Notebook No 6

Edmond Gill

Western District Vic

Index

69 Faulting at T.H.

72 Conn's Lane

74 Kelly's Swamp area

79 Definitions

80 Childers Cove middens

81 Bream Creek

83 Killarney Bores

Aborigines Adaptations

84 Dennington Shell bed

89 Dennington Middens

Merri Is. Middens

88 Port Fairy

98 Warrnambool L/IG Princes H'way

99 Lake Colongulac

101 Goose Lagoon

107 W'bool augur holes Datum

110 W'bool Museum

111 Old bacon factory

112 Fossil bones from Allansford

113-117 W'bool augur holes

118 Bore 118 Fram. Abo. Stn

119 Tower Hill Beach in storm

123 Tower Hill midden & augur hole near Island

124 Dennington

125 Dennington Spit

130 South Warrnambool

131 Rosebrook

132 Bream Creek

135 Frankston, Torquay (G.B.P. Notes)

136 Lake Colongulac, Geelong Limeburners Point Planorbis

137 Lake Pertobe

138 Lakes Gnotuk & Bullenmerri

139 Soil layer SW of Dennington

141 Lake Colongulac

146 Lake Keilambete

147 Dan's Cave Bores

148 Breakwater Rock, Warrnambool, photo

149 Port Fairy Photos

150 Tower Hill Photos

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 (biocoenose).

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.

Page 7

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

Page 11

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 fossilferous. Beds horizontal, but 1-1 ½ chs show dip c 7 ^{o} SE

Collapse feature? Yes

Page 14

23/12/49

Physiographic 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^{o} E to gate of entrance to rim quarry on NE side (opposite road to Wright’s).

Flow small arcuate, frothy and contains some pieces of bedrock. Minor flow part of final activity. Only flow seen. Flow structures clear.

Page 18

See p. 164

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^{o} 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

Birds, Whale, Seal, Potorous, Vombatus. Basalt axe. Flint Core.

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

Page 26

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

Page 28

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 aeolinite 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.

Page 31

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.
2. Bushfield during T.H. eruption period record of Dingo under Tower Hill ash.
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.

Page 37

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.

Page 40

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 ml 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. ?

Page 46

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.

Page 47

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.

Page 50

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

Page 51

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

Page 58

[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

[95] W. of Kirkstall Rd

Branch Rd c 1 ½ ml N of Highway c ¾ 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.

Page 59

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.

[96] Kirkstall Rd. N of scarp

8’ – 10’ black pug both sides of rly. Fossil reeds.

[97] 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

Page 60

[98] Boundary Rd N side c ½ ml E of Crossley Rd.

On MM *. 292,784

Tuff 4’ - 5’

Limestone 40’

[99] Koroit sale yards

Soil etc. 14’

Tuff 4’

Basalt 25’

Black sand 2’

[100] Boundary Rd. c 1/3 ml W of turnoff to NW rim of Tower Hill. 295,782

Soil etc 5’ – 6’

Limestone 80’

[101] Diagram: Boundary Rd intersecting with Railway line near bore.

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”.

Page 68

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.

Page 70

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.

Page 71

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 habour. 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?

Page 80

Childers Cove

Diagram: Plan of Cove showing location of Midden.

Charcoal. Flint implements common but no bone ones. Shells almost exclusively Turbo. A few limpets & one Purpurea. A few rabbit & bird bones.

Page 81

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.

Page 83

Killarney bores

[148] * on M.M 268,726 East of Killarney P.O. & N side of Princes Highway almost all sand like bores 87, 88.

[149] * on M.M. E of Killarney S side of Princes Highway 6' – 7' soil (=ash & soil) 23' sand.

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.

Page 84

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.

Page 85

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

Page 86

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 & Haliaotis 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.

Page 88

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.

Page 91

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

W of Aringa School, all between there & Orford Rd. Stony Rises at “Aringa North.” None at Orford. In again near Vine Bank.

Flow ½ ml wide from Ripponhurst SW for about 7 mls. 22’ thick. Flowed in channel. Goes to Byaduck & sea. Only basalt between Darlot Cr. Yambuk & Portland. Very hard indeed.

Bore 176

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

Page 96

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 yrds 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

Bore184

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

Page 103 – 104

Map: Showing Princes Highway in relation to Goose Lagoon, and associated flats, swamp and middens.

Page 105

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

Page 106

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.

Page 107

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

Page 108

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’

Page 109

Diagram: Showing cross section AB

Lighthouse auger hole is 1 ch. 55’4” 9approx) W of E fence line of Camping Ground & 7’6” S of S fence line of railway.

Page 110

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 goliah(?) 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.

Page 111

See p. 98

Near old bacon factory, Princes Highway near W boundary of W’bool. Excav for well. Pebbles sand 14’ & Haliotis at 16’ See bk 42:118 for map.

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.

Mt. Shadwell scoria pit. Piece of bone in cinders.

Fossil wombat – no loc.

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

Page 112

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.

Page 113

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

Page 114

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’ 10 ½” Aeolianite.

In 6’7” – 8’ 10 ½” 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

X 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 auger 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

Page 118

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.

Page 121

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

Page 122

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.

Page 123

2/9/50

Tower Hill

Map: Showing quarry, lake, augur hole & midden in relation to roads.

Page 124

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.

Page 125

= 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^{o} 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

Page 126

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 ¾ 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.

Page 127

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

Page 128

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.

Page 138

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?

Page 139

= 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.

Page 140

3. Ignited soil treated with HCl
    a. Effervesced strongly showing presence of $CaCO_3$
    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.

Page 141

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

Page 143

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

Page 143

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.

Page 144

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.

Page 145

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 .

Page 152

Photos 11-15 including Assistant Noel Shaw (15)

Page 153

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

Continued Page 163

Page 154

		Book	Page
184	Yambuk	6	97
185	Yambuk	6	97
186	N. of Cassidy's Bridge	1	32
187	N. of Cassidy's Bridge	1	32
188	Mathieson's Abo Stn., Purnim	6	118
189	McNaughton's Grange Burn	7	14
190	"Chocolyn" house bore	9	3
191	"Chocolyn" W. of dam	9	4
192	"Chocolyn" E of dam	9	4
193	Yulecart	7	51
194	Lake Terang	10	107
195	Cheetham, Geelong	10	109
196	Power's Cr., N. of Casterton	10	120
197	Maribyrong	13	97
198	Warrnambool, Henna St	9	70
199	Harrow	10	126
200	Hamilton	10	157
201	Albert Park, Warrnambool	17	79
202-3	Dan's Caves	6	149

Page 155

161	Port Fairy	6	89
162	Port Fairy	6	89
163	Port Fairy	6	90
164	Port Fairy	6	90
165	West of Kirkstall	6	91
166	Port Fairy	6	92
167	Koroit	6	92
168	West of Killarney	6	92
169	7 mls NW Pt. Fairy	6	93
170	Crossley	6	93
171	Toolong	6	93
172	Tower Hill	6	94
173	Port Fairy	6	94
174	Port Fairy	6	94
175	Port Fairy	6	94
176	Port Fairy	6	95
177	Goose Lagoon	6	96
178	Port Fairy	6	96
179	Port Fairy	6	96
180	Port Fairy	6	96
181	Port Fairy	6	96
182	Yambuk	6	97
183	West of Yambuk	6	97

Page 156

138	Coordmook – Gould's	1	48
139	Coordmook – Gould's	1	48
140	Coordmook – Gould's	1	48
141	Coordmook – Gould's	1	48

142	Flat Rock	1	61
143	Killarney	6	12
144	Illowa	6	13
145	Tower Hill	6	13
146	Killarney	6	19
147	Killarney	6	19
148	Killarney	6	83
149	Killarney	6	83
150	Port Fairy	6	88
151	Port Fairy	6	88
152	Port Fairy	6	88
153	Port Fairy	6	88
154	Port Fairy	6	88
155	Port Fairy	6	89
156	Port Fairy	6	89
157	Port Fairy	6	89
158	Port Fairy	6	89
159	Port Fairy	6	89
160	Port Fairy	6	89

Page 157

115	Tank Hill	1	34
116	Near Tank Hill	1	34
117	Near Tank Hill	1	34
118	Framlingham	1	34
119	Framlingham	1	35
120	~~Wollaston~~ Framlingham	1	35
121	~~Merri River~~ Framlingham	1	35
122	Wollaston	1	36
123	Merri River	1	36
124	Grassmere	1	39

125	Russell's Cr.	1	41
126	Owen Bros, Lava St *works	1	41
127	Mrs Johnson's E side Mailor's Flat Rd	1	32
128	Cooramook	1	44
129	Off Ellerslie Rd	1	44
130	Botanical Gardens	1	45
131	Chinese Garden, Russells Cr Flats	1	32
132	Dennington (Boulden)	1	45
133	Merri Vale School	1	45
124	Nr. Mailor's Flat	1	45
135	Grasmere	1	46
136	Winslow Rd	1	46
137	Killarney	1	46

Page 158

92	Near Glaxo	6	57
93	W. of Kirkstall Rd	6	58
94	W. of Kirkstall Rd	6	58
95	W. of Kirkstall Rd	6	58
96	Kirkstall Rd, Not scarp	6	59
97	Kirkstall Rd, Not scarp	6	59
98	Boundary Rd	6	60
99	Koroit Sale yards	6	60
100	Boundary Rd	6	60
101	Boundary Rd	6	60
102	Farley's Farm (E. Rosebrook)	6	48
103	McCrabb's, Spence St	1	32
104	"Ocean Fisheries" Liebig St.	1	32
105	Purnim	1	32
106	Tank Hill (2 bores)	1	32
107	Winslow Lake	1	33

108	Cooramook	1	33
109	Woolsthorpe	1	33
110	Warrong	1	33
111	Hawkesdale (26 bores on “Kilmorey”)	1	33
112	Woodford	1	34
113	Framlingham	1	34
114	NW of Tank Hill	1	34

Page 159

69	Tower Hill	6	51
70	Koroit	6	51
71	Koroit	6	52
72	Cemetery	6	52
73	Lynch’s Lane	6	52
74	Princes Highway	6	52
75	Yangery	6	52
76	Yangery	6	53
77	Tower Hill	6	53
78	Tower Hill	6	53
79	Rd. To T.H. Beach	6	53
80	Rd. To Killarney Beach	6	54
81	E. of Killarney	6	54
82	E. of Killarney	6	55
83	E. of Killarney	6	55
84	E. of Killarney	6	55
85	Tower Hill Marsh	6	56
86	Toolong	6	56
87	Killarney	6	56
88	Killarney	6	56
89	W. of Killarney	6	57
90	W. of Killarney	6	57

91	W. of Killarney	6	57

Page 160

46	Brierly Flats	6	12
	Brierly Flats	1	88, 64
47	Mt. Warrnambool	1	89
48	Mt. Warrnambool	1	90
49	Mt. Warrnambool	1	90
50	Panmure	1	94
51	Southern Cross	1	103
52	Koroit	1	103
53	Kirkstall	1	103
54	Warrong	1	104
55	Illowa (Crowe's Mill)	1	104
56	Illowa (Crowe's Mill)	1	104
57	Illowa (Crowe's Mill)	1	104
58	Southern Cross	1	105
59	Illowa	1	105
60	Koroit Beach turnoff	1	105
61	Dennington	1	105
62	Koroit Waterworks	1	105
63	"Aringa"	1	105
64	Goose Lagoon	1	106
65	Near Glaxo Factory	1	106
66	Rosebrook	1	106
67	Southern Cross	1	106
68	Koroit	6	51

Page 161

23	Hopkins Falls	1	72
24	Mt. Taurus	1	73

25	Purnim (3 bores)	1	73
26	Purnim (3 bores)	1	73
27	Koroit	1	74
28	Illowa	1	74
29	Lake Keilambete	1	74
30	Garvoc	1	74
31	Bushfield	1	75
32	Warrnambool	1	75
33	Warrnambool	1	75
34	W'bool Woollen Mill	1	75
35	Cudgee	1	75
36	Woolesthorpe	1	75
37	Wangoom	1	76
38	Wangoom	1	76
39	Tower Hill	1	76
40	Port Fairy	1	77
41	Rosebrook	1	77
42	Allansford	1	77
43	Allansford	1	77
44	Dennington	1	77
45	Dan's Cave	1	78

Page 162

List of bores

No.	Place	Book	Page
1	Naringal School	1	68
2	Nullawarre	1	68
3	Levy's Point	1	68
4	Steeplechase Paddock	1	68
5	Dooley's Telegraph	1	68
6	Framlingham School	1	68

7	Winslow	1	68
8	Dennington Rd	1	69
9	Woodford	1	69
10	Woodford	1	69
11	Half-way Hotel	1	69
12	Near Half-way Hotel	1	69
13	Near Half-way Hotel	1	70
14	Grasmere	1	70
15	Mepunga	1	70
16	Nullawarre	1	70
17	Naringal	1	70
18	Timboon	1	71
19	Wangoom	1	71
20	Wangoom	1	71
21	Winslow	1	71
22	Cudgee	1	72

Page 163

Photos 21 – 24

Continued from p. 153

Small basalt flow in caldera (23)

Vesicular basalt of photo 23 (24)

PTO

Page 164

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

Page 165

Blank

End of Notebook No. 6