173-1069A-17R-1 (Piece 16, 84-88 cm) **No. 159** OBSERVER: GAR, MAN, FRO

ROCK NAME: Meta-arkosic wacke.

GRAIN SIZE: Medium-grained.

TEXTURE: Inequigranular (fine-grained matrix of plagioclase and micas between larger clastic quartz and plagioclase grains).

MINERALOGY:

NAME	MODE (%)	SIZE (mm)	SHAPE	IG/MET/VEIN	COMMENTS
Quartz	30	0.05-0.5	Anhedral	MET/SED	Shows undulatory extinction, twin lamellae and recrystallization.
Plagioclase	40	0.05-0.5	Anhedral	MET/SED	Partly replaced by sericite.
Sericite	10	0.05	Platy	MET	Defines the foliation plane.
Chlorite	10	0.05-0.2	Platy	MET	Defines the foliation plane.
Epidote	<1	0.4	Euhedral	MET	
Opaque Mineral	5	0.5	Granular		Sphene partially to totally replacing ilmenite.

STRUCTURAL COMMENTS: Foliation defined by preferred orientation of grains and aggregates of white mica and chlorite (<0.05 mm). Quartz grains are also slightly elongated parallel to the foliation. Some larger quartz grains, feldspar grains, and rock fragments have pressure shadows parallel to the foliation, filled by fine-grained quartz (0.03-0.05 mm, often grown in optical continuity with the large quartz grain), sericite, and chlorite. Many quartz grains show undulatory extinction, some also have subgrains at their boundaries. Higher-T deformation structures, e.g., polygonal quartz with triple junctions, are only observed in rock fragments and pre-date the sedimentation of the rock.

COMMENTS: Evidence of shearing, chlorite and muscovite occurred in tails around plagioclase and quartz.

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173-1069A-17R-1 (Piece 15, 78-81 cm) **No. 161** OBSERVER: GAR, MAN, FRO

ROCK NAME: Meta-arkosic wacke (weakly foliated).
GRAIN SIZE: Fine-grained.
TEXTURE: Equigranular.

MINERALOGY:

NAME	MODE (%)	SIZE (mm)	SHAPE	IG/MET/VEIN	COMMENTS
Chlorite	20	0.01-0.25	Platy	MET	Elongated in the foliation plane.
Sericite	40	0.01	Platy	MET	Elongated in the foliation plane.
Quartz	15	0.05	Granular	MET/SED	Occurs (i) elongated in the foliation plane and (ii) as vein fill.
Plagioclase	20	0.1	Anhedral	MET/SED	Almost totally replaced by micas.
Pyrite	<<1%	0.2-1	Subhedral		
Biotite	<1	0.3	Subhedral	MET	Crosscuts the foliation.
Opaque mineral	5	0.2	Granular		Sphene (“leucoxene”) after ilmenite.

STRUCTURAL COMMENTS: Sedimentary bedding is marked by slight variations in grain size and composition. A weak foliation, inclined at about 45° to the bedding, is defined by alignment of white mica, chlorite, and elongated quartz grains (<0.1 mm). This foliation wraps around larger grains. It is deflected towards the bedding in layers rich in mica and chlorite (cleavage refraction). A 0.2 mm thick quartz vein is oblique to both bedding and cleavage. Quartz in the vein has undulatory extinction and subgrains.

COMMENTS: Poorly developed foliation. A microfracture filled with quartz and sericite crosscuts the foliation.

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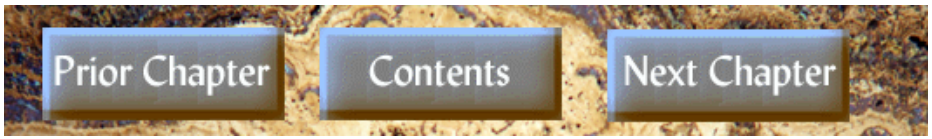
173-1069A-19R-1 (Piece 1, 1-3 cm) **No. 160** OBSERVER: GAR, MAN, FRO

ROCK NAME: Meta-siltstone.
GRAIN SIZE: Fine-grained.
TEXTURE: Equigranular.

MINERALOGY:

NAME	MODE (%)	SIZE (mm)	SHAPE	IG/MET/VEIN	COMMENTS
Chlorite	40	0.01-0.25	Platy	MET	Elongated in the foliation plane.
Sericite	40	0.01	Platy	MET	Elongated in the foliation plane.
Quartz	10	0.05	Granular	MET	Elongated in the foliation plane.
Plagioclase	5	0.01	Anhedral	MET	Almost totally replaced by micas.
Pyrite	<<1%	1	Subhedral		
Opaque mineral	5		Granular	MET	Ilmenite with some replacement by leucoxene.

STRUCTURAL COMMENTS: Foliation (slaty cleavage) defined by preferred orientation of grains (<0.05 mm) and aggregates of white mica and chlorite, and by elongated quartz grains. A second planar fabric (probably bedding) is at 45° to the foliation and is marked by orientation of some of the elongate opaque grains and by a thin layer of more quartz-rich composition . Larger grains have pressure shadows parallel to the foliation. Stylolites, outlined by opaque material, occur oblique to the foliation.



173-1069A-20R-10(Piece 2, 5-10 cm) **No. 171** OBSERVER:GAR, MAN, FRO

ROCK NAME: Dolomitic meta-arkosic wacke.
GRAIN SIZE: Fine-grained.
TEXTURE: Equigranular.

MINERALOGY:

NAME	MODE (%)	SIZE (mm)	SHAPE	IG/MET/VEIN	COMMENTS
Light zone:					
Sericite	40	0.05	Platy	MET	Elongated in the foliation plane.
Chlorite	20	0.05	Platy	MET	Elongated in the foliation plane.
Quartz	30	0.1	Anhedral	MET/SED	Elongated in the foliation plane.
Plagioclase	5	0.1	Anhedral	MET/SED	Partly replaced by sericite.
Muscovite	<1	0.2	Platy	MET	Discordant to the foliation plane.
Biotite	<1	0.3	Platy	MET	Replacing chlorite.
Pyrite	<1	1	Granular		Elongated oblique to foliation and in veins.
Dark zone:					
Sericite	40	0.05	Platy	MET	Not oriented.
Quartz	30	0.1	Granular	MET/SED	Not oriented.
Opaque mineral	20	0.05	Granular		Not oriented.
Muscovite	5	0.3	Platy	SED	Not oriented.
Biotite	<1	0.4	Platy	MET	
Pyrite	5	1	Granular		

STRUCTURAL COMMENTS: Sedimentary bedding defined by slight variations in grain size and composition. Foliation at 55° to the bedding, defined by white micas and large elongate opaque grains (1 to 3 mm). Anastomosing seams of opaque material are parallel to the foliation (relative enrichment by pressure solution). Both the foliation and the bedding are oblique to the boundary between the light zone and the dark, opaque-rich zone. Quartz grains are angular and <0.1 mm.

COMMENTS: Light zone: opaques < 5%, weakly foliated, foliation defined by elongated sericite and chlorite. Dark zone: opaques more abundant (up to 20%), unfoliated. These dark/light zones define bedding. Foliation in the light zone is discordant to bedding. Elongation of pyrite is oblique to bedding and foliation.

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173-1069A- 21R- 1 (Piece 2, 5 - 10 cm) **No. 172** OBSERVER: BEA

ROCK NAME: Meta-arkosic wacke.

GRAIN SIZE: Fine-grained.

TEXTURE: Sedimentary (bedding/lamination, relict pyritized fossils) with metamorphic overprint (foliation). Ilmenite may be porphyroblastic.

NAME	MODE (%)	SIZE (mm)	SHAPE	IG/MET/VEIN	COMMENTS
Quartz	60%	<.05-.1 mm	Clastic	SED/MET	May be partially recrystallized.
Plagioclase	10%	<.05-.1 mm	Clastic	SED/MET	
Muscovite/sericite	20%	<.05-.4 mm	Platy/sheaflike	SED/MET	Large grains may be detrital. Abundant fine-grained material probably sericite.
Chlorite	<5%	<.05-.3 mm	Platy	MET	Mostly occurs as a replacement of large (detrital?) muscovite.
Ilmenite	<5%	0.3- 1 mm	Tabular, subhedral	MET?/SED	May be porphyroblastic, now largely replaced by “leucoxene”.
Pyrite	<5%	up to 1 mm	Anhedral	???	Occurs as very fine grained material in veins or stringers. Large, hollow aggregates appear, in part, to be replacements of fossils.
Tourmaline	<1%	<1 mm	Euhedral/broken	DETRITAL	
Chalcopyrite	<1%	<.05 mm	Anhedral	MET?	Intergrown with pyrite.

STRUCTURAL COMMENTS: Sedimentary bedding outlined by variations in composition. Some large (up to 0.4 mm) detrital muscovite grains (partly replaced by chlorite and commonly kinked) and some of the large opaque grains are aligned parallel to the bedding. Foliation (slatey cleavage) at an apparent angle of 60° to 70° to the bedding, defined by preferred orientation of small mica and chlorite grains, anastomosing seams of fine-grained opaque material and alignment of a large part of the elongate opaque grains. Undulatory extinction in quartz.

COMMENTS: N.B. Thanks to Gus Gustafson for pointing out the fossils.

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173-1069A-23R-1 (Piece 1, 1-3 cm) **No. 173** OBSERVER: GAR, MAN, FRO

ROCK NAME: Dolomitic meta-siltstone.
GRAIN SIZE: Fined-grained.
TEXTURE: Equigranular.

MINERALOGY:

NAME	MODE (%)	SIZE (mm)	SHAPE	IG/MET/VEIN	COMMENTS
Chlorite	30	0.05-0.2	Platy	MET	Non oriented.
Plagioclase	40	0.04	Anhedral		
Quartz	15	0.04	Anhedral		
Sericite	5	0.05	Platy	MET	Non oriented.
Pyrite	<<1		Granular		
Dolomite	5	0.2	Subhedral		Poikilitic.
Opaque mineral	5	0.4			Ilmenite partly or wholly replaced by leucoxene.

STRUCTURAL COMMENTS: Sedimentary bedding defined by slight variations in composition. Bedding outlines an open fold. Axial-planar foliation is at a high angle to bedding. Foliation is defined by white micas and chlorite (<0.1 mm). Elongate dolomite grains are aligned in part parallel to the foliation and in part parallel to the bedding. Quartz grains are angular and exhibit undulatory extinction.

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