guichon Creek batholith. There exists, therefore, the possibility that copper derived from weathering of the older rocks may have been deposited as stratiform deposits within the sedimentary succession. The Nicola Group, on the other hand, is of Late Triassic age and is intruded by the batholith. It, therefore, is a potential site for contact metamorphic and contact metasomatic deposits adjacent to the batholith. One such deposit, Craigmont, is now a major copper producer in British Columbia. Rocks of the Nicola Group are also favourable strata to explore for metal occurrences of volcanigenic origin.

THE JURASSIC SECTION

In the creek which drains northward from Barnes Lake, the unconformity between Nicola Group and Ashcroft Formation rocks is exposed (Fig. 6). Nicola Group rocks consist of interlayered porphyritic andesites and basaltic andesites with local thinly bedded layers of tuff. The tuffs strike southeast and dip steeply toward the northeast below the unconformity. At the unconformity, the underlying rocks are rusty and rust extends downward several tens of feet into closely fractured areas (Fig. 7, columnar section 2). The overlying conglomerate contains cobbles to boulders of Nicola rocks in a rusty, sandy matrix. The larger clasts have weathered borders and are apparently rounded at least in part as a result of spalling-off of angular edges. Upward in the section, the size of the clasts decreases and fetid grey limestone clasts occur. At the top of this unit, only limestone clasts are found. Locally (Fig. 7, columnar sections 2 and 3) the rusty conglomerate grades upward into limestone conglomerate with a grey, sandy limestone matrix. Shell fragments occur and the limestone is fetid. It is probably of bioclastic origin.

The limestone conglomerate is overlain (Fig. 7, columnar section 2) unconformably (?) by a thin sandy 'soil' layer (regolith) which gives way to volcanic conglomerate, then limestone with scattered mud pellets. Conglomerate clasts are well rounded and are variable from deeply weathered feldspar porphyry to fresh dark grey basalt. A second regolith developed on a surface which truncates the underlying beds with gentle angular unconformity. This regolith is overlain by fetid, dark grey, crystalline (bioclastic ?) limestone.

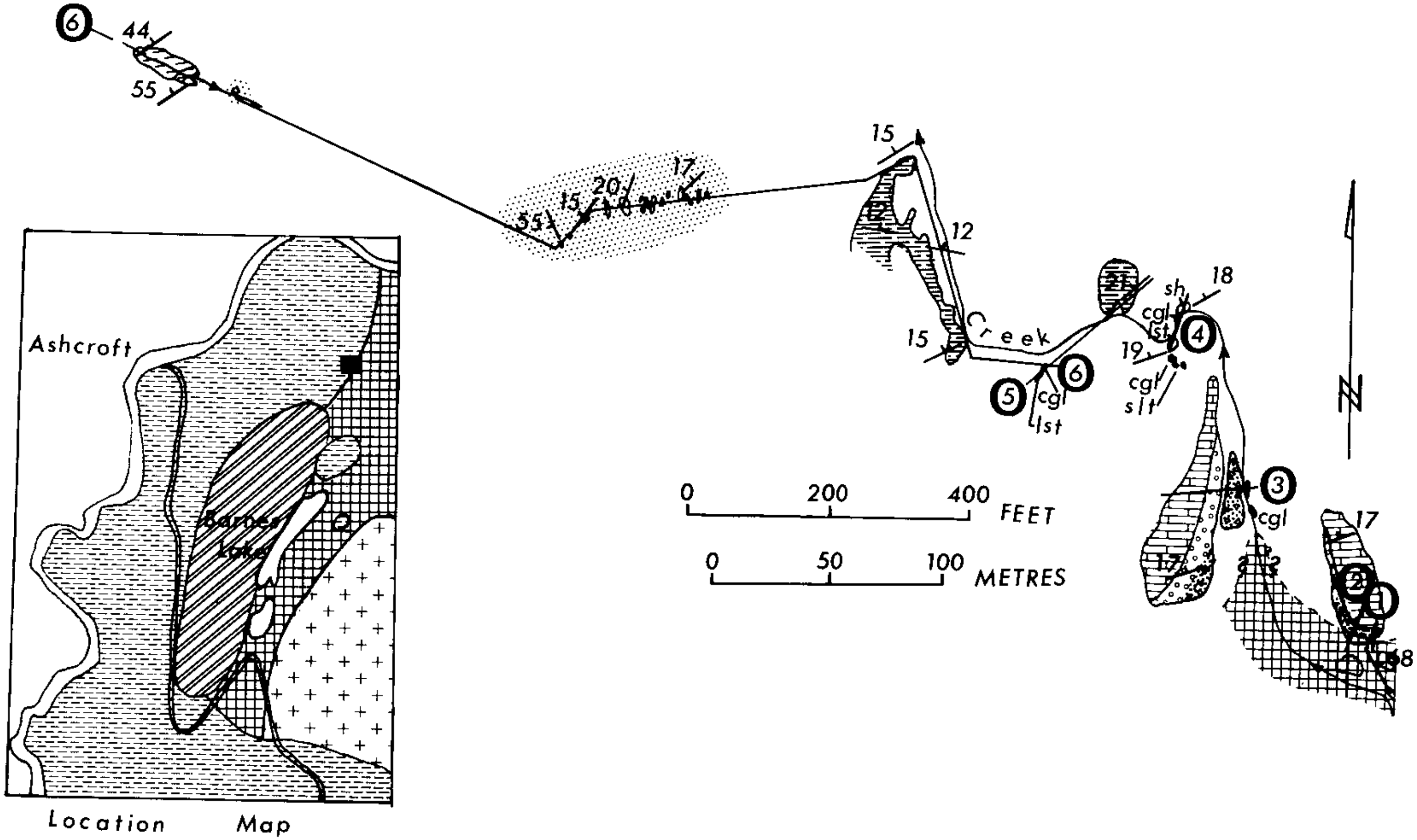

Figure 6. Location map and plan; columnar sections through Jurassic Ashcroft Formation (for legend, *see* Figure 7).

In columnar section 1, the rusty basal conglomerate is directly overlain by massive dark grey limestone. In columnar section 3, the rusty conglomerate itself is underlain by a poorly sorted, Nicola volcanic conglomerate. This conglomerate has acid to basic volcanic clasts in a sandy matrix. It is well indurated. By comparison with rocks elsewhere in the map-area, this conglomerate is interpreted to be part of the Ashcroft Formation. Its occurrence and clast distribution suggest that it formed in a stream channel.

Columnar section 4 shows the limestone member overlain by conglomerate. This conglomerate has some well-rounded pebbles to cobbles of Nicola volcanic rocks but white to tan, deeply weathered granitic clasts predominate. It also has lenses of shale and 'rip-up' clasts of siltstone. Beds are variably dark grey to brown but overall the zone looks black. Erosion truncated softer clasts in the conglomerate at the siltstone interface but more resistant clasts project up into the siltstone. One thin lens of conglomerate was noted in the siltstone. Ammonites and pelecypods from near the top of the 'black' member are of Callovian age. Fossils from localities indicated on columnar sections 5 and 6 have not yet been identified but judging from collections elsewhere in the Ashcroft Formation they are likely to be of Callovian age.

Columnar section 6 was begun at the same lowermost outcrop as that for section 5. The 'black' member (A) here is black shale with several very thin siltstone beds. The overlying unit has more siltstone interlayers, which are bedded with alternating golden brown and black beds. In unit D, rusty layers cemented by limonite (?) occur within the shale-siltstone succession. Virtually all the layers within units A to G are thin bedded. Calcite veins cut beds at high angles locally and small-scale high-angle reverse faults occur.

Above unit G, outcrop is less abundant (Fig. 6) but it is clear that the shale-siltstone succession is gradually replaced by a succession characterized by fine-grained brown to red-brown sandstone and siltstone with local black organic-rich partings. Layers are massive to thin bedded and local mudstone layers and partings occur.

To this point in the succession strike and dip of bedding are fairly uniform. The uppermost outcrop in the sandstone-siltstone succession dips 55 degrees toward the west but the outcrop was poor and bedding may have been disrupted. The next outcrop is poorly exposed but consists of fine-grained sandstone with mudstone partings. Above it is a bluff of mainly carbonaceous black shale. These shales are cut by calcite veins at high angles to bedding and selenite crystals occur locally. Beds in these rocks strike northeast and dip 44 to 55 degrees northwestward.

The black shales are definitely stratigraphically higher than the sandstone-siltstone succession but the change in dip and strike of bedding suggests that either a fold or more likely a fault (Fig. 7, columnar section 6) separates the two successions. Displacement is probably minor but the sandstone-siltstone succession may be somewhat thicker than it now appears.

An outlier of Jurassic rock crops out east of Barnes Lake. Fossils from the outlier include two species of Weyla, pectenid pelecypods and rhynchonellid brachiopods. This fauna suggests the rocks are of Pleinsbachian age (Tipper, 1973, personal communication).

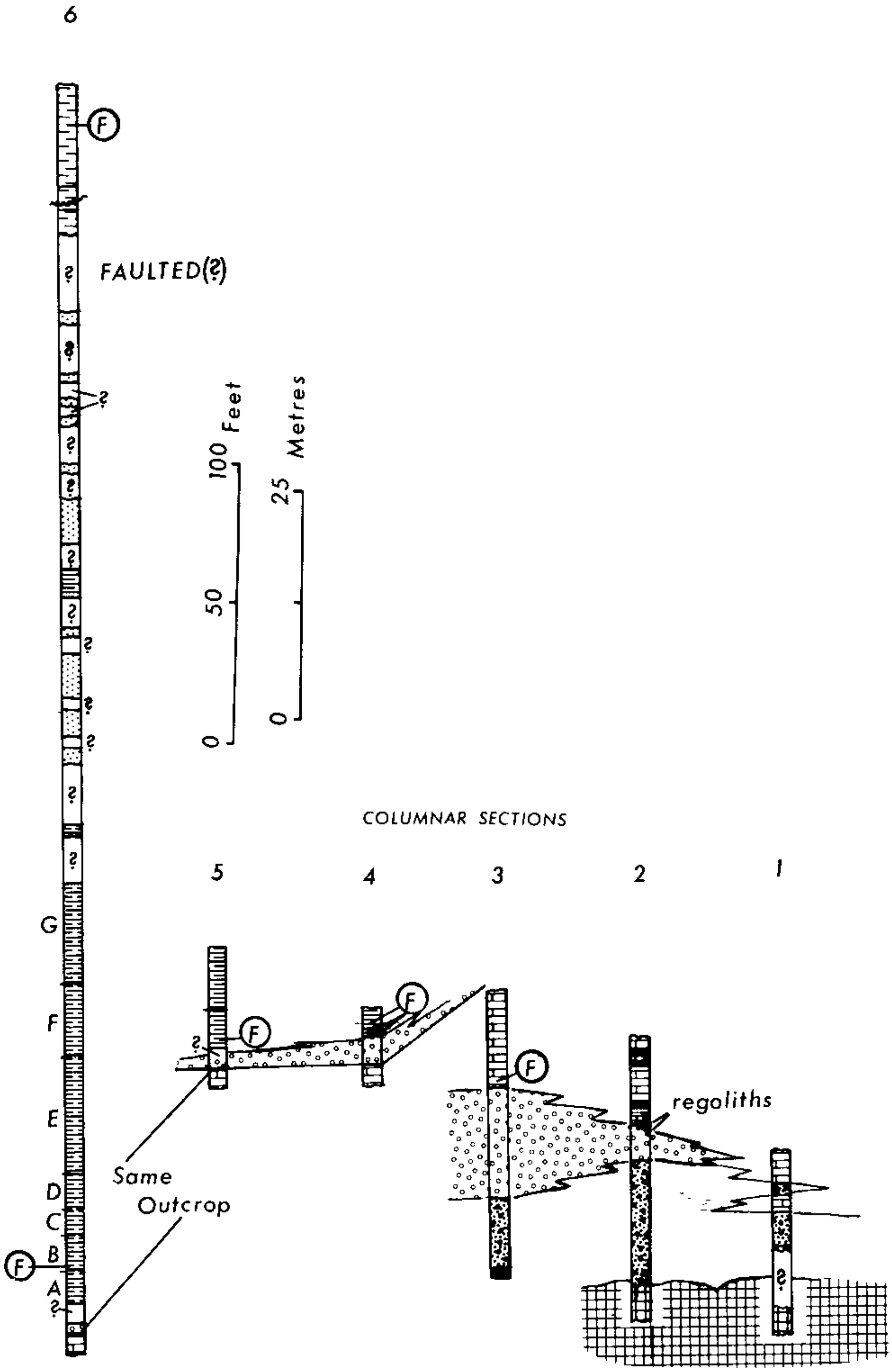

Figure 7. Columnar sections, Ashcroft Formation.

LEGEND

TERTIARY

KAMLOOPS GROUP

JURASSIC

UNDIFFERENTIATED

CALLOVIAN

ASHCROFT FORMATION

BLACK CARBONACEOUS SHALE WITH GREY SHALE AND SILTSTONE INTERBEDS

SILTSTONE AND SANDSTONE WITH LOCAL SHALE INTERLAYERS

INTERLAYERED BLACK SHALE AND THIN-BEDDED SILTSTONE; HAS LOCAL CONGLOMERATE LENSES NEAR ITS BASE

MASSIVE TO THIN-BEDDED, DARK GREY FETID LIMESTONE

FETID LIMESTONE CONGLOMERATE THAT GRADES DOWNWARD INTO A RUSTY CONGLOMERATE WITH A SANDY 'SOIL' MATRIX

PLEINSBACHIAN (?)

CONGLOMERATE WITH POORLY SORTED, WELL-ROUNDED CLASTS OF NICOLA VOLCANIC ROCK IN A SANDY MATRIX

GUICHON CREEK BATHOLITH

HYBRID PHASE: QUARTZ DIORITE

TRIASSIC

CARNIAN

NICOLA GROUP

ANDESITIC VOLCANIC ROCKS AND TUFF

SYMBOLS

OUTCROP

AREA WITH NUMEROUS SMALL OUTCROPS

5 LOCATION AND NUMBER OF COLUMNAR SECTION

(F)— FOSSIL LOCALITY

GEOLOGIC CONTACT: SHARP, GRADATIONAL, INFERRED

INTERPRETATION

Jurassic sedimentation began with deposition of conglomerates composed of material derived from the surrounding rocks of the Nicola Group in stream channels. Active erosion and weathering were occurring but the terrace had considerable relief. If the tentative fossil ages are correct, it seems likely that a marine incursion occurred during the Pleinsbachian stage. This was followed by a period of erosion during which stream valleys were cut and filled, soils developed, and much of the Pleinsbachian succession was eroded. During Callovian time, the area was again inundated by marine waters. During the early phase of this transgression, the lithologic succession records considerable tectonic instability with development of rusty conglomerates which were probably of subareal scree slope origin initially but were subsequently covered by marine waters. Limestone clasts predominate near the top of the conglomerate. Two soil zones developed at the apex of the conglomerate suggest subareal erosion, followed by deposition which was at least partly marine. Subareal erosion then removed some of the material deposited above the first soil zone. Transgression and biogenic (?) limestone development followed. The limestone is overlain by conglomerate that is in part of marine origin and interfingers with marine shale and siltstone of Callovian age. Above the conglomerate is a rhythmic succession of marine shales and siltstones that may indicate deeper marine conditions. These give way in turn to a succession of siltstones and sandstones which are presumably marine and may represent gradual infilling of the sedimentary basin. Carbonaceous black shales above the sandstone rarely contain fossils but often contain carbonized wood fragments. Only a few ammonite impressions and one bed rich in pelecypod remains were found. These data suggest the shale was deposited in a restricted marine basin, probably under anaerobic conditions.

THE TRIASSIC SECTION

Rocks of the Late Triassic Nicola Group were studied in an area near Basque which is 8 miles south of Ashcroft (Fig. 8). The Nicola succession there forms a large block dipping 45 degrees westward. Emplacement of the Guichon Creek batholith uptilted the block but deformation and faulting within it are not intense. Metamorphic alteration of the rocks has produced mineral assemblages typical of middle to upper greenschist facies. Near the batholith contact, local areas have almandine amphibolite facies assemblages.

Section 1 (Fig. 8) consists of a lower unit of interlayered volcaniclastic rocks and porphyritic lavas and an upper unit of skarn and limestone.

No copper mineralization was seen in the lower pyritic unit (A) but chalcopyrite was observed as grains strung out along bedding and as small pods in one skarn layer and in a quartz-epidote veinlet in another. A copper occurrence was also noted on the NOD 12 claim. In test pits on these showings clumps and pods of chalcopyrite, bornite, and tetrahedrite (?) occur in a white garnet (?) skarn.

Section 2 (Fig. 8) can be divided into several segments (A to G) based on relative proportions of limestone and chert and grain size of clastic sedimentary units.

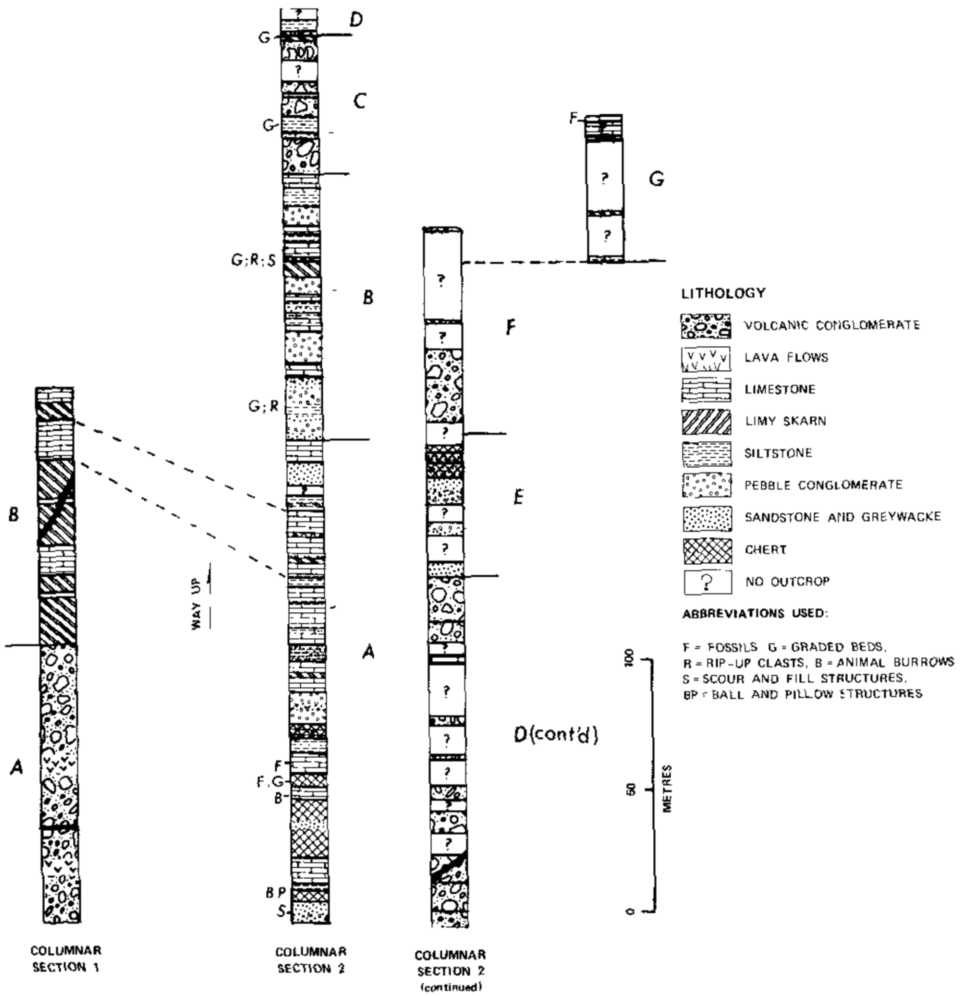

Figure 8. Columnar sections through Triassic Nicola Group, near Basque.

Unit A is characterized by interlayered limestone and chert. Sandstone and siltstone interlayers are relatively common. Chert in unit A is pale green to black and pyritiferous. It has interbeds of siltstone and sandstone and in some areas has been called cherty siltstone. Limestone throughout section 2 is typically tightly folded internally but has undeformed or only gently folded contacts. Locally, layers are richly fossiliferous with pelecypod and ammonite impressions. Fossils in the unit are correlative with the Tropites zone of Late Carnian time.

Soft sediment deformation structures, ball and pillow structures, rip-up clasts, scour erosion, and grading all occur locally in various siltstone or sandstone layers.

Unit B consists of roughly equal proportions of: limestone; siltstone and greywacke; and conglomerate. Skarn, usually associated with limestone, is a minor constituent. Limestone and siltstone layers are similar internally to those in unit A. Volcanic conglomerates in this and higher sections are dark-coloured, well-indurated rocks composed almost entirely of subrounded to subangular basic volcanic fragments in a finer volcanic-derived matrix. Granitic, aplitic, and acid volcanic clasts occur but are rare. In many instances, as for similar rocks in section 1, the fragmental nature of the rock is difficult to see unless there is an appropriate weathered surface. Unlike section 1, no flows were recognized in section 2. Bedding is almost never developed in the conglomerate layers but some have interlayers of laminated siltstone.

Unit C is two-thirds volcanic conglomerate with the remainder consisting of siltstone with minor greywacke and limestone layers. Grading in some siltstone beds enables 'tops' to be determined. In unit D, volcanic conglomerate is the major constituent, with a few siltstone interlayers and rare, thin limestone layers. In one area, quartz diorite dykes from the Guichon Creek batholith cut conglomerate. It must be stressed that while unit D is estimated to be 120 metres thick, 50 metres are covered by overburden.

Unit E consists mainly of interlayered volcanic conglomerate and greywacke. Odd fine-grained ellipsoidal features (mud balls ?) comprise up to 10 per cent of the volcanic conglomerate and greywacke in the central part of the unit.

The upper parts of unit F and unit G are poorly exposed. Unit F is predominantly volcanic conglomerate but only siltstone, skarn, and limestone were exposed in unit G. Because of poor exposure, it is not possible to be sure that unit G is in its true stratigraphic location.

Pyrite commonly makes up 2 to 3 per cent of the volcanic conglomerates, some siltstones, and some cherts. Chalcopyrite was found as pods and stringers in skarns and, rarely, in epidotized volcanic conglomerates.