New Age Controls on Rock Units in pre-Carboniferous Basement Blocks in Southwestern Cape Breton Island and Adjacent Mainland Nova Scotia¹

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Introduction

Pre-Carboniferous rocks are exposed in five areas in southwestern Cape Breton Island and adjacent mainland Nova Scotia: Creignish Hills, North Mountain, Sporting Mountain, Cape Porcupine, and Isle Madame (Fig. 1). Bedrock mapping in these areas was conducted at times through the 1980s and 1990s as part of the Canada-Nova Scotia Mineral Development and Cooperative agreements and various other university-based research projects. The Targeted Geoscience Initiative (TGI) project in south-central Cape Breton Island (2000-2003) provided an opportunity to compile and reassess these data, as well as to acquire new data that are critical in interpreting and understanding the complex pre-Carboniferous geology in the area. In addition to their regional geologic significance, the pre-Carboniferous rocks have importance as hosts for base- and precious-metal deposits and as sources of building stone and aggregate. In addition, relations between these “basement blocks” were important in localizing subsequent basin development (King, 2002) and, hence, influenced the distribution and thickness of Carboniferous and younger sedimentary units.

Geological Setting

The boundary between the Mira (Avalon) and Bras d’Or terranes of Cape Breton Island (e.g. Barr and Raeside, 1989) has been placed through the Bras d’Or Lakes (Fig. 1) such that the North Mountain and Creignish Hills are part of the Bras d’Or terrane, whereas the Sporting Mountain and Isle Madame areas are in the Mira terrane. The location of the boundary was investigated by King (2002), who confirmed its position and better defined its shape on the basis of geophysical modeling.

The position of the Mira-Bras d’Or terrane boundary southwest of the Strait of Canso is uncertain. Barr et al. (1998) showed it offset 200 km to the north, in a dextral sense, along a postulated “Canso fault”, inferred to follow the western margin of the Creignish Hills (Fig. 1). The orientation of this pre-Carboniferous fault is inferred from mylonitic rocks in the Cape Porcupine Complex (White et al., 2001), located on the western side of the Strait of Canso (Fig. 1), opposite the inferred termination of the Mira - Bras d’Or terrane boundary (King, 2002). However, the Canso fault is not recognized in some other regional interpretations in which rock units and structural features are extended across the Strait of Canso with little or no disruption (e.g. Keppie et al., 1998). It should be noted that the Canso fault is a pre-Carboniferous structure, and not the same as the younger, northwesterly trending Strait of Canso fault which offsets Carboniferous units (Fig. 1).

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The study area may also contain the boundary between the Mira and Meguma terranes to the south. Earlier reconstructions assumed that the Mira-Meguma terrane boundary followed the inferred offshore extension of the Chedabucto Fault into the Orpheus Graben Fault along the northern margin of the Orpheus Graben (Marillier et al., 1989; Jansa et al., 1993). However, Webster et al.
recognized that a branch of the Chedabucto Fault (Roman Valley Fault; Fig. 1) may follow the northern margin of the Guysborough block. This interpretation provides support for an earlier suggestion (Barr et al., 1992), based on basement exposures in the Isle Madame area, that the terrane boundary may follow splay of this fault system into southern Cape Breton Island (Fig. 1). Hence, metamorphic and igneous units in the Isle Madame area could be related to the Meguma terrane, rather than Mira terrane as more generally assumed.

**Dating Methods**

Samples were processed at the ROM using a jaw crusher for initial crushing, a disk mill for sample reduction to sand-sized particles, and a Wilfley table, heavy liquids (bromoform and methylene iodide) and a Frantz magnetic separator for isolation of heavy mineral fractions. Zircon was selected from the least paramagnetic fraction by hand picking under a binocular microscope. All picked zircon grains were given an air abrasion treatment to eliminate cracked grains and remove exterior surfaces (Krogh, 1982). Final selection of grains for analysis was then made. The weight of each fraction (typically one or two grains) was either estimated or measured using a microbalance. As the weights are normally small (generally <3 micrograms), both the measured and estimated weights are accurate only to about ±50%. However, this only affects the calculation of Pb and U concentrations and has no influence on age data.

The selected grains were washed in 4N and then 7N HNO₃ and then loaded into Teflon bombs with HF and a measured amount of ²⁰⁵Pb - ²³⁵U isotopic tracer solution (Krogh, 1973). Dissolution occurred over four to five days at 195°C. No chemical isolation of U and Pb was carried out on the dissolved grains.

Fractions were dried with phosphoric acid and then loaded with silica gel on outgassed rhenium filaments. The isotopic compositions of Pb and U were measured using a single Daly collector with a pulse counting detector in a solid source VG354 mass spectrometer. A detector mass discrimination of 0.14% per atomic mass unit (AMU) and a deadtime of 22.5 nanoseconds were employed for Daly detector measurements. A thermal source mass discrimination correction of 0.1% per atomic mass unit for both Pb and U was also used.

The assigned laboratory blank for U is 0.2 pg. Total measured common Pb in samples was below 1 pg in nearly all cases and was assigned the isotopic composition of the laboratory blank. Error estimates were calculated by propagating known sources of analytical uncertainty for each analysis, including ratio variability (within run), uncertainty in the fractionation correction, and uncertainties in the isotopic composition of the laboratory blank. Decay constants used are those of Jaffey et al. (1971). All uncertainties in the text below and on concordia diagrams (Fig. 2) are given at the 95% confidence level. Discordia lines and concordia intercept ages were calculated by the method of Davis (1982) using the in-house program ROMAGE. Average ²⁰⁶Pb/²³⁸U ages were also calculated using ROMAGE. Probability of fit measures the scatter of analyses with respect to a Pb-loss line. A value of around 50% would be expected for unimodal data sets with correctly chosen analytical errors. Low probability of fit suggests real differences in Pb loss history and/or zircon crystallization age.

Concordia diagrams for the zircon analyses are presented in Figure 2. Data tables for the analyses will be published elsewhere.

**Creignish Hills and North Mountain Areas**

**Geological Summary**

Rock units are similar in the Creignish Hills and North Mountain areas (Fig. 3). Campbell (1990) divided metamorphic rocks in the Creignish Hills area into the Blues Brook Formation (mainly low-grade rocks including slate, quartzite, marble, and metavolcanic rocks) and the Sky Mountain metamorphic suite (mainly higher grade rocks that include low-pressure/high-temperature amphibolite-facies gneiss and migmatite). Our preliminary work in the area during 2002 generally supported this subdivision, although some unresolved problems in the assignment of rocks to
Figure 2. U-Pb concordia diagrams for samples described in the text. The data table for these diagrams will be published elsewhere.
Figure 3. Simplified geological map of the Creignish Hills and North Mountain areas, compiled from various sources including White et al. (1990), Campbell (1990), and Justino (1991). Locations for dated samples SMB02-79, 81, and 83 are indicated. Abbreviations: BB, Big Brook Pluton; MB, Mill Brook quartz diorite; MM, Marble Mountain Pluton; MS, Melford stock; qd, unnamed quartz diorite; RD, River Denys Pluton; SK, Skye Mountain granite; WB, West Bay Granite.
these units showed the need for additional field work, planned for 2003. The corresponding units in the North Mountain area are the Malagawatch Formation and Lime Hill gneissic complex, as mapped by Justino (1991). In both areas, all of these metamorphic rocks were previously assigned to the George River Series or Group (Milligan, 1970); however, in current terminology, the Blues Brook and Malagawatch formations are part of the George River Metamorphic Suite, whereas the Skye Mountain and Lime Hill units are part of the Bras d’Or Gneiss (Keppie, 2000).

The metamorphic units in both areas have been intruded by varied dioritic to granitic plutons (e.g. White et al., 1990; Justino and Barr, 1994). In the Creignish Hills, most of the plutonic rocks have been assigned to the Creignish Hills Pluton (White et al., 1990; Campbell, 1990), and in the North Mountain area three main suites have been defined: Marble Mountain, Big Brook, and West Bay (Justino, 1991; Justino and Barr, 1994). The Creignish Hills Pluton is mainly granitic in the south and dioritic in its northwestern part, with outlying plutons of both dioritic (e.g. River Denys Pluton) and granitic (e.g. Skye Mountain granite; Melford Stock) composition (White et al., 1990; Campbell, 1990; Keppie et al., 2000). In the North Mountain area, the Big Brook and Marble Mountain plutons are mainly of granodiorite composition, although small tonalitic to dioritic bodies (e.g. Mill Brook quartz diorite) occur along their margins. The West Bay Pluton is mainly coarse-grained monzogranite that likely extends south of the Marble Mountain block under Carboniferous cover, based on the presence of outcrops of similar granite in the Sugar Camp gypsum quarry (Fig. 2). A small area of quartz diorite occurs on the eastern margin of the West Bay granite.

Prior to the present study, crystallization ages of plutons in the Creignish Hills were constrained by U-Pb (zircon) ages of 586 ± 2 Ma and 540 ± 3 Ma from the Melford Stock and River Denys Pluton, respectively (Keppie et al., 1998a). Zircon from the dioritic part of the Creignish Hills Pluton yielded a U-Pb age of 553 ± 2 Ma, slightly older than 40Ar/39Ar (hornblende) cooling ages of ca. 550-535 Ma from the dioritic units (Dallmeyer and Keppie, 1993; Keppie et al., 1990, 1998a, 2000). The granitic part of the Creignish Hills Pluton, which underlies about half of the area, had not been dated by the U-Pb method, and earlier Rb-Sr results were uncertain and ambiguous (White et al., 1990). An age of ca. 495 Ma was postulated based on petrological similarity to the Kellys Mountain and Cape Smoky plutons farther to the east and northeast in the Bras d’Or terrane (White et al., 1990). A small mafic pluton in the eastern Creignish Hills (Skye Mountain gabbro-diorite) has yielded a much younger U-Pb (zircon) age of 439 ± Ma (Keppie et al., 1998b, 2000).

In the North Mountain area, pluton crystallization ages are more poorly constrained than in the Creignish Hills (Fig. 4). An anatectic granite sheet in the Lime Hill gneissic complex yielded a concordant U-Pb (monazite) age of 553 ± 3 Ma (Keppie et al., 1998a), similar to U-Pb (zircon) ages of 545 ± 7 Ma and 540 ± 1 Ma from tonalitic orthogneiss and a granitic dyke in the gneiss (Sangster et al., 1990). Hornblende from the Marble Mountain granodiorite, Mill Brook quartz diorite, and an unnamed quartz diorite body adjacent to the West Bay Granite yielded 40Ar/39Ar cooling ages of ca. 555-545 Ma (Keppie et al., 1990).

The minimum ages of metamorphic units in both the Creignish Hills and North Mountain areas are constrained by the ages of plutons that intruded them. Their maximum ages are estimated from ca. 640 Ma detrital zircon ages in the metasedimentary units, although most detrital grains are much older, ranging back to the Archean (Keppie et al., 1997; Barr et al., submitted).

**New U-Pb (Zircon) Ages**

Samples for dating were collected from an orthogneissic component in the Skye Mountain metamorphic suite, granite in the Creignish Hills Pluton, and the West Bay Granite.

Dated sample SMB02-81 from the Skye Mountain metamorphic suite was collected from an active quarry north of Skye Mountain (Fig. 2; UTM coordinates 5094125N, 642350E). It is a fine- to medium-grained tonalitic orthogneiss that consists
Figure 4. Compilation of U-Pb (zircon) and $^{40}$Ar/$^{39}$Ar (hornblende) ages (with error bars) interpreted to indicate crystallization ages of igneous and meta-igneous units in the study area. Data were compiled from the present study and Keppie et al. (1990, 1998a, b), Sangster et al. (1990), and White et al. (2001). Time scale is after Okulitch (2002). Abbreviations: $^\text{A}$, $^{40}$Ar/$^{39}$Ar (hornblende) age; U, U-Pb (zircon) age; CPC, Cape Porcupine Complex; PMG, Pringle Mountain Group.
mostly of quartz, plagioclase and biotite. It is interpreted as an orthogneiss based on its homogeneous appearance in outcrop and on the presence of relict weakly zoned plagioclase grains visible in thin section. A relatively high Th/U ratio (mostly >0.5) in the zircon is also consistent with an igneous origin. The zircon population obtained from the sample is characterized by colourless, good-quality euahedral and subhedral prisms ranging from euhedral to elongate with length to breadth ratio of 3:1 to 4:1. Many euhedral grains are distinctly zoned with an apparent euahedral overgrowth component, but this component is not present on most long prisms. Four fractions consisting of long prisms (length:breadth >3:1), both with and without tiny fluid inclusions, are concordant or near-concordant at 565-560 Ma (Fig. 2a). Their average $^{207}\text{Pb}/^{206}\text{Pb}$ age of 561 ± 3 Ma is interpreted as the igneous crystallization age of the tonalite, although we acknowledge that a slightly older age of ca. 565 ± 3 Ma (based on the $^{206}\text{Pb}/^{238}\text{U}$ age of analysis Z1) is possible. Two additional fractions (1 and 4 grains each) of euhedral, colourless grains give discordant results, indicating mid-Proterozoic inheritance (Fig. 2a).

Granite of the Creignish Hills Pluton was sampled for dating on a logging road in the south-central part of the Creignish Hills (UTM coordinates 5071750N, 626375E). Sample SMB02-79 is typical of the medium- to coarse-grained monzogranitic unit that forms most of the pluton (White et al., 1990). It consists of quartz, K-feldspar (perthitic orthoclase), and plagioclase in approximately equal proportions, with minor biotite and hornblende. It yielded abundant equant to 2:1, euhedral, four-sided zircon prisms of varying size. Fluid inclusions are relatively common and opaque mineral inclusions were also observed. Four concordant or near-concordant single grain and multigrain fractions have an average $^{207}\text{Pb}/^{206}\text{Pb}$ age of 553 ± 2 Ma (Fig. 2b), which we interpret as the crystallization age of the granite.

The West Bay Granite was sampled in a quarry at the southwestern tip of North Mountain (UTM coordinates 5066850N, 641000E). The dated sample (SMB02-83) is coarse-grained monzogranite, with K-feldspar megacrysts up to 5 cm in length. Mafic minerals (biotite and possibly hornblende) have been replaced by chlorite. The zircon population in this sample appears identical to that for sample SMB02-79, and three near-concordant single grain and 2-grain fractions yield an identical crystallization age of 553 ± 2 Ma (Fig. 2c).

**Significance**

The 565-561 Ma age for zircon from the Skye Mountain gneiss is similar to ages obtained from some granodioritic, dioritic, and tonalitic plutons elsewhere in the Bras d’Or terrane (Dunning et al., 1990). It is also similar to the metamorphic titanite age reported by Bevier et al. (1990) from orthogneiss in the proposed correlative Brookville Gneiss of southern New Brunswick, but younger than the ca. 605 Ma crystallization age of that orthogneiss. The new age constrains the age of paragneissic units of the Bras d’Or Gneiss, from which anatectic components had previously yielded ages of ca. 550-540 Ma (Sangster et al., 1990; Keppie et al., 1998a), to greater than ca. 565 Ma.

The new U-Pb ages from granitic units confirm correlation between the Creignish Hills and West Bay plutons, as assumed previously based on petrological similarities (Raeside and Barr, 1990; Justino and Barr, 1994). However, they disprove the proposed correlation between these granitic plutons and petrologically similar granites farther to the northeast in the Bras d’Or terrane at Kellys Mountain and Cape Smokey, which have yielded younger ages of about 495 Ma (Dunning et al., 1990). The new ages show that the granitic rocks of the Creignish Hills and North Mountain areas are co-genetic with the associated dioritic and granodioritic units that have given similar ages (Fig. 4), and did not form in a separate, younger igneous event, as previously postulated (White et al., 1990; Raeside and Barr, 1990).

**Sporting Mountain Area**

**Geological Summary**

The Sporting Mountain area consists of mafic to felsic pyroclastic rocks and flows and tuffaceous
sedimentary rocks that occur around the periphery of the granodioritic Sporting Mountain Pluton (Fig. 5). The volcanic and sedimentary rocks were named the Pringle Mountain Group by Sexton (1988) and Barr et al. (1996). No geochronological work had been done previously in this area, but on the basis of similarity in rock types, the Pringle Mountain Group was assumed to correlate with volcanic and sedimentary units in the East Bay Hills and Coxheath Hills (Fig. 5) which had yielded ages of ca. 620 Ma (Bevier et al., 1994).

New logging roads have resulted in improved access and new exposures of the volcanic and sedimentary rocks in the southwestern part of the Pringle Mountain Group, and mapping in 2001 and 2002 led to an improved interpretation of unit distribution (Giles et al., 2002).

**New U-Pb (Zircon) Age**

Dated sample SMB01-33 was collected from a distinctive flow-banded rhyolite unit in a roadside outcrop in the southern part of the Sporting Mountain block (UTM coordinates 5061375N, 651625E). It consists of scattered euhedral plagioclase phenocrysts in a very fine-grained quartzofeldspathic groundmass. The zircon population consists of colourless, long (>4:1 length:aspect ratio) prisms, and colourless, equant to 2:1, multifaceted prisms, some with minor tip overgrowths. Grain quality is good to excellent (i.e. mostly to completely lacking cracks and/or fluid- or mineral-inclusions). Three single-grain fractions and a 3-grain fraction of the long prisms and a single multifaceted grain were analyzed. The two most concordant fractions closely overlap on concordia, and their average 206Pb/238U age of 619 ± 2 Ma is taken as the crystallization age of the rhyolite (Fig. 2d). The remaining fractions lie on a mixing line to ca. 1330 Ma and indicate an influence of mid-Proterozoic inheritance on these analyses.

**Significance**

The new age is consistent with the previously assumed correlation of the Pringle Mountain Group with volcanic-sedimentary units in the East Bay Hills and Coxheath Hills. This demonstrated correlation emphasizes the potential of the Sporting Mountain area for porphyry- and vein-type sulphide deposits like those in the Coxheath Hills. It also confirms that the units of the Sporting Mountain area are not similar in age to units in the North Mountain area, as has been implied in some work (e.g. Keppie et al., 1990) and hence supports the presence of the Mira-Bras d’Or terrane boundary.

**Petit-de-Grat area**

**Geological Summary**

Most of Isle Madame and Petit-de-Grat Island on the southern tip of Cape Breton Island (Figs. 1, 6) consists of Carboniferous sedimentary rocks of the Horton and Windsor groups (Giles et al., 2002). However, southern Isle Madame also includes mylonitic amphibolite, granite, and garnet-sillimanite schist in fault-bounded slivers (Fig. 6). Southern Petit-de-Grat Island contains fault-bounded areas of polymictic volcaniclastic conglomerate, rare basaltic flows, and mafic dykes assigned to the Middle Devonian Glenkeen Formation of the Guysborough Group (White et al., 1998a, b; Giles et al., 2002). Although distinction between the older conglomerate and younger conglomerate units of the Horton Group is difficult in this area, the presence of volcanic rocks and granitic intrusions (Petit-de-Grat Pluton; Barr et al., 1984) distinguishes the older unit (Fig. 6). Pelitic units around the Petit-de-Grat pluton are contact metamorphosed and contain cordierite porphyroblasts.

Green Island, located 2 km offshore from Petit-de-Grat Island (Fig. 6) consists of layered amphibolite and granite sheets. Hornblende from the amphibolite previously yielded a 40Ar/39Ar plateau age of ca. 391 Ma (Keppie, 1982).

**New U-Pb (Zircon) Age**

Sample SMB01-42 was collected from near the northern margin of the Petit-de-Grat Pluton (UTM coordinates 5039495N, 661875E). It is of syenogranite composition with about 60% K-feldspar, and consists of porphyroclasts of quartz
Figure 5. Simplified geological map of southeastern Cape Breton Island (after Barr et al., 1996) showing the location of the Sporting Mountain area relative to other volcanic-sedimentary-plutonic belts of the Mira terrane. The location for dated sample SMB01-33 is indicated.
and K-feldspar set in a matrix of granulated quartz and feldspar. Abundant small euhedral to anhedral, colourless to light brown, mostly equant prisms dominate the zircon population. Grain quality is moderate to good. Despite intragrain variations, the recovered zircons appear to form a single igneous population. Rare larger grains were not analyzed and may be inherited. Four multigrain fractions are concordant within uncertainty and have very similar $^{206}$Pb/$^{238}$U ages. A crystallization age of 373 ± 1 Ma (Fig. 2e) is assumed, based on average $^{206}$Pb/$^{238}$U age. Two multigrain fractions of the same material are significantly younger, perhaps reflecting Pb loss.

**Significance**

A U-Pb zircon age of ca. 373 Ma for the Petit-de-Grat Pluton, and the presence of a contact aureole in the surrounding sedimentary rocks, show that the host rocks are older than and, hence, not part of the Late Devonian-Carboniferous Horton Group. The age confirms the speculation by White and Barr (1998a, b) that these rocks are part of the Glenkeen Formation and, hence, that the Guysborough Group of northern mainland Nova Scotia extends into southern Cape Breton Island. If so, then the fault-bounded slivers of metamorphic rocks in the Isle Madame area may originate along the Avalon-Meguma terrane boundary, as previously suggested by Barr et al. (1992) and Barr and White (1998a) based on petrological similarities to rocks in faulted slivers on the margins of the Guysborough block (Fig. 1) and elsewhere to the west.

**Cape Porcupine Area**

**Geological Summary**

The Cape Porcupine Complex (White et al., 2001)
consists of metasedimentary, metavolcanic, and granitoid rocks (Fig. 7). A granitoid belt in the west includes alkali feldspar granite to monzogranite and magnetite-rich quartz syenite in thrust-faulted contact with a central belt of metasedimentary rocks. As previously reported (White et al., 2001), granite in the western belt yielded a U-Pb (zircon) age of 610 ± 3 Ma. The metasedimentary unit consists of phyllonite from which two whole-rock ⁴⁰Ar/³⁹Ar ages of about 365-370 Ma have been obtained (P. Reynolds, personal communication, 2002; Teniere, 2002). They provide a minimum age for this unit. A mylonitic rhyolite unit occurs in faulted contact with the metasedimentary unit and with varied granitic rocks that form the eastern part of the complex (Fig. 7). The eastern granitic unit varies from equigranular and relatively undeformed to mylonitic.

New U-Pb Data

Three attempts to date samples from the meta-rhyolite unit were unsuccessful due to an absence of zircon. As an alternative, sample SMB02-84 was collected from the granitic unit to the east (Fig. 7). It is brecciated mylonitic alkali feldspar granite, in which the original texture was coarse-grained, but now consists of quartz ribbons around K-feldspar clasts. No mafic minerals are present. The zircon population in this sample consists of colourless, equant, euhedral prisms of good to excellent quality. Most are four-sided and are characterized by either igneous growth zoning or metamorphic overgrowths on igneous cores. Five multigrain fractions have an average ²⁰⁷Pb/²⁰⁶Pb age of 478 ± 3 Ma (Fig. 2f), which we interpret as the igneous crystallization age of the granite protolith. The consistency of the age data strongly suggests that igneous growth zoning characterizes the zircon population.

Significance

An unequivocal intrusive relationship cannot be demonstrated between the dated granitic unit and the meta-rhyolite of the Cape Porcupine Complex, although their close association suggests that they might be closely related in age. In any case, the age of the granite confirms that the granitoid rocks in the eastern part of the complex are not related to those that form the western part of the complex, which are much older at ca. 610 Ma (White et al., 2001).

The new age supports the idea that the N-S mylonite zone through the complex may be evidence for the Paleozoic position of the Canso fault, which offsets terranes of Cape Breton Island relative to those of northern mainland Nova Scotia (Fig. 1). However, it does not shed light on the position of the Cape Porcupine complex in the terrane collage because igneous rocks of ca. 478 Ma (Early Ordovician; Okulitch, 2002) are not known in any of the surrounding areas. It was previously recognized that the presence of ca. 610 Ma granite suggests the possibility of an Avalon terrane connection, whereas the metasedimentary rocks that form the central belt of the complex look like some of the low-grade components of the Blues Brook Formation in the Creignish Hills. However, ca. 478 Ma granite is not known to occur in either of those areas, so the terrane affinity of the Cape Porcupine complex remains uncertain.

Conclusions

Combined with previously known ages, the new data provide a much more complete picture for ages of rock units in the pre-Carboniferous basement blocks of the study area (Fig. 4). The increasingly well documented and consistent differences in unit ages support the distinction between the Mira (Avalon) and Bras d’Or terranes, originally based on lithological variations and other data (Barr and Raeside, 1989; Barr et al., 1998). The age of 561 ± Ma for orthogneiss in the Skye Mountain metamorphic suite provides a maximum age for the high-grade metamorphic event in the Bras d’Or terrane that formed the gneissic rocks, an event that is not recorded in the Mira (Avalon) terrane.

The ca. 373 Ma age for the Petit-de-Grat Pluton confirms the link between northern mainland Nova Scotia and the southern tip of Cape Breton Island, and confirms that geological complexity in that area is linked to interaction between the Mira (Avalon) and Meguma terranes. However, the ca. 478 Ma age from mylonitic
Figure 7. Geological map of the Cape Porcupine Complex (after White et al., 2001). Locations are shown for dating sample SMB02-84 and previously dated sample CP98-2.
granite in the Cape Porcupine Complex increases the mystery about the origin of that block of pre-Carboniferous basement and its place in the terrane puzzle.

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