Chapter 1
Introduction
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INTRODUCTION

The Earth is a unique, complex and dynamic planet that has changed continuously since its origin some 4.6 billion years ago. It is characterized by a crust enveloping the interior (mantle) of the planet with a sharp break (Mohorovicic discontinuity) in between (Condie, 1989; Monroe and Wicander, 2008). It is not yet precisely known that when the continental crust began to form. The first 50-100 Ma of Earth’s history is characterized by extensive melting in the outer part of the mantle. The process of crustal growth incorporated the interaction of early crust with the mantle and redistribution of the crustal constituents by sedimentary and tectonic processes involving several evolutionary mechanisms (Condie, 1981, 1989). There is a general agreement that bulk of the continental crust developed during 2.7-3.0 Ga (Naqvi and Rogers, 1987; Taylor, 1987; Condie, 1981, 1989; Chakrabarti et al., 2006).

The Precambrian period comprises of Archaean and Proterozoic Eons. The Archaean Eon lasted from 4.0 Ga to 2.5 Ga, about a third of geological time (Condie, 1994; Windley, 1995; Ahmad and Jayananda, 2008). Much of the growth of continental crust probably occurred at this time (Choukroune et al., 1997). Archaean was the period when the earliest crust segregated from the mantle, when the earliest cratons and terrains amalgamated by accretionary processes, and when the earliest orogens, continents and even supercontinents evolved. It is imperative to understand how the earth’s crust evolved through this critical period of time, because the subsequent development of the continents was strongly influenced by the nature of that pre-2.5 Ga evolution (Rogers, 1996). Proterozoic period, on the other hand, represent about half of the entire earth’s evolutionary history. The period of the Proterozoic ranges from 2500 to 550 Ma. In contrast to Archaean, Proterozoic crust displays marked diversity in its composition (Pharaoh et al., 1987). Moreover, this era (Proterozoic) facilitated
the development of stable cratons similar to the modern lithospheric plates (Windley, 1982).

Cratons and mobile belts are major characters of Precambrian crust (Anhaeusser et al., 1969). The cratons are flanked by a fold belt, with or without a discernible suture or shear zone, suggesting that the cratons, as crustal blocks or microplates, moved against each other and collided to generate these fold belts (Naqvi, 2005). Such fold belts are known as mobile belts (Younger linear metamorphic belts) which tend to surround the cratonic nuclei and which are characterized by high grade metamorphism, granitisation and often by transcurrent dislocation (Anhaeusser et al., 1969).

These terrains, constituting the continental crust, attained tectonic stability for prolonged period (since Precambrian time) and are designated as cratons (Naqvi, 2005). The cratons are mostly Archaean in age and are generally composed of low-grade greenstones and related metasediments (greenschist – amphibolite facies) with voluminous granitoids belonging to the tonalite-trondhjemite-granodiorite (TTG) suites. Many granite-greenstone terrains of major cratonic blocks show evidence of stratigraphic cyclicity (Chakrabarti et al., 2006). Precambrian cratons are widespread all over the world. Such terrains are known from Greenland (McLennan and Taylor, 1982), India (Radhakrishna, 1983; Naqvi and Rogers, 1987), Montana - Wyoming (Gibbs, 1986), Western gneiss terrain, Australia and Limpopo Belt, South Africa (Taylor et al., 1968). Extensive research has been carried out on these terrains during the last two decades, which has improved our understanding of these cratonic areas.

There are six cratons in the Indian shield with Mid- to Late- Archaean cores or nucleus. These cratons are: the Dharwar or Karnataka craton, Bastar (also called Bhandara) craton, Singhbhum (-Orissa) craton, Chhotanagpur Gneiss Complex (which is arguably a mobile belts for some workers), Rajasthan craton (Bundelkhand massif included), and Meghalaya craton (Sharma, 2009).
Figure 1.1. Outline map of India showing different cratons and mobile belts of the Indian Shield. CGGC=Chotanagpur Granite Gneiss Complex, GNE=Gneissic Complex of NE India, SN=Singhbhum. (Modified after Longjam K.C. and Ahmad T., 2011, and Acharya S.K., 2003).
1.1. Previous Works

Shillong Plateau is the only Precambrian cratonic block in northeastern India. The investigation of Shillong Plateau had been started from the beginning of 19th Century. Oldham (1858) and Medlicott (1869), two pioneering workers of the Geological Survey of India, set the milestone in geology of Shillong Plateau. Oldham (1858) discovered two types of metamorphic rocks in the plateau – one is older and more altered, represented by alternating bands of gneisses, quartzites and schists, greatly contorted and traversed in every direction by veins of finely crystalline granites and the other is less metamorphosed blue and flaky schist with micaceous quartzose layers.

Medlicott (1869) suggested that the rocks of the Shillong plateau can be classified under three divisions. They are the Shillong series, the epidiorite and the granites. He later revealed that the Shillong series consists of a considerable thickness of early rocks (Medlicott, 1871). The Shillong Series was intruded by epidiorites in the form of sills and dykes. The epidiorites are partially metamorphosed, green colored rocks, which he named as “Khasi green stone”. Regarding the “Mylliem granite” he was of the opinion that these granite masses were truly intrusive rocks and were younger in age than the Khasi green stone.

Dasgupta (1934) reported the presence of quartzite xenoliths in the Mylliem granite, cross cutting relationship with the quartzites and intrusive contacts effect on the older rocks like quartzites and Khasi greenstone. Dasgupta (1934) inferred that the granite intruded the Shillong series and was of a much later age.

Pascoe (1950) considered that the whole Shillong Plateau is a discontinued portion of the Indian Peninsula. In this plateau, highly faulted and steeply dipping Precambrian rocks like gneisses, schists, granites and porphyritic granites are found to occur as dominant rock components.

Ghosh (1952) observed that the boundary between Shillong series and granite gneiss is fairly sharp and well defined. Around Mairang he described the
Shillong series as consisting of quartzites, quartz-biotite-schists, quartz sericite schists, phyllites and slates, all of which have the same general strike with south-easterly and southerly dips.

Krishnan (1968) attempted to give a stratigraphy of Precambrian rocks of Shillong Plateau. In his stratigraphy, he considered the granulites, calc-gneiss, etc. as the basement rocks over which the Shillong Series laid down and was later intruded by Khasi greenstones followed by the Mylliem granite.

Murthy et al. (1969) revealed that the Dauki fault is actually a system of E-W trending faults. They mapped three major E-W trending faults between Jadukata river and Therriaghat and named as Dauki fault-I, Dauki fault-II and Dauki fault-III.

Crawford (1969) first suggested the probable age of $765 \pm 10$ Ma (Neoproterozoic) for the Mylliem granite of East Khasi Hills district which is an intrusive into the Shillong Group of rocks in the Plateau.

Choudhury and Rao (1975) grouped the different Precambrian rocks of the region into several stratigraphic units. He recognized at least two periods of sedimentation in the Precambrian succession of the plateau represented successively by (1) the highly metamorphosed rock of the Older Metamorphic Group and (2) the younger metasediments of the Shillong group which, having suffered only mild metamorphism, still retain some of their sedimentary features.

Mazumdar (1976) attempted to establish a regional stratigraphy of Shillong Plateau. He renamed the Shillong Series to Shillong Group and showed that it overlies the basement rocks with a profound unconformity manifested by a conglomerate at the base.

Rehman (1985) stated that both grey and pink Mylliem granites are composed of potash feldspar with subordinate oligoclase and quartz. He suggested that the crystallization of these granites from magma approximately took place between $650^\circ$ to $750^\circ$ C.
Nandy (1986) suggested that the Mikir Hills are separated from the Meghalaya plateau by the alluvium tract of the Kopili River and the NE-SW Kopili fault.

Mazumdar (1986) differentiated the basement rocks into gne issose, augen-gneiss, migmatite and granitoid members. He studied the space-time relationship between the non-porphyritic migmatitic granitoids and the prophyritic granitoids. He pointed out that Gneissic complex represents a group of rocks subjected to repeated deformation and metamorphism before the deposition of the Shillong group. He also stated that porphyritic granites are post tectonic, having post dated to the weak regional metamorphism of the Shillong group.

Ghosh et al. (1991) stated that Kyrdem, Nongpoh and South Khasi plutons were late to post tectonic and dominantly porphyritic granite plutons. They gave geochronological age of different granite plutons of Shillong plateau. According to them the age of granites of Mylliem, Kyrdem, Nongpoh and South Khasi Plutons are 607±13, 479±26, 550±15, and 690±19 Ma respectively. They suggested that a protracted thermal event during early Late Proterozoic (500-700 Ma), possibly related to mantle upwelling, which might have triggered the generation of these granitoids.

Bilham and England (2001) considered the Shillong plateau to be a popped up structure due to vertical upward movement along two reverse faults, namely the concealed Oldham fault in the north, dipping towards SSW and the exposed Dauki fault in the south, dipping towards N.

Ghosh et al. (2005) discussed that the isotopic age for the granite plutons of Shillong Plateau are similar to the granite plutons of Kerala and Tamilnadu. Granites of both the regions are devoid of mineralization. Tensional stress and thermal upheaval associated with break-up and reassembly of the Gondwana supercontinent could have caused melting in the lithosphere. The coeval of major granulite metamorphism in the southern Granulite Belt, widespread igneous, thermal and metamorphic activity in the Kerala Khondalite Belt, thermal
metamorphism in the Eastern Ghats and broadly similar granitic activity in Meghalaya, Kerala and Tamilnadu appear to be the manifestation of the collisional-extensional episode of the Gondwana supercontinent.

Kumar et al. (2005) found out from field studies that the magmatic interaction between Khasi Hill granitoids and basic magma give rise to microgranular enclaves. The microgranular enclaves are best recorded between Mawthaphdah and Jashiar villages and have sharp to crenulated contact with the granitic magma. The size of the enclaves varies from 3 to 30 cm across, with varying shapes from subrounded, ovoid to ellipsoidal. In these hybrid rocks, the large crystals of K-feldpars, mafic and felsic xenocrysts were in disequilibrium. Because of the changing composition of the hybrid magma these xenocrysts got corroded along the margin.

Chatterjee et al. (2007) dated monazite from high-grade metapelites of the craton. Their study provides well-constrained age of 1596 ± 15 Ma for the Garo-Golapar Hills. The EPMA monazite age in the Sonapahar high grade area is about 500 ± 14 Ma which nearly coincides with 408 Ma Rb-Sr dates of the porphyritic granite that intruded the Meghalaya gneissic complex. These dates correspond to Pan-African event which is widely documented in the southern granulite terrain (SGT) and in the Himalayas, besides other places of the Indian shield. It is also discussed that in Shillong Meghalaya Gneissic Complex at Sonapahar exhibits a multi-staged metamorphic history, of which the last two stages are similar and coeval with the two stage metamorphism of Pinjara orogenic belt. As the granite plutons are expansive east and south of Sonapahar (Ghosh et al., 2005), the thermal effect of Neoproterozoic emplacement is expected to be prominent towards the east. Thus it is suggested that the Pan African suture passing through Prydz Bay in Antarctica possibly continued northward into India through the Shillong Meghalaya Gneissic Complex with the western margin of the suture between the Sonapahar and the Garo-Goalpara Hills region.
Hussain and Ahmad (2009) discussed and stated that geochemically the Neoproterozoic Mikir Hill Massif granitoids (881 - 479 Ma) are peraluminous and show high-K calc-alkaline and I-type characteristics. They have fractionated LILE/HFSE and LREE/HREE patterns and plot within the volcanic arc granite (VAG) field in the Rb vs. Y+Nb diagram and common syn-collision granite (Syn-COLG) and VAG field in the Nb vs. Y tectonic discrimination diagrams. The geochemical signatures, the age of the granitoids and the position of Shillong plateau at the leading margin of India during Neoproterozoic point to the generation of the melts for the granitoids by partial melting of metasomatised mantle and/or overlying crust and subsequent mingling of both the magma and their emplacement in a convergent tectonic setting during re-assembling of the continents in Gondwana, subsequent to disintegration and dispersal of Rodinia.

Based on combined structural and geochronological work, Yin et al. (2010) deciphered three episodes of igneous activity at ca. 1600 Ma, ca. 1100 Ma, and ca. 500 Ma, respectively in Shillong Plateau. The 1600 Ma event was related to the collision of two proto-India continental blocks, the 1100 Ma event to collision between India-Antarctica and Australia-SouthTibet during the formation of Rodinia, and the 500 Ma events to the amalgamation of Eastern Gondwana Land. They also documented three ductile-deformation events at ca. 1100 Ma, 520–500 Ma, and during the Cretaceous. The first two events were compressional, induced by assembly of Rodinia and Eastern Gondwana, while the last event was extensional, related to breakup of Gondwana.

1.2. Precambrian Granite Magmatism

Evidences from zircon geochronology, recorded the existence of granitic crust, indicate that the genesis of Earth’s continental crust started very early in the history of our planet ca. 4.40 Ga ago (Wilde et al., 2001). The 2.5-2.4 Ga event has been interpreted to indicate rifting of a late Archaean supercontinent (Windley, 1995; Heaman, 1997) although it is not clear how many of the above
mentioned Archaean fragments were attached to each other at this time (Lauri, 2004). Archaean cratons are commonly composed of three main lithologic units (Windley, 1995): (1) a gneissic basement of tonalitic–trondhjemitic–granodioritic (TTG) composition; (2) volcano-sedimentary basins, known as “greenstone belts”; (3) K-rich granites, generated generally late in the geological evolution of the craton. Until a decade ago, it was commonly assumed that all late granites were related to intra-crustal anatexis; compositional differences were attributed to the depth of melting, or to the nature of the source (Sylvester, 1994).

The Archaean juvenile continental crust has been generated in a subduction zone environment. During the Archaean the Earth’s heat production was high enough to allow high degree of melting of subducted slab. Subducted oceanic slab reaches its hydrous solidus temperature before dehydration began and can melt at lower temperature, consequently, all slab melt was consumed by mantle interaction and TTG were generated. However, in course of time geothermal gradient decreased and interaction with mantle wedge increased. At about 2.5 Ga, decrease in geothermal gradients led to the low degree of melting of the subducted slab, geothermal gradient is low and dehydration reactions in subducted basalt occur before hydrous solidus temperature is reached such that the whole amount of slab melt was consumed by mantle metasomatism. Subsequent melting of this metasomatised mantle generated sanukitoid and Closepet-type granites. After Archaean time geothermal gradients became too low to allow slab melting. That was the condition of fluid metasomatised mantle wedge melting and thus generated modern continental crust (Martin and Moyen, 2005).

Martin et al. (2005) also proposed that the products of subduction-related magmatism in the Archaean define a compositional progression from relatively "primitive" tonalite-trondhjemite-granodiorite (TTG) series rocks prior to 3.0 Ga to magmatic systems that produced higher proportions of mafic material with higher transition metal contents towards the end of the Archaean. According to Martin
and Moyen (2005) the sanukitoids and Closepet-type granites are mainly emplaced at the Archaean-Proterozoic boundary, during a period where the mechanisms of genesis of the juvenile continental crust changed from melting of the hydrous slab melt (Archaean) to fusion of the fluid metasomatised mantle wedge (post-Archaean).

The composition of the TTG series varies widely and they probably represent a group of rocks with different origins (Halla et al., 2009). Geochemically TTG series shows high silica, high Na content, and low content of ferromagnesian elements: SiO$_2$ > 64 wt. %, 3 wt. % > Na$_2$O < 7 wt. %, and Fe$_2$O$_3$ + MgO + MnO + TiO$_2$ < 5 wt. % (Martin et al., 2005). TTG series are formed by partial melting of amphibolites or eclogite at high pressure (Martin, 1987; Rapp and Watson, 1995; Foley et al., 2002). There are two groups of thoughts regarding the tectonic process that formed the TTG series. According to Martin (1999); Martin and Moyen (2002); Foley et al., (2002) the source of TTG magmas was a subducting basaltic slab whereas Rapp et al., (2003) and Condie (2005), consider over thickened eclogitic crust to be the source of TTG. Second group of thought considered subduction as not the essential requirement for the formation of TTG.

Biotite-bearing granites probably represent the second most abundant family. Most of the "Late Archaean, K-rich plutons" belong to this type (Sylvester, 1994). They are biotite- (and rarely hornblende-) bearing monzo- to syenogranites to granodiorites, with high K/Na ratios (>1), moderately fractionated REE patterns ([Ce/Yb]$_{N}$ < 30) and a significant negative Eu anomaly. In many places, these granites have been demonstrated to be products of partial melting of pre-existing TTG gneisses (Jahn et al., 1988; Collins, 1993; Champion and Sheraton, 1997; Frost et al., 1998; Champion and Smithies, 2003). It is likely that most biotite-dominant granites are formed by remelting of the newly accreted TTG-type rocks.
Compositionally sanukitoid series show high contents of compatible and incompatible elements, at a given SiO$_2$ content (Lobach-Zhuchenko et al., 2005; Halla, 2005). Sanukitoids as diorites to granodiorites have high Mg$\#$ (>70), associated with high Ni and Cr. They are also alkali and LILE-rich ($\text{Na}_2\text{O} + \text{K}_2\text{O} > 3\%$ for SiO$_2 = 50\%$; Ba $> 800$ ppm; Sr $> 800$ ppm). REE patterns are strongly fractionated ([Ce/Yb]$_N = 10–50$) with high LREE contents (Ce$_N > 100$) with no or slightly negative, Eu anomalies (Moyen et al., 2003). The genesis of sanukitoids has been explained by a two stage process. Firstly, fluids and/or melts from a subducting oceanic slab and possibly sediments (Halla, 2005) enriched the mantle wedge peridotite, while Stern and Hanson (1991); Kovalenko et al., (2005); Lobach-Zhuchenko et al., (2008) thought that the enriched (metasomatized) mantle wedge was partially melted by a thermal event after or at the end of subduction.

Closepet Granite represents a distinct Archaean granite-type and is made up of several cogenetic phases (Jayananda et al., 1995). They have rather high K/Na ratios (0.45–0.9), uncommon for such mafic rocks. They are metaluminous (A/CNK = 0.85–1) and have high Mg$\#$ (35–70). In spite of the low silica contents, clinopyroxene-bearing monzonites are REE-rich (Ce$_N = 150–400$, Yb$_N = 5–20$), with fractionated REE patterns ([Ce/Yb]$_N = 10–50$) and no significant Eu anomalies. They are extremely rich in LILE with Ba and Sr up to 2500 and 1500 ppm, respectively, at 50–55% SiO$_2$. Little or no marked negative Nb, Zr, Ti, Y anomalies are observed, and these rocks thus have similar trace element characteristics to Niobium-enriched basalt (Sajona et al., 1996). The Closepet Granite is formed by mixing of various proportions of an anatctic melt with a mantle-derived melt (Jayananda et al., 1995 and Moyen et al., 2001).

The biotite-bearing granites, resulting from TTG anatexis, can be produced in different geodynamic settings. However, the other three types of granitoids (TTG, sanukitoid and Closepet-type) imply more specific settings (Moyen et al., 2003).
Martin (1986) had pointed out few criteria to differentiate Archaean granites and Post-Archaean granites. The Archaean granitic rocks are dominated by TTG, which belong to trondjhemite series with $K_2O/Na_2O$ ratio lower than 0.5 (Condie, 1981 and Martin, 1986). Post-Archaean granitic rocks are granodioritic and granitic in composition with $K_2O/Na_2O$ ratio near 1 and major oxides follow classical calc-alkaline trends (Barker and Arth, 1976). Archaean TTG have low Yb$_N$ content ($0.3 < Yb_N < 8.5$) and strongly fractionated pattern [$5 < (La/Yb)_N < 150$]. Post Archaean granites have high Yb$_N$ content ($4.5 < Yb_N < 20$) and moderately fractionated pattern [$La/Yb)_N <= 20$]. These two groups overlap for Yb$_N$ values ranging from 4.5 to 8.5 (Martin, 1986).

1.3. Palaeo Continental Construction of Shillong Plateau

There is a general agreement that the Earth's continental crust may have been assembled to form the supercontinent Rodinia, in the Late Mesoproterozoic and Early Neoproterozoic (1100 Ma). Rodinia is thought to have been produced by collisional events of broadly Grenvillian (Late Mesoproterozoic) age, and to have been relatively long-lived (1100-750Ma) (McMenamin and McMenamin 1990; Hoffman 1991). Grenvillian orogenesis was probably multistage, as was shown for East Antarctica by Fitzsimons (2000). The breakup (rifting) of Rodinia probably started at c. 820-800 Ma. Kalahari detached from Australia at 760-750 Ma and the Rodinia fragments began the slow journey towards their reassembly in Gondwanaland (Pisarevsky et al., 2003).

The Rodinia supercontinent broke up around 750 Ma and the East Gondwana (India, Australia and Antarctica) separated from West Laurentia (Powell et al., 1993). East Gondwanaland (Australia, India, Madagascar and East Antarctica in their Gondwanaland configuration) has been a single tectonic entity since the end of the Mesoproterozoic. The assumption has been based mainly on the apparent continuity of a Grenville-age metamorphic belt along the India-East Antarctica Margin, and its extension into the Late Mesoproterozoic
Albany Fraser Mobile Belt of Australia, and a supposed absence of Neoproterozoic or younger sutures between the continental blocks (Pisarevsky et al., 2003). In the East Gondwana reconstruction during Late Mesoproterozoic, the CITZ (Central Indian Tectonic Zone) is generally regarded to continue to the Albany-Flaser Mobile Belt of southwestern Australia through the Shillong Block (Harris, 1993). To the southeast, the Eastern Ghats Granulite Belt of Orissa also bears similar characteristics with the CITZ, and several researchers delineate a continuous Grenvillian Belt from the CITZ to both southwestern Australia and the Eastern Ghats Granulite Belt to the Grenvillian Belt proper of North America through the Circum East Antarctic Mobile Belt (Yoshida et al., 1996; Unrug, 1996).

The assembly of the supercontinent Gondwana was not achieved until sometime in the middle to late Cambrian. This was achieved through the gradual closure of a number of ocean basins to form west Gondwana (consisting of Africa and South America) in the Neoproterozoic, followed by Early Cambrian collisions that relate to the formation of east Gondwana (consisting of Australia, Antarctica and India). The Cambrian collisional events between the component cratons of West Gondwana and the deformational events along the East Gondwana palaeo-Pacific margin are broadly referred to as Pan African (Powell et al., 1993; Grunow et al., 1996). Prydz Bay lies within east Gondwana and also forms a part of previously unrecognized Pan-African suture (Fitzsimons, 1997).

Yoshida et al. (2003) opposed the existence of east Gondwana in Neoproterozoic time and suggested that the east Gondwana was formed during Pan African period. The idea of assembly of east Gondwana during the Pan African period is criticized based on existing geochronologic and geologic data mostly from East Antarctica.

Recently it is suggested that the Pan African suture passing through Prydz Bay in Antarctica possibly continued northward into India through the Shillong
Meghalaya Gneissic Complex with the western margin of the suture between the Sonapahar and the Garo-Goalpara Hills region (Chatterjee et al., 2007).

Tensional stress and thermal upheaval associated with break-up and reassembly of the Gondwana supercontinent could have caused melting in the lithosphere. The coeval and broadly similar granitic activity in Meghalaya, Kerala and elsewhere in India appear to be a manifestation of the collisional-extensional episode of the Gondwana supercontinent (Ghosh et al., 2005).

As Shillong Plateau is the leading margin of India during Neo-proterozoic, granitoids of Shillong Plateau were formed in a convergent tectonic setting during re-assembling of the continents in Gondwana subsequent to disintegration and dispersal of Rodinia (Hussain and Ahmad, 2009). The U-Pb ages of 1600 Ma, 1100 Ma, and 500 Ma given by granitoids of Shillong Plateau are also related to collision between India-Antarctica and Australia–SouthTibet during the formation of Rodinia, and the 500 Ma events to the amalgamation of Eastern Gondwana (Yin et al., 2010).

1.4. Objective of the Study

The magmatic history of Meghalaya is very important to decipher as the plateau forms the northeastern margin of India and records evidence of the evolving plate boundary during Mesoproterozoic. The objective of this study is to understand the geochemical nature of the porphyritic granite of Kyllang and Moudoh pluton and the basement gneiss exposed around these two granite plutons based on the detailed field relationships, petrological, geochemical and isotopic studies. This is an attempt to gain new insights into the Precambrian crustal evolution in North Eastern India, as hitherto no reliable ages or even geochemical data from the two plutons and surrounding basement gneiss are available.

The objective also includes comparison of geochemical characteristics of the Kyllang pluton, Moudoh pluton and basement gneiss to determine their
relationships with each other and to understand the petrogenetic evolution with evaluation of tectonic setting of the region in the light of amalgamation of Gondwana Supercontinents.

This study reports new geochemical data comprising major oxides, trace elements and rare earth element data coupled with zircon U-Pb isotopic data. This study thus aims to understand the evolution of the granite plutons of Shillong Plateau, North Eastern India.