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1965/230

PETROGRAPHIC NOTES ON PERMIAN SANDSTONE OF THE SPRINGSURE 1:250,000 SHEET AREA, QUEENSLAND.

by

L.V. Bastian

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SUMMARY

Thin sections of specimens from the Staircase, Aldebaran, Catherine and Colinlea Sandstones of the Springsure 1:250,000 Sheet area, were examined. Each unit has fairly distinct characteristics useful for correlation. The absence of feldspars distinguishes the Aldebaran Sandstone and most of the Colinlea Sandstone, the Catherine Sandstone is generally feldspathic, and the Staircase has intermediate composition. Most of the Colinlea Sandstone is correlated with the Aldebaran Sandstone, but part may be a correlate of the Catherine Sandstone.

Sandstones on Reid's Dome, at present referred to collectively as the Aldebaran Sandstone, are here correlated with the Staircase and Aldebaran, separated by a thin coarse-grained facies of the Sirius Formation. Widespread erosion of the Sirius Formation is believed to have occurred in the Reid's Dome area before deposition of the Aldebaran Sandstone.

Two main source areas are postulated; one probably the Retreat Granite and the other the Anakie Metamorphics and adjacent sediments which supplied sands deficient in feldspar. A third source, probably to the south or south-west, comprising the Timbury Hills Formation and various metamorphics, may also have contributed.

INTRODUCTION

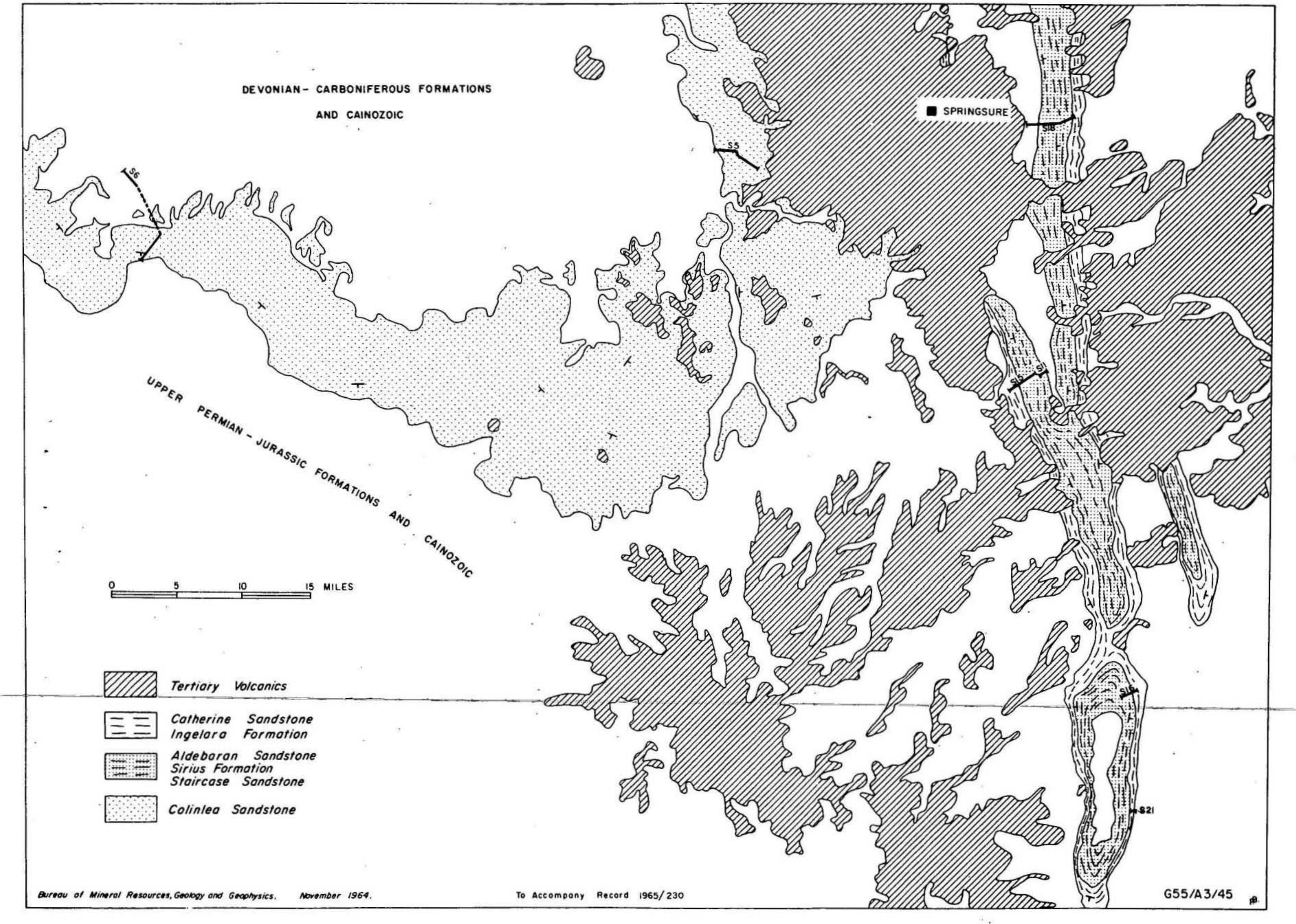
This report presents results of a petrographic study of specimens from the Staircase Sandstone, Aldebaran Sandstone, Catherine Sandstone and Colinlea Sandstone, on the Springsure 1:250,000 Sheet area. The specimens were collected during 1963 by members of a joint Bureau of Mineral Resources and Geological Survey of Queensland field party, and by the author and Dr. A. Fehr of the Institut Francais du Petrole.

Altogether 112 thin sections have been described, including 26 thin sections of pebbles collected from conglomerates in these units. Comments on probable provenance and depositional environments are offered, and lithological correlations have been proposed. The Staircase, Aldebaran and Catherine Sandstones are Lower Permian units in the Denison Trough; they are here described in ascending order of deposition. The Lower Permian Colinlea Sandstone, on the Springsure Shelf is described last. In each case, two suites of samples collected from measured sections at widely separated localities have been described to illustrate lateral lithological

FIGURE 1.

SPRINGSURE 1:250,000 Sheet Area

Generalized geological map showing location of sections



Bureau of Mineral Resources, Geology and Geophysics. November 1964.

To Accompany Record 1965/230

G55/A3/45

STAIRCASE SANDSTONE.

Measured Section S11, specimens SP111/1, A to H.

Most of the sandstones in this section are protoquartzites; specimens B, C and E represent greywackes in this sequence. The sandstones are mainly medium to fine-grained, and generally moderately to well sorted; having better sorting near the top. Most grains are subrounded to rounded; a few are subangular. Grain sphericity is generally fairly high.

The quartz content ranges between 55 and 70%, except for E which has about 45%. The rocks also contain about 10% quartz grains with metaquartzitic textures ("quartzite"), which were included with "rock fragments" for the purpose of naming the rocks. The quartz commonly has many fluid inclusions, and some grains show undulose extinction caused by strain. Overgrowths on the quartz are prominent, and pressure solution is present. Microcrystalline siliceous grains ("chert") are plentiful (up to 15% in B and E) but lessen slightly towards the top. These grains closely resemble the groundmass of rhyolite. K-feldspar, mainly microcline, does not exceed 5% in any specimen; plagioclase is rare. Muscovite is minor; most of the micas appear to have been leached and altered to kaolinite. Labile rock fragments are common, especially in E, and are mostly sedimentary rock types such as fine-grained quartz sandstone, siltstone and shale. There are also some fragments of pelitic metamorphic rocks ("schist") and volcanics. Accessory minerals are minor; tourmaline and zircon have been noted.

The matrix is mainly kaolinite, which occurs interstitially as clumps of "books". This kaolinite was formed by hydration and leaching of micas; transitional stages in this process are represented by muscovite flakes which are greatly swollen by hydration (described as "illite") and characterised by a reduced birefringence. In many thin sections an advanced stage of the process was seen, in which the hydrated muscovite flakes have frayed ends and have broken down into aggregates of kaolinite "books" which have spread into adjoining pore spaces.

Pebbles from a conglomerate (D) include quartz porphyry, vitric tuff, and very fine-grained quartzitic sandstone (orthoquartzite), of a type similar to lithic material in the other specimens. In thin section the sandstone is identical with sandstones, referred to the Timbury Hills Formation, forming basement to wells in the Roma area, e.g. A.A.O. Pickanjinnie No. I. (Associated Australian Oilfields, 1964.)

If the very fine-grained sandstone (E) is discounted, then in general quartz increases upwards in the measured section, and the "chert" component decreases. Apart from these trends the succession has quite consistent mineralogy. The prominent quartz overgrowths probably indicate a good primary porosity in the rock.

Measured Section S18, specimens SP139/1, A to D.

In this sequence two of the specimens are protoquartzites, and two (B and C) are subgreywackes. The rocks are fine and medium-grained; C and D being coarser than any of the specimens of section S11. They are fairly well sorted, but generally not as well rounded as the S11 specimens, and sphericity is poorer.

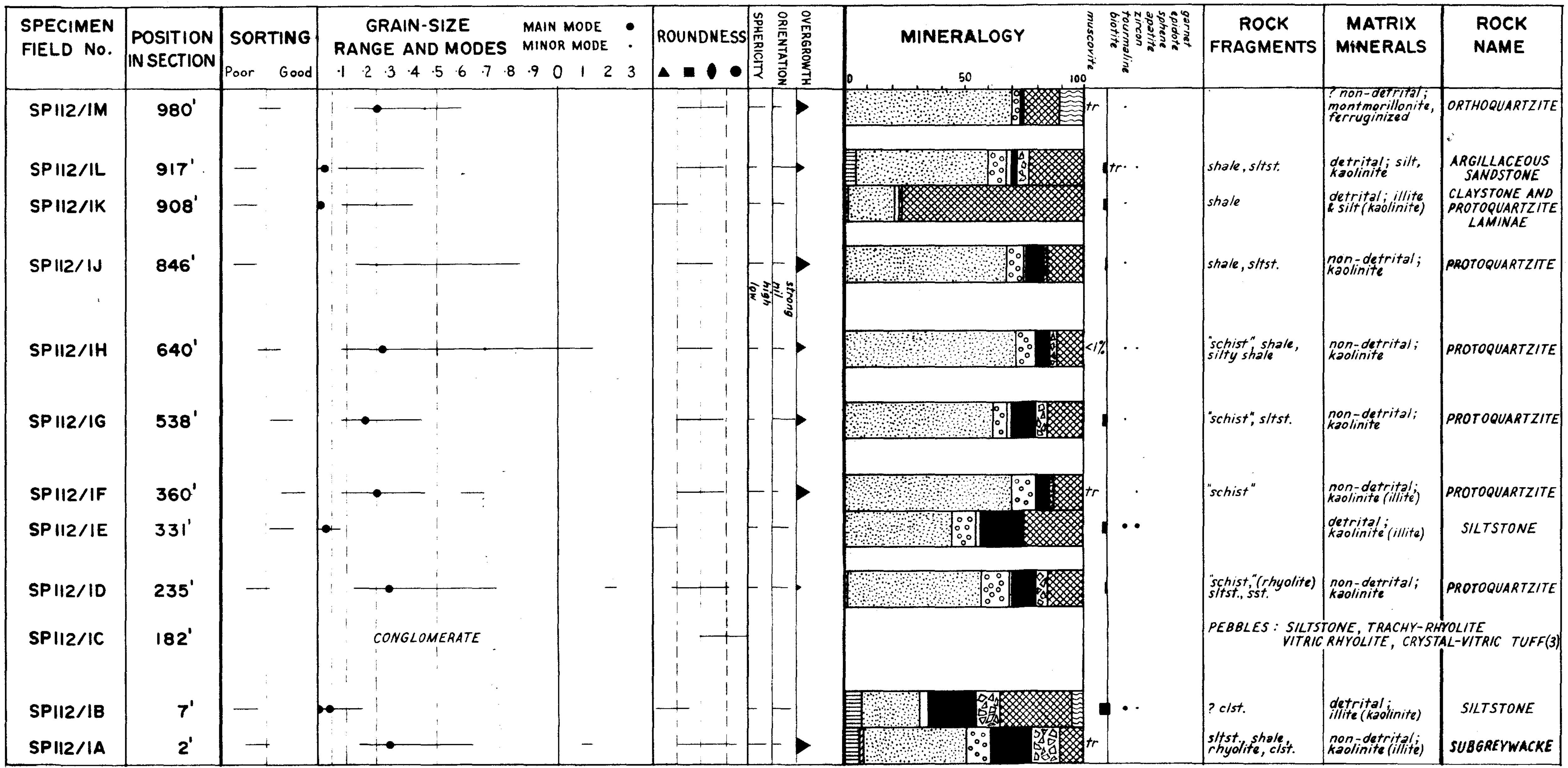
Quartz (50 to 65%) shows moderate to fairly prominent overgrowths, but generally less than in measured section S11. Feldspars occur in specimens A, B and C; K-feldspar is much more common than plagioclase. Specimen C has abundant volcanic rock fragments; these are mainly rhyolites, devitrified to microcrystalline siliceous material, but bentonitic rock fragments are common, and there are minor amounts of micrographic rock fragments. Rhyolite fragments also occur in the other specimens. and are more common than in measured section S11. In other respects the suites are similar. Matrices are composed of the diagenetic kaolinite, with the exception of C, which also has plentiful montmorillonite, partially converted to kaolinite.

Discussion.

The most obvious difference between specimens of measured sections S11 and S18 is the greater amount of acid volcanic detritus in the latter. It is, however, probable that both successions had similar provenance; namely sandstones and siltstones, and, perhaps less important, acid igneous rocks such as granites. The slightly poorer rounding, coarser grain-size, and - with the exception of D - higher content of feldspars in specimens from measured section S18, all suggest that this northerly suite is nearer to the source area. On the other hand, the clasts similar to Timbury Hills Formation lithologies imply a source area to the south. Thus an intermixing of sands from various sources, perhaps one to the south and another to the north, seems most likely. A westerly source is not favoured, because the Joe Joe Formation and a younger unit ("Undifferentiated Lower Permian" of Mollan et al, 1964) were probably exposed at that time, and the clast assemblage in the sandstones of these units does not resemble the clast assemblage in the Staircase Sandstone. The rather anomalous feldspar-free specimen D, may have been derived from a source which did not contribute significantly to beds represented by other specimens from the sequence.

PLATE I

MEASURED SECTION S15 — ALDEBARAN SANDSTONE
ALDEBARAN CREEK (SOUTH BRANCH)



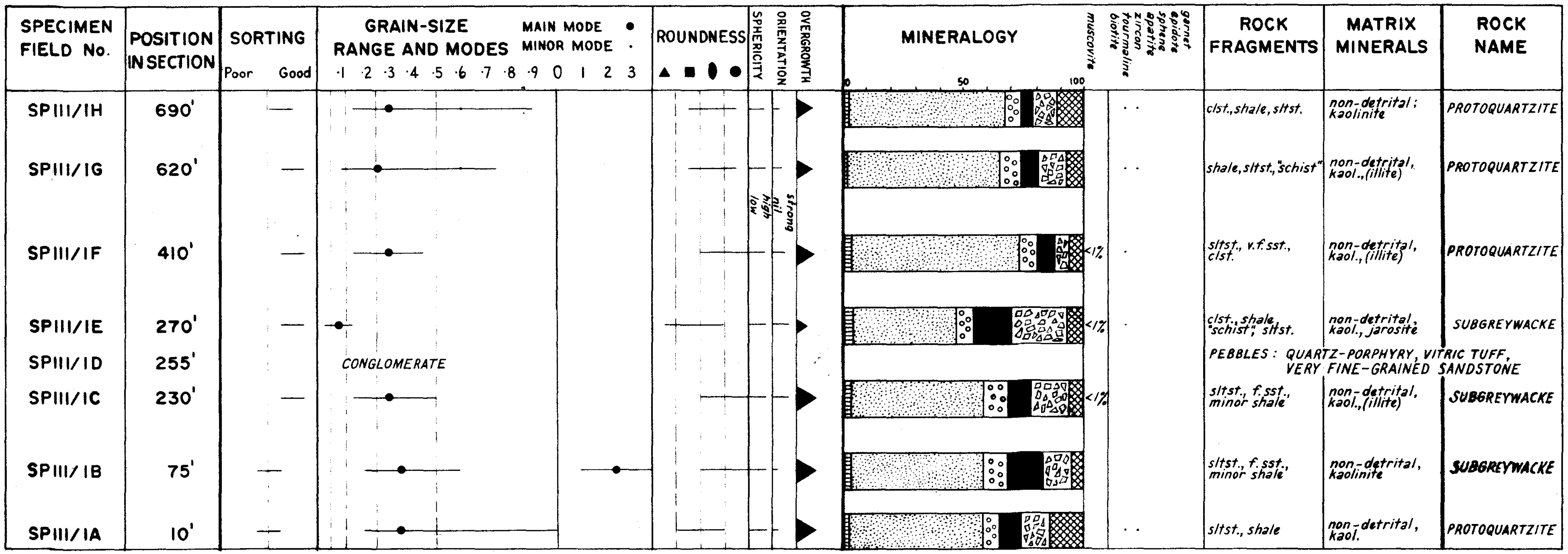
SPECIMEN FIELD No.	POSITION IN SECTION	muscovite	ROCK FRAGMENTS	MATRIX MINERALS	ROCK NAME
SP112/1M	980'	tr		? non-detrital; montmorillonite, ferruginized	ORTHOQUARTZITE
SP112/1L	917'	tr	shale, sltst.	detrital; silt, kaolinite	ARGILLACEOUS SANDSTONE
SP112/1K	908'		shale	detrital; illite & silt (kaolinite)	CLAYSTONE AND PROTOQUARTZITE LAMINAE
SP112/1J	846'		shale, sltst.	non-detrital; kaolinite	PROTOQUARTZITE
SP112/1H	640'	<1%	"schist", shale, silty shale	non-detrital; kaolinite	PROTOQUARTZITE
SP112/1G	538'		"schist", sltst.	non-detrital; kaolinite	PROTOQUARTZITE
SP112/1F	360'	tr	"schist"	non-detrital; kaolinite (illite)	PROTOQUARTZITE
SP112/1E	331'			detrital; kaolinite (illite)	SILTSTONE
SP112/1D	235'		"schist," (rhyolite) sltst., sst.	non-detrital; kaolinite	PROTOQUARTZITE
SP112/1C	182'		PEBBLES: SILTSTONE, TRACHY-RHYOLITE VITRIC RHYOLITE, CRYSTAL-VITRIC TUFF(3)		
SP112/1B	7'		? clst.	detrital; illite (kaolinite)	SILTSTONE
SP112/1A	2'	tr	sltst., shale, rhyolite, clst.	non-detrital; kaolinite (illite)	SUBGREYWACKE

- ● v. common
- • common
- · uncommon

KEY

K. Feldspar	▤
Plagioclase	▨
Quartz	░
Quartzite	⁘
Micas & accessories	☐
Chert	■
Rock fragments	△
Matrix	▩
Cement / alteration	≋

MEASURED SECTION S11 — STAIRCASE SANDSTONE
ALDEBARAN CREEK (SOUTH BRANCH)



SPECIMEN FIELD No.	POSITION IN SECTION	muscovite	ROCK FRAGMENTS	MATRIX MINERALS	ROCK NAME
SP111/1H	690'		clst., shale, sltst.	non-detrital; kaolinite	PROTOQUARTZITE
SP111/1G	620'		shale, sltst., "schist"	non-detrital, kaol., (illite)	PROTOQUARTZITE
SP111/1F	410'	<1%	sltst., v.f. sst., clst.	non-detrital, kaol., (illite)	PROTOQUARTZITE
SP111/1E	270'	<1%	clst., shale, "schist", sltst.	non-detrital, kaol., jarosite	SUBGREYWACKE
SP111/1D	255'		PEBBLES: QUARTZ-PORPHYRY, VITRIC TUFF, VERY FINE-GRAINED SANDSTONE		
SP111/1C	230'	<1%	sltst., f. sst., minor shale	non-detrital, kaol., (illite)	SUBGREYWACKE
SP111/1B	75'		sltst., f. sst., minor shale	non-detrital, kaolinite	SUBGREYWACKE
SP111/1A	10'		sltst., shale	non-detrital, kaol.	PROTOQUARTZITE

- ● v. common
- • Common
- · uncommon

Bureau of Mineral Resources, Geology and Geophysics. August 1965. To accompany Record 1965/230.

G55/A3/47

ALDEBARAN SANDSTONE.

Measured Section S18, specimens SP139/1, E to K.

These sandstones are protoquartzites which are mostly medium-grained, and moderately to poorly sorted at the base with improved sorting upwards (J and K are well sorted). Most have subangular to subrounded grains, but G, being finer, has mostly subangular grains, and F, the coarsest, hast mostly subrounded grains. Sphericity of grains is moderate to high. One specimen (K) has fairly strong dimensional orientation of grains, but the others show generally little orientation.

The quartz content (60 to 70%) tends to increase slightly upwards in the succession; strained quartz is common in some specimens, and some grains have embayments suggesting derivation from volcanic rocks. Overgrowths are generally moderate and pressure solution is slight. The quartzite content ranges between 5 and 10%, and the "chert" content is generally less. The grains of "chert" look like the devitrified groundmass material of rhyolite, but the occasional presence of shards indicates that at least some of the "chert" was derived from devitrified tuffs. Feldspars are absent throughout. The sediments contain only a small amount of micas, but some mica may have been removed by leaching. The few fragments of labile rocks in these sediments include metamorphic rock types ("schist"), and shale and siltstone. G, a fine-grained sandstone, has over 10% of rock fragments, mostly shale. Accessory minerals are generally uncommon, but G has notable tourmaline and zircon; such concentrations of heavy minerals are characteristic of fine-grained sandstones.

Matrices are all of diagenetic origin, the most common mineral being kaolinite. A less common type of clay matrix, seen in J and K of this suite, is composed of curved colloform clay aggregates which line or nearly fill pores. These aggregates are weathering products, and may contain several clay minerals, and disseminated iron oxides which impart an earthy yellow or red-brown colour to the aggregates. This is a common feature of the more weathered sandstones in the area.

Measured Section S15, specimens SP112/1, A to M.

This suite of specimens includes a wider variety of rock types than in measured section S18, mainly because of closer collecting. Specimens B, E, K and L, which represent only subordinate lithologies, have no counterparts in the specimens from measured section S18. The diagram shows an average composition for each of these thin sections. Specimens A, D, F, G, H, J and M represent the main lithologies and can be directly compared with the S18 specimens.

Of the seven specimens representing the main lithologies, five are protoquartzites; A is a subgreywacke and M an orthoquartzite. They are all fine to medium-grained, and in general slightly finer grained than the S18 specimens. Sorting ranges from rather poor to good, and is best near the middle of the unit. Grains are subangular to subrounded; only the siltstone and claystone specimens, E and K, have angular clasts. Sphericity is generally not very high; in specimens G and L there are many elongated grains and dimensional orientation is strong.

In the seven specimens used in comparisons, the quartz content ranges from 60 to 70% and moderate to thick overgrowths are common. D contains nearly 25 percent quartzite + 'chert'. Only in specimen A is there notable feldspar content (about 10%). The siltstone, B, and argillaceous sandstone, L, also have significant amounts of feldspar. Muscovite is present in all specimens, reaching about 2% in many. Rock fragments are mostly shale, siltstone. "Schist" is common, and fragments of volcanic rocks, principally rhyolite, are subordinate. The assemblage of rock fragments is very similar to that in the sandstones in measured section S18. Matrices are dominantly diagenetic kaolinite except in specimen M in which montmorillonite is the main matrix material.

Specimen C which comprises selected pebbles from a conglomerate, includes quartzitic siltstone, trachy-rhyolite, vitric rhyolite, and different types of crystal-vitric tuff. Quartzite and chert, which are the most common pebbles in this conglomerate, were not sampled.

The sandstones of measured section S15, excepting specimen SP112/1A, are very similar to those of measured section S18, twenty miles distant; the fine-grained interbeds have not been closely compared. The anomalously feldspathic sandstone SP112/1A may indicate a provenance for basal sands different from that for the remainder of the sequence. The same implication is seen in the anomalous feldspar content in specimen SP112/1L.

Discussion.

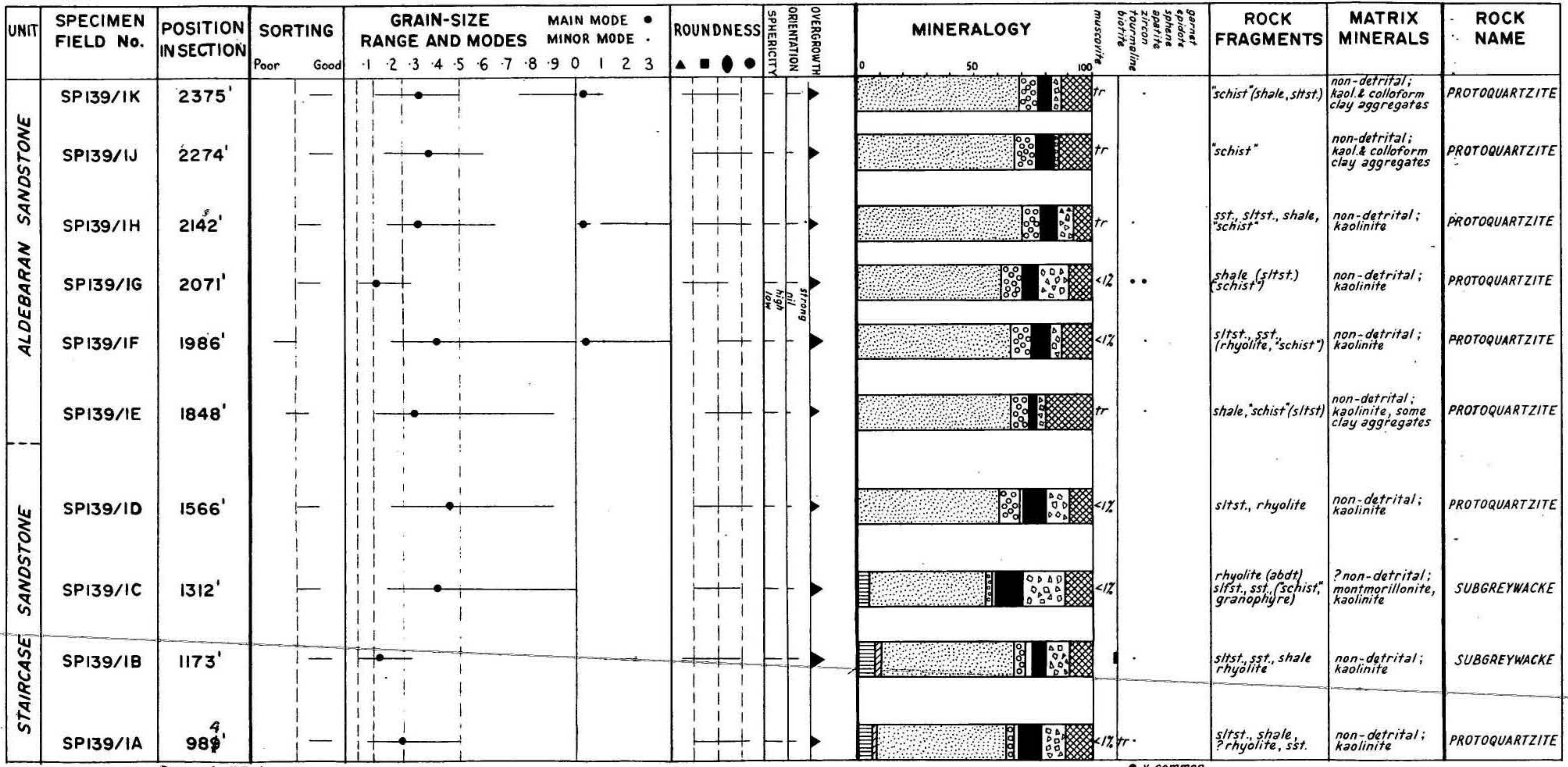
The bulk of the outcropping sandstones are non-feldspathic and no indications of leached feldspar, such as skeletal grains or prism-shaped kaolinite pockets, have been seen in thin sections. These were readily seen in material from other units (e.g. the Peawaddy Formation - Bastian 1965). Thus the lack of feldspar is not considered to be due to weathering. The fact that the few intercalations of feldspathic sandstone contain fresh feldspar, does not point to progressive loss of feldspar from the main sands during transport, but rather that sand was essentially feldspar-poor on leaving the source area.

Thus nearly all of the Aldebaran Sandstone in this area was probably derived from a source poor in feldspar; with a possible exception that a metamorphic source, containing partly metamorphosed feldspar that would disintegrate quickly on exposure, could produce a feldspar-poor detrital

ALDEBARAN AND STAIRCASE SANDSTONES

MEASURED SECTION S18

LITTLE OAKY CREEK



UNIT	SPECIMEN FIELD No.	POSITION IN SECTION	muscovite	biotite	ROCK FRAGMENTS	MATRIX MINERALS	ROCK NAME
ALDEBARAN SANDSTONE	SP139/1K	2375'	tr		"schist" (shale, sltst.)	non-detrital; kaol. & colloform clay aggregates	PROTOQUARTZITE
	SP139/1J	2274'	tr		"schist"	non-detrital; kaol. & colloform clay aggregates	PROTOQUARTZITE
	SP139/1H	2142'	tr		sst., sltst., shale, "schist"	non-detrital; kaolinite	PROTOQUARTZITE
	SP139/1G	2071'	<1%		shale (sltst.) ("schist")	non-detrital; kaolinite	PROTOQUARTZITE
	SP139/1F	1986'	<1%		sltst., sst., (rhyolite, "schist")	non-detrital; kaolinite	PROTOQUARTZITE
	SP139/1E	1848'	tr		shale, "schist" (sltst)	non-detrital; kaolinite, some clay aggregates	PROTOQUARTZITE
STAIRCASE SANDSTONE	SP139/1D	1566'	<1%		sltst., rhyolite	non-detrital; kaolinite	PROTOQUARTZITE
	SP139/1C	1312'	<1%		rhyolite (abdt) slfst., sst., ("schist", granophyre)	? non-detrital; montmorillonite, kaolinite	SUBGREYWACKE
	SP139/1B	1173'			sltst., sst., shale rhyolite	non-detrital; kaolinite	SUBGREYWACKE
	SP139/1A	98~~9~~4'	<1%	tr	sltst., shale, ? rhyolite, sst.	non-detrital; kaolinite	PROTOQUARTZITE

BASE AT 980'

KEY

K. Feldspar	▤
Plagioclase	▨
Quartz	░
Quartzite	○
Micas & accessories	☐
Chert	■
Rock fragments	△
Matrix	▦
Cement/alteration	≋

Bureau of Mineral Resources, Geology and Geophysics. August 1965. To accompany Record 1965/230.

G55/A3/48

assemblage. Lack of biotite in the unit likewise points to a source poor in biotite. Hence the most likely sources for the Aldebaran sands were metamorphic rocks - either feldspar-poor or containing strongly altered feldspars - and feldspar-poor sedimentary rocks. The quartz grains with metaquartzitic textures, the numerous elongated quartz grains, a feature typical of quartz deriving from schists (see Folk, 1964); and the sedimentary and metamorphic rock fragments, all support this contention. The Anakie Metamorphics, which according to Veevers, Randal, Mollan and Paten (1961), is composed of knotted schists, mica schist and quartz-mica schist, with slate and quartzose sediments, is the nearest source for the Aldebaran sands. Thin sections from these metamorphics show they have very little biotite or feldspar; textural features in the "schist" clasts of the Aldebaran sands are like those in the metamorphics.

CATHERINE SANDSTONE.

Measured Section S21, specimens SP129/1, B to J.

Of these sandstones, five are protoquartzites, and three (B, F and H) are subarkoses. The distinction between protoquartzite and subarkose is based on relatively slight variations in the proportions of feldspars to labile rock fragments. All the sediments are very fine-grained to fine-grained; the coarsest (F) having a mode less than 0·25mm. Sorting is generally good, but tends to get poorer upwards; C is very well sorted. Most grains are subangular; a trend towards increasing roundness upwards in the succession was noted. No noteworthy trends in grain sphericity and dimensional orientation were detected.

The quartz content (50 to 65%) tends to increase slightly upwards; fluid inclusions and undulose extinction in the quartz are common. Overgrowths are moderate to thin, and pressure solution is fairly common. The quartzite content is minor. The K-feldspar content ranges from 5% to 10%; plagioclase is rare. Muscovite is present in all specimens, ranging up to about 3 percent, and biotite is present in some. "Chert" (devitrified volcanic glass) is prominent only at the base. Micaceous rock fragments are very common; some of these may have been derived from shales and siltstones, others from schists or other metamorphics. A few grains of glauconite were noted in B and D. Accessory minerals, such as tourmaline and zircon, are common, and in E are abundant.

Matrices, both kaolinitic and illitic, occur in patches to make up to 20% of the sediments; these are of diagenetic origin. Some detrital matrix material, mainly silt with some clay, occurs in H. In some specimens, weathering has produced hydrated iron oxides, and in H there are brownish curved clay aggregates, probably indicative of incipient weathering.

Measured Section S15, specimens SP112/1, Z to BB, and SP134/1, A to G.

The sediments in this measured section differ significantly from those in the section S21. Two (E and F) are orthoquartzities, and four (AA, BB, A and G) are protoquartzites; Z, which is in a zone transitional from the Ingelara Formation, is an argillaceous sandstone. Specimens B, C and D, from near the middle of the section are subgreywackes and are the only sandstones comparable with the sandstones in measured section S21.

Most of the rocks are very fine to fine-grained, F is medium-grained, and E is coarse to very coarse-grained. Sorting is generally moderate to poor. Many of the specimens, especially in the lower part of the section, are polymodal. Grains are mostly subangular to subrounded, but angular grains are common in several specimens. Sphericity is generally moderate to low, and some very elongated grains were seen in AA and D; AA has a poor dimensional grain orientation, in contrast to the common tendency for specimens with grains of low sphericity to show good dimensional orientation.

In the subgreywackes B, C, and D, there is about 50 to 55% quartz, and from 5% to 15% K-feldspar, mostly fresh microcline and some untwinned feldspars. Of the other specimens, only Z has an appreciable amount of feldspar. The lack of feldspar in most of these specimens is the most obvious difference between the sandstones from measured sections S15 and S21.

Specimens Z and AA have, in addition to quartz (45 to 50%), labile rock fragments, matrix, and alteration products such as iron oxides. BB, A, E, F, and G, with from 65 to 75% quartz, comprise a quartz-rich suite showing much closer affinities to the Aldebaran Sandstone than to the sediments in measured section S21. Overgrowths on the quartz are moderate to minor; in specimen Z they are virtually absent. Pressure solution is generally present, but only in D is it pronounced.

Labile rock fragments are mostly shale, siltstone and metamorphics; metamorphic fragments tend to predominate in the lower specimens and shale fragments are more abundant in the subgreywackes, B, C, and D. Labile rock fragments are more common in the subgreywackes than in the quartz-rich sandstones; the three specimens (E, F, and G) near the top of measured section S15 have very few rock fragments. Accessory minerals are most common in D, and are also common in BB, A and B; they are distinctly less common in E, F, and G near the top of the succession in which micas are also uncommon. Micas are most common in the subgreywackes and fairly common in the lower specimens.

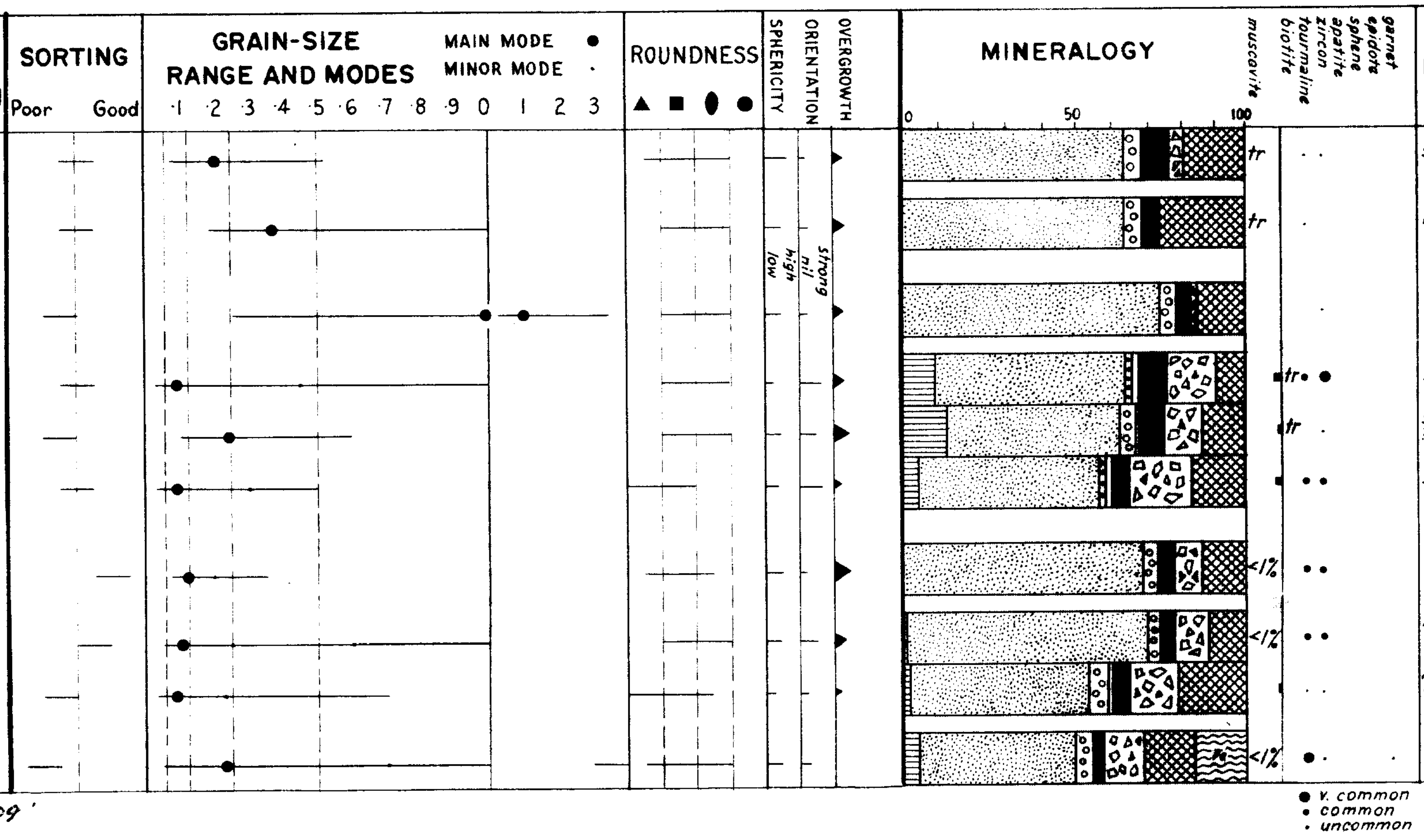
Matrices are mostly kaolinite "books", with occasional illite; several specimens near the top of the measured section have colloform aggregates of brown iron-rich clays indicative of weathering; Z at the base

PLATE 3

CATHERINE SANDSTONE

MEASURED SECTION S15

IN TRIBUTARY OF ALDEBARAN CREEK — SOUTH BRANCH



SPECIMEN FIELD No.	POSITION IN SECTION	ROCK FRAGMENTS	MATRIX MINERALS	ROCK NAME
SP134/1G	2090'	shale, ?"schist"	non-detrital; kaolinite (illite)	PROTOQUARTZITE
SP134/1F	2037'	rare granophyre	? non-detrital; ferruginous, colloform clay aggregates	ORTHOQUARTZITE
SP134/1E	1967'	minor shale	? non-detrital; ferruginous clay aggregates	ORTHOQUARTZITE
SP134/1D	1933'	shale, "schist"	non-detrital; kaolinite (mont.)	SUBGREYWACKE
SP134/1C	1920'	shale, "schist" ?rhyolite, ?granite	non-detrital; kaolinite	SUBGREYWACKE
SP134/1B	1910'	shale, "schist"	non-detrital; kaolinite	SUBGREYWACKE
SP134/1A	1828'	shale, "schist"	non-detrital; kaolinite	PROTOQUARTZITE
SP112/1BB	1780'	"schist", shale	non-detrital; kaolinite	PROTOQUARTZITE
SP112/1AA	1771'	"schist", shale, sltst.	non-detrital; kaolinite, illite	PROTOQUARTZITE
SP112/1Z	1716'	"schist", shale, rhyolite	detrital; ferruginized silt & clays	ARGILLACEOUS SANDSTONE

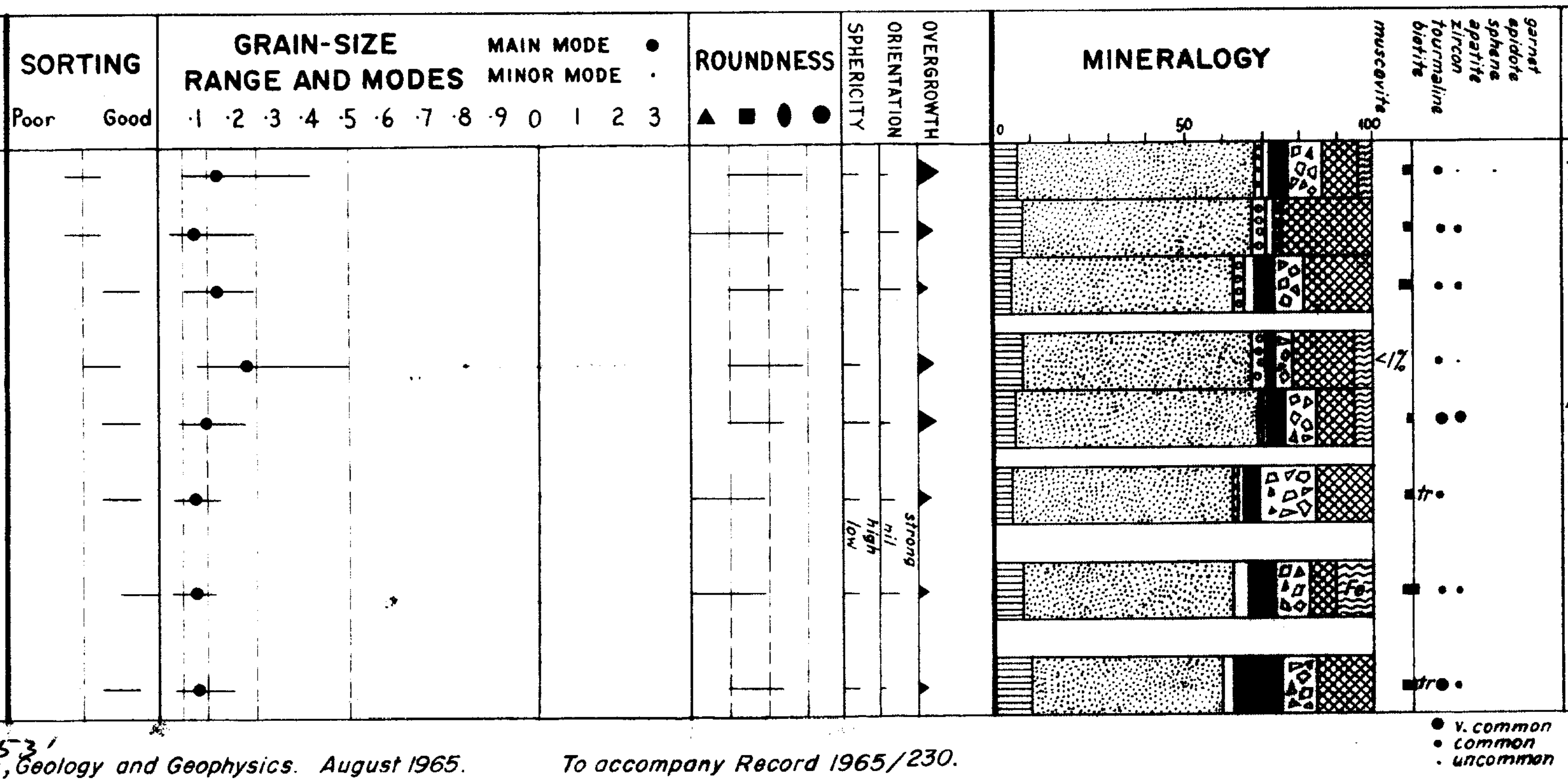
BASE AT 1709'

KEY

K. Feldspar	▤
Plagioclase	▨
Quartz	░
Quartzite	⁘
Micas & accessories	☐
Chert	■
Rock fragments	◬
Matrix	▩
Cement/alteration	≋

MEASURED SECTION S21

CONSUELO CREEK ON EAST FLANK OF REID'S DOME



SPECIMEN FIELD No.	POSITION IN SECTION	ROCK FRAGMENTS	MATRIX MINERALS	ROCK NAME
SP129/1J	610'	sltst; ?shale and ?"schist"	non-detrital kaolinite, illite	PROTOQUARTZITE
SP129/1H	585'	sltst., shale	? detrital; mixed clays, mostly ferruginized	SUBARKOSE
SP129/1G	570'	shale, ?"schist"	?non-detrital; illite, kaolinite	PROTOQUARTZITE
SP129/1F	515'	sltst., shale	non-detrital; kaolinite, (illite mont.)	SUBARKOSE
SP129/1E	505'	"schist", shale	non-detrital; kaolinite (illite)	PROTOQUARTZITE
SP129/1D	450'	"schist", shale	non-detrital; illite, kaolinite ferruginized	PROTOQUARTZITE
SP129/1C	380'	shale, "schist"	non-detrital; kaolinite	PROTOQUARTZITE
SP129/1B	310'	"schist"	non-detrital; illite, kaolinite	SUBARKOSE

BASE AT 253'

Bureau of Mineral Resources, Geology and Geophysics. August 1965. To accompany Record 1965/230.

G55/A3/49

of the section also has this material.

Discussion.

The Catherine Sandstone of measured section S21 and the central part of section S15 has as its main sources a suite of shales, siltstones and perhaps sandstones, and an area of granitic rocks, which supplied the feldspars. There was no significant contribution from a volcanic terrain or from active vulcanism. The Catherine Sandstone of Warrinilla North No.1 has essentially the same features, notably plentiful feldspar in the sandstones (Arman, 1964).

The feldspar-poor part of measured section S15 had a source similar to the source for the Aldebaran Sandstone, namely a clastic sedimentary suite and a feldspar-poor metamorphic suite; acid igneous clasts, principally vitric tuffs and rhyolites, are also more common than in the feldspathic sandstones. To generalize, two fairly distinct source areas can be postulated:-

(i) a source having granitic rocks and yielding feldspathic quartz sands
(ii) a source having metamorphics and yielding feldspar-poor sands.

Grains derived from pre-existing sediments sediments seem to be common to both types of sandstone.

The feldspathic portion of the Catherine Sandstone and the entire Aldebaran Sandstone probably received material more or less exclusively from each source respectively. As noted previously, the less consistent Staircase Sandstone probably received material from both sources. "Chert" derived from acid flow rocks and tuffs, common in the Staircase Sandstone, suggests a third source in which volcanics are prominent. From the evidence available, it is not known whether these volcanics were contemporaneous or ancient.

The abundance of heavy minerals in the Catherine Sandstone of measured section S21 could be attributed to a supply from the granitic source. but is possibly merely a function of the fine grain-size of the sandstones in that section. Concentration processes, not operative in deposition of the other sand bodies, may also have increased the heavy mineral contents. Field observations have shown that crossbedding is not a notable feature of the Catherine Sandstone (Mollan et al, 1964). The lack of crossbedding suggests reworking at the deposition site, which may have led to concentration of heavy minerals.

The plentiful heavy minerals, occasional glauconite and planar bedding of the Catherine Sandstone, together point to a shallow marine environment, subject to normal tidal and circulation currents. This conclusion is supported by the fact that both Ingelara Formation below and the Peawaddy Formation above (Mollan, Kirkegaard, Exon and Dickins, 1964) were laid down under marine conditions. The Staircase and Aldebaran

Sandstones, on the other hand, were laid down by streams. Meyers (1964) suggested that the Catherine Sandstone may be an erosional product of the Aldebaran Sandstone, but this is not favoured because the deficiency of feldspar in the latter unit would make an unlikely source of feldspar for the Catherine Sandstone. However, their suggestion may be tenable if the Aldebaran Sandstone was feldspathic in areas where it was subsequently eroded, such as in the vicinity of Warrinilla No.1. Arman (1964) found that the Aldebaran Sandstone in Warrinilla North No.1 has feldspars, indicating a fairly pronounced change in the unit eastwards, so the problem remains open.

COLINLEA SANDSTONE.

Measured Section S5 (Type Section), specimens SP118 A to F, and SP120 A to G.

Most of these rocks are protoquartzites, and two (SP118D, and SP120G) are subgreywackes. One siltstone (SP118F) is included in the suite. The sandstones are mainly fine-grained, and some are medium to coarse-grained; there are no general trends in grain-size above the conglomeratic base. Most of the sediments are well sorted, some very well sorted except for SP120E which is rather poorly sorted. Grains are mainly subangular to subrounded, and the best roundness was seen in SP120F. Sphericity of grains is generally moderate, and grain orientation moderate to poor, but SP118C, SP120D and SP120G have quite marked dimensional orientation.

The quartz content is about 65% almost throughout, two exceptions being the subgreywackes SP118D and SP120G, which have about 50-55% quartz. Fluid inclusions in the quartz are common, and embayed grains of volcanics are fairly common. Overgrowths are generally not prominent, except in SP120F which has fairly thick overgrowths; pressure solution, although present, is never pronounced. Metaquartzite occupies about 10% of these sediments and microcrystalline siliceous grains ("chert") resembling the devitrified groundmass material of rhyolite, occupy about 5%. In only one specimen (SP120G) is there any K-feldspar. Muscovite is generally minor; except in SP118D in which it is common. There are variable amounts of rock fragments, ranging up to about 15% in SP118D and SP120G. Many of these are quartz-mica rocks ("schist") from metamorphics (Fig.2); shales, siltstones and fine-grained quartzitic sandstones are fairly common, and devitrified rhyolites are rare. Accessory minerals are in general uncommon, but they are common in SP120C; tourmaline is the most common, zircon slightly less common, and sphene and apatite have been noted.

The main matrix mineral is diagenetic kaolinite in its usual form of clumps of small "books". Most of the SP120 specimens also have curved

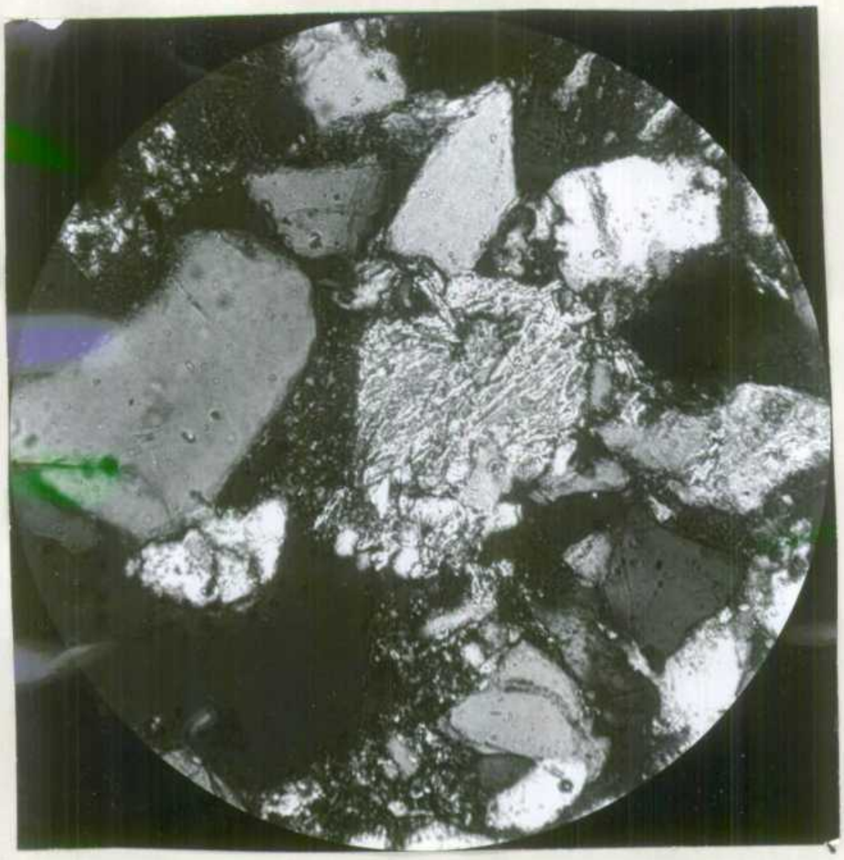


Fig. 2. Field . 75 MM. Mag X 150 crossed nicols. Specimen SP120C, Colinlea Sandstone; showing a fragment of metamorphic rock; the quartz is microsutured, and muscovite is differentiated into bundles.

B.M.R. Neg. G/7953

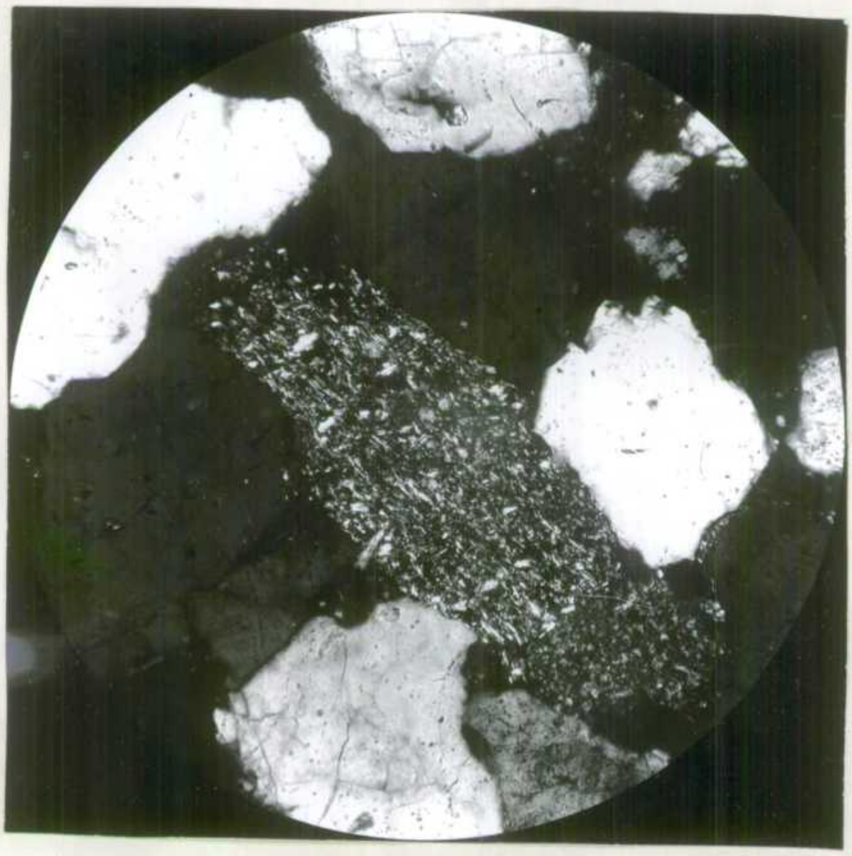


Fig.3. Field 1.1 mm. Mag X 104. crossed nicols. Specimen SP131/1R, Aldebaran Sandstone; showing a fragment of silty shale - note the discrete arrangement of silt grains and mica flakes in it (of Fig.2) -- and at right a quartz grain with crystal overgrowth.

B.M.R. Neg. G/7952

colloform clay aggregates which are probably weathering products. These are particularly noticeable in SP120A and B which were collected from near the top of a mesa.

Pebbles from the basal conglomerate, SP118A, include tourmalinized metaquartzite, several fully cemented fine-grained quartz sandstones (orthoquartzites), and a porphyritic rhyolite. The groundmass material of the rhyolite has essentially the same appearance as the "chert" material in the sandstones.

Measured Section S6, specimens SP124/1 to SP126/1B.

These are arenites which show a much wider variety than in the type section. SP124/3 is a subarkose, SP124/2C a subgreywacke, and there are several protoquartzites. Two specimens are interlaminated siltstone and sandstone (SP124/1 and SP125/1B); the diagram gives an average composition for each of these rocks, as several sand and silt laminae appear on the thin sections. Most of the sandstones are fine-grained and SP124/2A is very fine-grained; they are on the whole well sorted and grains are generally subangular to subrounded. In these respects, the rocks in this sequence are similar to those of the type section.

If the laminated rocks are disregarded, this section can be readily divided into an upper part, from SP124/3 upwards, having appreciable amounts of K-feldspar (up to 12% in SP124/2C), and a lower part deficient in feldspar. The lower part has a somewhat higher content of relatively stable grains (quartz, quartzite and "chert"), but there are no other significant differences. Quartz overgrowths are mostly minor, and only SP124/3 shows much overgrowth. Rock fragments in both are from metamorphic and sedimentary suites, as in the type section. In three specimens (SP124/2A, SP125/1B and SP125/1C) accessory minerals are plentiful. They are especially concentrated in the fine-grained specimen SP125/1B probably because of its finer grain-size. Micas are also plentiful in the silty laminae of SP125/1B. Matrices are mostly kaolinite and illite, derived from leaching of micas; colloform clay aggregates occur in specimens near the top of the sequence, where the rocks may have been more exposed to weathering.

Pebbles collected from this locality include a porphyritic rhyolite (SP124/2D) and fully cemented quartz sandstones (orthoquartzites - SP124/4B). Resistant siliceous rocks such as these appeared to predominate in the conglomeratic beds seen in this locality.

Discussion.

Only the lower specimens of measured section S6 are markedly similar to the type section specimens; thus the upper feldspathic sandstones may belong to a stratigraphically higher part of the unit not exposed in the type section.

The non-feldspathic portion of this unit is correlated with the Aldebaran Sandstone; their most obvious common feature is the absence of feldspar. Quartz percentages and the types of rock fragments also are remarkably similar. Close similarity, rather than specific differences, is the most striking aspect of this correlation. It is clear that both the Aldebaran Sandstone and the correlative part of the Colinlea Sandstone were derived from a feldspar and biotite deficient source; probably the Anakie Metamorphics, as noted previously.

The upper part of the sequence in measured section S6, is correlated with the Catherine Sandstone on the presence of feldspars. This suggests that the Ingelara Formation has wedged out westwards between the Aldebaran and Catherine Sandstones. However, there are too few samples from which to draw firm conclusions and the following alternative interpretation, is prompted by the presence of K-feldspars in a sandstone specimen from high in the Aldebaran Sandstone in measured section S15 (SP112/1L). The feldspathic top of the Colinlea could simply represent a westerly increase in the feldspathic content of the Aldebaran Sandstone. Thus the whole of the Colinlea could be correlated with the Aldebaran, and the overlying units, Ingelara Formation and Catherine Sandstone, both may have wedged out westwards between the Aldebaran Sandstone and Peawaddy Formation.

In either case, one or two important hiatuses are probably represented in the westerly section; also, Mollan et al.(1964) detected, by regional mapping, a disconformity at the base of the Peawaddy Formation which gives way to a low-angled unconformity in Reid's Dome.

REID'S DOME SANDSTONES OF MEASURED SECTION S16.

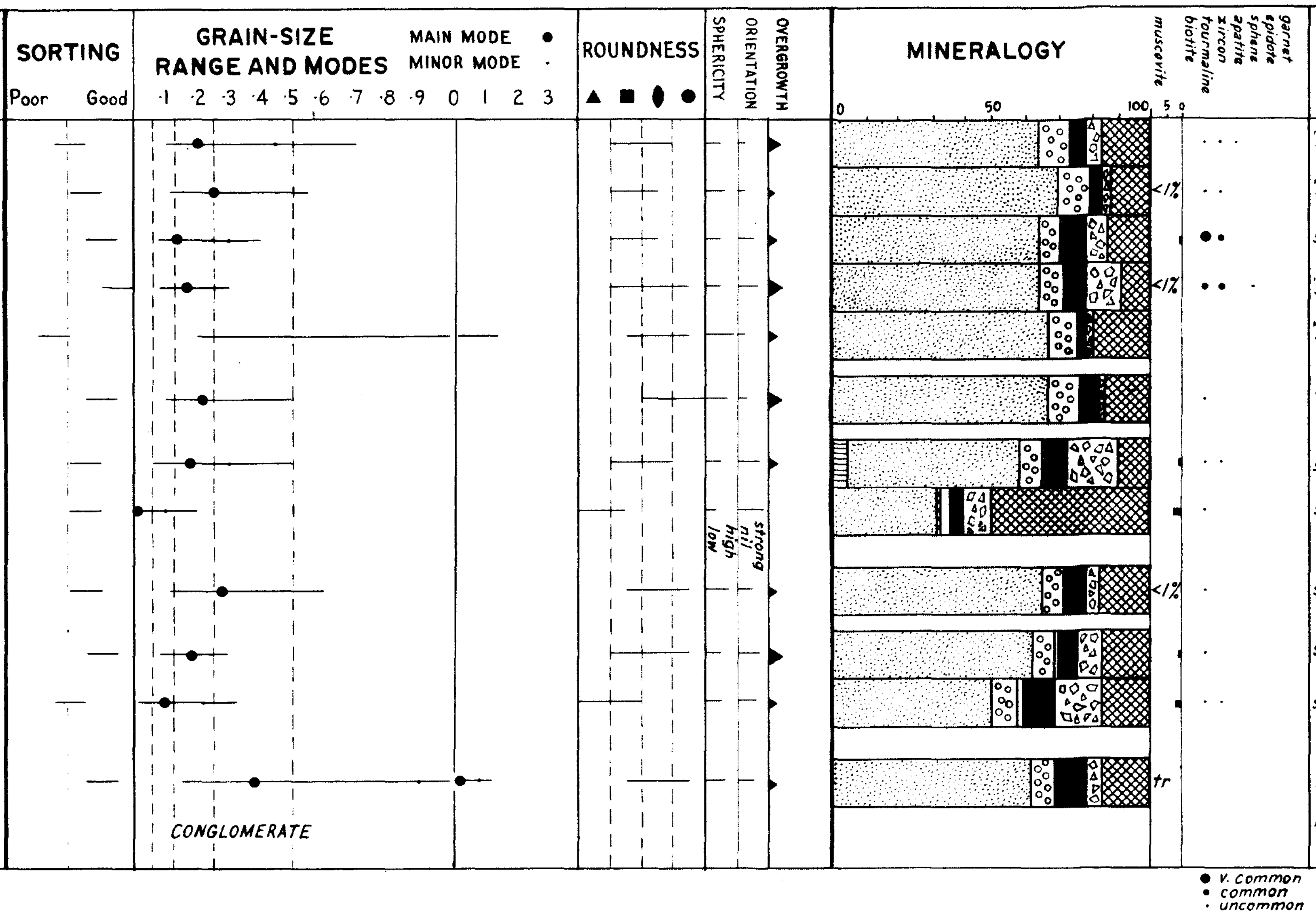
These specimens were collected from sandstones in Reid's Dome, which had in the past been identified as the Aldebaran Sandstone. The petrographic work has indicated two main subdivisions, a lower portion containing appreciable amounts of feldspar (specimens B to J), and an upper portion containing no feldspar (P to W). Specimens K to M have intermediate characteristics, and a conglomerate, N, marks the base of the non-feldspathic part of the section.

Specimens SP131/1, B to J.

Only one of these (J) is an orthoquartzite, five (B, D, F, G and H) are protoquartzites, and two (C and E) are subgreywackes. The lower specimens are very fine-grained, and grainsize increases fairly steadily upwards, from fine-grained to medium and coarse-grained. There is a related trend towards poorer sorting upwards; C and D are well sorted and the upper three are only moderately to poorly sorted. Grain roundness also improves

COLINLEA SANDSTONE

MEASURED SECTION S5 - TYPE SECTION

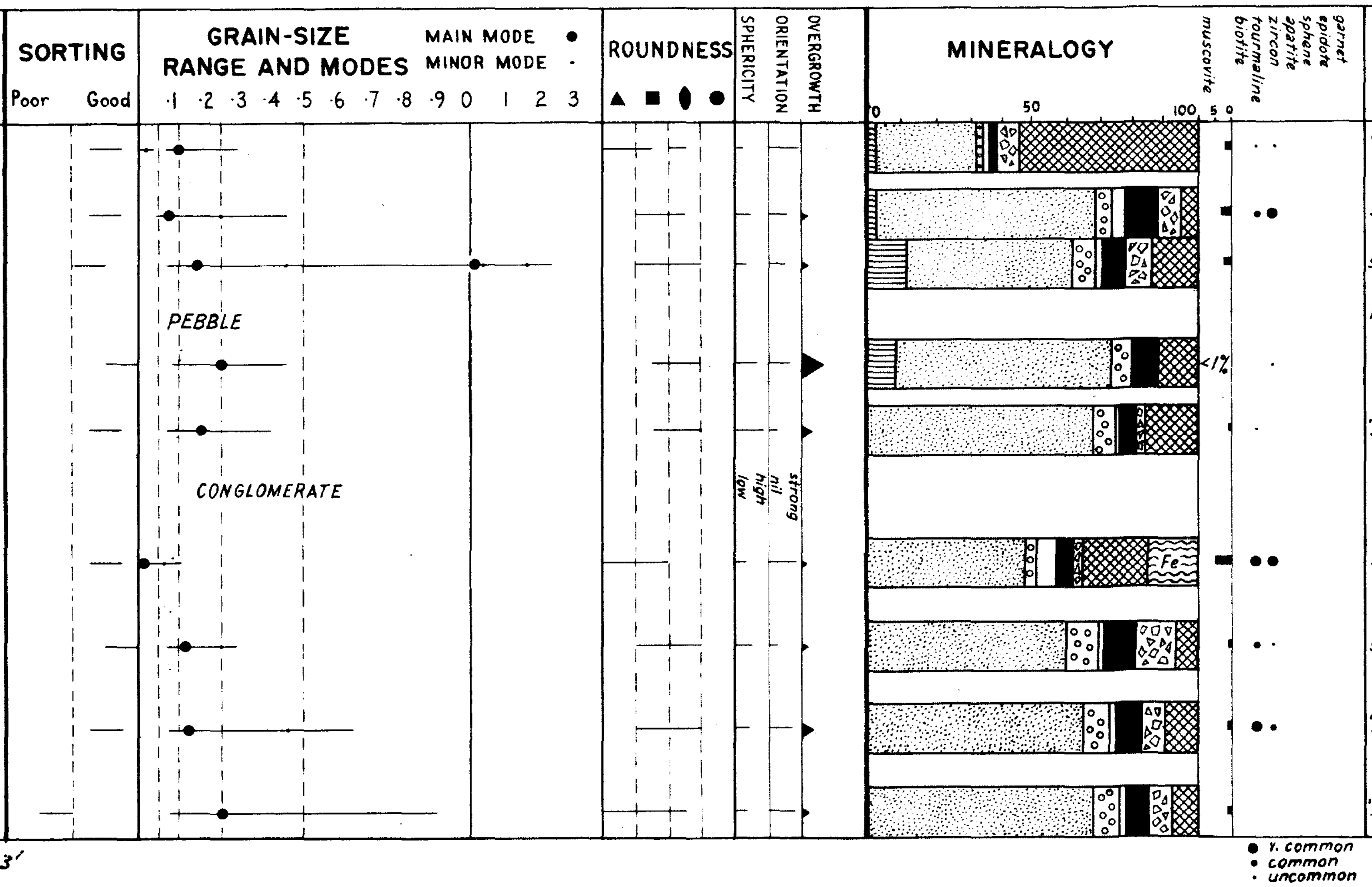


SPECIMEN FIELD No.	POSITION IN SECTION	ROCK FRAGMENTS	MATRIX MINERALS	ROCK NAME
SP120A	573'	"schist," sltst.	non-detrital; colloform clay aggregates	PROTOQUARTZITE
SP120B	553'	"schist"	non-detrital; colloform clay aggregates	PROTOQUARTZITE
SP120C	545'	shale, "schist," sltst.	non-detrital; kaolinite, illite & detrital silt	PROTOQUARTZITE
SP120D	516'	"schist," (shale)	non-detrital; kaolinite	PROTOQUARTZITE
SP120E	396'	"schist"	non-detrital kaolinite (illite); & detrital silt	PROTOQUARTZITE
SP120F	352'	minor "schist," ? rhyolite	non-detrital; colloform clay aggregates	PROTOQUARTZITE
SP120G	297'	sltst, shale, "schist"	non-detrital; kaolinite	SUBGREYWACKE
SP118F	289'	shale, sltst.	detrital silt; non-detrital clay aggregates	SILTSTONE
SP118E	180'	sltst, shale ("schist")	non-detrital; colloform clay aggregates	PROTOQUARTZITE
SP118C	130'	shale, sltst., "schist"	non-detrital; kaolinite, (illite)	PROTOQUARTZITE
SP118D	118'	sltst., shale, "schist"	non-detrital; kaolinite	SUBGREYWACKE
SP118B	23'	sltst., shale	non-detrital; kaolinite (illite)	PROTOQUARTZITE
SP118A	4'	PEBBLES : TOURMALINIZED QUARTZITE, common ORTHOQUARTZITES (f.& m. gr. sst.) PORPHYRITIC RHYOLITE		

KEY

- *K. Feldspar* ▤
- *Plagioclase* ▨
- *Quartz* ⬚
- *Quartzite* ○
- *Micas & accessories* □
- *Chert* ■
- *Rock fragments* △
- *Matrix* ▦
- *Cement/alteration* ≋

MEASURED SECTION S6 - JOE JOE ROAD



SPECIMEN FIELD No.	POSITION IN SECTION	ROCK FRAGMENTS	MATRIX MINERALS	ROCK NAME
SP124/1	600'	"schist," shale	detrital; silt & clays	SILTSTONE AND ARGILLACEOUS SST.
SP124/2A	565'	shale	non-detrital; illite	PROTOQUARTZITE
SP124/2C	537'	shale, ("schist," sltst.)	? non-detrital; clay aggregates	SUBGREYWACKE
SP124/2D	534'	PEBBLE : PORPHYRITIC RHYOLITE		
SP124/3	522'		? non-detrital; colloform clay aggregates	SUBARKOSE
SP124/4A	479'	"schist," shale	non-detrital; kaolinite	PROTOQUARTZITE
SP124/4B	453'	PEBBLES : ORTHOQUARTZITE		
SP125/1B	392'	shale	detrital silt & illite, ferruginized minor kaolinite	SILTSTONE AND PROTOQUARTZITE
SP125/1A	330'	shale, "schist"	? non-detrital kaolinite	PROTOQUARTZITE
SP125/1C	235'	"schist," shale, sltst.	non-detrital; kaolinite	PROTOQUARTZITE
SP126/1B	171'	"schist," shale	non-detrital; kaolinite	PROTOQUARTZITE

BASE AT 163'

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markedly upwards, from angular to subangular (B and C) to subrounded and rounded (H and J). Sphericity increases upwards, corresponding with the better rounding, and dimensional orientation is much less obvious in the higher specimens.

Quartz (about 45 to 50% in the lower two specimens) increases upwards until in J there is over 75% quartz. Metaquartzite is also present in subordinate amounts. Overgrowths are minor almost throughout, but are more noticeable in specimens H and J. Pressure solution is generally moderate, except in E where it is marked. The amount of K-feldspar increases from B to D; the latter specimen has over 10% K-feldspar (microcline) and minor plagioclase. The feldspar content then decreases, and remains generally around 5% in the upper specimens. "Chert", mostly devitrified glass derived mainly from rhyolites, is common, and reaches nearly 15% in C. Labile rock fragments are most abundant in C, and tend to decrease irregularly upwards. The most common fragments are of metamorphic rocks ("schist"); siltstone fragments are fairly common, but shale fragments are uncommon to rare, except in B and C. Fragments of rhyolite and micrographic rock occur in some of the specimens. Micas are common in B and C, but decrease sharply above, and are very subordinate from F upwards. Their abundance in the lower specimens is probably a function of the very fine grain-size of these specimens. Accessory minerals are rare throughout this suite.

Matrices are the usual diagenetic kaolinite in clumps, some illite, and occasional clay aggregates developed by weathering.

Specimens SP131/1, K to M.

These rocks have only minor amounts of K-feldspars. K and M are both fine to very fine-grained; M is coarse to very coarse-grained and has subrounded to rounded grains. The quartz in these specimens ranges from 50 to 65% and has moderate or rather minor overgrowths. The most significant feature here is the sharp incoming of reworked shales in K, and even more so in L: these had been on the whole very subordinate in the lower suite.

Specimen SP131/1 N (Conglomerate)

Pebbles from this conglomerate include quartzose siltstone, very fine-grained quartz sandstone, tuffaceous siltstone, tuffaceous sandstone, subgreywacke, micrograpite, and silty shale. This is a much wider variety of rocks than in any other pebble suites examined. The pebbles are subrounded to rounded, but on the whole less rounded than pebbles from other specimens; angular and subangular pebbles and cobbles, especially of the shale lithology, were noted in the field. The shale clasts are similar to the shale detritus in specimens K and L. Several of the sandstones are very similar to sandstones of the Timbury Hills Formation, notably in their poor sorting and feldspar deficiency.

Arman (1964) observed a conglomeratic interval with very similar features, especially as regards the angularity and the shale pebbles, in an equivalent stratigraphic position in Warrinilla North No.1.

Specimens P to W.

This suite of specimens is much more consistent in mineralogy than those stratigraphically lower. All the specimens are fine to medium-grained protoquartzites, and, in contrast to the lower part of this section, show no trends in grain-size; specimens P and T have minor coarse modes. They are moderately to well sorted and grains are mostly subangular to subrounded, except in R and S where they are mostly subrounded and rounded. Sphericity is generally fairly high, and is best in those specimens with rounded grains. Dimensional orientation is present throughout but is not marked.

Quartz (60 to nearly 70%) has moderate to rather thick overgrowths, distinctly more pronounced than in the lower specimens B to J. Pressure solution is moderate to fairly strong. There is from 5 to over 10% metaquartzite. "Chert" is, in general, less common than in the lower part of the section. Feldspars occur in only one specimen, where they are very minor. Labile rock fragments are most common in specimens S and T, but even in these they do not exceed 10%. In contrast to the lower specimens B to J, shale is the most common lithic material in this suite (fig.3). Clasts of other sedimentary rocks such as siltstone and very fine-grained sandstone are also present. Metamorphic clasts ("schist") are fairly common, and volcanics such as rhyolite, are very minor. Muscovite is uncommon to rare, probably due largely to leaching of the mica. Accessory minerals are uncommon, and only tourmaline and zircon have been noted.

Except in specimen T which has some detrital silt, matrices are of the usual non-detrital origin; kaolinite predominates, and illite is much less common. Some of the specimens have clay aggregates; it is interesting to note that these are all in about the middle of the section.

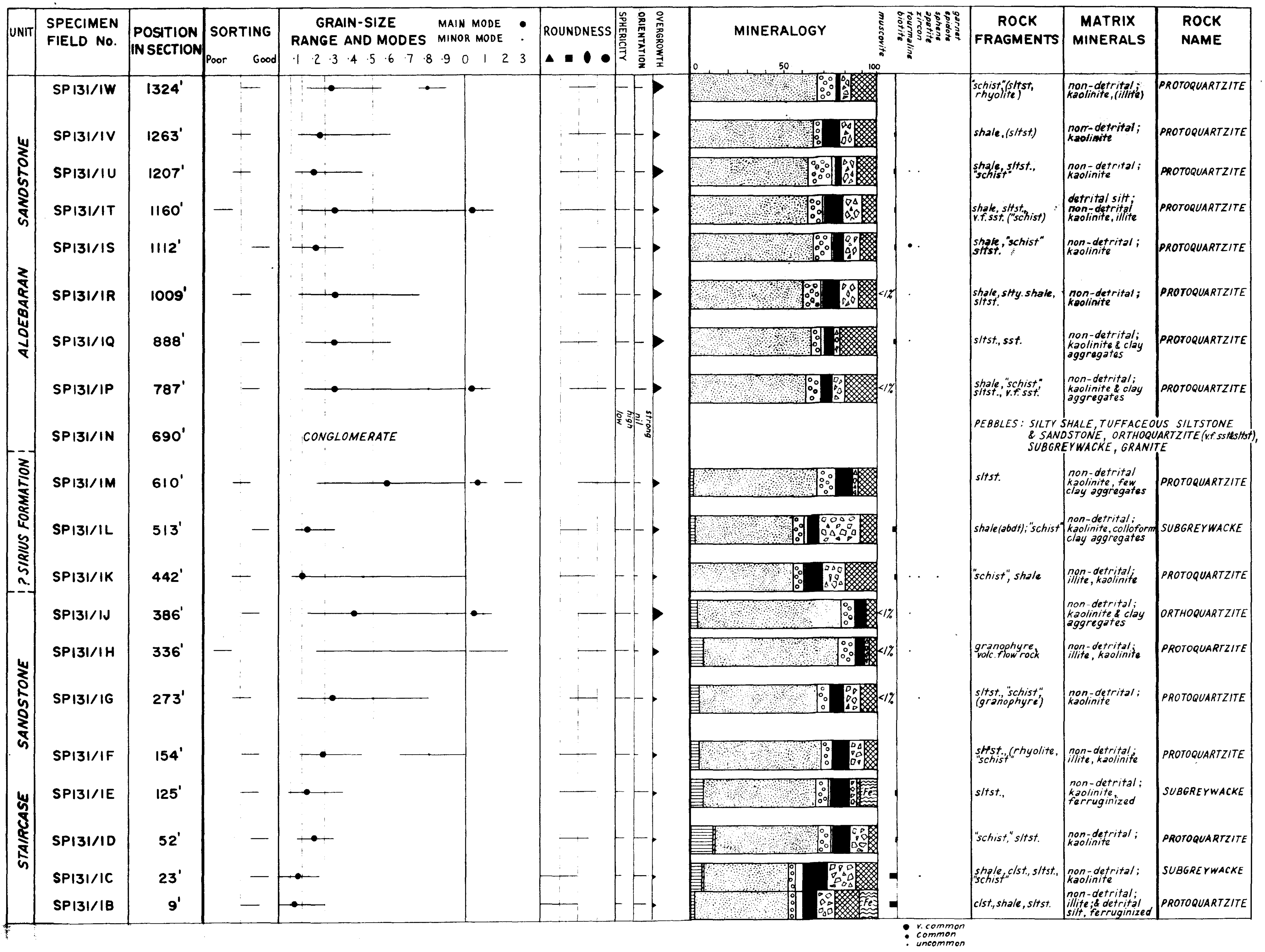
Correlation with other sandstones.

The upper part of measured section S16 can be readily correlated with the Aldebaran Sandstone. The absence of feldspar is the main feature, and the percentage of quartz is remarkably consistent. Specimens from each of the Aldebaran sections contain from 60 to 70% quartz.

The mineralogy of the lower portion, specimens B to J, is closer to the Staircase Sandstone; the most diagnostic feature being the presence

PLATE 5.

MEASURED SECTION S16 — REID'S DOME



UNIT	SPECIMEN FIELD No.	POSITION IN SECTION	ROCK FRAGMENTS	MATRIX MINERALS	ROCK NAME
ALDEBARAN SANDSTONE	SP131/1W	1324'	"schist"(sltst, rhyolite)	non-detrital; kaolinite, (illite)	PROTOQUARTZITE
	SP131/1V	1263'	shale, (sltst)	non-detrital; kaolinite	PROTOQUARTZITE
	SP131/1U	1207'	shale, sltst., "schist"	non-detrital; kaolinite	PROTOQUARTZITE
	SP131/1T	1160'	shale, sltst., v.f. sst. ("schist)	detrital silt; non-detrital kaolinite, illite	PROTOQUARTZITE
	SP131/1S	1112'	shale, "schist" sltst.	non-detrital; kaolinite	PROTOQUARTZITE
	SP131/1R	1009'	shale, slty. shale, sltst.	non-detrital; kaolinite	PROTOQUARTZITE
	SP131/1Q	888'	sltst., sst.	non-detrital; kaolinite & clay aggregates	PROTOQUARTZITE
	SP131/1P	787'	shale, "schist", sltst., v.f. sst.	non-detrital; kaolinite & clay aggregates	PROTOQUARTZITE
	SP131/1N	690'	PEBBLES: SILTY SHALE, TUFFACEOUS SILTSTONE & SANDSTONE, ORTHOQUARTZITE (v.f. sst&sltst), SUBGREYWACKE, GRANITE		
? SIRIUS FORMATION	SP131/1M	610'	sltst.	non-detrital kaolinite, few clay aggregates	PROTOQUARTZITE
	SP131/1L	513'	shale(abdt); "schist"	non-detrital; kaolinite, colloform clay aggregates	SUBGREYWACKE
	SP131/1K	442'	"schist", shale	non-detrital; illite, kaolinite	PROTOQUARTZITE
STAIRCASE SANDSTONE	SP131/1J	386'		non-detrital; kaolinite & clay aggregates	ORTHOQUARTZITE
	SP131/1H	336'	granophyre, volc. flow rock	non-detrital; illite, kaolinite	PROTOQUARTZITE
	SP131/1G	273'	sltst., "schist", (granophyre)	non-detrital; kaolinite	PROTOQUARTZITE
	SP131/1F	154'	sltst., (rhyolite, "schist"	non-detrital; illite, kaolinite	PROTOQUARTZITE
	SP131/1E	125'	sltst.,	non-detrital; kaolinite, ferruginized	SUBGREYWACKE
	SP131/1D	52'	"schist," sltst.	non-detrital; kaolinite	PROTOQUARTZITE
	SP131/1C	23'	shale, clst., sltst., "schist"	non-detrital; kaolinite	SUBGREYWACKE
	SP131/1B	9'	clst., shale, sltst.	non-detrital; illite; & detrital silt, ferruginized	PROTOQUARTZITE

KEY

- *K. Feldspar* ▤
- *Plagioclase* ▨
- *Quartz* ░
- *Quartzite* ⁘
- *Micas & accessories* □
- *Chert* ■
- *Rock fragments* △
- *Matrix* ▩
- *Cement/alteration* ≋

Bureau of Mineral Resources, Geology and Geophysics. August 1965. *To accompany Record 1965/230.*

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of K-feldspar. It has somewhat more volcanic detritus and fewer metaquartzitic grains than the upper specimens. These features are typical of the Staircase Sandstone. However in other respects the lower portion differs significantly from the Staircase Sandstone in measured sections S11 and S18. In particular, the average grainsize is much finer; only in the highest specimens is grainsize comparable with that of the other suites. Roundness is in general poorer (a function of the finer grain-size), and quartz overgrowths are much less developed than in the other Staircase Sandstone suites.

Thus correlation of this part of the succession from Reid's Dome with the Staircase Sandstone cannot be made on petrographic data alone, but the petrographic differences can be simply explained by assuming that the Staircase Sandstone in Reid's Dome was further from source rocks, and that a loss of porosity accompanied the resultant trend towards deposition of finer sands.

The alternative interpretation, one that has been generally assumed (e.g. Mollan et al, 1964), is that this thick lower section is a lower part of the Aldebaran Sandstone. This is not consistent with the fact that the upper part of the succession in the Reid's Dome area can be readily correlated with typical Aldebaran Sandstone; this alternative involves a thick basal section of the Aldebaran Sandstone not sampled elsewhere.*

Specimens K to M probably come from a reduced equivalent to the Sirius Formation. Evidence for this is afforded by

(i) the numerous beds containing vertical worm burrows in the vicinity of specimen K and the overlying 200 feet. This is a feature of the Sirius Formation.

(ii) the sudden incoming of shale detritus in K and L.

As already noted, this detritus is probably similar to that in the conglomerates immediately above, and the angularity of the pebbles suggests that the conglomerate was derived from relatively close by.

Thus this interval is probably an attenuated Sirius Formation, the thinning being mainly effected by absence of the shale beds by penecontemporaneous erosion. The eroded shales were derived as clasts into the coarser interbeds. The relative abundance of shale clasts in the lower part of the Aldebaran Sandstone indicates accelerated erosion of the Sirius Formation nearby accompanying an influx of sand from more distant source areas. In the type area the Sirius Formation contains much siltstone and sandstone (Mollan et al, 1961) and only a minor facies change would make it difficult to distinguish from the Staircase and Aldebaran Sandstone. Mollan et al (1964) also recorded southward thinning of the unit.

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* P.E. Power (pers.comm.) recently reported a thick lower Aldebaran Sandstone interval in the Springsure Anticline, which was not sampled for this study; the lower Reid's Dome section probably correlates with this interval.

Thus, in spite of some petrographic differences, the Staircase Sandstone and the lower sandstones of measured section S16 in the Reid's Dome area can be correlated. The Sirius Formation, previously correlated with an upper part of the Cattle Creek Formation, is thought to occupy a stratigraphically higher position, and the whole of the Cattle Creek Formation may well be a correlate of the Stanleigh Formation. Faunal correlation of these marine units is not conclusive (Dickins in Mollan <u>et al</u>, op. cit.).

SOURCE AREAS.

Two main source areas have been distinguished, one dominated by granites, the other dominated by metamorphics; sedimentary rocks are common to both. The most likely source for the metamorphic detritus is the Anakie Metamorphics, and that for the granitic detritus is the Retreat Granite only 50 to 60 miles north of this area. The Retreat Granite is composed mainly of granodiorite and adamellite (Veevers, Mollan, Olgers and Kirkegaard, 1962); it also contains plentiful biotite but lacks muscovite, and its feldspar is entirely orthoclase. Although these two rock bodies now crop out close to each other, the Anakie metamorphics could have been covered from time to time by sediments while the granite alone was being eroded. The Anakie Metamorphics are the only exposed metamorphic rocks near this area.

Alternatively, the source for the sandstone with abundant metamorphic clasts may have been an area now buried, perhaps south or southwest of the Springsure area. There is plenty of support for this in wells which have indicated that Lower Permian rocks are absent on the Roma High and upper Permian and younger units rest directly upon basement rocks. In many wells on the Roma High pre-Permian metasediments of the Timbury Hills Formation have been encountered. Certain sandstone lithologies in the Timbury Hills Formation are in the pebble suites from the Aldebaran and Staircase Sandstones, and perhaps also the Colinlea Sandstone. Thus at least some of the detritus in these units could have been derived from the south. An interplay between several source areas seems likely.

CONCLUSIONS.

Examination of thin sections has disclosed diagnostic features in rocks which in hand specimen appear to be similar. This applies particularly to sediments of the Aldebaran Sandstone and Staircase Sandstone. The main tool has been the mineralogy of the rocks, although other parameters, such as grain-size and quartz overgrowths, have provided useful supporting evidence.

The principal conclusions from this study are:-

(i) the bulk of the Colinlea Sandstone is a correlate of the Aldebaran Sandstone

(ii) the top of the Colinlea may be a correlate of the Catherine Sandstone; this is not certain

(iii) a thick sandstone interval in Reid's Dome, usually all referred to the Aldebaran Sandstone, may represent both the Staircase and the Aldebaran, with a thin development of the Sirius Formation between.

(iv) an area of feldspar-poor metamorphic rocks, probably the Anakie Metamorphics, and an area of granitic rocks, probably the Retreat Granite, provided the main sources for sediment.

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APPENDIX A.

LIST OF SPECIMEN FIELD NUMBERS AND REGISTERED ROCK NUMBERS

Field No.	Registered No.	Field No.	Registered No.
SP111/1A	R16240	SP129/1H	R16295
SP111/1B	R16241	SP129/1J	R16296
SP111/1C	R16242	SP112/1Z	R16299
SP111/1D	R16243	SP112/1AA	R16300
SP111/1E	R16244	SP112/1BB	R16301
SP111/1F	R16245	SP134/1A	R17087
SP111/1G	R16246	SP134/1B	R17088
SP111/1H	R16247	SP134/1C	R17089
SP139/1A	R17112	SP134/1D	R17090
SP139/1B	R17113	SP134/1E	R17091
SP139/1C	R17114	SP134/1F	R17092
SP139/1D	R17115	SP134/1G	R17093
SP139/1E	R17116	SP118A	R16075
SP139/1F	R17117	SP118B	R16076
SP139/1G	R17118	SP118C	R16077
SP139/1H	R17119	SP118D	R16078
SP139/1J	R17120	SP118E	R16188
SP139/1K	R17121	SP118F	R16189
SP112/1A	R16267	SP120A	R16211
SP112/1B	R16268	SP120B	R16212
SP112/1C	R16269	SP120C	R16213
SP112/1D	R16270	SP120D	R16214
SP112/1E	R16271	SP120E	R16215
SP112/1F	R16272	SP120F	R16216
SP112/1G	R16273	SP120G	R16217
SP112/1H	R16274	SP124/1	R16196
SP112/1J	R16275	SP124/2A	R16197
SP112/1K	R16276	SP124/2B	R16198
SP112/1L	R16277	SP124/2C	R16199
SP112/1M	R16278	SP124/2D	R16200
SP129/1B	R16289	SP124/3	R16201
SP129/1C	R16290	SP124/4A	R16202
SP129/1D	R16291	SP124/4B	R16203
SP129/1E	R16292	SP125/1A	R16204
SP129/1F	R16293	SP125/1B	R16205
SP129/1G	R16294	SP125/1C	R16206

Field No.	Registered No.	Field No.	Registered No.
SP126/1B	R16208	SP131/1M	R16257
SP131/1B	R16239	SP131/1N	R16258
SP131/1C	R16248	SP131/1P	R16259
SP131/1D	R16249	SP131/1Q	R16260
SP131/1E	R16250	SP131/1R	R16261
SP131/1F	R16251	SP131/1S	R16262
SP131/1G	R16252	SP131/1T	R16263
SP131/1H	R16253	SP131/1U	R16264
SP131/1J	R16254	SP131/1V	R16265
SP131/1K	R16255	SP131/1W	R16266
SP131/1L	R16256		