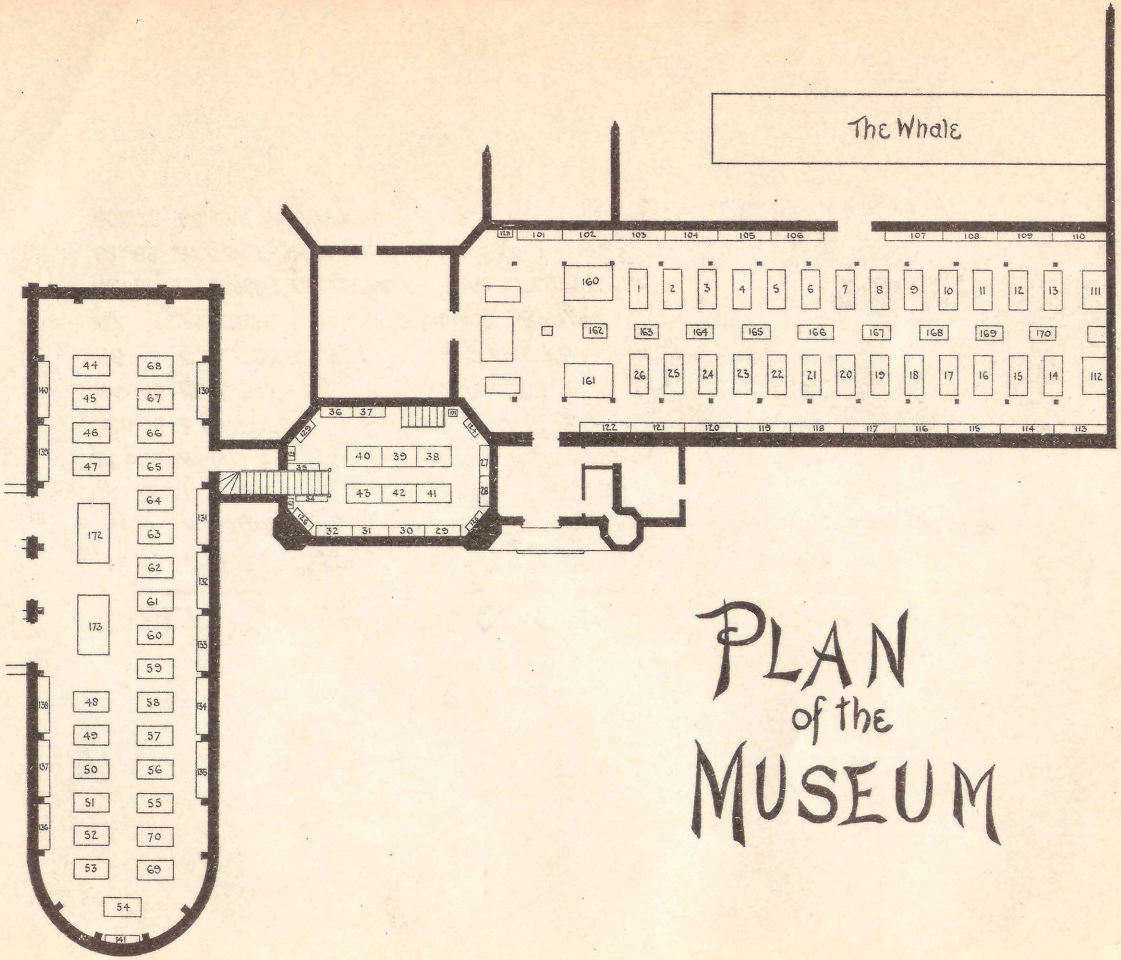
GUIDE TO THE W.A. MUSEUM & ART GALLERY

1900



PLAN of the MUSEUM

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GUIDE

TO THE CONTENTS OF THE

WESTERN AUSTRALIAN MUSEUM

AND

ART GALLERY

WITH A LIST OF THE

WESTERN AUSTRALIAN MARSUPIALS AND BIRDS

IN THE COLLECTIONS.

PRINTED BY ORDER OF THE COMMITTEE.

PERTH.
1900.

Perth :
Printed by AMES & HELLER,
184 Barrack Street.
1900.


THE MUSEUM
Bernard H. Woodward F.G.S.
Curator.
ZOO-GEOGRAPHICAL
PROVISIONAL SKETCH
MAP OF
WESTERN AUSTRALIA
1900
Scale of Miles
N.
N.W.
S.W.
C.
REFERENCE
N. Tropical rains, November to March 20 to 30 inches.
N.W. Uncertain rainfall, occasional torrential downpours, occasional winter rains, occasional protracted droughts, 7 to 12 in.
S.W. Regular winter rains May to October 13 to 40 in.
C. Dry district. Occasional thunder storms and sometimes the winter rains extend inland from the S.W. 5 to 10 in.
INDIAN OCEAN
SOUTHERN OCEAN
GREAT AUSTRALIAN BIGHT
SOUTH AUSTRALIA
Longitude 121° East from Greenwich

TABLE OF STRATIFIED ROCKS.

(as adopted in the British Museum)

Periods.	SYSTEMS.	FORMATIONS.	LIFE-PERIODS.
CAINOZOIC. Quaternary.	**RECENT**	Terrestrial, Alluvial, Estuarine, and Marine Beds of Historic, Iron, Bronze, and Neolithic Ages	Range of Invertebrata and Plants in time; Range of Fishes in time; Range of Amphibia and Reptilia in time; Range of Birds in time; Range of Mammalia in time — Dominant type, Man.
	PLEISTOCENE (250 ft.)	Peat, Alluvium, Loess Valley Gravels, Brick-earths Cave-deposits Raised Beaches Palæolithic Age Boulder-clay and Gravels	
CAINOZOIC. Tertiary.	**PLIOCENE** (100 ft.)	Norfolk Forest bed Series Norwich and Red Crags Coralline Crag (Diestian)	Dominant types, Birds and Mammals.
	MIOCENE (125 ft.)	Œningen Beds Fresh-water, etc.	
	EOCENE (2,600 ft.)	Fluvio-marine Series (Oligocene) Bagshot Beds } (Nummulitic Beds) London Tertiaries }	
SECONDARY OR MESOZOIC.	**CRETACEOUS** (7,000 ft.)	Maestricht Beds Chalk Upper Greensand Gault	Dominant type, Reptilia.
	NEOCOMIAN	Lower Greensand Wealden	
	JURASSIC (3,000 ft.)	Purbeck Beds Portland Beds Kimeridge Clay (Solenhofen Beds) Corallian Beds Oxford Clay Great Oolite Series Inferior Oolite Series Lias	
	TRIASSIC (3,000 ft.)	Rhætic Beds Keuper Muschelkalk Bunter	
PRIMARY OR PALÆOZOIC.	**PERMIAN or DYAS** (500 to 3,000 ft.)	Red Sandstone, Marl } Zechstein Magnesian Limestone, etc. } Red Sandstone and Conglomerate Rothliegende	Dominant type, Fishes.
	CARBONIFEROUS (12,000 ft.)	Coal-measures and Millstone Grit Carboniferous Limestone Series	
	DEVONIAN AND OLD RED SANDSTONE (5,000 to 10,000 ft.)	Upper Old Red Sandstone Devonian Lower Old Red Sandstone	
	SILURIAN (3,000 to 5,000 ft.)	Ludlow Series Wenlock Series Llandovery Series May Hill Series	
	ORDOVICIAN (5,000 to 8,000 ft.)	Bala and Caradoc Series Llandeilo Series Llanvirn Series Arenig and Skiddaw Series	Dominant type, Invertebrata.
	CAMBRIAN (20,000 to 30,000 ft.)	Tremadoc Slates Lingula Flags Menevian Series Harlech and Longmynd Series	
	EOZOIC—ARCHÆAN (30,000 ft.)	Pebidian, Arvonian, and Dimetian Huronian and Laurentian	

THE COMMITTEE

OF THE

WESTERN AUSTRALIAN MUSEUM AND ART GALLERY

(Nominated by the Government).

1895.

Hon. Sir JAMES G. LEE STEERE, K.C.M.G., M.L.A., Speaker, Legislative Assembly (Chairman).

Hon. Sir GEORGE SHENTON, Kt., M.L.C., President, Legislative Council.
Hon. J. W. HACKETT, M.A., M.L.C.
CHARLES HARPER, Esq., M.L.A.
H. F. HARVEY, Esq., M.R.C.S., L.S.A.
M. F. A. CANNING, Esq., J.P.

1899.

Hon. H. B. LEFROY, M.L.A., MINISTER OF MINES.
His Honor the CHIEF JUSTICE, Sir A. C. ONSLOW.

CURATOR AND SECRETARY:
BERNARD H. WOODWARD, F.G.S., F.I.I.

The Museum is open to the Public every Weekday (except Monday) from 10 a.m. to 5 p.m. Monday is reserved for cleaning in the morning, and in the afternoon for Students (permission to be obtained from the Curator) who desire to copy the Works of Art, or make drawings of the Natural History Specimens.

It is open on Sundays from 2.30 to 5.

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PREFACE.

In offering this Guide, I desire to emphasize the fact, that it is simply, that which its title denotes. It is not a Text-Book of Science or Art; neither is it a Catalogue, for such a work would fill a thousand pages were only a couple of lines devoted to each object exhibited.

It is an attempt to answer the questions frequently put by visitors, and it will, I trust, induce them to study some of the works, of which a list is appended, so that they may gain fuller knowledge of the subjects mentioned.

I desire to place on record my indebtedness to the authors of these books, and more especially to Sir William Flower, Mr. R. Lydekker, Dr. Henry Woodward, Mr. Oldfield Thomas, and Dr Bowdler Sharpe.

More than a third part of the collections are, for want of space, unable to be exhibited. This will soon be remedied, for in April last the Chairman and the Committee waited upon the Right Hon. Sir John Forrest, K.C.M.G., and represented to him the overcrowded state of the Galleries, the number of specimens awaiting space for their exhibition, and especially the need of an Art Gallery, for the paintings and other works of art are now exhibited in a remnant of the old buildings designed for quite another purpose, and totally unsuitable for the purpose of an Art Gallery. The Premier expressed his approval, and promised to bring the question before Parliament next session. Consequently it may be considered certain that within a few months the building of an Art and another Zoological Gallery will be commenced, for Sir John knows the practical value of science to the community, and it is to him that our thanks are in a great measure due, for the rapid progress that has been made within recent years, for had he not so enthusiastically and so successfully advocated the granting of funds by Parliament, the Committee would not have been able to have achieved as much as they have already done in the cause of Technical Education.

BERNARD H. WOODWARD,
Curator and Secretary.

The Museum,
19th May, 1900.

CORRIGENDA.

PAGE.

5. Line 7 from bottom, read "which guarded."
6. Line 16 from bottom, for "colonades" read "colonnades."
8. Line 2 from bottom, for "116" read "161."
9. No. 34 should read, "Lucretia Borgia, a daughter of Roderigo Borgia, who afterwards entered the Church, and eventually became Pope as Alexander VI."
19. Line 2 from bottom, for "antient" read "ancient."
23. Line 12 from top, for "haphasard" read "haphazard."
27. In top line, read "the pointed end."
31. Line 16 from top, read "Articulata (Annulosa)."
31. Line 21 from top, for "Protoza" read "Protozoa."
31. Line 26 from top
33. Line 24 ,, ,, } For "Ornithorhyncus" read "Ornithorhynchus."
40. Line 14 from bottom, for "Vieuna" read "Vicuna."
46. Line 11 from bottom, for "Acrobatus" read "Acrobates."
56. Line 15 from bottom, for "longrostris" read "longirostris."
68. Line 21 from bottom, for "Aptenodptes" read "Aptenodytes."
82. Lines 14 and 21 from top, for "Cephalapoda" read "Cephalopoda."
86. Line 18 from top, for "Mantides" read "Mantides."
89. Line 18 from top, for "first" read "simplest."
92. Line 3 from top, for "aspects" read "respects."

WEST AUSTRALIAN MUSEUM AND ART GALLERY.

Historical Introduction.

In the year 1860 a number of the residents of this Colony resolved to establish a Museum, and for that purpose opened a subscription list, obtaining altogether the large sum of £340 19s. 11d., for it must be borne in mind that 40 years ago the population was small and far from wealthy, the Government contributing £200, the Governor, the Bishop, and Mr. Shenton giving £10 each, and others following, according to their ability, with sums varying from 2s. 6d. to £5. The list is a long one, showing how general was the interest taken in the movement.

To the Surveyor-General, Captain John Septimus Roe (1797-1878), must be accorded the chief place in the work, for he, in addition to subscribing, gave valuable collections, and devoted much time to their arrangement. An account of his life, published by a Literary Society in Paris in 1878, states that he was one of the early explorers who, in spite of the greatest privations, and at the peril of their lives, by their courage and determination achieved the vast and important results attained by the colonisation of Australia by the English; that he was a man of very extensive scientific attainments, whose botanical and mineralogical collections added considerably to the knowledge of those sciences, and that it is owing to him that the first Museum in Western Australia was inaugurated.

This Museum was attached to the Swan River Mechanics' Institute until 1892, when the Government purchased the collections for £400.

The Museum dates its actual formation on its present site from the year 1889, when the contents of the Fremantle Museum, on being transferred to the charge of Mr. Harry P. Woodward, F.G.S., the Government Geologist, were removed to the large room in the Auxiliary Government Offices, formerly used as the High Court of Justice (now the Ethnological Gallery).

The Fremantle Museum was started in 1881, at the suggestion of His Excellency, Sir William C. F. Robinson, K.C.M.G., by the Rev. C. G. Nicolay, Registrar of Minerals. The use of the old Guard Room having been granted for the purpose, he there arranged and added largely to the geological collections made by Dr. F. Von Sommer; by Messrs. Gregory Bros.; by Mr. H. Y. L. Brown, F.G.S. (now Government Geologist of South Australia); by the late Mr. E. T. Hardman, F.R.G.S.I., who was Government Geologist in 1882-3. Mr. Nicolay also held, incorporated with

these, portions of the Melbourne and London collections, to which further reference will be made; and a number of native weapons.

Mr. Bernard H. Woodward, who was appointed in September, 1889, Curator to the Geological Department, re-arranged these collections with those of the Government Geologist, and placed on loan his extensive collection of minerals. He was appointed Curator of the Geological Museum in January, 1891, by His Excellency the Governor in Executive Council.

The Museum was formally opened on the 9th September, 1891, by His Excellency the Governor, Sir W. C. F. Robinson, K.C.M.G., as the Geological Museum. This title was abbreviated by the omission of the word "Geological," in June 1892, when the Government purchased the Museum from the Swan River Mechanics' Institute, as that contained Zoological, Botanical, and Ethnological, as well as Geological specimens; these latter contained the larger portion of the four special collections of minerals, ores, and rocks, (1) exhibited in Sydney in 1873; (2) (arranged by Mr. H. E. Victor, C.E.), at Paris, 1878; (3) at the Melbourne Exhibition, 1880; (4) at the Colonial and Indian Exhibition, 1886, portions of which, as before mentioned, had been received with the Fremantle specimens.

In 1891 the specimens were returned, which had been lent to the Mining and Metallurgical Exhibition at the Crystal Palace, London, 1890, when Western Australia took the third place among the British Colonies for specimens of mining interest. The Museum at the same time was enriched by donations from the Directors of Mining Companies and others, of a large number of specimens which had been on view at that Exhibition.

In 1892 the Commissioner of Police (Colonel Phillips) deposited in the Museum the native weapons and implements that had been collected by the police.

In 1895 the Zoological Gallery was erected, at a cost of £2,000, and the control of the Museum was transferred from the Hon. the Minister of Mines to a Committee, consisting of the following :—The Honourable Sir James G. Lee-Steere (Chairman), His Honour Mr. Justice Stone, the Honourable Sir George Shenton, the Honourable J. W. Hackett, Dr. H. F. Harvey, Messrs. J. C. H. James, M. F. A. Canning and Charles Harper. On the 31st of July, 1895, the new gallery was opened by His Excellency the Administrator, Sir Alexander Onslow. At this date the Art Gallery was founded. The Government increased the annual grant from £200 to £4000 per annum, at which amount it remained until 1898-99, when it was reduced to £3,000, but for 1899-1900 it was increased to £3,500.

The foundation stone of the wing facing James Street was laid by His Excellency the Governor, Colonel Sir Gerard Smith, K.C.M.G., on the 21st June, 1897.

In 1897 Parliament voted a sum for additional buildings, of which this wing, costing £20,000 (the ground floor of which is

temporarily in the occupation of the Victoria Public Library), was completed in September, 1898, but not until the 19th June, 1899, was the Gallery on the first floor declared provisionally open by His Excellency, owing to the long time taken in supplying the cases, which were only completed on the 17th June.

General Arrangement of the Museum.

The Museum is entered for the present from Beaufort Street. The arrangements, pending the completion of the buildings, are as follows :—Visitors on entering from Beaufort Street find themselves in the vestibule. The door facing the entrance leads into the Zoological Gallery, in which are exhibited the Mammals and Birds, and temporarily the Minerals. The doors at the south end open into the Art Gallery. The Ethnological Gallery is on the first floor, and is entered by the south door of the vestibule, while the Zoological Invertebrate Gallery, on the first floor of the new wing, is reached through this gallery. It contains, for the present, the Reptiles, Amphibia, and Fish, the Fossil Vertebrates, and the Botanical specimens, in addition to the Recent and Fossil Invertebrates These will be rearranged as soon as the ground floor is available ; that is to say, when the further permanent buildings, for which the Committee has asked, are erected, for then all the vertebrate collections will be placed in the Zoological Gallery, and the Minerals and Rocks will have a special room.

At the present time the various collections of objects of Art, of Ethnology, and of Natural History have had to be arranged in the manner best suited to their display in the limited space available, rather than in strict accordance with scientific order.

The Museum.

The word "Museum" is derived from the Greek *Mouseion*, the name for the Temple of the Muses, the Goddesses of Song, of Poetry, of the Arts and Sciences.

Professor Huxley describes a Museum as a "consultative library of objects, where people can see for themselves the things of which they read in books."

Professor W. H. Flower says that "the real objects of forming collections are two, which may be briefly called research and instruction."

Professor Ruskin states that "the first function of a Museum is to give an example of perfect order and perfect elegance."

A Colonial Museum has, in addition to being the chief centre of technical education, to be also the SHOW-ROOM of the raw commercial products of the country. Hence the prominent position and space given the Minerals.

The collections in this Museum are arranged in three sections, viz., Art, Ethnology, and Natural History.

Section I. ART.—Architecture, Sculpture, and Painting.

Section II. ETHNOLOGY.—The study of the history of man, or more fully of the rise and progress of civilization, as exemplified by the works of man.

Section III. NATURAL HISTORY.—This term is used to describe all the processes or laws of the Universe and the results of those processes or laws upon the materials of which it is composed, which are independent of the agency of Man.

ART.

Art is a creation of the human brain. It is not a mere transcript from nature, but must contain an expression of thought.

The reason, that casts from the Antique and copies of Old Masters are included in the collection, is that the originals are unobtainable, and consequently by these alone can the general public be given an opportunity of learning the nature of true art, through the contemplation of works of the highest excellence.

ARCHITECTURE is at present only represented by casts of the columns and capitals of the five great orders of Greeks, viz., Tuscan, Doric, Ionic, Corinthian, and Composite.

SCULPTURE (Lat. *Sculpo*, I carve) comprises all carved work belonging to ornamental art.

The earliest art in the Gallery is represented by casts from Syrian, Egyptian, Greek, and Roman sculptures, showing the two extremes of the art. The Syrian is mainly interesting from an artistic point of view as showing sculpture in its infancy with its first rude impression of anatomy. But in the Greek and Roman sculptures, especially in the former, we see sculpture carried to a state of perfection that has never been surpassed, if ever equalled, for as in architecture, so also in sculpture the Greeks have ever acted as the guide and foundation of all that we, in our present age of progress, love and revere for beauty of form and conception. They did not recognise a man as an artist, however great his technical skill, unless his works gave expression to noble thoughts and feelings.

SCULPTURE.

Egyptian Art is represented by a cast from the black granite seated statue of the Pharoah Amenhetep or Amenophis III., the sixth sovereign of the 18th Dynasty, B.C. 1500-1466. The original from Thebes is in the British Museum. In this monarch's reign Egyptian art attained its highest development. Its characteristic is perfect calm.

ROSETTA STONE. Size 39in. x 30in.

The original, which is now in the gallery of Egyptian Antiquities in the British Museum, was discovered in 1799 in the little town of Rosetta (Rasheed of the Arabs), in the delta of the Nile.

It is a thick, irregular-shaped slab of hard, black basalt, on the surface of which is an inscription in three languages—Egyptian hieroglyphics, Demotic, and Greek. A translation of the Greek shows that it was an act of the priests assembled in Synod at Memphis, B.C. 196-197, in honor of the King Ptolemy Epiphanes, in the ninth year of his reign ; and, after reciting the events of the period, the ancestry of the king, his troubles in higher Egypt, the decease of Ptolemy Philopates, the attack of Antiochus, the suppression of rebellion, the remission of taxation, and the gifts to Apis and Mnevis and the sacred animals, proceeds to order that a figure of the king should be placed in the temples ; that a shrine should be placed with the other shrines and be carried in procession on a special festival in honor of the King on the 30th Mesori, his birthday ; and above all, that a copy of this synodical act should be engraved on a tablet of hard stone in sacred characters (hieroglyphics), in writing of the country, and in Greek letters, and set up in every temple of the first, second and third rank throughout the country.

The greatest interest centering in this tablet is that it gave the first clue to the hieroglyphics. The three texts of this inscription telling the same story, together with the obelisk of Philæ, rendered the translation of the heretofore unreadable hieroglyphics comparatively simple. A translation is placed beside the cast.

[This exhibit belongs properly to the Ethnological collections.]

Assyrian Art (B.C. 1820-609) is nearly all in bas-relief, and in it truth is sacrificed to the idea of strength. The Winged Lion and Bull, allegorical emblems of strength and power, guarded the entrance of the palace of Nineveh, are casts of the yellow limestone originals now in the British Museum. They were discovered by Layard in 1846 at Nineveh. The cuneiform inscriptions record the wars of Ashur-Nasir-Pal, King of Assyria, B.C. 885-860.

7. A bas-relief of horseman flying before the Assyrians. Date about B.C. 820. Cast from a stone slab in the British Museum.

Greek Art. In studying the rise and development of Greek Art, the designs on the coins should be compared with the statues of the time. The coins are usually divided into seven periods, as under :—

I.	Archaic (Ancient) Art ...	B.C. 700-480
II.	Transitional, or Early Fine Art	480-400
III.	Finest Art	400-336
IV.	Later Fine Art	336-280
V.	Decline of Art	280-190
VI.	Further decline of Art ...	190-100
VII.	Late decline of Art	100-1

A selection of electrotypes taken from the finest coins in the British Museum is hung on the wall. The great advantage of electrotypes is that the exact *fac-similes* of the best specimens in existence can be obtained ; and further, that both the obverse and and reverse can be seen side by side.

The Committee intend to obtain, as soon as practicable, specimens of the coins of each of these Periods, as yet only No. 3—the Period of the Finest Art—is represented, the Period of Scopas and Praxiteles, whose sculptures should be compared with the designs on the coins, for many of these were taken from the statues. This was the Age of the Spartan and Theban supremacies. Full descriptions of these coins are framed beside them.

One of the most wonderful of the great works achieved by Greek artists was that triumph of Doric Architecture, the Parthenon, or Temple of Athena (Minerva of the Romans), situated on the Acropolis, the highest part of the city of Athens. It was built by Pericles, B.C. 400, from the designs of the architects Ictinos and Kallicrates, on the site of the former temple, which had been destroyed by the Persians. It was adorned with sculpture, under the direction of Pheidias. Round the Temple, under the colonades, was the frieze representing the procession of the citizens to the shrine of the Goddess ; outside the columns, above the architrave, were the bas-reliefs representing fights with the centaurs. This work of Pheidias, the greatest of the Greek sculptors, is represented by two casts from marbles in the British Museum, one (No. 8) is a bas-relief from the Western Frieze, and the other (No. 19, Iris) a messenger of the Gods, from the Eastern Pediment. She is represented as floating down from Olympos, the abode of the Gods. This temple was destroyed by the Venetians in 1687.

20. KARYATID OF THE PANDROSEION, B.C. 406. Marble, British Museum. The portico of the Ionic temple of the Erechtheion is supported by the figures of six maidens, commonly called Karyatids. The knee is a little bent, to give some life and grace to the figure without destroying its architectural character. The dress is Attic.

N.B.—The casts are numbered in the order of their acquisition, but arranged according to their dates or subjects as far as practicable.

6. DISKOBOLOS AFTER MYRON. Cast from the marble in the Vatican, which is a copy of the original bronze. Myron, a contemporary of Pheidias, and also a pupil of Ageladas of Argos, has chosen a moment of pause between two energetic actions, when the disc-thrower was concentrating all his energies in a supreme effort. B.C. 440. Restorations: Left arm, left leg, and right hand.

2. APHRODITE (Venus of the Romans), of Knidos. A cast from the marble by Praxiteles, in the Vatican, B.C. 364. Restorations: Left arm and right forearm, the left leg from knee and the right foot.

18. VENUS DE MILO, OR MELOS. Cast of marble statue in the Louvre, found in 1820 in the Island of Melos. This noblest of all the representations of the Goddess of Love, in which the perfect beauty of the woman is made subordinate to the dignity and majesty of the Goddess, has been attributed to Pheidias, to Scopas, and others. It is most probably of the later Alexandrian period.

3. THE APOXYOMENOS. Cast from the marble in the Vatican, which is a copy of the bronze of Lysippos, brought to Rome from Greece by Agrippa. It represents a young athlete in the act of scraping himself with a "strigil" after a contest, in which, from the expression of the face, he has been victorious. The graceful attitude is full of change, as necessarily follows from the nature of his occupation. B.C. 350.

1. APOLLO. Greek Marble, British Museum. One of the great divinities of the Greeks. He was the God of Prophecy; his oracle at Delphi was the most famous. He was also the God of Song and Music, and is said to have invented the lute and the lyre. In later times he was also called the Sun God.

35. ATHENE (Minerva). Marble, British Museum. The Goddess of Wisdom. The owl and the serpent were sacred to her. The date of this bust is about B.C. 550.

29. HERA (Ludovisi). Marble bust in the Villa Ludovisi, Rome. This is the finest and most beautiful representation of Hera, the Queen of Heaven (Juno of the Romans). It is a Roman copy of a Greek work of the 4th Century B.C.

21. BOY AND GOOSE. Cast from the marble in the Louvre, which is one of the ancient copies of the original bronze by Boethos, of Chalcedon. It was intended as a travesty of the labours of Hercules. B.C. 230.

23. MENELAOS (Ajax). Marble, Vatican. Menelaos, King of Lacedæmon, was the husband of Helen, who was carried off by Paris to Troy.

24. AJAX (Diomede). Marble, British Museum. Found in villa of Hadrian. One of the heroes of the Trojan War.

36. HOMER (Baiae). Marble, British Museum. An ideal portrait of the famous blind Greek poet, the author of the epic poems, the "Iliad" and "Odyssey." He lived about 850 B.C.

27. PERICLES. Marble, found in Villa of Cassius, Tivoli, in 1781, British Museum. The greatest of Athenian statesmen. Under his administration the Parthenon and other buildings were erected. B.C. 493 to 429.

28. SOPHOCLES. Marble, British Museum. The celebrated tragic poet. B.C. 495 to 406. One hundred and thirty plays are attributed to him.

25. DIOGENES. Marble, British Museum. The cynic philosopher, born at Sinope, in Pontus, B.C. 412, died at Corinth 323.

26. DEMOSTHENES. Marble, British Museum. The greatest of Athenian orators. B.C. 385 to 322.

22. ALEXANDER. Marble, British Museum. Alexander the Great, son of Phillip II., King of Macedonia, born B.C. 356, ascended the throne 336. Three years later he defeated Darius, King of the Persians, whose army was said to number over 500,000. In 331 he conquered Egypt and founded the City of Alexandria. His further conquests extended into India. He died at Babylon in B.C. 323, aged 32.

17. THE VENUS DI MEDICI. This cast is from the marble, now at Florence, which was found in Hadrian's Villa at Tivoli. Sculptor, Cleomenes, son of Athenodorus, of Athens, who resided in Rome B.C. 160. Restorations by Bernini: Right arm, left arm from elbow downwards.

4. A ROMAN EMPRESS OF THE AUGUSTAN PERIOD, possibly Antonia, daughter of Mark Anthony, B.C. 50. This bust is better known as "Clytie," as for a long time it was considered to represent the water-nymph, who fell in love with Apollo, but met with no reciprocation of her passion, and was changed into a sunflower.

4. CAIUS JULIUS CÆSAR. Marble, British Museum; B.C. 105-44. This remarkable head is worthy of careful study.

32. TRAJAN. Marble, found in Campagna of Rome, British Museum. Marcus Ulpius Trajanius, Roman Emperor, A.D. 98-117.

31. HADRIAN. Marble, British Museum. P. Aelius Hadrianus, Roman Emperor, A.D. 117-138. He was a patron of learning, and founded a scientific institution in Rome under the name of the Athenaeum. His reign forms an epoch in the history of Roman jurisprudence.

30. MARCUS AURELIUS, as *Frater Arvalis*. Marble, British Museum. Marcus Aurelius Antoninus, Roman Emperor, A.D. 116-180, commonly called the "philosopher." His twelve books, entitled "Meditations," were written in Greek. He is in the robe

of Frater Arvalis, *i.e.*, of one of the twelve priests, who in spring and autumn celebrated festivals in honour of Ceres, the Goddess of Corn.

33. HEAD OF A BARBARIAN. Marble, British Museum. Probably a Gaul.

34. LUCRETIA BORGIA. Italian, 15th Century. Original marble in possession of Earl Wemyss. Lucretia Borgia, a daughter of Pope Alexander VI.

The busts of the following distinguished Naturalists will be found in the Zoological Gallery :—

Carl Von Linné (Linnæus), of Sweden (1707-1778).

Georges Louis Le Clerc Comte de Buffon (1707-1788).

Georges Cuvier, of France (1769-1838).

Frederick Henry Alexander Von Humboldt, of Berlin (1769-1859).

Louis Johann Rudolph Agassiz (1807-1878). Born in Switzerland. Professor of Zoology and Geology, Harvard, U.S.A.

Charles Darwin (1809-1882).

Rt. Hon. Thos. H. Huxley, P.C., M.D., F.R.S., etc. (1825-1895).

GLYPTICS.

The word Glyptics (*glupho*, I carve) is applied to sculpture on a small scale, *e.g.*, carved gems, cameos, medals, etc. This braneh of Art, after nearly a century of neglect, has lately made a great advance, notably in France, where the Minister of Fine Arts and the Director of the Mint have given encouragement to its votaries by offering commissions to artists, and by facilitating the collectors' opportunities of obtaining specimens.

The examples, which these gentlemen kindly selected for this Gallery, have just arrived from the Paris Mint, and will show that the work of artists like Chaplain, Charpentier, Degeorge, Dupuis, Patey, Roty, and others is of the highest excellence, and will stand comparison with that of the Greeks.

The medals and plaques are either portraits, commemorative of events, prizes for students, or for agricultural and other competitions.

PAINTING.

With the exception of wall decorations, of which many examples survive, notably in Egypt, and Herculaneum and Pompeii, there is very little evidence of early pictorial painting. The most remarkable examples, perhaps, are those archaic Greek portraits, discovered by Mr. Flinders Petrie, now hanging in the National Gallery, London. They are of great interest as exhibiting portraiture in its infancy.

The Church has been, up to within the last century, the mother of art. After the fall of the Roman Empire, Byzantin (Constantinople) became the capital of the Eastern Church, and the first advance from that rigid and conventional school was made when the Italian School came into life at Florence, under Giotto and Cimabue. Until the Renaissance, art was influenced by the grey and sombre light of the Church, but then it became infused wtih sunshine and brilliant colour, and obtained a much wider field for conception of subject; portraits were painted—not the portraiture so noticeable in the Saints, but professed portraits.

The end of this brilliant school was occasioned, not so much by natural decay as by what Ruskin calls "the political and moral ruin of those cities by whose virtue it had been taught, and in whose glory it had flourished."

The distinction between the early Northern art and that of the South is most noticeable, and very aptly contrasted by Mr. Ruskin in his reference to "the angular and bony sanctities of the North," and "the drooping graces and pensive pieties of the South."

The great aim of the early German, Flemish, and Dutch painters was to portray men and women as they saw them. W. M. Conway describes their chief qualities as being veracity of imitation, jewel-like richness of colour, perfection of finish, emphasis of character, conservatism in design, virtues not easily understood or popularly appreciated, but nevertheless virtues that have made them a great school of painters, notwithstanding the absence of beauty, as such, in their pictures.

During the seventeenth and eighteenth centuries, and into the nineteenth, a great difference is to be observed, especially in landscape, where idealism prevailed, and yet with all the idealism the suggestion of truth is strongly felt, for who can deny the liquid sunshine of Claude, or the natural graces and living feeling of flesh in Greuze. It is well-known that our own great landscape painter, Turner, was greatly influenced by Claude. The Spanish School was very strong, although its life was short, for the period of 1588-1682 covers the lives of all the great Spanish painters. It practically had no infancy. It was very much under the influence of the

Inquisition. It was intensely realistic, and shows the impressive gravity of the Spanish people.

The English School, as it is understood, began about the middle of the last century, with Reynolds, Hogarth, Gainsborough and Wilson. In the middle of this century it was carried away by an excess of realism, and later on by a wave of impressionism. It is marked by an absence of uniformity, very noticeable in our own gallery; in fact, if the reader will look for himself, he will find there are not two painters represented in the gallery with anything like approaching the same style, and only in very representative collections would one find that suggestion of "School" so noticeable in the history of Continental painters.

COPIES OF OLD MASTERS.

Dutch School.

1. "An Old Woman," dated 1634. Rembrandt. Copied by Mrs. Potter in 1895, from the original in the National Gallery, which was purchased in 1867 for £1,200.

Rembrandt Harmens, called also Van Rhyn, (1607 to 1669), was the great master of chiaroscuro, *i.e.*, of representing objects by light and shade rather than by colour.

P. 1895. Oval panel, 26in. x 21in.

Spanish School.

2. "El Scribenillo" (The Writing Dwarf), by Velasquez. Copied by George Pitt Morrison in 1892, from the original in the Museo del Prado, Madrid.

Don Diego Rodriguez de Silva y Velasquez (1599-1660), the "Painter to the King" (Philip IV.), was not merely the greatest of Spanish painters, but, according to Prof. Ruskin, he achieved "the highest reach of technical perfection yet attained in art."

P. 1896. Canvas, 42in. x 32in.

Flemish School.

3. "Portrait of Gervartius" (Van Dyck). Copied by Mrs. Potter in 1897 from the original in National Gallery, purchased in 1824.

Sir Anthony Van Dyck (1607-1640), the most distinguished of the pupils of Reubens, was appointed Painter to the Court of Charles I. in 1632. His portraits, of which this is considered to be the masterpiece, have been said to be the "wonder and despair of modern portrait painters.

P. 1897. Canvas, 30in. x 25in."

Spanish School.

4. "St. John and the Lamb." Murillo. Copied by Mrs. Potter in 1899 from the original in the National Gallery, purchased from Sir S. Clark in 1840 for £2100.

Bartholomé Estéban Murillo (1618 to 1682). A painter with a strong individuality, one of the first to successfully portray children.

P. 1899. Canvas 66in x 44in.

PAINTINGS IN OIL.

1. "Spring Time." Geo. Pitt Morrison.

Mr. G. Pitt Morrison, a Victorian, who studied in Paris and Madrid, was one of the founders of the Blackburn School, Victoria. This painting exemplifies the brilliancy of Australian daylight.

P. 1895. Canvas, 30in. x 50in.

2. "Cottesloe Beach" (1895). Herbert W. Gibbs.

Mr. Herbert W. Gibbs studied at South Kensington. D. 1895.

Canvas, 12in. x 27in.

3. "A Portrait." Sir Thos. Lawrence, P.R.A. This half-length portrait of a lady is gracefully composed, and the colour is healthy and pleasing

Sir Thos. Lawrence, historical and portrait painter, born at Bristol, 1769, admitted a student of the Royal Academy 1787; succeeded Sir Joshua Reynolds as Painter to the King in 1792. Knighted by the Prince Regent in 1815; elected President of the Royal Academy in 1820. Died 1830 and interred in St. Paul's Cathedral.

P. 1896. Canvas, 35in. x 30 in.

4. "Lake Lugano." R. P. Bonington.

This small painting of an Italian lake is tne gem of the collection. Its purity and delicacy of colour are typical of this "Old Master of the English School." Richard Parkes Bonington, born in Nottingham 1801; died in London 1828.

P. 1896. Canvas, 14in. x 11in.

5. "The Lizard Point" (1880). W. Melbye.

William (or Vilhelm) Melbye, a native of Germany, settled in Copenhagen, and was elected a member of the Danish Royal Academy.

P. 1896. Canvas, 32in. x 54in.

6. "The Little Fruit Girl." J. H. S. Mann.

P. 1896. Canvas, 12in. x 10in.

7. "The Road to Dromana" (1878). Louis Buvelot).

Louis Buvelot, landscape painter, born in 1814 in the Canton of Vaud, Switzerland. From 1834 to 1851 he resided in Brazil, then spent fourteen years in Europe, and finally migrated to Australia in 1865, dying in Melbourne in 1888.

P. 1896. Canvas, 20in. x 27in.

8. "Low Tide" (1886). Arthur Arnold Helcké. Low Tide, Roquaine Bay, Guernsey, is a good subject, offering a pleasing atmospheric effect.

P. 1896. Canvas, 60in. x 39in.

9. "Down on His Luck" (1889), Frederick McGubbin.
Frederick McGubbin is the teacher of drawing in the Art School, attached to the National Gallery, Melbourne.
P. 1896. Canvas, 45in. x 60in.

10. "North Beach." Herbert W. Gibbs. (*See* No. 2).
D. 1895. Canvas, 9in. x 16in.

11. "Lancing Mill, Sussex." J. Aumonier, R.I. A well-composed picture, good in colour and atmospheric effect; it gives an excellent idea of the scenery of the South Downs.
P. 1896. Canvas, 42in. x 72in.

12. "Morning Light." Sydney S. Morrish (1894).
P. 1896. Canvas, 40in. x 60in.

13. "In Sight at Last." W. Peter Watson, R.B.A.
P. 1896. Canvas, 54in. x 72in.

14. "The Match Sellers." W. P. Frith, R.A.
Mr. W. P. Frith was born in Yorkshire in 1819. A painter who may justly be said to have been the most popular of his day, as his subjects, such as "Ramsgate Sands," the "Derby Day," the "Railway Station," etc., appealed to the populace.
P. 1896. Canvas, 36in. x 24in.

15. "The Rugged North." Edward Hargitt, R.I. A composition of Highland scenery with a mob of cattle, with good local colouring.
P. 1896. Canvas, 16in. x 24in.

16. "The Leaf Gatherers." Florence Fitzgerald. An excellent painting of the famous "Burnham Beeches."
P. 1896. Canvas, 30in. x 50in.

17. "Sunset on the Yarra. J. Ford Paterson (1886). (*See* also No. 25.)
P. 1896. Canvas, 24in. x 48in.

18.* "Yacht Racing in the Solent." P. Wilson Steer (1897). A picture of the "impressionist school," who leave out all unnecessary detail, considering that it is only needful to depict the impression that is left on the mind by a glance.
P. 1897. Canvas, 24in. x 30in.

19.* "In the Meadows." Mark Fisher. A bold painting of cattle in rich grass by a brook, meandering through polled willows. It is strong in colour and full of daylight.
P. 1897. Canvas, 18in. x 26in.

20.* "The Freeholder." James Charles (1897). A study of an old English country man, who is making out with difficulty the engrossed writing of his Title Deed.
P. 1897. Canvas, 20in. x 16in.

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* Selected for the Gallery by George Clausen, A.R.A.

21* "Loading Hay Barges on the East Coast" (1897) Charles W. Wyllie. A typical example of the work of this artist.
P. 1897. Canvas, 20in. x 52in.

22*. "A Summer Morning" (1897). H. H. La Thangue. Exhibited at the Royal Academy, 1897.
An exceedingly good example of this master's work. It represents two children in a punt on a backwater of the Thames, one of whom has just hooked a "Jack." It is a straightforward sincere piece of work, masterly in technique. Mr. H. H. La Thangue studied at Dulwich, Royal Academy, and Paris. Elected A.R.A. 1898.
P. 1897. Canvas, 45in x 41in.

23*. "A Summer Afternoon" (1896). T. Sidney Cooper, R.A. Exhibited at the Royal Academy, 1897.
Thos. Sidney Cooper, born in 1803, at Canterbury; elected A.R.A. 1845, R.A. 1867. He was 93 years of age at the time of painting these cattle. He is a popular painter of cattle and sheep.
P. 1897. Canvas, 24in x 36in.

24. "The End of a Long Day." Geo. Clausen, A.R.A. (1897). Painted expressly for this Gallery.
This painting is a masterly piece of work, daring in its colour and vigorous in its painting. The warm glow of the setting sun is wonderfully felt. The artist has omitted all unnecessary detail; nothing is laboured. He gives an impression of nature almost perfect.
George Clausen, born in 1852 in London, studied at South Kensington and Paris, Elected A.R.A. 1895.
P. 1897. Canvas 44in. x 34in.

25. "The Great Southern Ocean." J. Ford Paterson. (*See* also No. 17.)
Mr. R. A. M. Stevenson, Professor of Art in Liverpool, thus writes in 1898 of the "Australian Pictures in England":—"On entering I came at once on a picture by Mr. Ford Paterson, whose work had pleased me in 1886 (Indian and Colonial Exhibition) more than that of any other Australian painter. On that occasion he seemed the only man who reached anything like the mystery of atmosphere, the grand breadth of a general effect, or the unity of impression that comes from fine composition and artistic subordination of detail and local colouring. Now his work by no means stands alone in technique, though I think very few equal Mr. Paterson in the depth of his feeling for the beauty of air and shadow."
John Ford Paterson, Melbourne, Victoria.
P. 1898. Canvas, 84in. x 48in.

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*Selected for the Gallery by George Clausen, A.R.A.

27. "Portrait of Sir George Grey, K.C.B. Tennyson Cole. D. A. Calvert, 1895. Canvas, 18in. x 26in.

28. "Bunny." Ralph Peacock. Exhibited at the Royal Academy, 1899.

P. 1899. Canvas, 50in. x 30in.

29. "The Tambour Frame." S. Melton Fisher. Exhibited at the Royal Academy, 1899.

P. 1899. Canvas, 36in x 52in.

Nos. 28 and 29 were selected for this Gallery by Sir Edward J. Poynter, P.R.A.

WATER COLOURS.

1. "Royal Windsor." Edward H. Fahey (1885).

Edward H. Fahey, born in London in 1844, studied at the Royal Academy, and elected a member of the Institute of Painters in Water Colours in 1875. This drawing of Windsor Castle, viewed from the left bank of the Thames, is in the style of the old water colour painters; direct and simple, with pure, healthy colouring. It was originally exhibited in the British Art Gallery in 1893.

P. 1896. Size, 30in. x 15in.

2. "Lake Wakatipu, N.Z." W. J. Wadham (1896).

P. 1896. Size, 19in. x 29in.

3. "Golden Autumn, Wales." A. Sinclair.

P. 1896. Size, 39in. x 31in.

4. "Fremantle Harbour." James W. R. Linton. Taken from the right bank of the Swan, below the Railway Bridge.

P. 1899. Size, 22in. x 31in.

BLACK AND WHITE.

A marked feature of the latter half of the nineteenth century has been the growth of the love of art in all classes, and than which, there can be no surer sign of the increase of culture and of higher civilisation. Everywhere and in everything, in metal, in pottery, in furniture, in wall papers, the designs are better, the colours more harmonious; and nowhere has this improvement shown itself more effectively than in the illustration of books, a work to which the great artists of the period have devoted much time and talent.

A number of their original drawings and etchings has been kindly selected for the Museum by Mr. Joseph Pennell, a leading authority on this branch of art, and a skilled draftsman himself. These will be found mounted in the screens on the first pedestal in the Art Gallery, while on the second stand are framed various examples, with explanatory notes, of the methods adopted for the reproduction and printing of such works, *e.g.*, photogravure, half-tone, wood-cutting, colour-printing, etc.

Drawings selected for the Gallery by Mr. Joseph Pennell (with the exception only of Nos. 44, 52, and 53, marked*):—

	ENGLISH SCHOOL	
1.	A. Boyd Houghton ...	Pen and ink
2.	G. J. Pinwell	,,
3 to 8.	Charles Keene	,,
9.	J. Mahoney	,,
10.	Fred. Walker, A.R.A. ...	,,
11.	Alfred Parsons, R.A., A.R.A.	,,
12.	William Small	,,
13.	Laurence Housman ...	,,
14 to 16.	Aubrey Beardsley	,,
17 to 19.	Robert Anning Bell ...	,,
20.	Phil May	,,
21.	Maurice Greiffenhagen ...	,,
22 to 27.	Sir David Wilkie, R.A. ...	,,
44.	Herbert W. Gibbs* ...	,,
45.	Sir John E. Millais, Bart., P.R.A.	,,
53.	W. Gordon Browne* ...	,,
28.	Sir Frederick Leighton, P.R.A.	Chalk
29 and 30.	Sir Edward E. Burne-Jones	,,
52.	James W. R. Linton* ...	Wash drawing
31 and 32.	J. A. McNeil Whistler ...	Etching
33 and 34.	Sir Francis Seymour Haden, K.B.	,,
35.	Oliver Hall	,,
46 and 47.	Frank Short, R.P.E. ...	,,
48 and 49.	William Strang, R.P.E. ...	,,
50 and 51.	Chas. J. Watson	,,
	AMERICAN SCHOOL.	
36.	A. B. Frost	Pen and ink
37.	Robert Blum	,,
38.	E. A. Abbey, R.A.	Pen and ink and wash
	GERMAN SCHOOL.	
39.	Adolph Menzel	Chalk
	FRENCH SCHOOL.	
40.	J. L. Forain	Pen and ink
41.	A. Willette	Chalk
42.	Paul Renouard	Pen and ink
43.	Paul Helleu	Drypoint etching

ENGRAVINGS.

In March, 1900, the Bishop, the Right Rev. Dr. Gibney, presented twenty-two engravings of the paintings by Raphael in the Vatican.

Raffaello Sanzio (1483-1520), Umbrian School. One of the greatest painters the world has ever seen. The grouping of the figures, the arrangement of the light and shade—in a word, the composition of his pictures—make these engravings a most valuable and instructive addition to the Gallery.

ETHNOLOGY.

Ethnology *(ethnos,* a tribe) has already been defined as the study of the history of man, or more fully of the rise and progress of civilisation, as exemplified by the work of man ; hence there can be no hard and fast boundary drawn between the objects to be considered in this section and those already referred to in the Art Section.

Before describing any of the works of man, it will be as well to remark that Anthropology *(anthropos,* a man) is a distinct branch of Science, and deals with the natural history of the human race. Man, as an animal, is described, hereafter, at the head of the Vertebrates, and there, notwithstanding his many varities, he is treated as one species.

The Races of Man are usually considered to be :—

1. The Caucasian : Comprising three sub-races, the Aryans, including the white races of Europe, the Persians, Afghans, and Hindoos ; the Semitic peoples ; the Jews, Arabians, etc.; the Hamites ; Egyptians, Copts, etc. Characteristics : Skin, white ; hair, soft, fair or dark, straight or wavy ; skull, globular, generally brachy-cephalic, high forehead ; teeth, vertical ; nose, narrow; face, oval.

2. The Mongolian : the Chinese, Japanese, Malays, Lap-landers, Esquimaux, and the American races. Skin, yellow ; hair, black, stiff and straight ; skull, variable, both long and short types occuring ; forehead, narrow ; nose, small ; face, broad with projecting cheek bones, and oblique sunken eyes.

3. The Ethiopian, Negroid, or Melanian (black) : The races of Central and Southern Africa. Skin, black ; hair, close, crisp and frizzly ; skull, dolicocephalic, narrow and long ; forehead, retreating ; jaws, prominent ; lips, thick ; nose, broad and flat ; eyes, prominent.

The Malays, the Polynesians, and the Maories are grouped as Mongolians, modified by a large infusion of Melanian blood.

The place of the Australians, with their black skin, their coarse and black, curly or wavy hair, with beards and moustaches well developed, long skulls with projecting jaws, large teeth, thick and pouting lips, and deeply set eyes, has long been in dispute.

They have often been named as the lowest of the human race, which is not the case, but is owing to their development having

been in a special direction, for they, having been shut off for countless ages from the rest of their species, have only had, in the struggle for existence, to contend with their natural surroundings, and not with other races of men, and in this strife they have attained the highest skill as hunters and trackers—a skill most marvellous and far beyond that of any other race in that one line, but which attainment, unfortunately for them, is of very little use now that their land is being occupied by a stronger race ; by men who have proved themselves the *fittest to survive* in the struggle with their fellows in the larger continents during that period when the Australians, isolated from the rest of the world, were happy in hunting and fishing, but became unfitted for any other pursuits.

This is not the place for discussing the various theories as to their origin, but from the latest information (according to Mr. R. Lydekker) they appear to be the descendants of a primitive Caucasian tribe, and perhaps closely allied to the ancient inhabitants of Europe. [Compare the Neanderthal skull with their skulls.] Their hair is wavy, and this fact alone, apart from other evidence, is of great weight in pointing out their relationship ; for the dark, straight hair of the Mongolians is found to be cylindrical—that is to say, a cross section is a circle, as is the case with the hair of the Old World apes and monkeys ; but the wavy hair of a Caucasian is in section an oval ellipse, which is the cause of the waviness, while the hair of a Negro forms a flat ellipse ; hence its frizziness, a peculiarity very persistent.

Mr. Lydekker, in *Knowledge*, January, 1900, reproduces some of the photographs from this Museum, of Western Australian natives, and he says :—

"The general physical similarity of the natives from all parts of Australia is indeed a very striking peculiarity of the race, and serves to show that, whatever be their origin and their relationship, they have been, previous to the European colonization of their island continent, isolated for an immense period of time from the rest of the human race.

"Their unity of type and isolation from other races is strongly emphasised by their language, which is quite distinct from that of any other people. It has indeed been attempted to connect the Australian tongue with that of the Dravidian races of Southern India, but this, according to recognised experts, is stated to have resulted in total failure.

"There is, however, a very curious connection between the Australian aborigines and certain of the wild tribes of Southern India, namely, that both possess the boomerang—a weapon unkown to any other members of the human race. (The boomerang of India has not the return flight of the Australian weapon.) Of course, there is the possibility that this very remarkable implement has been independently invented by the two people

who use it, but there is a considerable degree of improbability in this idea. If, on the other hand, it be an inheritance of the Australians from Asiatic ancestors, it may be fairly argued that it is unlikely to have been evolved at the extremely remote epoch when the ancestral Australians started from their Asiatic home. And if this view be accepted, then we are compelled to revert to the idea of a later immigration from Asia, which brings us again to the question of the origin of the wavy hair of Australians.

"Apparently there is no possibility of giving a definite answer as to the origin of the boomerang; but there is one very curious point which may indicate the great antiquity of its introduction. As most of my readers are aware, the Australian aborigines possess a semi-domesticated dog—the Dingo; and there are strong reasons for regarding this animal as not pertaining to the indigenous fauna of the country. It remains are, however, met with in association with those of a number of extinct animals, so that the date of its introduction was evidently very early. But if, as some suppose, man reached Australia at a time when it was much more closely connected with Malaysia than is at present the case, his advent might well have been contemporaneous with that of the Dingo. And here comes in the point referred to, namely, that the Dingo is very closely related to the Paria dogs of India. Now since these latter are domesticated breeds, the evidence, if it may be relied on, points to a very early immigration into Australia of aboriginal tribes accompanied with dogs from Asia And if such early aborigines had domesticated a dog, they might surely be deemed capable of having invented the boomerang."

The boomerang is usually called a "kylie" in this colony, and within certain limits it varies considerably in size, weight, and shape, as may be seen in the Ethnological Gallery, where a number of Western Australian weapons and implements are displayed, many of which show considerable artistic, even if crude, attempts at ornamentation, both in colouring and carving. The difference between the lower races of the South and the higher and finer men of the North is exemplified in the style of the weapons. From Esperance come the simply pointed spears, from the middle districts those with simple barbs, while from the North come the terrible weapons with numerous and complex wooden barbs or stone heads. Latterly glass has been been largely used in the Kimberley District in place of stone. These spear heads are roughly fashioned by the younger men with a stone hammer, and are finished off by the older and more skilled, the small notches on the edges being made by pressure (not by blows) with the hard shin bone of the kangaroo.

"The Bull-roarer," a common toy amongst European boys, and known and used by all native tribes of the world, is, perhaps, the most antient, sacred, religious symbol in the world. It was used by the ancient Greeks in the Dionysiac mysteries, in the same

way that it is now used at initiation ceremonies and other corroborees by Australians, who, at these times, rub themselves over with clay, as was also the practice of the ancient Greeks. When this instrument is whirled round, by a string attached to the end, it produces a humming or roaring sound, according to its size and shape, and the rapidity with which it is spun. It must not be shown to women, or to young men before initiation, under the penalty of death.* After the ceremonies they are hidden most carefully in a cave, or in a hollow tree plugged with clay and covered with stones, the exact locality of which is only known to the head men of the tribe. The very large and fine specimens from Kurnalpi, presented by Corporal Bewcher, were found hidden in the latter manner, while those from Cue, given by Mr. Blatchford, of the Geological Survey, were hidden in a fissure in the rocks.

A series of photographs show the "tribal marks"—deep scars, cut with stone knives (of which examples are shown in the next case). The scars vary much in number, direction and position, according to the tribe. Artificial means are adopted to force them into ridges when healing.

A photograph of a Broome woman shows a peculiar, and what must be a most uncomfortable method of going into mourning for a relative. Her hair is plastered into a series of tails, with a mixture of clay, wilgie, and emu or lizard fat, which is carried until it gradually wears off. Wilgie is red oxide of iron, hematite *(see* Minerals); the earthy brown oxide is burnt into red oxide by the natives in localities where they cannot obtain the former.

The Phallocrypts of pearl-shell are worn on the North-West.

The fishing nets are made of string manufactured from the root-fibres of Spinifex *(Triodia)*. Opossum hair is twisted into string by means of the framework, called a "Boolgo." The waist belts are woven of human hair. A resin obtained from the Spinifex is used for fixing spears, etc., in the north, while in the South a mixture of Black-boy *(Xanthorrhœa)* and other resins is used, the former being too brittle by itself.

There has not been since the establishment of this Museum, either time, or opportunity, or space for a systematic collection of Ethnological specimens, other than Western Australian, but a certain number have been acquired, of which the following are well worthy of notice :—

NEW ZEALAND.—Maori relics.

PACIFIC.—Weapons, etc., from New Guinea, the Solomon Islands and Fiji, with a few fabrics.

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*I once whirled one in Barrack Street as I approached a group of natives, when the women, on hearing the sound, instantly hid their faces in the sand.

JAPAN.—Electrotypes of ancient coins, and two bronze vases of the 12th or 13th Century.

INDIA.—Metal work, pottery, fabrics and embroidery. A set of armour used on State occasions by a Rajput Prince, presented by Chas. Bethell, Esq., who also gave some weapons taken from the Hill tribes, at Orissa, and some Madras ornaments. Afghan saddle, more than a hundred years old, lent by L. L. Cowen, Esq.

PERSIA AND ARMENIA.—Hand-made carpets. The long Persian prayer-carpet is from two to three centuries old. It has tufts of human hair woven in at places.

EGYPT.—From Thebes, two mummy heads. The female is remarkable for the wonderful preservation of the hair. Mummies of a hawk and of a snake. Portion of mummy cases showing decorative colouring. Pottery. Funeral wreath, etc.

ROMAN Pottery from Jerusalem.

BELGIUM.—A spinning wheel of the 17th Century from Brussels.

FRANCE.—Limoges Enamels on Copper of the 14th Century. These properly belong to the Art Section, and when space is available will be moved there.

RELICS ASSOCIATED WITH THE EARLY HISTORY OF WESTERN AUSTRALIA.

About 45 miles west and north-west of Geraldton, stretch for nearly fifty miles a series of rocky islands known as Houtman's Abrolhos, on one of which, Pelsart Island, the Dutch vessel Batavia, under the command of Commodore Francoys Pelsart, was wrecked in 1629 ; and in 1727, the Zeewyk, another vessel of the same nationality, under the command of Captain Jan Steyns, was wrecked on Gun Island.

These rocks and islands are leased by Messrs. Broadhurst, McNeil, & Co., who work the large deposits of guano, made by the sea birds with which they swarm.

In the course of their work they have from time to time found many relics of these two wrecks, all of which they have generously placed at the disposal of the Government. These are placed in the cases along the east and north sides of the Ethnological Gallery. They consist of silver and copper coins, rosary beads, tobacco boxes, pipes, copper kettles and stewpans, knives, scissors, spoons, fish-hooks and sinkers, tumblers and wineglasses, bottles, etc., cannon balls, bullets, portions of muskets, and, most interesting of all, two breech pieces of the early breech-loading cannons, one of which had been spiked.

In October, 1892, Mr. Geo. Giblett, of Balgarrup, found the skeleton of a man who had been buried in the drift sand on the coast, near the Donnelly River, for more than half a century. Along with the remains were thirteen sovereigns, dated before and up to 1832, ten Spanish dollars and three English silver coins, knives and buttons, portions of clothing, etc.

Mr. H. C. Prinsep believes that he has solved the mystery that has surrounded these relics, for he was informed by Dr. Green, late of Northam, that, in the early days of the colony, a trader of Fremantle, named Cass, periodically visited Augusta with a stock of draperies, hardware, etc., which he sold to the settlers. His last visit was in 1835, when he started against the advice of Dr. Green in very stormy weather. Neither he, nor his man, nor the cutter were ever seen again. The clothing, the money, and the other relics make it most probable that the skeleton is that of Cass, especially as, if unable to round the Leeuwin, the prevailing wind would have driven him towards the Donnelly River.

The Mulberry Plantation in the east end of Perth was started some quarter of a century ago for the purpose of rearing silk-worms. A parcel of cocoons was sent to France and manufactured at Lyons into handkerchiefs, and exhibited at the Paris Exhibition in 1878. These proved the suitability of the climate, but the high price of labour prevented the establishment of the industry on a commercial basis.

A steel-plate engraving, published in June, 1829, in London, entitled "Peel, Swan River Peel," is a skit upon the administration of the affairs of this Colony by the Home Government.

NATURAL HISTORY.

All Natural History objects may be separated into two great groups—Inorganic and Organic, and the latter again divided into two—Animal and Vegetable ; for although recent research has shown that the boundary line formerly drawn between these has no existence, yet for practical purposes it is retained, for the division into the Mineral, the Vegetable, and the Animal Kingdoms forms a most convenient basis for the classification of the Natural History collections in a Museum. The two latter are included in the study of Biology—the science of Life. The animals of a country are spoken of as its fauna, and the plants as its flora.

ZOO-GEOGRAPHY.

Different animals are found in different parts of the world, not in any haphasard manner ; their distribution is systematic. The globe, therefore, has been divided into a number of "regions," or "realms," each of which is characterised by its own particular forms of life :

1. The PALÆARCTIC, which comprises Europe, temperate Asia, Japan, and Africa north of the Atlas Mountains.
2. The ETHIOPIAN, embracing the rest of Africa, Southern, Arabia, and Madagascar.
3. The INDIAN OR ORIENTAL, including India, Burma, Southern China, Java, Bali, Borneo, and the Philippines.
4. The AUSTRALIAN, comprising New Guinea, Australia, Tasmania, New Zealand, and numerous islands in the Pacific.
5. The NEARCTIC, containing Greenland and North America as far south as Mexico and the Bermudas.
6. The NEOTROPIC, from Mexico southwards, taking in all South America and the West Indies.

These are divided into sub-regions, in which we are not much concerned, except as far as regards the four into which the Australian Realm is sub-divided :

1. The PAPUAN SUB-REGION.—New Guinea and all the islands as far south as, and including, the Celebes, New Ireland, and the Solomon Isles.

2. The AUSTRALIAN SUB-REGION.—This continent and Tasmania.

3. The POLYNESIAN SUB-REGION.—The islands from New Caledonia, Fiji, and the New Hebrides to the Society and Sandwich Islands.

4. The NEW ZEALAND SUB-REGION.—New Zealand, with the Norfolk, Chatham, Auckland, and Macquarie Islands.

There can be no hard and fast line, shutting off the fauna of one region from that of another, except physical obstacles, such as seas, mountain chains, deserts, or extremes of heat or cold. In past times they varied with the varying disposition of the land areas. A striking instance is the north-west boundary of the Australian Realm, known as Wallace's line, in honour of the distinguished naturalist and explorer, who was the first to point out, that the sharp distinction between the fauna of Bali and Lombok and other islands in the neighbourhood, was entirely irrespective of distance, but due solely to the depth of the dividing channel; for those islands only separated by shallow water had similar fauna, having evidently had more recent land connection than the others, that were divided by deep water.

The Australian sub-region, which, next to that of New Zealand, has probably the oldest land surface of the globe, has, both in its fauna and flora, many forms that became extinct in other parts of the world in past geologic epochs during the struggle for existence, in which only the fittest could survive, from which fate they were preserved, owing to their insular position.

Western Australia may, I think, be divided into four sub-areas:—Northern, North-Western, South-Western, and Central, as marked on the provisional sketch-map. (*See* Page *i.*) These appeared to me to have sufficiently distinct faunas, as far as the mammals and birds were concerned, to be classed as sub-areas; and when I requested Mr. Cooke to give me the climatic sub-divisions of the Colony (for the life of a district depends largely upon its rainfall), I found that the boundaries he gave were almost identical with those I had drawn. Consequently I adopted them, and repeat the information he kindly gave as to the rainfall:

N.—Tropical rains from November to March, averaging from 20 to 30 inches per annum.

N.W.—Rainfall quite uncertain, occasional torrential downpours between Christmas and Easter, occasional thunder showers, occasional protracted droughts. Average, 7 to 12 inches.

S.W.—Regular winter rains, May to October. Average, 15 to 40 inches, the greatest being in the south-west and gradually falling off to the north-east.

C.—Dry District. Occasional thunderstorms ; the winter rains extend inland from the south-west. Average, 5 to 10 inches.

Mr. Baldwin Spencer, in the "Report of the Horn Expedition," divides the Australian Region into three sub-regions, viz., (1) the Torresian, comprising New Guinea, the northern and north-western portions of this Continent ; (2) the Bassian, the south-east and Tasmania ; (3) the Eyrean, the central and south-west. Of these No. 1 covers N., and 3 covers C. and S.W. Whether N.W. should be a distinct sub-area or not, or whether the boundary between it and S.W. should be further S. is a question awaiting further evidence.

NOMENCLATURE.

The mode of nomenclature now in use was perfected by the great Swedish naturalist, Linnæus, in the year 1766-67. His method is to give each creature an appellation composed of two words, firstly a generic name, and secondly a specific name, as Felis Leo, Felis puma, FELIS, the generic name being applied to the whole race of cats, while LEO, the specific name, is restricted to the lion, puma to the puma, and so on with the remainder of the feline race.

Then all the GENERA of cats are grouped in the FAMILY of FELIDÆ. This family is placed along with other flesh-eaters, in the ORDER CARNIVORA. All the orders of animals that suckle their young form the CLASS MAMMALIA; this, and the other classes of animals having backbones form the DIVISION VERTEBRATA of the Kingdom Animalia.

A similar system is applied to the classification of plants.

Classification is only a means to an end, and that end is to obtain a full knowledge of the structure, development, and habits of the animal or plant under consideration—a knowledge of the utmost value when acquired, while the search for it is most interesting and absorbing.

Almost every one has some opportunity of observing the habits of animals, but the observations must be exact to be of any value, and, above all, it must be remembered that nothing in nature is done without a definite reason, and that the important thing is to ascertain the reason.

An apt illustration may be taken from the well-known humorous American tale about the woodpeckers in California, who, alighting on the chimney of a deserted hut, exclaimed, "Here's a hole; let us fill it with acorns," which they attempted to do, and had dropped down some bushels, when an owl coming by happened to look in at the window, and so ridiculed the woodpeckers that they desisted from their task. The writer of the story, like everyone who knew that district, was aware of the fact that every autumn this bird, the Red-headed Woodpecker, *Melanerpes formicivorus* (see wall-case, "Picarian" Birds) was in the habit of laying up stores of acorns—a strange thing for an insect-eating bird to do, and especially for one of migratory habits who, immediately the stores were completed, took his flight to a milder climate in the south. It was reserved for Dr. Jackson to elucidate the mystery. He noted that the acorns were always driven into the holes made in the bark of trees, the cup end fore-

most, so that only the pointed was exposed to view, and that they were packed so tightly that he could only extract them with the aid of a knife. On getting them out he found a maggot in every one. The birds having only selected the acorns in which they had discerned a minute—an almost invisible—hole made by an insect to deposit its egg. The acorn was fixed so that the maggot could not get out at maturity, as it could only cut through the softer shell of the cap. So when the birds returned in the spring to build their nests they had a plentiful supply of maggots ready for their young. Every year millions of acorns are thus packed into holes in the bark of trees and even in the wood of houses when a hole can be made of the size to take an acorn.

There is in this Colony a vast field for observers who take a delight in Natural History to note the life history of its remarkable fauna. With regard to the birds, for instance, accurate information is required as to their breeding time, their nests, the number of broods reared during the season, their food, if and when they migrate, etc. It is asserted by some settlers that the Bluebird (*Malurus splendens*, the Banded Wren) is polygamous, while others state that he only keeps company with one hen, and that the young in immature plumage are mistaken for other hens. Which is correct? For years the cry of the Boobook Owl ("More-pork") was attributed to the Frogmouth *(Podargus)*, which has quite a different note.

SYNONYMS (*sunonumos*, the same meaning).—Different writers at different times and in different places have applied different names to the same object. Such different names for the same thing are called "synonyms." This has caused much trouble. For example, most of the Australian marsupials have a great number of synonyms through examples having been sent to Europe and described by naturalists of various nationalities independently, each giving a different specific name. The principle of priority is now adopted—that is the use of the name first applied.

HOMONYMS *(homonumos*, the same name).—Where different things have been called by the same name, this is called a homonym. These have caused even greater confusion than Synonyms. Familiar examples are the application of the term "robin" to a red-breasted Australian bird (Petrœca) belonging to the Muscicapidæ, the Fly-catchers, which properly belongs to the European Warbler (Erythacus rubecula), one of the Sylviadæ, the Warblers. Again the names "herring" and "mullet" are here given to fish, which are neither the one nor the other.

HOMOLOGY—ANALOGY.

Homology is used to denote the likeness between parts of an animal constructed upon the same plan, however different may

be their function. Analogy refers to similarity of use in the parts of an animal, however different may be the plan upon which these are constructed.

Thus the fore-limb of a kangaroo and the wing of a hawk and the flipper of a whale are homologous, for they are constructed on the same plan, but have different functions. The wing of a bird and the wing of a butterfly are analogous, because they serve the same purpose, but they are not homologous, because they are constructed on entirely different plans. The hand of a man is analogous to the claw of a crab.

A series of specimens are in course of arrangement illustrative of these structures.

The "survival of the fittest" is an expression used in reference to the origin of different forms that, judging from analogy, have probably had a common ancestry. Among domestic animals how great are the variations that have been produced by artificial selection. How vast the differences between a highly bred racehorse, a carthorse, and a "brumby;" yet the latter is most nearly like the wild horse from which the others have been bred. [The "brumby" is a case of degeneration—of reversion to original stock. The same thing occurs when the agriculturist attempts to grow fruit-trees, say, apples or apricots, from pips and stones of highly artificial varieties. The trees thus raised will usually produce crab-apples, or small, sour plums with little pulp, like the original wild species.] The poultry fancier carefully selects his fowls and pigeons, and any that he does not deem to come up to the standard he requires are condemned, and by continuously breeding from those that show the points wished he raises all those abnormal breeds he so much values. In nature the same thing occurs. Although "sports" do not often occur among wild animals, yet their young are not all exactly similar in size and form and colour, though the differences may be very minute; still, they must be either advantageous or disadvantageous in the struggle for existence. If the former, they will in all probability be perpetuated; but if the latter, will tend to die out.

Specimens illustrating protective colouring are conspicuous in the bird and insect collection.

Variations in colour are of the utmost value,* or the contrary, in the struggle for existence. Animals living in those regions that are covered with snow during half the year, as the Ermine, Arctic

*To quote an instance, lately recorded in the daily papers, of the importance of protective colouring:—"The horses of the Scots Greys have been dyed khaki colour."

Fox, and some of the Ptarmigans, turn white as regularly as the winter sets in ; but those of the same species living in a more temperate climate do not change colour, as that would be a danger instead of a safeguard to them.

Consider, as an illustration, the case of a white wallaby. How much more conspicuous it is than one of neutral colour, and, as a consequence, how much more liable to destruction, although this is not a parallel case, for the whiteness in such an instance is not normal, but due to a diseased (?) state known as albinism, in which the pigments or colouring matter of the hair are absent. An opposite condition is also known, and termed Melanism (blackness); this is due to an excess of pigment, of which the Black Leopard (Felis pardus) is a good example.

SIGNS AND ABBREVIATIONS.

♂. The astronomical sign of the planet Mars is used to denote the male sex.

♀. That of Venus to denote the female.

N., N.W., C., and S.W. point out the district of the Colony from which the specimen comes. (*See* Map.)

The abbreviations after the names show who originally described and named the species. Thus Linn denotes Linnæus, Cuv., Cuvier, and so on.

The portions coloured Red on the maps of the world show the habitat of the animals named thereon.

A WHITE DOT denotes a Western Australian specimen; a GREEN DOT one from the other Australian Colonies.

D. denotes a Donation; P., a Purchase; C., that the Specimen was obtained by the Collector; E., by Exchange.

THE ANIMAL KINGDOM.

The department of Zoology *(Zoon*, an animal; *logos*, a discourse) comprises the Animal Kingdom, which contains two primary divisions, the Vertebrates—animals with a backbone, and the Invertebrata—animals without a backbone, incalculably more numerous than the former * These again are subdivided according to their Structure, as shown in the following table :—

Kingdom—Animalia.

Division I. VERTEBRATA.

Class I. *Mammalia*: Animals that suckle their young.
,, II. *Aves*: Birds.
,, III. *Reptilia*: Tortoises, Lizards, Snakes, etc.
,, IV. *Amphibia*: Frogs, Toads, Newts, etc.
,, V. *Pisces*: Fish

Division II. INVERTEBRATA.

Subkingdom I. *Mollusca*: Shellfish.
,, II. *Articulata*: Crabs, Lobsters, Spiders, Insects, etc.
,, III. *Echinoderma*: Sea Urchins, Starfish, etc.
,, IV. *Cœlentera*: Jellyfish, Sea Anemones, Corals, etc.
,, V. *Spongida*: Sponges.
,, VI. *Protoza*: Infusoria.

Class 1—Mammalia.

The Mammalia are air-breathing animals, more or less covered with hair. The females are provided with mammary or milk glands, and the young are brought forth alive, with the exception of the duck-billed platypus *(Ornithorhyncus)* and the Australasian porcupine *(Echidna)*, which lay eggs. The limbs are four in number. The number of known mammals at present existing is estimated at about 3000. There are doubtless many, of small size, still to be discovered.

MAMMALIA.

This class is divided into three subclasses :

1. MONODELPHIA, whose young are brought forth in a highly developed condition.

*For instance, only about 3000 Mammals are known, while nearly half a million insects have been described, and new species are continually being discovered, and the Insects are only one section of the Articulata.

2. DIDELPHIA, whose young are brought forth in an embryonic condition, completing their development in a pouch.

3. ORNITHODELPHIA, which lay eggs that are hatched in a pouch.

These subclasses are divided into orders depending upon their anatomical structure, in which the dentition is one of the prominent features, for the teeth show much as to the habits and mode of life of the animal. The dentition is of two kinds : "Homodont," where all the teeth are of one pattern, as in Sloths, Armadillo, Dolphins, etc.; and "heterodont," in the majority, where there there are four patterns—Incisors (I.), or cutting teeth, canines (C.), cutting-edged premolars (P.M.), and lastly true molars (M.). The dental formula is written thus, for the Catarrhini :—I. $^2/_2$, C. $^1/_1$, P.M. $^2/_2$, M. $^3/_3 \times 2 = 32$, which means that on each side of each jaw there are two incisors, one canine, two premolars, three molars, which multiplied by two gives the total number of teeth, 32, that are common to Man and the Old-World Monkeys.

SYSTEMATIC ARRANGEMENT OF THE CLASS MAMMALIA (AS ADOPTED IN THE BRITISH MUSEUM).

Subclass I. **MONODELPHIA.**

Order I. PRIMATES.

Suborder 1. ANTHROPOIDEA.
Section 1. *Catarrhini* : Man and Old-world Monkeys.
2. *Platyrrhini* : New-World Monkeys.
Suborder 2. LEMUROIDEA.

Order II. CARNIVORA.

Suborder 1. FISSIPEDIA.
Section 1. *Æluroidea* : Cats, Hyænas, Civet-Cats.
2. *Cynoidea* : Dogs, Wolves, and Foxes.
3. *Arctoidea* : Bears, Weasels, and Raccoons.
Suborder 2. PINNIPEDIA : Seals, Walrus, and Sea-Lions.

Order III. INSECTIVORA : Shrews, Moles, Hedgehogs, etc.

Order IV. CHIROPTERA : Bats.

Suborder 1. FRUGIVORA : Flying-Foxes.
2. INSECTIVORA : Insectivorous Bats.

Order V. DERMOPTERA,

GALEOPITHECIDÆ : Flying Lemurs.

Order VI. RODENTIA.

Suborder 1. SIMPLICIDENTATA.
Section 1. *Sciuromorpha* : Squirrels.
2. *Myomorpha* : Rats and Mice.
3. *Hystricomorpha* : Porcupines.
Suborder 2. DUPLICIDENTATA : Hares and Rabbits.

O der VII. UNGULATA.

Suborder 1. PROBOSCIDEA : Elephants.
2. HYRACOIDEA : Coneys.
3. PERISSODACTYLA : Rhinoceros, Tapirs, Horses, and Asses.
4. ARTIODACTYLA.

Section 1. *Bunodonta :* Hippotamus and Pigs.
2. *Tylopoda* : Camels and Llamas.
3. *Tragulina* : Chevrotains.
4. *Pecora* : Oxen, Antelopes, Deer, and Giraffe.

Order VIII. SIRENIA : Manatees and Dugongs.

Order IX. CETACEA : Whales and Dolphins.

Suborder 1. ODONTOCETI : Toothed Whales and Dolphins.
2. MYSTACOCETI : Whalebone Whales.

Order X. EDENTATA.

Suborder 1. PILOSA : Sloths and Anteaters.
2. LORICATA : Armadillos.
3. SQUAMATA : Pangolins.
4. TUBULIDENTATA : Aard-Varks.

Subclass II. **DIDELPHIA.**

Order XI. MARSUPIALIA : Pouched Animals (Kangaroos, Opposums, etc).

Subclass III. **ORNITHODELPHIA.**

Order II. MONOTREMATA : Ornithorhyncus and Echidna.

ORDER I. PRIMATES.

[First Wall Case on the west side of the Gallery.]

The Primates comprise Man, the Monkeys, and the Lemurs.

SUBORDER I.—ANTHROPOIDEA (Man-like).

Section 1. The CATARRHINI, or narrow-nosed, distinguished by the very narrow division between their nostrils, and by having only 32 teeth, are restricted, with the exception of man, to the Old World. They possess opposable thumbs, collar bones, and flat nails in the place of claws.

Man, with his intellectual powers and articulate speech, upright gait, well-formed hands and broad-soled feet, large, but non-opposable, great toes, and arched insteps, is placed at the head of the Order. Naturalists refer all his Races (*see* Ethnology, page 17) to one species, *Homo Sapiens* (*homo*, a man ; *sapiens*, wise).

Anthropologists have distinguished men by the dimensions of their skulls into Dolicocephali, long-headed, in which the width is

only three-quarters or less of the length (75 or under to 100); Mesocephali, medium-headed (between 75 and 80 to 100); and Brachycephali, the short-headed (80 or over to 100). They have also separated them into Orthognathi (*orthos*, straight; *gnathos*, a jaw), and Prognathi (*pro*, before), with projecting jaws. The lower races have the projecting jaws and the long heads. On examining the dolicocephalic prognathus skulls of the Western Australian natives with the Caucasian and other skulls, in the first wall case, it will be seen that this difference in form is very marked, and that they approach much more nearly in character to the Neanderthal man, a cast of which famous skull is exhibited It was found, in 1857, in a limestone cave in the Neanderthal, between Dusseldorf and Elberfeld. The Engis skull was discovered by Prof. Schmerling, in the Engis Cave, Liége, Belgium in 1833. It was found at a depth of five feet, along with the remains of the woolly rhinoceros, hyænas, bears, and other animals long since extinct in Europe.

The cast of a human skeleton is from the specimen in the British Museum, which was found at Guadaloupe, in the West Indies, in a modern limestone rock composed of corals and shells of the same species that still exist in the adjacent seas.

The Anthropoid Apes are represented by the Chimpanzee (*Anthropithecus troglodytes*), and by three Orang-outangs (*Simia satyrus*) and their skulls, in which it will be noticed that the youngest, before the frontal bones have become prominently developed, is much more humanlike than the adult; the Chacma Baboon (*Cynocephalus porcarius*), and several Indian and other Monkeys.

Section 2, PLATYRRHINI, the broad-nosed Monkeys, characterised by their widely separated nostrils, are peculiar to the New World. They frequently have prehensile tails. These are represented by a Spider Monkey (*Ateles Geoffroyi*), Central America, and the Grey Monk (*Pithecia monachus*), Brazil.

SUBORDER II.—LEMUROIDEA.

The members of this division are all arboreal in their habits, and are nearly all natives of Madagascar. They are the lowest of the Primates. The number of teeth varies from 18 to 36 in various orders. Like the monkeys, they chiefly subsist on fruits, but some are insectivorous, and others prey on small birds, etc.

The Ring-tailed Lemur (*L. catta*), from Madagascar, was so called by Linnæus, as it is easily domesticated, and much resembles a cat in its habits and playfulness.

ORDER II. CARNIVORA (FLESH-EATERS).

BEASTS OF PREY.

This important order is, in general, marked by very graceful forms, denoting the strength and swiftness so necessary to beasts

of prey, and is characterised by having two sets of teeth of three kinds—incisors, canines, and molars, all highly specialised, the canines being particularly strong and sharp; in fact, they take their name through being so prominent in the dog (*Canis*).

With the exception of Australasia (the dingo excepted), they are world-wide in their distribution, and have been so since early Miocene times.

SUBORDER I.—FISSIPEDIA (Cleave-footed).

Section 1. ÆLUROIDEA (*Ailouros*, a cat).—These are the most highly organized of all the beasts of prey. The true cats, or *Felidæ*, have the power of retracting their claws, which enables them to be kept sharp. Teeth, 30. With the exception of Australasia and Madagascar, they are found everywhere throughout the world. The Hyænas are restricted to Asia and Africa, as are also with two exceptions the *Viverridæ*, or Civet Cats. The *Felidæ* are represented by the Lynx (*F. canadensis*), of North America; the Puma (*F. puma*), of South America; an African Lion (*F. leo*), an Indian Tiger (*F. tigris*); the *Viverridæ* by the Genet (*Genetta vulgaris*), from South Europe; the Ichneumon or Mungoose (*Herpestes paludosus*), from the Cape; and the Indian Palm Civet (*Paradoxurus niger*).

Section 2. CYNOIDEA (*Kuon*, a dog).—These differ from the cats in not having retractile claws. Teeth, usually 42. Their distribution is world-wide. The principal genus is *Canis*, which comprises the dogs, wolves, jackals, and foxes, represented by the Dingo (*Canis dingo*), and its skeleton, and also by a pair grouped with a litter of six pups; the Arctic Fox (*C. lagopus*), North America; the Wolf (*C. lupus*), Russia; the European Fox (*C. vulpes*), the Indian Jackal (*C. aureus*), and a curious Raccoon-like Japanese dog (*Nyctereutes procyonoides*).

Section 3. ARCTOIDEA (*Arktos*, a bear) contains the Bears, Weasels, Racoons, etc.

One family, the *Mustilidæ*, contains the Weasels, Otters, Badgers, etc. Some of which, such as the Martens and Sables, yield the most highly valued of furs. Three species of *Mustela* are exhibited—the Sable (*M. siberica*), Japan; the Stone Marten (*M. foina*), Tuscany); the Weasel (*M. vulgaris*), Cambridgeshire; the Glutton or Wolverine (*Gulo luscus*), Norway; the Badger (*Meles taxus*), North Asia; and the Otter (*Lutra vulgaris*), Europe.

The *Procyonidæ* contain the Raccoons and the Coatis, forms peculiar to America, which subsist largely on vegetarian food, and are represented by the Raccoon (*Procyon lotor*) and the Coati (*Nasua rufa*).

The Panda (*Ælurus fulgens*), closely allied to the above, is entirely vegetarian in its diet. It is a native of Central Asia, and is rarely found below the altitude of 7000 feet above the level of the sea.

The true bears (*Ursidæ*) are absent from Australia, Africa, and the greater part of South America. The largest is the Polar Bear, which, with the Grizzly Bear (*Ursus ferox*), the most formidable beast of prey of North America, are wholly carnivorous, but many of the smaller species are partly or entirely vegetarian, *e.g.*, the Malay or Sun Bear (*Ursus malayanus*), of which a young specimen is exhibited.

Suborder II.—Pinnipedia (Fin-footed).

This suborder consists of the Seals and their allies, which have their limbs developed into flippers, adapted for swimming, but almost useless on land. They have short tails, close fur, large eyes, and have the power of closing their nostrils and ear-openings. Except during the breeding season, they live in the sea, generally near to the shore, but at times they wander far out. Their food consists almost entirely of fish, crabs, and cuttlefish. From the skins prepared for the trade all the long, coarse hairs are removed, and only the soft under fur left, which accounts for their having such a different appearance to the Museum specimens. They are represented by the Sea-Lion or Sea-Bear (*Otaria forsteri*), and the Sea-Leopard (*Ogmorhinus lepthonyx*), both from the Southern Ocean.

ORDER III. INSECTIVORA (Insect Eaters).

The Shrews, Moles, Hedgehogs, etc., form but a very small order. Their range is, however, world wide, with the exception of Australia and South America. Their dentition and general osteological characters vary considerably in the different families. The skeleton of the mole (Talpa) is modified in a special manner, giving the animal its remarkable burrowing powers.

This order is divided into five families, of which two—the *Talpidæ* (Moles), and *Soricidæ* (the Shrews) are represented by an Albino specimen of the Common Mole (*Talpa Europea*) and the Shrew (*Sorex vulgaris*).

The earliest fossil form occurs in the Eocene.

ORDER IV. CHIROPTERA (Bats).

(Gr. *cheir*, a hand, and *pteron*, a wing.) A remarkable and sharply defined order in which the fore-limbs are developed into true wings, while the hind-limbs are small, feeble, and of but little use, except while the animal is resting, when it hangs head downwards, suspended by its sharp claws. They are found living all over the world, and as fossils in the Upper Eocene and the more recent formations.

There are two suborders: 1. Frugivora, or Fruit-eating, with flattened teeth, and with claws on their first and second fingers; about 70 species are known, the largest being the Philip-

pine Fruit Bat (*Pteropus jubatus*), having a spread of wing measuring 4 to 5 feet. In the case are shown specimens of Red-naped Kalongs (*Pteropus funereus*), from Derby, locally called Flying Foxes. 2. INSECTIVORA, Insect-eaters, with sharp teeth and claws on their thumbs only. These are much smaller, but much more numerous than the Fruit-eaters, over 350 species being known. The Nose-Leaf Bats are peculiar in having the membrane of the nose developed so as to resemble a leaf. This remarkable expansion of the skin gives a correspondingly large surface for the spread of the sensory nerves of scent and also of feeling, enabling them to avoid obstacles while flying, for it seems to receive vibrations communicated to the air by approaching or approached objects.

Specimens of the Little Bat (*Scotophilus pumilus*), Gould's Bat (*S. Gouldi*), the Chocolate Bat (*S. Morio*) and the Western Nyctophilus (*N. timoriensis*) are on view; but there is no example as yet of Geoffroy's Nyctophilus (*N. Geoffroyi*).

ORDER V. DERMOPTERA.

(Gr. *derma*, skin; *pteron*, a wing.) The FLYING LEMURS.

This order contains but a single genus, *Galeopithecus*, represented by *G. volans*, from the Philippines, to which island, and Malaysia, the Flying Lemurs are limited.

The lateral extension, of the skin of the body, forms, when stretched out by the limbs, a kind of parachute, enabling the animal to take long flying leaps, but only in a descending direction, just as is the case with the Flying Squirrels, Flying Opossums, and Flying Lizards. They have no power of ascending like Bats and Birds, and other creatures with true wings. They are all vegetable feeders. The lower incisors are altogether unique, being very deeply notched.

No fossil forms are known.

ORDER VI. RODENTIA.

(*Rodo*, I gnaw). The Gnawing Animals comprise the Squirrels, Rats, Mice, Rabbits, etc. They form the largest order of the Mammalia, numbering over 900 species, more than double that of the next largest, the bats. They are characterised by their want of canine teeth and by the peculiar structure and great development of their incisors, usually limited to two in each jaw, which continue to grow from their roots as they are worn down at the tips. Should one of these get destroyed the corresponding tooth in the other jaw, not getting worn down, continues to grow until it has been known to cause the death of the animal by starvation through preventing the mouth from closing.

In distribution they are world-wide; they first appeared in Eocene times.

They are divided into two sub-orders :—

1. SIMPLICIDENTATA (having a single pair of incisors) sub-divided into three sections :—1. SCIUROMORPHA, the Squirrels, Marmots, etc., represented by the Common Squirrel, (*Sciurus vulgaris*), the Flying Squirrels, (*Sciuropterus volucella*), New York, the Alpine Marmot, (*Arctomys marmotta*), and a Beaver, (*Castor Canadensis*), in which latter the incisor teeth are extremely sharp and strong. 2. MYOMORPHA (mouse-shaped), Rats and Mice. This section contains about 60 genera and 500 species, of which the following occur in this colony. The localities refer to the specimens in the wall-case. Those marked * have been introduced by man, the others are indigenous.

Hapalotis hemileucura [Gray] "Elsey's Hapalotis," Broome.
Hapalotis mitchelli [Gray] "Mitchell's Hapalotis," Katanning.
Hapalotis penicillata [Gld.] "Pencil-tailed Hapalotis."
Hapalotis longicaudata [Gld.] "Long-tailed Hapalotis."
Hydromys fuliginosus [Gld.] "Sooty Beaver Rat," Swan River.
Mus musculus* [Linn] "Common Mouse," Perth.
Mus decumanus* [Linn] "Brown or Norway Rat," Perth.
Mus rattus* [Linn] "Black Rat," Perth.
Mus fuscipes [Waterh.] "Dusky-footed Rat."
Mus assimilis [Gld] "Allied Rat."
Mus gouldi [Waterh.] "White-footed Mouse."
Mus nanus [Gld.] "Little Rat."
Mus albocinereus [Gld.] "Greyish White Mouse."
Mus burtoni [Ram.] "Burton's Rat."

3. HYSTRIOMORPHA, Porcupines. This section comprises animals in which the hair is developed in the form of spines, as is the case in our native Porcupine, a toothless animal, belonging to a totally distinct order, which will be described below. The European Porcupine (*Hystrix cristata*) is closely allied to the species abundant in India and the Malay Archipelago. These are all vegetable feeders, and live in burrows. The South American genus, however, contains several species which are arboreal, and have prehensile tails.

Suborder 2, DUPLICIDENTATA (having two pairs of incisors), consists of two genera, *Lepus*, the Hares and Rabits ; and *Lagomys*, the Pikas, The chief peculiarity of this suborder is that some of the bones of the skull consist merely of a bony network.

The North American Hare (*Lepus nigricollis*) and the Rabbit (*L. cuniculus*) are exhibited.

ORDER VII. THE UNGULATA,

Or Hoofed Animals, are divided into four suborders. 1. the PROBOSCIDEA, so called from the long trunk or proboscis into which the nose is developed. There are only two species now existing ;

the African and the Indian Elephants. They possess no lower incisors, and only two upper ones, which form the tusks. The six pairs of molars are brought into use successively during the animal's life, the new ones coming forward as the old ones are shed. The patterns of their crowns vary greatly in the different species, as can be seen by comparing teeth of the Indian Elephant (*Elephas indicus*) with those of the Mammoth (*E. primigenius*) from the Pliocene Essex, and those of *Elephas meridionalis*, from the older Pliocene of Norfolk, or with those in the cast of the skull of *Mastodon giganteus* from Orange Country, New York. In the Dinotherium this order of the incisors is reversed, the tusks occurring in the lower jaw, as shown in the cast from the original skull, found in Miocene of Hesse, Darmstadt, that is now in the British Museum.

There is plenty of evidence that the Mammoth, this extinct elephant, which closely resembled the existing Indian species, was contemporaneous with man in Europe, not only through its remains being found associated with human relics, but also by the rough carvings on a portion of a tusk found in a cave in Dordogne, and the drawings, on walls of other caves in France, of this hairy monster. For this elephant was distinguished by having a dense coat of long coarse outer hair, and a close woolly under hair of a reddish brown colour; these characteristics having come to light through the discovery of carcases disclosed by the melting of the ice in Northern Siberia. The flesh of some of them, although they had been dead some thousands of years, was so fresh that the dogs ate it, so great is the preservative power of extreme cold.

Suborder 2, HYRACOIDEA, the Coneys, small animals somewhat resembling short-eared rabbits, having small rounded hoofs and peculiar teeth, of which the formula is I. $^{1}/_{2}$, C. $^{0}/_{0}$, Pm. $^{4}/_{4}$, M. $^{3}/_{3}$, total 34. The molars resemble in pattern those of the Rhinoceros. Example (*Hyrax capensis*) the Coney of South Africa. No extinct forms are known.

Suborder 3, PERISSODACTYLA, the Odd-toed Ungulates. The Rhinoceros having three toes, the Tapir four, on their fore-feet, but three only on their hind feet, while the Horse walks on one only, though various fossil species of the latter show the intermediate forms back to the four toes. The rudiments of the second and fourth will be noticed in the skeleton of the domestic horse, *Equus caballus*. The differences in the teeth of these three families are well marked.

The Rhinoceros is only represented by a few fossil teeth from the Eastern counties of England, but the Tapir by a mounted specimen, and a skeleton, of *Tapirus indicus*.

Horses are now found wild in many parts of the world, where they have been introduced by the agency of man. A closely allied species, *E. prezevalskii*, is found wild in Central Asia. Several wild asses are indigenous to Asia, and one to Africa, where

also live the four striped species, the Quagga and the Zebras, but only two have been domesticated—the horse and the ass. The family has existed since Eocene times, and more than thirty fossil forms have been found in North America, but *E. caballus* did not appear until Pleistocene times, when it roamed over the whole American Continent and then became extinct. This happened ages before the discovery of that Continent. Why it happened is not understood, for when they were reintroduced they throve well and multiplied rapidly. Wild horses were numerous in Europe in the Pleistocene Period, but it is believed that our horses are the descendants of those imported through Greece and Italy from Asia, where they had long been domesticated and improved by careful breeding and training.

Suborder 4, ARTIODACTYLA. The Even-toed Ungulates contains four sections; 1, Bunodonta, Pigs and Hippopotami. Their toes are always in two or fours. The Pigs are represented in the New World by the Peccaries, of which the Collared Peccary (*Dicotyles tajacu*) is exhibited.

The Hippopotamus was once numerous in Europe and England, but the two surviving species are confined to Africa.

The remaining animals in this suborder are ruminants, having a stomach with three or four divisions, from one of which the food can be returned to the mouth to be masticated a second time, a process commonly called "chewing the cud."

Section 2, TYLOPODA. The camel and dromedary, restricted to North Africa and Asia, develope, when food is abundant, a large mass of fat in the hump, which is gradually absorbed in periods of scarcity. They have also the power of retaining water in their capacious stomachs for more than a week, rendering them invaluable as carriers in desert country.

The skeleton of *Camelus dromedarius* shows the dentition. The remaining genus of the Tylopoda inhabits South America. It contains two species, the *Huanaco* and the *Vieuna*, which under domestication are known as the Llama and Alpaca.

Section 3. The TRAGULINA or Chevrotains are small deer-like animals, represented by the "Napu" (*Tragulus javanicus*), from Sumatra.

Section 4, PECORA (*Pecus, pecoris*, a sheep), Oxen, Sheep, Goats, Antelopes, and Gazelles. These include all the most useful of the domesticated animals, except horses and dogs. They are all closely related; have no incisors in the upper jaw; stomachs consisting of four compartments; most have horns or antlers, and in nearly all the outer toes are rudimentary, or absent, while the hoofs are what are called "cloven." They consist of a pair of toes encased in hoofs, which have the appearance of being produced by splitting of a single hoof into two equal parts.

There are four families : 1, *Bovidæ*, in which the male members have, as a rule, hollow horns of fibrous structure, really modified hair. They are represented by the American Bison (*Bison americanus*) and the Cape Sheep (*Ovis aries*), the Water-buck, or Selous' Antelope (*Cobus ellipsiprymnus*), and the Persian Gazelle (*Gazella subgutturosa*).

2, The *Antilocapridæ*. The Prong-buck of North America is the only species ; and 3, the *Giraffidæ* have but one living representative, the Giraffe, now confined to the Ethiopian Region, and almost exterminated there. They are unrepresented in the Gallery, except by the cast of a skull of *Sivatherium*, the largest of the Pecora, an extinct animal closely allied to the Giraffe, found in the Lower Pliocene deposits, Siwalik Hills, India.

4, The *Cervidæ*, or Stags. In this family the males have antlers, outgrowths of true bone, covered during their development with a sensitive integument, which dies and peels off as soon as the antler is fully grown, leaving the bone bare and insensible.

In many species the antlers are shed and renewed every year, and in each succeeding year a new "tine," as the branches are called, is added by those species that have branching horns. The Red Deer (*Cervus elaphus*), from Scotland, is thus six years old. The other examples are the Fallow Deer (*Cervus dama*), the Axis (*Cervus axis*), and a fine specimen of the Elk, or Moose (*Alces machlis*), shot in Norway by Mr. Neil McNeil, who had it set up in London, and presented it to the Museum. This, the largest living member of the family, ranges round the Arctic Circle. In Europe and Asia it is called by the former name, and in America by the latter.

ORDER VIII. SIRENIA.

(Gr. *Seiren*, a mermaid.) The Sirenia or Sea-Cows are aquatic animals, with rounded heads, very small eyes, no ears, the fore limbs are flippers, no hind limbs, broad flattened tails, thick hairless skin, but with stout bristles on the lips. There are three Genera—*Manatus*, the Manatees ; *Halicore*, the Dugongs ; and *Rhytina*, Steller's Sea-Cow, which lived in Behring's Straits, but is now extinct. The Dugongs are of three species, one of which, *Halicore australis*, is found on the North-West Coast of this colony. It is now scarce and very shy, but formerly it was abundant, and was extensively trapped for the sake of its oil.

ORDER IX. CETACEA.

(Gr. *Ketos*. a whale.) The Cetacea are divided into two suborders :

1. Odontoceti, the Toothed Whales and Dolphins, have no whalebone, but always possess teeth. The external respiratory aperture, or blowhole, is single, the two nostrils

uniting before they reach the surface. The fore-limbs are flattened paddles externally, but the skeleton consists of the same bones as in other Mammals, except that in the digits, either four or five, the number of phalanges (finger-bones) is not limited to three, as in all other animals, but sometimes reaches as high as twelve or thirteen; and that the clavicle or "collar-bone," is wanting. The general surface of the skin is smooth, and immediately beneath is a thick layer of fat held together by a dense mesh of fibrous tissue. This constitutes the blubber. In most species there is a triangular fin, composed only of skin and fibrous tissue, placed near the middle of the back, to assist the animal to keep in an upright position in the water. They are devoid of hair, with the exception of a few bristles around the mouth in some species.

The most interesting member of this suborder is the great Sperm Whale (*Physeter macrocephalus*), of which some teeth were presented by Capt. J. S Roe, R.N. Its average length when full grown is 50 feet. The oil found in the cavity above the skull yields "spermaceti," the blubber gives sperm oil, and "ambergris," largely used in perfumery, is found in the intestines.

The only fresh-water species is the Dolphin of India, *Platanista gangetica.*

The Family DELPHINIDÆ contains, in addition to the true Dolphin, *Delphinus delphis*, the Grampus, the Porpoise, the Beluga or White Whale, the Narwhal or Sea-Unicorn, and others. A skeleton and a skin of a Dolphin, from the Estuary of the Swan, are exhibited. In the former the nature of the teeth (homodont), of which mention was made above, can be well seen. The Dolphin is world-wide in its distribution.

The Porpoise, *Phocœna communis*, is confined to the North Atlantic. It seldom enters the Mediterranean, where the Dolphin, the "sacred fish" of the ancients, is abundant. These two Mammals are very commonly misnamed, even by seafaring people, although they are very different in appearance. The Dolphin attains a length of seven and a half feet. It has a long and distinct beak, and 46 to 50 teeth; while the porpoise does not attain six feet, has no beak, and only 26 teeth.

Suborder 2. MYSTACOCETI, or BALANOIDEA, the Baleen or Whalebone Whales, have rudimentary teeth when very young, but these soon disappear and are replaced by the "baleen," a series of horny plates to the number of three or four hundred on each side of the mouth, which are used to strain the water from the small marine animals upon which these whales subsist. There are five genera:—*Balœna*, the Right Whales, none of which exceed 50 feet in length; *Neobalœna*, whales found on the Australasian and New Zealand coasts; *Rhachianectes*, the Grey Whale of the North Pacific; *Megaptera*, the "Humpbacks" of the whalers; and lastly

the *Balænoptera*, the Rorquals, Fin Whales, and Razor-backs, which are found in all oceans. The largest is *Balænoptera sibbaldi*, Sibbald's Fin-Whale, the most gigantic of all animals, living or extinct, and of which this Museum possesses an unusually large specimen, as its skeleton measures 79 feet 7 inches in length, for they seldom attain a length of more than 80 feet, and this one, when in the flesh, must have been at least 86 or 87 feet long. These whales have only four digits in the flippers.

This whale was stranded on the coast of the Vasse in the winter of 1897, and promptly secured by Mr. E. C. B. Locke. M.L.A. Its colour is a dark bluish grey. Its speed is very great, reaching twelve miles an hour when hunted.

The oldest Cetaceans known were found in the Eocene of North America. Three bones of *Balænodon*, an extinct whale, from the Red Crag of Suffolk, are to be seen in the table-case.

ORDER X. EDENTATA (Without Teeth).

This order is so called on account of the incompleteness or entire absence of teeth in its members. There are four families: 1, Pilosa (Hairy) contains the Sloths and Ant-eaters. The Modern Sloths are small animals, not much larger than a cat; they pass their lives in trees, hanging by their powerful claws to the branches, and living on the leaves and twigs. They never descend to the ground unless compelled to do so. They have five teeth in the upper and only four in the lower jaw, rudimentary tails, and either two or three claws. An example of the Two-toed Sloth *(Cholœpus hoffmani)* from Costa Rica is exhibited. They are confined to Central and South America.

The Ant-eaters have no teeth, a long snout, with a very small mouth, but a very long tongue covered with a viscid secretion, which catches the Ants and small insects upon which they live. The Great Ant-eater (*Myrmecophaga jubata)*, from Guiana, has very powerful claws, which enable it to pull down the nests of the White Ants. It has a magnificent bushy tail. It lives on the ground. Some of the species of this genus are arboreal, but none make burrows.

Many fossil forms presenting characters intermediate between those of the above genera have been found in the Pleistocene of South America, some of gigantic size, *i.e.*, the Giant Ground Sloth from La Plata, eighteen feet in length, with bones more massive than those of the elephant.

2, Loricata (Shielded). The Armadillos occupy about the same area as the Pilosa, and are also found fossil in the same formations. One, *Glyptodon clavipes*, measured nearly twelve feet in length, while the Giant Armadillo of the present days only attains two feet. The specimen of the Hairy Armadillo *(Dasypus villosus)*, from Brazil, shows the "Shield," which is composed of bony plates. They live on insects, for which they burrow in the ground.

3, Squamata. The Pangolins, or Scaly Ant-eaters, are toothless; they subsist almost entirely on white ants. In the development of mouth, tongue, and claws they closely resemble the Giant Ant-eater, but are covered with horny scales (modified hair). They are found in Africa and Asia. *Manis longicaudata* is an excellent example.

4, Tubulidentata (tube-toothed). The Aardvarks (Earth-pigs), of which two species exist, one in South and the other in North Africa, received their name from the Dutch. They have eight to ten teeth, are insect eaters, and have feet very similar to the Ant-eaters. They are as yet unrepresented in the Gallery.

ORDER XI.—MARSUPIALIA.

The Marsupials (*Marsupium*, a pouch), are characteristic of the Australian Region, a region so remarkable that some authorities think that it should be opposed to the rest of the world, for exclusive of man and animals introduced by him, the marine mammals, a few rodents and bats, all the mammals found in it are implacental, *i.e.*, marsupials and monotremes, offering, in the 130 species known, forms and habits representative of almost all the other orders of Mammalia. They are the lowest in organization, and have been the longest in existence, their fossil remains appearing early in the Mesozoic Period, and at one time probably spread over the greater portion of the globe.

A characteristic feature is the possession of long, slender epipubic, or "Marsupial," bones, as they are commonly called, the only exception being in the Tasmanian Wolf, in which animals these bones are cartilaginous.

In this Order the young are born in a very immature condition, and are conveyed by the mother in her mouth to the pouch, where they attach themselves firmly to the nipples, to which they adhere until considerably developed; and for some time after they use the pouch as a place of refuge.

The only Marsupials at present living outside the Australian Region are the *Didelphiidæ*, the American Opossums, which are carnivorous and insectivorous, and in some cases have no pouch, but the young are carried on the back of the mother, on which they are supported by twisting their tails round hers.

Marsupials and Monotremes Indigenous to Western Australia.

ORDER XI.—MARSUPIALIA.

Suborder I.—Diprodontia.

FAMILY I.—MACROPODIDÆ

SUB-FAMILY I.—MACROPODINÆ.

Macropus giganteus [Zimm] "Great Grey Kangaroo," Kojonup and Gillingarra.
Macropus antilopinus [Gld.] "Antilopine Kangaroo," Derby.
Macropus robustus [Gld.] "Wallaroo," Murchison.
Macropus isabellinus [Gld.] "Isabelline Kangaroo."
Macropus rufus [Desm] "Red Kangaroo," Upper Murchison.

Macropus irma [Jourd] "Black-gloved Wallaby," Katanning.
Macropus agilis [Gld.] "Agile Wallaby," Kimberley.
Macropus eugenii [Desm] "Dama Wallaby," Abrolhos Islands and Kojunup.
Macropus brachyurus [Q. and G.] "Short-tailed Wallaby," Rottnest Island and Perth.
Petrogale lateralis [Gld.] "West Australian Rock Wallaby,' Derby.
Petrogale brachyotis [Gld.] "Short-eared Rock Wallaby."
Petrogale concinna [Gld.] "Little Rock Wallaby."
Petrogale inornata [Gld.] "Plain Rock Wallaby."
Onychogale unguifera (Gld.] "Nail-tailed Wallaby," Broome.
Onychogale lunata [Gld.] "Crescent Wallaby," Kojonup and Katanning.
Lagorchestes conspicillatus [Gld.], "Spectacled Hare Wallaby."
Lagorchestes conspicillatus var. leichardti [Gld.] "Spectacled Hare Wallaby," Broome.
Lagorchestes hirsutus [Gld.] "Rufous Hare Wallaby," Dorie Island, Carnarvon.
Lagostrophus fasciatus [P. and L.] "Banded Wallaby," Dorie Island, Carnarvon.

Sub-Family II.—Potorinæ.

Bettongia penicillata [Gray] "Brush-tailed Rat Kangaroo," Kojonup.
Bettongia lesueuri [Q. and G.] "Lesueur's Rat Kangaroo," Kojonup.
Potorous gilberti [Gld.] "Gilbert's Rat Kangaroo."
Potorous platyops [Gld.] "Broad-faced Rat Kangaroo."

FAMILY II.—PHALANGERIDÆ.

Sub-Family I.—Tarsipedinæ.

Tarsipes rostratus [Gerv. and Verr.] "Tarsipes," Albany.

Sub-Family II.—Phalangerinæ.

Acrobatus pygmæus [Shaw] "Pigmy Flying Phalanger," Wagerup.
Dromicia concinna [Gld.] "Lesser Dormouse Phalanger."
Petaurus breviceps [Waterh.] "Lesser Flying Opposum," Roebourne and Broome.
Pseudochirus occidentalis [Thos.] "Western Ring-tailed Opposum," Broome Hill.
Trichosurus vulpecula [Kerr) "Common Opposum," Swan River, Williams, Korrinup.
Trichosurus vulpecula, var. fuliginosus [Ogilb.] "Black Opposum" Swan River.

Suborder II.—Polyprotodontia.

FAMILY IV.—PERAMELIDÆ.

Peragale lagotis [Reid] "Rabbit Bandicoot," Wagin and Broome Hill.
Perameles obesula [Shaw] "Short-nosed Bandicoot," Broome Hill.
Perameles macrura [Gld.] "North-West Australian Bandicoot," La Grange Bay.
Perameles bougainvillei [Q. and Gld.] "Striped Bandicoot." Kojonup.
Chœropus castanotis [Gray] "Pig-footed Bandicoot, La Grange Bay.

FAMILY V.—DASYURIDÆ.

Sub-Family I.—Dasyurinæ.

Dasyurus geoffroyi [Gould] "Geoffroy's Dasyure," Perth and Mandurah.
Dasyurus hallucatus [Gld.] "Northern Australian Dasyure."
Phascologale apicalis [Gray] "Freckled Phascologale," Cranbrook and Wagerup.
Phascologale flavipes, var. leucogaster [Gray] "Yellow-footed Pouched Mouse," Wagerup and Albany.
Phascologale penicillata [Shaw] "Brush-tailed Phascologale," Kojonup.
Phascologale calura [Gld.] "Lesser Brush-tailed Phascologale," Kojonup.
Sminthopsis murina [Waterh.] "Common Pouched Mouse," Kojonup.
Sminthopsis crassicaudata [Gld.] "Fat-tailed Pouched Mouse," Day Dawn, Murchison.

Sub-Family II.—Myrmecobiinæ.

Myrmecobius fasciatus [Waterh.] "Banded Ant-eater," Coolgardie, Kojonup, and Katanning.

FAMILY VII.—NOTORYCTIDÆ.

Notoryctes typhlops [Stirling] "Marsupial Mole," East Central District (?).

ORDER XII.—MONOTREMATA.

FAMILY I.—ECHIDNIDÆ.

Echidna aculeata [Shaw] "Porcupine," Newcastle and Geraldton.

The localities refer to the specimens in the Museum, and thus show what species are there represented.

SUBORDER I. The DIPROTODONTIA

(With two front teeth) are all vegetable feeders. They are divided into three families :—

Family I. Macropodidæ, the Kangaroos.

Family II. Phalangeridæ, the Phalangers, or Australian Opposums.

Family III. Phascolomidæ, the Wombats.

They all have the hind feet syndactylous (toes joined together) tails long, and ears well developed. In the first family the hind limbs are much longer than the fore, and there is no hallux (great toe) ; in the second the limbs are nearly equal, and there is a large opposable hallux ; in the third tails and ears rudimentary.

The Macropodidæ are again divided into three well-marked sub-families.

1. The Macropodinæ, or Kangaroos proper, are all very similar in form and general appearance, and have a characteristic hind foot. In it the fourth toe is very large and strong, and has a powerful claw. On the outer side lies the fifth toe, much smaller, while on the inner side are the second and third toes, excessively slender, and *joined together* ; the great toe is wanting. In the Kangaroos the hind feet are more than ten inches in length ; in the large Wallabies under ten but more than six inches, and in the small Wallabies under six inches. One genus, Dendrogalus, contains the Tree-Kangaroos, which have the fore limbs nearly as long as the hind. They are restricted to the forests of New Guinea and North Queensland.

2, Potoroinæ. The Kangaroo rats are small, the length of head and body not exceeding two feet ; the claws of the fore feet are large, the ears small and rounded ; canines present.

3, Hypsiprymnodontina. There is one species, *Hypsiprymnodon moschatus*, found in Queensland, which is remarkable for having an opposable great toe, and modifications in the teeth, bringing it near to the Phalangers in those respects, though the macropine characteristics preponderate.

Family 2, Phalangeridæ, contains three sub-families. 1, Tarsipedinæ, represented by a single species, *Tarsipes rostratus*, a small mouse-coloured pouched animal, found only in the south of this colony. The muzzle is long, and so is the extensile tongue. The teeth are minute and peculiar, as will be seen by the formula I. $^{2}/_{1}$, C. $^{1}/_{0}$, P. $^{1}/_{0}$, M. $^{3}/_{3}$, total 22, fourteen being in the upper jaw and only eight in the lower. They feed on the nectar of flowers and on insects. Their tails are prehensile. They are very interesting in captivity, for although they sleep, curled up into a ball, during the day, like all the Marsupials, they are very lively at night. They can be fed on sopped bread, sweetened with honey or sugar, and on flies, moths, etc.

Subfamily 2, PHALANGERINÆ. The Australian Opossums extend over Australia, Tasmania, and the Papuan Islands. Twenty-nine species are known, but only six of these have been found in this colony, of which the most interesting is the Pigmy Flying Phalanger, occurring in the South-West Districts. It only attains a length of two and three-quarter inches, with a tail slightly longer than that; teeth 36. Owing to its minute size and nocturnal habits it is seldom seen.

Family 3, PHASCOLOMYIDÆ. The Wombats are confined to Australia, south of the Tropics; the Common Wombat, *Phascolomys mitchelli*, being found in New South Wales, Victoria, and South Australia; the Hairy-Nosed Wombat, *P. latifrons*, in South Australia only; and the Tasmanian Wombat, *P. ursinus*, in Tasmania, and the islands in Bass's Straits. *P. mitchelli* was first described from its fossil remains in the Pleistocene of this Continent, while in that formation in Queensland the remains are found of an extinct form, *Phascolonus gigas*, which was as large as a Tapir.

Another extinct marsupial (*Thylacoleo carnifex*), from the Pleistocene, is represented by the cast of a skull from King's Creek, Darling Downs, Queensland. At first sight it would appear to be a carnivore; however, a closer inspection shows that its dentition is unlike that of any known predaceous beast, but nearer to that of the Phalangers, so that its name *carnifex* (an executioner, a torturer) may be quite undeserved.

Suborder 2. The POLYPROTODONTIA (with many front teeth), have four or five incisors in the upper, and three or four in the lower jaw; the canines are long and pointed. They are carnivorous and insectivorous. They are divided into four families.

Family IV. PERAMELIDÆ, Bandicoots.
Family V. DASYURIDÆ, Tasmanian Wolf, Native Cats, etc.
Family VI. DIDELPHYIDÆ, Opossums.
Family VII. NOTORYCTIDÆ, Australian Mole.

The DIDELPHYIDÆ are exclusively American, although fossil forms occur in Europe; the others are strictly Australasian.

FAMILY IV.—PERAMELIDÆ.

The Bandicoots have the hind feet somewhat similar to those of the Kangaroos, though the limbs are nearly equal in length. They have the canines well developed. The pouch opens backwards, not as in the Kangaroo. The three Genera are all represented in this colony. The Rabbit-Bandicoot (*Peragale lagotis*), remarkable for its long soft fur and enormous ears, is not uncommon in the districts traversed by the Great Southern Railway. The short-eared Bandicoot (*Perameles obesula*), and the Striped Bandicoot (*P. bougainvillei*), inhabit the southern portions of the colony. The most remarkable is the Pig-footed Bandicoot (*Chœropus castanotis*),

in which the fore feet have the second and third toes fully developed, and of equal length, the others being rudimentary or absent, while the hind foot is mainly composed of the fourth toe, the others being minute and useless. The vernacular name is due to the striking resemblance of its fore feet to those of a pig.

Family 5, DASYURIDÆ, contains two suborders. 1, Dasyurinæ, the carnivorous marsupials, the largest being the Tasmanian Wolf or Tiger *(Thylacinus cynocephalus)*, which is about the size and build of the dingo (its skull is peculiarly dog-like) ; it is now restricted to the wildest and most inaccessible mountain glens of Tasmania. A closely allied form is found fossil in Queensland and in New South Wales. The next in order and in size is *Sarcophilus ursinus*, also restricted to the same island. On account of its savage nature it is known as the " Tasmanian Devil."

Dasyurus geoffroyi, the native cat, occurs in the south of this colony, and *D. hallucatus* in the north. The next genus, Phascologale, is represented by several species, and Sminthopsis by two. These latter are commonly called marsupial, or pouched, mice ; they are mainly insectivorous. All the above have from 42 to 46 teeth, but the remaining suborder, the Myrmecobiinæ, has the largest number of any marsupial, viz., 56. There is only one living form, *Myrmecobius fasciatus*, the Banded Ant-eater, confined to the temperate portions of this colony and of South Australia. It has no pouch, but the young hang on the teats and are hidden in the long fur.

In 1891, Dr. Stirling described a Marsupial Mole, *Notoryctes typhlops*, from the sand plains 1,500 miles north of Adelaide. This little creature, which measures but seven or eight inches in length, is very mole-like in structure. It is the only member of Family VII., Notoryctidæ. In all probability it will be found to occur in the East Central Districts of this colony.

A cast of the skull of *Diprotodon australis*, from the Pleistocene deposits of Queensland, is of great interest, for this huge extinct Marsupial, which must have been as big as a rhinoceros, belonged to a Family intermediate in character between the Macropodidæ and the Phalangeridæ.

ORDER XII. MONTREMATA.

The Monotremes have skeletons of a very low type, resembling in some particulars those of the reptiles. They are ovo-viviparous, and the young are nourished in a temporary pouch, developed during the breeding season. There are two families : 1, ECHIDNIDÆ, containing two genera, the five-toed *Echidna aculeata*, inhabiting Australia, Tasmania, and New Guinea, and the three-toed *Proechidna bruijini*, peculiar to the latter country. They have no teeth ; the back is cylindrical, and the fur mixed with spines. They burrow in the ground, as their food consists exclusively of

ants, which they catch on their long extensile tongues. 2, ORNITHORYNCHIDÆ, which only contains the Australian Water Mole *(Ornithorhynchus anatinus)*, an aquatic animal, with webbed feet, and a flat bill, which it uses, just like a duck, in searching for small creatures in the mud. It has no teeth, except a few rudimentary ones, when very young. It has been found in all the Australian Colonies, except Western Australia.

CLASS II.—AVES.

Birds.

The possession of feathers distinguishes a bird from every other vertebrate animal. Birds are defined as "Oviparous warm-blooded animals, having a double circulation, a covering of feathers, and with the anterior limbs transformed into wings."

The structure of birds is specially adapted for flight, with modifications according to the mode of life, the manner of obtaining food, or for protection.

About 11,617 species of birds are known to Naturalists, and these are divided into three primary sub-classes:

Subclass 1. CARINATÆ *(carina*, a keel*)*, Birds with a keeled breast-bone.

Subclass 2. RATITÆ *(rates*, a raft*)*, Raft-breasted Birds.

Subclass 3. SAURURÆ *(saura*, a lizard*)*, Lizard-tailed Birds.

The fauna of the Australian Realm is as distinctive and as remarkable in its birds as in its mammals. In the following notes as much space as possible is allotted to the indigenous birds, and but little to those of the rest of the world, as this collection is an Australian one, types merely being exhibited of Foreign Birds.

INTRODUCTORY CASE.

To enable visitors to obtain an insight into the classification, they will find, opposite the entrance to the Zoological Gallery, a case containing the heads, wings, legs, and tails of the chief orders of birds, as those parts show their leading characteristics.

About 800 birds are set up in the cases, while nearly as many again are stored in the Reserve Collection, which latter can be seen by Ornithologists on application to the Curator.

SYSTEMATIC ARRANGEMENT OF THE CLASS AVES.

Subclass I. **CARINATÆ.** CARINATE BIRDS.

Order I. ACCIPITRES : Birds of Prey.
II. PASSERIFORMES : Perching Birds
III. PICARIÆ : Picarian Birds.
IV. PSITTACI : Parrots.
V. COLUMBÆ : Pigeons and Doves.
VI. PTEROCLETES : Sand-grouse.
VII. GALLINÆ : Game-birds.
VIII. OPISTHOCOMI : The Hoatzin.
IX. HEMIPODII : Quails.
X. FULICARIÆ : Rails.
XI. ALECTORIDES : Cranes, Bustards, etc.
XII. LIMICOLÆ : Plovers, etc.
XIII. GAVIÆ, Sea-birds.
XIV. TUBINARES : Tube-nosed Swimmers.
XV. PLATALEÆ : Ibises and Spoonbills.
XVI. HERODIONES : Herons.
XVII. STEGANOPODES : Pelicans, Cormorants, etc.
XVIII. PYGOPODES : Diving Birds.
XIX. ALCÆ : Auks.
XX. IMPENNES : Penguins.
XXI. CHENOMORPHÆ : Swans, Ducks, etc.
XXII. CRYPTURI : Tinamous.

Subclass II. **RATITÆ.** RAFT-BREASTED BIRDS.

Order I. STRUTHIONES : Ostriches.
II. RHEÆ : American Ostrich.
III. CASUARII : Emus and Cassowaries.
IV APTERYGES : Apteryx.

Subclass III. **SAURURÆ.** LIZARD-TAILED BIRDS.

The Tabulated Lists of Species, that follow, only contain the names of those Western Australian birds, which are to be seen in the Museum.

A complete list of all the known West Australian birds appears in the *Year Book* just issued.

SUBCLASS I.—CARINATÆ

Includes all those birds which have a keel on their breast-bone, a "merry thought," and wings having, except in the Penguins, the power of flight; whose feathers are in tracts, and have their barbs united along the margins. The Penguins have merely rudimentary wings.

The above list contains the Orders of living birds only. Many fossil carinate birds have been discovered, of which the oldest and most remarkable is the *Ichthyornis*, a toothed bird found in the Cretaceous Beds of North America. The remains of other toothed birds have been found in England. Altogether, about twenty species of Cretaceous birds have been described. In Tertiary times birds became much more numerous, and many orders are represented, while relics of all the orders, of many of the genera, and even of some of the existing species, have been found in the Pleistocene deposits.

Order I.—Accipitres (*Accipiter*, a hawk), Birds of Prey.

All the members of this Order are characterised by their strong, curved, sharp-edged, sharp-pointed bills; the upper mandible is the longest, and is hooked at the end. The wings are pointed, and very powerful, especially of those that seek their food by day, but less so in those that hunt by night. The former have the eyes directed laterally, the latter forwards; the legs are short, with three toes in front and one behind, all armed with strong claws or talons. The males are usually much smaller than the females. No vultures inhabit Australia.

Suborder—Falcones: "Falcons."

FAMILY—FALCONIDÆ: HAWKS.

Sub-Family—Accipitrinæ: "Long legged Hawks."

Circus assimilis (J. and S.) Spotted Harrier.
Circus Gouldi (Buonaparte.) Harrier.
Astur novæ-hollandiæ (Gm.) White Goshawk.
Astur approximans (V. and H.) Goshawk.
Accipiter cirrhocephalus (Vieill.) Sparrow-hawk.

Sub-family—Aquilinæ: Eagles.

Uroaëtus audax (Lath.) Wedge-tailed Eagle (Eagle-hawk).
Nisaëtus morphnoides (Gould.) Little Eagle.
Haliaëtus leucogaster (Gm.) White-bellied Sea-Eagle.
Haliastur girrenera (Vieill.) White-headed Sea-Eagle.
Haliastur sphenurus (Vigors.) Whistling Eagle.
Milvus affinis (Gould.) Kite.
Lophoictinia isura (Gould.) Square-tailed Kite.
Gypoictinia melanosterna (Gould.) Black-breasted Buzzard.
Elanus axillaris (Lath.) Black-shouldered Kite.
Elanus scriptus (Gould.) Letter-winged Kite.

SUB-FAMILY—FALCONINÆ : FALCONS.

Falco melanogenys (Gould.) Black-cheeked Falcon.
Falco hypoleucus (Gould.) Grey Falcon.
Hieracidea berigora (occidentalis) (V. and H.) Striped Brown Hawk.
Cerchneis cenchroides (V. and H.) Kestrel.

Suborder—Pandiones: Ospreys.

Pandion leucocephalus (Gould.) Osprey (Fish-hawk.)

Suborder—Striges : Owls.

FAMILY—BUBONIDÆ : OWLS PROPER.

SUB-FAMILY—BUBONINÆ.

Ninox boobook (Lath.) Boobook Owl. [The real "Morepork."]
Ninox ocellata (H. and J.) Marbled Owl.
Ninox connivens (Lath.) Winking Owl.

FAMILY—STRIGIDÆ : BARN OWLS.

Strix novæ-hollandiæ (Steph.) Masked Owl.
Strix delicatula (Gould.) Lesser Masked Owl.

Order II.—Passeriformes (Sparrow-shaped, *Passer*, a sparrow), PERCHING BIRDS.

This contains by far the largest number (6200 species) of birds of any Order. However, they can easily be recognised by short slender legs, having three toes before and one behind, the two external toes being united by a very short membrane. The toes have long, pointed, and slightly curved claws. The males are usually larger and more brilliantly coloured than the females, this being very marked in the Birds of Paradise, the Humming-birds, the Sun-birds, and many others. The true Finches are not found in Australia, but their place is taken by the Weaver Finches. The Bower-birds are confined to this Continent and New Guinea. Their playhouses, or "bowers," have nothing to do with their nests, but are simply what the name denotes. They amuse themselves by collecting all the small objects of the lightest and darkest colours that they can find, placing the former at one end and the latter at the other, and then change them backwards and forwards. The galvanised screws and washers, shells, etc., and the pieces of charcoal, etc., with the specimen, were all carefully collected by Mr. John T. Tunney, when he found this "bower."

The Lyre-Birds are peculiar to this realm ; while of the 200 species of Honey-eaters known, only one occurs outside Australia, Malaysia, and Polynesia.

Suborder.—Passeres.

FAMILY—CORVIDÆ : CROWS.

SUB-FAMILY—CORVININÆ : CROWS PROPER.

Corvus coronoides (V. and H.) Crow.
Corone australis (Gld.) Raven.
Strepera plumbea (Gld.) Leaden Crow-Shrike.

FAMILY—ORIOLIDÆ: ORIOLES.

Oriolus viridis (Lath.) Oriole.

FAMILY—PRINOPIDÆ: WOOD-SHRIKES.

SUB-FAMILY—PRINOPINÆ.

Grallina picata (Lath.) Magpie Lark.
Collyriocincla rufiventris (Gld.) Buff-bellied Shrike-Thrush.
Pinarolestes parvulus (Gld.) Little Shrike-Thrush.

FAMILY—CAMPOPHAGIDÆ: CUCKOO-SHRIKES.

Pteropodocys phasianella (Gld.) Ground Cuckoo-Shrike.
Graucalus melanops (Lath.) Black-faced Cuckoo-shrike
Lalage tricolor (Dw.) White-shouldered Caterpillar-eater.

FAMILY—MUSCICAPIDÆ: FLY-CATCHERS.

Petrœca campbelli (Sharpe.) Scarlet-breasted Robin; Western variety of P. Leggii.
Petrœca goodenovi (V. and H.) Red-capped Robin.
Petrœca bicolor (V. and H.) Hooded Robin.
Smicrornis flavescens (Gld.) Yellow-tinted Tree-Tit.
Gerygone albigularis (Gld.) White-throated Fly-eater.
Pseudogerygone culicivora (Gld.) Southern Fly-eater.
Malurus splendens (Q. and G.) Banded Wren.
Malurus leucopterus (Q. and G.) White-winged Wren.
Malurus leuconotus (Gld.) White-backed Wren.
Malurus amabilis (Gld.) Lovely Wren.
Malurus coronatus (Gld.) Purple-crowned Wren.
Malurus dorsalis (Dewin.) Red-backed Wren.
Rhipidura preissi (Cab.) Western Fantail.
Rhipidura setosa (Q. and G.) Northern Fantail.
Rhipidura tricolor (Vieill.) Black and White Fantail.
Myiagra latirostris (Gld.) Broad-billed Fly-catcher.
Sisura inquieta (Lath.) Restless Fly-catcher.

FAMILY—TURDIDÆ: TRUE THRUSHFS.

SUB-FAMILY SYLVIINÆ: WARBLERS.

Acrocephalus longrostris (Gld.) Long-billed Reed Warbler.

FAMILY—TIMELIIDÆ: BABBLING THRUSHES.

SUB-FAMILY- PTILONORHYNCHINÆ: BOWER BIRDS.

Chlamydodera guttata (Gld.) Yellow-spotted Bower Bird.
Chlamydodera nuchalis (J. and S.) Great Bower Bird.

SYB-FAMILY—TIMELIINÆ: BABBLERS, ETC.

Stipiturus malachurus (Lath.) Emu-Wren.
Stipiturus ruficeps (Camp.) Rufous-crowned Emu-Wren.
Amytis striata (Gld.) Striated Grass-Wren.
Amytis macrura (Gld.) Large-tailed Grass-Wren.
Acanthiza inornata (Gld.) Plain-coloured Tit.
Acanthiza apicalis (Gld.) Broad-tailed Tit.
Acanthiza chrysorrhoa (Q. and G.) Yellow-rumped Tit.
Sericornis maculata (Gld.) Spotted Scrub-Wren.
Cinclosoma castanonotum (Gld.) Chestnut-backed Ground-bird.

Cinclosoma cinnamoneum (Gld.) Cinnamon Babbling-Thrush.
Psophodes nigrogularis (Gld.) Black-throated Coachwhip-bird.
Pomatorhinus superciliosus (V. and H.) White-browed Babbler.
Pomatorhinus rubeculus (Gld.) Red-breasted Babbler.
Cinclorhamphus cruralis (V. and H.) Brown Song Lark.
Calamanthus campestris (Gld.) Field Wren.
Ephthianura albifrons (J. and S.) White-fronted Chat.
Ephthianura tricolor (Gld.) Tri-coloured Chat.
Ephthianura aurifrons (Gld.) Orange-fronted Chat.

FAMILY—PARIDÆ: TIT-MICE.

SUB-FAMILY—PARINÆ.

Sphenostoma cristatum (Gld.) Wedge-bill.

FAMILY—LANIIDÆ: CROW-SHRIKES.

SUB-FAMILY—GYMNORHININÆ.

Gymnorhina dorsalis (Campb.) Long-billed Magpie.
Cracticus picatus (Gld.) Pied Butcher-bird.
Cracticus destructor (Temm.) Butcher-bird.

SUB-FAMILY—PACHYCEPHALINÆ.

Falcunculus leucogaster (Gld.) White-bellied Shrike-Tit.
Oreoica cristata (Lewin.) Bell-bird.
Eopsaltria georgiana (Q. and G.) Grey-breasted Shrike-Robin.
Eopsaltria gularis (Q. and G.) White-breasted Shrike-Robin.
Pachycephala occidentalis (Ram.) Western Thick-head.
Pachycephala rufiventris (Lath.) Rufous-breasted Thick-head.

FAMILY—CERTHIIDÆ.

SUB-FAMILY—CERTHIINÆ.

Climacteris melanonota (Gld.) Black-backed Tree-creeper.
Climacteris rufa. (Gld.) Rufous Tree-creeper.

SUB-FAMILY—SITTINÆ.

Sittella pileata (Gld). Black-capped Tree-runner.
Sittella striata (Gld.) Striated Tree-runner.

FAMILY—MELIPHAGIDÆ: HONEY-EATERS.

SUB-FAMILY—MYZOMELINÆ.

Myzomela erythrocephala (Gld.) Red-headed Honey-eater.
Myzomela nigra (Gld.) Black Honey-eater.
Acanthorhynchus superciliosus (Gld.) White-browed Spinebill.

SUB-FAMILY—ZOSTEROPINÆ.

Zosterops gouldi (Bparte.) Green-backed White-eye.
Zosterops lutea (Gld.) Yellow White-eye.
Melithreptus chloropsis (Gld.) Western White-naped Honey-eater.
Melithreptus gularis (Gld.) Black-chinned Honey-eater.

SUB-FAMILY—MELIPHAGINÆ.

Glycyphila fulvifrons (Lewin.) Tawny-crowned Honey-eater.
Glycyphila ocularis (Gld.) Brown Honey-eater.
Entomophila rufigularis (Gld.) Red-throated Honey-eater.
Entomophila leucomelas (Cuv.) Pied Honey-eater.

Ptilotis flavistriata (Gld.) Yellow-streaked Honey-eater.
Ptilotis sonora (Gld). Singing Honey-eater.
Ptilotis leilavalensis (North.) Carter's Honey-eater.
Ptilotis unicolor (Gld.) White-gaped Honey-eater.
Ptilotis penicillata (Gld.) White-plumed Honey-eater.
Ptilotis ornata (Gld.) Yellow-plumed Honey-eater.
Ptilotis flavescens (Gld.) Yellow-tinted Honey-eater.
Meliornis longirostris (Gld.) Long-billed Honey-eater.
Meliornis sericea (Gld.) White-cheeked Honey-eater.
Manorhina obscura (Gld.) Dusky Minah.
Manorhina melanophrys (Lath.) Bell Minah.
Acanthochæra carunculata (Lath.) Red Wattle-bird.
Acanthochæra lunulata (Gld.) Little Wattle-bird.
Acanthochæra rufigularis (Gld.) Spiney-cheeked Honey-eater.
Philemon citreogularis (Gld.) Yellow-throated Friar-bird.

FAMILY—DICÆIDÆ: FLOWER-PECKERS.

Dicæum hirundinaceum (Shaw.) Flower-pecker or Mistletoe-bird.
Pardalotus ornatus [striatus] (Temm.) Red-tipped Pardalote.
Pardalotus punctatus (Temm.) Spotted Pardalote (Diamond-bird).
Pardalotus uropygialis (Gld.) Chestnut-rumped Pardalote.

FAMILY—HIRUNDINIDÆ: SWALLOWS.

SUB-FAMILY—HIRUNDININÆ: SWALLOWS PROPER.

Hirundo neoxena (Gld.) Swallow.
Petrochelidon nigricans (Vieill.) Tree Martin.
Petrochelidon ariel (Gld.) Fairy Martin.

FAMILY—MOTACILLIDÆ: WAGTAILS AND PIPITS.

Anthus australis (V. and H.) Pipit (Ground-lark).

FAMILY—ARTAMIDÆ: WOOD-SWALLOWS.

Artamus superciliosus (Gld.) White-browed Wood-Swallow.
Artamus personatus (Gld.) Masked Wood-Swallow.
Artamus cinereus (Vieill.) Grey-breasted Wood-Swallow.
Artamus melanops (Gld.) Black-faced Wood-Swallow.
Artamus sordidus (Latham.) Wood-Swallow.
Artamus minor (Vieill.) Little Wood-Swallow.

FAMILY—PLOCEIDÆ: WEAVERS.

SUB-FAMILY—VIDUINÆ.

Zonæginthus oculatus (Q. and G.) Red-eared Finch.
Emblema picta (Gld.) Painted Finch.
Tæniopygia castanotis (Gld.) Chestnut-eared Finch.
Stictoptera bichenovii (V. and H.) Banded Finch.
Stictoptera annulosa (Gld.) Black-ringed Finch.
Munia pectoralis (Gld.) White-breasted Finch.
Bathilda ruficauda (Gld.) Red-faced Finch.
Poephila acuticauda (Gld.) Long-tailed Finch.
Poephila personata (Gld.) Masked Finch.
Poephila gouldiæ (Gld.) Gouldian Finch.
Poephila mirabilis (H. and J.) Scarlet-headed Finch.
Neochmia phaeton (H. and J.) Crimson Finch.

FAMILY—ALAUDIDÆ: LARKS.

Mirafra horsfieldi (Gld.) Bush Lark.

FAMILY—ATRICHIIDÆ: SCRUB-BIRDS.

Atrichia clamosa (Gld.) Noisy Scrub-bird.

Order III.—Picariæ (*Picus*, a woodpecker), Picarian Birds.

The members of this Order have four toes, two forwards (the second and third), and two backwards (the first and fourth), a peculiarity that they share with the parrots, and which is of inestimable value in climbing. Few of them are songsters. The woodpeckers are absent from Australia, but the Swifts, the "Frogmouths," commonly known as "More-porks" or "Mau-pawks" (this designation is erroneous, as the sound attributed to them is due to the Boobook Owl), the Kingfishers, and the Cuckoos are numerous. The Coucal, inhabiting the North-west of this Colony, has, at first glance, a remarkably pheasant-like form, although it is not related to that family.

Suborder—Coraciæ.

FAMILY—CYPSELIDÆ: SWIFTS.

Sub-Family—Cypselinæ.

Micropus pacificus (Lath.) White-rumped Swift.
Chætura caudacuta (Lath.) Spine-tailed Swift.

FAMILY—CAPRIMULGIDÆ: GOAT-SUCKERS.

Sub-Family Caprimulginæ.

Caprimulgus macrurus (Lath.) Large-tailed Nightjar.
Eurostopus argus (Hartert.) Spotted Nightjar.

FAMILY—PODARGIDÆ.

Sub-Family—Podarginæ.

Podargus strigoides (Lath.) Tawny Frogmouth [More-pork].

Sub-Family—Ægothelinæ.

Ægotheles novæ-hollandiæ (Lath.) Owlet Nightjar.

FAMILY—CORACIIDÆ: ROLLERS.

Sub-Family—Coraciinæ.

Eurystomus australis (Sw.) Roller or Dollar-Bird.

FAMILY—MEROPIDÆ: BEE-EATERS.

Merops ornatus (Lath.) Bee-eater.

Suborder—Halcyones.

FAMILY—ALCEDINIDÆ: KINGFISHERS.

Sub-Family—Alcedininæ.

Alcyone azurea (Gld.) Blue Kingfisher.

Sub-Family—Daceloninæ.

Dacelo gigas (Bodd.) Brown Kingfisher [Laughing Jackass].
Dacelo cervina (Gld.) Fawn-breasted Kingfisher.

Halcyon pyrrhopygius (Gld.) Red-backed Kingfisher.
Halcyon sanctus (V. and H.) Sacred Kingfisher.

Suborder—Coccyges: Cuckoos, &c.

FAMILY—CUCULIDÆ: CUCKOOS.

SUB-FAMILY—CUCULINÆ.

Cuculus pallidus (Lath.) Pallid Cuckoo.
Cacomantis flabelliformis (Lath.) Fan-tailed Cuckoo.
Cacomantis variolosus (Hors.) Square-tailed Brush Cuckoo.
Mesocalius palliolatus (Lath.) Black-eared Cuckoo.
Chalcococcyx basalis (Hors.) Narrow-billed Bronze Cuckoo.
Chalcococcyx plagosus (Lath.) Bronze Cuckoo.
Chalcococcyx pœcilurus (Gray.) Rufous-throated Bronze Cuckoo.
Eudynamis cyanocephala (Lath.) Koel.
Scythrops novæ-hollandiæ (Lath.) Channel-bill.

SUB-FAMILY—CENTROPODINÆ.

Centropus phasianus (Lath.) Coucal.

Order IV.—Psittaci (*Psittacus*, a parrot.)

The Parrots are amongst the most intelligent and most highly organised of birds. They are distinguished by their sharply-hooked beaks, both the upper and lower parts of which are moveable; and by feet similar to those of the preceding order. The brilliancy of their plumage is as remarkable as it is protective. Take, for instance, the "twenty-eight"; brilliant as they appear in the sunlight, the instant they settle in a gum-tree they are almost indiscernible, either in colour or form, from the tufts of leaves on the twigs on which they alight.

FAMILY—LORIIDÆ: LORIES, OR BRUSH-TONGUED PARROTS.

Trichoglossus rubritorquis (V. and H.) Red-collared Lorikeet.
Ptilosclera versicolor (Vigors.) Varied Lorikeet.
Glossopsittacus porphyrocephalus (Dietr.) Purple-crowned Lorikeet.

FAMILY—CACATUIDÆ: COCKATOOS.

SUB-FAMILY—CACATUINÆ.

Calyptorhynchus baudini (Vig.) White-tailed Cockatoo.
Calyptorhynchus macrorhynchus (Gld.) Great-billed Cockatoo.
Calyptorhynchus stellatus (Wagl.) Red-tailed Cockatoo.
Cacatua galerita (Lath.) White Cockatoo.
Cacatua leadbeateri (Vig.) Pink Cockatoo.
Cacatua sanguinea (Gld.) Blood-stained Cockatoo.
Cacatua roseicapilla (Vieill.) Rose-breasted Cockatoo (Galah).
Licmetis pastinator (Gld.) Dampier Cockatoo.

SUB-FAMILY—CALOPSITTACINÆ.

Calopsittacus novæ-hollandiæ (Gm.) Cockatoo Parrakeet.

FAMILY—PSITTACIDÆ: PARROTS.

SUB-FAMILY—PALÆORNITHINÆ.

Polytelis melanura (Vig.) Black-tailed Parrakeet (Rock Pebbler).
Spathopterus alexandræ (Gld.) Alexandra Parrakeet.
Ptistes erythropterus (Gm.) Red-winged Lory.

SUB-FAMILY—PLATYCERCINÆ: PARRAKEETS.

Platycercus icterotis (Temm.) Yellow-cheeked Parrakeet (Rosella of W.A.)
Porphyrocephalus spurius (Kuhl.) Red-capped Parrakeet.
Barnardius semitorquatus (Q. and G.) Yellow-collared Parrakeet (the "Twenty-eight.")
Barnardius zonarius (Shaw). Yellow-banded Parrakeet.
Psephotus hæmatorrhous (Bparte.) Crimson-bellied Parrakeet.
Psephotus chrysopterygius (Gld.) Golden-shouldered Parrakeet.
Psephotus multicolor (Temm.) Many-coloured Parrakeet.
Neophema elegans (Swains.) Grass Parrakeet.
Neophema petropnila (Gld.) Rock Parrakeet.
Neophema splendida (Gld.) Scarlet-chested Grass Parrakeet.
Melopsittaccus undulatus (Shaw.) Betcherrygah, or Warbling Grass Parrakeet.
Pezoporus formosus (Lath.) Ground Parrakeet.
Geopsittacus occidentalis (Gld.) Night Parrakeet.

Order V.—Columbæ: (*Columba*, a dove) PIGEONS.

This order is so well known as to need but little description. Pigeons are all monogamous, and pair for life. Australia and New Guinea may be considered their natural home, as such a large number, many of which are found no where else, occur in this region. Many of them are most gorgeous in plumage, rivalling even the parrots in brilliancy of colouring.

The domestic pigeons are all descended from the Rock Pigeon (*Columba livia*), a native of Europe, and although, by artificial selection, such extraordinary varieties have been produced, yet if allowed to interbreed they speedily return to the original type, as can be seen in the flocks that have taken up residence in the roofs of the public buildings throughout the world.

The most remarkable of pigeons was the Dodo, a large and heavy bird, as big as a swan, that formerly inhabited Mauritius. It had lost the power of flight, having no enemies, until the arrival of Europeans, who speedily exterminated it, the last being killed in 1681.

The pigeons, as a rule, have very powerful wings, which enable them to fly with great rapidity for marvellous distances. They have four toes, three in front and one behind; the latter is articulated on the same level as the others, and touches the ground in walking.

Suborder—Columbæ: Pigeons.

FAMILY—PERISTERIDÆ.

SUB-FAMILY—GEOPELINÆ.

Geopelia humeralis (Temm.) Barred-shouldered Dove.
Geopelia tranquilla (Gld.) Ground Dove.
Geopelia cuneata (Lath.) Little Dove.

SUB-FAMILY—PHABINÆ.

Phaps chalcoptera (Lath.) Bronze-wing.
Phaps elegans (Temm.) Brush Bronze-wing.
Histriophaps histrionica (Gld.) Flock Pigeon.
Lophophaps plumifera (Gld.) Plumed Pigeon.
Lophophaps leucogaster (Gld.) White-bellied Plumed Pigeon.
Ocyphaps lophotes (Temm.) Crested Pigeon.

Order VI.—Pterocletes (SAND-GROUSE).

The three genera contained in this small order inhabit Asia, Southern Europe, and Northern Africa. They are in no way related to the grouse. The young are hatched in a highly-developed condition, and are able to run about a few hours after they are hatched.

Order VII.—Gallinæ (*Gallina*, a fowl), GAME-BIRDS.

These birds, formerly included in the old Order of Rasores, Scratchers, are much heavier in the body, more powerful in the legs, and much less powerful in the wings than the pigeons. The hind toe is shorter, and at a higher level; the strong, blunt claws are well adapted for scratching up the ground for seeds and insects; the males are usually furnished with spurs.

They are represented in this Colony by the Quail and the Gnou, or Mallee-Fowl, sometimes called the Native Pheasant. This latter is one of the mound-building birds. A number of them associate and scratch out a hollow in the ground, from six to eight inches deep, and two feet across. They then collect leaves and other vegetable matter, in which they lay their eggs; they next cover with sand, making a mound from two to four feet high, and about twelve feet in diameter. The heat arising from the decomposition of the decaying vegetable matter is sufficient to hatch the eggs. The young are born fledged, and able to take care of themselves.

Suborder—Alectoropodes.

FAMILY—PHASIANIDÆ: PHEASANTS, ETC.

Synœcus australis (Temm.) Brown Quail.

Suborder—Peristeropodes.

FAMILY—MEGAPODIIDÆ: MEGAPODES.

Lipoa ocellata (Gld.) Mallee Fowl (Native Pheasant or Gnou).

Order VIII.—Opisthocomi.

This Order, in which the structure of the sternum is unique, contains but a single genus and species, *Opisthocomus hoazin* (Mull), the Hoatzin, an inhabitant of the Amazon Valley and Guiana. The nests are usually built over the water, and the young have a habit of diving to escape capture, which is most extraordinary, as this is an arboreal bird that seldom descends even to the ground.

Order IX.—Hemipodii (Half-footed), Quails.

These Bustard Quails closely resemble the true quails in general appearance, but are easily distinguished by having only three toes. There are in this Colony four species, of which *T. varia* is the only one represented in the Museum.

FAMILY—TURNICIDÆ: BUSTARD QUAILS.

Turnix varia (Lath.) Painted Quail.
Turnix castanonota (Gld.) Chestnut-backed Quail.
Turnix velox (Gld.) Little Quail.
Turnix leucogaster (North.) White-bellied Quail.

Order X.—Fulicariæ.

This Order contains the Rails, Crakes, Coots, etc. They mostly possess large feet and short wings. Some have but trifling power of flight. The bills are strong and grooved, and in a few species the feet are "lobed" or half webbed.

FAMILY—RALLIDÆ: RAILS.

Hypotænidia philippinensis (Linn.) Pectoral Rail.
Porzana palustris (Gld.) Little Crake.
Porzana tabuensis (Gm.) Spotless Crake.
Microtribonyx ventralis (Gld.) Black-tailed Native Hen.
Gallinula tenebrosa (Gld.) Black Moor Hen.
Porphyrio bellus (Gld.) Blue Bald Coot.
Fulica australis (Gld.) Coot.

Order XI.—Alectorides (Cranes and Bustards).

This order is represented in this Colony by the two well-known birds, the "Native Companion" and the so-called "Wild Turkey," the largest of the indigenous Game-Birds. In these the hind toe is raised above the level of the other toes.

FAMILY—GRUIDÆ: CRANES.

Antigone australasiana (Gld.) Crane, or Native Companion.

FAMILY—OTIDIDÆ: BUSTARDS.

Eupodotis australis (Grey.) Bustard, or Wild Turkey.

Order XII.—Limicolæ: Plovers, Etc.

This Order, although not much larger than the last-named, is represented in this country by 29 species. They are generally to be found by the sea-shore, being often waders in habit, their food consisting chiefly of worms, molluscs, etc. The legs are often thin and long, and so are the bills. This is especially noticeable in the Stilts and Avocets.

FAMILY - ŒDICNEMIDÆ: THICK-KNEES."

Burhinus grallarius (Lath.) Stone Plover.
Orthorhamphus magnirostris (Vieill.) Long-billed Stone-Plover.

FAMILY—CURSORIIDÆ: COURSERS.

Stiltia isabella (Temm.) Pratincole.
Glareola orientalis (Leach.) Oriental Pratincole.

FAMILY—CHARADRIIDÆ: PLOVERS.

Sub-Family—Arenariinæ.

Arenaria interpres (Linn.) Turnstone.

Sub-Family - Hæmatopodinæ: Oyster-catchers.

Hæmatopus longirostris (Vieill.) Pied Oyster-catcher.
Hæmatopus unicolor (Wagl.) Black Oyster-catcher.

Sub-Family—Lobivanellinæ.

Erythrogonys cinctus (Gld.) Red-kneed Dottrel.
Lobivanellus miles (Bodd.) Masked Plover.

Sub-Family - Charadriinæ.

Zonifer tricolor (Vieill.) Black-breasted Plover.
Squatarola helvetica (Linn.) Grey Plover.
Charadrius dominicus (Müll.) Lesser Golden Plover.
Ochthodromus geoffroyi (Wagl.) Large Sand Dottrell.
Ægialitis hiaticola (Linn.) Ringed Dottrel.
Ægialitis ruficapilla (Temm.) Red-capped Dottrell.
Ægialitis melanops (Vieill.) Black-fronted Dottrel.
Ægialitis cucullata (Vieill.) Hooded Dottrel.

Sub-Family—Peltohyatinæ.

Peltohyas australis (Gld,) Dottrell,

Sub-Family—Himantopodinæ: Stilts, Etc.

Himantopus leucocephalus (Gld.) White-headed Stilt.
Cladorhynchus leucocephalus (Vieill.) Banded Stilt (Rottnest Snipe).
Recurvirostra novæ-hollandiæ (Vieill.) Red-necked Avocet.

Sub-Family—Totaninæ.

Numenius variegatus (Salvad.) Whimbrel.
Limosa novæ-zealandiæ (Gray.) Barred-rumped Godwit.
Hecteractitis brevipes (Pall.) Grey-rumped Sandpiper.

Tringoides hypoleucus Linn.) Common Sandpiper.
Glottis nebularius (Gunner.) Greenshank.

SUB-FAMILY—SCOLOPACINÆ : SNIPES.

Limonites ruficollis (Pall.) Little Stint.
Heteropygia acuminata (Hors.) Sharp-tailed Stint.
Ancylochilus subarquatus (Gm.) Curlew Stint.
Tringa crassirostris (Temm.) Great Sandpiper.
Gallinago australis (Lath.) Snipe.
Rostratula australis (Gld.) Painted Snipe.
Calidris arenaria [Linn.] Sanderling.

Order XIII.—Gaviæ (THE SEA-BIRDS).

These birds have powerful wings, and are web-footed; that is, have their anterior toes united by a membrane enabling them to swim and dive with great rapidity. The hind toe is free, the nostrils side-slit. They are fish eaters. The Abrolhos Islands are a favourite resort of the members of this and the next Order during the breeding season.

FAMILY—LARIDÆ : GULLS AND TERNS.

SUB-FAMILY—STERNINÆ : TERNS.

Hydrochelidon hybrida (Pall.) Marsh Tern.
Gelochelidon anglica (Mont.) Gull-billed Tern.
Hydroprogne caspia (Pall.) Caspian Tern.
Sterna dougalli (Mont.) Roseate Tern.
Sterna bergii (Licht.) Crested Tern.
Sterna anæstheta (Scop.) Brown-winged Tern.
Sterna fuliginosa (Gm.) Sooty Tern.
Sterna nereis (Gld.) White-faced Ternlet.
Sterna melanauchen (Temm.) Black-naped Tern.
Anous stolidus (Linn.) Noddy.
Micranous tenuirostris (Temm.) Lesser Noddy.

SUB-FAMILY—LARINÆ : GULLS.

Larus novæ-hollandiæ (Steph.) Silver Gull.
Gabianus pacificus (Lath.) Pacific Gull.

Order XIV.—Tubinares (TUBE-NOSED SWIMMERS).

The members of this Order are very similar in general appearance to those of the last, but they have the nostrils produced externally in the form of tubes.

FAMILY—PROCELLARIIDÆ : PETRELS.

SUB-FAMILY—OCEANITINÆ : STORM PETRELS.

Pelagodroma marina (Lath.) White-faced Storm Petrel.

FAMILY—PUFFINIDÆ : PETRELS, ETC.

SUB-FAMILY—PUFFININÆ.

Puffinus chlororhynchus (Less.) Wedge-tailed Petrel.* [Mutton Bird of Western Austral a.]
Puffinis assimilis (Gld.) Allied Petrel.

SUB-FAMILY—FULMARINÆ : FULMARS.

Ossifraga gigantea (Gm.) Giant Petrel.
Prion desolatus (Gm.) Dove-Petrel or Prion.

FAMILY—DIOMEDEIDÆ : ALBATROSSES.

Diomedea exulans (Linn.) Wandering Albatross.
Thalassogeron cautus (Gld.) White-capped Albatross.
Phœbetria fuliginosa (Gm.) Sooty Albatross.

Order XV.—Plataleæ (IBISES AND SPOONBILLS).

This Order contains two small, but widely-distributed families, which are well represented here ; three of the 24 species of the former, and two out of the five of the latter, being indigenous. They are remarkable for their long legs and peculiar bills.

FAMILY I.—IBIDIDÆ : IBISES.

Ibis molucca (Cuv.) White Ibis.
Carphibis spinicollis (Jameson.) Straw-necked Ibis.
Plegadis falcinellus (Linn.) Glossy Ibis.

FAMILY II.—PLATALEIDÆ : SPOONBILLS.

Platalea regia (Gould.) Black-billed Spoonbill.
Platibis flavipes (Gould.) Yellow-billed Spoonbill.

Order XVI.—Herodiones (HERONS AND STORKS).

The birds in this Order have long legs and necks, small heads, with long-pointed, powerful beaks. They are waders, and live upon small fish, frogs, etc. The Jabirus are noted for their brilliant colours.

FAMILY I.—ARDEIDÆ : HERONS.

Mesophoyx plumifera (Gould.) Plumed Egret.
Herodias timoriensis (Less.) White Egret.
Notophoyx novæ-hollandiæ (Lath.) White-fronted Heron.
Notophoyx pacifica (Lath.) White-necked Heron.
Garzetta nigripes (Temm.) Little Egret.
Demiegretta sacra (Gm.) Reef Heron.
Nycticorax caledonicus (Gm.) Night Heron.

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*Puffinus tenuirostris (Temm.), The Short-tailed Petrel is the true Mutton Bird. Its oil and the eggs are of high commercial value. The eggs are, in the Eastern Colonies, frequently sold as those of the domestic fowl.

Ardetta pusilla (Vieill.) Little Bittern.
Dupetor gouldi (Bparte.) Black Bittern.
Botaurus pœciloptilus (Wagl.) Bittern.

FAMILY IV.—CICONIIDÆ: STORKS.

Xenorhynchus asiaticus (Lath.) Black-necked Stork, or Australian Jabiru.

Order XVII.—Steganopodes (Cormorants, Pelicans, Etc.).

This order contains those web-footed birds that have all four toes included in a broad web. They are expert swimmers and divers. Many have great power of flight, especially the frigate birds, which, with their long wings, are said to be the most enduring in flight of any birds. The Gannets are noteworthy for the immense accumulations of guano they have deposited. They have enormous appetites, and consume vast quantities of fish. The pelicans have large throat pouches, in which they can retain the fish, when fishing rapidly, until they have leisure to swallow them or to carry them to their nests to feed their young.

FAMILY I.—PHALACROCORACIDÆ: CORMORANTS.

Phalacrocorax carbo (Linn.) Black Cormorant.
Phalacrocorax sulcirostris (Brandt.) Little Black Cormorant.
Phalacrocorax gouldi (Salvad.) White-breasted Cormorant.
Phalacrocorax hypoleucus (Brandt.) Pied Cormorant.
Phalacrocorax melanoleucus (Vieill.) Little Cormorant.
Plotus novæ-hollandiæ (Gould.) Darter.

FAMILY II.—SULIDÆ: GANNETS.

Sula serrator (G. R. Gray.) Gannet.

FAMILY III.—FREGATIDÆ: FRIGATE-BIRDS.

Fregata ariel (Gould.) Lesser Frigate-Bird.

FAMILY IV.—PHÆTONTIDÆ: TROPIC-BIRDS.

Phaeton rubricauda (Bodd.) Red-tailed Tropic-Bird.

FAMILY V.—PELECANIDÆ: PELICANS.

Pelecanus conspicillatus (Temm.) Pelican.

Order XVIII.—Pygopodes (Grebes).

This order contains sea birds, having the hind limbs further back than in the generality of birds; hence they have to assume a curiously erect position in standing. The three anterior toes are webbed, but the hind, which is very small, is free. The thick, soft, glossy breasts are much in demand for the lining of dresses by the Esquimaux, and are used as muffs and tippets by European ladies.

FAMILY—PODICIPEDIDÆ; GREBES.

Podicipes novæ-hollandiæ (Steph.) Black-throated Grebe. [Dabchick.]
Podicipes poliocephalus (Jard and Selby.) Hoary-headed Grebe. [Dabchick of W.A.]
Podicipes cristatus (Linn.) Tippet Grebe.

Order XIX.—Alcæ (Auks).

The most famous bird of this order was the Great Auk (*Alca impennis*), at one time very common on the shores of the North Atlantic, but now extinct. Its diminutive wings were useless for flight, but acted as fins. The other members are the Razor-bills, Guillemots, and Puffins. Of the first and last of these, specimens have been received from the Hon. Walter Rothschild, M.P.

Order XX.—Impennes (Penguins).

This order comprises but a single family, containing 19 species. The first and second digits become fused together in adults. The wings have no quill feathers, and are useless except as fins for swimming. They are only found on the borders of the Southern Ocean. Some species build no nest, but develop a pouch, in which they carry the egg about with them until it is hatched, This is the case with the King Penguin (*Aptenodptes patagonica*), of which an egg is exhibited.

Eudyptula Minor (Forst). Little Penguin.

Order XXI.—Chenomorphæ (Swans).

This order is well represented in the Colony, no less than 16 out of the 20 Australian species being found. It includes the Swans, Geese, and Ducks, which are all characterised by having flattened bills, covered with a soft skin. The edges of the bills are furnished with a series of transverse plates, which form a kind of strainer, through which the birds sift the mud in which they seek their food. Three toes are webbed, the fourth is free.

Suborder—Anseres: Geese, Etc.

FAMILY—ANATIDÆ: DUCKS.

Sub-Family—Cygninæ: Swans.

Chenopis atrata (Lath.) Black Swan.

Sub-Family—Anseranatinæ.

Anseranas semipalmata (Lath.) Pied Goose.

Sub-Family—Plectropterinæ.

Nettopus pulchellus (Gld.) Green Goose-Teal.

Sub-Family—Cereopsinæ.

Cereopsis novæ-hollandiæ (Lath.) Cape Barren Goose.

SUB-FAMILY—CHENONETTINÆ.

Chenonetta jubata (Lath.) Wood Duck or Maned Goose.

SUB-FAMILY - ANATINÆ.

Dendrocycna arcuata (Cuv.) Whistling Duck.
Dendrocycna eytoni (Gld.) Plumed Whistling Duck.
Tadorna radjah (Garnot.) White-headed Shieldrake.
Casarca tadornoides (Jar.) Shieldrake or Mountain Duck.
Anas superciliosa (Gm.) Black Duck.
Nettion castaneum (Eyton.) Teal.
Nettion gibberifrons (S. Müll.) Grey Teal.
Spatula rhynchotis (Lath.) Shoveller (Blue-wing).
Malacorhynchus membranaceus (Lath.) Pink-eared Duck (Widgeon).
Stictonetta nævosa (Gld.) Freckled Duck.

SUB-FAMILY—FULIGULINÆ.

Nyroca australis (Gld.) White-eyed Duck (Hardhead).

SUB-FAMILY—ERISMATURINÆ.

Erismatura australis (Gld.) Blue-billed Duck.
Biziura lobata (Shaw.) Musk Duck.

Order XXII.—Crypturi (TINAMOUS).

There are 39 species of these birds, which are partridge-like in appearance, but very different in internal structure. They are found in Mexico and South America.

SUBCLASS II.—RATITÆ,

Includes all those birds that have a breast-bone without a keel, a rudimentary "wishing-bone" or "merry thought," and no oil gland. They are incapable of flight, but can run very swiftly.

Order I.—Struthiones (OSTRICHES).

Two-toed birds, of which two species exist. The Order is represented by *Struthio australis*, the South African Ostrich.

Order II.—Rheidæ.

The Rhea, or three-toed Ostrich, inhabits South America.

Order III.—Casuarii (CASSOWARIES AND EMUS).

The first-named are restricted to Eastern Australia and New Guinea, while the Emu is peculiar to Australia, *D. novæ-hollandiæ*, ranging over the whole continent; but *D. irroratus*, the Spotted Emu, is confined to this Colony.

FAMILY—DROMÆIDÆ: EMUS.

Dromæus novæ-hollandiæ (Lath.) Emu.
Dromæus irroratus (Bartl.) Spotted Emu.

Order IV.—Apteryges.

(*A*, without; *pterux*, a wing. "Apteryx.")

Three species of this Order occur in New Zealand. They are covered with hair-like feathers, which hang closely, and completely hide the rudimentary wings. They are nocturnal in habit, and feed on insects. Their eggs are abnormally large.

One of the most remarkable of the extinct birds of this subclass was *Æpyornis maximus* (Geof.), of which the cast of an egg is exhibited. The bird was about six and a half feet in height, and the egg measures 36 inches in circumference lengthways.

The Moa, *Dinornis giganteus* (Owen), of New Zealand, must have been over 10 feet in height. The leg bones exhibited did not belong to a fully-grown specimen. An almost complete skeleton of a nearly related bird, *Anomalopteryx casuarina* (Owen) shows the massive skeleton of these "running" birds. They, in all probability, became exterminated from a century to a century and a half ago.

SUBCLASS III.—SAURURÆ.

The singular fossil bird, *Archæopteryx lithographica* (Meyer), (*archaios*, ancient; *pterux*, a wing) found in the lithographic stone (Upper Jurassic formation) at Eichstadt, near Solenhofen, Bavaria, has a leg and foot similar to that of a modern perching bird; but the pointed, lizard-like tail, which has a pair of feathers springing from each joint, is unique. It had teeth, coated with enamel, implanted in distinct sockets. The cast exhibited is from the specimen in the British Museum. The only other specimen in existence is in the Berlin Museum.

Class III.—REPTILIA.

The Reptiles are in many essential features of their organisation very closely allied to the birds ; in fact, Huxley classed them together as *Sauroptida* in his second Division of the Animal Kingdom, but the differences are so marked that they are rightly placed in a distinct class

They are cold-blooded animals ; that is to say, their blood is but slightly warmer than the external temperature of their habitat. The heart consists of three cavities, two auricles, and one ventricle, whereas in the warm-blooded animals, Mammals and Birds, that organ has two ventricles as well as two auricles.

The normal temperature of man is 98½°, of the higher mammals from that to 104°, but in the lower forms much less ; thus the temperature of the Ornithorhynchus is only 77°, of the Echidna 86°, while the marsupials vary from 93° in the Wombat to 98° in the Kangaroo The temperate ranges from 105° to 111° in the Carinatæ, but in the less highly organised a similar difference is noticed ; for in the Ostrich the blood heat is only 99°, and in the Emu, according to the observations of Mr. E. A. Le Souef, it is 103°

In the Reptilia the temperature is but two or three degrees above that of the medium in which they live ; that is to say, of the surrounding air or water.

Reptiles are invariably provided with an epidermic (*epi*, upon ; *derma*, the true skin) clothing of scales, which, not being part of the dermis or true skin, can be periodically shed, as in the snakes, or it may be hard and thick as in the tortoise, or tough as in the crocodile. They are all oviparous, but many are what is termed ovo-viparous ; that is to say, the eggs are hatched on or before being laid.

About 4,000 species of living Reptiles have been described, which are divided into four orders, according to the structure of their skeletons, the external appearance being often very deceptive, for the slow worm and lizard are nearly related, and both are more closely connected with the Snakes than with the crocodiles, although at first sight the Lizard and Crocodiles would appear to approach most nearly. The other seven orders are extinct.

They are most numerous in the Tropics, and entirely absent from the Arctic and Antarctic Regions. The oldest known reptiles date back to the Permo-Carboniferous formations.

SYSTEMATIC ARRANGEMENT OF THE CLASS REPTILIA.

Order I. PTEROSAURIA : Winged Lizards.
II. CROCODILIA : Crocodiles and Alligators.
III. DINOSAURIA.
IV. SQUAMATA : Snakes and Lizards.
V. RHYCHOCEPHALIA : Tuatera.
VI. PROTEROSAURIA.
VII. ICHTHYOSAURIA.
VIII. CHELONIA : Tortoises and Turtles.
IX. SAUROPTERYGIA.
X. PLACODONTIA.
XI. ANOMODONTIA.

ORDER I.—PTEROSAURIA.

The Winged-Lizards are now entirely extinct, though in the Mesozoic Period they were abundant, and of great size, for some found in the chalk had a spread of wing of from 18 to 20 feet. A cast of *Pterodactylus crassirostris* (Goldf.), from the Middle Oolite of Solenhofen, is exhibited.

ORDER II.—CROCODILIA (CROCODILES).

In this Order the teeth are implanted in sockets, not as in the other living reptiles, in which the teeth are grown to the bone of the jaws.

The Crocodiles are distinguished from the Alligators by having the fourth lower tooth passing into a notch of the lateral edge of the upper jaw. The former are restricted to the Old World, the latter, with one exception in China, to the New World. A specimen of *Crocodilus Johnstonii*, from Kimberley, Western Australia, lent by Dr. T H. Lovegrove, is exhibited.

This Order first appeared in the Cretaceous rocks of North America. A cast of *Teleosaurus mandelslohi* (Bronn), from Wurtemberg, is exhibited.

ORDER III.—THE DINOSAURIA (*deinos*, terrible).

Numerous remains of these extinct reptiles have been found in the Jurassic and Cretaceous formations of both hemispheres. Some of them rivalled the whales in size.

ORDER IV.—SQUAMATA (*squama*, a scale).

This Order contains the true Lizards, the Chamæleons, and the snakes. The former appeared in the Cretaceous strata, but the snakes not until Tertiary times. Of the 1,600 species of recent snakes known, about 30 have been noticed in this colony, the most common being one of the Pythons (*Morelia variegata*), the Carpet

Snake, which unfortunately is being ruthlessly destroyed, although it is not poisonous ; and it is a useful friend to the agriculturist, as it feeds on the small mammals and birds which injure their crops.

There are very few poisonous snakes in the Colony, and the statistics of the Registrar-General show that only one death from snake-bite has been noted since medical returns have been kept. It is not easy from external appearance to distinguish between the poisonous and non-poisonous kinds, as at least one family of the former have assumed the head-forms of the harmless varieties. The non-venomous snakes have generally two rows of short-pointed, incurved teeth in the upper jaw, and one row in the lower ; but the venemous have, in addition, a pair of longer-grooved or perforated fangs, connected with a duct which carries the fluid from the poison glands. This gland is compressed at the moment the Snake opens its mouth, and the poison forced through the tooth.

Several species of Typhlopidæ, the Burrowing or Blind Snakes, occur in this Colony. The Sea-Snakes, of which some species are found in the North-West, pass their whole life in the sea. They are very poisonous.

LACERTILIA.—LIZARDS.

This suborder contains about 2,000 species, of which more than 100 occur in the Colony. The snake-like Lizards, Pygopodidæ, are often mistaken for snakes, as they have no hind-legs, and only minute rudimentary fore-feet, which are not easily seen. All the Australian Lizards are harmless. The most conspicuous are the Lace Lizard (*Varanus varius*), and the Stump-tailed Lizard (*Trachysaurus rugosus*). These are frequently, but erroneously, termed Iguanas, for those are exclusively American. The Frilled Lizard (*Chlamydosaurus kingii*), has an extensive fold of skin round its neck, which it erects when startled. *Moloch horridus*, the York or Mountain Devil, which lives on flies and other insects, is covered with tubercles and spines, and, notwithstanding its name and appearance, is perfectly harmless.

ORDER V.—RHYCHOCEPHALIA.

This order, of which fossil forms occur in the Permian and subsequent formations, is only represented by one living species, the Tuatera of the Maories.

ORDER VI.—PROTEROSAURIA.

An extinct reptile of the Permian System.

ORDER VII.—ICHTHYOSAURIA.

The Fish-Lizards first appeared in the Upper Trias ; they were most abundant in the Lias, and finally became extinct in the

Chalk. They attained an enormous size, as can be seen from the cast, from the specimen in the British Museum, of *Ichthyosaurus intermedius* from the Lias, of Glastonbury, England. In the table cases containing the Tennant Collection there are several bones and teeth.

ORDER VIII.—CHELONIA (*Chelone*, a tortoise).

The Tortoises and Turtles are distinguished from the other Reptiles by having a more or less bony case or "shell," which encloses the body, and into which most of them can withdraw their heads and limbs. They are divided into four groups: 1, the Sea Turtles; 2, the Fresh-water Turtles; 3, the Fresh-water Tortoises; and 4, the Land Tortoises. The turtles have their limbs in the form of swimming paddles, while the tortoises have feet, furnished with short nails, suitable for progression on the land. They have the dorsal vertebræ (the back-bone), with the exception of the first, immovably connected together; and the ribs are very wide and flattened, so that they form a solid case.

Their earliest fossil remains are found in the Permian System. The giant fossil tortoise of India reached a length of 13 feet. A remarkable extinct form has been found in the New Tertiary deposits of Queensland. It was described by Mr. A. S. Woodward and named *Miolania Oweni*, after the distinguished Professor of Comparative Anatomy. It had nine horn-like prominences in its skull, a cast of which, and also of the tail-sheath, are exhibited in the wall case. The first specimens found were considered to be the remains of an extinct lizard allied to the York Devil, but of enormous size. Further researches have, however, proved it to be a Chelonian. A cast of another horned Chelonian, *Miolania platyceps* (Owen), will be found in the same case.

Of recent Chelonians, specimens of the Hawksbill Turtle (*Chelone imbricata*), from the Lacepede Islands, the Leathery Turtle (*Dermochelys coriacea*), from the Vasse, and the Long-necked Tortoise (*Chelodina*) are exhibited.

ORDER IX.—SAUROPTERYGIA.

These extinct reptiles had no horny or bony covering, so far as is known; their geological range was from the Lias to the Chalk. They are represented by casts of *Pliosaurus brachydeirus* (Owen), Dorchester, England; of *Plesiosaurus dolichodeirus* (Conyb.), Glastonbury, England, as well as by some bones in the Tennant Collection. These long-necked marine lizards were large, for the swimming paddle of the Dorchester specimen is seven feet in length, the jaw six feet, and one of the teeth 15 inches long.

ORDER X.—PLACODONTIA (Plate-toothed).

These reptiles were formerly considered to be fish, owing to the unusual form of the jaws and teeth, which are well shown in the cast of the head of *Cyamodus laticeps* (Owen), from the Triassic rocks of Baireuth, Germany.

ORDER XI.—ANOMODONTIA (*anomo*, irregular).

This Order, which appears to have only existed in Permian and Triassic times, is unrepresented as yet. It is of great interest, as it would seem to connect the Reptiles with the Monotremes.

Class IV.—BATRACHIA.

(Gr. *Batrachos*, a frog).

This class includes the Frogs, Toads, Newts, etc., cold-blooded animals, commonly regarded as Reptiles, but distinguished from these by having gills in the early stages of existence, which some of them retain during their whole life. They have many points in common with fish.

The majority have, when first hatched, a totally different appearance from that of the fully grown animals, the gill-bearing fish-like tadpoles gradually developing limbs and lungs, absorbing their gills, and maturing as frogs, toads, or newts. Hence the class is often termed Amphibia (*amphi*, both; *bios*, life) from its passing one stage in the water and the other on land. They are divided into three orders :—

I. ECAUDATA (*e*, without; *cauda*, a tail), Frogs, Toads, etc.

II. CAUDATA (*cauda*, a tail), Newts and Salamanders.

III. APODA (*a*, without; *podes*, feet), Limbless worm-like Batrachians. Not found in Australia.

The Labyrinthodonts first became known to science through their foot-prints in Triassic Sandstones. The foot-prints of *Cheirotherium barthi* (Kaup), are shown by casts from the specimen that was found in the New Red Sandstone of Jena, Germany, and is now in the Ward Museum, Rochester, U.S.A.

Class V.—PISCES.
Fish.

Fish are the lowest of the Vertebrates. The limbs, when present, are modified into fins; they are either naked or covered with scales; they are cold-blooded, having a heart with two chambers only; breathe by means of gills; pass all their lives in the water, and although a few can exist for some time away from it, yet the majority perish very quickly when removed from their native element. About 13,000 species have been described. Their fossil remains are found as early as the Lower Silurian. Fish are arranged in four subclasses and nine Orders.

SUBCLASS I.—TELEOSTEI.

(*Teleios*, perfect; *osteon*, a bone).

The "Bony Fish" include the majority of living fish. This subclass is divided into six Orders.

SUBCLASS II.—PALÆICHTHYES.

(*Palaios*, ancient; *ichthus*, a fish).

This subclass contains two Orders: 1, the Ganoidei (*ganos*, splendour, brightness), the enamelled-scaled fishes, to which the majority of the fossil fish of the Palæozoic and Mesozoic Periods belong, while only about thirty species now exist. The skeleton is either cartilaginous or bony. The Barramunda (*Ceratodus*), of Queensland, has both lungs and gills, and consequently can live long out of the water. During the dry season it buries itself in the mud, and remains in a torpid condition until the next rains. This and the Sturgeons are the best known examples. 2, Chondropterygii (*Chondros*, a grain), contains the Sharks and Rays, which have a cartilaginous skeleton and a *grained* skin. This, when prepared for commerce is known as shagreen.

SUBCLASS III.—CYCLOSTOMATA.

(The Lampreys and Hag-fishes).

SUBCLASS IV.—LEPTOCARDII.

(The Lancelet).

It is impossible to give a full description of the fish, of which there are a large number in the collection, until they are properly arranged. This will be done as soon as possible after the cases,

now being constructed, are finished, when a Supplement to this Guide Book will be issued. A list of a few of the local fish, with their Vernacular names, is appended.

Subclass I.—Teleostei (The Bony Fishes).

ORDER I.—ACANTHOPTERYGII.

(*Akantha*, a spine; *pterux*, a wing). Spiny-rayed Fishes.

Therapon candovittatus (Rich.) Yellow Tail; Swan River.
Therapon ellipticus (Rich); Broome.
Pagrus unicolor (Major.) Schnapper; Garden Island.
Chrysophrys sarba (Forsk.) Silver Bream; Mandurah.
Platycephalus inops (Jeny.) Flathead; Garden Island.
Platycephalus bassensis; Swan River.
Trigla lucerna. Springing Gurnard; Fremantle.
Sphyræna obtusata. Sea Pike; Fremantle.
Sphyræna novæ-hollandiæ (Gthr.) Pike; Garden Island.
Caranx trachurus (Linn.)* Yellow Tail of N.S.W.; Garden Island.
Periopthalmus koelreuteri (Bl.) Mud Skipper.
Hoplognathus Woodwardi (Waite.) A new species, caught at Fremantle by Mr. Abjornson.
Mugil dobula (Gthr.) † Sea Mullet; Swan River.

ORDER II.—PHARYNGOGNATHI.

(*Pharygx*, gullet; *gnathos*, jaw).

Odax Richardsonii (C. V.) Rock Whiting; Garden Island.

ORDER III.—ANACANTHINI.

(*A*, without; *akantha*, a spine). Soft finned fishes.

Pseudorhombus multimaculatus (Gthr.) Flounder; Garden Island.
Rhombosolea monopus. Flounder; Swan River.
Plagusia acuminata (Cant.) Sole; Garden Island.

The flat-fishes, when young, are perfectly symmetrical, and have an eye on each side, and swim like other fish; but when fully grown they are "one-sided," always live on the bottom, and swim on one side, with an undulating motion of the body.

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* The Horse-Mackerel, common on the British Coasts, etc., and in all temperate and tropical seas.

† The *true* Mullet, esteemed so highly by the Romans, is *Mullus barbatus*, the Red Mullet. It belongs to the Family Mullidæ, while *Mugil dobula* belongs to the Mugilidæ, and is allied to the Grey Mullet.

ORDER IV.—PHYSOSTOMI.

(*Phusa*, air-bladder).

Belone ferox (Gthr.) Long Tom ; Garden Island.
Hemirhamphus intermedius (Cant.) Garfish ; Garden Island.
Exocœtus hillianus. Hill's Flying Fish ; Shark's Bay.
Gonorhynchus greyi (Rich.) Rat Fish ; Garden Island.
Chatoëssus erebi (Gthr.)* Perth Herring ; Swan River.

ORDER V.—LOPHOBRANCHII.

(*Lophos*, a crest ; *bragchia*, a gill).

Hippocampus abdominalis.† Sea-horse ; Mediterranean.
Hippocampus brevirostris. Sea-horse ; Fremantle.

ORDER VI.—PLECTOGNATHI.

(*Plecto*, I bind). Fish in which certain bones of the jaw are immovably connected.

Monacanthus sp. Leather Jacket ; Shark's Bay, Rottnest, and Mandurah.
Chilomycterus jaculiferus. Porcupine Fish ; Rockingham.

Subclass II.—Palæichthyes.

ORDER VII.—GANODEI.

Holoptychius nobilissimus (Ag.) Old Red Sandstone, Clashbinnie, Scotland. Cast from specimen in British Museum.

ORDER VIII —CHONDROPTERYGII.

Carcharias glaucus. Blue Shark ; Fremantle.
Galeocerdo Rayneri. Tiger Shark ; Fremantle.
Zygæna malleus. Hammer-headed Shark ; Fremantle.
Cestracion phillipi. Pavement-toothed Shark ; Fremantle.
Raja aquilla. Eagle Ray ; Fremantle.
Raja punctata. Thornback Ray ; Fremantle.

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* *Clupea harengus* is the true herring.

†The male Sea-horses, during the breeding season develop a kind of marsupial pouch into which the females deposit the eggs. The young avail themselves of this pouch as a place of refuge for some time after they are hatched.

INVERTEBRATA.

ANIMALS WITHOUT A BACKBONE.

[See Page 31.]

INTRODUCTORY CASE.

The first Wall Case is devoted to the display of a series of specimens, illustrative of the typical forms (when such can be prepared suitably for exhibition) of the principal sub-divisions of the animals comprised in the six Sub-Kingdoms forming this Division of the Animal Kingdom.

The Specimens exhibited as types have full descriptions attached.

The basis of classification rests chiefly on the nervous system.

Subkingdom I. MOLLUSCA (*mollis*, soft). The Shell-fish possess circulatory and nervous systems; their bodies are soft; they have no jointed limbs.

Subkingdom II. ANNULOSA (*annulus*, a ring).

Class I. BRACHYOPODA: Lamp-shells.

II. BRYOZOA (or POLYOZOA).

III. TRACHEATA: Insects, Myriopods, Spiders, and Scorpions.

IV. CRUSTACEA: Crabs, Lobsters, Trilobites, Etc.

V. VERMES: Worms.

These all possess a bilateral symmetry, *i.e.*, both sides are alike in form, and a well-defined nervous system.

Subkingdom III. ECHINODERMA (*Echina*, an urchin; *derma*, a skin): Sea Urchins, Starfishes, Etc.

They possess a nervous system; their structure is radiate; they have a series of tubes that carry water through the body.

Subkingdom IV. CŒLENTERA (*Koilos*, hollow; *enteron*, the bowel): Jellyfish, Sea Anemones, Corals, Etc.

They possess a stomach and body cavity, a radiate symmetry, and the mouth is bordered by tentacles armed with thread-cells, but no nervous system has been discovered in them.

Subkingdom V. SPONGIDA: Sponges.

They have an internal cavity with one outlet and many inlets; they are supported by a network of horny fibres, or of siliceous, or calcareous spicules.

Subkingdom VI. PROTOZOA (*protos*, first; *zoon*, animal).

The simplest animals, which have neither a body cavity nor a nervous system. They are represented by a series of enlarged models.

SUBKINGDOM I.—MOLLUSCA.

The forms of life exhibited in this large Subkingdom show a vast range of variety in structure and habits, as a glance at the Cuttlefish, Snail, Slug, and Oyster will prove.

They may be defined as soft, cold-blooded animals, covered with skin more or less thick, in or on which are developed one or more calcareous, or corneous, bodies, commonly called shells, which, varying in composition, solidity, and form, afford the animals, or, at any rate, their essential organs, a retreat and protection.

They possess a heart, consisting of two or more chambers; their livers, intestines, and salivary glands are well developed. Eyes, more or less well developed, are generally present, though in the headless Pelecypods they are absent. In a modified form they may be said to possess a sense of hearing; and it is certain that at least some families, such as the carnivorous Gasteropods, possess a sense of smell. The sexes are distinct in the most highly organized mollusca, but are united in the same individual in some of the lower forms. Reproduction is always effected by means of eggs.

The ventral surface of molluscs is produced into the so-called foot, which is sometimes curved and capable of serving as a leaping organ, or shaped like a sole and adapted for creeping, or, again, sometimes produced into elongated processes, as in the so-called arms of the Cephalopods.

Upon the upper surface of the foot in many of the Gasteropods a flat, hard structure, termed the operculum, is situated, which, when the animal is retracted, partly or entirely closes the aperture of the shell. It is sometimes thick and stony, as in the Turbos; sometimes shelly, as in the Nerites; but in the majority of instances is horny.

The shell is formed by the outer covering of the animal, called the mantle, and may consist of two parts (called valves) as in the

oyster or cockle; or may be single, as in the limpet; or be composed of a series of plates, as in the Chitons. It may invest the body, as in the oyster; lie within the mantle, as in the Sea-Hares; or be entirely internal, as in the Squids.

Mollusca are either animal or vegetable feeders. They are found all over the globe, and in almost every situation. By far the greatest number are inhabitants of the sea, but rivers, lakes, mountains, valleys, forests, and even deserts all contribute their quota to the grand total of species.

They breathe either by means of gills, or, as in the land snails and slugs, by a fold of the mantle enclosing an air-chamber, which serves as a lung.

The Mollusca are divided into five Classes.

Class I.—Cephalapoda (head-footed).

This class includes the Octopus, the Cuttlefishes, the Squids, the Spirula, and the Nautilus. Examples of both the Pearly and Paper Nautilus will be found in case 68, and of the Cuttlefishes and Squids, preserved in spirit, in the adjoining wall case.

The Octopus has no internal shell or "bone" such as is found in the mantle of the Cuttlefish, and which is cast up in abundance on all our ocean beaches. All the Cephalapoda, except the Nautilus, discharge a dark fluid when disturbed, which clouds the water, and assists them in escaping from their enemies. This fluid, called *Sepia*, was formerly used for writing and in the preparation of a pigment.

Class II.—Pteropoda (wing-footed).

There are, as yet, no examples of this class in the collection.

Class III.—Gasteropoda (ventral-footed).

By far the larger number of shells belongs to this class; and, as indicated by the name, these molluscs crawl or glide on the under-surface of their body, called the "foot." Heading the list, the *Muricidæ* or rock-shells, in case 68, contain many handsome and peculiar forms. They are carnivorous, and bore through the shells of bivalves with their so-called tongues, for their teeth are placed on a ribbon-like process, which uncoils and grows forward as the tip in use gets worn out. In the same case will be found examples of the Trumpet Shells (*Tritonidæ*.) The species *Triton variegatus* grows to a large size, and is used by South Sea Islanders as a horn, a hole being made in the upper end of the spire to blow through, and the sound produced varied by inserting the hand into the mouth of the shell. *Fusus proboscidiferus*, of which there is an example in the wall case, is one of the largest shells to be found on our coast.

The Volutes *(Volutidæ)* (case 67) are an attractive group of shells occurring in the greatest variety in Australian waters, *Melo diadema*, of which there are a series of specimens in the wall case, grows to a large size on our own North West Coast, and is familiarly known there as the "Conch." In case 67 will also be found specimens of several well-known and appreciated families, such as the Mitras *(Mitridæ)*, Olives *(Olividæ)*, Harps *(Harpidæ)*, Cones *(Conidæ)*, Auger Shells *(Terebridæ)* and Wing Shells *(Strombidæ)*.

The Scorpion or Spider Shells (*Pteroceras*) in case 66 have the outer lip of the shell developed into most singular claw-like projections. The Cowries (*Cypræidæ*) are probably better known than any other species of shells owing to their peculiar shape, varied markings and splendid polish, which is produced and preserved by two flaps of the mantle, that fold over the back of the shell. The rare Orange Cowry, of which there is a specimen, is worn as a mark of the highest dignity by the Chiefs of some of islands in the Pacific. *C. moneta*, the Money Cowry, is, as its name implies, used as a coin amongst the negro tribes in Africa. This is found in large numbers round the shores of tropical Australia and the Pacific.

We cannot do more than refer to the Tun Shells (*Doliidæ*), Slipper Shells (*Calyptræidæ*), Screw Shells (*Turritellidæ*) and Helmet Shells (*Cassididæ*) to be seen in case 66. The last-named are extensively used for cameo carving.

Case 65 contains, besides several genera of very small shells, specimens of the Violet Snails (*Ianthinæ*) which live in the open seas, where they are found in myriads floating with the aperture of the shell upwards; they feed on jelly fish and construct a gelatinous raft, filled with air bubbles.

The Periwinkles (*Litorinidæ*) are a well-known large family found in every part of the globe; many of the species are used as food. The family *Rissoidæ* is a large one, but not well-known. It contains probably the smallest shells in existence. The Top and Hoop Shells (*Turbinidæ* and *Trochidæ*) are two extensive families, the interior of the shells being pearly and the exterior generally adorned with bright colours. The opercula of some of the *Turbinidæ* are known in Australia as "cat's eyes," and are often mounted as ear-rings, scarf pins, etc. The Ear-Shells (*Haliotidæ*) are lined with pearl and adhere to rocks. A fine specimen of *H. rufescens* from California shows how beautifully decorated is this genus. Passing over the Keyhole Limpets (*Fissurellidæ*) we come in Case 64 to the common Limpets (*Patellidæ* and *Acmæidæ*), a large specimen of which (*P. neglecta*) is found on our own coast. Following these are the Bubble Shells (*Bullidæ*) and Sea Wood-Lice (*Chitonidæ*). The shell of the latter consists of eight shelly plates which overlap each other, and the animal has the power, like a wood-louse, of rolling itself into a ball.

Specimens of the Sea-Hares (*Aplysiidæ*) will be found in the wall-case in spirit. They are naked mollusca, and so called from a fancied resemblance to a hare.

The PULMONATA, or Air-breathers, include a vast number of species, and representative specimens will be found of the Common Land-Snails (*Helicidæ*), Fresh Water Snails (*Limnæidæ*), and Limpet Snails (*Siphonariidæ*).

CLASS IV.—SCAPHOPODA (Boat-footed).

At the end of this case (64) are specimens illustrating this class—the Tooth Shells (*Dentaliidæ*).

CLASS V. PELECYPODA (Hatchet-footed).

Passing on to Case 63 we come to the PELECYPODA, which are bivalves. The first family represented is *Pholadidæ*, or Piddocks. The shell, though thin, is strong, for many species bore into rock, wood and sand. The ravages caused by Ship Worms or *Teredinidæ*, is shown by a block of wood which has been pierced by these most destructive molluscs.

Passing by the Razor Shells (*Solenidæ*) and several other genera, we come to the Cockles (*Cardiidæ*), many species of which are used as food. They are a large family, and the species found in tropical countries are generally handsomely coloured and adorned with beautiful sculpture.

The TRIDACNIDÆ, or Clams, are well-known ponderous shells, found in large numbers in Australian waters. They grow to a very large size, and specimens of *T. gigas* are said to have been found weighing over 500 lbs.

In Case 62 will be found specimens of the Pearly Cockle (*Trigoniidæ*), which have ceased to exist in the world, except upon Australian shores. Here will also be found the Mussels (*Mytilidæ*), the Fan Mussels (*Pinnidæ*), and the Pearl Oysters (*Meleagrina margaritifera*). The last-named, the "Pearl Bearer," is too well known to need more than a passing note, but attention may be directed to some specimens of it in the wall case, which were presented by Mr. George Streeter.

The Thorny Oysters (*Spondylidae*) are often very brightly coloured and attractive shells, as a pair of fine specimens of *S. limbatus* will show.

Our list must close with just a reference to the Scallops or Fan Shells (*Pectinidæ*), the Limas (*Limidæ*), and the Oysters (*Ostreidæ*).

The fossil Mollusca are represented by some 4000 specimens arranged in the table cases placed parallel to those containing the recent forms.

Four of the cases contain the W.A. fossils from formations of the Devonian, the Carboniferous, and the Pleistocene Systems.

Fourteen cases are devoted to a portion of the Tennant Collections, which contains over 3400 Fossils, mostly British. The specimens are all characteristic, and were originally selected principally from the celebrated collections of the Marchioness of Hastings, Drs. Buckland, Bowerbank, Mantell, and others. There are also some types figured in Dixon's "Geology of Sussex," and choice specimens of fossil fishes from Monte Bolca, Italy, the Lithographic Stone of Solenhofen, etc. The names were verified by the late Dr. S. P. Woodward, author of "The Manual of Mollusca," and the late Wm. Davies, which adds greatly to the scientific value of this important collection. The remaining portion of this collection will be displayed as soon as space is available.

The most important donations of shells have been those made by Mr. George Gross, of Brisbane; Mrs. H. R. M. Gale, of Wallcliffe; and Mr. A. Wigglesworth, England.

INSECTA.

The collections of this subclass will be found in the cabinet placed under the first table case. On the drawers are painted the names of the orders they contain.

COLEOPTERA (*koleos*, a sheath, *pteron*, a wing).—Beetles. The anterior wings are hardened, and form protective cases for the membraneous posterior pair.

LEPIDOPTERA (*lepis*, a scale).—The Moths and Butterflies, which have four wings, mostly covered with minute scales.

NEUROPTERA (*neuron*, a nerve).—The Dragon Flies, etc., which have four membraneous wings, with numerous reticulated nervures.

DIPTERA (*dis.* twice).— The two-winged insects, Flies, Mosquitoes, etc.

HYMENOPTERA (*humen*, a membrane).—The Bees, Ants, etc., which have, in the perfect forms, four membraneous wings.

ORTHOPTERA (*orthos*, straight).—Cockroaches, Mantidos, Crickets, Grasshoppers, and Locusts, which usually have four wings, the anterior pair being smaller.

HEMIPTERA (*hemi*, half).—Aphides, Cicadas, Fleas, Lice, etc. The latter are sometimes classed as APTERA (*A*, without), for the single pair of wings characteristic of this order, are in them so rudimentary as to be useless.

Insects date back to the Middle Silurian. Their remains are very abundant in the Carboniferous formations.

ARACHNIDÆ (*arachne*, a spider).—The Spiders, Scorpions, and Mites. The ingenious contrivances of the trap-door spiders are well shown in the specimens presented by Mr. Jas. Adam, of Pinjarrah.

The collections of Echinoderms, Corals, and Sponges are in course of arrangement. The Corals from the Abrolhos are of special interest, as those islands lie on the southern limit of coral growth.

The gigantic Cup Sponge from the North-West Coast, presented by Capt. Thos. W. Smith, of the Meda, and the sponge from Sharks Bay, given by the Rev. C. G. Nicolay, are exceptionally fine specimens.

BOTANY.

The large collection of dried plants obtained by Capt. Roe, has been increased by donations from Mr. Alcock and others. These will shortly be available for inspection.

During the spring months, Dr. Morrison, the Government Botanist, has kindly kept the Museum supplied with fully labelled and classified specimens of fresh wild flowers of the Swan District.

The fine collection of timbers showing the excellence and durability of the West Australian timbers has been lent by the Committee to the Paris Exhibition.

The collection of Fossil Plants is very extensive, and contains a very complete series of specimens from the Coal-measures.

THE MINERAL KINGDOM.

The Mineral Kingdom includes not only all the inorganic products of the Earth, but also all those bodies known as Meteorites, which have fallen from the sky.

Geology deals with the Earth, the composition of the various strata, or layers, of which it consists, their distribution, and the physical conditions under which they were formed.

Palæontology (the knowledge of old beings) deals with the remains of ancient life found in the various strata, and strives, by comparing them with the living fauna and flora, to restore the successive life-forms which have passed away, and to trace by those relics the evolution of life on the earth, from earliest times to our own.

Petrology (the knowledge of rocks) treats of rocks as regards their mineral constituents. The term "rock" is applied by geologists to any stratum or dyke, whether it be loose sand or hard granite. Rocks are built up of minerals.

MINERALOGY.

A mineral is a natural inorganic substance which has a definite chemical composition and is homogeneous; that is to say, the same mineral is always composed of the same materials, and is alike throughout its structure. Take, for example, an ordinary piece of granite, which is a rock composed of three minerals—quartz, felspar, and mica. Break it up and examine these three minerals carefully. You will find that it is easy to distinguish between them, but that you cannot resolve them by any mechanical means into substances more simple. However finely you may break them up, each will retain its own properties. Chemistry, however, will enable you to do so, for it has proved that all substances are composed of some sixty-five elements. An element is incapable of being reduced into anything simpler. Gold, silver, iron, copper, etc., are elements, but brass is a compound, consisting of two elements—copper and zinc; and can easily, by the process known as chemical analysis, be split up into these two elementary metals, but no process is known by which they can be resolved into simpler constituents.

Chemical analysis will prove that the quartz is composed of two elements—silicon and oxygen, in the proportion of twenty-eight parts by weight of the former to thirty-two of the latter; and

that all quartz is thus built up, and that each fragment, however small or however large, always contains these two elements in exactly the same proportion; that is to say, it has a definite chemical composition and is homogenous.

Minerals have also various physical properties, such as form, colour, fusibility, specific gravity, hardness, etc., by which they may be identified.

CRYSTALLOGRAPHY.

To do justice to the subject of Crystallography would necessitate entering deeply into mathematical problems, and so lies beyond the scope of this Guide Book; but as even, a superficial acquaintance with its elements is helpful in the determination of minerals, it is advisable to say a few words on the Science of Crystals.

All crystals may be referred to one of the six systems enumerated below, for it has been proved mathematically that there can be only six systems.

Crystals are symmetrical forms bounded by faces, which meet in edges and solid angles. A cube may be taken as the first form. It has six faces, twelve edges, and eight solid angles.

It gives its name to the first system, viz., the Cubic, or Isometric (*isos*, equal; *metron*, measure), in which all the axes are equal and at right angles to one another.

The axes are imaginary lines uniting the centres of opposite faces, and their existence is assumed to aid in explaining the symmetry and relationship of the faces.

The Isometric system contains thirteen forms, of which models are exhibited. Some of these, such as the regular octahedron and rhombic dodocahedron are said to be holohedral (whole-faced), and others, such as the regular tetrahedron to be hemihedral (half-faced).

It is necessary to rightly understand these terms in order to comprehend the relationship of the modifications to the primary form, and how it is that, although, for instance, in the case containing iron pyrites (mundic) there are twelve forms of crystals, yet this mineral is said to be cubic, and the further statement that the same mineral always crystallises in the same form.

A simple mechanical method of seeing the relationship is to cut a few cubes out of raw potato or soap, then carefully cut off all the edges half way down the faces, when a regular rhombic dodocahedron (a solid, with twelve diamond-shaped faces) will be found. Then from another cube cut off the solid angles equally, and a regular octahedron (eight-faced), bounded by eight equal-sided triangles, will remain. Then if these eight solid angles be removed the form will be restored to the cube. The above are

holohedral modifications; but by cutting off from a cube the alternate solid angles a hemihedral form will be produced, viz., the regular tetrahedron—a form bounded by four equilateral triangles.

In nature crystals are often found in which such modifications have partially taken place. In one specimen of iron pyrites can be seen the faces of both the cube and the octahedron, the solid angles having been replaced or truncated; while in fluor spar it is not uncommon to find the edges replaced by the faces of the rhombic dodocahedron.

In trying the above-mentioned experiments it will be seen that the axes remain the same, whatever the modification, and therefore it will be more readily understood what is meant by the mathematician's statement that the faces of a crystal stand in symmetrical relationship to the axes.

II. DIMETRIC, or TETRAGONAL.—In this the three axes are at right angles to one another, but only two are of equal length. The primary form is a square prism.

III. TRIMETRIC, or ORTHORHOMBIC.—The three axes are all uneqal in length, but are all at right angles to one another.

IV. MONOCLINIC, or OBLIQUE.—Two of the axes of equal length and at right angles, but the third of different length, and not at right angles.

V. TRICLINIC, or ANORTHIC.—The three axes unequal in length, and not at right angles to one another.

VI. HEXAGONAL, or RHOMBOHEDRAL.—Three equal axes, intersecting at angles of 60°, in one plane, the fourth axis is unequal in length, and cuts them at right angles at the point or intersection.

DIMORPHISM.—Occasionally the same natural chemical compound occurs in crystals belonging to two different systems, as calcite (hexagonal), and aragonite (trimetric), which shows that the carbonate of lime, of which they are both composed, must have been formed into crystals under different conditions, probably as to temperature and pressure.

ISOMORPHISM (same shape).—When different minerals take the same form, as occurs with the carbonates of iron (chalybite) and of magnesia and lime (dolomite).

PSEUDOMORPHISM (false form) is applied to those instances of minerals exhibiting a form belonging to another mineral, as in the case of the Tinstone from St. Agnes, which has been deposited in cavities from which orthoclase felspar had been dissolved, and so has the form of the latter.

TWINS.—Crystals are said to be twinned when two or more similar crystals are attacked by similar faces.

EFFECTS OF LIGHT.

The LUSTRE of Minerals varies with the nature of the surface of their faces. It may be—

1. Metallic,	as in	Galena
2. Vitreous	,,	Quartz
3. Subvitreous	,,	Calcite
4. Resinous	,,	Sulphur
5. Pearly	,,	Talc
6. Silky	,,	Satin Spar
7. Adamantine	,,	Cerussite
8. Dull	,,	Chalk.

The COLOUR of a mineral is often of great assistance in determining its name, but not always, for it must be borne in mind that slight, even extremely minute, percentages of impurities entirely alter the colour. Rock crystal is absolutely colourless, but a trace of manganese gives it a purple hue (amethyst); of iron, various shades of yellow and red; of carbonaceous matter, brownish-black (cairngorm); while if it be finely striated it gives play to delicate but brilliant colours, and is then called opal.

It is very difficult to describe intermediate shades of colour, but the 53 specimens in the table-case will show at once what is meant by such terms as "emerald-green," "grass-green," "pistachio-green," "olive-green," etc.

DIAPHANEITY.

The capacity of minerals for transmitting light is illustrated by five specimens:

1. Transparent	...	Selenite
2. Semi-transparent	...	Halite
3. Translucent	...	Alabaster
4. Sub-translucent	...	Calcite
5. Opaque ...	...	Jasper.

REFRACTION.

Rays of light are bent when passing from one medium to another of different density, as can easily be easily be seen by dipping a stick into water. The index of refraction varies greatly, that of water being 1.3: of rock crystals, 1.5; of diamond, 2.4; this latter having the highest refractive power known.

DOUBLE REFRACTION.

All minerals, except those crystallising in the isometric system, in which all the axes are equal, and therefore the internal structure similar in all aspects in every direction, have the power of dividing light into two sets of rays which emerge at different angles, as can be seen by the duplication of the coloured dots on the card under the specimen of calcite in the case.

DICHROISM (Two Colours).

All transparent coloured minerals, except those crystallising in an isometric form, exhibit dichroism. Thus an emerald is slightly bluer green in one direction, and yellower in another; a ruby a bluer red when viewed one way, and a more orange red another, while a garnet, being isometric, appears the same colour in whichever direction it be regarded.

POLARISATION.

Minerals that doubly refract light are able to be identified by means of an instrument called the Polariscope, to which further reference will be made under the heading of Petrology.

SPECIFIC GRAVITY.

The specific gravity of a substance is its weight compared with that of water. This is ascertained by weighing the body in the air and again in water, the difference in the result being the weight of the equal bulk of water displaced. By dividing the original weight by this difference the specific gravity is obtained.

EFFECT OF COHESION.

The following minerals have been adopted as a standard for testing the scale of hardness. Each will scratch its predecessors, but cannot scratch its successors.

1. Talc
2. Selenite
3. Calcite
4. Fluor
5. Apatite
6. Orthoclase
7. Quartz
8. Topaz
9. Corundum
10. Diamond.

No. 1 can be marked with the finger-nail, while No. 10 is the hardest substance known. Intermediate degrees are marked by a half. Thus cuprite is said to be 3.5 to 4, which means that it is harder than calcite, and closely approaches fluor.

STATE OF AGGREGATION.

A mineral may be—

1. Brittle, as example ... ... Galena
2. Tough ... ... Corundum
3. Sectile (splitting into thin parts) ... Selenite
4. Malleable ... ... Native Copper
5. Flexible ... ... Talc
6. Elastic ... ... Mica.

Fracture may be :

1. Conchoidal (like a shell), as in Obsidian.
2. Even, as in Orthoclase.
3. Uneven, as in Serpentine.
4. Hackly, as in Galena.

CLEAVAGE.

Most minerals have certain directions in which their cohesive power is weakest, and this gives them a tendency to break in certain planes called cleavage, which have a direct relationship to their crystalline form. For example, Fluor, which belongs to the cubic system, cleaves in planes parallel to the regular octahedron.

MAGNETISM.

Magnetite (loadstone) and a few other minerals are magnetic.

ODOUR.

The Bitumens, some of the Sulphur and Arsenic compounds, and the Clays have characteristic odours ; Arsenic resembling garlic.

TASTE.

Salt, Nitre, and other soluble minerals may be distinguished by their flavour.

The Mineral Collections.

These are arranged in table cases in the Zoological Gallery in the following order :—

Western Side.

The Introductory Cases, containing the models of Crystals, and specimens illustrating colour, hardness, and other properties.

The Woodwardian Collection, comprising 1300 specimens of typical minerals, is arranged on the plan adopted in Dana's System of Mineralogy, which is based on the chemical composition.

Models of the famous historic diamonds, and of gems.

Auriferous Quartz from the Eastern Colonies.

Broken Hill and Tasmania Silver Ores.

Tasmanian and other Tin Ores.

EASTERN SIDE.

The Western Australian Minerals and Ores, arranged according to their economic value, in the following order:—Gold, tin, copper, lead, zinc, iron, manganese, plumbago, mica, asbestos, etc. Of these specimens, over 300 were presented by F. C. B. Vosper, Esq., M.L.A.

A full list of all the minerals as yet found in the colony is contributed to the Year Book by the Government Geologist, Mr. A. Gibb Maitland, F.G.S.

PETROLOGY.

Rocks may be Igneous, Aqueous, or Metamorphic.

The Igneous Rocks are subdivided into the Volcanic—those that cooled down on or near the surface of the earth, such as the lavas, trachyte, or basalt; and the Plutonic, which have solidified at a depth, such as granite, syenite, felsite, diorite, etc.

The Aqueous Rocks are those that have been deposited by water, such as the limestones, sandstones, etc.; in fact, all stratified rocks. They are usually fossil-bearing.

The Metamorphic Rocks are of aqueous origin, but have been so altered by heat and pressure that they have assumed the character, to a great extent, of the Igneous rocks. The schists and gneiss of the Darling Ranges are metamorphic. They are, however, traversed by many intrusive dykes of granite, diorite, and other Igneous rocks.

A series of specimens, with microscopic sections, of typical Igneous rocks is displayed in a table case.

When these rocks are coarse-grained, it is a simple matter to separate the various minerals of which they are built up, in order to analyse them, but when they are fine-grained this can only be done by cutting a section thin enough to be transparent, so that it can be examined under the microscope, when the crystalline forms and optical properties (see above, "Effects of Light") of their constituent minerals enable them to be determined.

The large collections of rocks and minerals made by the Rev. C. G. Nicolay, and by the Government Geologists and Surveyors, mentioned in the Introduction, will be placed on view as soon as the new galleries are built.

The specimens presented by the Elder Exploration Expedition, which consist of a large series of rocks, also await show cases.

METEORITES.

Meteors, familiarly called "Shooting stars," are to be seen on any clear night. In the daylight they are invisible. They vary greatly in size and brilliancy. They are cosmic bodies, travelling through space at an enormous velocity, that have come within the sphere of the earth's attraction. When they rush into our atmosphere they are so intensely heated by the friction, that they are, unless very large, burnt up before they reach the surface of the earth. The larger ones that survive are called Meteorites.

Meteorites are of three kinds—those which consist mainly of iron are called "Siderites" (*sideros*, iron); others, partly stone and partly iron, "Siderolites" (*lithos*, stone); those almost wholly stone, "Aerolites" (*aer*, air).

Several have been found in this colony, of which casts and sections are exhibited. The Youndegin Meteorite was found in January, 1884, by P.C. Alfred Eaton, near Penkarring Rock, about seventy miles from York. There are four pieces, weighing respectively 25¾ lbs., 24 lbs., 17½ lbs., and 6 lbs. In 1891 Mr. L. Knoop found another portion weighing 373½ lbs., and in 1892 yet another, which weighed 2044 lbs. The former specimens were described by Mr. L. Fletcher, F.R.S., in the "Mineralogical Magazine," Vol. VII., and the latter in "Nature," on 24th November, 1892, by Mr. J. R. Gregory.

Its composition is: Iron, 92½ per cent.; nickel, 6½ per cent.; with traces of cobalt, magnesium, phosphorus, and carbon.

The "Roebourne" was found on the alluvial plain, two hundred miles south-east of Roebourne, by Mr. H. Reginald Hester in 1892; weight, 192½ lbs. The "Ballinoo" by Mr. Geo. Denmack, ten miles south of Ballinoo, on the Murchison River, in 1892; weight, 92 lbs.

The "Mooranoppin" was found in, or before, 1893 by a native and left with Mr. Massingham, and in the year following was brought to the Museum by P.C. J. S. Edmonson.

The composition of the Youndegin Siderite is fairly representative of that of most of the Siderites, but the internal structure of these varies considerably, as is shown by what are called "Widmanstätten" figures, which are brought out by etching a polished surface with weak acid, or bromine.

Chemical analysis has proved the presence in these bodies of twenty-six of those elements (see page 88) that are most abundant in the earth, but of no new element. Some of the combinations of these elements are different from any that have yet been found on this planet. Of these the most interesting is CLIFTONITE, a cubic form of Graphite, discovered in the Youndegin Siderite by Mr. L. Fletcher, and described by him in the paper above mentioned.

The "Cranbourne," now in the British Museum, is the largest Australian Siderite on record, as it weighs over 3¼ tons. It fell near Melbourne. Fragments of it and of several foreign Meteorites are on view.

STAFF

OF THE

Western Australian Museum and Art Gallery.

CURATOR AND SECRETARY:
BERNARD H. WOODWARD, F.G.S., F.I.I., ETC

CLERK:
CHARLES P. CONIGRAVE.

HEAD ATTENDANT:
W. ROCKLIFF (RESIDENT).

EXTERNAL.

COLLECTOR:
JOHN T. TUNNEY.

TAXIDERMIST AND ARTICULATOR
OTTO LIPFERT.

APPENDIX.

LIST OF WORKS CONSULTED.

ART.

The Works of	P. J. Hamerton
The Works of	John Ruskin
The Studio	
The Art Journal	
Addresses to R.A. Students	Lord Leighton
Manual of Ancient Sculpture	Geo. Redford
Médailleurs Français	Roger Marx
Catalogues, etc.	British Museum
Handbook of the National Gallery	Edward T. Cook
Handbook of the Tate Gallery	Edward T. Cook
English School of Painting	E. Chesnau
Coins and Medals of the Ancients ...	Barclay V. Head

ETHNOLOGY.

Native Tribes of Central Australia	Spencer and Gillen
Ethnological Studies in North-West Queensland	W. E. Roth
Aborigines of Australia	Thos. Worsnop
Anthropology	E. B. Tyler
Man's Place in Nature	T. H. Huxley
Descent of Man	Charles Darwin
Study of Man	A. C. Haddon
Descent of Man	F. E. Beddard
Man and the Glacial Period	G. F. Wright
Anthropology	R. Helms

ZOOLOGY.

Catalogues and Guide Books	British Museum
Mammals Living and Extinct	Sir W. H. Flower and R. Lydekker
Royal Natural History	R. Lydekker
Zoology	H. A. Nicholson
Zoology	A. Newton
Marsupialia	Oldfield Thomas
Marsupialia	G. R. Waterhouse
Teeth of the Macropodidæ	M. F. Woodward
The Cat	St. George Mivart
The Dog	St. George Mivart
Zoology	C. Claus
Vertebrata	A. Macalister
Invertebrata	A. Macalister

ZOOLOGICAL WORKS (Continued).

Whales	F. E. Beddard
Mammals of Australia	J. Gould
Comparative Anatomy	Sir R. Owen
Osteology of the Mammalia	Sir W. H. Flower
Birds of Australia	J. Gould
Key to Birds of Australia	Robert Hall
Proceedings Zoological Society of London ...	
Report of the Horn Expedition ...	
Ornithology	St. George Mivart
The Ibis	
The Naturalist in Australia	Saville Kent
Manual of Mollusca	S. P. Woodward
Manuel de Conchyliologie	J. B. Chenu
Handbook of Shells	B. B. Woodward
The Study of Fishes	A. C. L. Gunther
Geographical Distribution of Animals ...	A. Wilson
Geological and Geographical Distribution of Animals...	A. Heilprin
Geographical History of Mammals ..	R. Lydekker

GEOLOGY.

Textbook of Geology	Sir A. Geikie
Geology of England and Wales	Horace B. Woodward
Manual of Geology	T. G. Bonney
Principles of Geology	Sir Charles Lyell
Geological Magazine	
Proceedings of Geological Society	
Proceedings of Geologists' Association ...	
Reports of Geological Department of Western Australia	H. Y. L. Brown E. T. Hardman H. P. Woodward A. Gibb Maitland
Palæontology of Western Australia ...	A. H. Foord
Palæontology of Western Australia	George J. Hinde
Manual of Palæontology	A. Nicholson and R. Lydekker
Handbuch der Palæozoologie	Karl A. Zittel

MINERALOGY.

A System of Mineralogy	J. D. Dana
A Textbook of Mineralogy	J. D. Dana
A Glossary of Mineralogy	H. W. Bristow

BOTANY.

Botany, Lessons on	Daniel Oliver
Flora Australiensis	Bentham and Muller
Botany, Structural	Otto W. Thomé
The Vegetable Kingdom	J. Lindley.

ENGLISH MAMMALS AND BIRDS.

The Honourable Walter Rothschild has sent, in exchange for skins of Western Australian Marsupials and Birds, specimens of a number of British Mammals and Birds. These comprise Hares, Rabbits, Stoats, Weasels, Water Voles, Hedgehogs, Robins, Bull-finches, Green-finches, Chaffinches, Yellow-ammers, Starlings, Thrushes, Wheat-ears, Rooks, Magpies, Hawks, Cormorants, Puffins, and many others, which are being set up, and will be exhibited in special cases. The collection also includes specimens of the Blue Hare, *Lepus variabilis* (Pall), which turns white during the winter in those countries, which are then snow-covered. Its range extends from Ireland, in the West, to Japan, in the East; from the Arctic Circle in the North, to the Pyrenees, Alps, and Caucasus, in the South.