BADGER MAP AREA (12A/16), NEWFOUNDLAND

by

B.F. Kean and N.R. Jayasinghe

INTRODUCTION

Mapping of the Badger map area (12A/16) was completed during the 1979 field season. The area was previously mapped on a scale of 1:250,000 by the Geological Survey of Canada (Williams, 1970). The geology of the area was compiled on unpublished, 1:50,000 scale maps by F. Anderson of the Geological Survey of Canada. Parts of the area have been mapped by mining companies (ASARCO, NORANDA).

The map area is divided into two parts by the northeast flowing Exploits River. The area south of the river can be reached by private logging roads from Grand Falls. The area north of the river is accessible via the Buchans highway (Route 50) that branches off the Trans Canada Highway at Badger. However, the northwest corner of the map area is accessible only by helicopter.

Bedrock exposure is generally poor. The area has an extensive till and glacial gravel cover. The predominant direction of ice movement was northeasterly.

General Geology

The map area is predominantly underlain by sedimentary rocks of the fossil dated pre-Middle Ordovician Victoria Lake Group, and by younger sedimentary rocks. The Hungry Mountain Complex, Buchans Group and Skull Hill Granite occupy the northern part of the map area. The Hungry Mountain Complex overthrust the Buchans Group and both have been intruded by the Skull Hill Granite. The relationship between the Buchans Group and the sedimentary rocks (unit 5) to the south is not clear, however it has been inferred to be a fault by Williams (1970) and a conformable contact by Anderson (1972). Considering (a) the conformable contacts between the Victoria Lake Group, the Harbour Round Formation and overlying lithologies that resemble the Buchans Group (Kean, 1977a) and (b) regional stratigraphic correlations (Kean, 1977b), the Buchans Group is interpreted to be younger than the sedimentary rocks of unit 5 in the map area. However, the contact in the map area is interpreted to be a fault by the authors.

DESCRIPTIONS OF ROCK UNITS

Hungry Mountain Complex (Unit 1)

The Hungry Mountain Complex (Thurlow, 1975) occupies the northeastern corner of the map area. The complex was divided into an eastern and a western belt by Kean (1979) and only the eastern belt occurs within the present map area. It consists of two phases; an older gabbroic-dioritic phase (unit 1a) and a younger granodioriti-granite phase (unit 1b). The gabbro-diorite phase is fine to coarse grained equigranular and consists of plagioclase, pyroxene and hornblende. In places leucodiorite intrudes the gabbro and xenoliths of gabbro, diorite and diabase are common. Some of the gabbro xenoliths have been deformed prior to incorporation.

The gabbro-diorite phase is for the most part undeformed, but in places it contains a distinct fabric. An alignment of amphibole crystals seen locally may be related to the emplacement of the complex.

The granodiorite-granite phase consists essentially of medium to coarse grained granodiorite and minor granite.

DEVONIAN

11 Skull Hill granite: 11a, diorite, gabbro and hybrid diorite; 11b, fine grained, red syenite, quartz syenite and granite.

MIDDLE ORDOVICIAN AND YOUNGER

10 Cripple Back Lake quartz monzonite: medium grained, quartz monzonite and minor unseparated basic phases.

9 Gabbro

BUCHANS GROUP (Units 6-8)

8 Silicic and intermediate volcanic rocks undivided; 8a, dacite and rhyolite breccia and tuff, quartz-feldspar porphyry and crystal tuff, minor massive flows; 8b, feldspar porphyry and massive rhyolite.

7 Green, fine-grained, bedded sandstone, tuffaceous sandstone, graywacke and arkose.

6 Mafic pillow lava, agglomerate and tuff; minor interbedded red and green chert and sandstone; 6a, massive basalt, tuff and minor felsic rocks.

5 Gray-green graywacke and conglomerate, minor sandstone, siltstone, slate and argillite; 5a, conglomerate.

MIDDLE ORDOVICIAN (Caradocian)

4 Black slate, shale and argillite; interbedded chert and graywacke, minor pyrite beds.

MIDDLE ORDOVICIAN AND OLDER (May include younger rocks in places)

VICTORIA LAKE GROUP (Units 2-3)

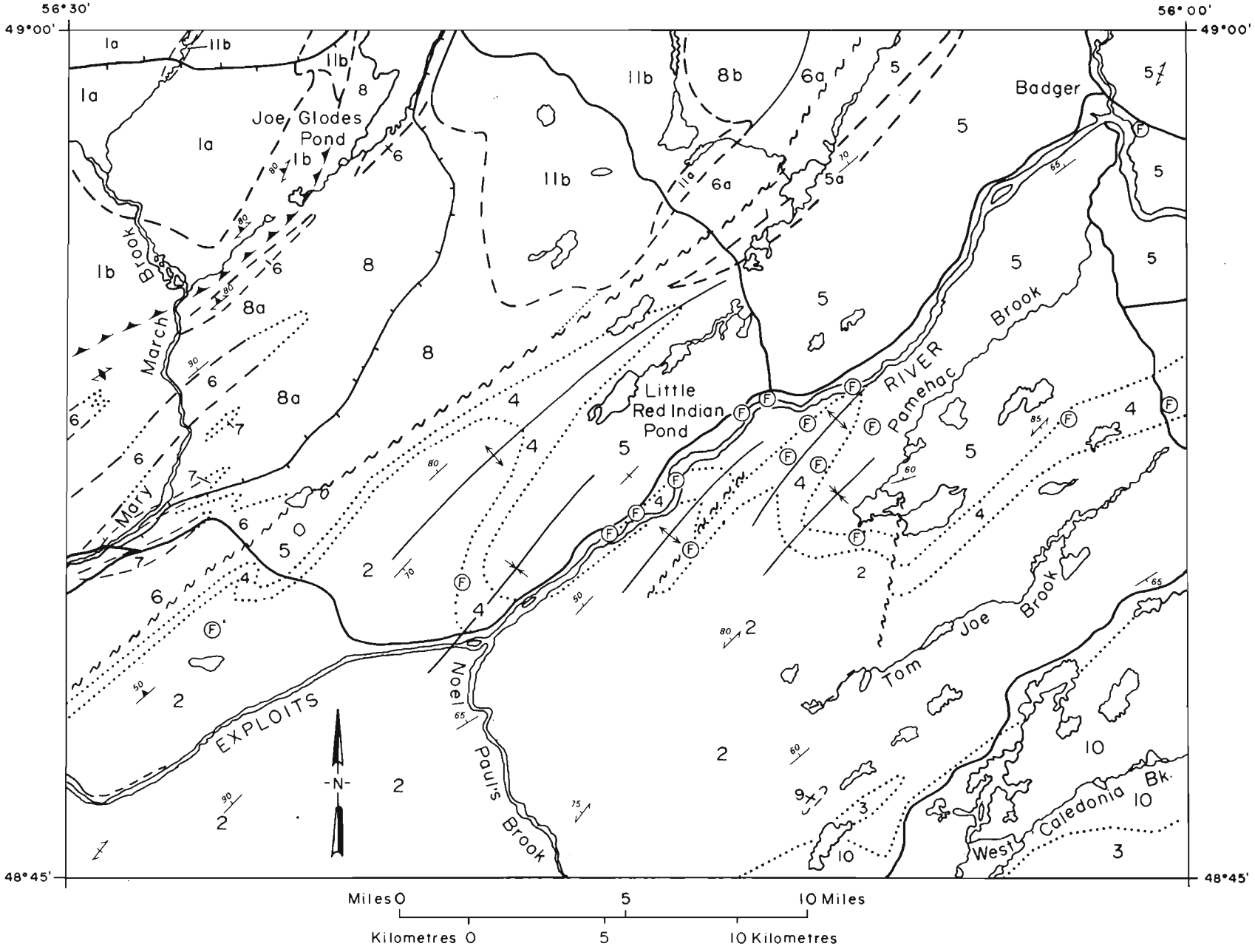
3 Tally Pond volcanic rocks; unseparated acidic and mafic tuff, flows and mafic pillow lava.

2 Gray and green sandstone, siltstone, chert, argillite, shale and graywacke.

HUNGRY MOUNTAIN COMPLEX

1 1a, gabbro and diorite; 1 b, granodiorite and minor granite.

Schistosity: related to thrusting. . . . . .



Like the mafic phase, the ganodiorite-granite phase is predominantly undeformed. However, adjacent to the contact with the Buchans Group it shows a penetrative fabric that trends parallel to the contact.

Victoria Lake Group (Unit 2-3)

Sedimentary Rocks (Unit 2)

The southeast corner of the map area is underlain by the Victoria Lake Group (Kean, 1977a). It consists of graywacke, sandstone, siltstone, argillite, slate and chert that are interbedded with each other. Bedding in the graywacke ranges from less than 0.5 m to greater than 2 m and contains thinner (<1 cm to 0.5 m) beds of internally laminated siltstone, argillite and chert. The graywacke is characterized by rip-ups, load-casts and slumps. The siltstones and other fine grained sediments generally show flame structures and slumping; small scale cross-laminations occur at places. These rock types have sharp top and bottom contacts that commonly show scour and fill structures. The graywacke is generally more common in the lower part of the unit and contains numerous siltstone, chert, argillite and slate clasts. Locally, clasts of felsic volcanic rocks and quartz porphyry are also present.

Siltstone, sandstone, argillite and chert are best developed in the upper part of the sedimentary sequence. They also contain thin (<0.5 m) beds and lenses of graywacke. In the southwest corner of the map area black slate and shale commonly occur interbedded with these sediments and well developed Bouma sequences are preserved.

Limestone beds near the top of the sequence (south of Buchans Junction) contain conodonts of late Llanvirnian to early Llandeillo age (Stouge, 1978; unpublished report).

Tally Pond volcanic rocks (Unit 3)

A small area in the northeast corner of the map area is underlain by rocks that form a northeast extension of the Tally Pond volcanic rocks - a sequence of acidic and mafic tuffs, breccias and flows (Jayasinghe, 1979). They are poorly exposed in the map area. The only exposures are altered mafic pillow lava.

Black Shales (Unit 4)

A major formational unit of black slate and shale crosses the center of the map area. It is well delineated on airborne EM geophysical maps (McIntyre-Porcupine, 1966). Chert, argillite and in places graywacke occur interbedded with this unit; thin lenses of pyrite (<1 cm) also occur in places. It has been fossil dated in exposures along the Exploits River as Caradocian (Williams, 1970; D. Skevington, 1977, personal communication). A number of new fossil localities along the unit have been found during this year's mapping. No identification has yet been done on the newly found fossils.

Graywacke and Conglomerate (Unit 5)

An upward coarsening graywacke and conglomerate sequence stratigraphically overlies the black shale unit. The graywacke is generally coarser than those of the underlying Victoria Lake Group and it also contains more conglomerate lenses than the latter. The conglomerate lenses contain clasts of chert, shale, slate, argillite and siltstone. In places it is interbedded with a few centimetres to 1 m wide siltstone and sandstone beds. Cross-bedding, graded bedding, load casts, flame structures and scour and fill structures are common. Large scale (1m - 2m) trough crossbedding has developed in places towards the upper part of the sequence. Conglomerates are common in the upper part of the sequence where a

number of prominent conglomerate lenses (unit 5a) occur as mappable units interbedded with graywacke. These are characterized by the presence of well-rounded granite and granodiorite pebbles and cobbles. The other clasts are angular to subrounded and are composed mostly of chert, siltstone, argillite and slate. Also present are minor, white and black quartz rhyolite porphyry and limestone clasts.

Buchans Group (Units 6, 7 and 8)

Units 6-8 are assigned to the Buchans Group and are considered to be part of the Lower Buchans Subgroup (Kean, 1979).

Unit 6 consists of mafic pillow lava, agglomerate and mafic tuff with minor interbedded red chert, chert breccia and green sandstone. They are equivalent in part to the Basal Basalt or Footwall Basalt of the Lower Buchans Subgroup (Kean, 1979).

Green quartzose sandstone and tuffaceous sandstone and graywacke containing quartz, feldspar and pink rhyolite clasts comprise unit 7. This unit is lithologically similar to and occupies the same stratigraphic position as the Footwall Arkose and Prominent Quartz Sequence of the Lower Buchans Subgroup.

Silicic volcanic rocks (unit 8) consisting of dacitic and rhyolitic breccias and tuff, massive flows and quartz-feldspar porphyry and crystal tuff are all tentatively assigned to the Lower Buchans Subgroup on the basis of their stratigraphic position. But, many of the breccias and quartz-feldspar porphyries lithologically resemble rocks of the Upper Buchans Subgroup.

Intrusive Rocks

Gabbro (Unit 9)

Small bodies and sills (4 m wide) of gabbro occur intruding Units 2 and 5, most of these are too small to be shown in the accompanying map. They are fine to medium grained and do not generally contain a fabric.

Cripple Back Lake quartz monzonite* (Unit 10)

The Cripple Back Lake quartz monzonite has been emplaced into units 2 and 3. However, the actual contact is not exposed. The pluton is medium grained and locally porphyritic with small (<1 cm) whitish to pink, lath-shaped feldspar phenocrysts in a groundmass consisting of quartz, feldspar, biotite and hornblende. No penetrative fabric is seen in the intrusion. In places it is cut by fractures that are commonly filled with pyrite and chalcopyrite.

Skull Hill granite* (Unit 11)

The Skull Hill granite occurs in the northeastern corner of the map area and has been interpreted as a part of the biotite granite phase of the Topsails Granite (Kean, 1979; Taylor, *et al.* in preparation).

Diabase and fine to medium grained diorite and gabbro (unit 11a) forms an earlier phase of this unit. In places diabase and gabbro with an alkaline affinity appear to be with the granitic (*s.l.*) phase (unit 11b). Unit 11b consists of fine to medium grained, red, equigranular syenite, quartz-syenite, and granite; alkasitic varieties and feldspar porphyritic phases are developed in places. Hornblende is the most common mafic mineral, in places as acicular needles.

*These names are used informally throughout this report. They will be formally proposed in later publications.

METAMORPHISM AND STRUCTURE

The sedimentary and volcanic rocks of the map area are in the sub-greenschist to greenschist facies. No contact metamorphic aureoles were noted adjacent to the intrusions, but, this may be due to the poor exposure in the area.

The rock units in the area are folded into a series of major anticlines and synclines that plunge at moderate angles in a northeasterly direction. In places (*e.g.* along Exploits River), parasitic minor folds occur on the limbs of the major folds. A widespread northeast trending, moderate to steeply dipping cleavage occurs axial planar to the folds.

There are two major faults in the area. One separates the Hungry Mountain Complex from the Buchans Group and the other separates the Buchans Group from unit 5. The former trends in a northeast to north-south direction and has steep dips. Farther to the southwest, it has been interpreted as a thrust fault along which the Hungry Mountain Complex has been thrust over the Buchans Group prior to the major folding in the area (Kean, 1979). The fabric in the Buchans Group becomes progressively more intense towards the contact with the Hungry Mountain Complex. The second major fault trends in a northeast direction more or less parallel to the strike of the rocks. In addition, a number of north-northeast trending minor faults occur in the southern part of the area displacing the limbs of the major folds.

MINERALIZATION

No significant mineral showings have been discovered in the area. Sulphide boulders containing pyrite, chalcopyrite and galena occur southeast of Leonards Lake. Disseminated pyrite occurs throughout subunit 8a.

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