Section

Mt Anna Ss. – Prelim. Note

Rept. Bk. No. 56/70
G.S. No. 2579
D.M. No. 2298/62
Petroleum No. 2/63

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

PETROLEUM SECTION

NEW OBSERVATIONS ON THE BASAL CRETA-JURASSIC SANDSTONE IN THE MT. ANNA REGION, SOUTH AUSTRALIA

by

H. Wopfner
Senior Geologist

and

G.R. Heath
Geologist

04/95

26th March, 1963

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G.H.B. 63 (March 26th)

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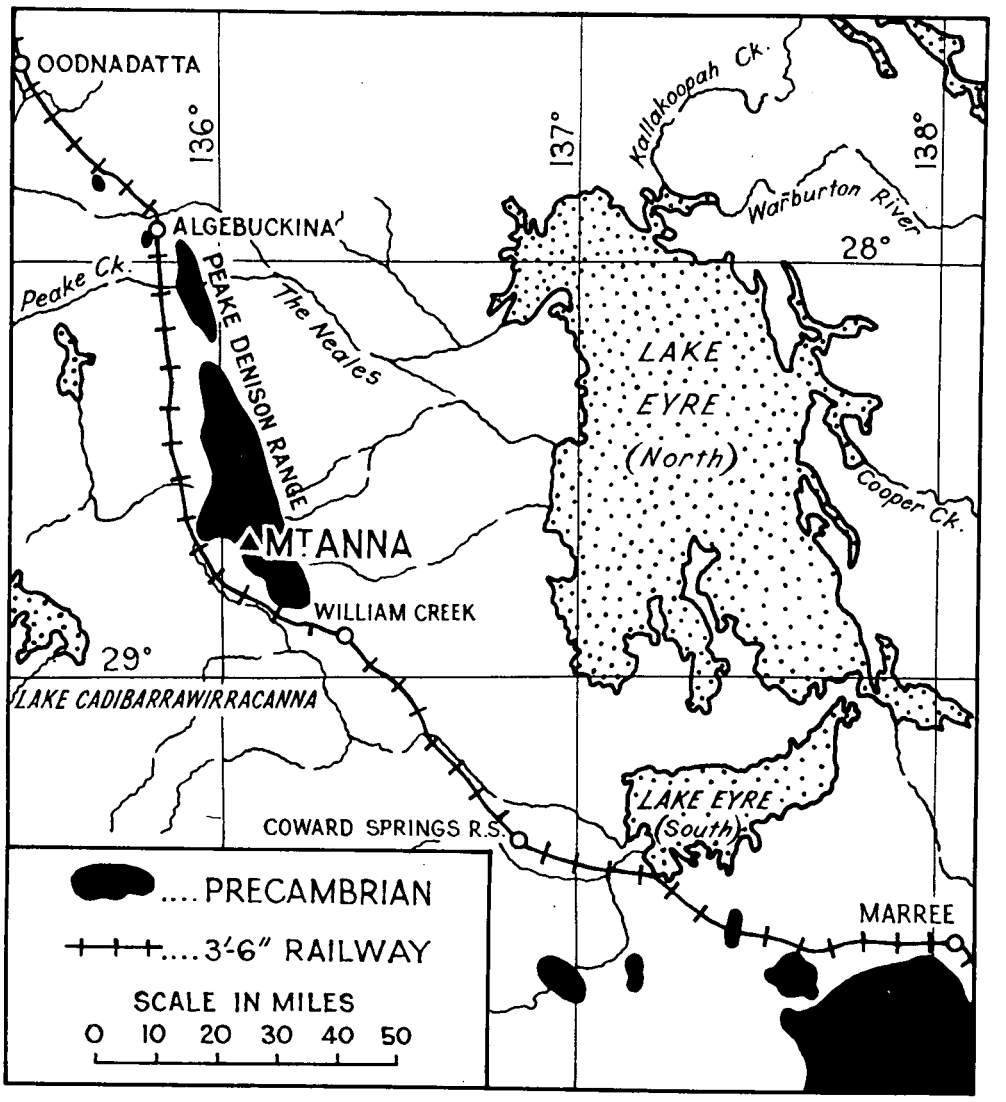

To accompany report by R. Heath, Geologist.

S.A. DEPARTMENT OF MINES

Approved	Passed	Drn.	LOCALITY MAP MT. ANNA OUTLIER	D.M.	Scale 32 miles to 1 inch
		Tcd. M.J.T.		Req.	S3366 Bd
		Ckd.			
Director		Exd.			Date 19·3·1963

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NEW OBSERVATIONS ON THE BASAL CRETA-JURASSIC SANDSTONE IN THE MT. ANNA REGION, SOUTH AUSTRALIA.

The Proterozoic inlier of the Peake and Denison Ranges, situated about 50 miles west of Lake Eyre, is surrounded by a narrow, discontinuous belt of sandstone outcrops which rest unconformably on the older rocks. In the literature, this sandstone is referred to as (?) Jurassic sandstone (Reyner, 1955; Chugg, 1957), and was generally thought to be equivalent to the uppermost artesian aquifer. However, no type locality or stratigraphic section has ever been described.

A virtually complete and undisturbed section of this sandstone is present in the Mt. Anna region (Fig. 1), where it forms a small outlier about 5.2 square miles in area. The more prominent features of the section are recorded in this note.

The sandstone is flat lying and forms several table-top hills. It rests unconformably on folded, Upper Proterozoic quartzites, slates and dolomites (Adelaide System, Torrensian equivalents), and is overlain (apparently conformably) by silty shales of presumed Cretaceous age (Roma equivalents). As shown in the stratigraphic column, Fig. 2, the sandstone sequence contains three distinctive and readily recognisable members:

(a) The basal member consists of about 50 feet of quartz grits and coarse ill-sorted sub-angular quartz sands, containing abundant beds of pebble-conglomerate and clay balls, particularly near the base. The pebbles are dominantly white quartz, with lesser quartzite, tourmaline-quartzite and jasper. They are generally rounded, frosted and frequently pitted and hollowed. The rock is highly porous, although interstitial kaolin is abundant The sandstone is mainly white in colour, but some beds have been stained brown or red-brown. Cross bedding (small to medium scale, low angle, straight to concave) is almost ubiquitous. Minor

disconformities and cut and fill structures occur irregularly throughout the sequence.

The basal 10 feet of this member are concealed by scree.

(b) The second member is 60 feet thick. It is rather featureless by comparison with the other members, consisting of buff to pinkish, medium to fine grained, friable quartz sandstone. The medium grained, well sorted, clean sandstone, which makes up the lower 40 feet, gradually becomes fine grained, silty and micaceous towards the top. Cross bedding is occasionally prominent, particularly near the base.

(c) The top member, which is about 40 feet thick, is characterised above all else by the presence of rounded pebbles of porphyry and porphyritic rhyolite (reminiscent of the Gawler Range porphyry), varying in size from 0.5 to 8 inches. Near the base of this member the porphyries are concentrated in well defined lenses and beds, in which they constitute up to 70% of the pebble-fraction. Higher up they are irregularly distributed. Quartz pebbles are moderately abundant in the basal conglomerate beds, but are rare in the upper part of the section.

The bulk of the rock consists of coarse grained, clayey, gritty, poorly consolidated, buff quartz-sandstone. It is cross-bedded throughout, the central portion showing prominent torrential concave and festoon cross bedding up to 6 feet thick. Many of the foresets which are 0.5 - 2 inches thick, are perfectly graded, starting with a basal 0.1 inch quartz-grit and passing up to a very fine grained sand on top. Such graded foresets may be repeated hundreds of times in a single bed.

As mentioned previously, this unit is overlain by white Cretaceous shales. During the formation of the Tertiary duricrust, a remnant of which still caps Mt. Anna, these shales were bleached and kaolinised.

Within the sandstone sequence several horizons have been ferruginised, and one has been superficially silicified. The most prominent ferruginization occurs at the top of the

sequence, where 11 ft. of sandstone below the shales has been completely impregnated with limonite (and possibly some silica), forming a very tough rock which caps most of the plateaux in the area. The other ferruginous horizons are massive, sandy limonite sheets ranging from 1 inch to 2 feet in thickness, with stalactitic appendages on their lower surface. They are restricted to member(b).

Silicification apparently developed on the surface of an old peneplain, from which the limonite capped plateaux, mentioned above, stood out as monadnocks. The silica has impregnated about 3 feet of section, 70 feet above the base of the sandstone. The only remnants of the old peneplain are "quartzite" terraces around the monadnocks, and one lower "quartzite" capped plateau near the southern edge of the outlier.

This silicification of a normally friable sandstone has resulted in the perfect preservation of large numbers of plant impressions (Fig.3) which would normally have been destroyed as soon as exposed to weathering.

W. K. Harris (1962) has examined samples of this flora and identified the following forms:

Microphyllopteris gleichenioides (Oldham & Morris).

Microphyllopteris minuta Medwell.

Hausmannia cf. buchii Andrae.

?Cladophlebis Australis (Morris) Seward.

Cycadites sp.

Taeniopteris spatulata Oldham & Morris.

Pagiophyllum cf. peregrinum Schimp.

He concludes that the age of the flora is Upper Jurassic to Lower Cretaceous, thus supporting the broad correlation of this sandstone with the Blythesdale Group (Whitehouse 1954).

As a result of the observations made at Mt. Anna, the following points emerge:

(1) Each of the three members reflects a distinct depositional environment which, from a preliminary evaluation, would appear to be:

Member (a) terrestrial - fluviatile.

Member (b) shallow water - lacustrine.

Member (c) fluviatile.

(2) Porphyry boulders have been known to occur near the base of the Cretaceous for many years and, in fact, led Woolnough & David (1926) to postulate a Cretaceous "glaciation". However, it now appears that these occurrences are referable to a relatively thin well defined stratigraphic horizon.

Finally, we emphasize that this is the first virtually complete exposure of the main Great Artesian Basin aquifer recognised in South Australia. We feel that such a section, used as a standard, will greatly facilitate the study of sedimentation around the western and southern margins of the Basin.

The Mt. Anna section will be described in detail and formally named in a paper now in preparation.

H. Wopfner
Senior Geologist

HW-GRH:AGK-EMD
26/3/63

G.R. Heath
Geologist

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Woolnough, W.G. & David, T.W.E. (1926) Quart. Journ. Geol. Soc. Vol. 82.

Figure 3: Frond of Cycadites sp. from 70 ft. level Mt. Anna section (scale: graph paper, 0.1 in. divisions).