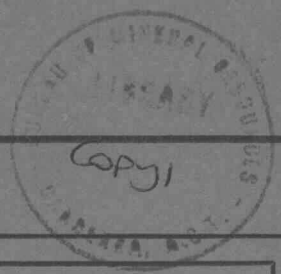

BULLETIN NO. 1

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(Palae 1)

PALAEONTOLOGICAL BULLETIN

The Tertiary Geology of East Gippsland, Victoria:

as shown in Borings and Quarry Sections
(with 2 maps and plate)

By

FREDK. CHAPMAN, A.L.S., F.G.S.,
Commonwealth Palaeontologist,

AND

IRENE CRESPIN, B.A.,
Assistant Palaeontologist

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INTRODUCTORY NOTE.

The discovery of natural petroleum in Gippsland has resulted in considerable drilling activity in various parts of the area. As a result, a large amount of sub-surface information has been collected which supplements, to a very important degree, the meagre details obtainable by the ordinary methods of geological survey. Bore cores and surface samples have been submitted to critical examination by the officers of the Department of Home Affairs, and far-reaching conclusions have been arrived at.

It has been shown conclusively that there exist in the region a number of well defined and easily recognizable "marker beds" which can be relied on, in drilling operations, as "geological landmarks" by the aid of which the structure of the petroliferous basin can be elucidated.

It is not to be expected that absolute uniformity of conditions will be encountered over wide areas. "Marker beds" themselves will vary from place to place, and interbedded sediments will vary continuously in thickness and character. But for the purpose of determination of structures over limited areas, such as are involved in individual oilfields, these regional variations are negligible. The "marker beds" described in this Bulletin may therefore be trusted absolutely as the safest guide in the location of potential oil structures, and systematic scout drilling closely checked by palaeontological examination of drill cores will undoubtedly provide the most economical method of prospecting for such structures in Gippsland.

These methods are implicitly relied on in the great oilfields of other countries, and spectacular successes have been achieved by this close association of scout drilling with scientific study of bore cores.

W. G. WOOLNOUGH,
Geological Adviser to the Commonwealth Government.

THE TERTIARY GEOLOGY OF EAST GIPPSLAND, VICTORIA, AS SHOWN IN BORINGS AND QUARRY SECTIONS.

By Fredk. Chapman, A.L.S., F.G.S., Commonwealth Palaeontologist, and Irene Crespin, B.A., Assistant Palaeontologist.

CONTENTS.

I. INTRODUCTION.

The authors have been engaged for the past four years in studying in the minutest details the material obtained from various borings in both the Lakes Entrance and the Stradbroke–Glencoe areas. This work has been done under the authority of the Department of Home Affairs at the Commonwealth Palaeontologist's Office at the National Museum, Melbourne. We would here like to acknowledge the exceptional facilities afforded by the Director and Trustees of the National Museum in making available to us their invaluable reference collection of fossils. We are also under great obligations to the officers of the Geological Survey of Victoria for their valuable help in facilitating the examination of the cores from the various bores here dealt with.

We have examined six bores in the Lakes Entrance area, eleven bores in the Stradbroke–Glencoe areas, and eight quarry sections and surface samples from two bores in the Stradbroke–Glencoe areas.

The bores and quarries are fully listed in sections II. and III. From the immense amount of details derived from the bore cores and quarry samples it has been possible to piece together conclusive evidence in regard to the sequence and age of the beds in East Gippsland.

II. LAKES ENTRANCE AREA.

A list of bores examined is as follows :—

(1) Parish of Colquhoun—
No. 1 Bore, Lakes Entrance Development Co. (No. 1 Bore, Lake Bunga, Lakes Entrance) .. 102–1,215 feet
No. 1 Government Bore (No. 3, Lakes Entrance) .. 20–1,404 ft. 6 in.
No. 1 Bore, Kalimna Co., Rigby Island (upper portion) .. .. 30–100 feet

(2) Parish of North Colquhoun—
No. 1 Bore, North Colquhoun (No. 4, Lakes Entrance) .. .. 54–666 feet

(3) Parish of Bumberrah—
No. 1 Bore (Metung) .. .. .. 60–1,429 feet

(4) Pelican Point, Lake Victoria .. .. .. 325–392 feet
(Three samples only.)

(*a*) We have selected as a type bore for this area No. 1 Bore, Parish of Bumberrah (Metung), the reason being that it gives us the most complete series from the Kalimnan down to Upper Oligocene. The depth of this bore is from 60–1,429 feet. The sequence from above downwards is as follows :—

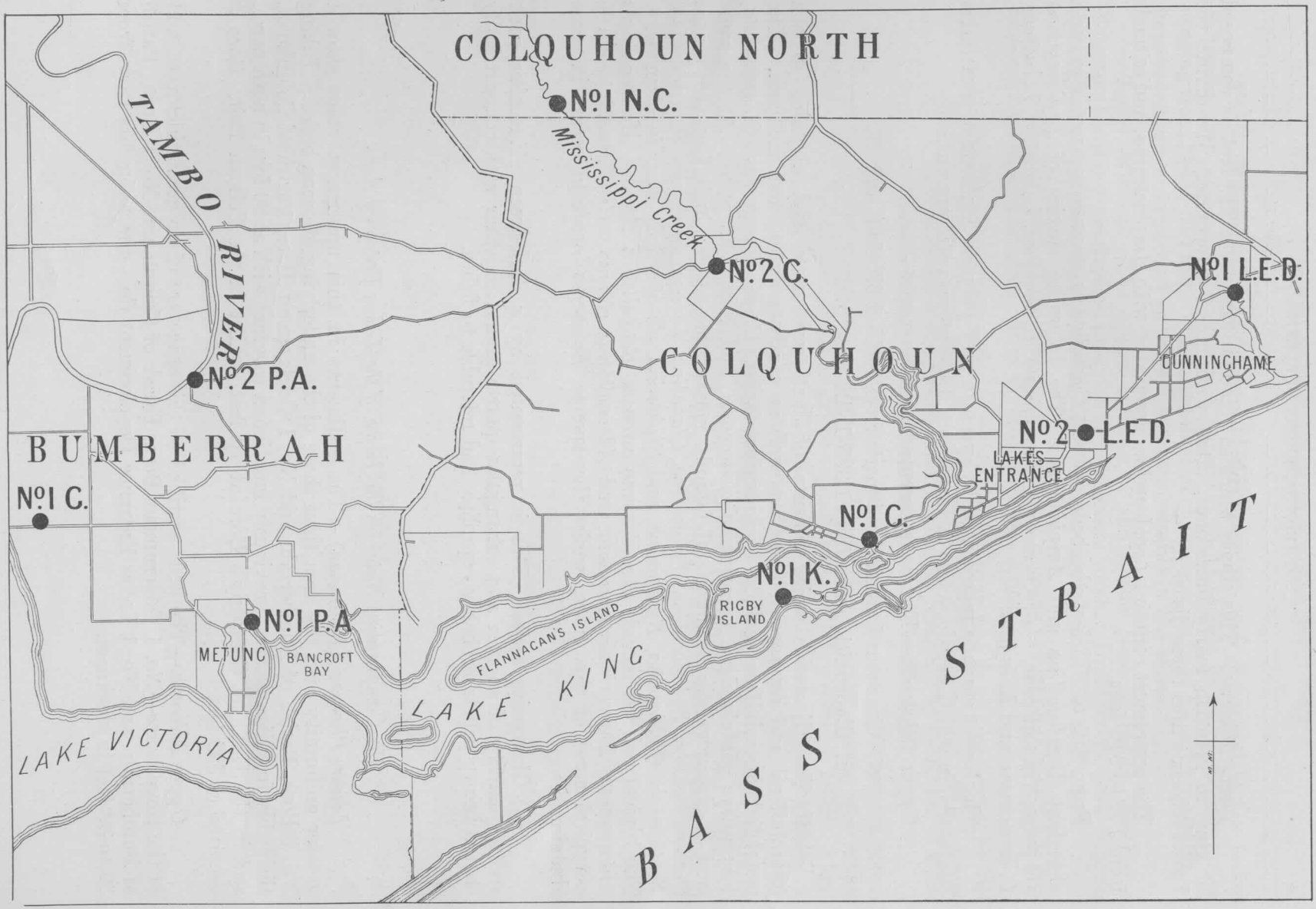
Lower Pliocene (Kalimnan)	60–240 feet
Upper Miocene	240–285 feet
Middle Miocene	290–690 feet
Lower Miocene	700–1,110 feet
Upper Oligocene	1,115–1,429 feet

Lower Pliocene (Kalimnan).—These beds are easily recognized as greenish-grey shelly marls, with a fair proportion of glauconite and by the very characteristic Lower Pliocene fauna, of which *Neotrigonia howitti*, *Glycymeris halli*, *Limopsis beaumariensis*, *Chlamys antiaustralis*, *Cardita kalimnae*, *Clausinella subroborata*, *Phos gregsoni*, *Tylospira coronata*, *Bathytoma pritchardi*, *Cancellaria wannonensis*, and *Turritella conspicabilis* are notable examples. At 90 to 100 feet there occurs an excessively rich band of typical Kalimnan fossils which forms a marker bed in this area.

Upper Miocene.—The main features of the sediments ascribed to this stage are the absence of Kalimnan species of mollusca, and the presence of a few bivalves which are restricted to the upper part of the Miocene series, including a new species of *Spondylus*. together with an almost entire absence of gasteropoda. Polyzoa first becomes abundant at this stage. The sediments are generally grey friable marls.

Middle Miocene.—This comprises the chief polyzoal series, represented by typical grey and white polyzoal limestones, and includes the first appearance of the foraminiferal genus *Amphistegina* in any abundance. Characteristic species of the polyzoa are *Cellepora fossa*, *Cribrilina terminata*, *Hiantopora liversidgei*, *Acropora gracilis*, *Smittina tatei*, *Idmonea milneana*, *Lichenopora wilsoni*, and *Conescharellina philippinensis*. A typical series of the foraminifera is met with in this stage, comprising *Textularia gramen*, *T. sagittula*, *Dentalina fissicostata*, *Lenticulina orbicularis*, *L. rotulata*, *Cibicides ungerianus*, *Eponides repandus*, *Operculina bartschi*, *O. plana*, and *Amphistegina lessonii*.

Map of location of bores in Lakes Entrance area.



Scale—114 chains to 1 inch.

Lower Miocene.—This stage, which in this bore comprises 410 feet, is composed of grey to greenish marly limestones, often with much glauconite. We divide the Lower Miocene into three divisions :—

The uppermost contains *Lepidocyclina* associated with *Amphistegina*, and extends from 700 to 870 feet

From 872 to 873 feet the beds contain *Cycloclypeus communis*, associated with abundant *Lepidocyclina* and *Amphistegina*. The following species of *Lepidocyclina* are present in this zone :—*L. tournoueri*, *L. marginata*, *L. angulosa*, *L. martini*, *L. radiata*, *L. borneënsis*, and *L. inflata*.

The lowest stage is represented by greenish-grey polyzoal limestones, sometimes laminated, in which *Lepidocyclina* is absent but *Amphistegina* still present.

Upper Oligocene.—This is represented by two stages—

(i) Micaceous foraminiferal marls from 1,115–1,370 feet, and

(ii) Glauconitic series from 1,396–1,429 feet.

(i) The Micaceous series consists of dark-grey marls and contains a rich foraminiferal and ostracodal fauna, as well as corals, polyzoa, and mollusca. The restricted foraminifera include *Cyclammina incisa*, *C. longicompressa*, *C. rotundata*, *Vaginulina gippslandica*, *Lamarckina glencoensis*, and *Victoriella plecte*. At the same time a characteristic foraminiferal faunula marks this stage, including the genera *Quinqueloculina*, *Spiroloculina*, *Triloculina*, *Clavulina*, *Lagena*, *Dentalina*, *Polymorphina*, *Lenticulina*, *Globigerina*, *Epistomina*, and *Siphonina*, all of which occur in abundance. The typical polyzoa include *Aspidostoma airensis*, *Reticulipora airensis*, *Membranipora concamerata*, *Bracebridgia emendata*, and *Adeonellopsis obliqua*. *Cyathosmilia velata* is a typical coral of this stage, whilst the sponge *Ecionema newberyi* occurs in some abundance.

(ii) Glauconite series. This is represented by a dark-green glauconitic rock and a quantity of angular and subangular quartz grains, together with concentrically coated brown pellets probably coprolitic and referable to fishes.

(*b*) *Comparative Notes on the Bores of the Lakes Entrance Area.*

Lower Pliocene (*Kalimnan*).—The sediments in this uppermost stage show a greater uniformity over the area than those of the underlying Miocene beds. Taking No. 1 Bore, Parish of Bumberrah, and No. 1 Government Bore, Parish of Colquhoun, the richly fossiliferous zone previously mentioned was met with at 90 feet in both bores, and in the Kalimna Company's Bore at 70 feet, whilst in the Pelican Point Bore it occurred at 392 feet.

Upper Miocene.—The beds ascribed to this stage are of no great thickness, and in the three bores—No. 1 Government Bore, Parish of Colquhoun, No. 1 Bore, Parish of Bumberrah, and No. 1 Lakes Entrance Development Co.—the sediments vary from 30 to 80 feet in thickness.

Middle Miocene.—The sediments of this stage are well developed in the Lakes Entrance area and show considerable variation in thickness in the different bores, ranging from 304 to 570 feet. Their lithological characters, as hard to soft grey polyzoal limestones, are so consistent as to be easily recognizable in the series.

Lower Miocene.—The upper division of the Lower Miocene in all the Lakes Entrance bores is characterized by a rich *Lepidocyclina* fauna. In thickness the sediments are somewhat less than that of the Middle Miocene, varying from 250 to 410 feet.

Upper Oligocene.—This stage shows a general average thickness of about 250 feet in the Lakes Entrance area. It is divided into two series—

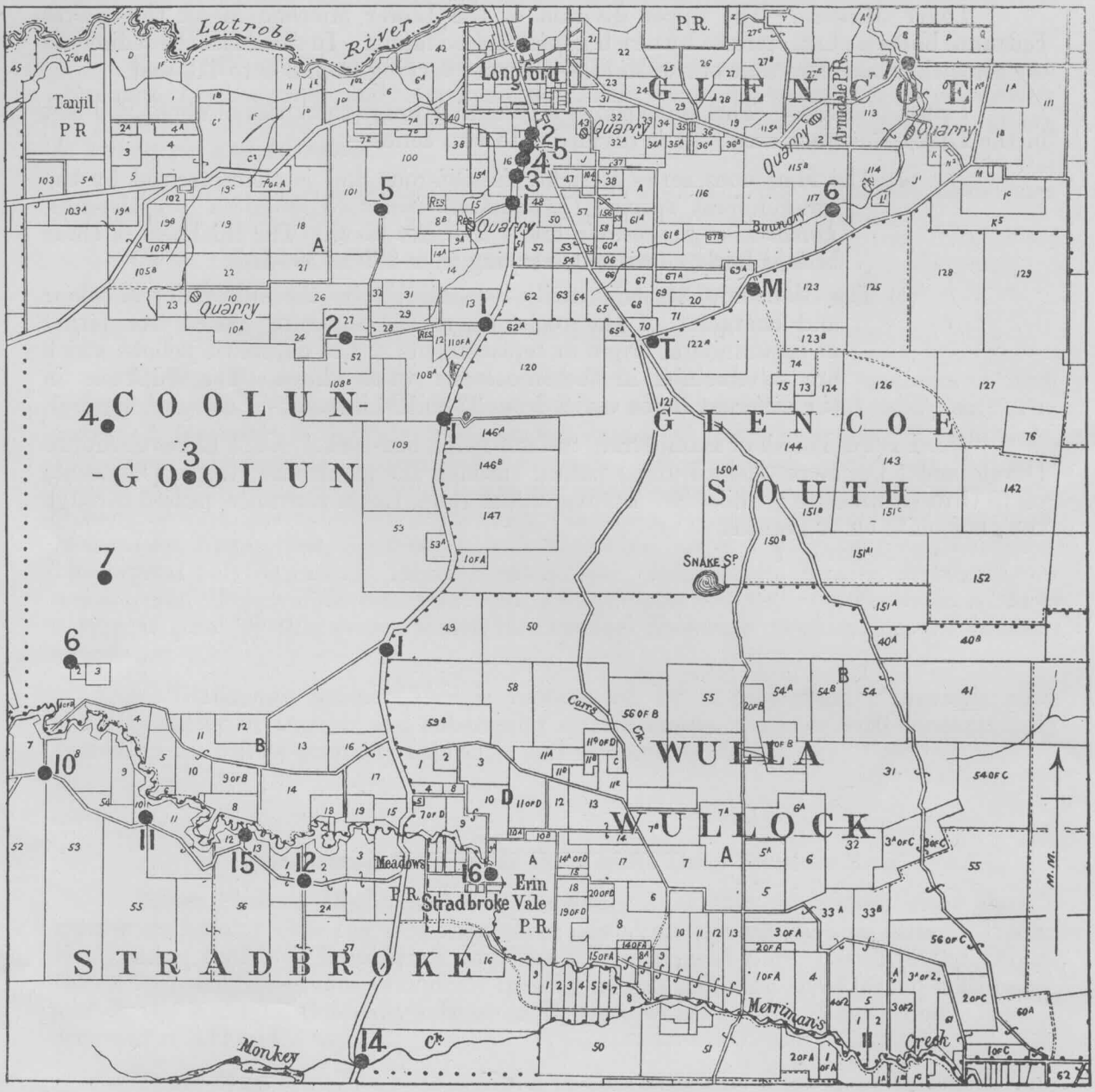
(*a*) The Micaceous series is richly fossiliferous and is characterized by the foraminiferal species *Cyclammina incisa*, *Vaginulina gippslandica*, *Lamarckina glencoensis*, and *Victoriella plecte*. The thickness of these beds is fairly consistent, varying from 229 to 304 feet.

(*b*) The Glauconite series is easily recognizable by the uniformity in colour and character of the rock, where the separate grains are either of foraminiferal origin or replacements of the coprolitic pellets which are so common in the micaceous series above. The thickness in the different bores varies from 33 to 126 feet.

No. 1 Bore, Parish of Bumberrah, did not reach bed-rock. No. 1 Lakes Entrance Development Co. Bore (Lake Bunga) passed through the glauconite (Upper Oligocene) on to Ordovician slate ; whilst No. 1 Government Bore, Lakes Entrance, passed through the glauconite on to granite.

III. STRADBROKE–GLENCOE AREAS.

Map of location of bores in the Stradbroke–Glencoe area.



Scale—2 miles to 1 inch.

A list of bores and quarries examined is as follows :—

(1) Parish of Glencoe—

No. 2 Bore	30–947 feet
No. 3 Bore	20–214 feet
No. 4 Bore	20–340 feet
No. 5 Bore	30–532 feet
No. 7 Bore	120–1,380 feet

Quarries in Parish of Glencoe—

McColl's (Upper Dutson's)—Middle Miocene.
Robertson's (Lower Dutson's)—Lower Miocene.
Le Grand's (south of Longford) Lower Quarry—Lower Miocene.
Le Grand's (south of Longford) Upper Quarry—Lower Miocene.
No. 1 Bore, Glencoe South, old bore—Lower Oligocene.

(2) Parish of Coolungoolun—

Massey's or Mortimer's Quarry—Lower Miocene.
Dowd's (south of Longford)—Upper Oligocene.

(3) Parish of Wulla Wullock—

Bore No. 1 (sample collected at surface, probably from about 300 feet)—Middle Miocene.

(4) Parish of Stradbroke—

No. 14 Bore	130–1,505 feet
No. 15 Bore	45–640 feet
No. 16 Bore	200–1,476 feet

Merriman's Creek Outcrop—Lower Miocene.

(5) Parish of Darriman—

No. 3 Bore	62–1,207 feet

(6) Parish of Woodside—

No. 5 Bore	24–312 feet
No. 6 Bore	32–137 feet

(*a*) We have selected No. 16 Bore, Parish of Stradbroke, as the type for this area, supplementing it by No. 15 Bore, Parish of Stradbroke, to complete the series. The sequence in No. 16 Bore, Stradbroke, is as follows :—

Lower Pliocene (Kalimnan)	200–480 feet
Upper Miocene	490–500 feet
Middle Miocene	410–580 feet
Lower Miocene	590–990 feet
Upper Oligocene	1,000–1,476 feet

Lower Pliocene (*Kalimnan*).—The fauna is of the usual Kalimnan type, which is recognizable in East Gippsland. These beds show a marked uniformity in character, and to some extent in thickness, with those of Lakes Entrance. The richly fossiliferous zone, which is so constant a feature in the Lakes Entrance Kalimnan, occurs at 200 feet.

Upper Miocene.—The bed which is referred to this series here attains a thickness of only 10 feet; this is 35 feet less than recorded from the type bore in the Lakes Entrance area.

Middle Miocene.—This is the typical polyzoal series, and is represented by only 70 feet in this bore. The foraminiferal and polyzoal faunas are much the same as met with in No. 1 Bore, Parish of Bumberrah.

Lower Miocene.—This stage in No. 16 Bore, Stradbroke, has a thickness of 380 feet, which is nearly equal with that recorded from No. 1 Bore, Parish of Bumberrah. Of the three divisions which were represented in the Bumberrah bore, only the two lower could be recognized here. The characteristic rich *Lepidocyclina* fauna of the second division, where it is associated with *Cycloclypeus*, is present. The species included are *Lepidocyclina tournoueri*, *L. howchini*, *L. marginata*, *L. borneënsis*, and *L. martini*. The lowest part of the Lower Miocene series is developed to the great extent of 340 feet.

Upper Oligocene.—In this bore the sediments which we have referred to the Upper Oligocene, are represented by typical micaceous marls, occurring from 1,000 to 1,476 feet, and the same foraminiferal fauna as recorded from the Upper Oligocene of No. 1 Bore, Parish of Bumberrah. It should be noted here that the glauconitic series is absent from the Stradbroke area, although it is present in the Glencoe area.

Lower Oligocene.—The Lignite series of the Lower Oligocene was not reached in this bore, but in No. 15 Bore, about 250 chains to the west, which started in Lower Miocene, it was met with at 610 feet, the bore finishing at 640 feet still in lignite. In this area, therefore, we have represented the entire series from Kalimnan to Lower Oligocene.

(*b*) *Comparative Notes on the Bores and Quarries in the Stradbroke–Glencoe Areas.*

Lower Pliocene (*Kalimnan*).—The Kalimnan sediments, with their typical molluscan fauna and lithological characters, are well represented in the Parish of Stradbroke, where they occur in Bores Nos. 14 and 16. In the Parish of Glencoe they occur in No. 2 Bore, as a not very typical sandy bed, from 30 to 50 feet. In No. 7 Bore, Glencoe, Kalimnan beds are typical, and extend from 120 to 210 feet, with the rich fossiliferous zone from 170 to 180 feet. This richly fossiliferous zone occurs again in the Stradbroke Bores Nos. 14 and 16 at 190 feet and 200 feet respectively.

Upper Miocene.—This series appears in Nos. 14 and 16 Bores, Parish of Stradbroke, and also in No. 3 Bore, Parish of Darriman. The only occurrence in the Glencoe district is in No. 7 Bore. The greatest similarity in thickness is noted in No. 16 Bore, Parish of Stradbroke, and No. 7 Bore, Parish of Glencoe, where the Upper Miocene is 10 feet thick.

Middle Miocene.—This series of hard and soft polyzoal limestone and marls with *Amphistegina* is typically developed in the Parish of Stradbroke in Nos. 14 and 16 Bores, and in Parish of Darriman in No. 3 Bore. In the Parish of Glencoe it is met with in Nos. 2 and 7 Bores. In the latter it shows a considerable thickening to the extent of 231 feet. The quarry section of McColl's (Upper Dutson's) in the Glencoe area, and a sample from Bore No. 1, Parish of Wulla Wullock, collected at the surface probably from 300 feet, are also in the Middle Miocene.

Lower Miocene.—This series shows an extraordinary development of *Lepidocyclina* limestones and marls in the Stradbroke–Glencoe areas as compared with the Lakes Entrance area. The marls in No. 5 Bore, Parish of Glencoe, and in No. 15 Bore, Parish of Stradbroke, are exceptionally rich in *Lepidocyclina* and *Cycloclypeus* in the topmost samples, for these two bores commenced in Lower Miocene. Two bores must be singled out to show the most extraordinary thickening of the Lower Miocene. In No. 2 Bore, Parish of Glencoe, it is 857 feet thick, the bore ending in Lower Miocene at 947 feet; and in No. 14 Bore, Parish of Stradbroke, it shows a thickness of 900 feet, this bore also ending in Lower Miocene at 1,505 feet.

The quarries in the Glencoe area represented by Robertson's (Lower Dutson's), Le Grand's Upper and Lower Quarries, Massey's or Mortimer's Quarry, Parish of Coolungoolun, and an outcrop in Merriman's Creek, Parish of Stradbroke, are all in the Lower Miocene.

Upper Oligocene.—As in Lakes Entrance area the Upper Oligocene beds are represented by the Micaceous and Glauconitic series in the Glencoe area, whilst only the Micaceous series is present in the Stradbroke area.

(*a*) The Micaceous series in the Stradbroke area is about 400 feet thick; in No. 3 Bore, Parish of Darriman, it shows a thickness of 196 feet; whilst in the Glencoe area in Bores Nos. 3, 4, and 5 it averages about 120 feet.

(*b*) The Glauconitic series is only present in the Glencoe area in Bores Nos. 3, 4, and 5, where it varies in thickness from 10 to 30 feet. This glauconite is not entirely comparable in its lithological characters with that of Lakes Entrance, for it does not contain replacements of the coprolitic bodies, and may even represent a shallower water phase of glauconitic deposition in that it contains a large amount of terrigenous material. A striking feature of the Upper Oligocene sedimentation of the Stradbroke area is its greater thickness as compared with the Glencoe area, for the former shows an average thickness of 400 feet as against about 150 feet in the latter.

Dowd's Quarry, south of Longford, Parish of Coolungoolun, represents the micaceous phase of the Upper Oligocene.

Lower Oligocene (*Lignite*).—The Lignitic series was reached in Nos. 3, 4, and 5 Bores, Parish of Glencoe, and in No. 15 Bore, Parish of Stradbroke, whilst it occurred at the surface in the old Bore No. 1, Glencoe South. These lower beds show a marked difference in sedimentation to the overlying Upper Oligocene beds, for they are of terrigenous and estuarine origin, as compared with the deeper water marine sediments of the Upper Oligocene.

IV. COMPARISONS WITH OTHER AREAS.

(*a*) *Western Victoria.*

In comparing East Gippsland with Western Victoria, the Tertiary series from the Kalimnan down to the Lower Oligocene is present in Western Victoria, and is characterized in the main by similar faunas as in Gippsland, especially in regard to the occurrence of certain genera of the foraminifera.

In the Mallee the Middle Miocene is represented by well-developed polyzoal limestones containing *Amphistegina* and *Operculina*, whilst in one bore the Upper Oligocene is present, as indicated by the foraminiferal genus *Victoriella*.

In the Dartmoor area we have the whole series present, and the lowest beds are there characterized by *Victoriella* and *Cyclammina*, as in the Upper Oligocene of East Gippsland.

In the Hamilton District the *Lepidocyclina* phase of the Lower Miocene is well represented in the Red Limestone of the Grange Burn, and these beds appear to extend downwards to some considerable depth.

(*b*) *East Indies.*

In comparing the *Lepidocyclina* fauna of East Gippsland with that represented in stages "e" and "f" (Lower to Middle Miocene) adopted by the Dutch geologists for the East Indies, we find that in the Southern Australian region, the faunas that are distinctive of the two stages in the East Indies are here found commingled in the same bed. The reason for placing the Victorian *Lepidocyclina* beds in the Lower Miocene is the presence of the restricted "e" forms, *Spiroclypeus margaritatus* and *Lepidocyclina radiata*.

V. STAGES WITH "MARKER" BEDS IN THE TERTIARY SERIES OF EAST GIPPSLAND.

The appended stratigraphical table gives a summary of results obtained from a consideration of facts derived from the numerous bores in the East Gippsland area. The marker beds are based either on the occurrence of restricted fossils, or on rich fossil zones and faunulas—

Pliocene—
- Kalimnan bed above marker zone .. .. C 3
- Marker bed, of a richly fossiliferous zone in the Kalimnan, usually about 10 feet thick .. .. C 2
- Kalimnan bed below marker zone .. .. C 1

Miocene—
- Transition band with few fossils and occasional *Ditrupa*. Probably Upper Miocene .. .. B 5
- Middle Miocene.—Chief Polyzoal series. *Amphistegina* typical .. B 4
- Lower Miocene—
  - With *Lepidocyclina* and *Amphistegina* .. .. .. B 3
  - *Cycloclypeus communis* and abundant *Lepidocyclina* and *Amphistegina* .. .. B 2
  - *Lepidocyclina* absent, *Amphistegina* present .. .. B 1

Oligocene—
- *Cyclammina*, *Vaginulina gippslandica*, and *Victoriella*. Typical *Ecionema* zone, *Amphistegina* absent .. .. .. A 2
- Lignite .. .. A 1

SUMMARY OF BORES AND QUARRIES IN LAKES ENTRANCE, STRADBROKE, AND GLENCOE AREAS.

Bores and Quarries.	Kalimnan. C 2 = rich zone.	Upper Miocene. Fossils scarce.	Middle Miocene. Rich in Polyzoa, *Amphistegina*.	Lower Miocene. B 3—*Lepidocyclina* and *Amphistegina*. B 2—*Lepidocyclina*, *Amphistegina*, and *Cycloclypeus*. B 1—*Amphistegina*.	Upper Oligocene. *Cyclammina*, *Victoriella*, *Vaginulina gippslandica*, *Ecionema* rich.	Lower Oligocene. Lignite.
Parish of Colquhoun— No. 1 Bore, Lakes Entrance Development Co., Lake Bunga (No. 1, Lakes Entrance)	*102′	120′–200′	243′–553′	563′–823′ B 3 = 563′–603′ B 1 = 613′–823′	833′–1,210′ M.S. = 833′–1,062′ G.S. = 1,084′–1,210′	..
No. 1 Government Bore (No. 3, Lakes Entrance)	*20′–140′ C 2 = 90′	150′–180′	190′–760′	770′–1,020′ B 3 = 770′–840′ B 1 = 850′–1,020′	1,030′–1,396′ M.S. = 1,030′–1,334′ G.S. = 1,341′–1,396′	..
Parish of North Colquhoun— No. 1 Bore ..	..	..	*54′–358′ (*a*)	358′ (*b*)–659′ B 3 = 358′ (*b*) B 1 = 370′–659′	.. .. ..	..
Parish of Bumberrah— No. 1 Bore (Pt. Addis, Metung)	*60′–240′ C 2 = 90′–100′	240′–285′	290′–690′	700′–1,110′ B 3 = 700′–870′ B 2 = 872′–873′ B 1 = 875′–1,110′	1,115′–1,409′ M.S. = 1,115′–1,370′ G.S. = 1,396′–1,429′	..
Parish of Darriman— No. 3 Bore ..	*62′–98′ C 2 = 66′–76′	88′–141′	149′–289′	299′–1,069′ B 3 = 299′–369′ B 2 = 379′–559′ B 1 = 569′–1,069′	1,079′–1,207′	..
Parish of Woodside— No. 5 Bore ..	..	..	..	*24′–312′ B 3 = 24′–87′ B 1 = 88′–312′	.. .. ..	..
Parish of Stradbroke— No. 14 Bore ..	*130′–405′ C 2 = 190′	415′–455′	465′–595′	605′–1,505′ B 3 = 605′–695′ B 2 = 705′–745′ B 1 = 755′–1,505′	.. .. ..	..
No. 15 Bore ..	..	..	..	*45′–130′ B 2 = 45′–80′ B 1 = 90′–130′	155′–590′	610′–640′
No. 16 Bore ..	*200′–480′ C 2 = 200′	490′–500′	510′–580′	590′–990′ B2 = 610′–640′ B 1 = 650′–990′	1,000′–1,476′	..
Merriman's Creek Outcrop	..	..	..	Lower Miocene	.. .. ..	..

* = First sample received.

SUMMARY OF BORES AND QUARRIES IN LAKES ENTRANCE, STRADBROKE, AND GLENCOE AREAS—*continued.*

Bores and Quarries.	Kalimnan. C 2 = rich zone.	Upper Miocene. Fossils scarce.	Middle Miocene. Rich in Polyzoa, *Amphistegina*.	Lower Miocene. B 3—*Lepidocyclina* and *Amphistegina*. B 2—*Lepidocyclina*, *Amphistegina*, and *Cycloclypeus*. B 1—*Amphistegina*.	Upper Oligocene. *Cyclammina*, *Victoriella*, *Vaginulina gippslandica*, *Ecionema* rich.	Lower Oligocene. Lignite.
Parish of Glencoe—						
No. 2 Bore ..	30′–50′	..	60′–80′	B 3 = 90′–947′	.. .. ..	..
No. 3 Bore ..	..	..	..	B 1 = *20′–90′	100′–210′	214′
No. 4 Bore ..	..	..	..	B 1 = *20′–161′	162′–270′	272′–340′
No. 5 Bore ..	..	..	..	*30′–380′ B 3 = 30′ B 2 = 40′–90′ B 1 = 100′–380′	384′–520′ M.S. = 384′–479′ G.S. = 486′–520′	532′
No. 7 Bore ..	*120′–210′ C 2 = 170′–180′	220′–230′	236′–467′	477′–1,259′ (*a*) B 3 = 477′–510′ B 2 = 520′–760′ B 1 = 770′–1,259′ (*a*)	1,259′ (*b*)–1,380′	..
Quarry Sections in Parish of Glencoe—						
McColl's (Upper Dutson's)	..	..	..	Middle Miocene	.. .. ..	..
Robertson's (Lower Dutson's)	..	..	..	Lower Miocene = B 1	.. .. ..	..
Le Grand's (south of Longford)	..	..	..	Lower Miocene = B 2	.. .. ..	..
No. 1, Glencoe South (old bore)	..	..	..	.. .. ..	.. .. ..	Lower Oligocene
Parish of Coolungoolun—						
Massey's or Mortimer's	..	..	..	Lower Miocene	.. .. ..	..
Dowd's (south of Longford)	..	..	..	.. .. ..	Upper Oligocene	..

* = First sample received.

EXPLANATION OF PLATE.

Fig. 1.—*Lepidocyclina* (*Nephrolepidina*) *radiata* (Martin). No. 5 Bore, Parish of Glencoe, 70 feet. Lower Miocene. X 9.

Fig. 2.—*Lepidocyclina* (*Nephrolepidina*) *borneënsis* Provale. No. 1 Bore, Parish of Bumberrah (Metung), 872 feet. Lower Miocene. X 16.

Fig. 3.—*Amphistegina lessonii* d'Orb. No. 14 Bore, Parish of Stradbroke, 935 feet. Lower Miocene. X 10.

Fig. 4.—*Cycloclypeus communis* Martin. Le Grand's Upper Quarry, south of Longford. Lower Miocene. X 16.

Fig. 5.—*Vaginulina gippslandica* Chapman and Crespin. No. 3 Bore, Parish of Glencoe, 180 feet. Upper Oligocene. X 14.

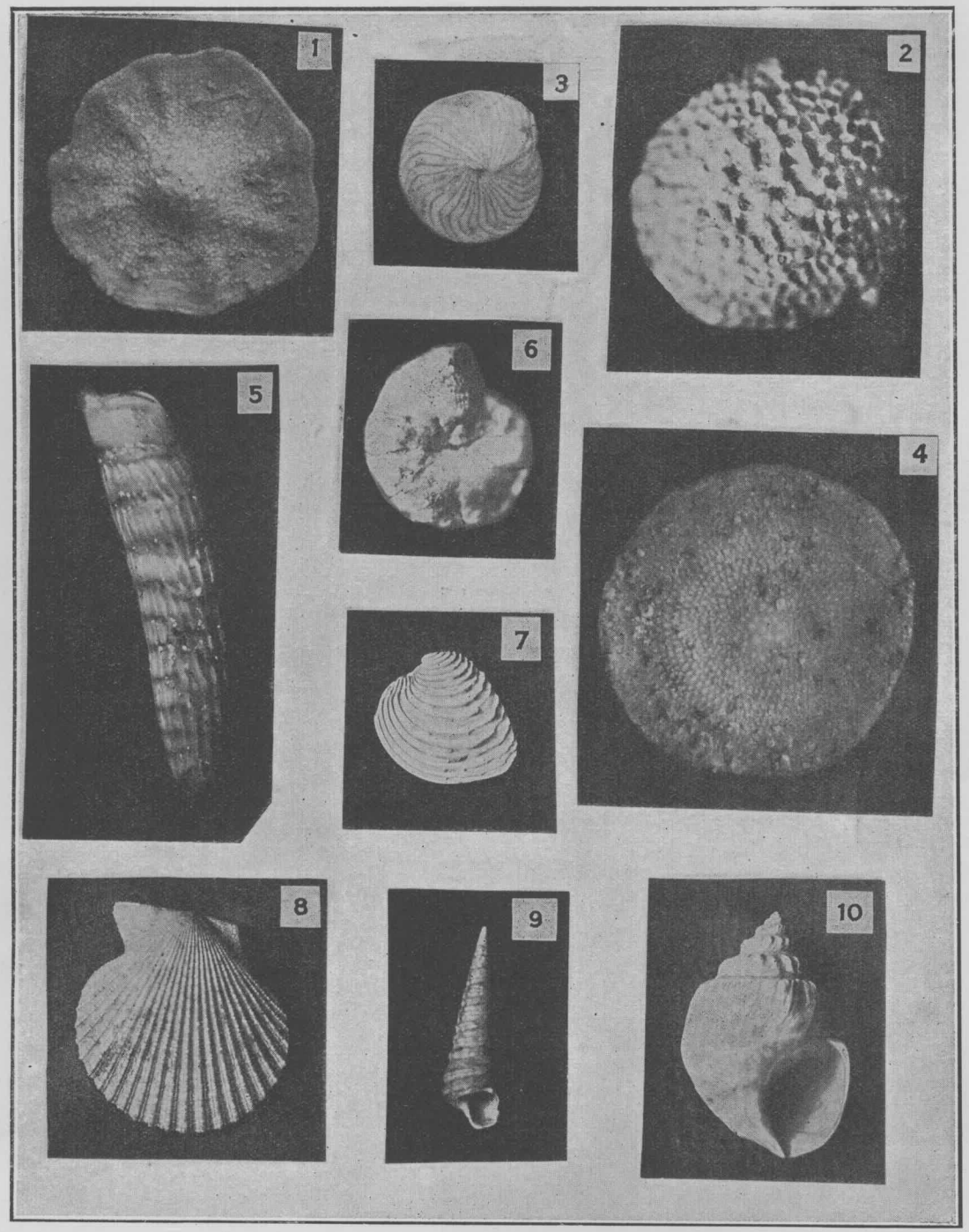
Fig. 6.—*Cyclammina incisa* (Stache). No. 1 Bore, Parish of Bumberrah, 1,320 feet. Upper Oligocene. X 15.

Fig. 7.—*Clausinella subroborata* (Tate). No. 1 Bore, Parish of Bumberrah, 60–70 feet. Kalimnan. Natural size.

Fig. 8.—*Chlamys antiaustralis* (Tate). No. 1 Bore, Kalimna Company, 30 feet. Kalimnan. Natural size.

Fig. 9.—*Turritella conspicabilis* (Tate). No. 1 Bore, Parish of Bumberrah, 90–100 feet. Kalimnan. Natural size.

Fig. 10.—*Tylospira coronata* (Tate). No. 1 Bore, Parish of Bumberrah, 80–90 feet. Kalimnan. Natural size.



Typical Tertiary Fossils f.om Borings and Quarries in East Gippsland, Victoria.