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Page 1

Introduced snail *Theba pisana*

Fossil land snails
Det. By Miss J. H. Macpherson

Soil horizons at Thunder Point, Warrnambool
In aeolianite & between it & Tower Hill tuff. All extant species.

Rhytida ruga (Legrand)
Laoma penolensis (Cox)
Charopa funerea (Cox)
C. tamarensis (Petterd)

Cliffs – Bay north of Cape Nelson, near Portland
Very numerous

Paralaoma halli (Legrand)

Gabriel says this species found under decaying wood & in moss. Huge numbers suggest pluvial period?

Page 2

21/12/49

Moyne Bridge
Loc 1, p. 5.

Works on bridge have bared large basaltic boulders up to 3’ in diameter (weathered flow) under which is solid basalt. Bores for bridge proved basalt to 15’ below LWM but it apparently much deeper according to reports about windmill bores.
Shell beds with aeolianite pebbles on seaward side of bridge therefore this bed post-aeolianite.

Some of the shells till have their colour. Oysters present. Bed rest on an uneven surface of basalt. From bridge to Belfast Lough

Page 3

is a base of planated aeolianite which reaches 3’-5’ above river level. Must have originally been sand ridges or dunes which lithified then planated.

Diagram: cross section of river bed at Moyne River at Rosebrook Bridge

Diagram: cross section of Glaxo bore and bedrock at Port Fairy basalt flow

Page 4

Geological History

1. Deposition Miocene marine limestone
2. Emergence & erosion below present S. L.
3. Extrusion of Pliocene basalt
4. Establishment of new drainage including River Moyne
5. Pleistocene dunes and associated shorelines. Lithification
6. Erosion of aeolianite
7. Deposition of post-Pleistocene shell-beds
8. Erosion of shell-beds by rejuvenated Moyne River
9. Deposition of swamp deposits

Page 5

Map: Showing Loc 1, Loc 2, Loc 3 on Moyne River

Loc. 1 see p. 2

Loc. 2 On south side (right bank) of River Moyne. Some shells free & some in solid rock. Some well preserved & some decayed. Some with colour & some without. Top layer Dosinids in pairs, mostly. In sand

Page 6

& probably their original habitat (biocenose).

Diagram: Loc. 3 East side (left bank) of river.

Finely bedded shell beds with cross-bedding in many places. Water laid because no aeolian sorting which would leave heavy shells & other heavy materials behind. Cross-bedding, low angles & over short distances.
Loc. 3 (cont’d)

Diagram of Section at S end of cliff.

Drift of charcoal, abo., midden shells, and artefacts.

Midden has chiefly Turbo, Patella, Acmaea, Flint flakes, Haliotis

Page 8

Microptic level readings on Moyne R.

Datum. H.W. at Rosebrook Bridge. Only c 6” tidal variation.

Table: showing changes in water level.

Therefore water level 1.52’ higher

Strat. Shell beds 7.11’ higher

Top Shell beds 10.41 higher

Page 9

?  

If take datum as MSL + 6” on assumption that back pressure from tides makes mean level at bridge = MSL on coast.

Diagram: Showing retarding effect of Belfast Lough on coast tidal range.

Then datum = 2.10” above LWM

= 2.83’

Loc 2 =2.83’ + 11.64’

=14.47” above LWM

Dosinia lives

Page 10

21 – 22/12/49

Moyne River

Diagram: Showing Loc. 4 and old shore line on a schematic plan of Moyne River
Diagram: cross section of river bank.

1. Basalt = former shore line
2. Quiet waters in which shells lived on sandy bottom
3. Black alluvium as on tuff. Therefore probably, post-Tower Hill
4. Limestone freshwater lake (petrological)
5. Clay alluvial phase in earlier Holocene between recession of sea & change of phys. due to Tower Hill ejectamenta.

Page 12
Shells from c 1’ under top of shell bed opposite appear to be a biocoenose. Above this broken shells & shell sand.

Bore 143
Killarney on sand 17’-20’ strike sand in bores & need casing, then on to 60’ before meeting limestone No basalt.

Warrnambool (see also Book 1, pp 64, 68, 88). Mental Home, Brierley Flats
Bore at foot of scarp 120’ deep
15’ clay
15’-20’ decayed basalt
45’-50’ basalt?
15’-20’ yellow clay (Hesse clay)
c 80’ limestone
Above from Mr McCrabb
Bore 46 see Book 1, p. 88

Page 13
Bore 144
Near Illowa P.O. Ash & lapilli to 60’ then limestone.

Tower Hill Princes H’way Port Fairy Rd 100 yds S of turn-off to Koroit on Tower Hill rim
Bore 145
0’-120’ lapilli
Then limestone
150’ good water

20/12/49 Crossley Scarp at S end of Tower Hill marsh near railway – Quarry in Miocene limestone fossiliferous. Beds horizontal, but 1-1 ½ chs show dip c 7° SE
Collapse feature? Yes

Page 14
23/12/49
Physo-geographic parallel between basalt ridges in sea and ridges inland which formerly in same relation to sea. Homologues. What appear to be rock pools seen in inland basalt ridges Geological history explains presence of “stony rises” in such ancient basalts (Pliocene).

Enormous area of planated aeolianite in coastal area only explicable by marine erosion.

Page 15
See p. 105
23/12/49
Goose Lagoon Between Lagoon & Port Fairy aeolianite ridges inland with planated aeolianite shoreward and on basalt, as in Tower Hill area. On East side of Goose Lagoon & c. 6 chs E of road also midden on side of hill.

Site A. All down side of hill showing eroded & washed down &/or blown down. Traced to level ground on top. [Midden A mostly Turbo; also Patella, Haliotis, pieces of rock] c 3 chs West of highway at foot of scarp (edge of swamp) rabbit burrows spoil heaps shows shells & pieces of consolidated shell bed, plus a few midden shells from hill above. B

Page 16
Diagram: Showing sites A, B & C on sides of highway between Portland and Port Fairy.
Diagram: Showing cross section of site B excavation.

Midden at C Turbo mostly, Haliotis, Patella and pieces of rock, Monodonta

Page 17
24/12/49
Tower Hill
Traverse of road round island in caldera.

25.39 mls “aero club” Quarry with baked limestone, scoriaceous lava, ropy lava, solid basalt, ash, lapilli, etc

25.89 mls Small lava flow bearing N 32° E to gate of entrance to rim quarry on NE side (opposite road to Wright’s).

Diagram: Lava flow at Tower Hill.

Page 19

Killarney

Windmill Pt Fairy MM 263,723 on east side of house.

Bore 146

5-8’ Soil & tuff

20-30’ sand

5’ Pug

2’ Rock

2’ Pug

- Water

Mr Lane reported this bore which he said was 40’-42’ deep. Also 277,723 40’ bore finished in shifting sand. No basalt. 7’-8’ soil & tuff c32’ sand

Bore 147

Page 20

Crossley Rd.

In swamps tuff at 1’-1’ 3’ c4’ deep

Lane opposite Mr Lane’s 277,723 has c4’ tuff.

Augur hole put down at North end of his lane (277, 733)

Diagram: Dated 26/12/49 of Augur hole with sediments encountered.

Page 21

Tower Hill Bridge over drain (see MM 278 739) on track to SW end of caldera, in from Crossley Rd.

Section in drain on N side of bridge. 4’ alluvium on reddish brown tuff.

Profile looking towards caldera.

Diagram: Profile looking towards Caldera, showing diary shed.

Dip due to slump. In quarry (inside of rim) 5° dip parallel to lake (at S end)
9° at N end.
Fault

Page 22
Outward dip 8°, strata flat in saddle then dip of 7° N on dairy-shed hill.

Page 23
Tower Hill Beach
Table: Survey data for excavations A to D

Page 24
A chain nearer = 1.36’
Excav. A. Reading gives top of tuff. Swamp deposits 4’ 2”. Hole situated in hollow in middle of sand ridge which was c 3’ high.

Excav. B. Top of tuff measured. On this 1’ of black alluvium. Hole in swampy depression c2’ below general terrain in a seaward direction r c5’ in a landward direction because between B & C sand rise c4’ high.

Excav. C. Shot to top of tuff again. Excav in swampy depression c2’ below general terrain. Tuff outcrops in this.

Page 25
Diagram: EXCAV.D. c6” soil/alluv in tuff sand rise between C & D 0.84’ higher
Tower Hill beach midden
Turbo mostly, Haliotis, Patella, Purpura, Donax, Acmeae, Mytilus, Conus, large? whelk
11 muduks (sharpened both ends 4.5 to 8.75 cm long)
6 awls (+2) pointed one end. 7.25-11.25 cms)
2 shovel-ended implements (8.75 & 13 cms long)
24 incomplete awls & muduks (4 more found Jan 1951)
Total 43 + 6

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27/12/49

Distances northwards over surveyed section line (pp. 23-25)

Shore platform outer edge 0 chs
Shore platform inner edge 1 ½ chs
Sandy beach
Outer edge tuff beach
Ridge 2 chs
Beginning of sand 2 ½
End of sand & beginning of older tuff beach ridge 4
End tuff beach ridge 4 ½
(i.e. ridge ½ ch wide N-S)
Begin second sand ridge 5
End of second sand ridge 6
Inland edge of old house 7
Within ¾ ch of gate 8
¼ ch thro’ gate 9
Also = Excav. A
(10’ E of E fence of road)

Page 27
About 6’ further N begin. of sand rise
End of sand rise 10 ch
Small sand rise c 20’ wide middle = 11ch
Excav B 10’ + 16 chs
Begin of sand rise 16 ½
Mid of sand rise 17
End of sand rise 18
Rock samples 18 ½
Excav. C 6’+ 21
Excav. D 32 chs
Sand rise are parallel to dune ridges & the sea shore
Tower Hill

Quarry on E side at top of Wright’s Rd. Tuff horizontal parallel to lake. Dip away from crater at 5°
Quarry where Princes Highway meets rim dips measured from island
NE end 4° SW dip
SW end 7° SW dip
Quarry on road down to island 10-15 chs N of Princes Highway (E side of caldera)
7° dip away from lake. Beds even on whole. Near top cross-bedding & a little intraformational puckering. (due to bomb?)

Page 29

Some slumping & occas. denting from bombs. Unconformity noted at one place. Most of these features near top. i.e. activity less common & some erosion between emission of ash clouds of N.Z. volcanoes at present.

Page 30

“Woodbine” (See MM E of Rosebrook)

Aeolianite on top of basalt seen along drain. Low hills on which homestead stands are remnants of dunes (ridges). In drain aeolianite has dips of less than 5 degrees. Sand washed on beaches. Sand spread and sand ridges? Or base of dunes? Air photos later showed sand ridges.

North of highway 12’ columnar basalt seen in drain. Disappears suddenly 3.5 – 4 chs N of highway at bend in drain. Obviously eroded. Alluvium comes in. c 4 chs further 3’-4’ basalt shows in drain wall. Outcrop 1 ½ chs long alluv. & basalt alternate. See map over Page.

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MAP: Showing placement of basalt and where it ends.

Page 32

Port Fairy

Map: Showing drain on N side of town, positions A, B & C.

A. Excav. Made 1’8” peaty alluv; 1’7” sand with shells as excav from drain. Hole dug in floor of drain.
B. Shells collected from excavation spoil heap of drain. Stratified shell beds in situ to above road level. cross bedding.

Page 33
C. Coll. of shells in site including large museum pieces. Determ. of Turbo stamineus = Ninella torquata Pres. By Mrs. I. Watts.

Diagram: cross section shell bed wall showing staff position

Staff on highest stratified shells so no question that the beds are marine & not aeolian. Readings taken to centre of railway crossing on Princes Highway near Glaxo (21.60'). Rails

Page 34
Specially tied, ballasted there so little different if any from surveyed height, the railway engineers informed me.

Table: Survey data.

Height of Loc C above only rly datum = 21.60 – 2.52 = 19.08’. This a minimum suggests 25’ Woakwine level ie. last of the Pleistocene levels.

Page 35
Shell beds
Distinguish –
1. Beds with shells, eg. swale into which shells washed by sea as behind dune ridge at Tower Hill beach (old mouth of Moyne) or residue in wind blow leaving lower-than-sand shells, or shells left by birds (Serventy & Teichert)
2. Shell Beds. i.e marine stratified deposits with water-laid shells. Coquina or coquinoid.

Page 36
Aborigines
1. Pre-Tower Hill. Middens on Woakwine shore lines. Middens eroded & often mixed with hillside drift. ½ miles inland from present sources of such shells. Immediately on old shoreline. Only simple flake artefacts.
3. Post Tower Hill On tuff or structures on tuff. Bone culture. Bores of marsupials etc plentiful at Tower Hill beach but not other localities. Source of bone for implements. All these sites related to present S.L.
Birds as aborigines’ food

Did abos of Tower Hill area use birds for food?

1. Bird bones (esp swans) common in middens at Tower Hill beach. Bird bones in midden p. 128
2. Some bird bones burnt with fire so appear closely assoc. with abo. feeding.
3. Bones more common than could accumulate by natural causes.
4. Patch of c5’ radius that had c10 seagull skeletons number indicated by number of bills among crowd of gull bones.
5. In living memory abos of WD known to catch swans for food (so McKay of “Wooriwyrite”) cf Dr. Donald Thomson who

Page 38
accomp. abos of N Aust. On exped for catching swamp birds. See Dawson.

6. When gales blow & other food hard to get (such as mollusca) they have turned to seabirds. Exception & not rule.

Page 39

Killarney Beach

Middens char’ ised by

1. Rarity of bones
2. Absence of bone implements
3. Rarity of flint or other artefacts. See below.
4. Basalt pebbles very common. Used for breaking shells?
5. Sepia guards so common that must infer they were an article of food.

In one place midden material solidified into black shell rock which shows the possibility of rapid lithification by calcareous cementation.

Killarney beach midden Turbo very common. Patella, Purpira, Conus, Donax, Sepia apama, Scutum, Flints, basalt hammer stones.

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29/12/49

Diagram: Schematic plan of Killarney Beach area

Page 41

Depth of basalt unknown 4’ basalt in excavation on W side of road to Killarney Beach.

Low bank probably former shore. Prob. c10’ above present LWM & c1/2 m] from present shore.
Isolated sand rise not easy to explain.

In river at Bushfield large fauna of marsupials preserved as black mineralised bones. Some flints found associated with bones.

Photograph: Bushfield location.

Page 42

Bushfield 30/12/49

See also Book3 pp39 – 41 and p2 Bk 53:274

Diagram: Map: Showing bone location and excavation site

Microptic level traverse made from excavation (whence Keble-Mitchell’s material) to road corner.

Page 43

Table: Showing survey levels Back and Forward towards hill, then towards river.

Page 44

Table continued from Page 43: 16’ to water’s edge

Bone platform 4.5 chs downstream from line of section.

Level then set in middle of left terrace of river

Table: continued from above.

Page 45

Post is 7chs 21’ from level position 18’ from river = 7 chs 39’ from river

Photo: showing midden in shelly beach

In Museum fossil wombat jaw from aeolianite at Shelly Beach.

W’bool abos fried gastropods in shells. Torquay abos grilled theirs. ?

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Shelly Beach where calcrete lowest between Picnic Cave & Pt Pickering.

Warrnambool: E side & top of cliff. midden (photo) 18” thick. Published in Mankind 1957 Plate p. 250 see oppos. page.

Nearly all Turbo undulatus a few limpets (see photo) & rare Haliotis. Colour still in some of the shells.
Stones – limestone, tuff – present & may have been for breaking shells. Stones common & flints rare.

Post-Tower Hill in age. Bed full of charcoal.

Most of shells burnt & broken. Suggests gastropods cooked in shells. Contrast with Bream Creek where rare to find burnt shells but all opercula burnt. Suggests cooked out of shells with opercula attached or burnt shells broken up.

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31/12/49

Kirkstall Rd Section in N bank of main drain over which is old basalt bridge & c5 chs W of bridge (MM 239 723) a little over ½ ml N of Princes Highway.

Diagram: showing cross section of bank next to water.

Terrain level in pre-Tower Hill time therefore below present drain floor level c 12’ & was of sea sand & shells & c 10’ above S.L. here.

Page 48
E of Rosebrook
216,715

Farley’s Farm

Bore 72’ reported by farmer. Still in basalt when finished. It is situated near the edge of the flat on the landward side of the dune ridge:

8’ - 10’ Black Alluvium
12’ – 14’ Sand & limestone (L/IGL?)
C 50’ Basalt

Bore 102

Tower Hill swamp alluvium post-Tower-Hill. No such physiographic conditions beforehand. Water not gather on sands so no swamp or lake. Sea in further. Drainage easier. Also alluvium on top of scarp – later than red clays & sands (MML loipon (see p50)) cf laterite.

Page 49
1/1/50

Hopkins Mouth

Cliffs of aeolianite. Shore platform narrow & very flat. Covered with green weed (W side of river) & thousands of small purple Brachidontes with ribs. No other shellfish found. Effect of fresh water?
Within ¼ ml W plentiful limpets of different species – some extra big. Also, Monodonta, Purpurea (Thais), & large chitons. No bivalves seen. Operacula of Turbo undulatus seen but none collected. Kelp profuse on seaward edge of shore platform, & sandy beach on landward edge kelp later absent from shore platform.

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In middens on top of cliffs at mouth of Hopkins nearly all Turbo & hardly any limpets though these numerous in some Warrnambool middens. All these middens post-Tower Hill eruption.

Note

MML = Miocene Marine Limestone
   = Port Campbell Limestone
Loipon (from Greek) p. 48 (own term)
   = left over
   = lag deposit

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2/1/50

Information on bores from Mr. Brooks, North St., Koroit

Bore numbers carried on from Book 1 p. 106

[68] Koroit Bores average,

Tuff & lapilli 40’
basalt 20’?

Miocene Marine Limestone.

[69] Tower Hill N Slope
50’ – 80’ Tuff - & lapilli

Fern roots.

[70] Koroit 317,764 (see MM)
Bore 260’ – 270’
Loam 10’
“scoria” etc 80’
bluestone 60’
Bluish-black clay 50’
sand c 60’
cf sand in T.H. marsh bores = c sea level.
[71] 318,763 Scoria 90’
basalt 10’+
(ended in basalt)

Page 52
[72] Cemetery Scoria 90’ – 100’
100’ above S.L.
therefore near S.L. before eruption.
[73] Lynch’s Lane 316,738
Soil 4’
fine ash? clay 20’
Basalt 20’ Cinders?
Clay 20’
Sand S.L. c 170’
“all bores round here go into sand” = aeolianite?
[74] Princes Highway few bones 325,736
(or MM)
Scorid 100’
Clay 5’ – 10’ = S.L.
[75] Yangery 369,753 Surface c 110’
Soil 2’
Basalt 40’
Old land surface red clay 20’
Rotten bluestone 6’
Total 66’
2 flows 1 flows in Tb

Page 53
[76] Yangery c 80’ above S.L. 368,746
Soil 2’ -3’
Basalt 50’
Limestone 6’ – c 30’ above S.L.

[77] Tower Hill 316,743
Soil 2’ – 3’
Scoria 80’
Limestone 70’
N.B. No basalt. Limestone c 140’ above S.L.

[78] Next lane south
Scoria 60’
[79] Road to Tower Hill Beach
Tuff c 20’ then
Sand c S.L.
N.B. Therefore pre-Tower Hill shoreline behind Kelly’s Swamp at aeolianite ridge if sea level as now, but was probably lower.

cf Bore 60.

Page 54
[80] Flats round road to Killarney Beach
3’ – 4’ loamy soil (from tuff prob.)
4’ – 5’ limestone
Basalt at about 8’
[81] E. of Killarney S side of Princes High. (MM) 279,723
Soil 6’ – 7’
Tuff scoria 12’ – 14’
Sand 70’
(Half way fine white sand. Last 20’ sea shells)
Bluestone 10’
Finishes in Bluey clay (?basaltic)
N.B. Bedrock 80’ + below present S.L. – ‘ erosion old valley?
Page 55

[82] E. of Killarney Princes Highway S. side & on W side of Lane’s farm. See MM. 276,723
Loam 6’
Scoria 2’ – 3’
Sand 65’
Bluestone (pug?) 7’ – 8’
Finished in Bluey Pug.
N.B. Bedrock 60’ + below S.L. cf p. 54

[83] House opposite last.
Loam 3’
Sand 15’
Limestone 7-8’
Sand 15’

[84] Next door 276,723 above
Same bore log

Page 56

[85] Tower Hill Marsh
In flats opposite i.e. N side of road. Limey scoria 12’ – 13’ underneath this sand & shells.

[86] Toolong
Black alluv. clay 8’ – 12’
Limestone 25’
Sand & shells (MML or Pleistocene?) 5’
“This country runs from Port Fairy bridge to Toolong”

[87] Killarney 267,724
S side Princes Highway
c ¼ ml E of Crossley Rd
Loam 3’
Sand 27’

[88] Ditto 263,722
c ¼ ml W of same corner. Same log.
Page 57

[89-90] W. of Killarney

Two mills 251,718 & 252,718

E & W of branch road c ¼ ml N of Highway

Soil 1’ – 1’ 6”

Basalt 12’

Soft limestone 8’ – 10’

Sand & shells

Basalt outcrops as small ridge at this locality.

[91] Madden’s

N. Side of Princes Highway c ¼ ml E of Kirkstall Rd. 242,714

Limestone 15’

Basalt 20’

Sand & shells 35’

Finishes in black clay.

[92] Inland side of Glaxo factory

Bores show 50’ – 60’ basalt

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[93] W. of Kirkstall Rd

C ¼ ml

N side Pr. Highway 236,713 (4-5 chs N of road)

Soil 4’

Basalt 40’

Sand  Below S.L.

[94] Bores c 20’ deep near stone bridge over drain across Kirkstall Rd

Black clay c 6’

Tuff c 6’

Limestone then sand with shells 8’ not hard layer due to exposure or low water table therefore Pleistocene
W. of Kirkstall Rd
Branch Rd c 1 ½ ml N of Highway c ¼ ml W along Branch Rd. Mill on S side as on MM 232,730
Up Hol Black pug 20’
. Up Pleist.
Soft limestone with shells 6’ – 7’
Black clay 2’ – 3’
Light grey sand.

N.B. cf black clay in bore 91 which c 35’ below S.L. Here c 10’ below S.L. Black clay probably old land surface. Swale? Below present S.L. so probably Pleistocene could be recent oscillation.

Kirkstall Rd. N of scarp
8’ – 10’ black pug both sides of rly. Fossil reeds.

Duncan’s 300 yds N of railway siding near Kirkstall in lane on W side of road.
Red clay 25’
cf cutting in railway line.. 224,757

Boundary Rd N side c ½ ml E of Crossley Rd.
On MM*. 292,784
Tuff 4’ - 5’
Limestone 40’

Koroit sale yards
Soil etc. 14’
Tuff 4’
Basalt 25’
Black sand 2’

Boundary Rd. c 1/3 ml W of turnoff to NW rim of Tower Hill. 295,782
Soil etc 5’ – 6’
Limestone 80’

Diagram: Boundary Rd intersecting with Railway line near bore.
Page 48

288,781
Log as 100.

[102] Page 48

Page 61
Koroit occupies a ridge N of Tower Hill (see contours on MM). This is due to basalt flow with tuff on top. So close as bores 100-101 there is no Basalt.

Page 62
2/1/50
Murray Brook
In creek c 1 ch below fence line which is a projection of branch road at foot of scarp. 255, 745
Fossil reeds in black sandy clay.
Diagram: cross section of left bank of creek.
C 3 chs upstream from said fence line section in right hand bank forms cliff as shown in diagram on next Page.

Page 63
Diagram: showing cross section of bank and water level.
MM Limestone & derivatives all down creek. Limestone outcrops under above section a few chs further upstream & from then on is common fossils from somewhat decalcified marl at bend 253,752 (photo).

Page 64
Moyne
C 300 yds N of road along top of scarp section in drain 222,753
Diagram: Showing cross section of drain.
Diagram: Showing cross section of drain wall.
Drain sections near rail way (further N) show 2’ dark to bright grey sandy soil with concretions.
PAGE 65
of secondary iron.
4’ Brownish sand with clear & milky quartz. Tendency to bad lands weathering.
Cutting on railway on Port Fairy side of drain. Reddish & red and brown mottled sands.

Page 66
Jan 1950
Rosebrook shell beds
For photos see book 53
Map: Showing placement of shell beds.
Photo: Moyne River bank behind Rosebrook school.

Page 67
Final phase Tower Hill eruption

1. Minor quarry on top of rim above E end of MML outcrop not far from Princes Highway.
   Diagram: cross section within quarry.
   Volcanic agglomerate contains basaltic bombs, pieces of baked limestone bedrock (MML) a regular pieces of scoria, basalt etc; ropy lava, tuff, lapilli, etc. Suggests ejectmenta derived from caldera complex of “Aero Club Quarry”.

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2. Quarry on road down to island. Regular tuff & lapilli till near top then cross-bedding, disconformities & unconformities. Been explained as due to rains from volcanic activity. If so apply at all levels & not just the top. Rather to be explained as due to spasmodic nature of eruption of dying volcano. Slight erosion then new ash fall(s) full up depression. See photos.

Page 69
Faulting at Tower Hill
Hill 300,737 above W end of MML outcrop on S side of Tower Hill.
Diagram: Showing angles of hillside slope and dip of tuff.
As hill followed W elevation suddenly drops 100’. Bedding outcrops on inside of rim still parallel with crater, i.e. no slumping as NW of gap. Probably a fault. This line of lake when small ie deeper water. Break affects whole thickness of rim so at end of volcanism. Probably associated with caldera formation. Cold lahar not form gap.
Water table prob. not such as to support high lake level. No lahar debris observed. Lake high after 1946 flood. Recession very slow & steady – appar. a function of the water table cf Mt Gambier lakes.

Diagram: Showing position of fault line across Tower Hill lake.

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Diagram: Cross section showing tuff and lapilli above a red soil and Limestone.
Shows limestone a land surface when the volcano erupted.

Page 72
Yangery
Conn’s Lane
W side road cutting 363,722 tuff & lapilli finely bedded (as expected at this distance from crater) but at all angles from vertical to horriz. & much fractured in places.

1. Due to collapse, such as roof of cave or sink hole failing under load of ejectementa.
2. Took place after volcanism because whole thickness of beds involved & because. They would need to be lithified before could fracture without crushing.
3. Not recent event as whole mass re-cemented.

Alluvium of Yangery Creek in this lane c 5 chs wide.

Page 73
Cutting 2/3 way from Yangery Cr to house N of it (W side) on M.M. 363, 727
Small faults in bedded tuff. Formed when tuff not ash. Some cross bedding. Also similar collapse feature to last locality.
Tuff in cutting on scarp shown on M.M. 367,750

Page 74
4/1/50
See Page 125
Kelly’s Swamp
Map: showing swamp location in relation to nearby roads
Excav. A 5 chs S of edge of swamp at end of road.
Diagram: Showing cross section of swamp wall
Half-way across swamp similar deposit & shells. B.

Page 75
Schematic Map: Showing points A & B covering from N edge of swamp to the sea.

Page 76
Near A auger test proved mud to 6' 5" where tuff but tuff outcrops at bridge therefore River channel eroded & later filled with swamp (or swale) deposits.
Diagram: Showing cross section from sea to N edge of swamp.
Veneer of sand on swamp deposits in places. Eroded by high level seas (SW storms) changing bar admits sea.

Page 77
at times & so dead Serpula, Mussels etc noted on tuff boulders near deep pool. Sea broke away blocks of tuff & made miniature beach ridge of them
MIDDEN at 334,697 (Military map reference) under dune. Much sand with charcoal showing dune active then. Mixture of rock & sand shells (Turbo & limpets – Donax). Bones & bone implements also flint artefacts.
MIDDEN at 330,700 Rock shells like Turbo but far greater proportions of sand shells (Donax). Layer of Donax on top & Turbo underneath in one part. different shells available at different times. No rocks seen outcropping

Page 78
in sea (high tide) although rocks on beach washed up by sea, incl plates of tuff which bedded as at Tower Hill. Bones of kangaroo & birds.

1. More sand on coast than when abos there. Accum. gradually since tuff laid down. W set carry this along cf W’bool harbour. Derived from erosion of aeolinite by rivers & sea. Old rocky beach ridges smothered with sand & only revealed in part by sand blows.
2. Early writers say shore area well vegetated, but now denuded altho marram grass help.
3. Abundance of Turbo shows presence of solid platform all along this

Page 79
Definitions
Sand beach
Sand flat
Sand rise
Sand ridge
Sand dune
Sand & shells
Shell beds
Aeolianite

Continued from P. 78

part of the coast & this must be aeolianite except near Tower Hill where tuff & basalt. Less sand then & so bore platforms? This ties in with presence of soil layers.

4. Why soil layers grey? Accumulation of organic matter. Terra rossa formed in dry period 20,000 – 9000 yr B.P?

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Childers Cove

Diagram: Plan of Cove showing location of Midden.

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Bream Creek

WSW of Barwon Heads

Map: Showing position of various geological units around creek.

At large midden A collected flints & stones. Turbo undulatus common – Chione strigosa (note diff habitats – windblown but appar. different locations on midden). Also occasional Purpura, Patella, Scutum, & Donax. Burnt opercula of Turbo but no

Page 82

burnt shells – suggests aborigines took shellfish out of shells & cooked them with opercula attached then threw away the opercula on eating the food as we throw away the stone from plums. The shells of Turbo have not been hit on the apex smashing the whole shell but just the last chamber containing the animal has been broken. Saved effort with primitive tools & saved having food penetrated with pieces of shell.

Dr Gallus claimed found implements at Point Lonsdale worked from glass. Microliths.
Killarney bores


Aborigines’ adaptations

1. Spear heads in glass from N Aust. Microliths in glass from Point Lonsdale.
2. In Warrnambool Museum abo stone axe with iron handle.
3. Rabbits in newer middens.

Dennington

Shell bed

Map: Merri River S of Dennington showing low flats, quarry and midden in relation to Dennington Township.

Moulder’s Q. Sand quarry is where aeolianite ridge meets river. Dunes of this age have travertine exterior but soft inside. Last interglacial.

Diagram: Cross section of dune at Mouldens Quarry.

Under the hard cap, the aeolianite is only slightly cemented so that it readily breaks down into sand (cf shell beds at Port Fairy). The aeolianite cut for building blocks is only slightly more cemented.

At the quarry most of the bedding is horizontal, but bedding clear only for c 10’. Just above the shell bed is

cross-bedding on the south side. Ecological situation probably a beach. Many shells much worn.

Fauna included representatives of a number of ecologies e.g.

1. Shore Platform Suite. Turbo undulatus, chitons, Monodonta, etc.
2. Rock & Cliff Suite Patella, Fissurella, - a number of limpet types.
3. Outer Edge Shore Platform Haliotis
4. Deeper Water Gastropods
5. Mud suite Anadara trapezia One specimen only
6. Sand Suite Chione strigera etc
   = Port Fairy Calcarenite
Page 87

Dennington middens

See Book 3 pp. 125-128

These of considerable antiquity because

1. 1 ½ miles from sea
2. Eroded

The midden consists of burnt stones, charcoal, burnt & broken shells (mostly Turbo but also Patella, & ?Scutum) & flint microliths & Halioitis also an Hydridella.

Situated c40’ above river on leeward slope of aeolianite ridge.

Merri Is Middens

Reduced aeolianite & on this ferruginous tuffaceous layer on which middens, on which 0’ – 3’ of blown sand etc. Middens fast being destroyed by wind erosion.

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Port Fairy

Information from “Report on the Sewerage of the Borough of Port Fairy” by Gutteridge, Haskins & Davey

Consulting Charted Engineers

427 Bourke Street

Melbourne CI

Through the courtesy of the Town Clerk Mr. G. J. Mackley, Port Fairy.

Table: Showing bores and their locations, depths & materials.

Page 89

Table continued Showing bores and their locations, depths & materials.

Page 90

Port Fairy

Table continued Showing bores and their locations, depths & materials.

Bridge over drain on N side of Port fairy is 20’ contour.

6 chs E of road (toward Lough) is 18’ contour.

16’ contour goes through Glaxo Factory
20’ contour is on E side of rly crossing near Glaxo.
22’ contour is 1 ch W of road at above rly crossing.

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Port Fairy
Flats near river with shell beds (N of Rly Stn) 6’-8’
Public gardens 8’ – 10’
Holocene (Check with C 14)
Information from Mr. S. P. Wilson, Bank St, Port Fairy
Basalt averages c70’ in Port Fairy
Kelson’s Farm c80’ – 90’
Mil Map 234,816
C 20’ clay & soil
C 60’ basalt
Soft limestone
West of Kirkstall
Bore 165

Page 92
Port Fairy
12’ limestone sand
60’ basalt
Bore 166
176, 677 E side highway. Supplies water to Port Fairy. 7500 gallons per hour.
Bore 167.
Presbytery at Koroit water 145’ Tuff all way.
Sand & shells 50’
Total 195’
Bore 168
Bore S of Princes Highway 1 ml E of Kirkstall Road (near it anyway)
Probably 248,712
Gleeson Bros
Soil 4’
Limestone 3 – 5’
Basalt 90’
Limestone with water
Valley from Pliocene Murray Brook?

Page 93
Port Fairy
Bore 169
127,767
Mollie? Wests Hill 6 mls NNW of Pt Fairy
Bore started on basalt outcrop
100’ basalt (valley)
Then clay 20’+ Then limestone Bore 133’ deep put in Mar 1931
Bore 170
Crossley W side Rd between P.O. & Church
30’ tuff
Bore 171
Steele Bros Near end Toolong Rd c 190,698
96’ basalt all way after 10’ superficial deposits – some limestone & sand
Rosebrook

Page 94
Tower Hill Lane Bore 172
c 301,729
Sand (buried dunes?) To c 90’ where limestone.
Bore 173
Butter Factory end Gipps St Port Fairy. Bore c 30’ from bank of river.
Basalt then river water
Bore 174
Another on Boundary of Street

C 70' then good water

All basal.t penetrated it.

Rubble etc.

Bore 175

Soldiers Hall beside Rly Stn. E side. 90' basalt.

7000 galls per hour limestone underneath.

Basalt cuts out at Goose Lagoon. Comes in again

Page 95


Bore 176

S side town just past boundary 40' basalt cave underneath – i.e. South side of Port Fairy

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Port Fairy

Bore 177

Mill at “Leura” 117,675

Sand & limestone 15 – 20'

Basalt 50'

Quartz sand

70'

Bore 178

Bore on Golf Course

40’ sand & shells

Stream

Bore 179

In Cox St (opps near Barkley St) c 30’ sand on basalt
Bore 180
300 yds inland from above c 25’ sand

Bore 181
Behind Wilson’s workshop
Practically no overburden. hill as property behind c 12’
Bank St blasted for water pipes.

Page 97
Ridge across to bridge over Moyne River.
Bore 182
All limestone at Yambuk. 30’ – 35’ bores
Bores for cement coy 30’ – 60’ but all limestone
Bore 183
West of Yambuk
Hummock’s Rd 50’ all limestone
973,732
Bore 184
Between Yambuk trig & hut on MM. c 40’
Limestone
Bore 185
014,746
C 50’ all limestone Yambuk
NE Cnr. Bank St & Princes Highway, Pt. Fairy low cutting.
Basalt boulders with shells cemented with limesand.
Diagram: Cross section of cutting. L/IG1

Page 98
Emerged sea level Warrnambool (L/IG1)
3rd & 4th SEC poles on N side of Princes Highway E of Cassidy’s Bridge Road – excavations showed plentiful flat aeolianite pebbles, marine shells of both sand & rock facies.
Map: Showing posts between Cassidy’s Bridge Rd & Lane.
Surface on 50’ contour Prob. 45’ sea entry from Dennington.

Map: showing extent of sea entry over land near Princes Highway crossing Merri River.

In W’bool Museum cemented pebbles & fossil Haliotis from well near Bacon Factory see p. 111.
Prob. Sunnyside Calcarenite

Page 99
25-8-50
Map: Showing Lake Colongulac & make up of area surrounding the SE banks.

Page 100
Diagram: Cross section of creek running into Lake Colongulac

Creek runs from SE of Camperdown. Blue clay on this flat in “Chocolyn” & was a Tea-Tree swamp originally.

Lake apparently once as deep almost as top of creek terrace. Stream meandered over flood plain.
Then lake level reduced and meander entrenched. Even the short run across former floor of lake is now entrenched a little.

Thus more pluvial period since deposition of loess “dunes”. Lake must have been dry for loess to form therefore dry period. Not also black soil on loess.

Page 101
16-7-50
Goose Lagoon
Map: Showing swamp, roads and various deposits in area.

Page 102
Basalt reef up to c10’ above HWM Boxthorn green, Thistles seeding, Swamp tussock & succulents noted growing between boulders.

Also between boulders deposits of fossiliferous limestone with shells of extant species. Function of higher S.L. Now being strongly eroded.

Middens at Boulder Point are Limpet middens, that being the dominating genus. cf Turbo, Donax, Mytilus middens. Limpets do well on boulders whereas Turbo needs shore platform, Donax sand, while Mytilus thrives near river mouths etc. However, in these middens Turbo Haliotis, Scutum, Purpura & an occasional lamellibranch also present. No bones noted. At Tower Hill beach, shells & bone midden
Map: Showing Princes Highway in relation to Goose Lagoon, and associated flats, swamp and middens.

See p. 15

Goose Lagoon

Midden SW of woolshed on last Page is on a localized platform on scarp thus:

Map: showing midden, scarp and fence.

c 10 chs N of highway on E side of Lagoon.

Turbo, Haliotis, Patella, charcoal etc.

Slight projection into lagoon of platform up to 10’ above alluvium level – basalt. c 5 chs further N from midden

Middens NE of aeolianite ridge with 50’ contour are c 20’ above alluvium of flats i.e. about ¼ way up ridge. Occupy less steep parts of ridge. Charcoal. Turbo, Patella, Haliotis, Monodonto. One piece of chiton found. Flints present but rare.

No middens or midden material found on basalt. Tendency to choose sandy places.

Alluvium runs up sides of scarps c 6’ indicating former higher level of water.

Diagram: Cross section showing levels of flat, Alluvium and basalt on steep bank.

Warrnambool

Bench marks

1. Intersection of South B.L of Merri St., & West B.L. of Kelp St. 85.22’
2. On line of West B.L. Banyan St. and kerb line on North side of Merri St. 70.13’

Bench marks X on basalt pitcher.

Datum is L.W.O.S.T. at Warrnambool breakwater where there is a tide gauge. Calculated when sewerage scheme introduced c1925
Map: Showing railway line, drain, beach camping ground and lighthouse along with auger hole and cross section AB.

Warrnambool beach camping ground auger
6’ Dark brown compact? tuffaceous sand
5” Ditto. With white fragments of limey material.
1” Hard light grey? Broken with crow bar
2’ 8” Grey tuffaceous sand
2” Red sand (old land surface oxidized material)
Then 1/2” aeolianite
Total 9’ 4 ½”

Water at about 6’
Surface = 70.13 – 57.55 = 12.58’
Bottom = 12.58 – 9.33 = 3.25’

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Diagram: Showing cross section AB

Lighthouse auger hole is 1 ch. 55’4” (approx) W of E fence line of Camping Ground & 7’6” S of S fence line of railway.

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Warrnambool Museum

Timboon Vertebrae of whale. Probably from lime works on Curdie’s River. Shark’s teeth, fish’s jaw, volutes, bivalves from Miocene – no localities.
Procoptodon goliath(?) jaw & other large bones from district but no loc.
Diprotodon Found on surface at Lake Wangoom & coll. for bone mill Diprotodon incisor.
Vertebra of very large marsupial from between 200’ & 300’ in mine near Bunninyong.

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See p. 98


Turbo undulatus “in dune rock” (prob old soil layer?)
Princes Highway a short distance east of Flaxman St. coll. from sewerage works by G. M. Chisholm, City engineer.


Fossil wombat – no loc.

Australites from Nirranda. Dumbell-shaped one from Mepunga found at depth 2’ another dumbbell one from Caramut.

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Allansford

Highly mineralized bones from depth of 30’ Deep alluvium there.

Alaska

Diagram: Showing Indian fish hook.

Fish hook used by Indians of Alaska, N. Amer. For catching halibut. cf use of bone spike by aborigines for fish-hook.

Old soil horizon in S. end of Pertobe Rd cutting on E side is 5’ thick.

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31/8/50

Cannon Hill auger hole no. 1

Map: Showing slope, cliff, railway line, fence and Auger hole 1.

Diagram: Showing cross section of old sea cliff

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Surface 13.36’ above LWOST

Bottom 13.36 – 8.85 = 4.51’

0’ – 4’4” Blackish tuffaceous soil. Earthly consistency

4’4” – 5’4” Greyish to blackish sand with freshwater fauna

5’4” – 6’7” Greyish brown sand

6’7” – 8’10” Reddish sand for a few inches then bright red for rest. Old soil layer. Material stuck in augur like a sandy clay.

8’10” – 8’ 10½” Aeolianite.

In 6’7” – 8’ 10½” Melliteryx helmsi (Hedley) & Austropyrgus buccinoides (Q & G).
Augur hole 1 is 6 chs 45’ W of Pertobe Road (approx.) along N fenceline of railway & 20’ N of same.
Augur hole 2 is 6 chs. 29’ W of Pertobe Rd (approx.) along N. fenceline of railway & 18’6” S thereof.

Page 115
Cannon Hill augur hole no 2
0” – 9” Black clayey sand with freshwater fauna.
9” – 1’ Marine shells & brown sand running into above.
1’ – 3’6” Greyish very compact ?tuffaceous sand. Broken with crowbar.
3’6” – 4’ Red sand then yellow aeolianite at base.
Surface 8.17’ above datum
Bottom 8.17’ – 4’ = 4.17’
Diagram: Showing theodolite image and tacheometry calculation

Page 116
Survey of augur hole levels
Table: Showing survey data for auger holes
Peg on railway line below lighthouse at W end of curve. 15.88’ above datum
Height of B.M. at corner of Banyan & Merri Sts. Above top of Lighthouse augur hole which is therefore 70.13 – 57.55’ = 12.58’ above L.W.O.S.T.
Platform in aeolianite of 10’ – 12’ sea.

Page 117
Cannon Hill augur hole Nos. 1-2
Table (continued): Showing survey data
Bottom of hole 1 = 4.5’ above LWM
Bottom of hole 2 = 4.2’ above LWM
Shows platform in aeolianite. No. 2 38.5’ further from cliff than No 1
Auger hole 3 Notebook 7 p. 120
Bottom of hole 3 = 0.43’ above LWM
Framlingham aboriginal station at Purnim

Bore 188 Windmill on E side of Mathieson’s (Missioner’s ) house & near road to school & church.

Map: Showing house location in reference to roads

Basalt 70’
Clay 50’
Limestone 10’
Total 130’
This amount of clay unusually large.

Page 119
2/9/50
Tower Hill Beach in stormy weather

Strong S.W. squalls & W squalls all day, most accomp. by gale force winds & many with hail. Sea ran up into wind blows in seaward sand ridge & eroded strongly the seaward edge thereof. Shore platform covered with a foot or two of sand & this apparently why devoid of marine life when examined in fine weather. Tuff blocks pushed up over sand. Sand will later blow away & so blocks form a beach ridge. Other blocks probably so transported up a ramp of sand. Hole 4’ deep dug between the two lines of

Page 120

tuff slabs but only sand met. The top of the hole was about 1’ below the highest part of the landward tuff ridge & about 2’ above the highest part of the seaward ridge. Soon after the hole dug the sea reached it by the swash of a large wave. Loc. About ½ way between 2 ridges.

Ridges of sand strongly eroded by winds. S.W. winds of previous day blew holes in ridges & winds of 2/9/50 blew more along ridges. Blast of sand in open stretches of sand.

Half way to Merri cutting from Gorman’s Lane sea had broken through the seaward sand ridge. Near the Merri ctg the 2 ridges coalesce.

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At Merri cutting sea awash over sand bar which much reduced in height by wind action. The salt lagoon reached by seawater & filled. Such occasions perhaps allow Serpula & Mytilus to be temporarily established on tuff near bridge at inland end of lagoon.

Diagram: Showing sand ridge, salt lagoon, sand bar and limit of sea entry.

Marram grass said to have been introduced to Aust. first at W’bool where imported from Sth Africa on suggestion of von
Mueller who Govt. Botanist & whose advice sought on moving sand of dunes. Planted 1900 – 1901 says Mr H. J. Worland, town clerk under recently. Bags of plantings in those early days sent to many places in Australia.

Kelly’s swamp a lake after rains. Cattle graze on swamps in summer – paddocks fenced – but bogs or lakes after rain.

2/9/50
Tower Hill
Map: Showing quarry, lake, augur hole & midden in relation to roads.

3/9/50
Dennington
Merri River see plan p. 84
Section in water gap which contemporaneous with or older than 25’ sea because 25’ platform cut at Dennington.
Diagram: Showing positions A, B & C on platform.
As B not stratified or materials sorted is apparently an Aeolian deposit and not sedimentary. Piled against 10’ cliff and so later. No evidences noted of 5’ & 2’ sea, but as tuff so piled water must have been about where it is now for the ash not to be washed away.

Dennington Spit see p.74
Mobile coastal dunes SW Of Dennington
Numerous outcrops of soil layers which give a general picture of dunes to nearly present height with a 10° seaward slope. This must have been vegetated to hold the soil & of this there is both fossil & historical record (Boldrewood 1896, Bonwick 1858) Usually 2 soil layers although these often merge into 1 at the top of the dune.
Diagram: Showing cross section of dune with soil layers. See p. 139
Fossil snail shells in soils. In upper soil layer burrows of native bees or wasps. Must have been settled layer for this extensive burrowing to successfully take place. Seen in upper soil in another place too.

For 3’ horizontally in one place thin layer of charcoal seen along top of lower soil.

Soils can be traced for c 3 chs.

c ¼ mile further W another soil layer traced for 5 chs seaward dip – 10° Situated on side of big blow. 2’ – 10’ sand on top. Soil layer 1’ thick on top of dune & becomes 2 one foot layers at bottom with section as opposite. Here bee or wasp burrows too.

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Diagram: Showing Channel through a dune and leading to a spit into swamp land.

Channel right through dunes. Big wind blow but now settled & vegetated with grass.

Sand from blow has formed a long “spit” into the swamp. See longitude 563 on Mil. Map

Rabbits plentiful & they help disturb the surface. Many “blows” where no vegetation, but dunes mostly vegetated in

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part with marram grass & tussocks. On inner side more vegetation further from roads. 10’ scrub in one part & stable surface.

Midden c. 352,688 2.4km WNW of bridge over Merri R. S of Dennington

from beach to top of ridge flakes of flint, shells (Donax, Subninella (Turbo) predominate in that order). Bones include

Shark

Seal

Birds

Kangaroo

Wallaby

Dasyurus

Wombat

?Bandicoot

Dingo or Sarcophilus

Diagram of spine: Diagram: Pristis? Diodon spine?

Rabbit, sheep & cow teeth also seen. Wind blow here reveals soil layer with low
Page 129
dip seawards as at other localities. In highest third of area extensive patch of fossil shrubs in situ.
Here only short distance to swamp as dune system narrower.
Many middens of thin & inextensive type found all along dunes. Only flint flakes & no true implements. No bone implements. Mostly Turbo middens but a number of Donax ones.
General dune system.
Diagram: Showing swamp, dune and sea levels
New dune line not over 25’ formed thro recent retreat of sea or since dunes denuded? No middens seen on them.

Page 130
South Warrnambool
20/8/50
Map: Showing post point in relation to roads in three directions.
Post hole at corner penetrated shellbeds, so they are almost against cliff at this point.
Turbo undulatus found in sewerage excav. In reddish aeolianite a short distance E. of road to Hopkins River in Princes Highway (Road in wh. Fletcher Jones factory stands).

Page 131
Rosebrook
?Pleistocene midden
Map: Showing Princes Highway and bridge in relation to midden sand flat, cliff & drain
Midden material consisting of charcoal shells, & flint flakes
MM 224,715
Turbo mostly; Patella, lamellibranch

Page 132
Bream Creek
Map: Showing Dune, beach, sea  and auger hole in relation to Bream Cr.
Diagram: Showing auger hole cross-section
½’ – 1” black peaty soil with saltmarsh weed
2’ brown clayey sand with gasteropods
6”+ black sand

Page 133
Map: Showing land from creek through to sea and quarry
In small quarry shown above section: Midden with Turbo, Purpura, etc. Artefacts
Diagram: Showing cross-section at quarry

Page 134
Diagram: Cross section at Bream Creek showing Dunes both partly vegetated with marram grass but mobile still.

Page 135
Dr. G. B. Pritchard
Diagram: of bone muduk
Bone muduk found in abo kitchen midden at Frankston.
Reports aboriginal quarry in quartzite off Spring Cr. at Torquay.
Map: Showing Spring Creek and quarry
Says natives in S.A. have sites in hollows whereas in Vic more often on rises. Lookouts?

Page 136
Lake Colongulac
Dr. Pritchard stated bones collected by him were from South end of Lake Colongulac where Timboon Creek flows in. Apparently washed from bed under tuff. Many of the bones broken.
Old man who had a saddler’s shop in the main street opposite Leura Hotel had a collection of bones from there including a good Thylacoleo tooth.
Geelong
Pritchard found Planorbis in limestone at beach at Limeburners Point. This also recorded in the literature.

Page 137
May 1950
Lake Pertobe
Photo: Mud cracks on west side May 1950

Photo: Crack pattern. Alluvium rich in small shells.

Diagram: Cross section showing differing levels from Warrnambool to Cannon Hill to Lake Pertobe.

Why this hump? Sand ridge blow up during retreat. Remnant of old dune line? Or off-shore bar when sea retreating from 70’ shore? If so, expect platform under it. Not so in Pertobe Rd cutting.

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Diagram: Cross section showing Lake Gnotuk and Lake Bullenmerri with point A in between as a rise.

At A note

1. Change of slope
2. Slope not steep enough to be part of ring fault. Due to erosion by water running over?

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= Dennington Spit

Soil layer S.W. Of Dennington (c. 363,684) see p. 129

Tests

1. Soil ignited
   a. Went almost white, so no reduced iron which would turn red on oxidation.
   b. Numerous white flecks which interpreted as calcined shell etc fragments.
2. Soil washed
   a. Water immediately clouded with black organic matter & some floated.
   b. Translucent residue (mostly quartz) left.

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3. Ignited soil treated with HCl
   a. Effervesced strongly showing presence of CaCO₃
   b. Large percentage of sample was of quartz grains etc as residue.
   c. Mounted in clove oil showed residue nearly all quartz. Odd grains Limonite, Tourmaline & a couple of other minerals noted.
   d. All grains very well rounded. No angular mineral suggesting tuff not mixed in soil. If so would expect darker residue & higher % of heavies.

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Lake Colongulac
Small quarry in old bed of lake N. of “Chocolyn” (see p. 99) Bones of giant marsupials with grey “loess” = silt salt inside & attached in a matrix of gravelly rock consisting of pellets, somewhat worn of a brick-red colour & very fine texture.

It was thought these might be pieces of decomposed basalt or hard red basaltic clay. They were separated, washed & crushed & found to be gritty in texture. The mineral fractions were cleaned by boiling in dil HCl. Bromoform separation showed a small % only of heavies mostly rounded. A euhedral zircon was noted.

Page 142

The light mineral had a % of quartz but consisted chiefly of altered minerals of some kind. Platyshape & pleochroic haloes showed some of it biotite. Probably decomposed feldspars common. Not decomposed basalt, but detrital material & may well have been iron impregnated loess, i.e. material as in fossil bones but ferruginous.

As some of the bones have the “loess” or silt still attached & show so little signs of wear they cannot have been transported far nor have had much transport previously. Others quite worn especially smaller bits.

Dr Beasley’s report on material in bones says not pyroclastic in his opinion. So therefore

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either aeolian or sedimentary. May be homologous with material forming dunes on E sides of lakes at present or old lake silt. Form of these “dunes” shows they are aeolian & as they consist of silt, they must be loess. It is noted also that these structures occur on the shores of lakes to the N. miles from any occurrence of tuff, according to Grayson Mahony’s map cf lunettes.

Photo: lunette on lake shore

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Lake Colongulac

Photo: Lake, old bed (with cattle, cliffs in loess. Looking c N from creek just N. of “Chocolyn”

Photo: Looking c E. from same point. High level alluvium with entrenched meanders.

Photo: Looking c W from same point. Creek wandering across old lake bed in which it is entrenched.

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Diagram: Cross section of lake wall showing black soil, loess, abo skeleton, cliff & old lake floor.

Photo: N.B. basalt outcrop. View from site of abo skeleton on E cliff of Lake Colongulac.

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Photos: 3 Views from various angles of abo skeleton in situ
Photos c 3pm 10/3/51

Page 146
Lake Keilambete
Photo: Man in rubber dinghy on lake
Carron McAllister (ex Australian Navy) in Museum rubber dinghy on Lake Keilambete. In this we took depths in various lakes. Those taken along the lines of Mahony’s survey showed a drop of level in Lake Bullenmerri ~ 50 ft. The geological survey would not believe this when reported at The Geology Club (forerunner of the Geological Society). Dave Thomas sent John Knights to survey from the railway station datum at Camperdown to the lake. It was found that my report was correct.

There was a stone set by local people at the level at which the lake stood in the early days. The locals estimated the fall in lake level by reference to this stone.

Dan’s Caves bores
Mr. Keith McCrabb sank two bores one on each side of Dan’s Caves on the coast east of the Hopkins River mouth. They were 160 feet deep and had 11-20 feet of water.

Page 148
Breakwater Rock Warrnabool
Viewed from Merri Island low tide (shore platform exposed) & exceptionally flat sea show the reefs at the harbour entrance stand above LWL. (photo)

Page 149
Port Fairy
Photo: Moyne River (with small boat)
Photo: South Beach Calcarenite on basalt (with horses & person)
Photo: Looking towards Killarney Beach (dunes & sea)

Page 150
Prob 1949-1950
Tower Hill
Photos 1-5 Quarry in tuff and various views of the volcano

Page 151
Photos 6-10 various photos including near breach in rim, Quarry in bedded tuff of caldera rim.

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Photos 11-15 including Assistant Noel Shaw (15)

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Photos 16-20 including Malcom Gill born 1940 (16); Miocene marine limestone = Port Campbell Limestone in caldera wall (17)

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Photos 21 – 24
Continued from p. 153
Small basalt flow in caldera (23)
Vesicular basalt of photo 23 (24)
PTO

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Photo 25 Another view of the small lava flow (basalt) in The caldera geophysical survey indicates inverted cone of basalt below crater floor at c 10m It is size of crater i.e. 3100 x 2100 m. See bk. 52: 271-273
See Page 18
Tower Hill

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End of Notebook No. 6