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A FURTHER COLLECTION OF LIMESTONES FROM ROUGH
RANGE STRUCTURE, CARNARVON BASIN, WESTERN AUSTRALIA

by

I. Crespin and D.J. Belford.

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Twelve rock samples from the Rough Range Structure were submitted by West Australian Petroleum Pty.Ltd. for micropalaeontological examination. The results of the examination of an earlier collection was given in Records 1955/48. Seven of the present samples came from a gully due east of Rough Range Well No.6 and five from a gully immediately south of Rough Range Well No.7. The distance between the two well sites is approximately $2\frac{1}{4}$ miles. A detailed description of samples from each section together with the thickness of the section is given below. The sections from each locality are arranged in descending stratigraphical sequence.

A table is attached showing formations represented in samples examined from thirteen localities on the Rough Range Structure. These are arranged in approximately a north-south direction. The Table indicates the necessity for more detailed sampling before a complete picture of the stratigraphical sequence in the area can be obtained.

A. Gully due east of Rough Range Well No.6.

Section 8 - 18 feet 8 inches

Crystalline limestone with calcareous algae, foraminifera and molluscan shell fragments. Many of the organisms are ironstained.

Foraminifera:

Austrotrillina cf. striata
Calcarina cf. verriculata
Lepidocyclina (Trybliolepidina) sp.
Rotorbinella cf. cycloclypeus
Sorites cf. verbeeki
Valvulina sp.
Numerous miliolids

Section 7 - 2 feet 8 inches (Horizon δ)

Calcareous sandstone with a few small indeterminate foraminifera.

Section 6 - 8 feet (Horizon ϵ)

Crystalline coral limestone with calcareous algae including Halimeda, and foraminifera, chiefly ironstained.

Foraminifera:

Acervulina inhaerens
Amphistegina sp.
Calcarina cf. verriculata
Sorites cf. verbeeki
Small miliolids

Section 5 - 16 feet

Crystalline limestone with abundant calcareous algae and some foraminifera, not well preserved.

Foraminifera:

Calcarina cf. verriculata
Carpenteria sp.
Rotorbinella cf. cycloclypeus
Sorites cf. verbeeki

Section 4 - 5 feet 4 inches

Crystalline limestone similar to section 8 with calcareous algae (abundant), foraminifera and some bryozoa.

Foraminifera:

Acervulina inhaerens
Calcarina cf. verriculata
Rotorbinella cf. cycloclypeus
Miliolids

Sections 2 and 1 - 21 feet

Section 2

Crystalline limestone similar to section 4, with calcareous algae and foraminifera.

Foraminifera:

Austrotrillina howchini
Austrotrillina cf. striata
Amphistegina sp.
Flosculinella sp.
Rotorbinella cf. cycloclypeus
Sorites cf. verbeeki
Numerous miliolids

Section 1.

Crystalline limestone similar to Section 5 with calcareous algae and foraminifera which are fragmentary and poorly preserved.

Foraminifera:

Amphistegina sp.
Austrotrillina howchini
Calcarina cf. verriculata
cf. Flosculinella
Gypsina vesicularis
Gypsina globulus
Lepidocyclina sp.
Rotorbinella cf. cycloclypeus
Sorites cf. verbeeki
Numerous small foraminifera in groundmass

B. Gully immediately south of Rough Range Well No.7.

Section 6 - 16 feet

Crystalline limestone with calcareous algae, foraminifera and fragments of molluscan shells.

Foraminifera:

Austrotrillina cf. striata
Borelis sp.
Marginopora cf. vertebralis
Miogypsina cf. irregularis
Rotorbinella cf. cycloclypeus (c)
Sorites cf. verbeeki

Section 5 - 4 feet (Horizon δ)

Crystalline limestone and calcareous sandstone with foraminifera, chiefly fragmentary.

Foraminifera:

Austrotrillina howchini
Austrotrillina cf. striata
Lepidocyclina sp.
Rotorbinella cf. cycloclypeus
Sorites cf. verbeeki
Valvulina sp.
Numerous miliolids

Section 3 - 16 feet (Horizon α)

Dense crystalline limestone with abundant calcareous algae including Halimeda, also foraminifera, bryozoa and shell fragments.

Foraminifera:

Austrotrillina howchini
Amhistegina sp.
Calcarina cf. verriculata
Carpenteria sp.
Lepidocyclina verbeeki
Lepidocyclina cf. parva
Lepidocyclina (Eulepidina) cf. manduensis
Lepidocyclina sp.
Neoalveolina pygmaea
Sorites verbeeki
Spiroclypeus margaritatus
Spiroclypeus sp. nov.

Section 2. - 21 feet 4 inches

Dense crystalline limestone with numerous calcareous algae and foraminifera.

Foraminifera:

Austrotrillina howchini
Amhistegina sp.
Calcarina cf. verriculata
Carpenteria sp.
Cycloclypeus sp.
Lepidocyclina verbeeki
Lepidocyclina inflata
Lepidocyclina parva
Lepidocyclina (E.) cf. manduensis
Neoalveolina pygmaea
Rotorbinella cf. cycloclypeus
Sorites cf. verbeeki
Spirolina sp.
Spiroclypeus margaritatus
Spiroclypeus yabei

Section 1. - 37 feet 4 inches

Dense crystalline limestone with numerous calcareous algae and foraminifera.

Foraminifera:

Austrotrillina howchini
Flosculinella cf. cucumboides
Lepidocyclina inflata
Lepidocyclina parva
Sorites cf. verbeeki
Spiroclypeus margaritatus
Numerous miliolids

NOTES ON THE FORAMINIFERAL ASSEMBLAGES

This interesting collection of limestones from the Rough Range Structure contains two foraminiferal assemblages, one which is characteristic of the beds of the basal part of the Trealla Formation and the other which appears to be the oldest recorded from the surface of either the Cape Range or Rough Range Structures.

The assemblage similar to that found in the beds of the basal Trealla occurs in both measured sequences. All samples from the gully east of Rough Range No.6 from sections 8, 7, 6, 5, 4, 2, and 1 in downward sequence (no sample was received from section 3) contain this assemblage; the specimen from section 7, which represents Horizon δ of the W.A.P.E.T. geologists in the area, is typical of the Pilgrammuna Formation, which is the sandy equivalent of the basal Trealla. In the gully east of Rough Range No. 7 only sections 6 and 5 contain this assemblage and the sample from section 6 again resembles the calcareous sandstone of the Pilgrammuna Formation.

The older assemblage is present in sections 3, 2, and 1 near Rough Range No.7 and represented beds stratigraphically lower than any recorded from outcrops of Mandu Calcarenite in the Cape Range Structure. These limestones are characterised by the presence of many tests of the typical "e" stage genera Spiroclypeus and Neoalveolina. Spiroclypeus is represented by the species S.margaritatus (Schlumberger) and S.yabei van der Vlerk and also a new species. Neoalveolina pygmaea (Hanzawa) is found in Indo-Pacific deposits as high up as "e₄". Limestones containing these two genera were collected by E.A. Rudd in 1936 in the northern part of Rough Range and W.A.P.E.T. geologists recently found limestones containing Spiroclypeus in a gully due south of Rough Range No.3 and in the second gully north-east of Rough Range No.2 (see Record 1955/48).

Two horizons, indicated by letters " δ " and " α " have been recognized in each sequence by W.A.P.E.T. geologists. The correlation of Horizon δ in section 7 near Rough Range No.6 and section 5 near Rough Range No.7 is confirmed by micropalaeontological and lithological evidence. Both represent the calcareous sandstone lithology of the Pilgrammuna Formation. The suggested correlation of Horizon α in section 6 in the area of Rough Range No.6 and in section 3 in the area of Rough Range No.7 cannot be sustained on present micropalaeontological evidence. The available specimen of limestone from section 6 contains a typical basal Trealla foraminiferal assemblage whilst the limestone from section 3 contains Spiroclypeus and Neoalveolina. The relationship of the assemblage in section 6 near Rough Range No. 6 and section 3 near Rough Range No.7 may be solved by close sampling of these two measured sections. In section 6 one sample was submitted from 8 feet of section and in section 3 one specimen only came from 16 feet of section.

"e" stage limestones containing numerous tests of stout species of Eulepidina including E.insulaenatalis and a new species but without Spiroclypeus were present in the collection of limestones from Rough Range recently examined (Records No.1955/48). This assemblage was unique in the limestones of the Rough Range and Cape Range and has not been recorded in the present collection.

Rudd collected Spiroclypeus-bearing rocks from below the Tulki Limestone at the northern end of the Rough Range Structure. In the central portion, that is at a locality between the sites of Rough Range No.5 and Rough Range No.2, he collected limestones of the Trealla Formation. In Rough Range No.1 Well only Trealla and Mandu Formations were recorded near the top of the well. This may be due to the lack of samples between the depth of 15 feet and 60 feet, which may have represented the Tulki Formation, and the Spiroclypeus-bearing rocks may have been in the upper part of the unsampled interval below 200 feet.

Evidence indicates that the Tulki and Mandu Formations appear to be present in the Rough Range area but have thinned out to a remarkable degree when compared with their exposures in the Cape Range Structure to the north-west. It seems that the problems of the stratigraphical sequence and relationships of the microfaunas in the Rough Range Structure could be satisfactorily settled if the beds from the northern part, where Rudd obtained samples, and in gullies southward to the vicinity of Rough Range No.7 Well, were more closely sampled.

Another species of Austrotrillina, tentatively referred to A.striata, Todd and Post was found in the limestone from section 8 near Rough Range No.6 and from section 6 near No.7 Bore. This species was described by Todd and Post (1954) from one of the deep holes drilled on Bikini Atoll where it was first met with in rocks of "f₁" stage and later in "e" stage beds. A.striata has a striated surface, much coarser-textured alveolae and is less distinctly triangular in transverse section.

REFERENCE

Todd, R.M. and Post, Rita, 1954. - Smaller Foraminifera from Bikini Drill Holes, U.S.geol.Surv.Prof.Pap. 260-N, 547-568.

TABLE SHOWING NAMED FORMATIONS, AND A POSSIBLE UNNAMED FORMATION, WITH ASSOCIATED MICROFAUNAS, IN SAMPLES COLLECTED FROM LOCALITIES IN THE ROUGH RANGE STRUCTURE

The localities, which are arranged below in an approximate north-south direction, are as follows:

1. N. end of Rough Range (E. A. Rudd)
2. Gully due S. of Rough Range No.3 (W.A.P.E.T.)
3. Rough Range No.1 Well
4. Gully due S.E. of Rough Range No.5 (W.A.P.E.T.)
5. Gully S.W. of Rough Range No.6 (W.A.P.E.T.)
6. Gully due E. of Rough Range No.6 (W.A.P.E.T.)
7. Gully S. of Rough Range No.6 (W.A.P.E.T.)
8. Top of Rough Range at Trig. Point (N.H. Fisher)
9. 15 feet to 40 feet below Rough Range trig. station
384 feet (E. Craig)
10. Central portion of Rough Range between sites of No.5 and No.6 Wells, (E.A. Rudd)
11. Second Gully N.E. of Rough Range No.2 (W.A.P.E.T.)
12. Gully N.E. of Rough Range No.2 (W.A.P.E.T.)
13. Gully S. of Rough Range No.7 (W.A.P.E.T.)

Formation and associated microfaunas	Localities												
	1	2	3	4	5	6	7	8	9	10	11	12	13
<u>Trealla (basal)</u> <u>Marginopora</u> , small <u>Lepidocyclina</u> , <u>Flosculinella</u> , <u>A.howchini</u>	x	-	x	-	-	x	-	x	x	x	-	-	x
<u>Tulki</u> Abundant <u>Cycloclypeus</u> small <u>Lepidocyclina</u> <u>A.howchini</u>	x	-	?	-	-	-	-	-	-	-	-	-	-
<u>Mandu</u> <u>L. (E.) badjirraensis</u> <u>L. (E.) manduensis</u> numerous small forams	-	-	x	-	-	-	-	-	-	-	-	-	-
Possible unnamed formation. (a) <u>L. (E.) insulaenatalis</u> , <u>L. (E.) sp.nov.</u> , <u>A.howchini</u> without <u>Spiroclypeus</u> and <u>Nealveolina</u>	-	-	?	x	x	-	x	-	-	-	-	-	-
(b) <u>Eulepidina</u> with <u>Spiroclypeus</u> , <u>Nealveolina</u> and <u>A.howchini</u>	x	x	?	-	-	-	-	-	-	-	x	x	x