

Revision of Jamaican lithostratigraphic nomenclature decided at a stratigraphic workshop of the Jamaican Stratigraphic Committee at the 60th Anniversary of the Geological Society of Jamaica

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SUMMARY. The Jamaican Stratigraphic Committee at a meeting held on the 25th November 2015, came to the following decisions with regard to the naming of stratigraphic units in Jamaica: The names Yellow Limestone Group, White Limestone Group and Coastal group were formally adopted because of their historical use and to maintain terms in common usage. The name Popkin Formation needs to be replaced. The name Wagwater Belt Group was rejected as it is considered unnecessary. The name Blue Mountain Group is rejected because it is pre-occupied. No decision was reached on the name Main Ridge Group. The name Bath Volcanics/Bath Volcanics Formation was adopted and the names Bath Limestone and Bath-Dunrobin Formation were rejected. The name Brownstown beds was rejected and the name Brown's Town Limestone was adopted because of its historical use. The name Flamstead Formation was rejected and the name Flamstead Limestone was adopted because of priority of usage. The name Good Hope Limestone was adopted and the name Good Hope Lava/Flow was rejected because of priority. The name Green River Formation, for the lowest unit in the Summerfield Formation of the Central Inlier, was adopted as the earlier name Green River Formation, for a unit in the Blue Mountains, was not formally published. The name Guava River Formation was adopted and the name Guava River Stock was rejected because of priority of usage. The name Halberstadt Volcanics/Volcanic Formation was adopted and the name Halberstadt Limestone was rejected because Halberstadt Volcanics has been used for a distinctive type of igneous rock in international literature. No decision was reached on the name Maroon Town Formation pending further research. The name Mount Hibernia Schist was adopted and the name Mount Hibernia Marble was rejected because of the widespread use of Mount Hibernia Schist in literature.

Keywords: Lithostratigraphy, stratigraphy, Jamaica, Cretaceous, Cenozoic

1. INTRODUCTION

The island of Jamaica is characterised by a complex and (relatively) long geological history extending back at least to the early Cretaceous (e.g., Zans et al., 1963; Wright, 1974; Robinson, 1994; Mitchell, 2003, 2006; Brown and Mitchell, 2010). The older (Cretaceous) rocks are exposed as

a series of erosional inliers surrounded by rocks belonging to the Yellow Limestone and White Limestone. This varied geology has resulted in the introduction of more than 500 lithostratigraphic names for rock units in Jamaica. Place names in Jamaica have been derived from various sources and many of the names are repeated in different parishes (Higman, 2009). This means that in many

instances the same name has been used for different rock units in different places. Likewise, some names have a historical context, are well-entrenched in the geological literature, yet do not follow standard lithostratigraphic practice. To develop a sound lithostratigraphic nomenclature for Jamaica, problematic names need to be discussed and a unified decision made on them by the geological community. Various stratigraphic guides have been published that are relevant to the Jamaican region; these include: **Salvador (1994)**, **Murphy and Salvador (2001)** and **North American Commission on Stratigraphic Nomenclature (2005)**. This article presents the results of the discussion at the Stratigraphic Workshop held on the 25th of November 2015 as part of the conference celebrating the 60th Anniversary of the Geological Society of Jamaica.

2. METHODS

The Jamaican Stratigraphic Committee operates under the auspices of the Geological Society of Jamaica and is charged with solving nomenclature problems that exist in the lithostratigraphic nomenclature of Jamaica. The committee is assembled from time to time to deal with cases. The 60th Anniversary celebrations of the Geological Society of Jamaica were considered a suitable time to convene a stratigraphic workshop and those people with an interest in lithostratigraphic nomenclature in Jamaica were invited. It is noteworthy that attendance came from the Mines and Geology Division, the University of the West Indies and the Petroleum Corporation of Jamaica, all of whom have an interest in geological nomenclature.

Cases for consideration were compiled from a lithostratigraphic database prepared by SFM. The cases fell into three categories (**Table 1**). Each case was taken in turn and discussed. After discussion a vote was taken, if appropriate, and the decisions recorded. The cases are presented here together with the decisions, if any, that were made.

Table 1. Cases for consideration

Case 1	Adoption of established names that are not based on a geographical place name
Case 2	Too many groups
Case 3	Name occupied by pre-existing name

3. CASES FOR CONSIDERATION

A background is given below for each case, potential options for solution (where appropriate), and the decisions of the Jamaican Stratigraphic Committee are indicated.

CASE 1: ADOPTION OF ESTABLISHED NAMES WHICH ARE NOT BASED ON A GEOGRAPHICAL PLACE NAME

Four cases are outlined below.

Case 1.1. Yellow Limestone Group

Background. The name Yellow Limestone dates from the Barrett and Sawkins 1859-1867 survey of the geology of Jamaica (**Sawkins, 1869**). The name was first published as “*Yellow Limestone*” by **Duncan and Wall (1864, p. 3, 7)**, and subsequently it was widely described in the reports on the various parishes (**Sawkins, 1869**) as well as being shown on the Brown and Sawkins geological map, dated 1865 (which was formally published as an enclosure in **Sawkins, 1869**).

Options: 1. Adopt Yellow Limestone Group for consistency
2. Reject Yellow Limestone Group

Decision. The Jamaican Stratigraphic Committee voted unanimously (21 votes) to adopt the name Yellow Limestone Group.

Case 1.2. White Limestone Group

Background. The name was introduced as a foot note in **De la Beche (1825, p. 56)** as follows: “... [the] *Jamaica white limestone formation consists of compact white limestone beds, resembling the compact varieties of the Jura limestone*” It has subsequently been widely used by **De la Beche (1829, p. 169)**, **Duncan and Wall (1864, p. 7)**, **Sawkins (1869)**, and many others. The name was raised to group status by (**Robinson, 1965a, p. 20**) and supergroup status by **Robinson (1988, p. 62)**. **Mitchell (2004, 2013)**, following the recommendations in the *Stratigraphic Guide (Salvador, 1994; Murphy and Salvador, 2001)*, adopted the rank of group for the unit. **Mitchell (2015, 2016)** demonstrated that the Troy Formation at the base of the White Limestone Group on the Clarendon Block rested on a major angular unconformity, and this unconformity is the most useful way of distinguishing the underlying Yellow Limestone (which includes White Limestone-like lithologies) from the overlying White Limestone. The name White Limestone has had a long history and has been universally used on geological maps and in geological publications.

Options: 1. Adopt White Limestone Group for consistency
2. Reject White Limestone Group

Decision. The Jamaican Stratigraphic Committee

voted unanimously (21 votes) to adopt the name White Limestone Group.

Case 1.3. Coastal Group

Background. The name was introduced as the Coastal Series by Hill (1899, p. 82) for the units he called the Manchioneal Formation, Kingston Formation and the Elevated reefs. Subsequently it has been used as Coastal Limestones (e.g., Woodring, 1925, p. 6; Zans and Versey, 1954, p. 2) or Coastal Group (Greiner, 1965, p. 6, 11; Robinson, 1965b, p. 45, 1994; James-Williamson and Mitchell, 2012; James-Williamson et al., 2014). The lithologies in the Coastal Group are variable and not necessarily applicable to the term group. However, it is useful to have a designation for these deposits that occur largely close to the coast in Jamaica and, therefore, the retention of the name Coastal Group has merit.

Options: 1. Adopt Coastal Group for consistency
2. Reject Coastal Group

Decision. After discussion, the Jamaican Stratigraphic Committee voted unanimously (21 votes) to adopt the name Coastal Group.

Case 1.4. Popkin Formation

Background. The Popkin Series was introduced by Chubb (1958, p. 9) for a series of shales and conglomerates between the Maldon Series and the Vaughansfield Series. The name has been widely used since (e.g., Chubb in Zans et al., 1959, p. 265; Chubb, 1960a, p. 19; Chubb, 1960b, p. 86; Chubb in Zans et al., 1963, p. 7). Gunter and Mitchell (2005) retained the name as Popkin Formation for the mudstones succession between the Maldon Formation and the Vaughansfield Formation, despite stating that the origin of the name was unknown.

Options: 1. Adopt Popkin Formation consistency
2. Reject Popkin Formation

Decision. After a long discussion it was concluded that further research was needed to come up with a definitive view on the status of the Popkin Series/Formation. The voting was: 11 in favour of accepting the name; 3 in favour of rejecting the name, with 7 abstaining. No decision was therefore possible.

Note added after workshop. Since the status of the Popkin Formation was discussed SFM has investigated the origin of the name Popkin in more detail. The name is shown on the map of Atkinson (1969) and SFM asked locals in Maroon Town

about the origin of the name. The name as ‘Papkin’ or ‘Popkin’ is used for a constantly running spring on the road from Maldon to Maroon Town (close to where Atkinson placed the name Popkin on his map) and is therefore based on a geographic locality (although not a named geographical locality on the 1:12,500 and 1:50,000 topographic maps produced by the Survey Department). The Papkin or Popkin Spring resurges from a pebble conglomerate within the basal Eocene succession (the conglomerate below the Maroon Town Mudstones of Atkinson, 1969, and the Maroon Town Formation of Gunter and Mitchell, 2005). The name is therefore not appropriate for the Cretaceous mudstones between the Maldon Formation and the Vaughansfield Formation and a replacement name will need to be found.

CASE 2: TOO MANY GROUPS

In the 1970s there was a move to place Jamaican lithostratigraphic units into groups and various schemes with group names were proposed. *The Stratigraphic Guide* states: a group is “A succession of two or more contiguous or associated formations with significant and diagnostic lithologic properties in common. Formations need not be aggregated into groups unless doing so provides a useful means of simplifying stratigraphic classification ...” (Murphy and Salvador, 2001, p. 260) and that “The component formations of a group are not necessarily everywhere the same” (Salvador, 1994, p. 35). Many of the names for groups established in Jamaica do not comply with guidelines on stratigraphic nomenclature, were introduced inappropriately, and many of the names are preoccupied. Many of these group names are also superfluous and have often been introduced only to refer to perceived tectonically defined (unconformably bound) successions of strata. Three cases are considered here and the decision of the Jamaica Stratigraphic Committee is presented.

Case 2.1. Wagwater Belt Group

Background. The Wagwater Belt Group was introduced by Robinson (1965b, p. 45) to include the Richmond Formation and the Wagwater Formation. Matley (1940, p. 100) had originally named the Wagwater Group for what he had designated the Purple Conglomerate Group (Matley, 1928, p. 448). Subsequently, the term Wagwater Formation was used (e.g., Wright and Dickinson, 1963, p. 107). There has also been a tendency to have a Wagwater Formation within a

Wagwater Group (e.g., [West et al., 2014](#)), which is in violation of the Stratigraphic Guide ([Salvador, 1994](#); [Murphy and Salvador, 2001](#)) because units can change rank from one area to another, and therefore a unit of lower rank cannot be a component of a unit of higher rank with the same name.

There is also some question as to whether the Wagwater Belt is a valid geographical locality. The Wagwater Belt is a tectonically defined belt of uplifted conglomerates and shales that formed within the Wagwater Rift. It is a feature of tectonic and geological maps rather than topographic maps, and may not therefore be a valid geographic feature for defining a group.

Options: 1. Accept Wagwater Belt Group comprising the Wagwater Formation and Richmond Formation.

2. Reject Wagwater Belt Group and retain separate Wagwater and Richmond formations.

Decision. There was a unanimous consensus (21 votes) to reject the name Wagwater Belt Group and to adopt separate Wagwater Formation and Richmond Formation as units.

Case 2.2. Blue Mountain Group

Background. The name Blue Mountain Group was used by [Scott et al. \(2000, p. 6 in a key to a map\)](#), but is pre-occupied by the Blue Mountain Conglomerate of [Trechmann \(1936a, p. 256\)](#), the Blue Mountain Shale of [Chubb \(1961, p. 2\)](#) and the Blue Mountain granodiorite of [Khudoley and Meyerhoff \(1971, p. 33\)](#).

Options: 1. Adopt Blue Mountain Group
2. Reject Blue Mountain Group

Decision. The Jamaican Stratigraphic Committee agreed to reject the name Blue Mountain Group with no need for replacement.

Case 2.3. Main Ridge Group

Background. The name Main Ridge Group was introduced by [Wright \(1974, table on p. 16\)](#) for a unit in the Blue Mountains, but is pre-occupied by the Main Ridge Volcanics (Formation) of [Robinson et al. \(1972, p. 11\)](#) for a unit within the Central Inlier.

Options: 1. Adopt Main Ridge Group
2. Reject Main Ridge Group

Decision. The Jamaican Stratigraphic Committee

did not reach a consensus on this case and no vote was taken.

CASE 3: NAME OCCUPIED BY PRE-EXISTING NAME

Case 3.1. Bath Limestone/Bath Volcanics

Background. The name Bath Volcanics was introduced by [Bateson \(1974, p. 24\)](#) and was subsequently used by [Krijnen and Lee Chin \(1977a, p. 90; 1978, p. 244\)](#) and [Jackson and Smith \(1979, p. 388\)](#). The name Bath Limestone was introduced by [Krijnen and Lee Chin \(1977a, p. 89\)](#) and has been used subsequently by [Krijnen and Lee Chin \(1978, p. 244, 248\)](#), [Wadge et al. \(1982, p. 324\)](#), [Fenton \(1982, p. 76\)](#) and [Draper and Robinson \(1989, p. 40\)](#). The name Dunrobin Volcanic Member was introduced by [Jackson and Smith \(1979, p. 388\)](#) and was used subsequently by [Jackson et al. \(1980, p. 40\)](#). The combination Bath-Dunrobin Formation was introduced by [Wadge and Draper \(1978, p. 348\)](#) and has been used subsequently by [Wadge et al. \(1982, p. 323\)](#), [Hastie et al. \(2008, p. 327; 2010c, p. 658\)](#) and [West et al. \(2014, p. 602\)](#).

Options: 1. Adopt the name Bath Volcanics and reject the others

2. Adopt the name Bath Limestone and reject the others

3. Adopt the name Bath-Dunrobin Volcanics and reject the others

Decision. The Jamaican Stratigraphic Committee voted (21 votes) to adopt the name Bath Volcanics and reject the other names. A recommendation was also made to use the term Bath Volcanics or Bath Volcanic Formation rather than Bath Formation to prevent potential confusion with the invalid (pre-occupied) name Bath Limestone. A new name will be required for the Bath Limestone.

Case 3.2. Brownstown beds and Brown's Town Limestone

Background. The first use of the name Brownstown beds was by [Hill \(1899, p. 71, p. 75, p. 142\)](#) as part of his Oceanic Series (=White Limestone of [De la Beche, 1825, 1827](#)). The name Brown's Town Limestones was proposed by [Hose and Versey \(1957, p. 36\)](#) which they described as "... complete incoherence and lack of structure of the limestones and also by the presence of a typical Antiguan fauna of *Lepidocyclina undosa*, *L. fabulosa*, *L. gigas* and *L. parvula*". The publication of their paper was delayed, and the summary paper on the oil potential of Jamaica by [Butterlin \(1956, p. 78\)](#)

appeared before the paper by **Hose and Versey (1957)**. Hill's name has not found its way into the literature (other than a few papers discussing nomenclature problems), whereas **Hose and Versey's (1957)** name has been widely used.

- Options:** 1. Accept **Hill's (1899)** name (not desirable)
2. Accept **Hose and Versey's (1957)** name (desirable)

Decision. The Jamaican Stratigraphic Committee voted (19 votes) to adopt Brown's Town Limestone in the sense of **Hose and Versey (1957)** and reject the term Brownstown beds of **Hill (1899)**.

Case 3.3. Flamstead Limestone and Flamstead Formation

Background. The name Flamstead Limestone was introduced by **Matley and Raw (1942, p. 251)** for a limestone within the Wagwater Belt. The name Flamstead Formation (a different Flamstead) was also introduced by **Gunter and Mitchell (2005, p. 8)** for a series of Cretaceous mudstones above the Vaughansfield Formation (limestone) within the Maldon Inlier.

- Options:** 1. Accept Flamstead Limestone of **Matley and Raw (1941)**
2. Accept Flamstead Formation of **Gunter and Mitchell (2005)**

Decision. The Jamaican Stratigraphic Committee did not vote and gave preference to age priority. The name Flamstead Limestone of **Matley and Raw (1941)** is valid, and a new name will be required for the Flamstead Formation of **Gunter and Mitchell (2005)**.

Case 3.4. Good Hope Limestone and Good Hope Flow

Background. The name Good Hope Limestone was introduced by **Matley (1940, p. 100)**. The name Good Hope Lava was introduced by **Green (1977, p. 6)** for a lava flow within the Newcastle Volcanics. The Good Hope Limestone therefore has age preference over the Good Hope Flow.

- Options:** 1. Accept Good Hope Limestone of **Matley (1940)**
2. Accept Good Hope Flow of **Green (1977)**

Decision. The Jamaican Stratigraphic Commission voted unanimously (21 votes) to accept the name Good Hope Limestone of **Matley (1940)** and reject

the name Good Hope Flow of **Green (1977)**. No alternative to Good Hope Flow was suggested.

Case 3.5. Green River Formation

Background. The name Green River Formation was introduced in an abstract by **Draper and Robinson (1989, p. 40)** for a unit within the Blue Mountains Inlier but was never described. The name Green River Formation was introduced by **Mitchell and Blissett (2001, p. 26)** for a sandstone unit at the base of the Summerfield Group (rank upgraded from formation to group) in the Central Inlier.

- Options:** 1. Accept Green River Formation of **Draper and Robinson (1989)**
2. Accept Green River Formation of **Mitchell and Blissett (2001)**

Decision. The Jamaican Stratigraphic Committee voted unanimously (21 votes) to accept the name Green River Formation of **Mitchell and Blissett (2001)** and reject the name Green River Formation of **Draper and Robinson (1989)** because it was never formally defined.

Case 3.6. Guava River Stock and Guava River Member

Background. The name Guava River Member was introduced by **Krijnen and Lee Chin (1977a, p. 89)** for a sedimentary unit in the Blue Mountains Inlier. The unit has subsequently been described by **Meyerhoff and Krieg (1977a, p. 33)**, **Krijnen and Lee Chin (1978, p. 246)** and **Balkissoon (1989, p. 30)**. The name Guava River/Johnson River Stock was introduced by **Issacs and Jackson (1987)** for a granodiorite stock within the Blue Mountain Inlier.

- Options:** 1. Accept Guava River Member of **Krijnen and Lee Chin (1977a)**
2. Accept Guava River/Johnson River Stock of **Issacs and Jackson (1987)**

Decision. The Jamaican Stratigraphic Commission voted to accept the Guava River Member of **Krijnen and Lee Chin (1977a)** and reject the name Guava River/Johnson River Stock of **Issacs and Jackson (1987)**. The stock will need to be renamed.

Note added after by SFM. Although a possibility would be to use the term Johnson River Stock instead of Guava River/Johnson River Stock, this is rendered impossible because there is the name Johnson River Greenstone Group (equivalent to the Mt. Hibernia Schists, see below) which was introduced by **Spence (1961, p. 40)**. This would require a further meeting of the Jamaican Stratigraphic Committee to consider.

Case 3.7. Halberstadt Limestone and Halberstadt Volcanics

Background. The first usage of Halberstadt limestone was by **Sawkins (1869, p. 91)**. Subsequently, **Matley (1940, p. 100)** used the name Halberstadt Limestone and **Matley (1951, p. 32)** described it as “... *thick Eocene limestone found a few feet above the Halberstadt volcanics at Good Hope (St. Andrew), Halberstadt, Brook, Flamstead and elsewhere. ... poorly preserved corals, mollusks and other marine fossils*” and “... *appears on the 1869 Survey map as ‘Yellow Limestone’ but is of earlier age ...*”. The name Halberstadt Lava was mentioned by **Stockley (1925, p. 12)** and called the Halberstadt Volcanic Group by **Matley (1940, p. 100)** who described it as “... *vesicular basic and spilitic lavas and tuffs ... fine exposures of pillow-lava*”. Both names have been extensively used subsequently (e.g., Halberstadt Limestone: **Matley and Raw, 1942, p. 251**; **Zans, 1951, p. 5**; **Burke and Robinson, 1963, p. 238**; **Greiner, 1965, p. 10**; **Meyerhoff and Krieg, 1977a, p. 71**; **Eva and McFarlane, 1985, p. 211**; **Mann and Burke, 1990, p. 416**; **Ramsook and Robinson, 2009, p. 21**; Halberstadt Volcanics: **Trechmann, 1942, p. 161**; **Matley, 1951, p. 32**; **Butterlin, 1956, p. 79**; **Burke and Robinson, 1963, p. 238**; **Roobol, 1972, p. 104**; **Smith and Jackson, 1974, p. 873**; **Meyerhoff and Krieg, 1977a, p. 71**; **Jackson and Smith, 1978, p. 215**; **Wescott and Ethridge, 1983, p. 236**; **Mann and Burke, 1990, p. 420**; **Hastie et al., 2010a, p. 496**; **Hastie et al., 2010b, p. 346**; **Hastie et al., 2011, p. 5053**; **Abbott et al., 2013, p. 15**).

The name Halberstadt Volcanics has now been linked to a distinctive suite of high-Nb basalts (Nb > 20 ppm) with high U/Pb ratios that were derived from isotopically different spinel peridotite mantle source regions, which both require garnet and amphibole as metasomatic residual phases (**Hastie et al., 2011**). These rocks have therefore entered into the literature as a distinctive suite of volcanic rocks and this must be considered when deciding whether to accept Halberstadt Limestone or Halberstadt Volcanics.

Options: 1. Accept Halberstadt Limestone as valid because of date preference
2. Accept Halberstadt Volcanics as valid because of its use in literature

Decision. The Jamaican Stratigraphic Committee voted unanimously (21 votes) to accept the name Halberstadt Volcanics/Volcanic Formation as valid because of its use in international literature (**Hastie et al., 2010a, 2010b, 2011**). The Committee

recommended renaming the Halberstadt Limestone as the Good Hope Limestone, but this would require further work and analysis. It was recommended that the term Halberstadt Volcanics or Halberstadt Volcanic Formation should be used and not Halberstadt Formation which might lead to confusion with the former name Halberstadt Limestone.

Case 3.8. Maroon Town Formation

Background. The name Maroon Town Formation was introduced by **Atkinson (1969, p. 91)** for a sequence of mudstones overlying a persistent unit of conglomerate, both of which he placed within the Cretaceous succession. **Meyerhoff and Kreig (1977a, p. 47)** also introduced a Maroon Town Formation based on an unpublished B.Sc. geology thesis from the University of the West Indies (Mona) by R. G. Boxill (written in 1967). Subsequently, the name Maroon Town Formation was proposed by **Gunter and Mitchell (2005, p. 9)** for a series of conglomerates of Eocene age next to the Maldon Inlier. The name Maroon Town Formation of **Atkinson (1969)** has date preference. The conglomerates and mudstones represent a unit within the Eocene and even on **Atkinson’s (1969)** map clearly rest unconformably upon the Cretaceous succession. There is a close correspondence of the Maroon Town Formation of **Gunter and Mitchell (2005)** with that of **Atkinson (1969)**, although **Atkinson (1969)** considered his unit to be of Cretaceous age. These units are also equivalent to the type locality of the Popkin Formation (as noted above).

Decision. The Jamaican Stratigraphic Committee did not vote on this Case. Clearly more work is needed to understand the geology of this area which is within and on the edge of the Maldon Inlier.

Case 3.9. Mount Hibernia Marble and Mount Hibernia Schist

Background. The name Mount Hibernia marble was introduced by **Zans and Bailey (1961, p. 10)** for marbles in the Mount Hibernia area. Subsequently, **Wright (1974, p. 16)** introduced the name Mt. Hibernia Schist Group for the schists in the same area. The name Mount Hibernia Schist or Mt Hibernia Schist has been widely used (e.g., **Draper et al., 1976, p. 1284**; **Krijnen and Lee Chin, 1977b, p. 91**; **Green, 1977, p. 5**; **Wadge et al., 1982, p. 322**; **Draper, 1986, p. 51**; **Abbott et al., 1999, p. 837**; **Abbott et al., 2003, p. 3**; **West et al., 2014, p. 600, 602**). The Mount Hibernia Schist is therefore extremely well entrenched in the literature.

- Options:** 1. Retain Mt Hibernia Schist
2. Retain Mt Hibernia Marble

Decision. The Jamaican Stratigraphic Committee voted unanimously (21 votes) to retain the name Mt Hibernia Schists and reject the name Mt Hibernia Marble. A discussion also ensued and it was suggested that the name Mt Hibernia Marble might

be retained in an informal sense for a building stone (but it would have no formal lithostratigraphic standing).

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