TECTONOSTRATIGRAPHIC TERRANE ANALYSIS OF NEW BRUNSWICK

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The contents of a computerized lexicon database are displayed in the form of a range chart that demonstrates the spatial and temporal relationships of lithostratigraphic units to tectonostratigraphic terranes of New Brunswick. The chart provides a reference basis from which to derive the accretionary history of these terranes.

The tectonostratigraphic zonation of New Brunswick is based upon the uniqueness of the pre-Taconian stratigraphy within each fault-bounded terrane. From northwest to southeast, the following terranes and cover sequences are recognized: Matapedia Cover, Elmtree Terrane, Miramichi Terrane, Fredericton Cover, St. Croix Terrane, Mascarene Terrane, and Avalonian Terrane.

Overstepping of the Matapedia Cover Sequence indicates that the Elmtree and Miramichi terranes were docked with the North American craton by the Late Ordovician to Early Silurian. The presence of a similar early Paleozoic stratigraphy, tectonic style and major Silurian unconformity in the St. Croix Terrane suggests that it had become docked to the Miramichi Terrane prior to this subduction-related Taconian event.

Detritus and a similar fauna in the cover rocks of the St. Croix Terrane provide evidence that it was docked to the Mascarene Terrane by the Late Silurian. This docking coincided with the Salinic disturbance in northern New Brunswick where it is marked by an unconformity on the northwestern margin of the Miramichi Terrane and by coarse clastic sedimentation and local deformation within the Matapedia Cover Sequence. Detritus links the Mascarene and Avalonian terranes by the Late Devonian. The Salinic disturbance and culminating Acadian orogeny are interpreted to be the result of transcurrent convergence that accreted the Mascarene and Avalonian terranes to North America.

On rend le contenu d'un lexique informatisé sous forme d'un tableau qui démontre les relations spatiales et temporelles entre les unités lithostratigraphiques et les lanières tectonostratigraphiques présentes au Nouveau-Brunswick. Ce tableau sert de pivot pour dériver l'histoire de l'accrétion de ces lanières.

On base le zonage tectonostratigraphique du Nouveau-Brunswick sur le caractère unique de la stratigraphie pré-taconienne au sein de chaque lanière. Du nord-ouest au sud-est, on reconnaît les lanières et les séquences de couverture suivantes: la Couverture de Matapédia, les lanières d'Elmtree et de Miramichi, la Couverture de Fredericton ainsi que les lanières de St. Croix, Mascarene et d'Avalon.

Leur empiétement par la Séquence de Couverture de Matapédia démontre qu'à l'Ordovicien tardif, ou à l'Eosilurien, les lanières d'Elmtree et de Miramichi se sont déjà juxtaposées au craton nord-américain. La similarité de leurs stratigraphies éopaléozoïques et de leurs styles tectoniques, ainsi qu'une discordance silurienne importante dans la Lanière de St. Croix suggère l'accolement de cette dernière sur la Lanière de Miramichi avant cet événement taconien relié à une subduction.

La preuve que la Lanière de St. Croix s'est déjà accolée à la Lanière de Mascarene au Silurien tardif réside dans les faciès détritiques et une faune semblable dans les roches de couverture de cette première. Cette juxtaposition coïncide avec le tumulte salinique au Nouveau-Brunswick septentrional où elle se marque par une discordance sur la marge nord-ouest de la Lanière de Miramichi ainsi que par un épandage détritique grossier et une déformation locale au sein de la Séquence de Couverture de Matapédia. Un lien détritique s'établit entre les lanières de Mascarene et d'Avalon avant le Dévonien tardif. On interprète le tumulte salinique et le paroxysme de l'orogénie acadienne comme résultant d'un coulissage convergent qui a accrétionné les lanières de Mascarene et d'Avalon sur l'Amérique du Nord.

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INTRODUCTION

New concepts in the earth sciences have been developed recently that greatly aid in unravelling the geologic history of an orogen. Tectonostratigraphic zones that earlier were defined on the basis of lithofacies and tectonic styles are now being re-evaluated using the model of accretion of terranes, which provides more specific criteria for their recognition and definition (Jones *et al.*, 1983).

The first part of this paper discusses some of the principles and problems related to the establishment of geotectonic nomenclature. The detailed stratigraphic information compiled in Volume 6, Atlantic Region, Lexicon of Canadian Stratigraphy (Williams *et al.*, 1985) is then applied specifically to the evaluation of the tectonic zonation of New Brunswick. Since information on formal lithostratigraphic and lithodemic

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(plutonic, metamorphic) units had been assembled in a computer database, it was an easy matter to construct correlation charts that could be grouped into the previously established tectonostratigraphic framework of New Brunswick. In the second part of the paper, these charts are used as a basis to reconstruct the accretionary history of New Brunswick in terms of terrane concepts.

TERRANE CONCEPTS

The fundamental tectonic division is the tectonostratigraphic terrane, which is defined as a fault-bounded geologic entity of regional extent characterized by a distinctive geologic history (Jones *et al.*, 1983). This definition is similar to that for tectonostratigraphic zone (see Spencer, 1974) except that terrane boundaries are delimited by faults and the terranes, themselves, are considered to be allochthonous unless proven otherwise.

Tectonostratigraphic zones represent regional paleogeographic features such as a craton, and remnants of continental margin, island arc and ophiolitic assemblages that commonly trend parallel to the length of an orogenic belt (see Williams, 1979; Zen, 1983). The paleogeographic setting of each zone is determined from an examination of the stratigraphy and deformational history of its constituent lithogenetic elements, such as basement and cover rocks. These tectonic elements are composed of the groups, formations, suites, and complexes that comprise the lithostratigraphy of a zone.

The fundamental tenet of the terrane concept is that orogens develop by accretion of allochthonous terranes along the continental margin. Thus, cratons and autochthonous continental margins are generally not considered to constitute a terrane (see Williams and Hatcher, 1982). Accretion of terranes in the general case takes place by oblique subduction and obduction. Terranes are said to be "docked" upon initial collison, but relative displacement may continue by transcurrent motion. Terranes finally become "welded" together when their mutual faulted boundary becomes inactive. Timing of accretion can be constrained by determining whether lithogenetic elements are restricted to single terranes or shared by adjacent terranes (Jones *et al.*, 1983) as illustrated later in this paper.

Terrane analyses are meant to be more empirical than previous methods of paleogeographic reconstructions that resulted in an embarrassing number of plate tectonic models for a given area. Nevertheless, the accretionary nature of an orogen is extremely complex and ambiguities can still arise. Single terranes may have amalgamated to form composite terranes that have shared part of their geologic history prior to accretion to the craton. The problem presented is thus to work backward in time from the present composite terrane to define amalgamation or accretionary boundaries. In practice, these sutured boundaries may be completely obscured by later cover sequences or, alternately, a cover sequence may be so disrupted by later fault movement (terrane dispersion) that previous continuity of a terrane cannot be assured. Also different facies may be inferred but not proven to be part of the same lithogenetic element (see Fyffe and Pickerill, 1986). However, any erected system of terranes may be modified in analogy to the lithostratigraphic classification to accommodate new information. For example, a seismic survey may indicate whether a mapped fault is a major or minor feature.

TERRANE ANALYSIS OF NEW BRUNSWICK

Using the Lexicon computer file, the complete set of formal units for New Brunswick (approximately 200) has been compiled down to the formation level (Fig. 1). The units have been grouped into the tectonostratigraphic zones of New Brunswick (Fig. 2), and within those according to sedimentary groups and igneous suites. The presentation is in the style of a conventional range or correlation chart, with ages displayed vertically and units listed in the horizontal axis (the time scale is from Palmer, 1983). Detailed lithologic descriptions of the units are provided in Volume 6 of the Lexicon.

The correlation chart provides a convenient visual representation of the spatial and temporal relationships of the lithostratigraphic and lithodemic units present within each tectonostratigraphic zone of New Brunswick as previously established by Ruitenberg *et al.* (1977). This chart can be readily analyzed in terms of terrane concepts to reconstruct the accretionary history of the region.

Documenting the timing of terrane docking and welding involves the recognition of: (1) overlap linkages where the same stratigraphic sequence depositionally overlies adjacent terranes; (2) provenance linkages whereby detritus deposited in a terrane has been derived from an adjacent terrane; (3) plutonic linkages in which a terrane boundary has been sealed by intrusive rocks; and (4) biogeographical linkages which are indicated by the presence of fauna or flora of the same province in adjacent terranes (Coney *et al.*, 1980; Jones *et al.*, 1983).

In principle, any orogen is likely to have pre- and post-accretionary distinctions for a given event. In New Brunswick, the pre-accretionary lithogenetic elements are taken to be Late Precambrian to early Late Ordovician (i.e., pre-Taconian) in age and the post-accretionary elements to be late Late Ordovician and younger (see Ruitenberg *et al.*, 1977; Williams and Hatcher, 1982). Linkage relationships between the various terranes and the cover sequences are summarized in Fig. 3.

Since the tectonostratigraphic zones of Ruitenberg *et al.* (1977) used in construction of the correlation charts were based on the distinctive nature of pre-Taconian stratigraphy, little modification was needed in applying terrane concepts to them. It was essentially a matter of designating a tectonostratigraphic zone either as a terrane or as a cover sequence (Fig. 2). New Brunswick terranes and cover sequences from the northwest to the southeast are herein referred to as (zone designations of Ruitenberg *et al.* are given in brackets): Matapedia Cover Sequence (Zone 1), Elmtree Terrane (Zone 2), Miramichi Terrane (Zone 3), Fredericton Cover Sequence (Zone 4a), St. Croix Terrane (Zone 4a), Mascarene Terrane (Zone 4b), and Avalonian Terrane (Zone 5).

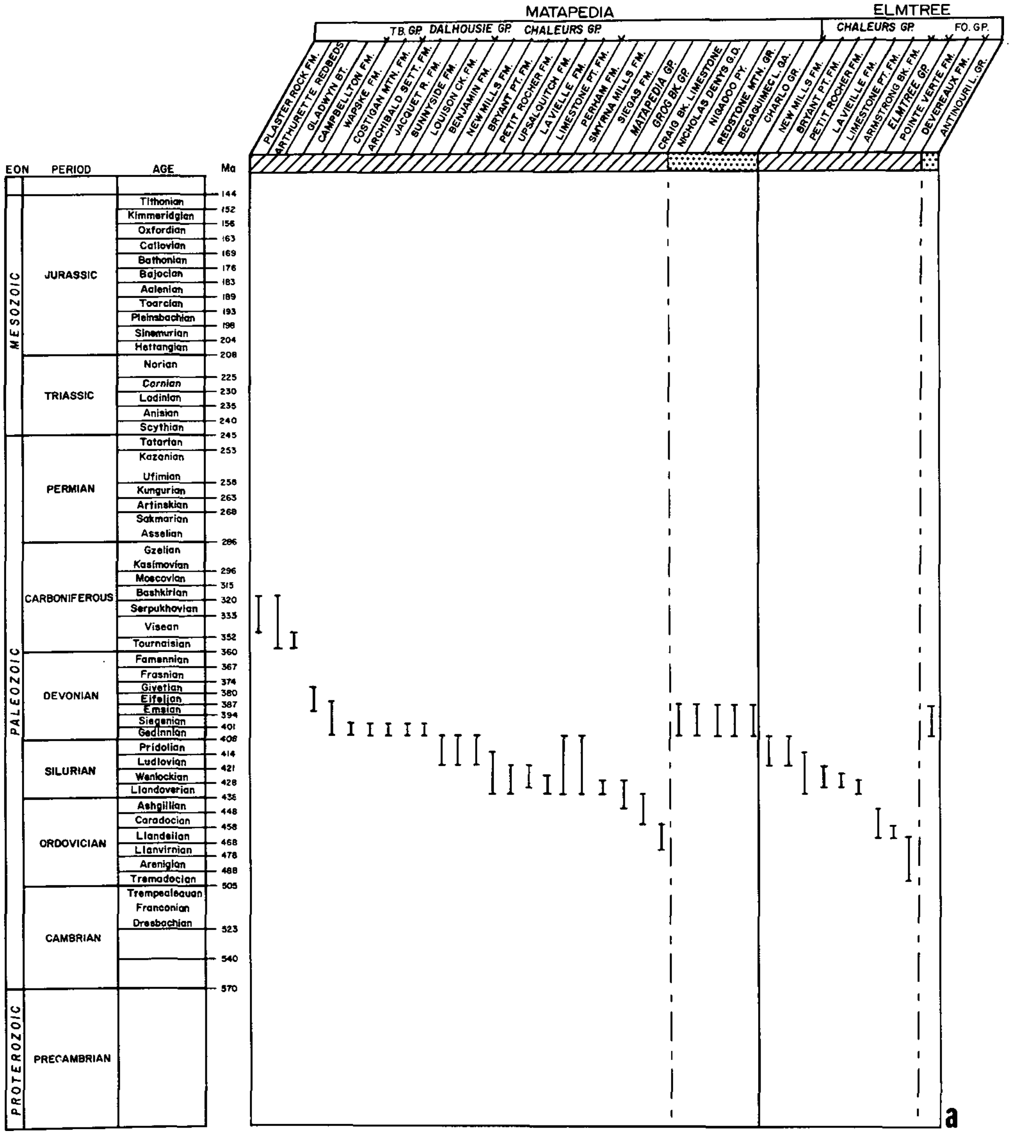

Fig. 1. Correlation Chart for Tectonostratigraphic Zones of New Brunswick: (a) Matapedia & Elmtree; (b) Miramichi; (c) Fredericton & St. Croix & Mascarene; (d) Avalonian. The division of units between zones is discussed in the text. Ages of units are indicated by solid vertical range bars; vertical dashed bars outline the age range of groups containing unnamed formations. Solid vertical lines separate tectonostratigraphic zones. Hachured and dotted patterns on the horizontal bar located beneath unit names respectively separate lithostratigraphic and lithodemic terms within each zone. Ticks on the horizontal bar above unit names delineate formations within the named group. Abbreviations: BA - Batholith; BK - Brook; BT - Basalt; CG - Conglomerate; CK - Creek; CX - Complex; D - Diorite; DY - Dyke; FM - Formation; FO - Fournier; GA - Gabbro; GD - Granodiorite; GH - Green Head; GP - Group; GR - Granite; HT - Horton; INT - Intrusion; L - Lake; MT - Mount; MTN - Mountain; N - North; PC - Petitcodiac; PK - Park; PL - Pluton; PT - Point; PY - Porphyry; QD - Quartz Diorite; QM - Quartz Monzonite; R - River; RD - Road; S - South; SETT - Settlement; SI - Sill; SK - Stock; SL - Slate; SM - Stream; ST - Saint; TB - Tobique; TO - Tonalite; TR - Troctolite; VOL - Volcanics; W - West.

Matapedia Cover Sequence

The Matapedia Cover Sequence is no older than Late Ordovician (early Ashgillian) in the eastern Gaspé Peninsula (Riva, 1981) where it lies unconformably on Upper Cambrian platformal limestone of the Murphy Creek Formation (Rodgers, 1971). Any overlapping of the Matapedia sequence onto terranes in this region will thus give latest possible times of docking of these terranes (see below) to the North American platform during or after the Late Ordovician (Fig. 3). These accretionary events clearly must have occurred later than most of the Ordovician (Caradocian) nappe emplacements (Vermontian phase of the Taconian orogeny, Rodgers, 1971) into the foreland trough of the Quebec Applachians (St. Julien and Hubert, 1975).

Elmtree Terrane

The Silurian Chaleurs Group, which conformably overlies the Upper Ordovician-Lower Silurian Matapedia Group, overstepped the ophiolitic Fournier Group of the Elmtree Terrane in the Early Silurian (late Llandoverian, Noble, 1976). The Jacquet River Fault (Figs. 2, 3) separates the

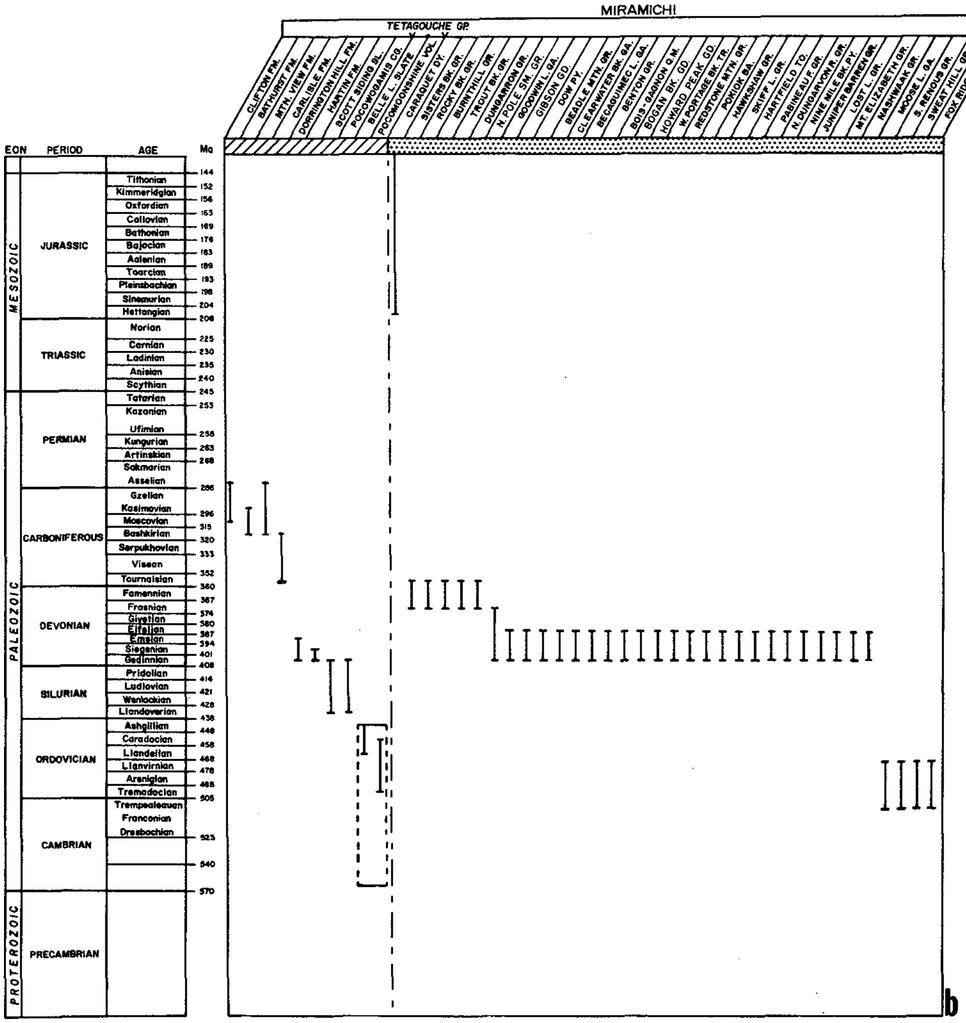

Fig. 1 Continued

shallower (in the east) and deeper water (in the west) facies of the Chaleurs Group. The Maquereau Terrane on the Gaspé shore of Chaleur Bay was also overlapped by the Chaleurs Group during the Early Silurian (Ayrton, 1967). This regional unconformity delimits the Hudson Valley phase of the Taconian orogeny (Rodgers, 1971).

Although Silurian cover rocks obscure the contact relationships between them, the lithological similiarity of the Caradocian wackes of the Mictaw and Elmtree groups, respectively of the Maquereau and Elmtree terranes, may indicate that these two terranes were in close proximity during the Late Ordovician before being docked to the North American platform by the Early Silurian. The correlation of the Pointe Verte Formation of the Fournier Group with the upper part of the Tetagouche Group (Pajari *et al.*, 1977) would imply that the Elmtree and Miramichi terranes were also not widely separated in the Late Ordovician but such a correlation across the major Rocky Brook-Millstream Fault needs to be viewed with caution.

Miramichi Terrane

Mid-Caradocian and older rocks of the Miramichi Terrane are in contact with the Matapedia Cover Sequence along the Rocky Brook-Millstream Fault in the northeast, and along the Portage Lakes, Serpentine River, and Woodstock faults in the west. The faults along the western margin have been intruded by Early Devonian gabbroic and granitic plutons that were locally mylonitized by reactivation of the faults (Fyffe and Cormier, 1979).

Some evidence exists that the Miramichi Terrane, or at least the northwestern extension of it, was docked (but not welded) to North America by the Late Ordovician. In the Woodstock area, in the southwestern part of the Matapedia Cover Sequence (Fig. 2), Upper Ordovician (upper Ashgillian) conglomerate, presumably representing a shallow-water equivalent of the Matapedia Group, unconformably overlies a small inlier of Lower to lower Upper Ordovician (Llanvirian to lower Caradocian) Craig Brook Limestone with associated tuff and chert (St. Peter, 1982). This inlier, which occurs westward of the Woodstock Fault, has been correlated lithologically with rocks in the nearby Tetagouche Group of the Miramichi Terrane (Fyffe *et al.*, 1983) although volcanic rocks are not nearly as abundant. This implies that prior to the Late Ordovician, the Miramichi Terrane included rocks presently under-

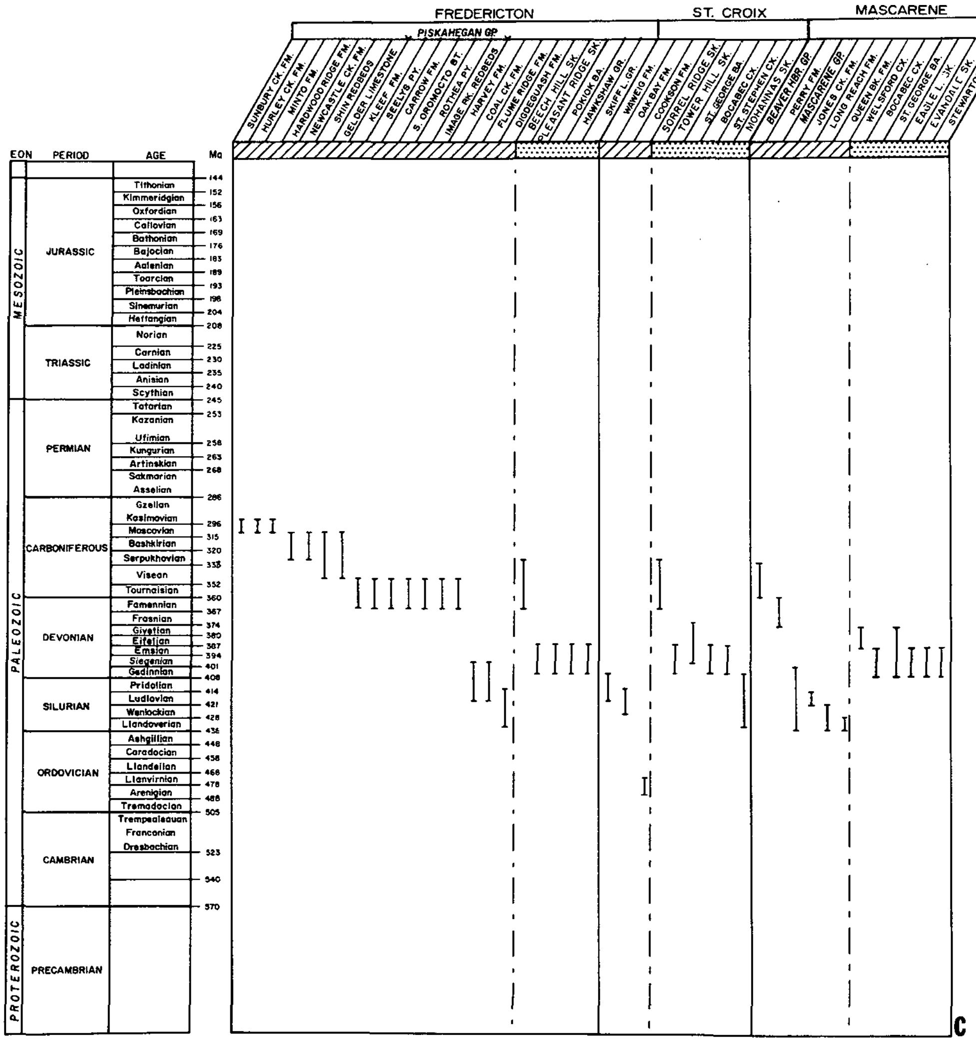

Fig. 1 Continued

lying the southwestern portion of the Matapedia Cover Sequence, and furthermore must have been linked to the North American platform by the Late Ordovician. The Miramichi Terrane may have extended in the subsurface as far to the northwest as the southwestern extension of the Rocky Brook-Millstream Fault, which delimits the extent of shallow-water Late Ordovician to Early Devonian sedimentation in the area (Fig. 2).

Unfaulted relationships between the exposed main belt of the Miramichi Terrane and Matapedia Cover Sequence are preserved in a few localities. On the northwestern margin of the Miramichi Terrane in the Portage Lakes area, Upper Silurian (Ludlovian) conglomerate of the Chaleurs Group overlies and contains clasts of lower Caradocian basalt of the upper part of the Tetagouche Group (Helmstaedt, 1971). In the Woodstock area to the southwest (Fig. 2), Lower Devonian sandstone of the Hartin Formation conformably overlies a calcareous conglomerate resting on Cambrian quartzite of the lower Tetagouche Group (Lutes, 1979). Deposition of some conglomerate (Pocowogamis Conglomerate) in this area was accompanied by faulting (Venugopal, 1979). Brachiopods in the Hartin Formation belong to the Appalachian Province (see Venugopal, 1979) as do those on the western margin of the Matapedia Cover Sequence (Boucot and Johnson, 1967).

Uplift of the Miramichi Terrane in the Late Silurian took place along faults of the Portage Lakes-Serpentine River, Woodstock, and Rocky Brook-Millstream systems (Rast and Stringer, 1974; Fyffe and Cormier, 1979), and was probably accompanied by considerable dextral displacement (Webb, 1969). This uplift is reflected not only by marginal unconformities but also internally within the Matapedia Cover Sequence by the widespread deposition of the Upper Silurian New Mills conglomerate (Greiner, 1967), and possibly by a local unconformity which separates the Lower Silurian Limestone Point Formation (late Llandoverian) from Upper Silurian (Pridolian) limy siltstone on Chaleur Bay (Fyffe and Noble, 1985). This period of uplift in northern New Brunswick has been referred to as the Salinic disturbance (Boucot, 1968).

Faults mapped by St. Peter (1982) in the Craig Brook area are compatible with a transcurrent component of motion along the northwestern margin of the Miramichi Terrane. Dispersion of the Miramichi Terrane along these faults would explain the

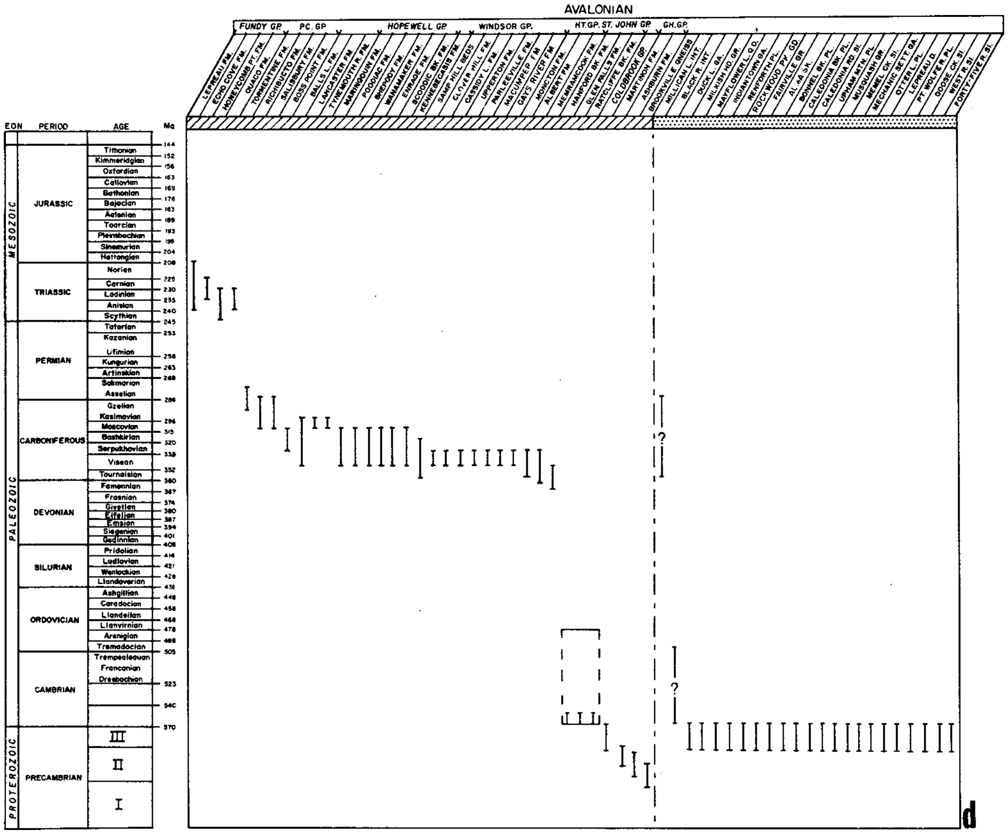

Fig. 1 Continued

observed facies differences between the Craig Brook inlier and the main belt of the Miramichi Terrane. Furthermore, this dispersion may account for the pre-cleavage folding observed within the Matapedia Group. These folds occur both in the Matapedia Group of southwestern New Brunswick (Rast *et al.*, 1980), and in the Lower Silurian Limestone Point Formation of northern New Brunswick (Stringer, 1975).

Fredericton Cover Sequence

The Fredericton Fault, which bisects the Fredericton Cover Sequence, is assumed to mark the boundary between the Miramichi and St. Croix terranes since it has been shown to be a major feature that may separate distinct Precambrian blocks in Maine (see Zen, 1983). The lithological similarity of the cover rocks on opposite sides of this fault indicates that the Miramichi and St. Croix terranes were docked (but not welded) prior to the Silurian (Ludman, 1986). This contrasts with the interpretation of Keppie (in Keppie *et al.*, 1985) who implies a difference in the cover rocks across the fault.

Furthermore, the lithological similarity of the lower Tetagouche Group of the Miramichi Terrane to that of the Cookson Formation of the St. Croix Terrane in southwestern New Brunswick led Rast and Stringer (1974) to suggest continuity of deposition between these terranes during the Early Ordovician. Later stratigraphic studies and graptolite discoveries within the Miramichi Terrane have been used to support this view (Fyffe *et al.*, 1983). The implication is that the docking of the two terranes took place before the Early Ordovician although the boundary did not become welded until late in the Carboniferous. Future seismic, paleomagnetic and isotopic studies should provide evidence whether the Fredericton Fault actually represents a terrane boundary or merely marks a dispersal site of a once continuous terrane.

Graptolites recovered from the clastic turbidites of the cover sequence range in age from early Llandoverian to Ludlovian. The Miramichi Terrane is in contact with these Silurian rocks along the Bamford Brook-Hainesville Fault (O'Brien, 1977; Irrinki, 1980). This fault has been intruded by the granitic, late Early Devonian Pokiok Batholith; later movement on the fault has fractured the granite (O'Brien, 1977; Venugopal, 1982).

Evidence that these Silurian rocks were cover to the Miramichi Terrane is found within Upper Silurian (Wenlockian to Ludlovian) lithic wackes located along the faulted southeastern margin of the Miramichi Terrane. The wackes contain distinctive clasts of spherulitic volcanic rocks that can be matched with exposures of pillow basalt within the adjacent Tetagouche Group of the Miramichi Terrane (Irrinki, 1979). The Bamford Brook-Hainesville Fault, therefore, was not a locus of significant terrane dispersion in the latter part of the Silurian.

St. Croix Terrane

The oldest rocks known within the St. Croix Terrane are Lower Ordovician (Tremadocian-

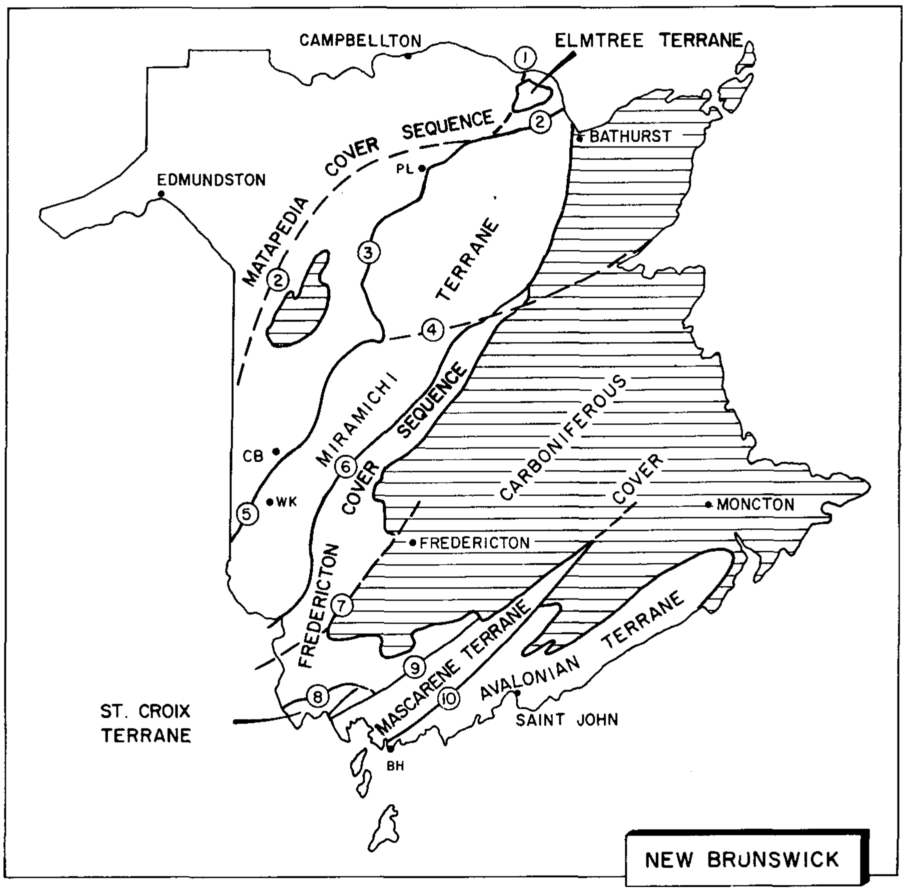

Fig. 2. Tectonostratigraphic terranes and cover sequences of New Brunswick. 1 - Jacquet River Fault; 2 - Rocky Brook-Millstream Fault; 3 - Portage Lakes-Serpentine River Fault; 4 - Catamaran Fault; 5 - Woodstock Fault; 6 - Bamford Brook-Hainesville Fault; 7 - Fredericton Fault; 8 - Honeydale Fault; 9 - Pendar Brook Fault; 10 - Belleisle Fault. Dashed lines represent faults within the cover sequences. Abbreviations: PL - Portage Lakes; WK - Woodstock; BH - Blacks Harbour; CB - Craig Brook.

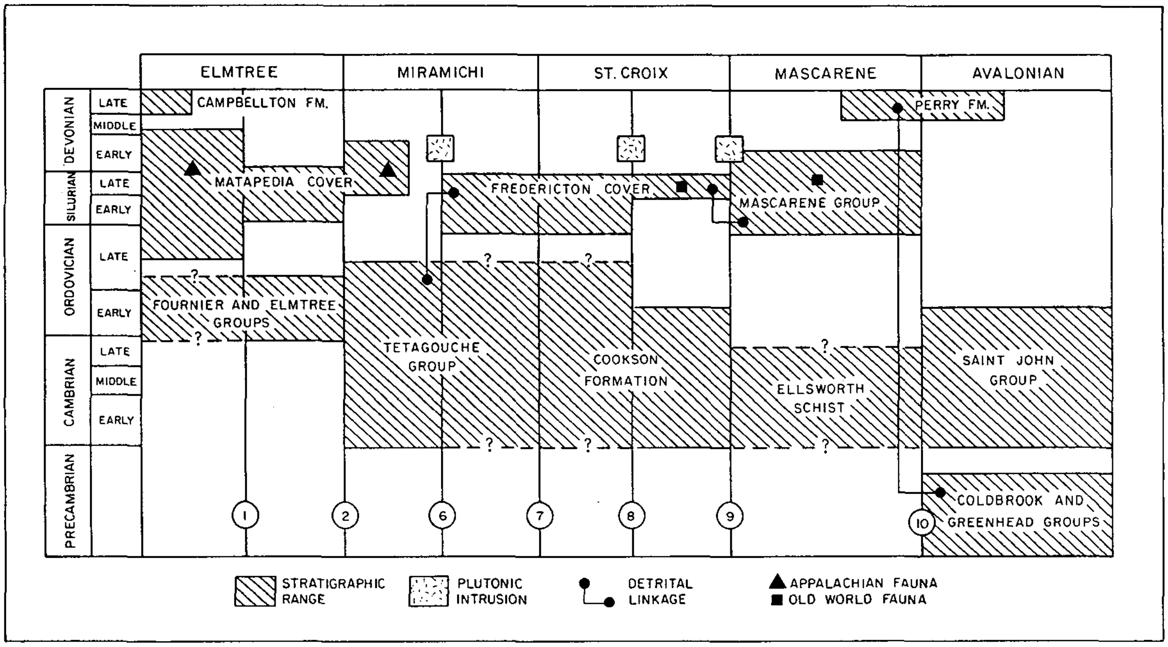

Fig. 3. Stratigraphic, detrital and plutonic linkages across terrane boundaries in New Brunswick. Numbers refer to faults listed in Fig. 2. Stratigraphic columns represent a composite section drawn between Campbellton and Bathurst in the north and Woodstock and Saint John in the south.

Arenigian) black slates, quartzites and minor basalt of the Cookson Formation (Cumming, 1967; Ruitenberg, 1967). These rocks were intensely deformed during the Taconian orogeny (Stringer and Burke, 1985), and are unconformably overlain by conglomerate of the Upper Silurian Oak Bay Formation and sandstone of the Waweig Formation containing a shallow-water fauna (Pickerill, 1976). This unconformity cannot be solely attributed to the Taconian Orogeny, however, since Silurian limestone clasts occur in the Oak Bay Formation (Cumming, 1967; Pajari, 1976). Uplift producing the conglomerate is, therefore, likely related to the Salinic disturbance (A. Ludman, written communication, 1986).

The Honeydale Fault separates the Cookson Formation and its shallow-water Silurian cover from the deep-water lithic and quartzose turbidites (Digdeguash Formation) of the Fredericton Cover Sequence to the north. No fossils have been recovered from these turbidites in southern New Brunswick, but they are assumed to be Silurian by comparison to similiar lower Llandoverian to Ludlovian rocks north of the Fredericton Fault. Although the Oak Bay, Waweig and Digdeguash formations apparently represent shallow- and deep-water facies of the same cover sequence (Ruitenberg, 1967), some terrane dispersion must have occurred since the two facies have been disrupted by movement on the Honeydale Fault. The late Early Devonian Pocomoonshine pluton intrudes the Honeydale Fault in Maine and provides an upper limit to the time of this dispersion (Ruitenberg and Ludman, 1978). The eastern extension of the fault is difficult to trace because of poor exposure but it is presumably truncated by the late Early Devonian Saint George Batholith.

Mascarene Terrane

No pre-Silurian rocks are exposed in the Mascarene Terrane of New Brunswick but the Cambrian Ellsworth Schist unconformably underlies the same Silurian and Lower Devonian volcanic rocks along strike in Maine (Stewart and Wones, 1974). The hiatus noted in Maine covers the same time interval as the unconformity in the St. Croix Terrane. Although this coeval hiatus may indicate that the Mascarene and St. Croix terranes were not widely separated, there is no evidence that they were actually docked with each other in the early Paleozoic. Brachiopods from the upper part of the Mascarene Group in New Brunswick and equivalents in Maine belong to the Early Devonian Old World Province (Boucot and Johnson, 1967).

The Saint George Batholith seals the Pendar Brook Fault, which forms the boundary between the Mascarene and St. Croix terranes in New Brunswick (McCutcheon, 1981), so that the two terranes were welded by the Early Devonian. Earlier docking is supported by two lines of evidence. The Silurian Oak Bay Formation of the St. Croix Terrane contains quartzite pebbles eroded locally from the underlying Ordovician Cookson Formation, as well as abundant volcanic clasts (Cumming, 1967) most likely derived from the Mascarene Terrane. Additionally, the Waweig Formation, which conformably overlies the Oak Bay Formation, possesses a Late Silurian brachiopod fauna similar to that in the Mascarene Group (Pickerill, 1976).

Avalonian Terrane

The boundary between the Mascarene and Avalonian terranes is defined by the Belleisle Fault (including the Wheaton Brook splay) to the northwest of which no rocks of Avalonian aspect are exposed (Brown and Helmstaedt, 1970; McCutcheon, 1981). Welding of these two terranes was not accomplished until after the Early Carboniferous since strata of that age are affected by movement on the Belleisle Fault (Webb, 1969; Brown and Helmstaedt, 1970).

The most direct line of evidence of linkage between the two terranes is provided by the Upper Devonian Perry Formation that unconformably overlies rocks of the Silurian to Lower Devonian Mascarene Group in the Blacks Harbour area (Fig. 2). The Perry possesses a main paleocurrent direction from the south and contains hornblende- and pyroxene-bearing plutonic pebbles that are similiar to intrusive rocks within the Avalonian Terrane; red granite clasts were derived from the Saint George Batholith, which intrudes the Mascarene Terrane (Schluger, 1976). The similiarity of Late Silurian-Early Devonian Old World faunal communities within the Mascarene Terrane of New Brunswick and Avalonian Terrane of Nova Scotia (Watkins and Boucot, 1975) is compatible with, but does not prove an earlier time of docking.

SUMMARY AND CONCLUSIONS

Stratigraphic evidence presented above suggests that terrane accretion had begun in northern New Brunswick by the Late Ordovician. Between the Late Ordovician and Early Silurian these terranes (Macquereau, Elmtree and Miramichi terranes) had docked with the North American craton as indicated by the deposition of the Matapedia overlap sequence. This Taconian accretion apparently took place along a consuming plate margin by obduction of the Fournier ophiolite over the Tetagouche volcanic sequence. The Upper Silurian-Lower Devonian rocks which form the conformable upper part of the overlap sequence on these terranes contain an Appalachian brachiopod assemblage.

The St. Croix and Miramichi terranes display similar early Paleozoic stratigraphy and structural histories. Therefore, if the Fredericton Fault is a terrane boundary separating different Precambrian basements, it was more likely the locus of along-strike rather than across-strike displacement during the early Paleozoic. The Fredericton Fault was active during the late Paleozoic since it displaces Silurian rocks of the Fredericton Cover Sequence and overlying Carboniferous rocks.

The Mascarene Terrane may also have been proximal to North America by the early Paleozoic as it exhibits the affects of Taconian uplift in Maine. However, the Mascarene Terrane probably did not reach its present position with respect to the St. Croix Terrane until later in the Silurian when it shed detritus to the Oak Bay Conglomerate. Movement along the Pendar Brook Fault on the northern margin of the Mascarene Terrane had ceased by the Devonian as demonstrated by the intrusion of undeformed plutons.

The Avalonian Terrane need not have been widely separated from the Mascarene Terrane in the Late Silurian since both carry an Old World fauna.

However, juxtaposition cannot be proven before the Late Devonian. Movement on the Belleisle Fault continued for a considerably longer time than on the Pendar Brook Fault as there is evidence for Early Carboniferous dextral displacement (Webb, 1969).

The Late Silurian accretion of the Mascarene Terrane in southern New Brunswick coincided with uplift along the northwestern boundary of the Miramichi Terrane at which time coarse clastic sediments were being deposited within the Matapedia Cover Sequence. The Salinic disturbance, thus, appears to have sporadically affected the New Brunswick Appalachians throughout the area north of the Pendar Brook Fault. Minor movement occurred on the Catamaran and Rocky Brook-Millstream faults in northern New Brunswick as late as the Early Carboniferous (Webb, 1969).

Laurent and Bélanger (1984) suggested that Siluro-Devonian volcanism in the region was generated in a transpressive intraplate tectonic environment rather than by subduction as postulated by McKerrow and Ziegler (1971). Therefore, Acadian accretion of the Mascarene and Avalonian terranes of southern New Brunswick can reasonably be attributed to a transcurrent regime as proposed by Zen (1983) and Zen *et al.* (1986). Later Variscan accretion in the New Brunswick Appalachians occurred along the Bay of Fundy fault system where dextral movement juxtaposed the Meguma Terrane of Nova Scotia with the Avalonian Terrane (Nance and Warner, 1986).

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