Fossils of Beaumaris

Erich Fitzgerald and Rolf Schmidt

MUSEUMVICTORIA

Trochocyathus sp., fossil coral

Geological background to the fossils of Beaumaris

The Beaumaris Sandstone of Beaumaris, Victoria, has produced the Beaumaris Local Fauna, including sharks and rays, bony ray-finned fish, penguins, diomedeid and pelagornithid seabirds, dugongs, phocid seals, baleen whales, toothed whales, rare remains of land-dwelling flightless birds and marsupials, and innumerable invertebrate fossils.

The coastal section at Beaumaris occurs onshore in the cliffs, shore platform and beach shingle from Table Rock about 1.6 km northeast to 'Dog Tooth Rock' (approximately opposite the intersection of Beach Road and Cliff Grove), and approximately 100 m out to sea as submarine outcrop. The rock is exposed parallel (W–E) to the shoreline by a shallow asymmetrical fold in the rock strata with its axis occurring at approximately the level (horizontally) of the intersection of Beach Road and Banksia Avenue (near 37°59'S, 145°02'E). From here, the strata dip eastward along the shoreline at a shallow angle of ≤2°. The cliffs along the shoreline are parallel with the eroded Beaumaris Monocline, which has a seaward (SE) average dip angle of 10–20°. The base of the rock sequence at Beaumaris consists of middle Miocene (~10 million years old) Fyansford Formation, which is overlain by a thin (ca 20cm thick) phosphatic nodule bed at the base of the Beaumaris Sandstone, which has a maximum thickness of about 15 m. The clayey limestone of the Fyansford Formation is not exposed in onshore outcrop, and only in limited areas on the sea bed close to shore where it is covered by beach sand. The phosphatic nodule bed at the base of the Beaumaris Sandstone consists of phosphatic and limonite nodules and mollusc shells, together with resistant and usually isolated and abraded vertebrate remains (e.g., teeth, vertebrae, ribs, cetacean ear bones) within a quartz-rich sandy matrix. The nodule bed is only exposed at low tide and on the Mentone (NE) side of the current premises of the Beaumaris Motor Yacht Squadron. The succeeding 6.7 metres of Beaumaris Sandstone consists of fossil-rich fine calcareous sands and silts, commonly burrowed and containing mollusc and echinoid-(especially Lovenia) rich layers. The top 8.5 m of the Beaumaris Sandstone comprises iron-rich sandstone containing burrows but no carbonate. The Beaumaris Sandstone was deposited in a shallow marine sandy shoreface environment.

The basal nodule bed and overlying 6.7 m of the Beaumaris Sandstone at constitutes the type section of the Cheltenhamian southeast Australian geological stage, which was originally correlated with the upper Miocene of international use. More recently, microfossils from the Beaumaris Sandstone have indicated that the sediments were laid down during the latest Miocene epoch, or about 4.5–6.5 million years ago. Strontium isotope dating of the basal nodule bed and overlying 5 m of Beaumaris Sandstone give ages of 6.2 million years ago (within basal nodule bed) to 4.9 million years ago (at 4.3 m high in the cliffs). These dates show that the Beaumaris Sandstone and its fossil fauna is between about 6 and 5 million years old, dating to the very end of the Miocene epoch and the beginning of the Pliocene epoch on the Geological Timescale.

Acknowledgments

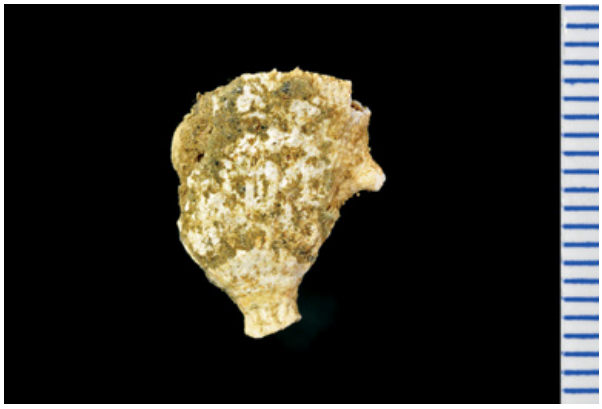
We thank: Dr Vicki Karalis and the Sandringham Foreshore Association for inspiring the development of this publication as well as for direct assistance in the photography of fossils at Museum Victoria; and generations of keen fossil hunters who have saved their discoveries for science and public enjoyment by donating their finds to Museum Victoria.

Fossils of Beaumaris
By Erich Fitzgerald and Rolf Schmidt, Museum Victoria
Scale bars in all photos are in cm.

Phylum Cnidaria

Order: Scleractinia (corals)

Family Flabellidae



Flabellum gambierense, Gambier fossil coral

Flabellum gippslandicum, Gippsland fossil coral

Placotrochus deltoideus, Fossil coral

Family Carophyllidae

***Deltocyathus* sp.,** fossil coral

***Trochocyathus* sp.** fossil coral

Family Montlivaltiidae

***Montlivaltia* sp.** fossil coral

Family Fungiidae

Bathyactis beaumariensis fossil coral

Phylum Brachiopoda
(lamp shells)

Family Terebratulidae

Anakinetica tumida fossil brachiopod

Phylum Bryozoa
(moss animals, lace corals)

Order Cheilostomata

Family Lepraliellidae

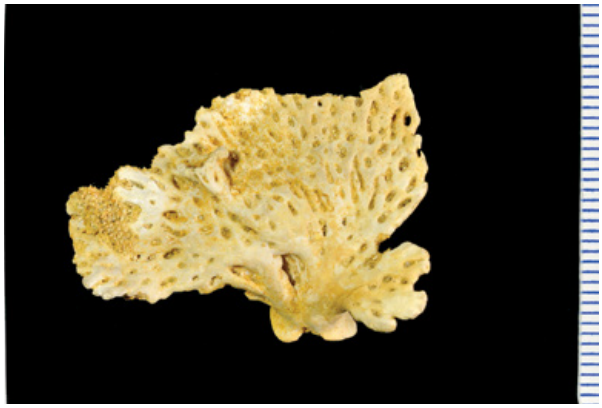
Celleporaria nummularia, fossil lace coral

Family Porinidae

Porina sp. fossil lace coral

Order Cyclostomata

Family Horneridae



Hornera foliacea fossil lace coral

Phylum Mollusca
(molluscs)

Class Bivalvia (bivalve shells)

Family Cucullaeidae (false arc shells)

Cucullaea corioensis

Cucullaea corioensis

Family Limopsidae

Limopsis beaumariensis

Family Corbulidae (basket clams)

Notocorbula ephanila

Family Glycimeridae (dog cockles)

Tucetona convexa

Family Pholadiae (piddocks or angelwings)

Barnea tiara

Family Carditidae

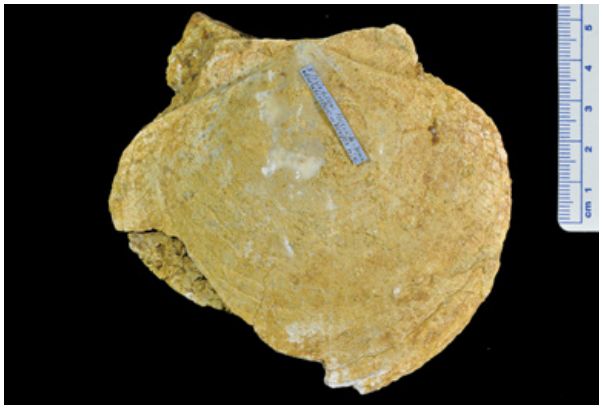
Glans kalimnae

Family Pectinidae (scallops)

Mesopeplum divergens

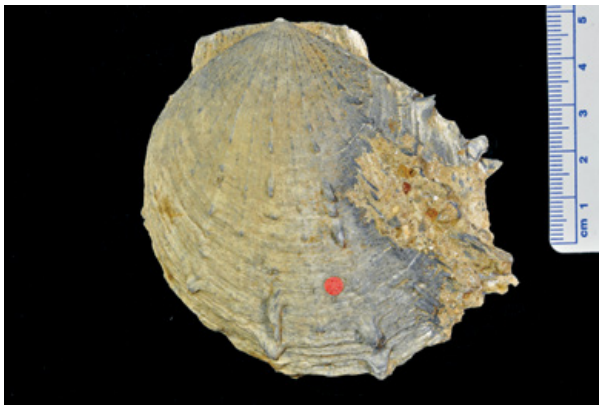
Family Crassatellidae

Eucrassatella eupontica



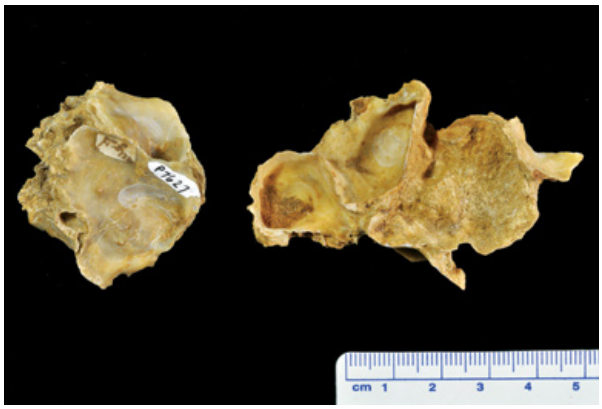
Serripecten yahlensis

Family Spondylidae



Spondylus baileyana

Family Ostreidae (oysters)



Lopha hyotidoidea

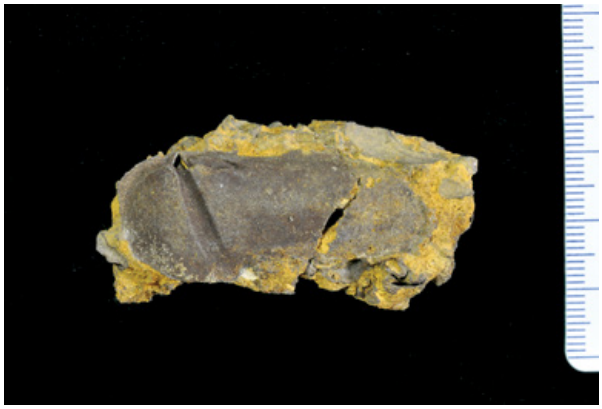
Ostrea manubriata

Family Trigoniidae

Neotrigonia acuticostata

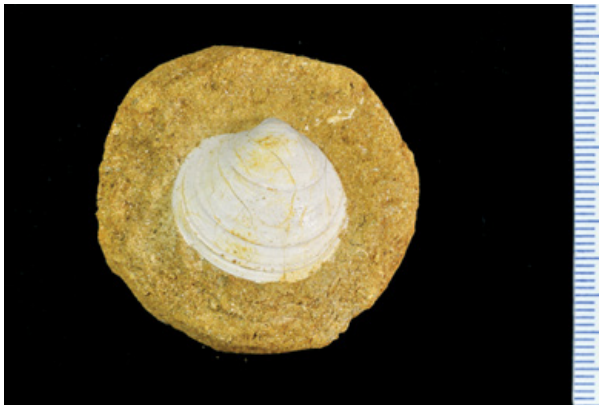
Family Mactridae

Mactra hamiltonensis



Zenatiopsis phorca

Family Veneridae



Kereia johnstoni

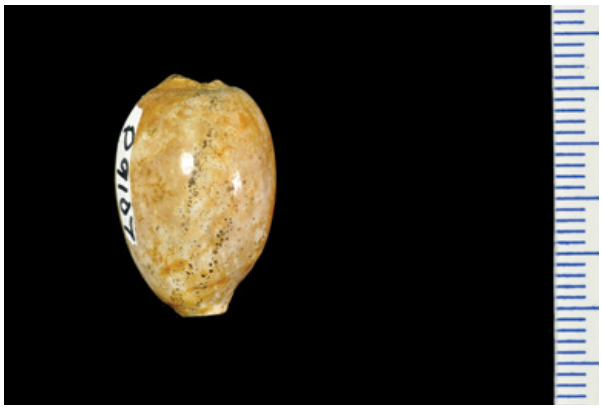
Proxichione moondarae

Class Gastropoda

Family Cypraeidae (cowries)

Umbilia hesitata

Umbilia hesitata



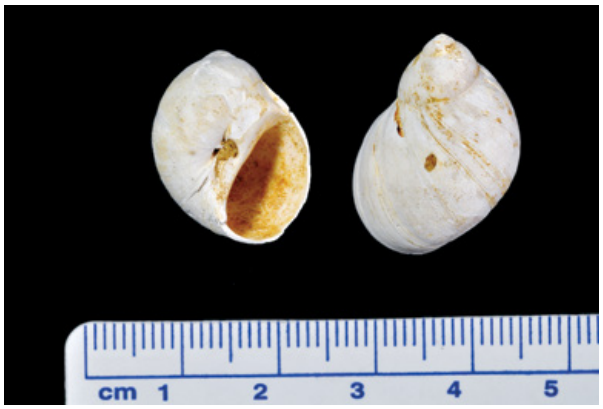
Austrocypraea subsidua

Austrocypraea subsidua

Family Turritellidae (tower shells)

Gazameda victoriensis

Family Naticidae (moon snails)



Polinices subvarians

Family Dentaliidae (tusk shells)

Fissidentalium mantelli

Laevidentalium lacteolum

Laevidentalium largicrescens

Class Cephalopoda (squids and octopus)

Family Nautilidae (chambered nautilus)

Aturia coxi

Phylum Echinodermata

Class Echinoidea

Family Arachnididae (sand dollars)

Monostychia loveni

Fellaster incisa

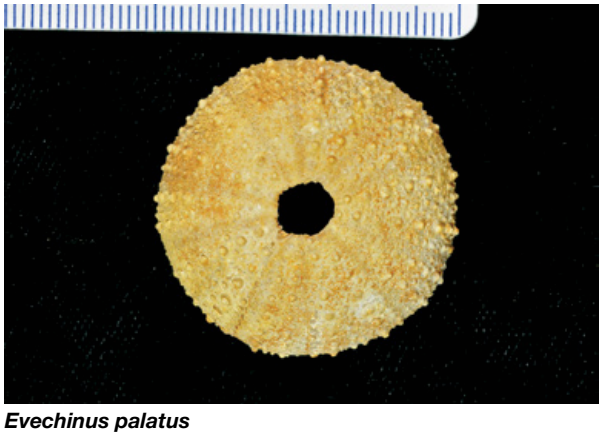
Family Clypeasteridae (sand dollars)

Clypeaster gippslandicus

Family Loveniidae (heart urchins)

Lovenia woodsi

Family Echinometridae (regular urchins)



Evechinus palatus

Phylum Arthropoda

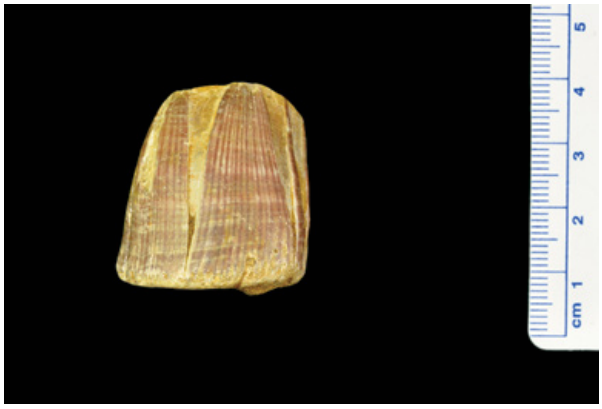
Class Crustacea (crabs, lobsters and barnacles)

Family Goneplacidae

Ommatocarcinus corioensis, crab

Family Balanidae (barnacles)

Austromegabalanus victoriensis



Balanus decorus

Phylum Chordata
(animals with a notochord, including vertebrates)

Class Chondrichthyes (sharks and rays)

Family Heterodontidae

Heterodontus cainozoicus fossil Port Jackson shark, crushing tooth plates

Family Orectolobidae (wobbegong sharks)

Orectolobus, wobbegong shark tooth

Order Lamniformes (mackerel sharks)

Lamniformes sp. mackerel shark vertebrae

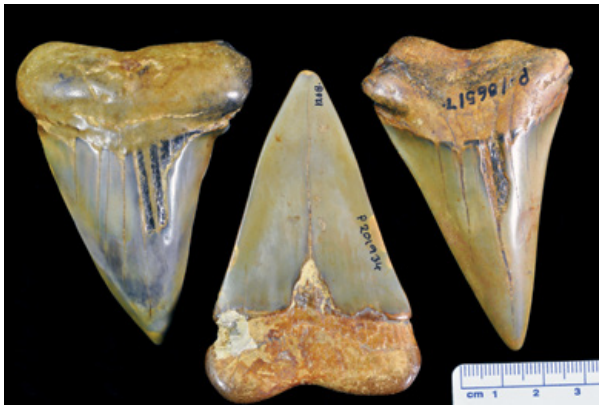
Lamniformes sp. articulated mackerel shark vertebrae

Isurus oxyrinchus shortfin mako tooth

Family Lamnidae

Carcharodon carcharias, white shark tooth

Carcharodon hastalis, extinct white shark lower tooth

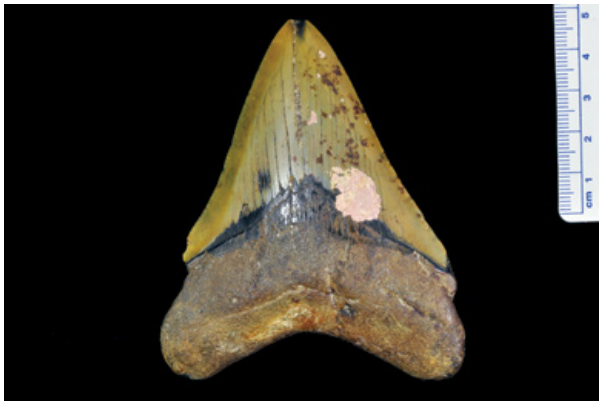


Carcharodon hastalis, extinct white shark upper teeth

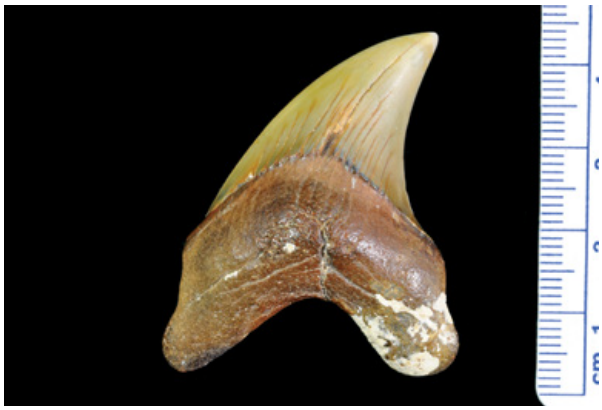
Family Odontaspididae

Carcharias taurus, grey nurse shark tooth

Family Otodontidae



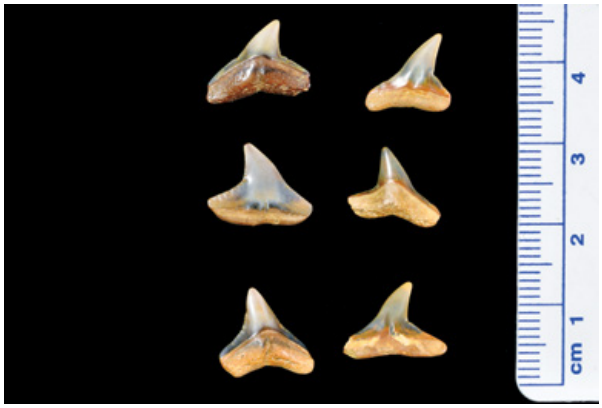
Carcharocles megalodon, megatooth shark tooth



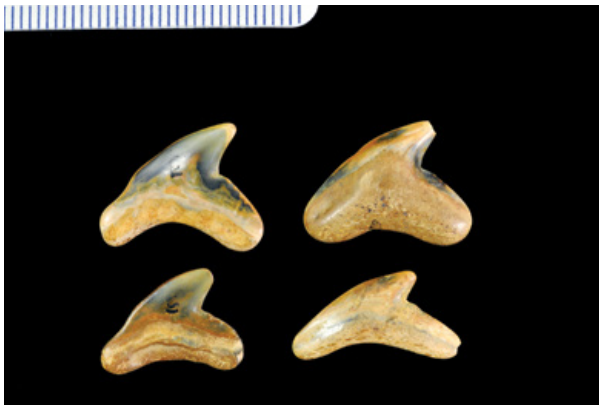
Parotodus benedeni, false mako shark tooth

Order Carcharhiniformes (ground sharks)

Family Carcharhinidae (whaler sharks)



Carcharhinus brachyurus, bronze whaler shark teeth



Galeocerdo, tiger shark teeth

Order Pristiformes (sawfish)

Family Pristidae

Pristis, sawfish rostral tooth

Order Myliobatiformes (stingrays)

Family Myliobatidae

Myliobatis, eagle ray, tooth plates

Myliobatis, eagle ray, base of tail stinger

Order Chimaeriformes (chimaeras)

Family Callorhincidae

Edaphodon sweeti extinct giant chimaera, tooth plates

Class Actinopterygii (ray-finned bony fish)

Actinopterygii sp. bony fish jaw

Actinopterygii sp. bony fish jaw bone fragments

Actinopterygii sp. large bony fish dorsal fin spine

Actinopterygii sp. large bony fish vertebrae

Order Tetraodontiformes

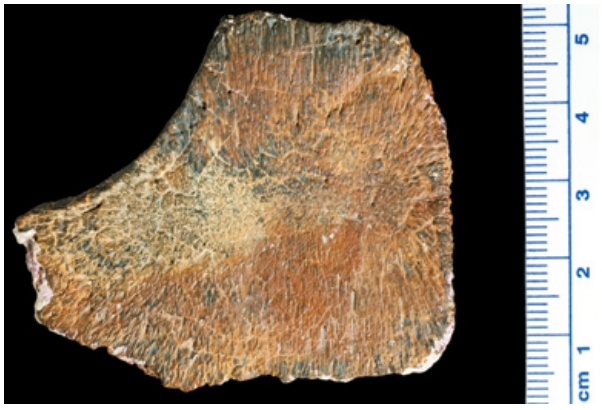
Family Diodontidae (toadfishes)

Diodon formosus, extinct toadfish crushing tooth plates

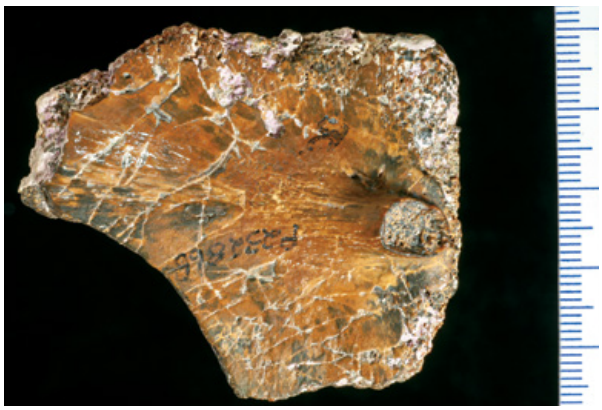
Class Reptilia (reptiles)

Order Testudines (turtles and tortoises)

Family Cheloniidae (hard-shelled sea turtles)



Cheloniidae sp. extinct sea turtle shell bone in external view



Cheloniidae sp. extinct sea turtle shell bone in internal view

Class Aves (birds)

Order Sphenisciformes (penguins)

Family Spheniscidae

Spheniscidae sp. extinct penguin humerus (upper wing bone)

Spheniscidae sp. extinct penguin wing bones

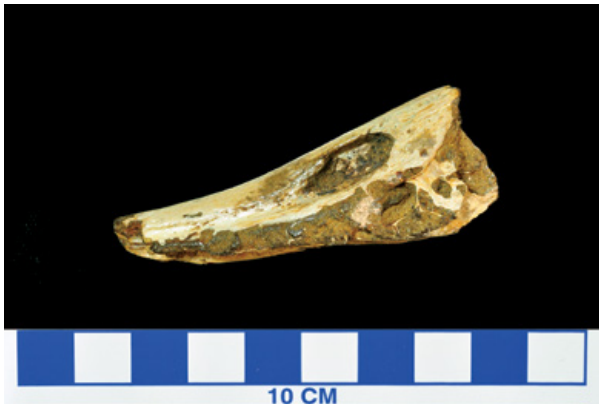
Order Odontopterygiformes (bony-toothed birds)

Family Pelagornithidae

Pelagornis sp. extinct giant bony-toothed bird tibiotarsus (shin bone)

Order Procellariiformes (tube-nosed seabirds)

Family Diomedeidae (albatrosses)



Diomedea thyridata, extinct albatross beak

Order Anseriformes (waterfowl)

Family Dromornithidae (thunder birds)

Dromornithidae sp., thunder bird partial tarsometatarsus (ankle bone)

Class Mammalia (mammals)

Order Diprotodontia (marsupials with two front teeth)

Family Diprotodontidae (giant quadrupedal herbivorous marsupials)

Kolopsis torus lower jaw bone with molar teeth in external view. Fossil is 13cm long.

Order Carnivora (cats, dogs, bears, weasels, seals)

Family Phocidae ('earless' seals)

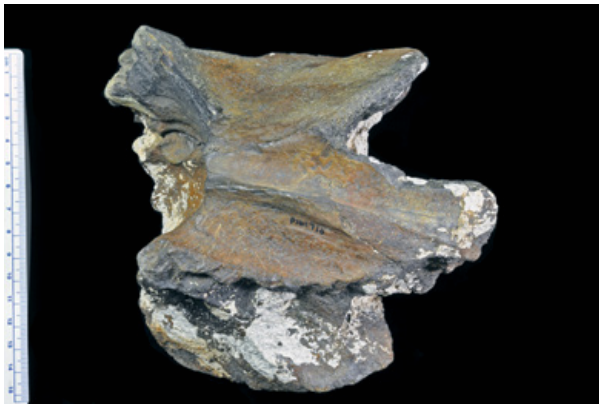
Phocidae sp. seal temporal bone (ear region of skull)

Phocidae sp. seal metatarsal (hindflipper bone)

Order Cetacea (whales, dolphins, porpoises)

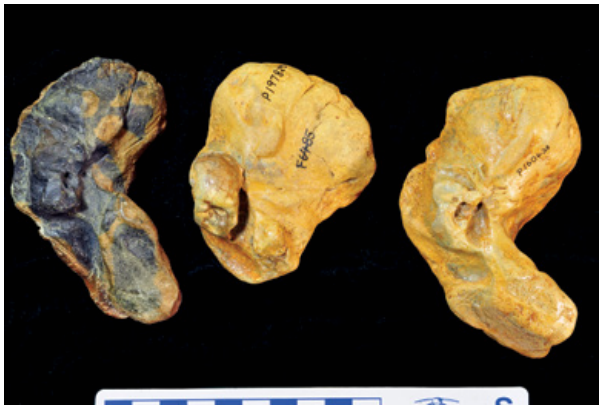
Cetacea sp. bone fragments from unidentified whales. The longest piece of bone is 22cm long.

Suborder Mysticeti (baleen whales)



Mysticeti sp., part of the cranium of a baleen whale

Mysticeti sp., eroded tympanic bullae (outer ear bones) of baleen whales



Mysticeti sp., periotics (inner ear bones) of baleen whales

Mysticeti sp., front section of the lower jaw of a baleen whale

Mysticeti sp., rear section of the lower jaw of a baleen whale

Suborder Odontoceti (toothed whales)

Superfamily Physeteroidea (sperm whales)

Physeteroidea sp., extinct sperm whale, front end of lower jaws measuring 27cm long.

Physeteroidea sp., extinct sperm whale teeth.

Family Ziphiidae (beaked whales)

***Mesoplodon* sp.**, rostrum (upper jaw or beak) of a beaked whale, measuring 31cm in length.

Superfamily Delphinoidea (dolphins and porpoises)

Delphinoidea sp. dolphin or porpoise tympanic bullae (outer ear bones)

Delphinoidea sp. dolphin or porpoise periotics (inner ear bones)

Delphinoidea sp., dolphin or porpoise lower jaws

Delphinoidea sp., dolphin or porpoise teeth

Delphinoidea sp., dolphin or porpoise humerus (upper forelimb bone)

Pseudofossils and other structures

Phosphate nodules

Ironstone structures, including ferruginised fossils and burrow casts


MUSEUMVICTORIA