Assigned to:

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Possible Honours thesis
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A geological reconnaissance of the north-eastern section of County Light.

Robinson

A GEOLOGICAL RECONNAISSANCE OF THE NORTH-EASTERN SECTION OF COUNTY LIGHT.

The area investigated extends from just north of the Southern boundary of the Hundred of Waterloo, northwards to the northern border of County Light. The westerly limit is on the western side of the Peters Hill ridge and the area extends eastwards to the Julia Range which runs northwards through Point Pass.

An area to the north in the County of Burra has been mapped by Mr. S.B. Dickinson (Bulletin 20 of the Mines Department of S.A.) whilst Mr. Hossfeld and Mr. Segnit have both covered areas to the south. Professor Howchin has noted the presence of glacial erratics in the area as well as the presence of the quartzite ridge south of Peters Hill.

TOPOGRAPHY.

The topography of the area is dominated by four parallel ridges running north-south. Between these ridges, are broad, gently sloping valleys which are highly cultivated and consist almost entirely of soil and alluvium. Here rock outcrops are rare, even in the river beds. In each of these valleys there are slow running streams which constitute the drainage of the area. These streams start at the northern boundary of the County and run in a southerly direction. The River Light runs down the western valley and to the east is Tothill Creek which swings westward, cutting through a low quartzite ridge to join the Light near the township of Marrabel. On the eastern side of Tothill's Range is the Julia Creek which starts at the northern boundary of the Hundred of Julia Creek, and flows south. To the north of this, in the Hundred of English, is Brady's Creek, which runs north, turns east and cuts through a ridge, finally being deflected south by a quartzite bed and flows into a lagoon near Robertstown. Just to the north of the area, in County Burra, the drainage system is that of an old peneplain with central drainage into lagoons such as Porter's Lagoon and one situated south of Black Springs.

GEOLOGY.

The rocks of the area are sedimentary in character, corresponding

to the middle beds of the Adelaide Series; however there are variations of a local character from similar beds met with in the Adelaide area. Difficulty in obtaining exact data as to thickness of these beds was encountered as they merge, very gradually, one into the other and the frequent occurrence of lenticular 'passage beds' was also a deterrent to such determinations. Soil-covered valleys, which are extensively cultivated, coupled with the soft and friable nature of the beds in these areas made any detailed mapping of structure impossible.

The lower beds of the series, in this area, consist of a considerable thickness of calcareous shales, with interbedded argillaceous varieties and some dark mudstones. This series has little character and toward the top, lenticular beds occur. Above these beds is a series of sandy shales with an approximate thickness of 850 to 900 feet. These are passage beds, having no definite boundaries, but grading into the grits and quartzites which overly them and into the calcareous shales below.

The next series of beds are grits and quartzites with an average thickness in the order of 800 feet. These beds form the crests of the parallel ridges which are the chief feature of the topography. In the stratigraphical column they are believed to correspond to the Mitcham and Glen Osmond Quartzites. They are apparently of fluvioglacial origin and have interbedded lenticular beds of feldspathic sandstones, and to a limited extent, sandy shales. The grits are usually more prominent towards the base and in the hand specimen, white decomposed feldspar invididuals are noticeable. The quartzites are generally dense and fine to medium grained with very little in the way of dark detrital minerals. Current bedding is found in many places. In some areas the interbedded feldspathic sandstones and sandy shales form fairly thick lenses. This is the case in Tothill's Range (sections 362 and 351 Apoinga) where the softer sandstones, etc., have weathered more than the quartzites, giving rise to twin crests to the ridge. There are also a few lenticular beds of sandy tillite with a very few small erratics (1599 Gilbert and 46 Saddleworth).

Overlying the Grits and Quartzites are 500-550 feet of feldspathic sandstones and arkoses. These form passage beds between the quartzite and the tillite. Generally they are friable and show evidence of their fluvioglacial character. Small embedded pebbles are not uncommon and current bedding is frequently observed. There are thin lenticular bands of tillite, with a friable sandy base, containing a few small erratics, interbedded in this series and these become more prevalent and the series passes almost imperceptibly into the tillite. There are also a few shaly bands. These arkosic beds are less priminent in the eastern portion of the area where they outcrop again due to their folded nature.

The tillite may be considered the marker bed of the area although it is seen to merge into the beds both above and below it, as well as alter somewhat in character from east to west. It has an average thickness of 1000-1100 feet. Generally it is a sandy variety of tillite, with a few small highly weathered erratics. The friable sandy nature is best illustrated in the beds occurring on the eastern side of the area in the Peters Hill region. Here the tillite forms little in the way of outcrop, being easily weathered and producing a sandy soil which is generally cultivated. Going west, the tillite becomes less sandy and the erratics are generally longer and more plentiful. In the Hundred of English the base grades into a dense dark-grey shale, here erratics up to 2 feet in length are found. This suggests a deeper water facies. Throughout the area there are bands with no erratics present, giving rise to sandstones, sandy shale and slaty shales, as one proceeds towards the eastern boundary of the area. In general the types of erratics found throughout the area consist of schists and gneisses although quartzites and some acidic igneous varieties are found.

In passing upwards from the tillite there is only a gradual change in the character of the sediments. The sandy tillite merges into sandy shales which in turn grade into shales and slaty shales. Banding is prevalent throughout these beds and in places varve-like varieties occur. In the Hundred of Julia Creek there is a bed of consolidated sandstone interbedded in this series. This bed follows around the trough of a South pitching syncline and is not found in the northern areas

It forms the undulating country of the northern watershed of the Julia Creek.

STRUCTURE.

The beds in the area have been folded into roughly symmetrical synclines and anticlines which have a general north-south strike and are gently pitching in a direction a few degrees east of south at about 15°. The structure dominates the topography as the folding causes the two central ridges to converge and curve around the crest of the anticline in the southern portion of the area in the vicinity of Allandale North. The pitch of the synclines were found to be 176° at 16° south in section 35 of Gilbert and 174° at 14° south in section 326 of Julia Creek. The crests of the synclines are not very noticeable in the field but may be easily traced by means of aerial photographs.

In the crest of the anticline located in the Hundred of Waterloo there is evidence of a strike fault but any data as to the mechanics of the fault is masked by the soil and alluvium. However, outcrops of crushed breccia, heavily cemented with iron, occur along this fault line. There are also some indications of slippage along the ridges where there are competent and incompetent beds. Evidences of this are the crushed shales found in section 1, 2 and 204 of the Hundred of English. Also the contorted and crushed shales found in sections 467 and 1599 of Gilbert and sections 406, 1074 of Waterloo.

The quartzites and grits do not outcrop in the Julia Range, the topography of which on the eastern side, suggests the possibility of a strike fault. In the north-eastern corner of the area, where Brady Creek cuts through the range, quartzites and grits do occur forming a steep cliff on the river bank. Here, because of the presence of wide quartz veins, the quartzite has become reinforced, but quickly fades towards the south under the alluvium on the eastern side of the range. There is a possibility here of a N-S strike fault but further detailed detailed investigation in an area to the north will be necessary to substantiate any such possible fault.

TERTIARY TO RECENT DEPOSITS.

Gravels of possibly Tertiary age are found throughout the area but more especially in the Peters Hill region and along the western side of the low hills to the east of the Burra Road. They are invariably cemented by iron and grade in size from fine pebble beds into the size of conglomerates. These gravels indicate the possibility of a pre-existing river system of possible Tertiary age.

CONCLUSIONS.

The beds of this area may be correlated with those of the middle Adelaide Series. The grits and quartzites which are of fluvioglacial origin are beleived to correspond to the Mitcham and Glen Osmond varieties. The tillite overlying these beds very probably corresponds to the Lower Tillite which S.B. Dickinson has mapped in the Burra Area, and postulated a fluvioglacial origin. In this area to the south of Burra, a similar origin seems almost certain. It is felt that field work in the Koonoona area of County Burra will no doubt show a direct linkage with the northern area. This will help to establish the presence of a considerable thickness of shallow water glacial deposits in this area of the State.