Cover

Western District

Geological Notebook No 17 Edmund D. Gill

National Museum of Victoria

Melbourne, C.I.

Victoria, Australia

Front end paper.

Western District of Victoria

2 Photos: "Creeping Lakes" Lake Corangamite at Pirron Yallock

Flyleaf.

Notebook No. 17

If found, please return to Edmund D. Gill

~~National Museum~~

~~Russell Street~~

~~Melbourne, CI~~

1/47 Wattle Valley Road

Canterbury, V. 3126

INDEX

1 Cundare

2 Thorp on Tower Hill soils, and

3 E. of Illowa, and

4 Laterite Timboon Rly

5 Mt. Porndon

6 Lake Condah

7 Byaduk Caves

8 Lake Keilambete (Tertiary)

9 Bushfield

10 North Shore

11 North Geelong

13 Mt. Moriac

14 Warrnambool & Pertobe

16 Dreeite

18 Weering Simpkin’s Lake

19 Strathdownie

25 Casterton-Coleraine Road

26 Warrnambool 25’ sea

27 Wannon Falls

28 S.W. of Casterton

29 Strathdownie

31 E. of Cobden

32 Lara limestone

33 Warrnambool L/IGl 25’ sea

34 Gnawarre

35 Inverleigh

37 Camperdown

38 Stony Rises

39 Pirron Yallock

41 Colac

42 Lake Condah

44 Port Fairy

45 Tarrington

47 Portland

48 Mt. Warrnambool soil

49 Caramut

50 Coleraine

52 Glenthompson

53 Grange Burn, Hamilton

63 Muddy Cr. Sub-basaltic beds.

66 Wannon Falls (Pictures)

68 Dennington Dunes

69 Tower Hill beach

72 Kelly’s Swamp

73 Dennington water gap

74 Tower Hill beach

75 Dennington Dunes

78 W’bool eustatic sea levels.

79 W’bool. Albert Park quarry.

81 West Warrnambool emerged shore L/IGI platform

82 W’bool Woollen Mill

83 Lake Elingamite

84 Lakes Bullenmerri – Gnotuk

85 Russell’s Cr, Warrnambool L/IGI

86 Waurn Ponds Sub-basaltic beds

87 Strathdownie

89 Lake Colongulac Tuff S. end

96 Lake Corangamite

98 Lake Colac

111 Lake Weeranganuk

114 Tower Hill

115 Hamilton

117 Minhamite

120 Colac

122 Irrewarra

126 Port Campbell

129 Colac

131 Hamilton

135 Tirrengower. Swan Marsh

136 Mt. Noorat

137 Grange Burn

138 Keilor cranium site

140 Pt. Campbell

142 Lake Weeranganuck

149 Lake Gnapurt

151 Dennington (Harrington St)

154 Lismore

155 Tower Hill Beach

156 Dennington (Harrington St).

157 Tower Hill Beach

158 Coesite

159 Sherbrook R. Loch Ard

162 Pt. Campbell Council Borrow pit

164 Sherbrook R.

165 2 m. S. of Camperdown

165 Colac near Motel

166 Rutledge's Creek

Lake Weering

Page 1.

24-4-55

Cundare

Diagram: Map of Lake Corangamite showing road cuttings and C14 sample site

Lake Corangamite mil. map 1941

2 ml = 1 in. shows area.

Beeac sheet mil. map 1949 1" = 1 mile

grid ref. 628,956.

Page 2

Prof. Jas. Thorp on Tower Hill soils

Soil at cinders quarry on central cone (Koroit side) beside road.

Brown ando soil. Varies in lime & phosphorus content. (there is also a black ando) cf Germans'

Brown Erde Brown Forest Soil chernozemic characters.

Tower Hill Beach

Juvenile soil, rendzina or regosol. Slight leaching & no profile level.

½ ml N. of Rosebrook on east side of Princes Highway.

Soil on Pleistocene aeolianite. Loam to sandy loam. Dark brown 18" deep in travertine band (old sea floor?) yes

Page 3

Princes Highway c 2 mls E of Illowa

Diagram: Three layers of soil and tuff in road cutting.

On hill crest in cutting, esp. S side.

Soil (1) ~~Prairie soil.~~ Brown ando. Beginning of profile development

0" - 3" spoil mid-brown

3" - 10" slightly coarser. Dark brown

10”- 18” slightly courser. Dark brown

18” – 30” Tuff

30” -46” Yellow sand

Aeolianite

2 Terra Rossa (fossil)

Page 4

Camperdown – Timboon Rly Ctg

In tuff degraded or maximal prairie soil or planisol (Thorp)

Camperdown reservoir – on tuff –maximal prairie profile Not podsol.

Solod

Otways Brown forest soils

Anglesea cliffs NE of river above jarrosite.

Solonized solonetz

2 fossil soils at point (above carb. beds with Cyclammina

Page 5

Mt. Porndon

Property of Mr. Swain on south side of mount between barrier & the mount. Paddock cultivated & found to be of tuff. It is between the original homestead & the present one. A well near the original homestead proves about 25 ft. of tuff.

Page 6

Lake Condah

Aboriginal mission

Photo of Church in paddock

Photo of ruined building in paddock

Photo of old farm building in paddock

Page 7

Byaduck Caves

Photo of cave entrance (from inside, looking out)

Photo Caption. On lava flow looking towards Nt. Napier(source).

Photo Caption. General view up valley to Mt.Napier in distance. Taken from near Kinghorn's house on Hamilton-Pt.Fairy road.

Page 8

Lake Keilambete N. W. of Camperdown.

Table

Limopsis beaumariensis	Approx. no. 200	Range CK
Cucullaea corioensis	1	JCBK
Glycymeris cainozoicus	5	JCBK
Corbula ephamilla	15	
Mytilicardia cf. compta	2	
Ancilla sp.	1	
Glycymeris gunyoungensis	1	
Dentalium sp	1	
Placotrochus deltoideus		

Page 9 see BK 10:113

Bushfield Site

Collected by H. R. Balfour Esq.

Bird bone – duck?

Fish vertebra

Emu egg fragment.

Page 10

25/4/56

North shore , Geelong

Diagram: Hand drawn map depicting Corio Bay near Harvester works and reserve and shell beds. Outcrops at intervals round shore of Miocene. Contains Hinnites corioensis, Pseudamusium yahlensis, Ostraea, Bairnsdalian?

Pleistocene. Chione, Arca, Ostraea, Austrocochlea, Diala, etc.

Pebbles of travertinized Miocene numerous at and near base of deposit.

Page 11

North Geelong

Diagram: Hand drawn map near Rly Bridge showing excavation

Diagram Cross section of excavation showing marine and non-marine beds

Page 12

Molluscs collected from ironstone. Corals etc. from travertine nodules.

1956

Non-marine = Red Bluff Member

Sandringham Sands

? Upper Pliocene

Disconformity

Marine = Black Rock Member

Sandringham Sands

Chettenhamian Upper Miocene

Page 13

Mt Moriac

Princes Highway, 1 ml W. of Mt. Moriac. Mil map grid ref Geelong sheet 1928, 242, 868.

Next cutting west from Moriac stone church (on Mil map). Cutting in small but prominent hill (550 ft. contour), made so apparently by ironstone.

Diagram: Vertical section of road cutting

Non-marine sequence.

Equivalent of Red Bluff Member of Sandringham Sands.

Section under basalt 6 ½ mls W of Moriac. Book 9, p. 14.

Page 14

26/4/56

Pertobe Road Warrnambool

See Bk. 2: 76-7

Briar Ltd. Factory (built during war as Dehydration plant) (for vegetables) Pertobe Road.

Diagram: Map showing Pertobe Road and Merri canal and auger site

Table: Description of soil profile from auger samples

Water stood at 3’11” (47”)

Page 15.

Cutting from newspaper. 26/4/56 Weather diary.
Water caused sand to run making further augering impossible. 18" dug with spade& the rest with auger. Fossils include Tellina (both valves together), Austrocochlea, Mesodesma, Chione.
C^{14} sample from W edge of Merri Canal 1 ch. S. of footbridge to Woollen Mill, S. W'bool. Samples from between H.W.M & M.S.L.
E side Pertobe Rd. at Cannon Hill below lighthouse, excav. to look for shells on aeolianite platform c 10' above L.W.M.
Soil 0"-21"
Tuff (partly decomp.) 21"-33"
Solid Tuff 33"-
Is this a fossil rock stack?

Page 16
27/4/56
Dreeite
C.J. Robertson's farm, cnr. Read's Lane & Taits' Road, Dreeite. Farm is on E. side of Lake Corangamite. Survey peg on dune 36' E of fence (no. 1) & c. 1 ch. S. of S. bldg. line of lane. Fence 1 is on former shoreline (3,500 yrs?).
Table. Survey results for highest water level in 1955.

Page 17
Recent wet winters & mild summers have made the lake shore c ¼ mile E of usual place at this farm. Water between 5' & 10' deeper.
Between Fence 3 & water (i.e. on lake beach) Coxiella piled up to 2' thick. Sample for C^{14} control taken. Also sample from peg site where rich shell band. C^{14} samples taken 2' 6" to 2' 9" and 2' 9" to 3' 0" from surface.
This is so rich that it would appear to be the equivalent of the deposits on the present beach. It is overlain with "loess".

Page 18
Weering
On property of Mr A.D. McNeill, "Loch Ness", Weering at N. end of Loch Calvert. This part known locally as Simpkin's Lake.

On surface is rubble of travertine – prob. an exhumed B horizon. Underneath clays sampled to 3 feet.
Bones in travertine, & also washed from clays by retreating lake. In recent wet period lake advanced a great distance & was 6' – 10' deeper.
Beeac 1 ml/1in Mil. Map 1948, c. 783, 972. McNeill later moved to Lorne, V.

Page 19
5/6/57
Strathdownie
See also Book 10, p. 129 Puralka, Book 10, p. 108 Fossils.
Diagram. Map showing Quarry in section 22 Parish of Kaladbro.

Page 20
Photo of Strathdownie Quarry depicting a cave. Caption: Fossils from this cave on & in red earth.
Photo of swamp and Quarry in 20' limestone ridge.
Photo of ridge in Strathdownie Quarry.
Photo of marine fossils in Strathdownie Quarry and truck.

Page 21
Quarry in ridge of shallow water marine limestone, fawn (yellowish to white where much travertine, as along side near swamp). Calcarenite mostly with occasional lenses of coarse siliceous sediment of granitic origin, sometimes approaching a fine conglomerate. However, mostly calcareous.
Plebidonax the commonest fossil but not numerous. Aragonitic shells only as casts. Two Ostraea found; calcitic material preserved.
A good deal of redeposition of calcium carbonate giving bands of crystalline limestone. Air spaces (horizontal), solution pipes & caves. Bedding horizontal &

Page 22
continuous to edges of swamp, i.e. has been truncated during formation of physiographic low areas. Limestone very travertinous. Caves commonly filled or largely filled with red earth. Also vertical pipes filled with terra rossa. Present surface soil much darker. Soil on ridge thin (c 9" where tested) & rock outcrops common. Stripped in arid period?
Wide areas of sand in this country probably from erosion of limestone which washed in some periods & wind winnowed in others. More extensive to S so moved mostly by water as that the

Page 23

direction of general drainage?

History

1. Deposition of limestone in shallow sea in Pleistocene. Post-Werrikooian so prob. mid Pleistocene. Similar rock & fossils at Devil's Den & elsewhere on Glenelg R.

2. Retreat of sea, leaving sand dunes & ridges on shallow water limestone.

3. Decalcification to form caves, pipes etc.

Formation of terra rossa. Impeded drainage from dunes etc. but Strathdownie ridge formed from horizontally bedded marine rock. Little physiographic relief so low water table needed for formation of

Page 24

caves, pipes, etc. This apparently a pre-swamp process or prob. synchronous with formation of sand.

Auger holes in Pieracle Swamp & such places should give the post-sand spread history & help date the end of that process.

Fossil Bones yellowish to whitish & somewhat decalcified. All organic matter gone. Bones free in caves or in red earth. Found 2' – 14' below surface. Bones in earth often rather rotten (except enamel of teeth) & with spots of manganese.

Det. By Jack Woods

P 17871-2 Palorchestes parvus De Vis upper teeth esp. diff. fr. Island specs.

P 17873 Protemnodon sp.

Page 25

Casterton-Coleraine Rd.

Road cutting just E of Casterton where road mounts to Dundas tableland. Redistributed lateritic ironstone. That at surface under 9" silt loam (without profile) is more rounded & somewhat polished. Blown about or sand blasted on deflated surface in last arid period?

On W edge of deep valley 12 mls E of Casterton, deep road ctg shows c 20' of lateritic profile. 3 ironstone band & loose eroded ironstone near surface as above. See colour photo. See Stephens "Aust. Soils."

Page 26

Aug 57

Warrnambool

Map of Highway - Morris Road area showing fossil cliff and Miocene Limestone platform

Last Interglacial.

Excavations in paddock show Quaternary marine "shell beds" (emerged beach) on platform of Miocene Marine Limestone latter hardened by secondary deposition of $CaC0_3$. Flat beach pebbles, sand & shells Subninella)

Haliotis) open coast fauna

Neothais)

Monodonta)

Dicathais cf baileyana could be new species.

See pages 33 & 81

Also book 10 p. 117-8

Book 1 pp. 30, 45

Page 27

Wannon Falls

17.2.58

Wannon used to be called Redruth

2 Diagrams of falls, with explanation of rock layer composition.

"Laterite" under basalt here not pedological. Wood (CSIRO No. 4506) coll. L.K.M. Elmore from under basalt. Collapsed but hardwood & prob. eucalypt.

Page 28

18.2.58

S.W. of Casterton

c. 6 ml S at fault – upthrow side. See GSV map and structural maps (Parish Plan).

Limestone – Lower Tertiary. Over this is ferrug. sand with local concentrations of ironstone. Looks like iron pan & not laterite. No fossils found in ironstone in situ.

Marine l'st has flint in it – prob. is Janjukian (cf. Mt. Gambier Limestone). Loose ironstone boulder with pecten.

Wannon Falls

Photograph of falls.

Page 29

Strathdownie

Quarry as on p. 19. See also p. 87

Diagram: Plan of cave in quarry, indicating entrances A & B.

Entry B higher than A. Much fallen material in cave. No floor of earth visible.

Page 30

Limestone

Generally horizontally bedded but one small piece of quarry wall c 10' x 10' with strong cross-bedding. Max. 25 ft. thick

(below this)..C 5' sand with concretionary areas.

May represent former water table. Wetting and drying caused lithification of most of the lime sand. That below relatively little altered.

Page 31

21.2.58

E. of Cobden

Map showing location of Cobden, creek and quarry.

Quarry top of hill 8 ½ mls east of Cobden on Cobden-Stoneyford Road. West side of road near house, roadside quarry c ½ ml. W of intersection with Carpendeit Rd. Section reminiscent of that under basalt in rly. ctg. W of Lake Bullenmerri. Buckshot at surface then cellular iron with some clay inclusions.

Just E of school on other side of road is a second ironstone quarry. Looks like laterite detritus rather than in situ.

Page 32

Lara limestone

Pritchard collected a "UNIO" counterparts from this limestone, P17593-4. Dr. McMichael says "new genus."

Limestone in 3 or more patches in Geelong Dist. Fossils found are freshwater mollusca & vertebrate bones. Re-crystallized – cf. Coimadai. Due to lakes formed in valleys on basalt when faults developed during Kosciusko uplift?

Late Pliocene? (Helix pisana introduced snail common)

19/4/61

Map of Hovells Creek area showing road cuttings and quarry locations

Bedding not clear. Horizontal much leaching & redeposition. Psilomelane on many joint planes. c20' thickness can be proved.

Page 33

Warrnambool

Map of Warrnambool area bounded by Princes Highway on the westside, Morris Road on the northside, Laverock Road on the south side and Woodend Road to the east.

See pages 26 & 81

These shell beds ~~apparently~~ belong to 25 ft sea level L/IGl (7.5 m above LWL or 7 m above MSL)

Page 34

Gnawarre

14.11.58

Map of Mt Moriac area

Map: detail of same showing laterite exposure and dams excavated in sand

Page 35

14.11.58

Inverleigh

Scarp on Cressy Rd c 2mls W. of Inverleigh

Diagram: Showing cross-section of scarp.

Laterite eroded & 1' leached material between it & the basalt. Detail of contact in this section on south side of cutting is as given on p. 36. Interpreted as mottled zone of laterite with some of ferruginous zone.

Page 36

Diagram: Vertical section showing layers of Basalt through to silty sand.

Page 37

Camperdown

Mr. Cox, school teacher, found basic rock in ejectamenta, Lake Bullenmerri. Dr. Tattam recognised

Dark hornblende

Colourless olivine & enstatite

Green chrome diopside

1961

Quarry N side of Princes H'way & Mt. Leura

Diagram: Showing cinder, basalt and tuff with dips in quarry

1. Basalt younger than cinders. Basalts of various ages round Mt. Leura.

2. Concentric faults or considerable lava withdrawal cause these severe collapses. As series of ridges (Mem. Nat. Mus. 18) perhaps faults more likely. Also basalt extruding then.

Cont. p. 38

Page 38

26.2.59

Stony Rises

Princes Highway at Mile post 102 about 2ml W of Pirron Yalloak. No soil on top of basalt ridges & (apart from cracks & depressions) only a few inches on sides. No soil profile.

Basalt fresh. Vesicular to massive. No "magnesite" but whitening on joint faces sometimes. Little decomposition even along joints. More vesicular for top 6'-8' which zone follows present surface – shows little erosion. Much jointing & bubble lines parallel to present surface.

Cont. from p. 37

Diagram: Section showing yellow tuff over grey cinders

3. Between these strata was time of

a. Basalt extrusion

b. Collapse as shown on p. 37.

Suggest a disconformity or rather diastem between above 2 strata.

Page 39

Pirron Yalloak Cr.

Right bank just downstream from Princes Highway bridge.

Diagram: Cross-section of creek showing layers and auger site

2'6" dark grey clayey sand

2" brownish to grey tuff

6" light grey silt & fine sand grading into light grey silty clay

1' light grey silty clay grading into

1’10” grey sand, with mottles of fawn at 5’9” from surface. At 6’ fawn very clayey sand.
2’+ fawn stiff clayey sand
8’+
N.B. (a) 2 tuffs
(b) sediments oxidized below water table.

Page 40
Highest ripple noted 5’ above water level (correct within 1”). Water level here just a little above present very high lake level. Base of tuff 4’8” above water. Sharp contact.
Tuff seen also in bank outcrops at a number of places nearer the lake. 21” of stratified tuff measured in one place. Some layers with ripples. Tuff rests on clayey sand. Clean sand & more numerous ripples near bridge suggests near old lake shore. Expect this on physiography.
Sandy alluvium on tuff 5’-9’ thick as outcrops in different places.

Page 41
27.2.59
Colac
Street west of White Ave, deep excav. trench 15’ deep observed (sewer)
2’ grey loam
13’+ mottled red & grey clayey sands. Lateritic probably. Ironstone boulders.
1’ or more in diameter in the largest mottles. Other streets nearest (i.e. c ¼ ml E of High School) White Av. show similar material in filled trenches. cf. cutting on Gellibrand Road at Elliminyt – laterite uplifted by rising of Otways? Laterite Lr. Pliocene & sediments Upper Miocene? Moorabool Viaduct F’m. In Barengarook Cr post. laterite sands 20’ & more thick – fans from uplift. Cretaceous in creek bed.

Page 42
11-12 April 1959
Lake Condah
Map: Showing the track followed through the Stony Rises and along Breakaway Creek.

Page 43
Map continued from previous page
Diagram: Cross-section from the area tested as marked on map

Site Heywood 1942 MM 1/1 map grid ref. 823,037. Found by Mr. Frank Gibbons of Soil Conserv. Auth. Visited by Dr. G. Baker & self.

Page 44

Port Fairy

Bore 202

Mines Dept. bore.

0’ - 70’ Basalt

70 - 85 Claystone

85 - 110 Basalt

111 - 135 No sample but driller places base of basalt at 113 ft.

Photo: Lake Condah Nr. track 1/4 S. of house.

C^{14} of peat above basalt 6235±120 (GX-0150)

Page 45

Tarrington

On flat area on top of hill – former terrain – hole sunk by Mr. Frank Gibbons. Allotment 4 of 12, parish of Sth. Hamilton.

Diagram: Showing three soil levels.

Page 46

Diagram: Showing Relation of soils to Physiography

Page 47

Portland

Diagram: Showing cross-section of soil exam. on property of Mr. T. Dusty “Midwood” 5 mls NNE of Portland.

Ecology of Dunes

Lagurus Ovatus “Hare’s Tail” adapted to copper deficiency in dune country.

with Bromus madritensis, a grass as at Robe S.A.

Page 48

28.5.59

Photos p. 51

Mt. Warrnambool

Quarry on S.E. side in tuff ring. Profile c. 15” on slope. Deepest 30” on flat area. (Butler – force 3 brittle)

0”-14” Dark grey – black strong fine-medium angular blocks becoming strong medium-coarse angular blocky towards bottom of horizon. 10YR 1/2

14”-29” Coarse angular blocky to fine prismatic, moderate to strong development. Butler – force 5 labile. 10YR 3/2 –3/4.

Roots abundant at top decreasing to 14”. A few below 14”.

March 2nd 1962 Pieces of fawn fossiliferous Tertiary Limestone collected with Ditrupa & forams. One piece pink. Also 2 fragments of whitish (lt. grey) slatey rock with mica. Prob. leached bedrock. Also pieces lateritic (α) ironstone.

Page 49

25.4.60

Caramut

Cnr. Caramut to W’bool Rd at turnoff to Mailors Flat airfield & Koroit. The following section of sub-basaltic sediments.

1.5’ Clayey sand with buckshot (probably transported)

3’ mottled red (mostly) & fawny grey slightly clayey sand. cf. Sandringham Sands.

1942 1/1 Mil. map Port Fairy sheet, grid ref. 403,766.

200 yds further W on road to airfield cutting shows 6’ of red & fawny slightly clayey sand. Mottled zone of laterite?

Page 50

Coleraine

Ctg on top of hill on Hamilton Rd before descending into valley of Koroit Creek. B horizon of laterite. Buckshot on top. Same as capping on hills as seen in cuttings on Coleraine-Portland Rd just S. of Coleraine.

4 mls S of Coleraine on Col-Portland Rd ctg on E side of road near valley floor:

2’ grey loam

12’ light fawn clayey sands with much current bedding.

Siliceous concretions, rounded or platey. Latter vertical & horizontal. Up to many feet long. Some with fossil wood. Inclusions in sediments – much milky quartz & a few red boulders.

Further

Diagram: Map showing Mr Taylor's house

Page 51

Mr. T.A. Taylor presented silicified wood from top of hill c ½ ml. SE of above junction.

Outcrops of lateritic ironstone on hills above (S) Coleraine. Dundas Tableland lateritized.

Mount Warrnambool

see p. 48

Photo 1: From W side S of bend in Framlingham Rd

Photo 2: Central complex cone & rim (on right)

Photo 3: Quarry in caldera rim.

Page 52

Glenthompson

On road from Dunkeld to Lake Boga pass through many road cuttings with deeply weathered Palaeozoic rocks.

Lithologically, the rocks are reminiscent of the Silurian of Melbourne & elsewhere. Mapped as Ordovician. The deep weathering is a kaolinization due to Tertiary (& Mesozoic?) tropical to subtropical climate. There is a large clay pit being worked at Glenthompson.

Diagram: Showing an Aboriginal site in relation to a former lake bed and sand dune.

Page 53

Grange Burn

Hamilton

Diagram: Showing sites A, B & C along a river bank.

Diagram: Showing cross-section of creek bank.

Creek long ago (probably before old red gums grew on above section) the water cut off the overlying beds. Since then talus of soil & boulders has gathered, & apparently has formed the sloping hillside behind.

Photo: Showing dip on bank

Page 54

At site B, at Forsythe's Bank, and at site C (between corner & fault). There is about 2 feet of sediment between the shell bed of The Grange Burn Coquina & the nodule bed forming its base. The nodule bed is not at the base of the shell bed as on Muddy Creek. The interposed sediments are like

the Muddy Creek Marl. Glaessner et al (AJS 22(12): 484-5, 1960) say “A richer, & perhaps significantly older, but apparently still Pliocene foraminiferal fauna was found in the bed underlying the Grange Burn Coquina at Forsyth’s.” Note diff. use of “Grange Burn Coquina” from definition in Gill Mem. Nat. His. Vict. 21(1957) p. 156.
There are nodules in the shell bed & at its base.
The above dating of the bed at Site C near the fault affects

Page 55
the calculation of the throw of the fault.
Diagram: Geological section through the fault line
If the top of the Bochara L’st is here 25’ above water level & the Muddy Cr. Marl is 75’ as at Pot’s Gully, the throw of the fault is 100’. However, there is evidence that the Muddy Cr. Marl thins northwards.
Photo: Showing layers in Creek bank.

Page 56
8.2.61
Grange Burn Bone Bed
Diagram: Map of Grange Burn showing geological features
See Nat. Mus. Vict. Mem. 21 Fig of part of cliff. 9’-15’ of top of Bochara Limestone in cliff with cavities from action of groundwater. In cavities clay, sand & gravel with remanie whale bone, shark’s teeth etc. Pieces of Bochara L’st but no other sedimentary formation; also of quartz porphyry. Clay common in lower part of cavernous zone; also at tops of cavities sometimes, & as small lenticles in coarser sediments. Coloured in places & sometimes lithified by iron & manganese. A large percentage of the gravel is buckshot. Qtz pebbles. Collections made in Feb. 1961 contained

Page 57
among its remanie fossils
25 Isurus hastalis teeth
44 Odontaspis teeth
2 Myliobatis teeth
1 Diodon palate
72
Diagram: Geological section at Grange Burn showing location of cavity zone

Photo p. 53

Bochara L'st ~~overlaps~~ onlaps qtz porphyry. Some differential compaction but 7° dip where in contact with planated surface of porphyry. These

Page 58

beds consisting largely of bryozoa fragments, forams etc must have been laid down at or near the horizontal. At downstream end of cliff at corner in creek some dips due to collapses. As shown opposite, synclinal structure present. Dip affects Muddy Creek Marl above. Slight thickening of Bochara L'st as come off qtz. porphyry i.e. sequence condensed slightly as go over porphyry high. Whole area one of low dips & small faults, some affecting only the Tertiary & some affecting also the basalt (e.g. diatomite locality on Grange Burn at McNaughtons. See Memoir 18).

At trough of syncline opposite

Page 59

there are rolls in base of Muddy Creek Marl involving about 6" of stratigraphical thickness.

Where creek runs c. S. to Pat's Gully dip of Bochara L'st is downstream, as also on next part running c W. Dip is something like S.W.

Succession

3 Grange Burn Coquina

2 Muddy Creek Marl

1 Bochara L'st

Found at three places in cliff on left back between above section & Pat's Gully.

Surface of porphyry washed clean before deposition of Bochara L'st. No evidence of a soil. Where Bochara L'st forms a land surface at present (e.g natural arch) a

Page 60

terra rossa is formed on it.

Diagram: Showing a possible fault between Muddy Cr. and Grange Burn

Limestone below creek level then suddenly forms 50' cliffs. Probably a fault, although this would be at c. rt. angles to the fault at "The Caves."

No groundwater solution cavities in top of limestone here & no nodule bed. The Muddy Creek Marl rests on a layer of solid limestone. Some phosphatic nodules in

Page 61

base of Muddy Creek Marl. Polished & interpreted as the result of the erosion of a phosphatic bed by transgressing sea. Sedimentary materials & not developed in situ. Would expect some phosphatization of contiguous materials.
Photo: Cavities in Bochara L'st from which bones excavated. Ruler for scale.
Photo: Bochara Limestone with solution cavities.

Page 62
Fossil Bones

Monotremata	Echidna
Marsupialia	macropodidae
	Vombatidae
	Dasyuridae
Placentalia	Rattidae

Aves
Bones physically protected by cavities in limestone & chemically protected by alkaline conditions
A small amount of charcoal found in bone bed.
Contains forams & bones derived from Bochara L'st but no other formation.
Photo: Showing Muddy Creek Marl, Bone bed & Bochara L'st.

Page 63
Muddy Cr. Sub-Basaltic Beds
Diagram: Vertical section showing sub-basaltic beds of Muddy Creek.

Page 64
Fossils fragmentary & scattered. Sometimes in bands. Somewhat leached. 2'-3' above water level a band of nodules well exposed just upstream from section. Vertical section on left bank & horizontal section on right bank. Pedological product, cf on Grange Burn. Also found a little further downstream. Shows basalt extruded on land surface. No signs of vegetation (as on Grange Burn) found here.
Diagram: Map of Muddy Creek showing McDonalds Bank
Survey from top of shell bed at MacDonald's Bank to

Page 65

base of basalt (section p. 63) shows that if the beds are horizontal (which they appear to be) the stratigraphical thickness is 25 ft.
Base of basalt followed for a couple of chains & found to vary 0.85' in elevation.
Samples 100 yds upstream from Macdonald's Bank. Occasional fragmentary marine fossils. Calcareous clay size particles small %. Large bulk light fraction (sep. by bromoform). Particles generally clouded with decomposition. Incl. chlorite which may give greenish colour to rock. Quartz not abundant. Sorting poor & grains angular. Heavy fraction very small. Olivine, augite, leucoxene, magnetite, ilmenite, limonite, zircons. Some of the opaques & almost all the zircons are very small. This is tuff, or at least, tuffaceous. Beneath is marine bed with tuff, here tuff is the main sediment. Nearer top proportion of tuff lessens.

Page 66
Wannon Falls. Wannon R W. of Hamilton, V.
Photo: flow or flows (prob. latter) of basalt Up. Tert. sands below.
Photo: Cave under waterfall with pool at foot.
Photo: Waterfall & pool at foot of waterfall.
Photo: Similar to photo at top of this page.

Page 67
Photo: View from shallow cave at Wannon Falls
Basalt on right bank above downstream end of pool at base of waterfall. Basalt flat-topped. River valley walls steep & high – very young physiographically. cf. Hopkins Falls. Speed of retreat increased by comparatively soft beds below basalt.
Fossil wood found by Mr. Elmore below basalt. See p. 27.
Photo: Marram not in fossil soil but in sand just above & to present surface. Thickly matted in top 5 feet. Infer active sand deposition till present stability reached.

Page 68
20 April 1961
Dennington Dunes
See p. 75
Photo: Sand held by matted marram grass roots. c ¼ ml. W. of Sanitary Depot. Between there & large blowout. Buried soil. Dips c. 28^{o} SW c 50' sand above it now. Sand with clumps of marram grass

roots some near horizontal bedding. As has Marram gr. belongs this century. Blowout structure now wall of new blowout.
Photo: Buried soil (as above) with Austrosuccinea australis. Vertical calcareous concretions in sand below soil.
Photo: In shadow – fossil soil. Taken a little further west nearer big blowout. Contains A. australis.
Photo: Dennington Spit cf. Armstrong Calcarenite.

Page 69
21 April 1961
Tower Hill Beach
Photo: Fossil soil with marine shells of Aboriginal midden. This the lower of 2 soils. Calcified ? teatree roots.
Photo: Dunes behind above site. View from top of dunes looking N towards "The Cutting". Calcareous sand on tuff.
Diagram: Showing distance between sea, beach and fossil soil at 9.30am on 21/4/61 with a point marked * for Libby C14 sample

Page 70
At * mass of Tellina deltoidalis in black soil with charcoal & bones collected for C14 dating. Sand facies shells but a few rock facies shells such as Subninella undulata & Dicathais textiliosa. Fascidaria & limpets elsewhere but not at this spot. Sometimes heaps of shells where rock shells predominate. Probably storms had swept sand off tuff platform, or shells brought from basalt area nearer Pt. Fairy. Latter more likely as shells fully grown. Photo of horizontal rhizoconcretions at this site – obviously a root system coastal teatree? 1"-2" diam.

Page 71
Also vertical concretions 1/8" – 1½" diam. but usually ¼" – ½" diam.
Charcoal from this (lower) & an upper soil horizons 4-5 chs nearer Port Fairy & Gorman's Lane. Separated by c10' of sand. Some faint soil formation in intervening levels i.e. slight accumulation of carbonaceous matter. Burnt marine shells assoc. with both soils. Burrows present probably due to worms.

Page 72
1961

Kelly's Swamp, Illowa

See book 10 p. 29; Book 6 p. 74

Diagram: Map showing swamp, dune & auger hole in relation to roads and Gleeson house.

0"-29" Black alluvium

29"-5'10" Grey marl full of freshwater shells. Soft & auger sank on, pushing till handle on ground without striking ~~or~~ (apparently) a marine bed.

29"+ Mineral analysis. Light fraction with charcoal, quartz etc

Heavy fraction poorly sorted & containing volcanic minerals. Some large grain olivine. Heavies a very small fraction.

Page 73

This locality in Sect. 6 Parish of Yangery (M. Atkinson) NE of "Salt Water Swamp"

Dennington Water Gap 1961

River Merri flows W from W'bool c 3 mls crosses ~~the~~ an aeolianite dune line at this point & then flows (or did) in the swale nearest the sea.

2 Photos: bank of aeolianite and Tower Hill Tuff.

Page 74

1961

Tower Hill Beach

Photo: Midden (Armstrong's Bay)

Photo: Masses of Tellina. These shells collected for C^{14} sample.

Photo: Calcified root moulds.

Photo: Here Subninella predominates.

Page 75

1961

Dennington Dunes

See p. 68 = Dennington Spit

Diagram: Showing Warrnambool Tip, sand dune, fence, track and blow out.

Shows the approximately original extent of dune & no blowouts over swamp as elsewhere. Covered by 4' sand & marram grass. No Austrosuccinea seen. Site about

Page 76

one chain. A specimen of Subninella undulata was found between the fossil soil & the overlying calcareous sand. These inland slopes of dunes quite extensively covered by ti-tree when first observed by me (c. 1931) but this reduced.

Big blowout in earlier notes (see air photos) now stabilized. Floor covered with marram. Hummocky dunes occupy seaward end. Since breakup of dunes

a. Hummocky low (c. 25') area on seaward side of dunes. Marram grass makes foredune higher & hummocky.
b. Sand spreads over contiguous part of swamp from blowouts.

Scrapers, rock chips & marine shells found in places on and /or in old soil (middens)

Page 77

On E side of big blowout is a small blowout showing fossil soil. Dip S.S.E. then S (but flattening at higher level) then SSW. Old swale c 50' above S.L.

Surface

Grey soil 1'

Fawnish-grey soil 6"

Light grey soil 1'

Fawnish-grey soil 1'

Fawn sand with vertical or near-vert. concretions 2'

5'6"

Both the above soils with Austrosuccinea.

Page 78

Warrnambool & Mouth R. Hopkins

Diagram: Showing Travertine band on headland

Travertine band & old planation probably Sangamon. This common at W'bool.

Diagram: Showing various dune heights around Warrnambool.

Page 79

Albert Park, W'bool

Council Quarry

Diagram: Showing cross-section and soils in quarry

Soil 1 must have been the thickest because beneath it the greatest pedagogical effects. But why no pipes? Stripped off without disturbance of surface so deflation. No sign of solution hollows, gullies, or other dissection caused by running

Page 80

water. How so flat a surface? Blowout? Suggests marine planation, but need to know its extent.
"Helix" (dry conditions) in aeolianite. Small planispiral (wet conditions) shells in soils (terra rossas).
See bore log Rec-GSV 1936 5(2):280
Bore 201

Page 81

West Warrnambool emerged shore platform L/IGl
See p. 26 & refs.
Diagram: Map of the area from Botanic Rd to Caramut Rd with detailed area near Hoddle St.
Diagram of cliff section with sand and shells on a marine platform in the above area

Page 82

17.5.61
Warrnambool Woollen Mill
Diagram: Showing Merri Canal area surrounding the Mill.
Emerged coquina on aeolianite upstream from footbridge on platform c.6' above LWM in canal (though greater tidal range when sea had free access across Lake Pertobe area). Footbridge on edge of platform which disappears below SL downstream.

Page 83

Lake Elingamite
Diagram: Showing Caldera
See photos Book 10, p. 101, also Book 9, p. 109.

1. Caldera
2. Higher tuff ring on E side
3. Old shoreline shows lake has been much higher
4. This event fairly recent (post arid period) because cliffs so steep
5. Caldera Holocene on maghemite dating. Minute buckshot as at Mt. W'bool.
6. White ? zeolitic mineral in tuff as at Ecklin Hill. Or simply fused sand? Section needed.

Page 84

3.3.62

Lakes Bullenmerri - Gnotuk

Diagram: Showing the two lakes in relation to road and various geological formations surrounding them.

Yellow Miocene calcareous clay fully oxidized material like that outcropping on lake shore. e.g. NW cnr. Bullenmerri. High here either because of varying topography (clay protected by laterite) or (more likely) uplift by volcanic pressure.

Page 85

2.3.62

Russell's Cr., Warrnambool

L/IGl

Sewer beside creek

Diagram: Vertical section of creek wall.

Calcareous sand with calc. nodules horizontally bedded. Some sand grains too big for dune sand. Fragments of marine fossils. Probably invaded by 25' sea. Sand bed is an aquifer, so to keep at low declivity necessary is laid on ferroconcrete base. Whole pipeline thus "floating" on sand.

Note 1982: Invaded by L/IGl sea. Excavated during L/Gl low sea. Refilled to new base levels during Flandrian Transgression.

Page 86

3.3.62

Waurn Ponds

Diagram: Showing quarries and cutting in relation to highway.

Diagram: Showing cross-section of cutting with layers labelled A to E.

A Vesicular basalt (Newer)

B c.6" yellowish prob. basaltic material

C 3' reddish siltstone

D 6"-12" ? carbonaceous band

E 4' generally greyish but sometimes tinted sandstone to siltstone.

Page 87

28.2.62

Strathdownie

See also pages 19, 29.

Essentially horizontally-bedded calcarenite, but with current-bedding involving to 1’ strat. thickness. Sandbanks? Fossil oysters & casts of some aragonitic lamellibranchs. Some layers show lack of sorting that precludes an aeolian origin. The fossils could not be windblown. They are related to the bedding & are sedimentary materials. Shallow water marine environment & perhaps beach in some places.

So retreat of sea & then cave formation & then deposition of bones. On roof of cave secondary carbonate

1. Earthy (more frequently) soft & v. white
2. Crystalline. Minute mammillae & spines up to 2 mm & closely crowded.

Two small drawings, one a half circle (mammillae) & one a triangle (spines).

Page 88

Lower in cave hair-like & stem-like stalactites.

On this date quarry carefully searched but no bones found.

Page 89

27.3.62

Lake Colongulac

Camperdown sewerage works at S. End.

Diagram: Mapshowing sections 1 & 2 in relation to sewerage tanks and lake.

Diagram: Vertical Section 1

Cut-and-fill structure &

Page 90

current bedding indicates tuff laid down in water. Disturbed (as in section p. 89) near shore. Layers more regular to E. Bombs of baked clay in lower part of tuff. Basaltic bombs in higher part above section shown. Joint planes in tuff full of carbonates, a little iron & some clay in places. At base of tuff above Chocolyn Silt are impressions of what appear to be water plants: mostly in first inch of tuff. Further evidence that laid down in water. Lake then extended further than now although bed deeper. Lakes always bec. shallower with time but helped here by

1. Fall of ash into lake

2. Tuff eroded from shores

Page 91

On the other hand has lost some sediment by deflation.

At East end of this cutting layers horizontal & vary from fraction of an inch to 25" thick. One 4" bed appears to be without layering as tho' deposited very rapidly. Ash probably reached this area as quiet showers but some heavier depositions.

Bombs do not appear to be related to the fineness or otherwise of the bedding. Apparently intermittent explosions when pressure built up in duct & only occasional pieces reached this distance.

Section 2 Tuff-silt contact of pipeline excavation shows horizontal N-S.

Page 92

3 ft. solid tuff on top of Choc. silt. Tuff in fine layers mostly. No pronounced cross-bedding or cut-fill structures. These appear to be limited to the old shoreline. Former shore not parallel to the present one apparently.

Photo: Hampden Tuff. Note disturbed bedding. Chocolyn Silt. Floor of Excavation.

Photo: Hampden tuff & Chocolyn Silt. Ruler for scale.

Page 93

Photo: Sewerage tank, Hampden Tuff.

Photo: Cut & fill & disturbed beds in Hampden Tuff.

Photo: Do

Photo: Piece of "baked clay" in Tuff. Ruler for scale.

Page 94

28.3.62

Lake Colongulac bone localities as mapped by Grayson & Mahony:

1. SE corner (from sewerage works to small cape.

Diagram: Map of lake with points 1, 2 & 3 marked.

Macropus titan commonest. Also tooth of Dingo

Page 95

2. N.W. corner. Fossils found by us were just N. of the basalt headland. None found further N. as mapped by Grayson & Mahony.
Worn piece of ramus probably
Macropus (size of titan)
Vombatus 2 specimens
~~Astagalus~~ Calcaneum of large kangaroo.
3. Ian Smith's Quarry. Wide exposure of red conglomerate bared by lake waves but only 8 undeterminable pieces of bone found.
Fish found in Lake Colongulac det. by Roger Franklinburg as Galaxia attenuata found in shallow coastal waters (normal habitat).

Page 96
Lake Corangamite
Photo: Banded parna & silt. Coxiella in places.
Photo: unlabelled of cliff
Photo: Basalt boulders on headland.
Lake Corangamite Mil. Map 2 ml/1" shows roads traversed as follows:

Page 97
Diagram: Map showing unnamed roads around Lake Corangamite.
The bands of sediment rise with the cliff height in region of headland. Dip due to wash of parna away from higher ground? Then how Coxiella? Due to blowing up against &/or over former rising terrain? Fairly level over wide area S of fossil cliff where no evidence of basalt.

Page 98
Lake Colac
See pp. 107-110
See page 109
4 Photos: Talus slopes developed since cliff cut. Columnar soil. Calcareous horizons.
Arches are probably too big to be pedologic Gilgai swellings covered by sandy wash? Overlying material is more sandy.

Page 99

Diagram: Showing Lake Colac, details of banks, roads, and up to Elliminyt scarp. Fossil leaf location also

Page 100

Fossils from lake silt & ash that passes up into agglomerate.

Diagram: Showing a fossil leaf.

Heavy leaf. Juvenile eucalypt? or Magnolia type?

Matrix a micaceous siltstone

Leaves often strongly bent through flowage of sediment. Some leaves bent double.

Two diagrams of a fossil leaf (acacia?) and eucalypt fruit

Page 101

Tuffaceous sediment is always yellow due to yellow tuff probably. Contact between tuffaceous plant bed & underlying grey lacustrine bed may be a sharp colour change. Leaves may occur on this interface.

Some very fine bedding noted but in other places there is evidence of considerable turbulence perhaps due to the landing above of masses of basalt tons in weight.

Iron staining common also psilomelane in places.

Carbonaceous matter found in lowest bed. (4 p. 102).

Piece of silicified wood found non in situ on lake beach.

Page 102

Stratigraphy

1 Grey basalt

2 Yellow basaltic agglomerate & tuff

3 Yellow Tuff with plant remains & a few marine shells

4 Grey Lacustrine silt with few fossils

……..Lake level…….

Pieces of Cretaceous bedrock in volcanic agglomerate. The marine shells show that marine bed beneath. Oligocene marine beds S. at Kawarren & E. at Birregurra. Miocene at Camperdown. 3 gastropods & pelecypod preserved as casts.

Page 103

Marine fossils in volcanic ejectamenta also at Mt. Shadwell, Red Rock, Tower Hill, Mt. Warrnambool.

Evidence of marine beds beneath volcanic rocks at “Punyart”, “Talindert”, Wiridgil (all cores), Lake Gnarpurt, Mt. Porndon (Skeats & James p. 247, 267, PRSV 49(2) 1937) Map p. 266
Diagram: Vertical Cross-section of lake cliff.

Page 104
Diagram: Vertical profile from lake up cliff with points labelled 1, 2 & 3.
3. Volcanic agglomerate. Tuff to huge masses of ropy lava (6’ diam.) from a volcanic fountain? Highly explosive vent. Phreatic explosion before lava extruded? Vent near? On whole finer at base & coarser at top.
Junction 3/2 irregular due in some instances anyway to impulsive loading from above by heavy basaltic bombs.
a) Lake an ancient feature. At least Pliocene.
b) No considerable earth movements since?
c) Date more distant beds by whether pre-tuff or post-tuff. e.g. “Colac clays” of McCoy with Diprotodon longiceps.

Page 105
2. Lacustrine yellow tuffaceous silt to silty tuff. Plant remains show considerable disturbance as also do sedimentary structures. Bombs the probable cause. Flora apparently leaves of trees hurled from trees by volcanic explosions. Some Eucalypt-Acacia group and some reminiscent of warmer & wetter regimes. Time of changeover from Tertiary to Quaternary flora:
1. Grey Lacustrine silt with traces of plant remains. No determinable fossils found.
Beach pebbles of red & brown & ironstone, & buckshot gravel, limestone (soil) nodules &

Page 106
some milky quartz. Some pebbles of volcanic rocks.
Diagram: Showing Tripod sites 1 & 2 and section 1, 2 & 3.
2 unlabelled Photos of shore line

Page 107
Unlabelled Photo of shore line
Diagram: Showing section of the edge of Lake Colac, point marked with a cross (X).
Diagram: At X looking E. Shows cliffs & point marked Y.
Photos x 2. Of views in opposite directions along shore from point Y

Page 108

Diagram: Beds at Y looking E.

History

1. Lake cutting cliff.
2. Retreat of lake & formation of talus slope.
3. Advance of lake & formation of emerged lake floor. Water still brackish as Coxiella present.
4. Retreat to present level, or rather, range of levels.

Page 109

Diagram: Showing Cross-section of shore cliff.

Photos p. 98.

Photo (unlabelled) showing survey tripod and cliff

Page 110

Photos p. 98

Diagram: Showing 2 layers in cross-section of shore line cliff.

Horizon rich in patches of earthy lime. The more concentrated ones yield the calcareous nodules seen on beach. All sizes to 6” diam. maximum.

Page 111

Lake Weeranganuk

27.3.62

See p. 143

Above spelling in Mil. Map 4/1 Colac 1942

in Broadbent’s Map 224, 1948

Weerancanuck in Mil. Map 2/1

Corangamite sheet 1941.

At “Danedite”

Diagram: Map of Lake with attention to shoreline showing section 1 location.

Page 112

Diagram: Section 1 showing layers in cliff marked 1, 2 & 3.

(layer 2) Greyish (various shades), often mottled with whitish Coxiella shells or fawnish bone fragments, horizontally-bedded (beach &/or) shallow water deposits of gravel, silt, shell-fragments & bones. Most fossil bones collected were in this formation. A few bones found in (1), most in (2) & a few at the base of (3). These layers distinct but may grade into one another.

Page 113

Grey silt forms shore platform & has on it a rubble of calc. nodules from loam on parna. Also pieces of milky quartz, rose quartz & quartzite noted, but these rare & may have been introduced by abos. Bones determinable mostly of young macropodids.

Macropus ~~titan~~ ferragus

Femur (as referred by Owen to ~~Procoptodon~~) found in top of bed (2)

Some smaller bones found on sieving Bed (2) re-worked material & hence

a. coarser grain on whole
b. concentration of bones & other heavier elements
c. wear on some bones
d. very low % of small bones

Lenameria in bone bed.

Page 114

Tower Hill

Photo: Cut & fill. Ruler for scale.

Photo: Van parked at cutting. Irregular deposition of unsorted material – a contrast with the even stratification through most of the volcanic deposits.

Tower Hill caldera; on road cutting.

Diagram: Showing location of cutting.

Page 115

15.5.62

Hamilton

Map of Muddy Creek showing section location

Diagram: Vertical section opf creek wall

Page 116

Note

a. Basalt boulders in conglomerate show an older flow or flows.
b. Erosion that deposited the conglomerate also eroded soil with buckshot. Therefore Mediterranean type climate.
c. Buckshot means 10,000 y. or more after lava flow, if buckshot in soil formed on basalt.
d. Limestone absent from the conglomerate where viewed.
e. But Muddy Creek Marl eroded to emplace conglomerate & basalt.
f. Dip to S.W. suggests basalt of this low level mass passes below plains basalt.

Page 117-118

16.5.62

Minhamite

Diagram over two pages showing volcanic features of the area and outcrop location.

Volcano above 600' crater. Observations in passing suggest a breached crater. Needs proper investigation.

Page 118

Diagram: Vertical section of outcrop

Middle fossil bed a greenish grey to fawn (according to degree of oxidation) pebbly coquina. Dark greenish-grey to light greenish-grey to fawn as oxidation proceeds. A couple of pieces of phosphatized bone collected. Most of the pebbles look like ironstone.

Page 119

Some of ~~the~~ these pebbles have been bored by marine borers. Borers still in place sometimes.

Reminiscent of upper shell bed in type Kalimnan sequence at Lakes Entrance. Whole shells & broken shells. No orientation – all higgledy piggledy. Tumbled, but many shells that are thin or have delicate protuberances not broken.

Shallow water facies.

Remarkable for presence of Aturia.

Tuff agglomeratic at base.

Page 120

17.5.62

Colac

See p. 129.

Diagram: Map showing Lake Colac & Basalt Quarries in relation to roads.
At both quarries poorly columnar basalt rests on red sand & red volcanic agglomerate. Under basalt at B, sub-bas. deposits form two small hillocks whose surfaces in contact with basalt as exposed show dips 15^{o} (E side of quarry) & 40^{o} (W side). Base of basalt at quarry B 50' (or more) lower than at A.

Page 121
Mr. P. Riordan says that under basalt at quarry A on site of crusher is
"Red sand"
"Pink sand"
"White clay"
Total 8'
Sample of Pebbles
739.813
Milky quartz to 1 ½" largest diam
Ironstone (reddish, yellowish) to 2"
Buckshot gravel to 3/8"
Coloured quartz to 1"
Pieces of angular, unworn ironstone
Unsorted sand impregnated with iron

Page 122
17.5.62
Irrewarra
Diagram: Map showing sand ridges east of Lake Colac and grid references to sand pits
Diagram Cross section at sand pit 738 774

Page 123
Diagram: map showing 2 sand pits at 738,769 Pit A & B
Diagram: Cross section of pit on sand ridge

Page 124
Diagram: Showing location of section between Beeac & Lake Beeac.
Diagram: beach to top of ridge in profile.

Deposits show much higher lake in pre-parna time.

Page 125

17.5.62

Lake Weering

Diagram: Map showing Lake and channel

Diagram: Vertical section of channel wall layers.

Page 126

3/6/62

Port Campbell

Gravel Point W of the Amphitheatre and Rutledge's Cr., but E. of Sparks' Gully, Goudie's Steps & The Sentinel

Diagram: Vertical section of Point

Australites found only in the surficial loam or amongst the residual buckshot when soil deflated or bulldozed for borrow pits & roads.

Page 127

Diagram showing location of australites in shallow soil

Port Campbell Old Tip

Diagram: Vertical profile of soil layers.

Buckshot not in above section, but is present on some of the surrounding scraped areas.

Site ½ - ¾ mile E. of Port Campbell on N. side of Gt. Ocean Rd & W side of a gully. About ¼ ml W. of Deawey Steps.

Put auger hole through above to see if buckshot there.

Australites from soil above hard zone.

Page 128

History

1. Upper Miocene marine limestone deposited
2. Emerged like Cheltenhamian at Beaumaris when Kosciusko movements began in Pliocene.
3. Long leaching reduced limestone at surface to ~~sandy~~ silty clay (or in places clayey ~~sand~~ silt or even just ~~sand~~ silt)
4. Lateritization of clays etc. L. Plio?

5. Erosion associated with further uplift. Cliffs formed in limestone.
6. Formation of solodic soil on eroded remains of laterite.
7. Deflation. This happened more than once? Latest prob. mid-Holocene judging by juvenile soil at surface.
8. Just after deflation as soil forming the australite shower fell in c. 2 minutes.

Page 129

Colac

See p. 120

Loc. 1 (p. 120) Cutting W side railway line where highest, N of road from Colac Motel to lake at boiling down works. Mottled (fawn, reddish & grey) sandy clay or clayey sand. Washed, show plentiful clear quartz (angular & rounded), & small quantity of small buckshot gravel (c 1/8" diam.) & a few scraps of rock. Piece of milky qtz. Some & iron oxide. Some effervescence when HCl added.

Loc. 2A Above ? Tertiary sands at bottom of dam W side of railway c 10' from surface where rly turns NE ½ m S of Illawarra Road crossing.

Mid-grey with white limey patches. Strong effervescence when HCl added.

Similar to above but more buckshot.

Page 130

Loc. 2B Same as loc. 2A but 15' colouring as Loc. 1. Very small amount of effervescence when acid added. Similar to other two.

Report by Dr. A.W. Beasley

All three similar. Mainly quartz.

a) Olivine, augite, poorly round black opaques etc. Therefore tuffaceous. Hackly olivines. Basaltic.

b) Also abundant zircon (many inclusions), rutile, tourmaline, well rounded black opaques & pinkish garnet. Acid igneous origin. Granitic.

2A like 1 but grain size generally smaller. Poorly sorted.

Page 131

Letter 24.4.61

Hamilton

Samples sent to Dr M. F. Glaessner and examined by Dr Mary Wade.

1. F107 Bed of Grange Burn at E. end of "Porphyry Gorge" i.e. between localities 7 & 8 on fig. 3 in Gill, Mem. Nat. Mus. Vict. 21, 1957. = (4) in age

2. Muddy Cr. rt. bank where meets basalt below bridge. Globigerinoides bispherica Todd. “Fair number .. but very few are advanced enough to be called G. glomerosa Blow. Therefore as old or even a trifle older than at Clifton Bank provided there was no sorting during deposition.” F108. “Contains oldest unit 10 indices” of Carter (Min. & Geol. J. ’59) & .therefore Balcombian.
3. F1 Muddy Cr. Marl c18” below surface (highest fairly unweathered) left bank a short distance upstream from bridge. Well-developed G. glomerosa circularis Blow verging on Orbulina suturalis Bronniman.

Page 132

4. Cliff bank of Grange Burn, west side of Pat’s Gully (Gill’s section) Sample 101 at level of 2nd fencepost from top of cliff.
F106 3’-4’ above water level.
F101-5 contain Orbulina suturalis & O. universa
F106 almost exclusively benthonic fauna with a few stunted Orbulina & high-spined Globigerina. No reason to think F106 significantly older than F101-5. The benthonic faunas are identical. Also they are identical with those of site (1).
It also has a few planktonic forms
Orbulina suturalis
O. universa
Globigerina bulloides
This is the fauna overlying the bone bed just downstream from the natural arch W of “The Caves” homestead. Carter’s faunal unit 11 Bairnsdalian

Page 133

5. Highest Muddy Cr. samples “possibly middle Balcombian”
Diagram: Showing the points 1-5 in relation to Muddy Creek & Grange Burn deposit ages.
Derived Lepidocyclina, Amphistegina etc so common at Muddy Cr. (incl. sample 108) are found only in the basal conglomerate in contact with the Bochara limestone in the Bairnsdalian near the natural arch.

Page 134

6. Grey bryozoa sandy marl (close by Gill’s Sect. 2) with glazed pieces of whalebone. “It has a most probably Pliocene fauna largely of very small benthonic forams like that we collected from 15” below The Grange Burn Coquina at Forsyth’s.

Page 135

1962

Tirrengower Swan Marsh

S.W. of Colac

Mr. C.B. Taylor put down a well in area of 1500 acres of peat. Dry in summer but drained 76 years ago to keep drier in winter.

Diagram: showing depth of Peat and bedrock underneath.

Layer of roots at 12 ft. Sample in Museum

Colac mil. map 1:253,440

2nd ed. J54/12 Zones 6 & 7

Reading 26-11-63

c. 2mls SSW of Swan Marsh.

Page 136

Mt. Noorat & Mt. Eccles

From scoria pit, collected L.K.M. Elmore, P.O. Box 317, Hamilton.

Granitic rock with felspars up to ¼" diameter.

Limestone with small Mollusca and bryozoa, etc.

Fine sandstone enclosed in scoreaceous basalt – a bomb - is from Mt. Eccles

Page 137

Grange Burn

1. Gill 1957 (Mem. Nat. Mus. Vict. 21) figs 3, 6, 7; Pl. 4, fig 3 records conglomerate. Very shallow water to shoreline facies.

In Nat. Mus. Coll. specimen from Grange Burn presented by Mrs. Coates. Qtz porphyry pebble c 1 ½" in diameter well worn.

Gravel size quartz & smaller. Worn pieces of shell & very coarse shell sand on one surface. Cross-bedding also unworn shells, both gastropods & pelecypods (incl. the fragile Zenatiopsis)

2. This horizon not present at Muddy Creek where the equivalents are apparently in the tuffaceous series.

Page 138

12.11.62

Keilor Cranium Site

Diagram: Showing Maribyrnong River and quarry with points marked x & 1-3.

Kaolinite Quarry

1. Diastem here used as datum for survey.
2. Peg of former survey (No. 8)
3. Site of implement in situ

Survey Data: Back to (1) diastem 0.96'

For'd to (3) core site 9.08'

Diff 8.12'

Check with tripod on new site

Back to (3) 9.29'

For'd to (1) 1.17

Diff 8.12'

See Book 18, p. 162, Book 20, p. 3

= 2.47m

Page 139

Diagram: Showing Kaolinite Quarry with location of section A-B

Diagram: Vertical section at A-B..

Page 140

2.12.62

Port Campbell

At Twelve Apostles E of Port Campbell. Top of cliffs at Castle Rock

Diagram: Showing layers in cliff top rock.

Diagram: Map showing a track and Borrow Pit.

Page 141

Gravel Point West side

Diagram: Showing layers marked 1-4.

(Layer 1)Lateritic horizon of leached whitish & mottled clays. Masses of ironstone in places. After lateritization, (Layer 2) washed in from elsewhere. Where from? Area where lateritic profile materials removed to bare Miocene marine limestone & overlying clay.

At bay W side of Gravel Point series of 5 successive young soil layers. Material washed in (not slump), soil formation, then repeat. Successive stability & instability of terrain.

Page 142

Charcoal in clay horizon at base could be collected for C^{14} to determine order of time involved.

Lake Weeranganuck

J. Bonwick in "Western Victoria" p. 25 says "Between it [Lake Colongulac] and Corangamite are the brackish lakes Kareetnung and Weerangamuck."

Page 143

12.2.63

Lake Weeranganuck See p. 111

Diagram: minute snail shell from nodule

Diagram: Showing various levels, lake base, lake wall and auger hole

Page 144

Auger 1 on E shore from top of "bone bed" to basalt. Overnight water level 4' from top, and 5'6" after completion of auger hole. Coxiella at c 2'6"

c4'6"-5' powdery secondary Ca CO_3 Juvenile soil formation by leaching of Ca. Depths approx. only. Exam. by me morning after hole sunk. cf Auger Hole 2.

6'-7' Pebbles of basalt & Fe stains. Pebbles buckshot size at 6'. Piece vesicular basalt 1 ½" diam at bottom. Not very rounded.

Auger 2 c 18' further west, also from top of "bone bed". Clayey silt

1'9" Fragments of bones & shells (Coxiella)

3'-3'5" Stratified Coxiella & fragments therefore sedimentary (water laid)

3'5"-3'10" Secondary carbonate fragments of Coxiella (make silt marly)

4'2" Water struck. As succeeding undisturbed pieces of matrix dry, the Coxiella bed must be the aquifer. A poor aquifer.

Page 145

3'10"-4'8" Numerous blebs of whitish secondary carbonate

4'10" First pebbles – buckshot-sized decomp. basalt. Infrequent.

5'5 ½"-5'6 ½" sample included hard pebble of dense carbonate, waterworn & so derived. Therefore, earlier lithified sediments. Sec. carb.

5’6 ½”- 5’8” Sample taken with nodules.
From 5’6” Sec. carb. more compact & harder to auger. Fe stains. Possibly former lake sediments compacted & probably eroded before new cycle of sediments on top. B horizon of old soil on ~~basalt~~ lower sediments. Large carb. nodules as beneath present soil.
6’-6’2” Pebbles of hard secondary carbonate as below present soil.
6’2”-6’11” More numerous Fe stains. A few pebbles of decomp. basalt of buckshot sizes.
6’11” Solid basalt.

Page 146
Inferences:
1. Lake once larger bec. stratified sediments extend under parna.
2. Water brackish or salt bec. Coxiella.
3. More compact sediments at base 5’6”-7’ B horizon of basalt soil or earlier cycle of sediments.
4. During dry period (mid-Holocene?) lime carried down during leaching of pre-parna beds. Rain to carry down $CaCO_3$. Sun to dry out & cause deposition.
5. Bone bed more compact than parna & resists lacustrine erosion better so forms a platform.
6. Since cliffing of parna, it has begun to run, & soon the bone bed will be covered by a vegetated slope of parna. Thus bones in quantity only found on lake floors on recession of lakes from a prolonged high stand. L. Colongulac dry 1923, 27-31, 33, 35, 38, 40-1, 45
L. Colongulac not dry 1946-62 (17 years).

Page 147
Diagram of NE end of E shore of Lake Weeranganuck showing drain location

Page 148
The extent of the parna can be followed by the proliferation of thistles.
Diagram: Section S of drain
Parna used for onions, potatoes, carrots & other crops. Economic value.
Rain absorbed by parna so keeps smooth surface. Basaltic soils sticky & cattle make innumerable holes with hooves. Parna smooth to drive over but basaltic (montmorillonitic) soils very rough.
Bones from L. Weeranganuck: Beach
Sarcophilus harrisi
Vombatus
Macropus cf. siva

Mocropus ferragus &/or titan

Mastacomys

Page 149

14.2.63

Lake Gnapurt

Diagram: Map showing Lakes Gnapurt, Corangamite & Terangpon

Page 150

Diagram: Showing layers 1-3 from lake to former lake floor.

Black soil washed over sediments so looks like 6' black alluvium. Auger advisable.

1. Interpreted as sediments that formed lake floor during building of parna dunes. Oxidized so exposed to air.

.

2. Interpreted as parna= loess to clayey loess that has been truncated by a post-parna higher lake level. Morphology very fresh. Soil very recent.

Page 151

'63

Dennington

Diagram: Showing map of Dennington with 4 cuttings A - D

A. High ctg in soft sand with shell of hard travertine. New road for h'way overpass over rly.

B. High ctg in soft sand with hard travertine shell cf. Moulden's Quarry (Dennington Sand).

C. As p. 152

D. As A & B & N end of C.

3 classes dune country can be mapped

1. Present mobile dune

2. Above unlithified sand in travertine coast.

3. Lithified aeolianite as used for building stone eg. Steer's Q., ctg. to beach.

Page 152

Diagram: Showing stratigraphy of a road cutting through calcareous sand and tuff

Diagram: Detail of a fossil burrow

Photo: Station wagon on road in cutting.

Page 153

Diagram: Showing location of cutting on Laverock St.

Ctg shown has deep red loam with buckshot - ¾" diam. over blocky clay subsoil with same. Soil developed on mottled clayey fine sand with buckshot. Post-Miocene ? fluviatile sediments. Lag from MML

See p. 152

Photo: Showing layers in cutting.

Page 154

3.3.63

Lismore

Diagram: Showing large cutting near Brown's Waterholes

Section just E. of Lismore

Diagram: Showing layers A, B, C & D

A & D smooth when observed.

B & C cracked where dry & with numerous fine rill furrows.

Page 155

Tower Hill Beach

Diagram: Showing Gorman's Lane, site marked x and "The Cutting"

Black loamy sand with numerous small shells

Melliteryx helmsi v. common

Coxiella striata common

Notospisula parva one specimen only shell washed in by sea during storm? No = estuarine facies

5/1/82

Before draining was a salty swamp invaded by storm waves

Sinistral snail

Above determined by Prof. J.W. Valentine.

Page 156

Dennington

5 Photos of Harrington Street road cutting

see section p. 152

Photo 2: Mobile sand under travertine shell held down 6” or 8” wire net & stone.

Photo 3: Soil, tuff, fossil terra rossa

Photo 4: Fossil burrow wombat? Small diagram.

Harrington St.

Page 157

Tower Hill Beach

Photo 1: Sea over sand ridge. Wind on inner side causing rills in sand & blowing it over the top where it forms ripples (see bottom photo)

Photo 2: Marram grass assisting stabilisation

Photo 3: Blown out aboriginal kitchen midden

Photo 4: Stones from aboriginal fire places forming (with midden shells) a lag deposit.

Page 158

Coesite

American Mineralogist 45(11-12): 1313-1314, 1960 (see refs.)

Science 132: 220-222, 1960

High-pressure polymorph of Si O_2 synthesized by L. Coes Jr. in 1953. Found in nature by E.C.T. Chao et al, in Meteor Crater, Arizona, etc.

Monoclinic S.G. 3.01

Hardness Knoop 1200 near Mohs 8

Nearly insol. in 5% HF

Rapidly dissolved in NH_4HF_2

Melting point

This dense high-pressure form of silica has ecological value in defining a particular kind of very unusual environment. So unusual as to be probably transitory in all cases.

Page 159

14.5.63

Sherbrook R. – Loch Ard

Abandoned track Loch Ard entrance Road west to Sherbrook River.

Diagram: Map showing area around Sherbrook River and gully.

“Road” made by shifting surficial sandy layer 1’-1’6” deep, leaving hard pan. Washed by rain. For c. 30yrs G. Baker collected australites from this track. They are washed from sandy horizon. Horizontal

(random orientation). Pieces of charcoal & carbonized wood dug from this hard pan (C^{14} sample 1) to obtain pieces very short: mostly ¼" – ½" Longest 1 ½" No continuing pieces as from roots truncated termini – not tapering. Mostly ferruginized.

Page 160

A maximum age for the australites where declivity to Sherbrook R. gullying has destroyed road. At head of this corrosion the following profile can be seen:

Diagram: Showing cut away section of Broken Head Clay & hard pan.

0"-8" Dark greyish-brown to black silt to fine sand (w. local reddish-brown iron accumulation - ¼" diam. in places)

Top 4" harder & darker.

8"-24" Mottled light-grey & fawn clayey silt. Columnar w. columns 2"-4" across. Dark grey to black material from hard pan washed down cracks between columns. Most roots follow cracks.

24"+ About half the number of columns, then below, no columns. Fine grey lines occasionally where in dry weather cracks have opened enough to admit a little dark wash from the hard pan.

Iron pan more ferruginous in places. Surface is a mosaic of brownish & black patches acc. to whether iron or carbon predominates.

Page 161

C^{14} Sample 2 consists of selected black carbonaceous material. Iron nodules in pan nearly all non-magnetic. An occas. magnetic one found.

Further downhill the gullying is 6' deep & shows mottled reddish & light-grey clay, whi is apparently the remains of a lateritizing process. Part of Baker's "Post-Miocene Clay." Material varies from clayey to silty to sandy.

The hard pan follows the present declivity of the hill. Can be traced to within about 7 chains of the river. No buckshot layer here. In places find buckshot,α iron oxide nodules.

Page 162

16.5.63

Port Campbell Council Borrow Pit

c ¾ mile E of Pt. Campbell. "Island" left.

0"-8" Dark grey sandy loam

8"-16" Ditto grading to

16"-30" Light grey sand with mid-grey & brownish-grey mottles.

30”-42” Hard pan of sand impregnated with carbon & iron oxide. Where soil only 15” thick, the hard pan is thicker to make total approx. the same (3’6”) at this site. Oscillating base of hard pan noted & on following over wider areas should say these oscillations reach as much as 12” vertical thickness. Hard pan follows present declivity but sand 9”-12” on hill top but up to 2’6” on lower slopes near gullies.
42”+ Mottled mid-grey & fawn sandy clay to clayey sand.

Page 163
On sieving this profile found some α ironstone pebbles.
21”-24” up to ½” diameter 10-12 per square foot in area examined. These are rounded pieces of hard pan material. From 24”-26” hard pieces of ~~top~~ commencement of hard pan zone i.e. solid mottles but full hard pan not til 30”.
On floor of pit are pieces of non-magnetic iron oxide from hard. pan. A few pieces of buckshot gravel, but so few prob came from outside used for roads, came in rubbish & so on.
Australites found during 9” deep ploughing in pine plantation. Also found by grader operator scraping sand at edges of road.

Page 164
Sherbrook River
East Valley Wall Section in road cutting
0”-6” Dark grey sandy loam
6”-14” Light grey leached sand
14”-16” Same but brownish-grey
16”-24” Fawn columnar clayey silt. Near river can see 2’-3’ of this silt over yellow limestone.
No buckshot; no hard pan.
West Valley Wall
Sand 6” thick on top of hill to maximum of 18”. Hard pan 6” on top of hill to max of 3’ on slope.
Up to 5’ of clay seen underneath. 3’ white with reddish mottles. Slumps & occas. badlands erosion.
No buckshot. Same in next valley leading to Baker’s Oven. In vicinity of 177 mile post just E of Rutledge’s Cr. Hard pan in places following declivity of present valley slope but in no case reaching gully floors.
On old roads etc on W side R’s Cr. majority of ironstone non-magnetic but nevertheless a percentage. 2 tests. One gave 1/24 & the second 8/30 magnetic.
6” dark grey loamy sand

6” slightly fawn grey sand with evenly spread iron gravel through zone. Prob. hill wash. cf Timboon rly ctg. α & ϒ

Page 165

c ¾ mile W of Port C on N. side of Ocean Road extensive area

4” dark grey sandy loam

8” Ochreous yellow clayey sand with buckshot (gter %) & non-magnetic ironstone gravel. Sample taken. No hard pan seen.

Diagram of soil profile.

Cobden Rd = Port Campbell Rd c2 ml S of Camperdown shows about 10 ft. of Hampden Tuff.

Colac.

E side of town top of hill opp. motel

2’6” Chocolate soil

1’6” decomposed brick-red ejectamenta in blocks with very decomposed material between

1’+ solid brick-red ejectamenta

Diagram showing these layers.

Page 166

Rutledge’s Cr.

Diagram: map showing mile post & Baker’s Oven

W of Rutledge’s Cr. on hill above present road + 2 old roads, near fence, is iron gravel in soil. Majority non-magnetic. In 2 tests 9 pieces out of 54 magnetic.

6” dark grey loamy sand.

6” slightly-fawn grey sand with iron gravel evenly distributed throughout (cf oppos. page). Non-magnetic ironstone from eroded podsol, eroded laterite

Magnetic ironstone from deflated solod.

Sand from deflated solod.

Diagram: Showing layers in hill.

Lake Weering

Parna = loess various levels at “Cloverside”.

Owner Miss J. Reddie, 1583 Malvern Rd. Glen Iris, V. Manager: Mr. J Bethune Weering 31 at homestead or after 6pm Beeac 67 for his residence.

End Notebook 17