Notebook 21

Edmund D Gill

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On L. Corangamite



3.8.63

LAANG

Map: Showing Cudgee Creek in relation to roads and the Illidge's & Halford's farms.

Diagram: Cross-section of road cutting showing basalt over soil.

Basalt very vesicular just above soil. Not so vesicular elsewhere in exposures viewed.

PAGE 2

4/8/63

NULLAWARRE

Map: Showing location of school, church and "Errawallum"

Dunes shown consist of depressed dunes of compact, mottled red/fawn sand c10' high. Contrast with sharper (geomorphologically) unconsolidated dunes of grey sand with juvenile soil. Mottled material taken to be B horizon of well-developed soil. Thus two series well separated in time. Postglacial and R/W?

PAGE 3

4/8/63

STH. ECKLIN

Map: of Ecklin area showing locations A - D

DISTANCES

A – B 0.5 mile

B – C 0.6 mile

C – D 0.4 mile

D – Halfords 0.2

A – next intersection E = 1.25 miles

A – 2nd intersection E = 2.5 miles

Basalt quarry 1.3 miles further c200 yds W of road to Timboon.

Trench on W side of Timboon Road one mile S. of Oil Well corner & against W fence of road. About 12' of mostly coarse volcanic ejectamenta – lapilli & ash mostly – in thin horizontal layers varying rapidly in grain size vertically. Pieces of yellow Miocene marine limestone, freshwater sandstone (as under basalt p1 but lithified) & white ?kaolinitic clay (F/W deposit or lateritic profile?). Deep red soil on top.

PAGE 4

17/5/63

PORT CAMPBELL

Completing notes & photos from end of Book 17. For site see p. 159.

East of Sherbrook river, on old road app. 176 mile post approx.

Photo: Looking west along old track down slope to Sherbrook River. Hard pan little developed in this section.

Photo: 2.3 ch. E of site above. Dr. George Baker standing at site where excavated hard pan as C14 material. Carbonaceous matter rich here. Dr Baker facing S (seawards) & looking W to camera.

Photo: Dr. Baker on same point but camera half way between him & point of top photo. Looking E towards road into Loch Ard. C. 100 australites found between here & Loch Ard road, above hard pan. C14 for carbonaceous fragments from this hard pan.

PAGE 5

Photos x 2: Council Pit ¾ ml E of Pt. Campbell (see Book 17 p. 162) Mulvaney's archaeological sieve. Test Sieve of area 3' X3', taken 2" at a time. Sharp spade used (so could cut roots), shovelled into plastic bucket & poured into sieve. This swung, sieved sand falling onto pieces of canvas which dragged away to dispose of sand.

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14.8.63

MARBLE ARCH

Between Rifle Range & London Bridge West of Port Campbell (& E of Peterborough).

Diagram: Showing cross-section of cliff.

Just E of this section is what appears to be a fossil gully full of red mottled off-white clay which is B horizon of laterite. This replaces the sandstone. Clay older than sandstone. Very strongly leached but sandstone not leached.

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This clay slipped after sandstone hard pan formed & eroded i.e. very recently.

Diagram: Showing slip structure cutting through hard pan

PAGE 8

(25/7/62?)

PORTLAND

Map: Showing location of park and canal with fossiliferous bank

Anadara with nodular ribs but this may be an artefact (to be studied)

Velacumantus australis

Austrocochlea

Mytilus

Phasianella

Katelysia

Subninella undulata

Homalina deltoidalis

Polinices

Pareanassa

Galeolaria

Sand rock & weed facies represented

Told dredged from Portland Harbour during preliminary stages of construction.

PAGE 9

WARRNAMBOOL

Last Interglacial R/W deposit of boulders & sand exposed in trench cnr. Princes H'way & Morris St., between W'bool & Dennington. Size analysis of sand:

| | BSS | | |
|---|---|---|---|
| Coarse sand | 16-30 | 386.8gm | 10.55% |
| Medium sand | 30-60 | 2408.3 | 64.18% |
| Fine sand | 60-120 | 825.0 | 22.52% |
| Very fine sand | 120-240 | 23.3 | 0.64% |
| Silt & clay | 240- | 20.8 | 0.57% |

Suggests sand to a large extend derived rather than produced on site. Erosion of wind-sorted aeolianite.

See Notebook 17 p. 26 & references for description of site.

PAGE 10

FOSSIL SNAILS

1. ~~WARRNAMBOOL AEOLIANITE~~ This name now limited
   a. In solid rock at Albert Park Quarry (E end of park)

Map: Showing location of Albert Park Quarry

Strangesta sp. Coll. E.D.G.

   b. In solid rock from depth 20 ft. in sewerage tunnel at 46 Canterbury Rd., Warrnambool. ? Strangesta Coll. E.D.G
   c. 1st soil layer, Thunder Point, Warrnambool (in aeolianite cliff) Chloritobadistes victoreae? Lowest soil layer & of wide extent.

PAGE 11

   d. Soil layer 3' thick S end E side road cutting through aeolianite Pertobe Rd, Cannon Hill, W'bool.

Magilaoma penolensis (Cox)

Permagera tamarenis (Pettera)

e. Fossil soil, Thunder Point
Rhytida rugosa (= Strangesta rugosa*)
Charopa funerea = ( Elsothera* funerea)
Magilaoma* penolensis (= Laoma penolensis)
Charopa tamarensis ( = Pernagera tamarensis*)

Used ticked (*) names.

Layer C, Nicholson St. W'bool Helicella barbara therefore is sand movement since European settlement.

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2. LAKE GILLEAR Dark silt W end of Lake Gillear before drained & now outcropping in wall of drain
Austropyrgus buccinoides (T.Woods) fr. & brackish water
Lenameria tenuistriata Sp (sow.) Juveniles. Freshwater dams & swamps
Pygmanisus scoltianus (Johnston)
Plananisus Mccoyi (Gabriel) among reeds in stagnant and slow moving water
Lenameria buccinoides (Q & G)
Peplimnea lessoni (Desh.)
3. BUSHFIELD Terrace on left bank reaching 5' above river
Limnea sp
Austropyrgus buccinoides (Q & G)
Plananisus tasmanicus (T. Woods)
Corbiculina angasi ( Breine) juveniles
Helicella (Cochlicella) barbara (Introduced)

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4. TOWER HILL BEACH, V.
Swamp inland side of dunes, c1/2 mile west of Lagoon. Coll. E.D.G. 3-3-63
Lenameria tenuistriata (Sow)?
Also see book 17 p. 155
Melliteryx helmsi v. common
Coxiella striata common
Notospisula parva (one shell only)
5. LAKE PERTOBE, Warrnambool, V.
Cannon Hill Auger Hole 6'7" – 8'10 ½"
Boring at edge of L. Pertobe Rd. Red soil layer at bottom yielded
Melliteryx helmsi (Hedley)
Austropyrgus buccinoides (Q & G.)

Top 2" black silt from Lake floor when May 1950. Above two species plus
Laevilitorina mariae (T. Woods)
Coxiella confusa Smith

Zeacumantus cerithidia (Q & G.)
Assiminea brazieri (T. Woods)

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Surface layer, excav. 1 ch N. of Price St., on E side of Lake Pertobe Helicella (Cochlicella) barbara Introduced

6. DENNINGTON DUNES = Dennington Spit
   Cochlicella ventrosa ("looks more like this than 'barbara'" J.H. Macpherson) Introduced.
   Helix aspersa Introduced
   ~~Euparypha~~ Theba pisana Introduced

   EDG 5.3.57
   Near Levi's Point at Sanitary Depot
   Helicella caperata Introduced
   Helix aspersa Introduced
   Austrosuccinea australis

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22/3/64

TOWER HILL BEACH

Diagram: Showing two soils in dune sand

Upper soil All limpets & Subninella

No sand shells

Lower soil All sand shells

However further N in same midden plenty of rock shells in lower soil. Different area (representing diff. times) one or other.

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Information from Clarey Watt NULLAWARRE.

CURDIE VALE

0 – 4' Soil

4 – 25' Marly limestone

25' – 30' Flinty limestone

30 – 126' Marine clay

Hard flint 90 – 91'

Water c100

Soft 100 -110'

Flinty 126’

126 – 225’ Soft pug.

In valley so no post-Miocene clay.

SOUTH ECKLIN

W side ¼ m. S. of Nirranda Rd.

Map: small, showing cross roads of Nirranda Rd & Ayrford Rd with location of bore.

0 -7’ Soil

7 – 22’ Salamander

22 – 27’ Grey pug

27 – 55’ Darkish red rotten marl

55 – 64’ Limestone with shells (Ditrupa, Magellania, cidaroid)

AYRFORD Rd. N of Nirranda Rd., E. side J. Edge

Gravel

40 – 78’ Basalt

78 – 93’ Coloured clays – c.5’ post-Miocene clay as at Halford’s

Limestone

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Dug 17.1.64

PORT CAMPBELL

Auger Hole in centre of square A12 of Pt. C. Project excavation.

0 – 6” Dark-grey loose sand with humus & roots ferromagnetic pisolites < 1/8” diam. mostly < 2 mm. Munsell cf Gley chart N4/

6” – 9” Transitional to

9” – 12” (Light) grey sand – loose to firm. Munsell 10YR 6/1 ferromagnetic pisolites (small)

12” – 16” Gray sand, v. compact to light-gray nearer Munsell 7/1 than 6/1. Small magnetic iron oxide pisolites (few) < ¼” diameter

16” – 18” Ditto. 10YR 7/1

18” – 19” Transition to more clayey facies. Silty sand. A couple of magnetic pebbles c 2mm diam.

19” – 20” Mottled grayish-brown to dark grayish-brown 10YR 5/2, 4/2, 3/2 Silly to clayey fine sand

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20 – 24” Mottled silty clay light yellowish brown to dark grayish brown 10 YR 6/4 to 4/2 Two or three small magnetic pisolites < 2mm.

24 – 27" ~~Silty~~ Clay with a little silt and sand mottled 10 YR 6/6 to 4/2 Darker mottlings partly due to darker material washing in from above. Sandiness also appears to be so derived bec. the most compact pieces have no sand.

27 – 30" Ditto but first red mottles in clay.

Summary:

0 – 18" Sturgess Sand

18 – 20" Transition to clay

20 – 30" Broken Head clay

2'6" – 20'6" Hesse Clay

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30" – 7' Clay with a little rounded sand Strong red & gray mottles as in laterite cs

10R 4/6

30 – 33" has some yellow

3'7" – 6'6" Lighter i.e. more gray

Light grey 2.5YR 2/7

Pebble of ironstone – dark reddish brown about 5 YR 3/2 – at 6 ft. c2" X 1.5"

5' – 5' 4" Some darker more purply red Munsell Dusky red 7.5R 3/2 manganese?

7' – 10'6" Similar clay lightly mottled i.e. c. 75% gray. Mottles of 7.5 R 3/2 and a little brownish yellow c 10YR 6/6 = more yellow than Broken Head clay.

Sudden change in colour.

10'6" – 10'9 Hardly any grey c 10% grey – mostly red 10R 4/6. Gravelly to auger due to concentrations of iron oxide. Also a few patches of dusky red & traces of brownish yellow.

10'9" – 12'6" Similar but 10'9" – 11'9" mottled but not impregnated with iron. c40% grey.

11'9" – 12'6" more red. Some streaks of yellow. c10% grey.

12'6" – 14'10" Practically no grey 12'6" – 12'9" red & yellow

14'6" – 14'10" more grey.

14'10" – 20'6" Fairly sharp break to yellowish brown clay 10 YR 5/8. Not penetrated.

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TOWER HILL BEACH

In situ in lower soil with midden 4315 ± 195 B.P. C14

Cladorhynchus leucocephalus (Vieill)

Banded Stilt. Rarer than white-headed stilt wh. a diff. genus

Antechinus

Vombatus

Mastacomys fuseus

Rattus

2 sharpened bones

Chips of quartzite

Pebble of basalt 2 ½" X 2" X 1 ¼"

Up. layer 1750 ±115y. B.P. C14 200 A.D.

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Black bones left (E.) bank Merri River, Bushfield (see Gill Mem. Nat. Mus. Vict. 18)

C14 6605 ± 190 y. (4655 BC)

"collagen" fraction very small

.

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LAKE COCKATOO

Near Beeac

Procoptodon goliah Owen

5 m. N. of Beeac at base of parna dune c10' high on SE side

Maps: Dune in relation to lake

Diagrams: Profiles of the dune

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PORT CAMPBELL

Project

AUGER through hard pan after excavation of light-grey sand above. 22' from NE boundary approx. on boundary E8/F8.

Dug 16/1/64

10" – 15" from surface. Black carbonaceous sand. A few small mag. iron pisolites

Munsell 5YR 2/1

15" – 18" Similar but less sandy. In 10" – 18" large rounded grains. Iron pisolite seen c 1mm diam.

18" – 22" Large quartz grains still present but material more clayey & turning brown. 5YR 2/1 to 7.5YR 5/6 Black. to Strong brown

22” – 26” Clayey. Curls from auger blade. Similar range of colour but more brown No large sand grains seen.

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26” – 31” Shades of brown plus some black (surface contamination by auger & down cracks?). No large sand grains seen. Broken Head clay.

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INSECTS FROM EXCAVATION Pt. CAMPBELL PROJECT JAN. 1964

| FAMILY | GENUS & SPECIES |
|---|---|
| Theridiidae | Nicodamus bicolor L. Koch |
| Dipluridae | Aname sp. Spider |
| Amycterinae, Curculionidae Weevil | Talaurinus perplexus Ferg. |
| Pentamonidae (Hemiptera) | Pentamonid bug |
| Hepialidae (Lepidoptera) | Hepialid larva made large burrows c. 1cm in diameter. |
| Cicadidae (Hemiptera) | Cicada nymph |
| Formicidae | ? Pheidole sp. Small ants |

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PORT CAMPBELL PROJECT

Excavation in search of australites for NASA through U.S.G.S. (Dr. Dean Chapman) (Dr. E.C.T. Chao). Site ¾ E of Port Campbell, N side of 1964 Ocean Road

Diagram: Map showing Excavation site in relation to Council Borrow Pit.

However, this is south of the Ocean Road as shown on the current Parish Plan.

Map: Showing excavation site in relation to road, rubbish depot and water reserve.

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6.1.64

Surveyor, Mr. Kevin Felton, Dept. Lands & Survey, Camperdown.

The datum point is 492.3’ 114$^{o}$22’ from the SE corner of allotment 20. Parish of Paaratte.

Diagram: Showing location of datum point and excavation site

Generalised Section

0 – 3” Dark gray sand

3 – 6” Dark gray sand Transition

6 – 12” Light grey sand compact

7.5YR 8/0 to 7/0

Diagram: Showing cross section

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Site burnt & dozed but tea-tree & grass-tree sprouted while on project. Grass-tree first then tea-tree

Square

I1 Photos of charcoal at 10”

D1 to 10” but pockets to 12”

I1 9 -10” Fragment of milky quartz

10 – 11” First signs of hard pan. Some coarser grains at this level.

S2 3” – 5” crockery – shows degree of penetration of surficial material. 4.1.64

D4 Diagram: Dark area – hard pan beginning to show through. Part of australite flange found in shaded area just above (c.2”) hard pan, at c. 10”

I8 11” Buckshot with polish c 3/8” diam. Only 2 in 90 polished. No non-magnetic pieces. Evidence of deflation.

D6 Diagram: Another part of australite flange in shaded area 11 ¼” – 12”. C6’ from D4 australite. C2” above hard pan.

Q17 Polished buckshot 3/5 – ½” diam. 9-10”

S2 3 – 5” 3 mag. pisolites. One polished pebble is resin with included sand. Polish evidence of deflation.

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C3 9 -10” 36 Magnetic pisolites one of which polished c1/4” diam Pisolites contain sand which makes surface rough so not so easy to polish as pisolites formed in clayey matrix.

G10 9 -10“ Mag. Pis. 3/8” diam with incipient polish.

P18 10 – 11” 3 pis. I mag. 2 not.

R18 9 – 10” 3 pis. 1 mag. with polish on edges ¼” diam.

K21 8 – 9” 1 non-mag. pis. with incipient polish.

E6 5 – 6” ½’ flake milky qtz, ¾” non-mag angular ironstone pebble. Pebble 1 ½” X 1 ¼” X 7/8” of ferrugized sand + mag. pisolites c 25 pisolites with polish. Pis broken out & appar. not polished inside. Well protected recesses on outside also little polished if at all so appar.

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all The polish after the gravel was cemented. Quartz grains to 1.5 mm diam. Clear, milky, rose & smoky varieties.

E3 10 – 11” 35 pisolites All magnetic One polished c.1.5cm = 7/8”

8/1/64

E5 Diagram: whole button in situ at 12”. 0.88’ below datum. C2 ½” above hard pan.

Diagram: of australite in situ.

9/1/64

C3 Diagram: Small core of button found in hatched area & prob. fr. Double-hatched area. Core pitted but with hard sand in cavities max. diam. Nearly 9mm

8 – 9" RL 0.50 approx. Sand compacted after australites emplaced.

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10.1.64

N16 Diagram showing pt 'X': 9 – 10" Piece of flange of button found in sieving sand fr. This depth very little charcoal associated. Small quartz flakes 8" – 9" in sieve with australite & also 10 – 11" R.L. c.1.36' Australite prob. From about 'X' bec. bucket filled from there.

H3 Diagram: Piece of core 9 – 10" c. – 0.53 R.L. in compact off-white sand. ½ - 2 ½" above hard pan. Not definite bec. not know where occurred in square and there is some variation in level of top of pan.

N. B. R.L.'s are estimated levels of australite occurrence.

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11/1/64

D7 Plan: Australite 7 lens 9 ½" – 10". Seen as scraping from shaded area. R.L. – 0.78'

Diagram: E7 D7 cross SECTION showing location (X) of australite

This & other australites found associated with ridge where hardpan deepens. To do with erosion? No.

13/1/64

R16 7 ¾" – 8" Small fragments of core found when scraping to level up. In hard white sand 1" – 1 ¼" above hard pan (coffee rock).

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15/1/64

L18 Diagram: Australite 9 from this area at 11" – 12". R.L. – 1.44'

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CARBON in HARDPAN

At 13" – 14" in J8 square. Top of hardpan below the first uncertain inch. Ignited & weights lost were:

Sample 1 12.4%

2 12.3%

3 12.9%

This the darkest material & so probably the richest in carbon. These values therefore round the maximum.

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PORT CAMPBELL

Map: Showing Council Pit with bare hardpan

1. Hardpan follows declivity of hill.
2. Where underlain by sand this sand is often cemented (in varying degree) by iron oxide.
3. A horizon of soil (= white sand) only 9" thick at interfl? but 2' 6" thick at gully. Top of hardpan gave date of c7300 years so movement of sand all since then. Present.

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general terrain is that of 7000 y. ago but valleys more incised in thalwegs since then. Hardpan late Pleistocene – Early Holocene-pluvial development.

4. At "Island" hard pan about 3 ft. thick but this varies.
5. At "Island" coarser sand & some ironstone gravel at interface of hardpan - white sand on W side. This also varies a good deal.
6. Concentrations of iron & carbon varies through the hardpan.
7. Hardpan formed variously on "post-Miocene clay" where it is lateritized, on Pleistocene brown clay & on sand. Deepest profile seen on sand in ocean road cutting W of Sherbrook River where 5ft+.

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10.1.64

SPARK'S GULLY

Map: Showing CRB excavations on E wall of gully. Spark's Gully in relation to nearby roads.

On cliff top S of above foot track is brown Pleistocene clay (± 6'). On top are pebbles as on lateritic clay. In cliff section lateritic clay at lower level (c50' from top) occupying fossil valley.

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BROKEN HEAD

0.8m from Ocean Road

cf. p.55

Diagram of this section:

0" – 9" Blown sand. Mixture of light brownish-yellow sand & dark grey humus 10YR about 6/4 and 4/1 dry

9" – 1'9" Very dark grayish brown humus layer of juvenile soil (sand) about 10YR 3/2. Lower 3" transitional to

1'9" – 2'5" Looks like above but this due to sand washing over surface. Yellowish brown about 10 YR 5/4 sandy clay or clayey sand with some ironstone gravel – most in lower half.

2'5" – 5'5" to 6'5" Brown silty to fine sandy clay 10 YR 4/3. Blocky with shiny peds of dark gray colour.

Mottled zone (lateritic) with some masses of ironstone.

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Relationship between lateritized clay & underlying limestone varies in different places (eg. In auger hole at excavation site rests on brown clay) but here directly on limestone even infilling hollows (karst) Could not have developed here or would have leached limestone.

Diagram: Cross section showing Clay in valley and on surrounding tops

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SHERBROOK RIVER VALLEY

Map: Showing section ¼ mile W from Loch Ard turnoff

SECTION

0" – 4" Gray sand & humus

4" – 9" Off-white sand

9" – 12" Transitional

12" – 18" Dark grayish-brown humus layer as at old Loch Ard Road. Hardpan.

(0" – 18" Sturgess Sand)

18" + Brown silty clay as at Broken Head. Broken Head clay.

Hardpan cuts out 7 -8 chains from Sherbrook River but brown clay continues.

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Diagram: Hardpan soils near Sherbrook River showing depth 'X'

History:

1. Valley cut previous to 8000 years ago. Late Pleistocene rejuvenation?
2. Soil developed. Top of hardpan c7000 y old. If this the age of the pan then -
3. Since 7000 y ago down-cutting continued and alluvium deposited.

The following inferences can be made:

1. 'X[ is the amount of down cutting in the past 7000 y. Probably most of it since the Postglacial thermal maximum

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2. As the hardpan follows the present surface in the upper part of the valley walls erosion has been negligible in that area except for occasional gullying.
3. Australites aboriginal artefacts, etc found on this terrain have a maximum age of 7000 y.
4. As the hardpan formed during the period 7000+ y. that must have been a time of relative surficial stability. Where valley wall stable for period of hardpan formation & since must have been stable for a long period – perhaps 20,000 years.
5. However, the presence of uncompacted sand,

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various lag deposits, & the juvenility of the surficial soil suggest that between 7000 y ago & now there has been a time of low order instability Not a complete deflation because lag deposits rarely one pebble thick. In the Western District lakes area, this instability occurred during the post-glacial Thermal Maximum.

6. The present surface, where undisturbed by human activity is stable, leaving completely covered with vegetation. The root systems especially of grasstree, tea tree, & eucalypt, do much to stabilize the surface even when burnt.

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Veneer of sand on brown clay near river due to rainwash on river valley wall.

On W wall of valley after river alluvium is limestone with brown clay on top, then sand with hardpan. On top of hill lateritic mottled clay. Hardpan developed in sand & on clay.

Brown clay at 177 milepost.

Diagram: Showing cross-section at milepost. Road cutting W. of Sherbrook River at Plateau level. Exposed hardpan harder than unexposed because of oxidation of iron & drying.

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14.1.64

<u>In situ status of australites</u>

1. Australites certainly in place in compact sand.
2. In sand before soil formed (i.e. hardpan developed) or after? Fall in Sturgess Sand before podzolisation, or later in A horizon of podzol?
3. A further possibility is that australites mixed in Sturgess Sand & older still. If so, in hardpan as well as where found.
4. If fell in top of Sturgess Sand before podzolisation then C & the leached past australites, & expect
    a. Evidence of leaching of australite specimens
    b. In recesses of specimen local deposition of C & Fe. Or small mass of humus underneath (small diagram).

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5. If fell in A horizon of Sturgess Sand podzol even if a later cycle has modified the surficial sand, the age of the australites is <7300 y.
6. Dimbleby (pers. Comm.) “Acidic soils way contain a great deal of pollen through the profile.”
7. Humus moves after the iron cf. Burges & Draver.

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<u>Possibilities of migration</u>

1. Australites gradually sink though sand? Only if sand soft (uncompacted) & disturbed in some way.
2. Australites fall down holes? Roots form holes when rot. Hepialid larvae dig holes to c2’ deep & to 1cm diam. As all 14 found within a few inches of top of hardpan no appreciable

migration occurred (unless all have migrated). No objects found migrated in present holes. No yabbie holes (not wet enough).

3. When australites fell in soft surficial sand probably some movement – this may be why through 3" – 4" stratigraphical thickness

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e.g. note how pieces of crockery distributed through top 3" – 5" at present

4. Long sinuous dark lines in compact sand & hardpan may be former root tracks or larval burrows.

Diagram: showing dark lines in square M18

However, some dark lines in tracing down have an apprec. vertical extension (2 – 3") & change colour when enter the hardpan (so appear formed after the hardpan)

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Diagram: Showing cross-section of hardpan.

In some places decomposed roots found in this structure. Due to roots following it?

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16/1/64

AUGER 1 E8

Auger through hardpan where high in square E8 almost on boundary with

F8 22ft. from NE boundary.

0" – 5" Dark-brown Munsell 7.5YR 3/2 sandy loam.

5" – 9" less sandy

9" – 12" Slightly darker. Dark reddish brown 5YR 3/2 with some clayey material about 7.5YR 4/2. More clayey than above. "Charcoal" present.

12" – 16" Lighter in colour bec. more of the yellowish clayey material. Some carbonaceous material.

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2.7.64

HUMUS PODSOL

Map: Showing site location in relation to Sherbrook River and roads.

Profile described by Mr W T Ward

8" Munsell 10 YR 2/1 and 5/1 moist speckled black & grey sand loose & structureless (= single-grained = no aggregation)

Diffuse boundary

10" 10 YR 6/1 light-gray loose sand single-grained. Diffuse boundary

15” 10 YR 8/1 white sand (sample) with 8/2 harder bands. 8/1 1 ½ - 2 ½ tons per sq. in (clockhouse penetrometer) and 8/2 >20. Firm and over firm in place and brittle

Highly irregular boundary.

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½” firm black sand 5YR 2/1 (humus band)

6” 10YR 6/8 and 5YR 5/8 firm sand ferruginous. >20 tons s.in. but less hard than above. Outlier.

16” Pale gray sand. Pan not penetrated.

I ch. N of site carb. Pan is only 20” from surface

At Pt. C. Project excavation site compactness of subsoil only when dry, so apparently due to clay skins on sand grains.

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3.7.64

PORT CAMPBELL PROJECT SITE

Soil profile by W. T. Ward.

Diagram: Map of site.

Table: Showing Penetrometer readings through a Wet Profile to 15” depth.

0” – 7” 10 YR 2/1 moist. Black loamy sand, very weak, medium nutty structure. Indistinct boundary.

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7” – 11” Sand structureless. 10 YR 4/1 moist. Boundary indistinct.

11” – 14” Pale grey sand 10 YR 6/1, firm in place but soft when excavated, structureless with medium & coarse ironstone fragments. 10YR 5/8 and 5YR ¾ Abrupt boundary.

14” – 16 ½” Black 5YR 2/1 humic sand with fragments of ironstone. Penetrometer 4 – 15.

16 ½” – 26” 10YR 7/5, 7.5YR 5/8 Yellowish-brown & strong brown clay loam with sand, massive = Broken Head Clay.

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3/7/64

BROKEN HEAD

Profile description by W. T. Ward cf. p. 39.

0” – 8” 10YR 3/1 Very dark gray sandy loam with clay, firm (Penetrometer 2 – 2 ½) massive. Diffuse boundary –

8” – 15” 10YR 3/1 dark brownish grey, very sandy clay loam, very firm 3 ½ - 4 ½ penetrometer. Weak coarse prismatic structure, smooth fracture. Indistinct boundary.

15” – 25” 10YR 4/4 – 5/6 sandy clay loam 4 – 4 ½ firm; with very many small pieces of ironstone. Very weak coarse prismatic structure with prominent 5YR 2/1 humus stain in fissures. Clear boundary.

On swelling clay 10YR 4/4 and 2.5YR 5/2 clay 2 ½ - 3. Abundant irregular slickensided fissures. Broken Head Clay.

Juvenile soil developed mostly in material above the B.H. Clay. Due to salt?

Broken Head 2’5” – 3” Type locality B.H. Clay Quartz grains to 1.5mm

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PROVENANCE of AUSTRALITES

1. Significant that 2000 australites collected in this area, apparently all from above the hardpan. Usual place of collection is on the hardpan.
2. Significant that the 14 specimens collected in situ were related to the hardpan. All close to it.
3. If there before the hard pan formed then expect collection of humus under those near hardpan (within c2”)

Small diagram of humus below an australite

A dynamic view of the hardpan needed. Always being destroyed by bacterial action etc.

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Also always being added to. Hence C14 of 1300 years under mid-Holocene sand.

As surface lowered by erosion, the leaching zone is extended down & the pan attacked. Humus carried further. Some ironstone re-dissolved but some pieces left & gradually come to surface. If australites passed through such a zone would (a) be very leached (b) have relics of humus in rims & underneath.

Diagram: Showing cross-section of site W. of Sherbrooke with various radiocarbon dates.

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KANGAROO GRASS FLAT CAVE c. 5 miles N. of NELSON

Diagram: Showing Excavation site in cave and layers around it.

PAGE 59

Under shelf near NNW chimney

Diagram: Showing cross-section of cave wall including bone layer.

This cave later called Mc Eachen’s Cave See Vict. Nat. 1964

PAGE 60

LAKE CORANGAMITE

Mr. Geoff Lewis of 47 Moore St. Colac sent in mandible of wombat from “hard earth rock on the windward side of Carsons Island in the middle of Lake Corangamite.”

Vombatus ursinus platurhinus molar row 54.5mm. Usually 52 – 54mm. V. pliocenus syntypes 58 – 60mm.

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COROROOKE

Drain from factory at Cororooke to Lake Colac. Clayey sand to sandy clay poorly sorted black to greyish brown. Pieces of bones mineralised, fragmented like those in Pejark Marsh, mottled brown & black. Oxidized & now in process of reduction?

Also large piece of white limestone. Evidence of horizontal deposition. Holes in it (roots?) filled with black clay. Also pieces of pale gray limestone with bones included. Bones are of the same colour.

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Map: Showing drain between Lake Colac and Carorooke township with bone location

Bones sent in by Don Burns via his brother-in-law Mr. Newbold 10.9.64

Bones include

Thylacoleo carnifex

Vombatus

Macropus

Nototheriid incisor?

Wallaby

See p. 67

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WEST of GRAVEL POINT Pt. CAMPBELL

Diagram: Layers A,B,C & D

A = Sandy topsoil. Note separated fr. Hardpan altho' thinned above it at Excav. Site

B = Layered clayey deposit including Miocene calcareous shell fragments therefore unleached. High in Miocene nearby?

C = In fossil gully. Grey clayey bed with some carbonized stems.

D = Hardpan. Eroded or only locally developed?

Diagram: Variation on above

Check by auger if this the relationship. If so, is extra evidence that "A" horizon at Excavation Site is actually a later loam.

COROROOKE

Map: Showing Lake Colac in relation to Ryan's Lane, Cororooke and points A & B.

ABORIGINAL SKELETON

Graham Wisbey of “Netley”, Cororooke (area locally called Balintore) donated remains of aboriginal skeleton found on Mr. Ray Drake’s property at A i.e. c ½ ml NE of “Netley” on NE side of swampy area when ground being plowed. Skeleton probably complete & c9” below surface.

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Pieces taken to Colac police who said aboriginal & returned to Mr. Drake who threw it away. Pieces in Museum retrieved by Graham Wisbey.

Map: Showing closer aspect of B on the above map.

MARSUPIAL BONES

On & beside lake pelicans, black swans, duck, water hens, seagulls, ravens, skylark, plover, “snipe”.

PAGE 66

Map: Showing drains flowing into Lake Colac

Covered drain from milk factory shows basalt & layered lapilli & tuff (from Mr Robertson?). Just S. of fence change to deep black alluvium with carbonate at 18”. Former lake floor. So

1. Lake with bones. Present lake level
2. Higher
3. Higher lake still which washed types of stoney rises recently (see Dr Currey’s paper).

PAGE 67

Bones sent to Museum by Don Burn include

Thylacoleo carnifex

Macropus gracilis (Bartholomai) or titan (Tedford).

Thylogale sp.

Wombat Vombatus

Nototherium

See p. 62

Some of bones have many secondary deposition of psilomelane – evidence of wetting & drying, wh. is shown also in the cracks in the bones & the accumulation of secondary carbonates.

In tuff are impressions of reeds. As the reeds are at various low angles in the tuff as well as horizontal it appears that the tuff or at least tuff-laden waters caused the

PAGE 68

Flattening & covering of the reeds. Aerobic bacteria have apparently destroyed the plant tissues, so that impressions only are left. They are not detailed, as impressions in clay would be, & so the reeds are determined as such only on the gross morphology. For this reason the det. might be questioned, but no alternative acceptable determined can be found.

P 2399 1-2 Macropus gracilis (Owen)

2399 – 4 M. cf. gracilis

23995 Macropus sp.

23996 Thylogale billardieri

23997 Macropodid terminal phalange of 4th digit of pes.

Det. by A. Bartholomai

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PEBBLE POINT

1. Foraminiferal Fauna indicates cold water and shallow (50' – 100'). Middle Paleocene in age, while Rivernook is upper Paleocene.
2. $^{18}O/^{16}O$ determinations also indicate lower temperatures than the usual Tertiary ones.
3. Cookson – palynology PRSV 78(2).

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MURNANE'S BAY

Near Childer's Cove, Western Vict.

Coll. R John Edge of Allansford

From c6' from top of cliff on east face in "fossilized wood" (rhizoconcretion) zone. Includes incisor of Procoptodon goliah.

See p. 96. This fossil therefore probably last interglacial.

PAGE 71

LESLIE MANOR

N. of Camperdown W. Victoria Brown tooth of Diprotodon very heavily mineralized Pres. E. G. Austin

21.3.32

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NEWFIELD

5m N. of Pt. Campbell

Aboriginal axe of very weathered basalt. Augite crystals in relief

Diagram: of stone axe

Obtained by Mr. Ellis M. Tucker "Greenacres", Brit Brit via Coleraine. Axe from "Gurnong" (Mr. Underwood), on Wild Dog Cr., a small trib. of Pt. Campbell Cr.

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Diagram: side profile of axe showing haft grooves

Mil. Map Refs

592245 Underwood's

589247 Axe site

PAGE 74

AUSTRALITE

Andrew Halford (10) Found a large australite, well-preserved. (Checked by me) weighed by his mother on the household scales as 5oz.

Map: Halford's house and road cutting in relation to roads.

Diagram: cross section of cutting showing location of find

Cutting about 2'6" high and australite picked from A horizon of soil apparently in situ. Seems to have been exposed by erosion of cutting.

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LAKE WEERANGANUCK

Letter from Prof. R. N. Tedford, Univ. California, Riverside, Cal., USA 17/6/65

Foot bones referred to Macropus ferragus and another macropodine species.

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TOWER HILL

Mr. Gavin Cereni of Fisheries & Wildlife sent to museum for identification an aboriginal skeleton from Tower Hill reserve.

Map: Showing locations of two skeletons in relation to Cerini's house, lake, causeway, and quarry.

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K/A DATES McDougall & Allsopp

| | Polarity | Age m.y. |
|---|---|---|
| 1. Quarry near Panmure | N | 0.56 |
| | | 0.58 |
| 2. Albion Q., Alphington | R | 0.81 (4) |
| | | 0.82 |
| | | 0.83 |
| | | 0.77 |
| 3. Merri Cr. Quarry | R | 2.16 |
| | | 2.23 |
| 4. Dunnstown Q, near Ballarat | R | 2.59 |
| | | 2.49 |
| 5. Newport Quarry | N | 2.49 |
| | | 2.50 |

| | | |
|---|---|---|
| 6. McGrath's Q., Braybrook | N | 2.63 |
| 7. Albion Q., Sunshine | N | 2.55 |
| | | 2.74 |
| 8. Ararat Q. | R | 3.59 |
| | | 3.52 |
| 9. Menzels Q., Hamilton | R | 3.95 |
| | | 3.88 |
| 10. Grange Burn, ditto | ?N | 4.35 |
| 11. Fowler Q., Steele Cr, | R | 4.42 |
| N. Essendon | | 4.45 |
| | | 4.46 |
| | | 4.52 (2) |
| | | 4.68 |

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<u>WARRNAMBOOL BORE</u>

Bk 52: 130 – 132

Samples from W.J. Park coll.

Log signed by

July 9, 1889.

Strata at Albert Park Bore

| No | | Ft. | IN |
|---|---|---|---|
| 1 | Top soil Terra rossa | 1 | 3 |
| 2 | Limestone with flint Calcarenite | 65 | 0 |
| 3 | Sandstone with flint Calcarenite | 16 | 9 |
| 4 | Dark red clay soil | 17 | 11 |
| 5 | Bright yellow clay | 5 | 4 |
| 6 | Yellow clay full of | | |
| | Magnetic oxide of tin | 8 | 9 |
| 7 | Calc. spar or carb. Lime | 9 | 6 |
| 8 | Yellow clay with gravel | 10 | 2 |
| 9 | Yellow & white marl | 26 | 6 |

| | | | |
|---|---|---|---|
| 10 | Sandstone with flint | 75 | 0 |
| 11 | Finely pulverized shells & | | |
| | White clay | 35 | 0 |
| 12 | Blue clay/Gault | 7 | 6 |
| 13 | Greensand with coral | 23 | 6 |
| 14 | Sedimentary rock | 36 | 6 |
| 15 | Greensand | 10 | 6 |
| 16 | Sedimentary rock | 49 | 0 |
| | Total depth | 398 | 2 |

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The sample 2 appears to be MML & is prob. displaced. There would not be a land surface between this & the grey silt. It is interpreted that there is 83 feet of W'bool aeolianite, then 32 feet of Pliocene clay (partly lateritized) Followed by Miocene marine rocks:

- (Layer No.4) - Poorly sorted sand & dark red clay cf sub-basaltic clayey sand
- No. 5 - Same but reddish brown
- No. 6 – Fine, well sorted sand (marine) origin – brown with reddish brown iron oxide
- No. 7 - crystalline calcite
- No. 8 - Miocene marine limestone "gravel" is prob. fossils.
- No. 9 - yellow M.M.L'st.
- No. 12 - Grey (very fine sand) silt 13 clay ware
- No. 14 & 16 ditto.
- No. 15 - not seen

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TARRINGTON

Bore on The property of Mr Colin Wilmore (1)

0 – 50' clay

50 – 180' Basalt with cavities at 70' and 120'

No water

Diagram: Showing bores 1 and 2 in relation to Western Motel and Ballarat and Chatsworth Rds.

BORE Schneider Bros (2) on Ballarat Rd

191' Plenty of water. Also a cavity. Went through basalt.

Information from Lionel Elmore.

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BORE near Victoria Valley P.O. Ernest Krause reported red gum at about 100ft.

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30/1/67

LAKE COLONGULAC

Photo: shore of Lake

Diagram: Showing perimeter of lake and where bones were located.

Mostly fragmentary but included pieces of Macropus jaw size of great grey and a wombat tooth.

Tuff so extensive at one place, it appears to be in situ. If so parna overlies tuff (as in published sectionM N M Mem. 18) and also there overlies it & old

PAGE 83

bank of lake (formed of basalt?) If former, then present dune built on base of older one. The parna above the tuff contains carbonate nodules to 6" X 1 ½" so not recent.

Bones in situ

1. At beach level in grey silt (relationship to tuff unknown). 3" above bone was layer sloping towards the lake at about 30° consisting of yellow silt overlain by black carbonaceous silt ($^{14}C$ sample taken NZ R1996 20,100 ± 500y B.P.) up to ¼" thick; reddish soil immediately underneath ~~suggests~~ burnt ground. Photos.
2. A little further north in same section of bank cut by lake, bone in situ in same compact

PAGE 84

silt c. 30" above beach. Photo. LAKE BUDGET (a) Tendency to be filled with sediment, balanced against (b) Removal by wind action when dry.

(a) Gravity action so dominant & tend end life of lake. Swamp then plain. All periods but esp. wet ones when lake high and more erosion by both lake and streams

(b) Wind energy & only operable during dry periods because in terrain depression.

Coxiella produced whenever lake but intermittent. Sometimes no new shells on beach; at other times great numbers. When lakes drying up each summer could not find

PAGE 85

a live Coxiella or any recent shells on beach. Could live for few weeks in wet mud but long dry periods would exterminate them. Of recent years large quantities. Safer re-introduced. Only in special circumstances blown into dunes at present time. Most dunes compact, & relatively old. Some do blow of course – matter of significant quantities. When lakes dry much material blown & farmers on "Chocolyn" built 6" high fences to trap saltatory material. Since washed away & much more by higher lake levels. Appears a prolonged period of dry

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conditions necessary to build dunes. Winter rains must be limited too. Only building now is where

1. ~~Shallow~~ Gently inclined floor
2. No cliffs
3. Normal to N. (dry) wind

Two parna lines. No 1 is aligned to present shore & No 2 to higher lake level.

Diagram: Lake and former lake bed with parna lines 1 & 2 and site A.

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At point A dune is dated as <14,000 y. BP.

The higher level may be of the same age as that at Pirron Yallock.

Photo strip of 3: (see p 83) Bone in place, close up "at beach level", "A little further N".

Photo: Bone site

Photo: Coxiella shells on beach S.E. shore of L. Colongulac.

Photo: S.E. shore of Lake Colongulac.

Cont'd p.91

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MAMMILLARY CARBONATE DENNINGTON 1967

See p. 94

also Notebook 33 p. 1

Sample of mammillary carbonate of fossil B horizon under present tuffaceous loam soil sent to

Dr. Gerald M. Friedman

Rensselaer Polytechnic Inst.

Dept. Geol., Troy,

NEW YORK 12181 USA

Reported 18/3/67 that sample was x-rayed & showed approximately:

Calcite 60 – 65%

Dolomite 15%

Quartz 10%

Clay 10%

Impure because B horizon of soil.

Why change from massive deposition to localized

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mammillary, fine-layered deposition. Perhaps due to (gradual) reduction of the conditions favouring deposition. As reduced, deposition in loci of preferred penetration & not overall emplacement. Deposition at points of easiest penetration of soil. The fine layers may also be a function of this lessening of carbonate supply. This interpretation supported by the fact that after emplacement, instability increased & the A horizon was stripped off. Date after Last Interglacial when dune formed & after deep soil formation which was

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a more humid period & so presumably Last Glacial. Cessation (or relative cessation) probably Postglacial Thermal maximum. Loam (with tuff) above this is postglacial (9" – 18" deep).

Could present a new palaeoclimatic indicator. Is the mammillary calcite only on the seaward side?

3 Photos: Mammillated surface.

See p. 94

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1967

HIGHER LAKE LEVEL L. COLONGULAC

Cont'd from p. 87

Photo: Shore of present lake with parna dune

Photo: On left shore of present lake. On right shore of higher lake level with dune

Photo: Former higher lake bed.

2 Photos: View of former higher lake bed taken from S. end of parna dune at SE cnr. present L. Colongulac.

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1967

See pp. 99 – 103

CUNDARE

Road cutting in top of old parna dune E of Lake Corangamite.

Diagram: Showing lake and cutting.

Site B of p. 99

Photo: Soils developed on inland side of dune; white zone is parna with Coxiella.

Photo: superposed soils

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Photo strip (5 photos): Black loam on carbonate rich substrate. Material blown over dune crest & soil formed, then process repeated. This blown material much younger than dune. Later "arid" period?

Photo strip (4 photos): Columns formed in dune a pedologic process. Carbonate at boundaries. Columns formed before later soils shown above Note disconformities. Carbonate in parna = loess. Detail of soil succession.

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DENNINGTON

See p. 88

Mammillary calcite in Moulden's Quarry.

15/8/67 examined slide with A.W. Beasley – zircons, augite, opaques, cloudy felspar, quartz. Rounded & not the shards charac'ic of tuff. contrast with sediments with tuff nearby - hockly olivines.

Photo: Moulden's Q. looking N. towards Dennington 30/4/67 Merri R.

Photo: 9" – 18" black soil, ±3' carbonate. loose sand (calcareous) to mildly lithified (usually can be crushed in hand) (Figures = Adrian & Jane Gill)

Photo: carbonate horizon = B horizon of fossil soil

Photo+ From Quarry looking West over Merri River Calcrete breccia

Photos: Mammillary horizon overlying calcrete breccia.

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10/6/67

WARRNAMBOOL

50 yd. W of Cramer St in Racecource Rd. on N side next Russell Creek an "island" of rock left round SEC pole when side of road bulldozed flat. Aeolianite with much secondary carbonate & hollow filled with bedded tuff.

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11/6/67

MURNANE'S BAY

Diagram: Four bays on the seaward side of the road.

Observations on E side Murnane's Bay

Diagram: Cross-section of bay wall showing palaeosols (one of which had Procoptodon fossil; p70).

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AEOLIANITE with strong lithification by secondary carbonates – presumably & almost certainly pedologic.

Strike oblique to coast c. NW-SE

PALEOSOL dark red (Munsell ~ 10 R 3/6) sandy loam 12" – 18" thick = A horizon. Clockhouse penetrometer ¼

B horizon red sand (2.5 YR 4/6) 30" deep where measured. Penetrometer 1.5/4

Diagram: part of the section showing charcoal fragments in the A horizon

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Thinner red paleosol c 1' thick in aeolianite as well as the one under it. These both seem in other bays on this coast & may have parallels at Warrnambool.

Where cracks allow admission to inside of "aeolianlte" much uncompacted sand present so on lithology would regard formation as Dennington Sand of Last Interglacial age.

Evidence widespread of break in this period of dune building.

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12/6/67

NORTH CUNDARE

see pp. 92-3

Diagram: Lake Corangamite in relation to cutting A & B

Cutting A $^{14}$C locality Coxiella shells 28,240 y.B.P

Dune therefore Middle Wurm? early phase? Consolidation & multiple soils developed since indicate not postglacial. High lake level subsequent to lake level subsequent to dune therefore Last Glacial

PAGE 100

Section N-S Cutting A

Diagram: Showing a stratigraphic cross-section of cutting A

New cutting

At top just under present black soil which not very old (by analogy postglacial & probably after mid-Holocene stripping [late Pleistocene]) are maturely structured sediments.

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Diagram: Two dotted circles representing columns

Columns to 1' in diameter marked out with lighter mineral (carbonate – effervesses) 2.5 Y 8/2 white. Also some yellow 10 YR 7/6 Further S. in cutting. Further S. still the columns have a superposed very dark gray (2.5 Y N/3) apparently from surface soil.

From surface down some four feet a burrow (?) 10" – 12" diameter & infilled with layers which are concave.

Diagram of infilled burrow

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Paleosol 1 could be Paudorf Oscillation or (more likely) the dune above it – a drier & warmer period cf. age of lenticle at base of Sobbe Site, King Cr. Q & paleosol at Allora Q. cf disconformity at Section B

Paleosol 2 is a minor development & could be due to quite local circumstances.

Paleosol 3 4” thick. Very dark gray 10 YR 3/1

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1967

CUNDARE

Section B (see map p. 99)

East end.

10” – 20” Black to v. dark gray 10 YR 3/1 crumby silt.

~ 10” Small carbonate nodules in same matrix.

~ 25” V. dark gray N3 to dark gray 5Y 4/1 blocky silt

2’+ white 5Y 8/2 parna (=loess). Light colour due to abundant shell.

Middle

1’ 6” Black soil

4’6” Pale brown 10 YR 6/3 shelly fine sand to silt. At base mottled with yellowish red 5 YR 5/6

3’+ Light gray 10YR 7/2 ditto. More shell in this than above. Sharp disconformity at the top of this member.

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N. CUNDARE

Site A p. 99 1967

2 Photos: Cutting. Paleosol 1 & 2

2 Photos: Lake floor of higher level since dune built. Continuation of dune to S.W.

2 Photos: Build up of road with material from cutting. Disconformity? cf Site 2.

2 Photos: General view of cutting. Present black clayey loam.

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Photo: Burrow? Wombats do not make vertical burrows. So what. Note concave beds of filling Vert. hole in dune material (parna).

Photo: Largest devel. of extant soil.

Photo: Horizontally bedded shell. Paleosol 1.

Photo: Pal 1 & 2.

2 Photos: Shell from layer at base of ruler dated $^{14}C$ 28,240y. BP Y ± 230

Photo: Floor of former higher lake level cf. that on which Pirron Yallock stands.

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N. CUNDARE

Site B p. 99 1967

Duplex soil – older than Site A

2 Photos: Dark grey loam carbonate nodules. Series of paleosols at W end of cutting.

Top of hill E-W road

2 Photos: Nodules in duplex soil B hor. Shells

Photo: View W. to higher lake floor and Lake Corangamite

Photo: Upside down. 1 Parallel bedded material; 2 disconformity; 3 parna

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Photo strip (4 photos): Disconformity. General views of cutting

Photo strip (4 photos): Columns in parna = loess. View looking E in cutting. Parna ridge continuing S.W. to Site A.

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30/7/67

WARRNAMBOOL

Diagram: Thunder Pt. through to Hopkins River coast

Diagram: Map of Thunder Pt area showing old river course and quarry

1983 Nicholson Aeolianite (unpublished).

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31/7/67

SOUTH DREEITE

PARNA = Loess dunes in roadcuts

1. "Merryworth", J.E. Jackson. Cut outside house c ½ m E. of lake. Deposited during higher lake level? c21' Sandy loam overlies compact parna with shells. Secondary carbonate at interface. Also soil pipes. Speedo 59940.6 Taits Rd. 40.85
2. "Melinga" Dunes bored & shells taken for $^{14}C$ some years ago. Dreeite S. Fire Brigade.
3. Parna in roadcut at 43.5

Map: Showing roads travelled with speedo reading to locate features

Site A p. 99 = 628 956 Beeac Mil. Map Speedo 59947.3

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N. CUNDARE

Diagram:Cross section of lake showing terraces and Cutting A

Gray cliffs of present lake at Cundare are not of waterlaid material. Shells & shell fragments in random orientation in silt – a function of aeolian movement.

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Map showing location of basalt island with inshore berms

Diagram: Showing Series of 6 berms succesively higher by c1' Total 5' – 6'

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Series of shell layers in low terrace.

Diagram: stratigraphy of low terrace:

Photo: Low terrace. Coxiella bands. 3' ruler for scale

Photo: High terrace. Occasional shells but no layers seen here

Photo: Low terrace.

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1967

Photo: Basalt rocks & low terrace.

Diagram: map showing $^{14}C$ site

3 Photo strip: Basalt; Island of basalt with soil on top; low terrace; high terrace with car.

3 Photo strip: Coxiella on beach; Coxiella and Foam on Beach at X in small map above clay with some Coxiella; Basalt islands at point Tumuli

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SOUTH DREEITE

SOIL PIPES

1967

2 Photo strip: Soil pipes in parna outside "Merryworth" see page 109

3 Photo strip: Soil pipes of loam; Parna = loess indurated

POMBORNEIT NORTH

2 Photos: Stony rises

2 Photo: Stone walls

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PIRRON YALLOCK

1967

Views from Princes Highway

2 photos: Looking upstream… downstream.

Village built on terrace not reached by Pirron Yallock Cr. nor by the lake even in years of extra high level. Photo on right shows alluvium over tuff with water ripple marks overlying clay Therefore lake higher at time of eruption. This followed the Stony Rises. Stony Rises therefore late Pleistocene. Stony rises E of Lake Corangamite have over them parna dunes with soil pipes as on opposite page.

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THUNDER Pt.

WARRNABMOOL

11/9/67

Dune of soft or lightly lithified calcarenite surficially hardened by sea water, & with calcrete on summit of stripped terra rossa.

Diagram: Showing cross section of dune

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When dune first attacked ~~tuff deposited~~ the sea was at least 600' to S. Rests on terra rossa with rhizoconcretions where well developed. Tuff only in hollow – none remains on crests – so does not help dating of stripping. Zone ~ 2 chs wide on cliff tops stripped of vegetation & loose sand. Some mammillary structures on top of tuff.

Loose sand without soil at back of stripped zone. This is apparently the bulk of the material that has been taken off that zone. Terra Rossa under tuff >10,000 y. old – Last Glacial cf. Denninton.

Diagram; coast and islands showing landward dip of beds

Landward slopes of former dune preserved & seaward part destroyed by sea,

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THUNDER PT. SURVEY

Table: Showing various measurements to fix height of dune .

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Diagram: Map showing Dunes, quarry, road to beach, cliffs and sea

Diagram: Dune profile showing seaward and lee angles

Calculations crossed out.

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DENNINGTON

12/9/67

HARRINGTON Rd. ctg. on W side c1/4 mile S. of Princes Highway on leeward side of Last Interglacial dune.

SURVEY:

Table: Showing various measurements for profile.

See Notebook 17 pp. 151-3, 156

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Tuff 1 (over terra rossa) Appar. dip. 12°S

Tuff 2 (over Tuff 1) Appar. dip 25°S

SITE 5

0" – 1'9" Talus

1'9" – 4'9" Black over brown soil

4'9" – 7' Tuff 2

7' – 13" Tuff 1

13' – 17' Terra rossa

SITE 4

0" – 1' Talus

1' – 4'3" Black soil

4'3" – 5'6" Brown soil

5'6" – 8'6" Tuff 2

8'6" – 15 Tuff 1

SITE 7

0' – 5' Talus

5' – 7' Black soil

Brown soil cut out

Tuff 2 cut out

7' – 11' Tuff 1

11' – 15' Terra rossa

15' – 17'6" Calcrete

17'6" – 20' Sand

SITE 8

0" – 1' Black soil

1' – 7' Calcrete (4'6" actual thick)

7' – 20' Calcareous sand

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Black soil 5YR 2/1 black

Brown soil (soft tuff) 5YR 3/6 dark reddish brown

Sand 7.5YR 5/8 strong brown

7/6 to reddish yellow

Very variable

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MOULDEN'S QUARRY

Dennington

12/9/67

1. Highest part of quarry – section:
   Diagram: 4' 6" calcrete, bare outcrop, bottom foot scalloped boundary
2. 50' SSE Section
   0" – 4" Calc. sand with introduced land snails Theba pisana
   4" – 1'4" 5YR 3/3 dark reddish brown loam – looks black –with fragments (incl. opercula) Subninella undulata, the commonest rock shell used by abos. for food.
   Disconformity.
   1'4" – 3'4" Calcrete (terra rossa stripped away) with soil pipes to greater depth. On top 1/8" – ¼" mammillary carbonates Calcrete 5YR 8/1 white to 2.5 YR 6/4 light reddish – brown acc. to relative amts carbonate & terra rossa.

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Mammillary carbonate 7.5YR 8/2 pinkish white to 10YR 7/1 light gray.

3'4" ++ Calcareous sand 7.5YR 7/4 pink to 10 YR 7/4 very pale brown. Sand mobile.

3. Six feet further downhill SW there begins a lenticle 30' long of breccia ~~conglomerate~~ varying from 1" – 24" thick (photos). Groundmass of terra rossa with included angular pieces from sand size to 9" diam. This the only place in quarry where conglomerate seen, but on hill above a cut shows 9' calcrete with zone up to 1' thick of conglomerate in middle. What the change of conditions providing congl? Form only when stripped? Evidence of climatic change?
   Conglom. at site 3 under mammillary carb. but over other calcrete.

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On N. side of quarry shell frag, of Subninella undulata & charcoal interpreted as small abo. midden.

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STANHOPE BAY

9/9/67 & 12/9/67

Australite site

Diagram: Map showing geology and location of survey site (X) and australite site between Stanhope Bay and point.

Cliff section measured at X in pocket bay 85'6" cliff top to beach level (= HWL)

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Section of aeolianite dune

STANHOPE BAY DUNE (E. side)

Table: Showing survey measurements.

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Table continued from previous page.

PAGE 129

STANHOPE BAY

Diagram: Showing dip of cliff.

L = tan Q = 105/604 = T .2402 = 9°52'

Considerable reduction from the angle of active dune building. Due to blowouts, erosion and pedologic reduction.

WIDTH of dunes (surveyed)

1. Stanhope Bay 600'+ x 2
2. Dennington Sect. 600'. 1000' at S.L.
3. Thunder Point 610' (185m) p118 x 2

Erosion rate 600' in 6000 ys = 0.1' per year = 1.2"

If 1000' eroded, rate – 2" per year

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LAKE WEERANGANUK

13/9/67

On "Danedite" occupied by Mr & Mrs H.G.C. Adams & now by Mr & Mrs Peter Schlicht. Weerite.

PARNA dune with strike cN10°W= 350° on N. Side of lake. Parna dunes also on E & S shores but more on N or W.

Diagram: Showing dune cross-section.

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c7' above beach at section is juvenile soil with which are associated fossil bones. Paleosol is 1.5 – 3' below top carbonate layer. Carbonate layer also directly above this paleosol – drainage apparently impeded by it. Nodules at S end small (to 1.5" diam) but to 6" diam to N and form a solid zone at one place. The nodules are earthly & not crystalline. There are also nodules in the clay at the base of the section.

Where the cliff highest there is a second paleosol c2' above the one described. There are sporadic carb. nodules below this top palesol but a definite alignment along its top surface. Sample coll. here for $^{14}C$ dating

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Black loam at surface 9" – 18" thick. Browner & thinner where more juvenile

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E. of STANHOPE BAY

22/10/67

Diagram: Showing cross section of dune where 8 australites were found

SECTION

MAP

Map: Showing location of cliffs, areas where 3 & 8 australites were found respectively.

PAGE 134

A. ON DUNE Coll. John W. Halford

Diagram: Tachylyte with conchoidal fracture and soil solution gutters. See Baker, G., 1956. Natural black glass resembling australite fragments. Mem Nat. Mus. Melb. 20: 173 – 189

Australite 1 Diagram E 4615 1.893 gm

Australite 2 Diagram E4614 1.162 gm

Australite 3 Diagram E4621 0.977 gm

Collected by Andrew C. Halford

Australite 4 Diagram E 4619 0.665 gm

Australite 5 Diagram E 4613 1.759 gm

Australite 6 Diagram E 4622 0.907 gm

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Australite 7 Diagram 0.637 gm

Australite 8 Diagram E 4616 2.173 gm

B. AT HEAD OF BAY

Diagram: Showing no dune and 3 Australites on "clay"

Australite 9 Diagram E 4617 2.087 gm Coll. John Halford

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Australite 10 Diagram E 4618 Coll. J.H.1.740 gm

A.11 Diagram E 4620 0.605 gm Coll. A. H. 0.605 gm

These australites are like those from Port Campbell but slightly sand-blasted.

See Baker Mem Nat Mus Vict. 27 for record of an australite in calcrete.

Photo: 10 australites and ruler.

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THUNDER Pt., WARRNAMBOOL

26.12.67

Map: Showing map of Thunder Point fossil soil survey.

FOSSIL SOIL

Diagram: Showing cross-section of soil.

2' (Thicker in places) Dark brown 7.5R 3/2 carbonaceous sand

1'3" leached sand

1'3" Sand with numerous calcareous concretions

2' Sand with rare concretion

B1-2 mottled at grain size & so no real colour match, 7.5YR 6/5 light brown to 10YR 7/4 very pale brown to 7/5 yellow

PAGE 138 – 139

SURVEY of PALEOSOL THUNDER Pt.

Table: Showing various measurements of paleaosol level.

PAGE 140

At the Table Cave (E) end of the section the paleosol dips down at c.5$^{o}$, horizontal bed giving way to beds dipping roughly N & 30$^{o}$ The Table Cave strata are therefore', younger than the paleosol & apparently of the same age as the beds above the paleosol. Cementation in those beds varies a great deal. It is stronger in the inclined beds than in the horizontal ones. The footprints are of this age. The beds are capped by calcrete on top of which is finely laminated mammillary calcite as in Moulder's Q., Dennington, (p.88). The Table Cave

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beds cut off the paleosol c15' above LWL & c. 1ch. S of the steps to Table Cave.

Well developed rhizoconcretions are present in association with the soil under the tuff & the paleosol 25' – 30' above LWL (p. 138). Concretions to 4" diameter indicate tree growth bigger than present. Due to higher (last) glacial rainfall?

At the west end of the section (difficult of access because of large scale rock fall so not time to survey), the paleosol continues at the same general level until point shown on p. 137 where it dips c. N & is cut off by steeply dipping beds.

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THUNDER POINT

Diagram: of paleosols. Paleosol 2 is probably Last Glacial and the underlying sand is probably Dennington Sand. Paleosol 1 is a less well developed soil. Horizontal beds deposited perhaps during Last Interglacial advance & paleosol when exposed. N. dip shows landward part of dune.

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SHORE PLATFORM THUNDER POINT

Diagram: Cross section showing height of platform and wave cut into cliff.

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HOPKINS ESTUARY

27.12.67

See 57: 252

E (left bank c 5 chs N of Belvedere Cave but on opposite bank. Loose sand under calcrete which overlain by 2' – 3' tuff.

Fauna of sand & mixture of open ocean & estuarine species.

Anadara trapezia (Deshayes 1840)

Corbula stolata (?? Notospisula trigonella?? JS)

Parcanassa

Homalina

Mytilus

Plebidonax deltoides (Lamarck 1818)

Katelysia

Ninella torquata (Gmelin 1791)

Subninella undulata (Solander 1786)

(last two found previously) Also flat calcrete pebbles sand very pale brown 10 YR 8/4 to reddish yellow 7.5 7/6 to white 10YR 8/2 Port Fairy Calcarenite.

25/7/84 This section eroded out in 1946 flood & ever since gradually covered with colluvial deposits.

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ALBERT PARK QUARRY

27.12.67

See pp. 148 – 150

Diagram. Vertical section of quarry showing 3 palaeosols

2' reddish chocolate sand (present soil)

7’ yellow aeolianite

1’ terra rossa with soil pipes up to 3’ deep

3’ yellow aeolianite

1’ terra rossa on truncated dune structure (no pipes)

24’ pale brown heavily lithified aeolianite crystalline in places & hence suitable for road metal

Quarry floor on section line another paleosol seen. 1’ outcrop but base not seen

PAGE 146

FOSSIL FOOTPRINTS

Dec 27-28, 1967

See Book 9, p. 144-149; 21: 146-147

For locality see p. 137

“Table Cave”. Present as counterparts the original print being in the fallen rocks on floor of cave & erased by wave action.

FOOTPRINT 1 (photo)

Toe 1 6 ½” X 2 1/8”

Toe 2 7” X 2 ½”

6” X 2 ½”

“Heel” Raised area on left

7” X 4 ¾”

Flat 9 ½” X 2 7/8”

Maximum 4 ½”

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Diagrams: Showing foot print dimensions.

Midpoint toe end of heel to toe 1 = 6”

2 = 9 ½”

3 = 10 ¼”

Midpoint of outer edge of toe 1- do. 3 = 15”

Midline of heel almost in line with inner ® side toe 1

Depressed side (in counter part as seen) of toes & heel is to the right.

FOOTPRINT 2 mirror image of 1

Toe 1 overall length from midpoint at rear of heel 2’ 7 ½”

Toe 1 length 7”

Toe 2 length 10 ½”

Toe 3 length 8 ½”

PAGES 148, 149

ALBERT PARK QUARRY, WARRNAMBOOL

See p. 145

Photo: Southwall of quarry (with crusher) Trees along Grieve St. Fox seen in SW corner of quarry which locked.

Photo: Closer view of S Wall Paleosols numbered

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Photo: W wall of quarry. Paleosols numbered

Photo: N. wall. Two local paleosols. Numbered ones can be traced round the whole quarry.

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Photo: Albert Park Q., W’bool. South wall. Pines. Aeolianite.

Photo: NW corner.

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WARRNAMBOOL L/IG1

Map: Showing Merri Cr. from Hyland St to lighthouse with Lake Pertobe and Lady Bay

Bend in line round dune probably left by retreating R/W sea. Ctg shown has 4’ tuff on truncated terra rossa on sand (often coarse) horizontal to 33$^{o}$

PAGE 152

NARRAWONG

29.3.68

On Princes Highway at Surry River:

1. PORT FAIRY side – dune sand, mostly free, in road cutting & covered by calcrete with remains of terra rossa
2. PORTLAND side – horizontally bedded coarse sand. (mostly calcareous) with pieces of shell & occasionally whole shells. Shallow water marine fossils – some current bedding. Mostly sand shells but one operculum of Ninella collected.

Prob. Pt. Fairy Calcarenite – Last Interglacial.

PAGE 153

SHORE PLATFORM NOTCH

WARRNAMBOOL

Diagram: Map of coast near Table Cave Thunder Point

Diagrams: Vertical sections of two notches

PAGE 154

A. W Beasley cut a section for me (sample in collection) to see why the ridges are where they are

Diagram: Showing polished section and two ridges of a honey comb rock sample

Although honeycomb covers the whole surface, there are two ridges & these are due to the horizontal stratification of the rock. The grain size is fine & the lithification

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more effective in these zones. Thus the major features are controlled by sedimentation & lithification. The cells are mostly to 1 cm diam & often protrude strongly (max 1 cm measured). The ridges are sharp & were often curved from straight. Detail of the surface shows removal of material from round large grains in such a way that access by a mollusc is impossible. This erosion also cannot be chiefly abrasion & solution (+ quarrying probably) is involved. Large numbers of Melarapha paludinella (Reeve 1857) in cells.

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Diagram: Showing Ridges 1 & 2

15/6/68

Waves noted running along notch. Some pebbles & sand from disintegrating rock falls & dead shells so some abrading materials present.

PAGE 157

RED ROCK

Diagram: Showing Lake Coragulac, quarry and entry road

Tuff & lapilli incorporating poorly preserved plant remains. Some stems to 1.5" diam. Coll. & pres NMV by Don Burn of Colac.

PAGE 158

P.S. LANG COLL.

Lake Colongulac

Det. H.E. Wilkinson.

Macropus titan

M. ferragus

Protemnodon sp.

Procoptodon cf. rapha

cf Rutledge's cutting 4000 y. Fossil Back-beach Boulder Bed.

Photo: Tower Hill Beach showing boulder bed.

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TOWER HILL BEACH MIDDEN SPECIES

Isoodon obesulus Coastal country Sydney to Adelaide. Omnivore (with preference for feeding mostly on) insect larvae. Fertile spots in dry sclerophyll forests.

Trichosurus vulpecula Subspecies extend fr. Cape York penin to Ceduna S.A. <10-40" rain

Vegetarian.

Wallabia rufogrisea Mt Gambier to Bundaberg. Distinct supspecies Bass Strait islands & in Tas. Brush loving, browsing. Favours heath country & rarely emerges into open grassland. Dry sclerophyll forest also.

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Wallabia bicolor SE Sth Aust. to Cairns. Thick swampy vegetation & scrubby gullies extending to hillsides where 20" – 40+" rainfall.

Macropus major N. Q'sland to Ceduna. Vegetarian of open forest to grassland. <10" – 40" rain pa.

Antechinus minimus Tas & Bass Str. Portland, Anglesea & E of Wilson's Prom Wakefield & Warneke (1967) record on Gleanie Is. Coastal habitat – damp scrub & Gahnia tussocks.

Gypsophyca tasmanica Wilson's Prom. Westernport, Tas coast, Lady Julia Percy Is. & Islands off NSW as far N. as Newcastle.

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Rattus lutreolus Coastal regions Adelaide – Cairns. Vegetarian. Damp to Swampy localities 20" – 40" rain pa., any altitude.

Mastacomys fuscus upland Tasm SE Austr. (eg Otways) Wet sclerophyll forest. Veget. Wiry grasses & coarse veget. 30" – 40" pa.

Diomedea spp. Two species found over southern seas. Nearest colony is Albatross Is off NW Tasm. Breeding colony nearly?

Cladorhynchus leucocephalus Banded stilt. Maryborough in Q to Pt. Cloates in WA Frequents shallows lakes, swamps & tidal flats. Preference for saline lakes

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where it feeds on Artemia & other crustacea.

Of the 13 birds found, 8 are marine. Red wattlebird is migratory foll. the eucalyptus & Banksia blossom. Grey Teal & Black Swan are commonly found on tidal swamps & coastal lagoons. Emu is terrestrial & widespread.

Black snake Pseduechis porphriacus Fertile coastal to mountainous forests fr. Cape York to SE Aust. 20' – 40' carnivore

& bluetongue lizard Tiliqua scincoides Ubiguitous 20"+ rainfall.

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BUCKLEY'S SWAMP & MT. NAPIER

near Hamilton

See Book 27 pages 167 – 170 (Swamp)

pp 171-3

pp 174-5

2 unlabelled Photos, 1 showing Mt Napier.

PAGE 164

HALL'S GAP

18.10.68

Camped in Hall's Gap-Dunkeld road at D25.

Diagram: Valley diagrammatic cross section

Is valley U-shaped ? bedrock not far under colluvium or is bedrock under valley flat. Colluvium has well-developed soil so relatively stable for a few thousand years. Present terrain the result of conditions different from the present.

PAGE 165

WINSLOW

19.10.68

Lake in town which has obviously been much more extensive in the past as is shown by swampy area & cliffs cut in basalt. The regular sweep of the cliffs shows that the higher ground is not simply the edge of a lava flow. This fits in with the widespread evidence for a climate in which the Western District lakes were recently more extensive. So Lake Corangamite, Lake Colongulac, Lake Weeranganuck, Buckleys Swamp etc.

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THUNDER POINT

19.10.68

Diagram: Map of embayment 1 & 2, table cave, Rock stacks A and B; point 1 marked.

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2 Photos: Wave cut nip at 1 in embayment 1. It is lower on the shoreward side than the seaward. Rock stack from landward side.

2 Photos: Rocks are horizontally embedded shallow water to beach deposits or dune flat.

Photo: "Eagle Rock" visor with wavecut nip, so called, on point between embayment 1 & 2.

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2 Photos: Wave-cut nip at shoreward end of embayment in ramp zone very low. Ramp at shoreward end of embayment 1 where Picnic Cove used to be.

2 Photos: “Eagle Rock”; Rock stack 2 from landward side.

2 Photos: unlabelled rock stack

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Photo: Eagle Rock

Photo: Ramp & nip Picnic Cave. Here horizontal beds replaced by landward dipping dune rock.

Photo: Collapse area of Picnic Cave. Top of steps lower right.

Photo: Morphology of nip on E side of embayment 2 controlled somewhat by the low dip of the aeolianite.

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2 Photos: Fossil soil Embayment 2 landward end.

Photo: Paleosol (brownish grey) showing rhizoconcretions in plan on top & in section where wind excavated loose sand under the soil.

Photo: Paleosol.

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Photo: Higher soil at top of cliff above paleosol shown p. 170 Note thin white line

2 Photos: two approx vertical cracks in cliff at landward end of embayment 2 filled with calcrete; rhizoconcretions.

Photo: Another crack filled with calcrete.

Photo: rhizoconcretions.

Photo: Cliff top paleosol in embayment 2

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Diagram: small natural bridge in rock stack

2 Photos: shore platform with E-W and N-S channels showing how an island platform can form. note heavy kelp; Small natural bridge in rock stack no. 1

Diagram: N-S and E-W channels

2 Photos: E. side of embayment 2. Low inland dip in aeolianite. Note irregular wave-cut nip resulting, & the step (red circle) to keep nip in wavebreak zone.

2 Photos: Low dip. Epiphytic algae & mollusca; Sharp edges on rocks in wave zone suggest solution dominates abrasion at this site.

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Photo: Algae, limpets. In zone of tidal range.

Photo: brown algae; white algae, mollusca. Three biotic zones.

2 Photos: Shoreward side of a N-S oriented rock stack in embayment 2. Note sharp edges suggestive of solution more than erosion.

PAGE 174

WEERING

7.11.68

Mr McNeil formerly of "Loch Ness" & now of Lorne says the foll. log of well on above property.

Diagram: 12' sediments; 12' basalt; 1' scoriaceous rock in which subartesian water to 12' (& sometimes less) from surface.

The same succession was found in a well on the next property ½ mile to SW.

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CAUSEWAY TO POMBORNEIT NTH

7.6.69

S end (lunch spot off Princes Highway where obtained ostracods in weed).

HISTORY

1. Lake Corangamite formed prob. perhaps by earlier basalt flows.
2. Latest flows are small linear with tumuli & structures like pillows so appar. flowed into lake water. Excavate in dry season to find if on terrestial or lacustrine surface.
3. Tuff – massive & laminated. Coll. on tumulus & from PMG cable trench on W side of causeway. cf at Lake Colac.
4. Peaty sediments rise high on recent flows & tumuli. Related to "creeping lakes" or earlier? Material could be dated by $^{14}C$. In dry season auger testing could show relation of these sediments to the small latest flows eg. whether the latter are deeply buried or not.

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SRWSC Sept. 1956 Preliminary hydrologic investigation of Lake Corangamite.

McVean's Spring can discharge 5 $^{6}$ galls per day = 9 cusecs to Lake. Woady Yaloak R. drains 450 sq. m. Pirron Yallock & Macks Crs c. 92 sq.m. Residual 500sq. m. of the basin is of indefinite topography. Corangamite 22m X 2-7m. Normal perimeter c90m. Bed near level E-W with rapid shelving of banks. Variations rarely exceed 2'. 1906 survey PWD shows bed falls c7' N-S. Surface then 380' (railway datum). 4' deep in N. 11' in S. On 1/5/56 across narrow midway section of lake (surface 387') depths 12' – 14'9. Average level of 1906 survey327.5' = c. 1' higher than 1906 survey. Normal surface estimated to be 88 sq. m. Surface area at RL 388.15' (8.15' above normal) is c121 sq. m. salinity extremely variable. c17 $^{6}$ tons salt. Anderson estimates 19000 tons per annum added. Varies over lake if Woady Yallok discharging large quantity fresh water. Present salinity c. 1/3 seawater. Normal submerged area 54 – 57000 acres

Average depth 6.5' – 8.25'

Volume water in storage 270-3.7000 acre ft.

Average catchment contribution (1036 sq. m.) = 2.1” (cf. Anderson)

Evaporation 48” per annum

Precipitation 23” per annum

Catchment 25” per annum

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| | | |
|---|---|---|
| Rise of flood | 1950 | RL 378’ Surface |
| | 1951 | 379.9 |
| | 1952 | 387.1 |
| | 1953 | 387.9 |
| | 1954 | 387.1 |
| | 1955 | 388.1 |

Flood freshet Sept 1956 Pirron Yal. Cr. 65 cusecs

Macks cr. 6 cusecs

AUSTRALITE RESEACH Prob 1962

Photo: Dr D. R. Chapman, Dr G Baker, EDG, Chapman’s research engineer

Photo by Dr E.C.T. Chao at Stanhope Bay, east of Warrnambool, Vict.

End of Notebook 21.