COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS

RECORDS

1952/72

THREE FORAMINIFERAL ZONES IN THE TERTIARY OF AUSTRALIA

by

I. Crespin

Discussion.

Three Foraminiferal Zones in the Tertiary of Australia by M. F. Glaessner, Geol.Mag., Vol. 88, No.4,1951.

Dr. M. F. Glaessner published a paper in Volume 88, No. 4, 1951 of this Journal in which he describes foraminiferal zones in the Tertiary of Australia and in which he summarises known and unpublished information on the Australian Tertiary sequence. A great deal of precise stratigraphic work has been done on the Australian Tertiary rocks in the past five years. Glaessner knew of this and it is regretted that he did not wait until the results of this work were available. Recent discoveries made since Glaessner's paper was prepared, have made necessary a drastic revision of the age correlations of the Victorian Stages and have emphasised the undesirability of prematurely publishing material based on investigations which are still in progress.

He lists what he calls "three distinctive foraminiferal zones" (1) Hantkenina alabamensis Zone, (2) Victoriella plecte Zone and (3) Austrotrillina howchini Zone. In his correlation table on p. 274, he indicates a fourth, "?Sherbornina Zone", which may be on zonal value. Recent investigation by Raggatt and Crespin (1952) in the Bird Rock section, Torquay, Victoria, which has been regarded as the type area for the "Janjukian Stage" and westward as far as Brown's Creek and Johanna River, have shown that the proposal of Hantkenina, Victoriella and Sherbornina as distinct zones is incorrect. In the basal portion of the Bird Rock Cliff section, these three forms occur together in the one sample, whilst Victoriella plecte has been found in the Upper Eocene beds at Johanna River and Brown's Creek. Sherbornina atkinsoni is common in many rock samples containing Victoriella in the vicinity of Bird Rock and Point Addis and its occurrence in beds higher in the stratigraphic sequence is extremely rare. "The possibility of establishing a zone based on the occurrence of Sherbornina between Victoriella and Austrotrillina Zones" (p. 278) seems quite untenable. The presence of Hantkenina alabamensis in the basal beds at Bird Rock definitely gives an Upper Eocene age for at least the lower part of the so-called "Janjukian Stage", which Glaessner has put down as Upper Oligocene.

According to Glaessner (p. 281) "Victoriella does not give any direct age indications". This writer believes that, in the absence of Hantkenina alabamensis, Victoriella plecte will prove an important age determinant for the Upper Eocene because of its ability to thrive under calcareous or argillaceous conditions. Also, on account of its comparative abundance, it is found in many places where the search for Hantkenina is unsuccessful.

On. p.277, Glaessner states that "the Hantkenina Zone of Brown's Creek is developed as a glauconitic clay with Notostrea forming the lowest fossiliferous bed of a sequence of Tertiary strata which rests, with unfossiliferous ironstones at its base, unconformably upon Jurassic sandstones". Raggatt and Crespin (1952) found that thirty-five feet of clays containing abundant foraminifera and mollusca, are exposed in a continuous section below the bed with Hantkenina and Notostrea, and that Jurassic rocks are not exposed at this place. Field measurements show that beneath these very fossiliferous beds there is a thickness of 166 feet of Tertiary strata. Also beds with Hantkenina are not at the top of the Eocene in Brown's Creek-Johanna River section as shown in the correlation table on p.274; there are at least 145 feet of beds containing Upper Eocene foraminifera above them. The species recognized include Anomalina perthensis

Parr, Angulogerina subangularis Parr, Alabamina obtusa (B. & H.) var. westraliensis (Parr), Bolivinopsis crespinae, Asterigerina adelaidensis (Howchin), Cibicides pseudoconvexus Parr and Pseudobulimina glaessneri Howe and Roberts.

On p. 278, Glaessner refers to "carbonaceous, pyritic sands and sandy clays with Cyclammina" as occurring above the Hantkenina zone. Instead, the Cyclammina beds of the "Anglesean Stage" stratigraphically underlie the beds containing Victoriella and Sherbornina in the Point Addis section. This sequence is common in many of the bores in Gippsland, in the Mallee and in south-western Victoria and the age of the Cyclammina beds is very probably Middle Eocene. The writer has examined a considerable amount of material from the section at Anglesea (Singleton, 1941). Cyclammina is exceedingly abundant there and many tests are beatifully preserved. Species are readily determinable rather than "not being identifable owing to distortion" as stated by Glaessner.

Many of Glaessner's comments regarding Austrotrillina howchini (pp. 276, 279, 281) are taken from published and unpublished work of the writer, who adheres to her views on the distribution in Australia of this important Miocene Indo-Pacific species (Crespin, 1948; 1950). Similarly, the stratigraphic position of Flosculinella bontangensis has been determined by the study of measured sections in North-West Australia. More recent research, however, shows that both of these forms must be considered as zonal species, in North-West Australia, for "f1" stage of the Indo-Pacific "letter classification" (Van der Vlerk, 1948) rather than "f2". The upper limit of A.howchini has not been definitely proved in south-eastern Australia. It is also admitted that "f1" stage is most probably Lower Miocene.

It is difficult to understand why Glaessner in the correlation table on p. 274, should correlate his foraminiferal zones in Australia with definite European Stages of the Tertiary, for example, the Sherbornina Zone with the Aquitanian and the Victoriella plecte Zone with the Chattian. Surely a long distance correlation of zones in the Australian Tertiaries with European Stages would require the presence of similar zonal species in the foraminiferal assemblages in both parts of the world. It was the absence of similar species in the deposits of these two widely separated regions that caused the early Dutch paleontologists to institute the "letter classification" for the East Indian Tertiaries and in spite of the very considerable detailed work that has been done there, agreement has still not been reached about the correlation of European Stages with Indo-Pacific Stages or Zones.

The correlation of Eocene and Lower Oligocene deposits throughout the world by means of the foraminifera and especially the larger foraminifera, is relatively easy. Forms such as Discocyclina, Assilina and Pellatispira are unknown in rocks younger than Eocene. Amongst the smaller zonal genera, Hantkenina is characteristically Middle to Upper Eocene and some of the smaller foraminiferal Eocene species are also widely distributed. It has been generally recognised that the association of reticulate Nummulites with Eulepidina represents stage "d" in the East Indies which by some authors, is correlated with the Rupelian or Middle Oligocene. Beds of Oligocene age are poorly developed in the Indo-Pacific region and in some places are absent.

Tan (1939) regarded the Aquitanian as Lower Miocene or Lower Neogene and suggested that certain beds in the Indo-Pacific region which contained European species

of Eulepidina such as E.dilatata E.elephantina and E.marginata could be correlated with the Aquitanian. He urged "that at the present state of knowledge the differentiation of Oligocene from Aquitanian by means of larger foraminifera is only possible if reticulate or other genuine Camerines are present". Recent research seems to indicate that the Aquitanian is Oligocene-Miocene.

Tan (1939) said it was very difficult to differentiate the Burdigalian Stage and higher European Stages in the Indo-Pacific because of "fundamentally different" marine faunas in southern Europe and in the Indo-Pacific. It is a well recognised fact that distinct faunal provinces existed throughout the world during Miocene times. Genera such as Katacycloclypeus, Trybliolepidina and Alveolinella and several species of Miogypsina and Nephrolepidina which are widely distributed in Miocene deposits in the Indo-Pacific region are unknown in the European beds. Furthermore, Miogypsina and Lepidocyclina disappear in the Burdigalian in Europe whereas they continued to live during later Miocene times in the Indo-Pacific region. Rayed forms of Lepidocyclina with nephrolepidine-trybliolepidine and trybliolepidine embryonic apparatus dominate the "f" stage (Miocene) assemblages in the Indo-Pacific region and are unknown in European assemblages.

REFERENCES.

Crespin, I., 1948 Indo-Pacific influences in Australian Tertiary foraminiferal assemblages, Trans.Roy.Soc.S.Aust. 72,(1) pp.133-142.

———————, 1950 Australian Tertiary Microfaunas and their relationships to assemblages elsewhere in the Pacific region. Journ.Pal. 24(4), pp.421-429.

Glaessner, M.F., 1951 Three Foraminiferal Zones in the Tertiary of Australia. Geol.Mag. 88,(4),pp.273-284.

Parr, W.J., 1938 Upper Eocene Foraminifera from deep borings in King's Park, Perth, Western Australia. Journ.Roy.Soc.W.Aust. 24, pp.69-101.

———————, 1947 An Australian record of the foraminiferal genus Hantkenina. Proc.Roy.Soc.Vic. n.s. 58, (2) pp. 45-47.

Raggatt, H.G. and Crespin, I. 1952 Preliminary note on Geology of Tertiary Rocks between Torquay and Eastern View, Victoria. Aust.Journ.Sci. 14 (4).

Singleton, F.A., 1941 The Tertiary geology of Australia. Proc. Roy.Soc.Vict. n.s. 53(1),pp.1-118.

Tan Sin Hok, 1939 Remarks on the "letter" classification of the East Indian Tertiary. De.Ing. in Ned.-Indie, vol.6.,(6), pp. iv98-iv101.

Vlerk, I.M. van der, 1948 Stratigraphy of the Caenozoic of the East Indies based on Foraminifera. Inter.Geol.Cong.18thSess.Gt.Brit. 15, pp. 61-63.

(I. Crespin)

Bureau of Mineral Resources,
Geology and Geophysics,
CANBERRA.