Shahid Matangini Hazra Government College for Women

Department of Geology

Field Report

Academic Session 2018-19

Area of field work: Purulia, West Bengal

Duration: 26.12.2018-31.12.2018

No. of participation: 13

A compulsory field tour was conducted for the fulfilment of Skill enhancement course (SEC) paper (3rd Semester under CBCS system),B.Sc (Hons) syllabus of Geology Honours of Vidyasagar University at Purulia district, West Bengal.

Purpose of Field work:

- Learn the use of clinometer compass to measure attitude of various primary and secondary structures present within the rocks.
- Learn the use of toposheet to locate and to search exposure.
- Learn the use of clinometer to take bearing.
- Identify the different kind of rock in field.
- Recognise the deformational features and shear sense indicator at Bero hill.
- Mapping of litho-contacts in 1:200 scale and prepare the geological map of this area.
- Identify the primary and secondary foliation

Field Coordinator:

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Government of West Bengal

Department of Geology

Shahid Matangini Hazra Government College for Women

Purba Medinipur, West Bengal, PIN-721649

SMHGCW/GEOL/2/2019 Date 02.01.19

TO WHOM IT MAY CONCERN

This is to certify that the following students of 1st & 2nd year, Geology Hons. in the academic session of 2018-19 have completed their field work for the partial fulfilment of their curriculum of Vidyasagar University.

SL.No.	Name	Year
1.	Swatilekha Baksi	1st
2.	Shreya Maity	1st
3.	Mili Das	1st
4.	Lipi Bera	1st
5.	Aishi Guin	2nd
6.	Sukanya Bera	2nd
7.	Moumita Rana	2nd
8.	Simika Pramanik	2nd
9.	Jhuma Hazra	2nd
10.	Joyeeta Mondal	2nd
11.	Sudeshna Samanta	2nd
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Aparupa Banerjee 02/01/19

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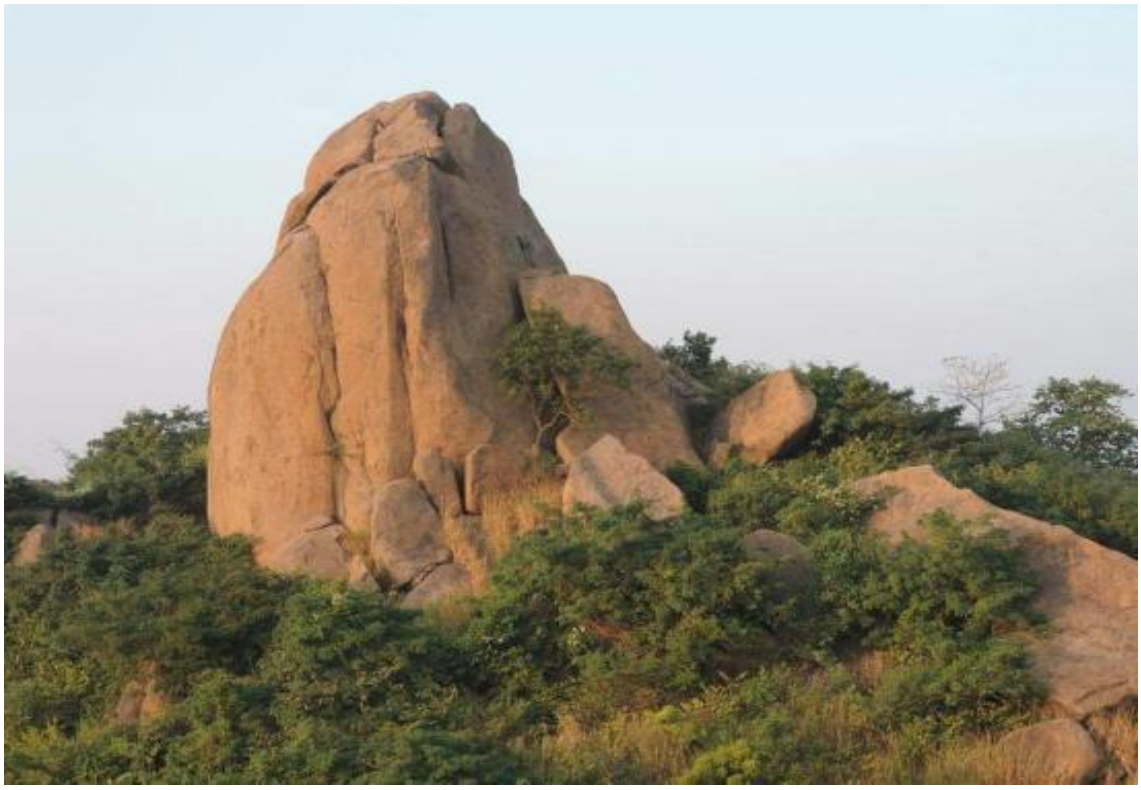
Signature of Coordinators

SHAHID MATANGINI HAZRA GOVT. COLLEGE FOR WOMEN



DEPARTMENT OF GEOLOGY

FIELD REPORT

SUBMITTED BY
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3rd sem,2nd year.

Phone: 03228-262262

GOVERNMENT OF WEST BENGAL

***SHAHID MATANGINI GOVT.* COLLEGE FOR WOMEN**
DEPARTMENT OF GEOLOGY

To Whom It May Concern

This is to certify that Swatilekha Baksi, has completed the field work under my supervision at "***Bero-Saltora Sector of Purulia***" for the fulfilment of B. Sc (Hons.) 3rd Semester in Geology. She is now allowed to submit her field report for final examination under Shahid Matangini Govt. College for women, Vidyasagar University.

Date:
Place: Chakshrikrishnapur

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CONTENTS

CHAPTER 1

INTRODUCTION:

Geological Sciences is extended enough, not to be solely confined inside the classroom. The whole spectrum of this science can be easily understand if field works are mingled up with the class room studies.

We, the students of 3rd semester, had undertaken a fieldwork in and around Raghunathpur-Bero-Santuri sector of Purulia district. It is an excellent region with different Structural features. The field work carried out for 8 days duration from26st December to 3rdJanuary, 2019.

1.1 LOCATION & ACCESSIBILITY:

Raghunathpur is a city and a municipality in Purulia district in the state of West Bengal, India. It is the headquarters of the Raghunathpur subdivision. Industrial City Raghunathpur is located near Adra on the North-East part of Purulia district. It is connected with other cities through five main way road's, which are Purulia – Barakar road, Raghunathpur-Adra-Hura road, Raghunathpur-Chas road, Cheliyama road and Raghunathpur-Bankura road. The nearest main junction station is Adra Junction railway station.

Raghunathpur is located at 23.55°N 86.67°E. It has an average elevation of 155 m (509 ft). The area forms the lowest step of the Chota Nagpur Plateau. The general scenario is undulating land with scattered hills.

1.2 CLIMATE AND VEGITATION:

Longitudinally the area falls under tropical climate zone. In general the climate of the area is arid. The winter temperature goes down to 5^{o}C but in summer the temperature shoots up to 45^{o}C the mean annual rainfall varies from 100 to or120cm.

The area is sparsely forested. The major portion of the lands is under cultivation mainly paddy, Wheat and other steeply foods. Sal,Mahua, Tendu andArjuntrees flourish locally in the hilly areas.

1.3 TOPOGRAPHY&DRAINAGE:

The undulating plain covering the NE of the district is flanked onthe north by the Damodar valley and the Bagodaruplands , on thesouth by the Dalma Range and the east by the rolling and locallydissected , laterite capped plains . It is characterized by high landsalternating with long stretches of low lying areas . Long continuederosion by Kasai, Kumari ,Silai , Darakeswar and their innumerabletributaries is responsible for the formation of this peneplain .Contours are few . General slope except the subamarekha valley isfrom west to east as is evident from the flow of the main rivers likeKasai and Darakeswar . Average elevation is 200 m. Important hills inthis terrain are Panchet hill (643.13 m) , Tilabon (406.90 m) ,Ramchandrapur (357.83 m), Barberia (330.70 m) , Jaichandipahar (318.51m) , Managuria (280.72 m) etc.

1.4 GENERAL GEOLOGY:

Geology of Purulia district plays an important role in determining thephysical properties of soils viz. particle size distribution , structure ,aggregate , stability, tendency to surface crusting and permeability . All
these properties are related to the resistance or susceptibility of the soilto erosion, i.e., soil credibility.

The district is underlain by Pre-Cambrian metamorphic rocks excepting a small area in the north eastern part where sedimentary rocks of the Gondwana age predominate. Unconsolidated sediments of Recent to Subrecent age are restricted in narrow river channels and to the valleys. The rocks of various geological ages ranging from Archeanto Recent found in the district may be grouped into six categories (Map No.-1) .

[Reference : Resource Map'(Geology and MInerals) Purulia, West Bengal GJSJ.,2j0Oll*)*

1. GONDWANA GROUP OF SEDIMENTARIES WITH COAL SEAMS :
   a) Clay with caliche concretions : These rocks are soft and unconsolidated and occur as small patches in Hura and Manbazar blocks.
   b) Red sandstone and Red clay : Very insignificantpatches of these medium hard to soft layered sedimentaryrocks are found mainly in Nituria .
   c) Sandstone, clay and shales : These are found in Nituriaand Santuri blocks.
   d) Coal bearing sandstone and shales : These rocks areconsidered as a part of Ranigunj formation and foundmainly in Nituria and Santuri .
   e) Sandstone and shales: They cover very negligible area ofNituria .

2. INTRUSIVE GRANITES :

Kuilapal (GRk), Manbhum (GRm) and other Granites : These hard massive rocks occur mainly in north Jhalda , Jaipur , Arsa , Purulia , Para , Raghunathpur , Nituria, Balarampur , Barabazar , Manbazar and assmall patches in Bagmundi and Bandoan blocks.

3. DALMA GROUP OR BASIC VOLCANIC ROCKS :

a) Metamorphosed basic volcanic rocks : These hardmassive rocks are found along the southern margin of theBandoan block.
b) Metamorphosed basic rocks : They occur as patchesin Puncha , Manbazar , Balarampur , Barabazar , Bandoanand Santuri .

4. SINGHBHUM GROUP :

a) Phyllite and mica schists : Southern part of Balarampur ,Barabazar and most part of Bandoan block are covered bythese soft flaky rocks.
b) Quartzite : Insignificant patches of quartzite are found inBalarampur and Bandoan .

5. PLUTONIC COMPLEX :

Gabro and anorthosite : Very small patches of these hardmassive rocks are found mainly in Santuri block.

6. CHOTANAGPUR GNEISSIC COMPLEX :

a) Granite gneiss andmigmatite : They cover almost 56percent of the total area of the district and found in allblocks except the Bandoan and the southern part ofBarabazar, Balarampur , Manbazar , north eastern part ofNituria and southern Santuri . These rocks are hard and foliated and can easily be weathered.

b) Quartz and Quartz Scists : These hard layeredrocks occur mainly in extreme north western part ofJhaldal and as small patches in Barabazar and Para.

c) Calcgranulites, calc schist and crystalline limestone :These rocks are found in northern part of Jhalda and assmall patches in Jaipur and Nituria.

d) Mica Schist : These soft and flaky rocks occur in centralpart of Jhalda II , north ofArsa, southern part of Bagmundi,Balarampur , Barabazar and as patches in Jaipur , Purulia II ,Para , Kashipore , santuri ,extreme northwestern part ofRaghunathpur, eastern part of Manbazar.

e) Amphibolite and hornblende Schist : In Jaipur , JhaldaII , Arsa , Bagmundi , Para , Raghunathpur , Santuriamphibolites and hornblende schists occur as insignificantpatches.

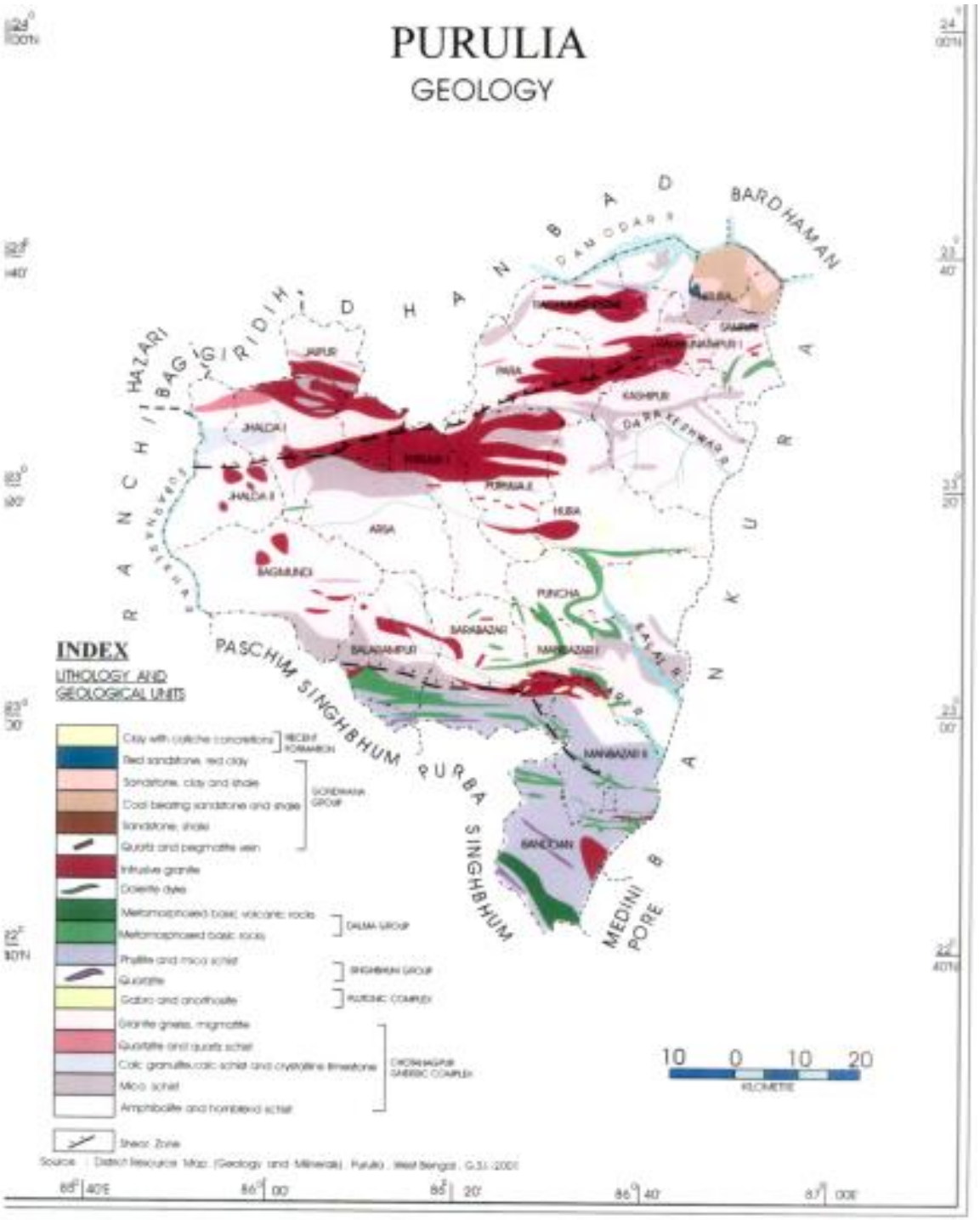
TABLE-2 :The extent of different rock groups of various geological ages :

ROCK GROUP	GEOLOGICAL AGE	AREA IN Sq.Km.	PERCE-NTAGE OF TOTAL AREA	COVERAGE IN DIFFERENT BLOCKS
1. GONDWANA GROUP OF SEDINENTARIES WITH COAL SEAMS .	GONDWANA	125.18	2	Hura ,Manbazar, Nituri and Santuri .
2. INTRUSIVE GRANITES	PROTEROZOIC	1,157.915	18.5	North Jhalda , Jaipur Arsa , Purulia , Para Raghunathpur , Nituria Balarampur , Barabazar Manbazar and as smal patches in Bagmundi an Bandoan blocks .
3. DALMA GROUP OF BASIC VOLCANIC ROCKS	PROTEROZOIC	156.474	2.5	patches in Puncha Manbazar , Balarampur Barabazar , Bandoan an Santuri .
4. SINGHBHUM COMPLEX	PROTEROZOIC	624.0223	9.97	Southern part of Balarampur , Barabazar and most part of Bandoan .
5. PLUTONIC COMPLEX	PROTEROZOIC	8.1367	.13	Small patches in Santuri
6. CHOTANAGPUR GNEISSIC COMPLEX	ARCHEAN	4,187.271	66.9	found in all blocks except the Bandoan
TOTAL		6259.00	100	

Calculated by the author . from the DISTRICT RESOURCE MAP (GEOLOGY AND MINERALS) , PURULIA , WEST BENGAL published by Geological Survey Of India - 2001.

Presence of shear zones in Purulia district :

Two shear zones are observed in the Purulia District. One of them known as South Purulia Shear Zone (SPSZ) exists along the boundary between the Singbhum Group and Gneissic Complex . Another Shear Zone (North Purulia Shear Zone , i.e., NPSZ) has been traced further tothe north between Jhalda and Ragunathpur .These shear zones are susceptible to erosion.



Map no. 1.Geological map of Purulia.

1.5 OBJECTIVE OF STUDY:

- Identification of litho units and litho-boundaries.

- Study of the development of various structural features and their relative ages.
- Study of relasionship between different plner and linear structure.
- Study of primary structures and determination of younging direction.
- Recognition and measurement of the different kinds of structural elements.
- Mapping of litho- units at Bero-Santuri sector of purulia.

CHAPTER 2

LITHOLOGY OF THE AREA

In our field area we can identify different types of rock which are basically belong to Chotonagpur Gneissic Complex.We encountered meta-sedimentary and meta-igneous rocks in our field area in Bero-Santuri and also Saltora sector.

There are basically two types of rocks in our field area,-

A. Older Basement rocks,

B.Younger Intrusive rocks,

- Older Basement Rocks:

1. Granitic Gneiss
2. Felsic Gneiss
3. Augen Gneiss
4. Khondalite
5. Garnetiferrous Granite Gneiss
6. Mica Schist
7. Migmatite

Granitic Gneiss:Granitic Gneiss is a type of metamorphic rock.Its outcrop pattern is like a hill rock.It is mainly composed of alkali feldspar,plagioclase

feldspar,quartz.It consists of two alternate mafic and felsic layers.It contains gneissic foliation.Pegmatite vein develops parallel to the It is found in Bero Hill.

Fig.2.1Granite gneiss.

- Augen Gneiss:It present as a hill rock near Bero.Augen Gneiss is a type of metamorphic rock.It is composed of alkali feldspar,quartz,garnet.It consists of eye shaped feldspar that formed due to stretching deformation.
- Felsic Gneiss:Felsic Gneiss is type of metamorphic rock.It is composed of feldspar, quartz,mica(mainly muscovite).Gneissic foliation develops in this rock.Ridged quartz band can be ssen in this rock formed due to differential erosion.It is found in

Ramchandrapur,Purulia with a domal shaped appearance.

- Mica Schist:It is present as a small isolated outcrop.Mica Schist is type of metamorphic rock.It is composed of mica,quartz,feldspar.Schistos foliation develops in this type rock.It is found in Santuri,Purulia.
- Khondalite:It is a metamorphic rock.Khondalite is composed of niddle shaped Sillimanite,Garnet,Alkali feldspar,Quartz.Sillimanite presents as needle shape and epidote veins also present.Fold axis lineation develops in this rock.Foliation planes develop in this type rock.We found this rock in Santuri,Purulia with the outcrop pattern as hill rock.
- GarnetiFerous Granite Gneiss:It is a metamorphic rock,composed of porphiroblast of Garnet,Feldspar, Quartz.Foliation planes develop in this rock.Peritectic Garnet produced as porphyroblast.Boudins of pegmatite present in it.Dark biotite vein present in this rock.It is found in Santuri as hill rock.
- Migmatite:This type rock is found in Santuri and in Shaltora.It is a quartz under saturated igneous rock.Migmatite is composed of Nepheline, Feldspar.It consists of two band such as,Melanosomal or mafic band which is dark coloured and lucosomal band

which is light coloured.Epidote and Nepheline vein present in this rock.The lucosomal bands are further bend due to shearing.

- Younger Intruded Rocks:

1.Porphiritic Granite

2.Charnokite

3.Nephelene Syenite

4.Pink Granite

5.Granolite

6.Anorthosite

- Porphiritic Granite:Its outcrop pattern is like a hill rock.It is a type of igneous rock.It is mainly composed of alkali feldspar,quartz,biotite.Alkali feldspar present as phenocrysts defining porphyritic texture.It is found in Isharadanga hill.

Fig.2.2 Porphyritic granite.

- Charnokite:Its outcrop pattern is like a hill rock.It is a of metamorphic rock.Charnokite is mainly composed of Orthopyroxene,Clinopyroxene, Plagioclase feldspar.An isolated boudin of Charnokite presents in Granite Gneiss.This rock is found in Bero hill and in Santuri.

Fig.2.3 Boudin of Charnockite within Porphyritic granite.

- Nepheline Syenite:Nepheline Synite is an igneous rock and it is also known as hard alkaline rock.It Present as a dome shaped pattern.It is composed of feldspar,biotite,nepheline.It is formed due to Metasomatism reaction between magma plume and basement rock.Mineral lineation exists in this rock .It is found in Ramchandrapur.
- Pink Granite:The outcrop pattern of the rock is like hill rock.Pink Granite is found in Bero.It is a type of igneous rock.Pink Granite is composed of mainly Alkali Feldspar,Biotite with less Quartz.Foliation planes exist in this rock and it contains two sets of joints.
- Granolite:Granolite is found in shaltora.It is a mafic igneous rock,composed of Feldspar,Orthopyroxene, Clinopyroxene.It never contains Quartz.
- Anorthosite:It is found in Shaltora with the outcrop pattern as domal shape..Anorthosite is an igneous rock.It is Plagioclase Feldspar rich and also contains Garnet and Biotite.In this rock the Plagioclase Feldspar is black coloured beca**use of being Ca rich.**

CHAPTER 3

TOOLS USED FOR STRUCTURAL STUDIES

The tools used for structural studies are clinometer compass, Brunton compass, diagonal scale, stereo net, toposheet of the area to be studied and cellophane sheet.

2.1. Use of clinometers for the determination of planar and linear elements:

Attitudes of linear and planar structures of a rock can be directly measured in the field by an instrument called clinometer compass. It possesses a pivoted magnetic needle with a mark on North point. The peripheral part of the compass is graduated by a circular scale (0-360°). N-S and E-W line of the compass coincide with 0°-180° and 90°-270° angles and the north point of the scale0/360° is marked by a crown. Besides this outer scale which is used to determine the directional alignment of a line or plane, there is also an inner circular scale, which is divided into four quadrants, each is marked from 0°-90°. This scale is used for measuring inclination of a line or plane. A brass pendulum hangs from the centre which will swing freely in a true vertical position of the compass. There is a bridge, movable in a semi-circular manner. This bridge helps to orient the compass as necessary.

Fig 2.1. Clinometer – Compass

For measuring the angle of inclination of a plane (dip), we have to put the clinometer along with its bridge in a vertical position on the inclined planconcerned. In this position, the pendulum also lies vertically. In order to find out the true direction of inclination of the plane, the upper end of the bridge is kept fixed, while the lower end is moved in a circular way on the surface of the plane. At one position, the pendulum of the compass is found to oscillate freely. This indicates the direction of maximum inclination. At this position, dip of the plane will be indicated by the angle between 0-0 line and the pendulum indicator.

To find the trend of a linear structure, the clinometer is kept horizontally and the line is made parallel to N-S line of the outer scale of the clinometer. At this position, clinometer magnetic needle (or magnetic N-S direction) will make some angle with the line. This angle is the trend of the linear element. In order to measure the plunge direction of a line, same procedure should

be followed with a slight alteration. We have to keep the N-S line of the clinometer parallel to the line, with the crown of the outer scale of clinometer pointing towards a particular direction. The angle of this direction with the north point of the magnetic needle would be the required direction.

2.2 Use of toposheet:

The outcrop pattern of different rock units are represented on a base map, which is generally a topographic map. Topographic maps are prepared by surveyors, commonly by ***Plane table survey***. On this map, points denoting different elevations are plotted and lines drawn connecting the points of equal elevations which are called contour lines. There may be a wide choice of contour interval and scale of the map. By observing the pattern of contour lines we can locate river, nalas, hilly tracts, valleys, peaks and all other notable physiographic features of the area. Besides, topographic maps also show location of villages, railway-lines and rail stations, metalled and non-metalled roads, foot tracks, market places, ponds, temples, hospital, post-office and many other features.

2.3. Use of stereo net:

Stereographic projection is an essential tool of structural geology. It is used to represent the orientation of planar and linear structures and find the angular relations between them. In actual practice the plotting of planar and linea

with the help of a **STEREOGRAPHIC NET** or a **WULFF NET**.

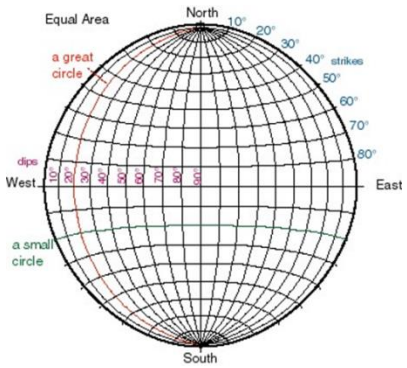


Fig 2.3. Stereo net

Any plane or line with any attitude can be projected on stereographic net. Equal area stereographic net has been used. The periphery of a stereo net is called ***primitive circle***. Two diameters of this primitive circle have been drawn cutting each other at 90° indicating N-S and E-W directions.The North and South directions are specially marked as two poles of a geographic globe.

From East to West, a number of arcs are drawn just like longitudinal lines of geographic globe. These are called ***great circles***. The two diameters through N-S and E-W are also two great circles (like meridian and equator of a globe). There are some smaller arcs centering North and South Pole just like latitudinal lines of the globe. They are called ***small circles***. Each great circle on the stereo net represents the horizontal projection of any plane inclined towards East, West, North or South. The

two diameters are also projections of two vertical planes, while the primitive circle of the net represents the projection of a horizontal plane. The angular measurements on the net are done from the small circles, as each point of intersection of small circle and great circle is situated at a definite angle from the north or South Pole. The dip/plunge is measured from the intersection of small circles and N-S/E-W line (each point representing 2°). On the other hand, intersection points of small circles with the primitive give measurement of directional angle (0°-360°).

2.4. Geological Mapping in toposheet and plain paper:

For any type of geological field work on a toposheet, we have to locate ourselves on the map. For this we have to orient the toposheet according to the N-S direction of the area (that can be found by clinometer compass) with N-S direction of toposheet (given on the map). After orientation of the map, we have to identify at least 2 spots in that area which are also given on the map. With the help of the clinometer, we have to find out our positions with respectto these two points. To determine our position we have to take back bearing value. The intersection points of these two lines would be our position on the map. Then we measure the planar and other structural elements of rocks exposed at that locality and plot them on the topo-sheet.

The 3-D form of the large scale structures can be constructed only if the outcrop pattern of the large scale folds can be obtained by mapping the lithological units or the form surface on a plain paper. For that purpose a suitable scale (1:100) was chosen. The geographical North direction was marked on the map .After that, starting from an initial location, traverses were taken for short distance and new locations are marked on the plain paper. At each location all data related to S_1, S_2, S_3 and F_1, F_2, F_3 were measured. The different structural elements were represented by different notations. Measurements were taken by measuring tape and clinometer compass.

CHAPTER 4

SEVERAL STRUCTURAL FEATURES:

In our field area we can see such structure that are produced due to deformation of rocks.These are the secondary structures and are highly deformed structures.

❖ Planer Structures:

❖ FOLIATION:It can be defined as a general term used for any planar feature that occurs penetratively in a rock body.In our field we see two types of foliation surface:

- SCHISTOSITY:Schistosity is a secondary planar fabric,define by preferred orientation of inequant,elongated minerals in medium to coarse grained rock.It is produced under medium to high grade metamorphic condition.It is commonly seen in Mica Schist.Its trend is $115^{o}/62^{o}$NE.
- GNEISSOSITY:Gneissosity is a secondary planar fabric,define by the alternative mafic & felsic layers in a coarse grained rock.It is produced under high grade

metamorphic condition.It can be documented in Granitic Gneiss.Its trend is $125^{o}/65^{o}$NE,$100^{o}/85^{o}$NE,$110^{O}/81^{O}$NE,$95^{O}/70^{O}$NE.

- AXIAL PLANER FOLIATION : It develops by the intersection of bedding plane and axial surface of a folded foliation . This type of foliation found in Granitic gneiss. It's attitude is $045^{o}/80^{o}$ NW.

- LINEATION:Lineation is a descriptive and non genetic term for any linear feature that may be penetrative or non penetrative in a rock body.In field we see two types of lineation:
  - Mineral Lineation:Mineral lineation is marked by the parallel or sub parallel alignment of elongated mineral grains that occurs penetratively in a rock body.We see this type lineation in Nepheline Synite .Its plunge is $72^{o}/70^{o}$N.

Fig 4.1 Mineral lineation in nepheline syenite.

- Pucker Axis Lineation:Pucker axis lineation rises from parallel axes of small scale folds and is formed due to intersection between axial planar cleavage and bedding.We see this type intersection lineation in Khondalite.Its trend is 85^{o} and pitch is 30^{o}.
- Stretching Lineation:The lineation That is produced due to parallel alignment of such objects that has acquired elongated shaped by the deformation.It can be observed in Granitic Gneiss.

Fig 4.2Stretching lineation in granite gneiss.

- Boudinage:Boudinage is a cylindrical structure,produced due to periodical segmentation in more competent layer enclosed in less competent ones during inhomogeneous stretching deformation of a multilayered sequence.Boudins occurs with length much greater than width and thickness.These are also examples of regularly spread areas of thinning in many extended competent layers without the separation into isolated fragments or boudins.Such structures are called Pinch and swell structure.The process by which they form,is known as necking.

Fig 4.3Migmatitic appearance of mafic rock within granite gneiss.

In our field we see boudins of Charnokite in Granitic Gneiss near Bero Hill and another boudinage structure near Ramchandrapur. Overall attitude of boudinage is 285°/85°NE.

FOLD:Fold is a curved surface whose curvature increases from the initial stage due to deformation.Folds are developed in the country-rock when the region is subjected to severe stress. Charnokite is folded in Granitic gneiss. The fold in Granitic gneiss induced by the effect of shearing.Here we will discuss about Dextral Fold.

- Dextral Fold:It is a 'Z' shaped fold which is also a asymmetric fold.Dextral fold forms due to clock wise rotation of a layers.Its attitude is 085°/70°N.

Fig 4.4 folding present within felsic gneiss.

❖JOINTS:Joints is a type of Extension Fracture with little or no detectable displacement along it representing a hairline crack with almost vertical dip amount.We can see two sets of joints in Porphiritic Granite and Pink Granite.First one's strike is 020° and another's strike is 150°.

❖Evidences of Shearing:

- SHEAR BAND:Shear band is a planar feature that occurs parallel to the shear zone boundary.A shear zone must have a simple shear component.It is characterized by intense grain size reduction.
- Book self Structure:It is a intra granular fracture that looks like book self.this type structure are formed due to brittle deformation of grains in a plastically

deforming matrix.Book self structure is commonly found in alkali feldspar.

- Mylonite:Mylonite is a strongly deformed and well banded rock that is commonly associated with shear zone.Mylonite is characterized by drastic grain size reduction.

Fig 4.5 Evidence of shearing in mylonite.

Fig 4.6 Sense of shearing in granite gneiss.

Fig 4.7 Intense shearing in porphyritic granite.

Acknowledgement

We express our gratitude to the Dept. of Geology, Shahid Matangini Hazra Govt. College for Women for bestowing us the opportunity to undertake the geological field work in and around Bero-Santuri sector in Purulia, West Bengal.

We are indebted Prof. Aparupa Banerjee and Prof.Lovely Barman of our college and Dr.Proloy Ganguly for their valuable guidance, care, and encouragement at every step of the entire course of our field work.

They taught us, cajoled us, scolded us, when we made mistakes, but they always stuck to their guns and never got tired of our endless questions. They taught us to survive through a tough fieldwork and made us realize our own potential and for this, we shall be extremely thankful to them.