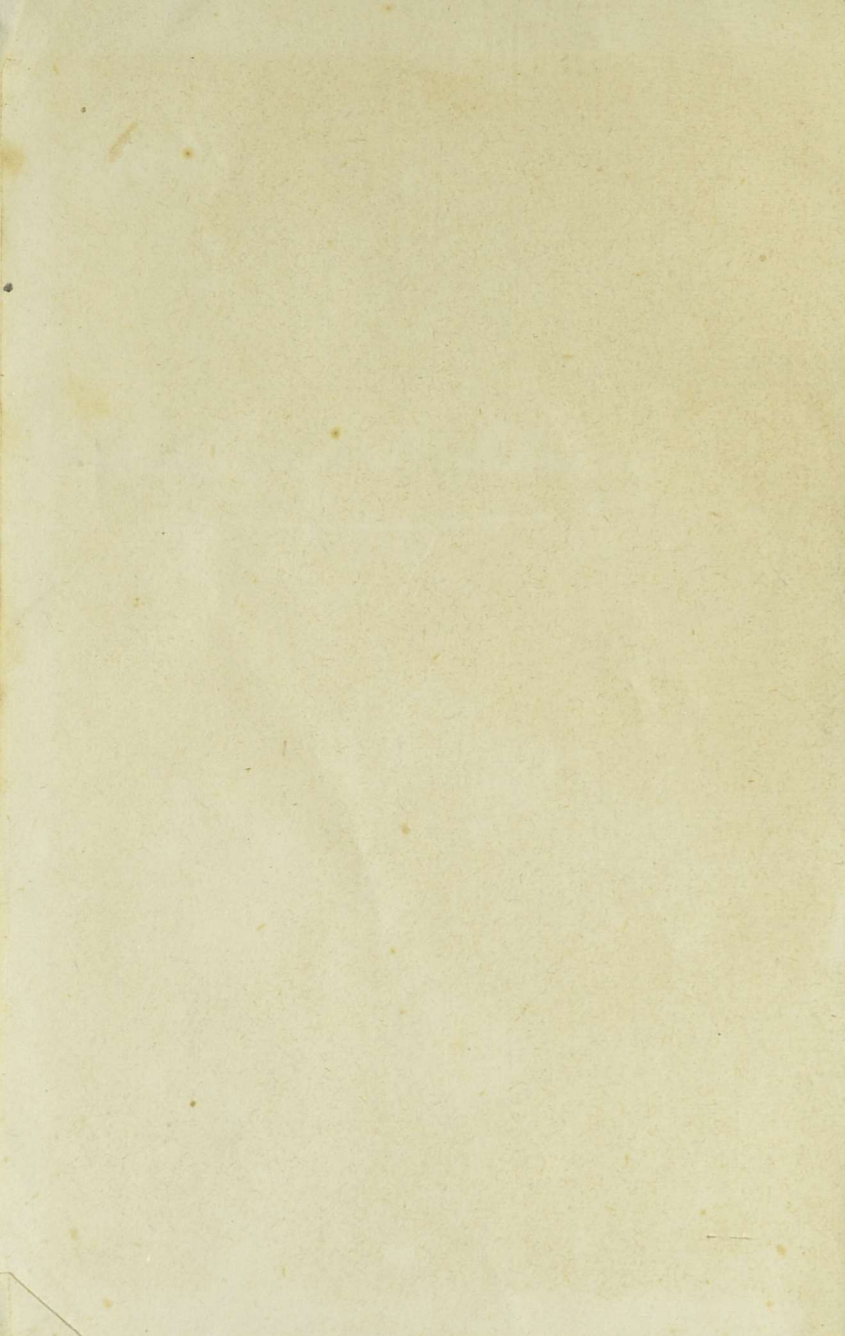




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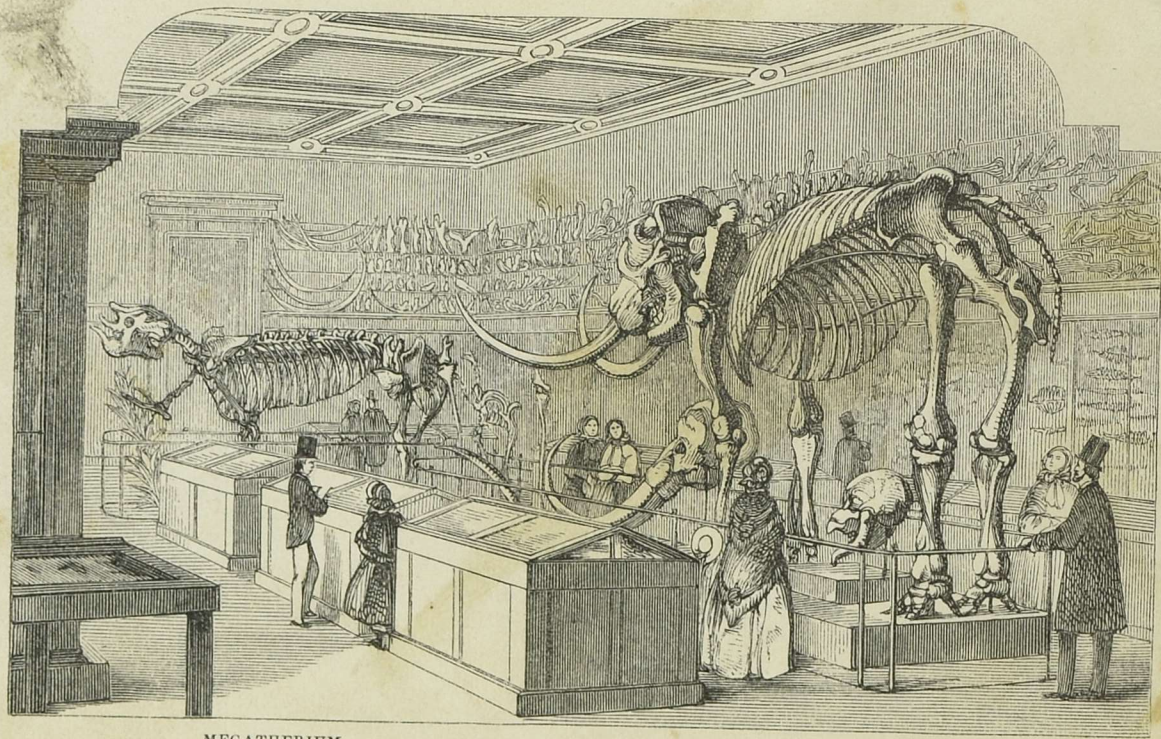
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MORE PLEASANT MORNINGS

AT THE

BRITISH MUSEUM.



MEGATHERIUM.

FOSSIL ROOM.

MASTODON.

MORE PLEASANT MORNINGS

AT THE

BRITISH MUSEUM;

OR,

The Handy-work of Creation.

NATURAL HISTORY DEPARTMENT.

BY THE AUTHOR OF

"PLEASANT MORNINGS AT THE BRITISH MUSEUM," "PEEPS AT
NATURE," "VILLAGE SCIENCE," ETC.

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THE BRITISH MUSEUM.

Natural History Department.

CHAPTER I.

BOUNDLESS RESOURCES;

OR,

OMNIPOTENCE MANIFEST IN THE MINERAL RICHES OF
THE EARTH.

FRANK and Lucy had travelled more than many young people, for their father's engagements had caused a frequent change of residence, which he endeavoured to make profitable by leading them to observe the varieties of climate, productions, and other features, which distinguished their different homes; while he tried to prevent desultory habits, by leading them to pursue methodical plans of study.

One of their chief amusements was to collect and arrange an assemblage of curiosities which some people contemptuously termed "rubbish," but which they named "a museum." Papa always treated this with proper respect, and

delighted his children by occasionally adding a specimen, trusting to their increasing knowledge to weed out the "rubbish," and satisfied that they could learn something even from common objects; while the choice of their own gatherings would gradually improve by comparison with other more worthy museums.

It was with great delight that the young people accepted an invitation from their aunt to spend a vacation in London, for the purpose of exploring the Natural History Department of the British Museum; and their eagerness was not a little increased, as well as solemnized, by a remark respecting that department made at the dinner table on the day of their arrival, by a friend of no small attainments in natural philosophy and theological study. "I never," said he, "saw so much of God before as was there brought to view. The boundless riches; the endless resources of contrivance; the exquisite adjustment of organizations; the inexhaustible variety of beauty and usefulness,—all excited such wonder and love, and adoration of the Great Creator, that I was glad to be alone to indulge my emotion, and drink in the light which such a collection sheds upon the inspired volume."

The host and hostess could fully sympathize with their guest in this respect; and when Aunt Edith accompanied her nephew and niece to the Museum the following morning, she was glad to perceive they had not lost the impression of her visitor's remarks.

They begged to go at once to their favourite MINERALS, and were charmed with the extent and variety of the collection.

As they walked through the rooms given to this portion of Natural History, they observed with pleasure the admirable arrangement of specimens in glass cases, so amply labelled with the names of the principal substances combined to produce the varieties in each section, that much information may be derived from this source alone. Of late years so many discoveries have been made in mineral chemistry, that considerable changes have occurred in the systems of classification; therefore it is not surprising that Frank and Lucy, although they had read a few books on the subject, should presently find out much that was new to them, and they were soon ready to ask for further information.

"How is it, aunt," inquired Frank, stopping short in his survey, "that so many things which I have always supposed to be earths, such as magnesia and soda, are here placed among metals?"

"Because," replied Aunt Edith, "Sir Humphry Davy proved that these substances, as well as lime, alum, potash, and several others, are really only the *oxides* or *rust* of metals. Subsequent research and experiment have confirmed his discoveries, while the innumerable variety of substances, which, combining with metals form their ores, afford perpetual interest to the student. Different learned men have devised various methods of classifying these

substances, which it would only perplex you to explain or enumerate; therefore I shall only tell you that the arrangement now adopted by the British Museum is that of Berzelius, an eminent Swedish chemist, who fully concurred with Sir Humphry Davy in what he termed the *metallic bases* of many substances formerly considered as salts and earths.* Berzelius examined also the agency of electricity in producing metals, which he found of such extensive influence, that he has given it the greatest prominence in his system of classification."

"That is the reason, then, I suppose," rejoined Frank, "that we see so much about negative and positive electricity written on the sides of these cases?"

"It is; they begin, you perceive (in Cases 1—3), with the non-oxidized bodies—various *metals* in their greatest natural state of purity—iron, copper, bismuth, lead, silver, mercury, palladium, platinum, osmium, and gold."

"Some of these names are different from those of the ten metals I used to learn about at school, aunt," remarked Lucy. "Do palladium and osmium mean our old acquaintance tin and zinc?"

"No, they are different substances, only discovered about 1803. In the books of Moses six metals are enumerated as spoils of the Midianites; and compounds of these are obvious in the Ninevite remains. There are now about

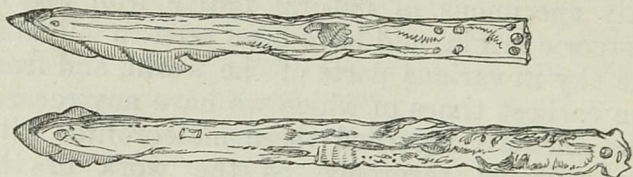
* Their metallic existence is so rare and evanescent, that many chemists still call them *earths* and *salts*.

fifty-one different metals known, which appear to be simple bodies not capable of analysis, or decomposition, and are therefore entitled to the term of *elements*.

“Most of these occur in the earth as *ores* mingled with other substances, and require the aid of art to separate them. *Iron*, for instance, is scarcely ever found pure; indeed, almost the only specimens of natural native iron are of meteoric origin, and have been seen to fall from the sky in various parts of the world, and from the earliest times of which we have any record. The ancients regarded these meteorolites with superstitious reverence as the work of the gods; the more scientific moderns have long discussed their origin without coming to any completely satisfactory conclusion; some referring them entirely to electric causes; others attributing them to the eruption of lunar volcanoes projecting fragments beyond the moon's attraction; while some deem them to be bits of some asteroid whose orbit has intersected that of our earth, and poetically muse on these stones, as specimens of the materials composing far-off planets.

“Without pronouncing on these theories, however, which perhaps are none of them true or tenable, you must remark some of these interesting pieces of iron (Cases 1 and 1a). A few have been polished to exhibit their purity and the fineness of the grain, resembling our best steel. These are portions of masses of iron known to have fallen from the sky between the

years 1751 and 1850, many of them weighing several thousand pounds, some even many tons. They will bear smelting; and those found in the Arctic regions are much prized by the Esquimaux for their knife blades and harpoons. Here is one of each brought from Davis' Straits by Captain Ross in 1819.



ESQUIMAUX KNIFE AND HARPOON.

“These specimens are all arranged chronologically, as well as the meteoric stones, which are classed with native iron on account of the preponderance of that metal. Nickel also is found in them in various proportions. These cases are filled up with interesting varieties of native *copper*, which is discovered almost all over the world in threads, or thin branchy crystallizations. It derives its scientific name, *cuprum*, from the Isle of Cyprus, whence the ancient Greeks imported all their copper.

“The specimens of native *lead* in this case are all obtained from volcanoes; the leaden medal is cast from the metal ejected from Vesuvius in an eruption of 1631. It is but rarely that natural pure lead is found in any other place than near volcanoes, except those

very small cubes which are occasionally seen amongst bunches of crystals in lead mines.

“Native *bismuth* is a brownish white colour, and occurs in tin mines, but is not plentiful; it is very useful mixed with other things as a solder; and as it expands while cooling is a valuable ingredient in type metal. Combined in a large proportion with tin and lead, it will yield so fusible a substance that tea spoons made of it melt in boiling water.”

“Ah!” interrupted Frank, “I remember our tutor amused us once by putting some round the tea table, and though they looked very respectable articles we were all so amazed to find our spoons disappear as we each stirred our tea.”

“You would be still more amazed to see a delicate white complexion turn black under the influence of fire or gas light; but ladies who use cosmetics have met with such an accident, as this treacherous bismuth is sometimes put into dyes and washes for the skin.

“In this same case is some artificially produced *titanium* crystallized in cubes from the great iron works in Wales. It is a very rare metal, of a glittering coppery colour, sometimes seen in granite and slate. The native *silver* is particularly beautiful from its varieties in moss-like wire-shaped threads, or toothed, branched, and massive specimens, many of which are aggregations of minute crystals. The native *mercury* in globules imbedded in sparry limestone, or in cinnabar, is very pretty. Hydrar-

guret of silver, or native *amalgam*, occurs in perfect crystalline forms in all quicksilver mines—there are in this case (2) several figures and ornaments moulded by the miners of Mexico.”

“Is not the working of quicksilver mines very injurious to the health, aunt?” asked Lucy, who remembered seeing a young friend from the tropics suffering from an over dose of mercury.

“It is said that most quicksilver mines are noted for mortality among the workmen,” replied Aunt Edith. “Indeed, it used to be one of the Austrian punishments, to condemn criminals to perpetual labour in the mines of Idria; but the free workmen in the Spanish mines preserve their health and strength as well as other people, by taking care to change their whole dress, and especially their shoes, on leaving work. They also abstain from eating any food in the mines, and wash very carefully when they quit them. It seems harmless unless taken into the blood with food or through a wound; and, for want of proper care on these points, our mirror silverers sometimes suffer much from the shaking palsy or mercurial tremors; but this is by no means a fatal or even lasting disorder if the work is intermitted during its attack.

“*Platinum* is ranked, you see, among the most valuable metals, as it resists the influence of most acids, and bears intense heat without melting.”

“Ah! papa has a pretty little platinum crucible for some of his chemical tests; but what

makes it so expensive? It cost more than a silver one of the same size."

"Platinum occurs in such very small quantities, rarely in larger particles than the size of a pea; and from its infusibility is extracted from the ore so slowly, that it is not nearly so much used in the arts as it would be were it easier to work it. It is employed for the mirrors of reflecting telescopes; and the Russians have attempted to coin it. A coin of Siberian platinum is placed beside some crude grains of the metal.

"*Palladium*, *osmium*, and *iridium* are all newly discovered metals something like platinum. You will perhaps be interested to know that osmium derives its name from the Greek word 'osmé, a smell,' because when combined with oxygen gas it produces a poisonous acid of most disagreeable odour.

"In Case 3 are specimens of native *gold*, and natural alloys of silver called *electrum*."

"Is that the same *electrum** of which we were told the earliest coins were made, aunt?" asked Frank.

"Yes; it is of a pale yellow colour, and consists generally of sixty-four parts of gold with thirty-six of silver. Gold is extensively diffused over the earth, as the east and west 'gold fields' amply prove. It is obtained both by direct mining on the rocks, or by washing the sands of rivers that have flowed through subter-

* See "Pleasant Mornings at the British Museum," ch. iv., Stamped History, or Coins.

anean auriferous beds or gold fields. It is too soft for use alone, and is therefore alloyed with copper for coinage; and jewellers add silver or copper according to the various colours they wish to obtain.

"In Cases 3—12 you will observe three electro-negative metals, which will combine with other substances without the help of oxygen—*tellurium*, *antimony*, and *arsenic*; also three metalloids—*carbon*, *selenium*, and *sulphur*."

"It seems strange," said Frank, "to hear of arsenic as a metal; yet I recollect papa used to buy it from the copper mines in Cornwall. But what are metalloids, aunt?"

"Metals which cannot be kept in that state without the careful exclusion of air and water; hence we never find them excepting as oxides. The various substances found in combination with these metals and metalloids, are distinguished here as tellurets, combined with tellurium; stibiurets, combined with stibium or antimony; carburets, sulphurets, etc."

"Thank you, aunt; that explanation will enable us to understand many of these labels. What beautiful varieties seem caused by a little change in the proportion of these substances!"

"You will find in every division of the natural world the same marvellous variety, with comparatively few elements—a circumstance well fitted to increase our admiration of the skill and wisdom of the great Contriver of the universe, whose works are at once so simple and so com-

plex, so numerous and yet of such few materials. *Antimony* and its ores, though of little use alone, are, when mixed with other metals, largely employed in the manufactures of printing type, stereotype plates, Britannia metal, pewter, etc.; also for mineral pastes and dyes: it aids, too, in the composition of blue lights."

"Do we not have antimony wine sometimes as medicine?" asked Lucy.

"Yes; tartar emetic, which is one form of antimony, dissolved in sherry, bears that name, and is useful where a speedy emetic is needful; but as it is an active poison of violent effect, it ought never to be administered by ignorant people."

"But how could papa get arsenic from copper mines?"

"Because, though sometimes found native, it is more frequently met with as an oxide or rust, or combined with some other metal, as nickel, cobalt, or bismuth. It exists in considerable proportion in that sulphuret of copper in the Cornish mines known by the name of *mundic*, or *marcasite*; glittering cubes of which papa used to bestow upon your little museum after his journeys in search of this ore."

"Is not arsenic very poisonous? for papa's workmen always work with gauze masks and gloves."

"Yes, it is one of the most deadly and virulent in nature, whether inhaled in fumes, taken with food, or introduced into a wound. Like many other poisons, however, it is valuable as a

medicine. It is used in making glass, hardening candles, and manufacturing shot. It is also employed in colour-making, and, under the name of emerald green, is much used by paper-stainers, and by some confectioners for imparting a fine but fatal green to pickles, preserves, and sugar-plums."

"I shall take care, then, how I venture upon any tempting green sweetmeats," exclaimed Frank. "But, aunt, how is it that in Cases 4 and 5 there is such an odd mixture of things—see, coals and precious stones, diamonds, topazes, etc.?"

"Nay, Frank," replied Aunt Edith, "only diamonds, though some of them are coloured, yellow, red, blue, and green. But have you not heard that these brilliant gems are but concentrated and crystallized *carbon*, and consequently of the same chemical nature as charcoal, coal, and plumbago or black lead? That is why you see them in the same case. However, though the chemist has often succeeded in decomposing and in burning a diamond, he has not yet managed to produce one. Amongst this beautiful collection, the most transparent are the most valuable; next rank those of highest colour.

"They were discovered originally in Bengal, but have been found also in the Brazils, East India Islands, and Uralian Mountains, generally in detached crystals amidst sand and gravel. For ornament they are cut into a multitude of facets. The cuttings, with any flawed or dirty

diamonds, are pulverized to polish others. Fragments with sharp edges are set for glaziers' cutting pencils, which are therefore generally expensive articles. They also furnish *drills* for cutting other gems. Most diamonds lose about half their weight in setting.

"The largest ever known was brought to the king of Portugal from Brazil. It is uncut, weighs 1680 grains, and is valued at £5,644,800; but it does not appear that more than £150,000 was ever actually paid for any diamond. Here, you see, are models in glass of those most celebrated.

"The coal placed in this case is *anthracite*. It differs from the common sorts by being a mineral charcoal, free from bitumen, and therefore giving out little or no smoke while burning. The Cumberland *graphite*, plumbago, or black-lead, so useful for drawing, is of similar chemical composition as the diamond, though in different conditions. It is therefore classed with it."

"I like this plan of classifying minerals very much, aunt," said Lucy. "I have often wished I could see all together the varieties that could be formed by joining the same materials in different proportions."

"Well, you see some illustrations here; and by a little inquiry you can amuse yourself by tracing the very varied application of these same substances in the arts. There is a small medalion of Berzelius, the Swedish chemist—whose scientific arrangement is chiefly followed in these rooms—struck in *selenium*, which is found com-

bined with many other metals, though not occurring in its pure state. Those specimens of *sulphur* from the volcanic island of Lipari owe their orange and red incrustations to the presence of selenium, and are termed volcanites. Sulphurets exhibit a very gaudy variety to the eye, as can be observed in Cases 5—10. Some of these are in crystals; others as cubical, radiated, and magnetic pyrites; needle ore; cinnabar or coral ore; silver sand; and plumose antimony, resembling delicate wool or down, with a fine rainbow tint."

"Oh! Lucy," cried Frank, "we have some of these in our little collection; look here (Case 6), is some of the mundic or marcasite papa used to buy, and here is some of the pyrites we used to call wood-iron from its likeness to wood, and here are some specimens like those Uncle Edward sent us from Vesuvius and Solfaterra."

"*Sulphur*," remarked Aunt Edith, "is found in most parts of the world, but is more abundant in the vicinity of volcanoes, where it occurs either as an efflorescence on the surface of the ground, or in masses of cinders, ashes, etc. England derives her chief supply from Sicily, where it is dug in mines from the beds of blue clay on which it has been deposited; 20,000 tons of it are annually imported into Britain, as great quantities are used in the manufacture of gunpowder, vitriol, and many other compounds. Lucifer match makers, calico dyers, and straw bleachers find it useful in their arts; and the physician employs it both in medicines

and ointments. Indeed, many mineral springs owe their efficacy to sulphureous qualities.

“Cases 11, 12 contain *sulphur-salts*, known under various names derived chiefly from their appearance, such as feather ore, antimony glance, ruby silver, hemiprismatic ruby blende, etc., and grey copper. The sulphurets of arsenic furnish the yellow and red orpiment of painters and dyers. The red is remarkable for decomposing by the influence of light into an orange-coloured powder.

“Zinc-blende yields *zinc* to the miners, who call it, from its dark colour, ‘black jack;’ it abounds in Cornwall, Cumberland, and Derbyshire, as well as Hungary and the Hartz Mountains. This beautiful *cinnabar* or sulphuret of mercury is the chief source of the quicksilver of commerce. The Spanish cinnabar mines of Almaden have been worked for 3000 years. In Pliny’s time they produced annually 10,000 Roman pounds; they now furnish 2,244,000lbs. annually.

“Now you must observe we pass on to another division of minerals as labelled on the cases, ‘The oxides of electro-positive metals.’ In Case 13 are the *oxides of manganese*.”

“They are not very pretty, aunt,” remarked Lucy.

“True; but they are useful to the chemist for producing oxygen gas; to the calico printer for dyeing brown; and the hardware manufacturer adds a little to his British iron to improve its steel. Glass makers find it useful for im-

parting a dark colour to glass, and potters use it in glazing their wares. One oxide of manganese is an earthy substance called *black wad*, peculiar for its spontaneous combustion when mixed with linseed oil.

“The *oxides of iron*, in Cases 14—16, are prettier, Lucy; those from Elba exhibiting a fine variety of colour. Those fine blood-red scales sometimes cover the cells of lava. That shining brownish black dust is used as a becoming hair powder by some of the South African tribes; and these round balls, called ‘*pea ore*,’ descended as a shower in Hungary in August, 1841, and were deemed a new species of meteorolite until their terrestrial origin was demonstrated by microscopic observation, and careful analysis. It is from these ores or iron-stones that the miners prepare, or ‘*make*,’ as they term it, the various sorts used in art, as malleable iron, cast iron, and steel.

“The *oxides of copper*, of a ruby colour (Case 17), deserve admiration—as do those of *bismuth*, of *zinc*, and of *cobalt*. This last is much employed for giving a blue tint to glass. *Oxide of uranium* affords a paint for porcelain.

“Case 18 contains *oxides of lead*, known by painters as red lead, and by glass makers as litharge. *Oxides of tin*, or tinstone, form many pretty crystals, some greatly resembling different woods, and named from their appearance toad’s eye, fortification, wood tin, etc. To these are added some specimens of metallic tin smelted by the natives of Soudan in Africa, and cast

into thick wires, which were brought home by Captain Clapperton."

"Now I suppose we pass to another division," said Frank, reading the names printed on the next cases: "Oxides of electro-negative bodies, and their combinations. Alumina and aluminates in Case 19. Is alumina a metal or an earth, aunt?"

"According to Berzelius, Frank, *alumina* is chemically an oxide, or rust of the metal *aluminum*. Most of the substances we used to call earths are now satisfactorily ascertained to have the *metallic bases* that Sir Humphry Davy discovered, and therefore we must carry our notions of these substances a stage further, to the metals they represent—but which, however, have never been found native, though abundantly procured by artificial means: but we will examine these interesting specimens in due order.

"*Crystallized alumina*, variously coloured by small admixtures of some other substance, yields corundite in all those splendid gems, the oriental sapphire, ruby, amethyst, topaz, and emerald, chiefly found in China and India; also the more common substance emery, a compound which owes its hardness and polishing qualities to the presence of blue or grey corundum: it takes its name from Cape Emeri in the Isle of Naxos, whence it is principally obtained. Aluminates of magnesia yield, you perceive, red, blue, violet, and brown sapphirines; also the beautiful chrysoberyl, an aluminate of glucina and iron; with a hydrous aluminate of lead, occurring only in Brittany, and termed gum lead."

"I like these names, aunt," said Frank, "which seem to tell what composes the minerals; yet I observe some labels on the specimens which seem to tell nothing, such as Gibbsite, Indienite, and Wavellite: have they any meaning?"

"Yes; but it is so difficult to invent very minutely descriptive names for every variety, that where the relative proportions only of the same component ingredients vary, the specimen is named after its discoverer, Gibbsite; or its locality, Indienite; or its appearance, Wavellite."

"Thank you, aunt; I understand. What a range of tables for *silica* and *silicates*! They are varieties of flint, are they not?"

"Flint, rock crystal, quartz, and chalcedony, are oxides of the metal *silicium*—indeed, its purest natural condition, for it is never found in its native state. It assumes an almost endless variety of form, being more largely diffused on our earth than almost any other material.

"Amongst the most beautiful is the amethyst quartz (Case 20), differing in composition, though in colour so greatly resembling the oriental amethyst in Case 19. Bristol diamonds, smoky topaz, Cairn gorums, and rock crystal, valued when transparent for spectacles and ornaments, are all silicates. Rock crystal sometimes encloses fragments of ironstone, antimony, asbestos, chlorite, etc.

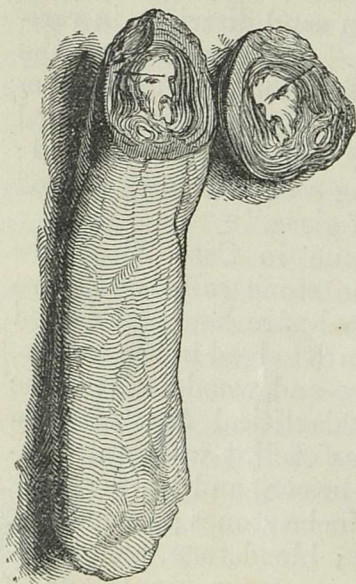
"Case 21 presents common *quartz* in endless variety, hacked, toothed, corroded, cellular, and fibrous, so named from its different shaped crystals or colour.

“The flexible sandstone or itacolumite is very curious. Larger specimens are placed on a table in the middle of the room. They are from the mountain of Itacolumi in Brazil. Here are also a suite of quartz stalagmites from the Geysers in Iceland, and the hot springs of the Philippine Isles, with some of those remarkable lightening tubes discovered in sand districts, in various parts of the world. In a case near the window is one several feet long brought from Dresden. Its course is marked by a raised vitrified ridge, colouring the adjacent sand red: the heat of the lightning seems to have melted the quartz into a sort of glass.”

“The *silicates* continue in Case 22, where there are varieties of the stone called cat’s eye from Ceylon, the cattish lustre being produced by minute fibres of amianth lodged in the quartz. Here, too, are hornstone and woodstone; some beautiful groups of stalactitical flint passing into chalcedony; nodules of flint with water inside; chalcedony, blue, brown, and white; dark polished pieces called Mocha stones; cornelians, both red and yellowish; bloodstone, and heliotrope, with the rare chrysoprasus, mentioned in Scripture as one of the foundations of the walls of the heavenly Jerusalem. All the precious stones named in the twenty-first chapter of Revelation, as well as those in the high priest’s breastplate, are to be found here, and can give an idea of their splendour.

“Agates, celebrated for their hardness, and valued for their peculiarity of mark in curved,

concentric, or delicate zigzag lines, are in Case 23. Case 24 exhibits further modifications of silex known as jasper. The rounded or Egyptian variety, when cut and polished, sometimes display curious figures; one you see represents a tolerable likeness of Chaucer the poet. The



EGYPTIAN AGATE.

porcelain jasper is produced by the action of subterranean fire upon clay slate."

"What a number of influences the mineralogist seems to find at work, aunt! How often I have turned over my little collection, and wondered how all were produced!"

"No doubt much remains undiscovered, my boy, to give the human mind perpetual pleasure in searching out the wondrous works of the Creator's hand.

"These opals are remarkably beautiful, from their changing hues, and are named, from their peculiarity, sun or fire opal. The semi-opal becomes transparent when immersed in water. These are wood opal, jasper opal, and liver opal. They are all comparatively precious varieties of silica; but its commoner forms are perhaps

more useful, such as granite and sandstone. The latter is formed merely of grains of silex held together by clayey cement. The grains themselves are the same as sea-sand, and enter largely into the manufacture of glass. Pounded flints increase the beauty of porcelain and flint glass. Millstones and whetstones are mostly made of sandstone.

“ Other groups of materials are formed by silex acting like an acid upon other earths or metals, or on both together. Cases 25 and 26 contain these silicates with *one base*, or silex, combining with one ingredient only. *Silicate of lime* forms table spar, or wollastonite, from Mount Vesuvius; *silicate of magnesia*, feeling soft and greasy, forms soapstone. Briançon chalk gives the meerschäum so esteemed by smokers for the bowls of their pipes, and steinmark is used by carpenters for marking wood and stone. Some specimens of serpentine, with garnets imbedded in them, are very pretty: the green marble, or verd antique, are varieties of silicate; also Schiller spar from the Hartz.

“ *Silicate of zinc* is called Smithsonite, after its discoverer. There are *silicates of manganese*, of *iron*, and of *copper*, the latter better known as mallachite. Jewellers' hyacinths from Ceylon and France, and blue zircon from Vesuvius, are all composed of these materials, as well as the curious minerals called cross-stones, the structure of whose crystals is very little understood. Here is also the catlinite, or Indian pipe stone, named after Mr. Catlin, the first

white man allowed to visit the quarries by the North American Indians; and agalmatolite, used by the Chinese for carving images, vessels, etc.

“Cases 27—29 contain silicates with *several bases* or sillex, acting as an acid upon various compounds; such as zeolitic substances, which show a bubble under the blowpipe, such as needlestone, prehnite, which is of so brilliant a green hue as to be mistaken for the emerald; also the famous green jade used by the Chinese for cups. That carved tortoise from Hindostan in the middle of the room is composed of the same stone.”

“The table on which it stands is very pretty,” said Lucy; “what is it made of?”

“Various antique marbles and other mineral substances,” replied Aunt Edith. “The little table near Case 30 is made of a slab of feldspar brought from Finland. In the Cases 30—32 are many varieties, called from their lustrous appearance moonstone, sunstone, opalescent, and icespar. Crystals of this substance are sometimes imbedded in porphyry. The micaceous and talcose substances are interesting from their aspect and use, but they are not yet chemically known. Those shining particles you admire in granite consist of minute scales of mica. They sometimes, however, occur a foot square, and are used for windows, lanterns, and ship lights, as mica does not easily break even with the vibration of cannon. Talc is very similar to mica, but softer; it is employed by manufacturers in porcelain paste, and for polish-

ing alabaster ; it is also reported to possess the property of softening the skin."

Passing on more rapidly as time flew by, Frank and Lucy were delighted to perceive numerous specimens of *asbestos*, the curious fibrous mineral which they had read of in ancient history as having been woven into burial garments for the dead who were burned. They admired its silky lustre, and the cloth which, when the stone is steeped in oil, can be prepared from it.

"It does not consume," said Aunt Edith, "but is only purified by fire: hence its names '*amianthus*, or undefiled,' '*asbestos*, or unconsumable.' In America it is occasionally employed for lamp wicks. There are several kinds (Case 34) of this curious mineral called mountain wood, mountain cork, mountain leather, mountain paper, etc., which are, as their names indicate, more compact in their structure."

"Here are some more precious stones, I suppose," said Lucy, looking at the contents of Case 35.

"Not real ones, though from their brilliance they are often called Vesuvian gems. They are compound silicates, which have been ejected from the volcano.

"Case 36 exhibits the almost endless *garnet* tribe of different colours, though all are silicates, owing their variety to the proportions of glucina and alumina in them. To these combinations also we owe the *beryl* and *emerald*—the bright green of the latter arising from the

presence of oxide of chromium. In short, the eye can take in these innumerable combinations more rapidly than the tongue can describe them."

"And to think, aunt," exclaimed Lucy, "that all these splendours should be hid in the ground under our feet!"

"Not all hid, my dear; for you may have noticed some specimens glittering out of the rocks in various counties of England; and travellers generally observe others in every fresh country, besides those which are imported, and greet the eye in our public buildings, or ornamental furniture.

"It is interesting to trace, by the labels appended to any collection, the geographical distribution of these various materials which are stored up for human sagacity to discover, and combine into the multifarious articles required by the generations which succeed one another upon the earth. But we have not quite finished our examination.

"In Cases 38, 39 are different combinations of the newly discovered metals named *columbium* or *tantalum*, *vanadium*, *molybdenum*, and *chromium*. These are seldom found in a pure state, and but little known and less used in their metallic condition. Here are also *oxides of antimony*, white, grey, and red, with the fibrous flakes from the Hartz Mountains, so resembling tinder as to be termed by the mountaineers tinder ore.

"The varieties in which *borax* forms an in-

gredient may be interesting to you, as it is used in the glazing of porcelain and pottery; also in the chemist's laboratory for helping the melting of other substances. Braziers and silversmiths use it for a similar purpose, and it is valuable in medicine. Combined with one or more silicates, it forms *tourmaline* of different colours, red, blue, green, or black, specified as *rubellite*, *indicolite*, etc., according to its hue. Transparent *tourmaline* becomes electric when heated. The variety with axe-shaped crystals is called *axinite*."

"Is that the same as axe-stone, aunt?" inquired Frank.

"No, the axe-stone is silicate of magnesia or green jade, used for sharp instruments by savage tribes. Case 41 commences the extensive group of *carbonates*, almost as numerous as the silicates, and to be accounted for by the immense quantity of carbonic acid continually being thrown into the atmosphere by respiration, combustion, and a hundred other processes; while it is readily taken up by as many oxides, and, through the skill and wisdom of the benevolent Creator, changed from a poisonous gas into wholesome or useful substances.

"The common *carbonate of soda* is used as a medicine, or as one ingredient of a pleasant effervescing drink. From carbonate of *strontia* a nitrate is prepared, which produces the brilliant red flame of fireworks. *Aragonite* is a beautiful carbonate of lime, named from the Spanish province where it was first observed.

It occurs usually in fibrous masses of a silky lustre, and is hence sometimes termed *flos-ferri*; when well crystallized it has a rich pearly lustre, and, as satin spar, makes pretty ornaments; with admixtures of strontia or metallic oxides, its colours vary from the most resplendent white to green, grey, violet, and blue.

“Case 43 contains *calcite* or *calcspar*, exhibiting remarkable illustrations of double refraction, or unusual forms of crystal; all which are of special interest to the chemist and mineralogist, who, accustomed to the regularity of nature, set their wits to work for new discoveries when any great difference is observed. The hot springs of Carlsbad yield the varieties (Case 46) known as peastone, roestone, porous, spongy, cellular, tubular, and other imitative forms: indeed, the peasantry often place moulds of medals, gems, etc., to receive the calcareous spray which gradually incrusts them, as you have seen in the Matlock springs. That skull was found thus incrustated in the river Tiber at Rome; and that table in the middle of the room is formed from the incrustations of a square wooden pipe in Derbyshire.”

“Oh, what beautiful marbles!” exclaimed the young people. “Then they are limestone, I suppose.”

“Yes; *marble* is merely the technical name for any sort of limestone compact enough to take a polish. When quite pure, it is perfectly white *alabaster*, but any foreign substance intermingling varies either its colour or its markings:

hence we see black, green, red, yellow, grey, and flame-coloured, variegated with fossil shells and corallines, or veins of greenish talc. *Breccia* is marble formed of minute angular fragments; pudding-stone of rounded ones. The *lumachelli* or Corinthian fire marble is much admired for the singular burnish which seems to flit like flame beneath its polished surface. The chalk and marl in this case show you limestone of more recent deposit, and in a less compact form than marble, but all can be burned into the common lime used in making mortar."

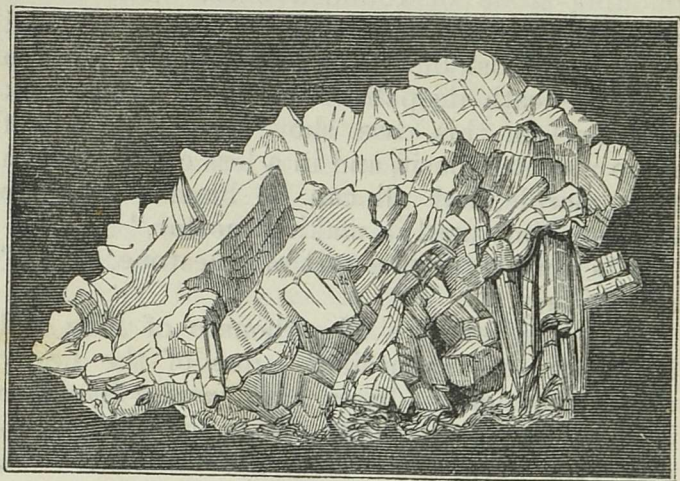
"Is not magnesia a sort of limestone, aunt?" asked Lucy.

"It is a mixture of carbonate of lime and carbonate of magnesium—one of the newly discovered metallic bases. *Magnesian limestone* is common in England, and is usually cream-coloured. Some varieties are soft and frail, others very hard and durable. After much investigation of materials, the Derbyshire magnesian limestone was selected for the new houses of parliament. The most compact specimens are valued by the lithographer.

"In Case 49 are *carbonates of iron*, manganese, and zinc, or calamine, lead, bismuth, cerium, and yttria, which are interesting for their beauty, as well as the *carbonates of copper* (50, 51), the green variety of which excites so much admiration as malachite. Some are in fibrous, others in rich velvet-looking crystals; others are accompanied by carbonate of lead.

"Cases 52—55 show us *nitre* or *saltpetre*,

and *nitrates*; sulphate of soda, or Glauber's salts; sulphate of baryta, of strontia, and of lime or gypsum. A splendid group of selenite crystals, the gift of prince Albert, occupies a



GROUP OF SELENITE CRYSTALS.

large glass case by the window. Sulphates of magnesia, zinc, iron, copper, lead, and alumina, occupy these cases."

"How curious, Lucy!" said Frank; "here are the same metals and earths over again just combined with something else; and what a beautiful variety of specimens they give!"

"True," replied their aunt, "you will recognise many from their common names in the arts; *gypsum*, for instance, is the same as plaster of Paris; in its compact state it is *alabaster*, very beautiful and easily worked, but so soon

tarnished by exposure to the air, it requires to be kept under a glass shade. *Sulphate of magnesia* is *Epsom salts*; that of zinc is better known as white vitriol, and that of alumina as common alum. *Alum* is found native only in small quantities and in a few places; therefore, as it is largely used in making leather, paper, candles, etc., it is produced artificially from the coal shales of Glasgow, the slate of Yorkshire, or from Cornish clay. In a small table opposite Case 54 are specimens of *lapis lazuli*, which furnishes the artist with his *ultramarine*; but though the lapidary still uses the mineral itself, *ultramarine* can be artificially produced so cheaply that you may buy as much now for sixpence as would formerly have cost a pound.

“The *arseniates* (Case 56) are chiefly useful for the arsenic extracted from them. The *phosphates* (57) will interest you for yielding the Persian gem turquoise in nodules, or veins, of a beautiful opaque blue colour. The *fluorides* are pretty, especially such as combined with silica furnish the *topaz* of Brazil. Case 59 contains *chloride of sodium* or *rock salt*, so extremely important to our culinary purposes. It exists in various forms and different colours; for domestic use it requires purifying. *Chloride of ammonium* is the *sal ammonia* of commerce. *Chloride of copper* yields the silver sand which is still sometimes used instead of blotting paper for drying ink. Cases 60 and 60*a* contain a small collection of mineral substances composed after the manner of the organized bodies from

which they derive their origin; such are salts, resins, bitumen, and coal."

"None of these then, I suppose, aunt, were deposited or made like minerals," said Frank.

"No; they seem all to be substances of animal or vegetable nature formerly, and have been changed into their present substance by some process not yet fully understood. To the salts belong that *mellite* or honey-stone, found in coal beds; and *oxalite* or resinous iron, yielding a poisonous acid similar to that found in the juice of many plants. *Struvite* is phosphate of magnesia and ammonia found in crystals under the foundation of a church at Hamburg.

Amongst the *resins*, *amber* is the most remarkable, found chiefly on the shores of the Baltic, though there is some from Madagascar and the Asiatic Isles. At Dantzic there are regular mines of it, and it is generally imbedded in brown coal. The largest mass ever found weighed about eighteen pounds. The most probable explanation of its origin is, that it may be the fossilized gum of ancient trees, which may account for the numerous insects, leaves, drops of water, and fragments of wood constantly observed in it. It is easily cut, and takes a beautiful polish: hence it is much used for beads and trinkets of various sorts. When rubbed it is highly electrical; indeed, this circumstance caused the ancients, to whom it was well known, to call it *electron*, whence we derive our term electricity. Dissolved in linseed oil, it forms amber varnish. *Gum copal* much resembles

amber in appearance, and, like that, often encloses insects. It is derived from trees still growing in America, and is placed here merely for comparison with amber, as well as some fossil copal or Highgate resin.

“The term *bitumen* includes all varieties of mineral pitch, from the fluid naphtha, and petroleum, or mineral oil, to the hard asphalte and jet. *Jet* is but a variety of coal, much used in mourning ornaments, from its brilliant black colour. Its genuineness used to be easily detected by its extreme lightness; but papier maché can now be made so much like it that it is not valued very highly. There is also the elastic bitumen of Derbyshire, the *dapèche* of South America, an inflammable fossil possessing many of the properties of caoutchouc, or Indian rubber. Of coal there are but few specimens here, but as they belong more to the geological department, we had better reserve our examination of them for another morning.”

“That will be as well, aunt,” said Lucy, “for I long to think over all we have seen, and arrange them a little in my memory.”

“While thinking,” said Aunt Edith, “of these beautiful, useful, and valuable objects, you will not fail to thankfully remember the benevolent Being who has provided them for the benefit of his intelligent creatures. Man might at all times have used them innocently and freely, for they are abundantly bestowed; but it is painful to reflect how many crimes have been prompted by the coveting of these riches—robbery, murder,

piracy, invasion, and conquest. And after all they cannot confer true and lasting happiness—cannot preserve health, or secure from death; nor can they be kept long, for as we brought nothing into the world, it is certain we can carry nothing out of it, unless indeed it be the ‘true riches,’ ‘the pearl of great price,’ which is given equally to all who, like polished stones, are built upon that precious corner-stone which is Jesus Christ, the sure foundation of eternal life to all who believe in him.”

CHAPTER II.

INEXHAUSTIBLE SKILL;

OR,

FOSSIL REMAINS EQUAL TO MODERN SPECIMENS.

ON returning to the FOSSIL DEPARTMENT of the British Museum, the young visitors went first to the cases (60 and 62A) containing specimens of *coal*, a subject which had early excited their youthful curiosity, as, while residing in different coal districts, they had seen widely different species.

“I suppose there is no one now questions the vegetable origin of coal, aunt?” remarked Frank.

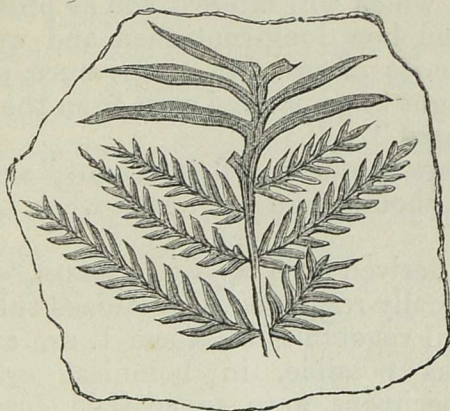
“I believe not; but there is still difference of opinion as to how its masses accumulated, and became changed into the present useful mineral. Probably the various kinds were produced by different methods. Some may have been by the slow action of water decomposing jungles and mosses which have become subsequently drained; others by the natural decay of successive layers of vegetation, or the sudden submerging and long-continued pressure of heavy material, displaced by some convulsion of nature, reducing the plants to their fossil condition. In different

collieries the eye may trace apparent evidences of all these proceedings, while, nevertheless, the learned may have failed to penetrate the true process. We cannot but admire, however, the wisdom and forethought shown by the great Creator in thus storing up, and turning to account, the waste luxuriance of former ages for the comfort and assistance of after generations. It is said that the earliest traveller in China found, in common use there, a 'black stone which burned like wood;' but it was only when wood began to grow scarce that search was made for it in England, where, since the twelfth century, it has become more extensively used than any other fuel. Thirty millions of tons are annually raised from our own mines, yielding the varieties known as caking coal, cubic coal, slate coal, and cannel coal. The latter is often hard and compact enough to be cut into inkstands and busts, of which you see specimens in Henry VIII. and his daughter Mary. It also furnishes the jet ornaments which used to be fashionable in mourning attire."

"Ah!" said Lucy, "I remember our amusement when our dear papa sobered our admiration of mamma's new brooch and bracelets by remarking that they were nice specimens of coal."

"In some coals," resumed Aunt Edith, "you can readily trace the shape of the ferns, stems, seeds, and branches which contributed to form the collieries; while the Irish bogwood and peat seem to afford specimens of half-formed

coal: indeed, some coal used to be called bituminous wood, from its fibrous and woody texture.



FERN IN COAL SEAM.



SEEDS IN COAL SEAM.

“If we now pass to the next Room I. (north gallery), we can see fossil vegetables in other portions of the earth’s crust, as well as animal remains, which will interest you as proving how early, and how long-continued and wonderful, is the series of proof of contrivance, skill, and forethought to be derived even from the remains of past ages.”

“I know the look of fossils, aunt,” said Lucy, “but I should like to know what the word means.”

“It is derived from the Latin *fossus*, ‘dug out,’ but is usually restricted to organized substances. The fossil vegetables in Room I. are arranged, as far as possible, in botanical order, but many specimens were so crushed, broken, or partially decayed, ere they lost their vegetable life, that it is extremely difficult to distinguish them clearly. This is especially the case with the fossil algæ or sea weeds (in Case 1). Some, it is obvious, are merely impressions of the plants which once filled the present empty space, and whose graceful spread can be traced on the old rocks, laid bare by the industrious miner, or the inquisitive student.

“*Calamus* or cane, and the reeds known as horsetails, are found in the older coal formations, but their internal structure is so entirely obliterated that they are not yet satisfactorily classified.

“Impressions of *ferns* in coal shale are very numerous, and so distinct that in some instances the organs of fructification are dis-

cernible. Some of these strongly resemble existing ferns, especially such as abound in tropical countries, being also of the same gigantic size—measuring fifty feet in height. The fossil *lycopodiaceæ* or club mosses (Cases 3, 5) are equally enormous. The leaves and fruit also of *lepidodendra* interest geologists.

“Besides the fossil plants which exhibit some analogy with our present vegetation, there are remains of trees of which no living specimens are known to naturalists. Of the *sigillaria* (Case 5), with a round conical stem deeply furrowed, though not jointed, and apparently filled when alive with a soft pulpy pith like the cactus, only the trunks remain. The *stigmaria* (Case 6), Dr. Buckland considers must have been an aquatic plant. In this case also are remains of real *palms* and *pinces* brought from the Isle of Sheppey. The globular trunks of *mantellia nidiformis*, two of which are cut and polished, are from Portland.”

“What are those other blocks of polished wood, aunt?” inquired Lucy; “surely they are not fossils.”

“They are indeed, my dear; and they claim your attention. You may well be astonished, for they still exhibit the fibrous structure of the trunks and branches of this ancient flora. These are from the red sandstone of Saxony and Bohemia.”

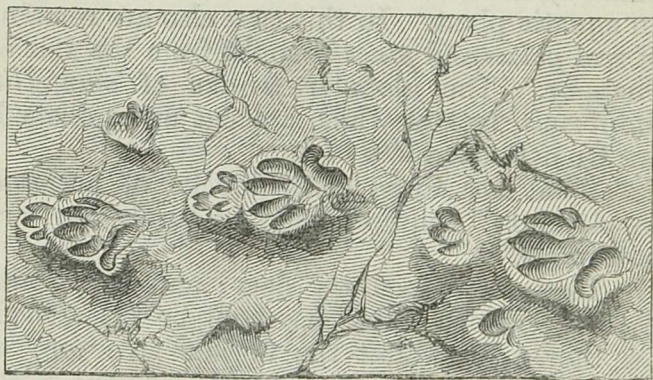
“They are very like some papa brought us from Antigua, in the West Indies,” remarked Frank; “and when I showed them to our

carpenter, he called one oak, and another deal, and could scarcely believe his own senses when he took them up, and felt their weight and stony coldness."

"It is observed," continued Aunt Edith, "that all the hard-wood trees of the dicotyledonous order occur in strata more recent than the chalk formation, while the earlier woods are exclusively coniferæ, or cone-bearing firs."

"What are those marks on the large slabs of sandstone on one side of this room, aunt?" inquired Lucy, who had been silently contemplating them for some time.

"Those on the left are the foot-tracks of some animal called *chirotherium*, from the



FOSSIL FOOTSTEPS OF CHIROTHERIUM IN SANDSTONE.

quarries of Hildburghausen in Saxony; those in the centre are similar tracks from Horton Hill, near Liverpool; and those on the right hand, from the same new red sandstone formation, are

called ornithichnites, from the resemblance to the foot-marks of birds. They occur at a cataract in the Connecticut River, Massachusetts."

"How curious it seems to me that we should look upon the footprints of creatures so long extinct!" exclaimed Frank.

"There must have been some extraordinary and sudden convulsion of nature to overwhelm them while they were so distinct and fresh. In some specimens of sandstone even the ripple marks of the retreating tide, and the tiny perforations of raindrops have been preserved so hard as to cause a perfect impression of their shape upon the next upper layer of sandstone. Indeed, some very shrewd naturalists have considered that the inequalities occasionally observable in their projecting edges afford memorials of the winds that blew at the time, having noticed similar effects from wind in the shape of the ripple marks and raindrops of the present day."

"How many little things philosophers notice!" said Frank; "I will do the same the next time we go to the seaside."

"Do so; and you will find yourself repaid, I can assure you from experience," replied his aunt.

"But," pursued Lucy, "are these fossil plants found by themselves, or are the remains of animals found with them?"

"In the great coal fields," answered Aunt Edith, "fossil plants are found alone, but in sandstone, plants and animals are intermingled.

In the clay slate of our own part of the globe there are traces of a few corals and mollusks. Various efforts have been made by learned men to detect the order in which our world was formed, by examination into its internal structure; but the deepest excavations have not yet penetrated further than about 1500 feet, and although a great number of interesting facts have been observed, very much more will have to be learned before safe and certain conclusions can be reached.

“We will now look at the *fossil fishes* (Room 11), which are arranged in Agassiz’ *four* divisions of *placoids*, or plate-covered fishes, so called from the Greek word *plax*, a broad flat plate, such as sharks’ rays; *ganoids*, or bright covered scales, from the Greek *ganos*, brightness, like the sturgeons; *ctenoids*, or horny jagged scales, from the Greek *kteis* (genitive, *ktenos*), a comb, like those of the perch; and *cycloids*, from *cyclos*, a circle, with smooth scales, whole at the edge, and showing concentric lines on the upper surface, such as herring and salmon scales.”

“Why are fossil fishes classed by the shape of their scales, aunt?” asked Lucy.

“Partly because, when all the soft parts decay, the scales are often the most plentiful remains; but also because naturalists have discovered that certain internal structures so invariably correspond with certain peculiarities of scale, as to supply considerable light as to the nature and habits of the fish in which they are combined;

just as the learned Cuvier found that particular forms of teeth were always furnished to those animals whose digestive organs were suited to the food those teeth were adapted to masticate."

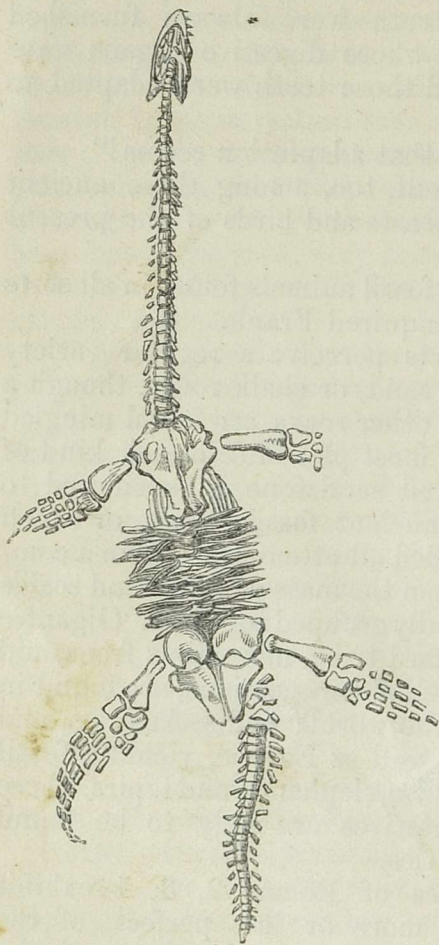
"How curious that adaptation seems!"

"It is as evident, too, among these ancient fossils as in the beasts and birds of the present day."

"Are the same fossil animals found in all sorts of rock, aunt?" inquired Frank.

"No; geologists perceive a regular variety belonging to the sand, or chalk rocks, though a few, like those in other rocks, are found mingled with the remains most plentiful in each kind of rock. The old red sandstone is considered to afford the most ancient fossils, many of which have hitherto baffled all attempts to form a complete skeleton, from the mass of bones and scales which are confusedly grouped together. Gigantic reptiles of the lizard tribe, monstrous frogs, and tortoises of marvellous proportions, are found in various parts of the world; India, America, and New Zealand, as well as Europe, yielding fossil remains of crocodiles, elephants, and tapirs, whose present representatives are only to be found in tropical countries.

The wall cases of Rooms 2, 3, 4 exhibit fossil skeletons, more or less perfect, of the *plesiosaurus*, *ichthyosaurus*, and others of the fish lizards. The *pterodactyles*, or bat lizards, whose gigantic size and singular combination of fish, reptile, and quadruped, have excited much

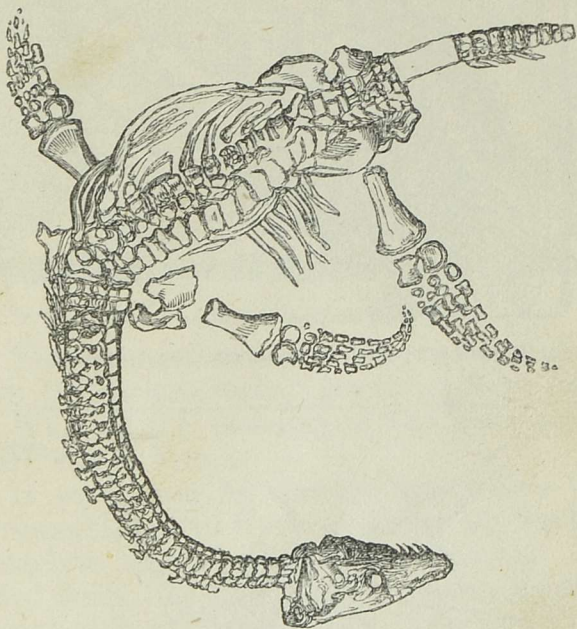


PLESIOSAURUS DOLICHODEIROS,
LONG-NECKED.

curiosity about their habits. Some of these were completely dismembered, but others have been found so perfectly preserved as to confirm the correctness of the naturalists' theories by the resemblance of the natural and concocted skeletons. It is remarkable that there are no remains of serpents, excepting in the rocks of the newest formation. One of the table cases of Room 4 is occupied by fossil sponges from Germany, and the green sand and chalk of England."

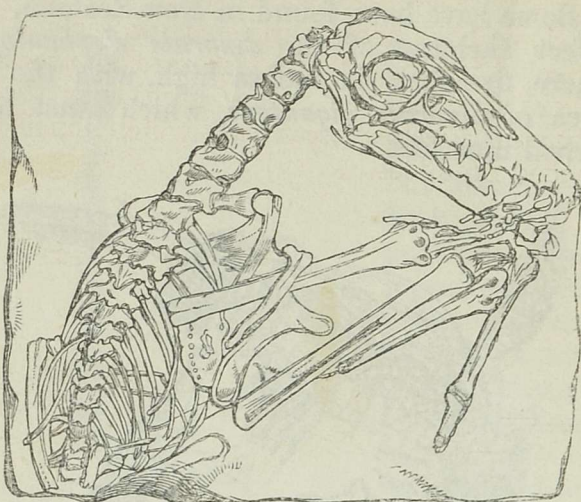
"Are there any fossil birds, aunt?" asked Lucy.

“Some have been found in New Zealand. A perfect skeleton of the *dinornis elephantopus* is here, five feet six inches high, with the leg bones of *dinornis giganteus*, which must have reached nine feet.

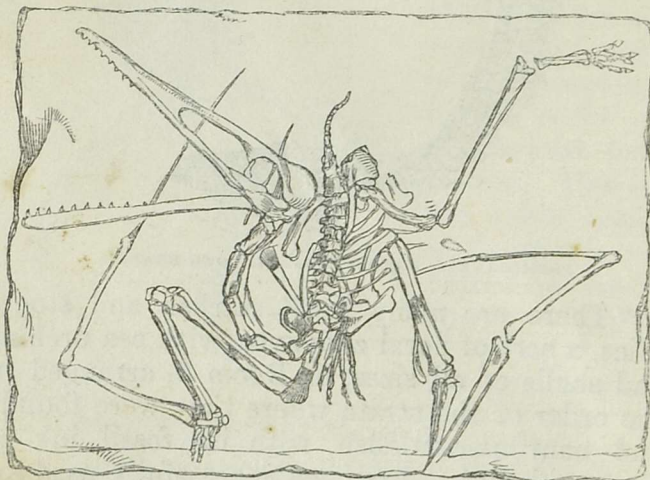


PLESIOSAURUS MACROCEPHALUS, LONG-HEADED.

“There are many fossil starfish and stone-lilies, a sort of floral zoophyte, with sea urchins and shells of all sizes, in Room 5, arranged in the order of the strata where they were found; and nautilus-cuttlefish, with its fossil ink so preserved that it has been successfully used for drawing its own portrait.”

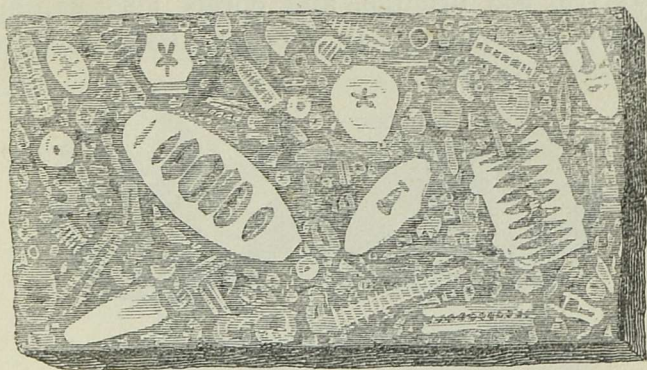


PTERODACTYLUS CRASSIROSTRIS, THICK-BEAKED.



PTERODACTYLUS LONGIROSTRIS, LONG-BEAKED.

"Some of these small shells are like those we used to notice in our chimneypiece of Devonshire marble," said Lucy.



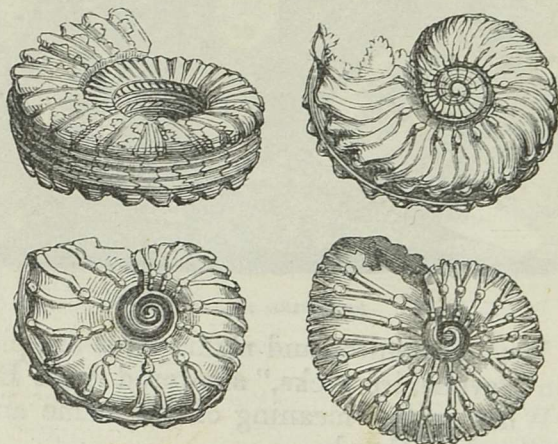
PETRIFIED SHELLS.

"Yes, ammonites and madrepores are plentiful in Devonshire rocks," answered Aunt Edith.

"What is the meaning of the name ammonite?" asked Frank.

"It was given by classical naturalists from its resemblance to the coiled horn on the head of ancient statues of Jupiter Ammon. The animal itself, like some of the modern nautilus, appears to have lived in the outer cup of his shell, and to have been furnished with this coil of separate air chambers so communicating with one another, that by a tube the creature could empty or fill them with air, and thus rise or sink in the water at his pleasure. Dr. Buckland made several drawings of the exquisite variety of arch used in these divisions to insure lightness and strength, lest the shell should be

broken by the pressure of water at a great depth—an accident which often occurs to glass bottles when sunk in the ocean. The fossil bivalves, sea urchins, and corals also exhibit similar peculiarities to those of their modern representatives.”



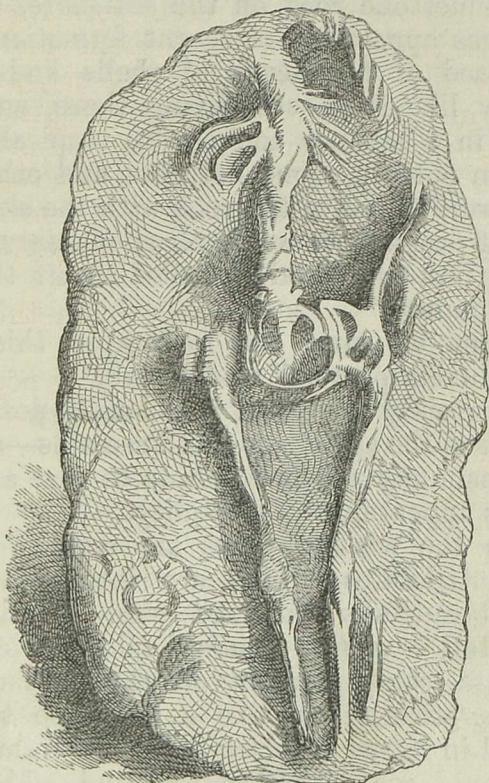
FOSSIL SHELLS, SHOWING THEIR FLUTES AND BOSSES.

“I have heard that fossil shells always have their openings and coils in the opposite direction to modern ones,” remarked Lucy. “Is that true, aunt?”

“No; there are not a greater proportion of these sinistral shells, as they are termed, among fossils than among present species. The direction of the whorl is according to the side on which the heart is placed; most shellfish have it on the right side.

“From time to time large fossil quadrupeds have been discovered imbedded in the rocks of

Europe, Asia, and America. Specimens of some of these are in the Museum, and casts have been obtained of some remarkable individuals in modern collections—such as the *dinotherium*, the *mastodon*, and *megatherium*. There are many fossil elephants' skulls and bones from India."



FOSSIL HUMAN REMAINS.

"Are there no fossil human remains?" inquired Frank.

“None of the early date of these animals. The fossil human skeleton from Guadaloupe at the west end of Room 6 excited great attention when first brought to England. Its skull is said to be in an American museum. It was found with a number of others imbedded in a solid limestone rock on the sea-shore, but the rock was apparently of recent formation, being composed of fragments of shells and corals, exactly like those still living there, and combined in a manner common to tropical shores. Broken pottery, stone hatchets, and other weapons were found in the rock with the skeletons, so that probably it was a place of interment for the natives who lived and died about the time of Columbus.”

“Then we must not look upon this as an antediluvian person,” said Frank.

“Certainly not; and it is hardly possible to be sure of the age of any fossil remains—so many circumstances might combine to give a greater or less appearance of antiquity.

“In the window cases are certain animals called trilobites, which are interesting from their beautifully contrived eyes. Fossil anatomists tell us of *four hundred* spherical lenses in separate compartments on the surface of a cornea, sticking up like a cone; so that the animal in its usual place at the bottom of the sea could see everything around. Moreover, as there are two eyes, and one of the sides of each would have been of no use, the inner side is destitute of lenses, no useless profu-

sion being common in the works of the great Creator."

"How beautiful, aunt!" said Frank; "they must be something like bees' eyes."

"The serolis, an animal still in existence, has eyes precisely similar, excepting that, as its back is lower, the eyes are not quite so high."

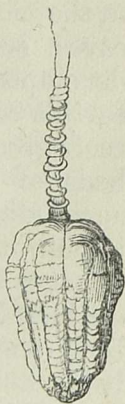
"How delightful it is, aunt, to look upon such proofs of God's care for the welfare of these reptiles and fishes so long ago!"

"The same yesterday, to-day, and for ever," is the testimony from the book of nature as well as revelation, and encourages our perfect confidence in him as the Most Wise as well as the Most Benevolent. Philosophers remark with pleasing surprise that these delicate organs of sight prove that there must have been pure light and air for them to have been of any use.

"Did you notice the fossil star-fishes, and the long stalked stone-lily, a sort of zoophyte? Its stalk of ring-shaped bones sometimes consisted of twenty-six thousand separate pieces. They are very numerous in the north of England, and are called there St. Cuthbert's beads."

"I see many fossil shells from the London and Paris clay basin (Cases 6, 7, 8)," remarked Lucy. "I am surprised they should be found so far from the sea."

"Geologists find many marine remains in places now so inland that it is evident the surface



ST. CUTHBERT'S
BEAD.

of the earth has undergone very great changes before the era of map-making; but as the learned have not yet agreed upon the causes or extent of these changes, we will not discuss them now. It is singular that the earliest appearance of serpent remains occurs in this London clay; part of a large reptile resembling the boa constrictor has been found in the Isle of Sheppey. Judging from inference, it could only have flourished in a tropical climate. Geologists report that the organic remains in the plain at the foot of the Himalayan mountains are of similar character to those observed in London clay; and many resemble the animals now animating the present surface of the earth.

“The beautiful fossil *corals* (Case 5), and other zoophytes which you have found yourselves in the chalk cliffs on the downs or in the Dudley caves, seem indeed to have supplied, by their decomposition, no inconsiderable portion of the earth’s crust, as the powder procured from coral reefs greatly resembles chalk. In Saxony, whole beds of rock are found composed entirely of such minute shells, that, under the name of tripoli, it had been used as a polishing powder for ages before the power of modern microscopes enabled Mr. Ehrenberg to detect its real nature: forty-one thousand millions of distinct organisms being found in one cubic inch of polishing slate from Bilin in Prussia.”

“That is surprising,” said Frank; “I should like to have a piece under my microscope.”

“The common Derbyshire rottenstone used

by every housemaid is the same sort of substance ; indeed, upon the surface of glazed paper and cards a good magnifying glass will exhibit a complete Mosaic work of well-preserved minute shells ; so that the old saying of the early naturalists, for a long season exploded, ‘ that all chalk is formed by worms,’ may be with truth revived again, and thus revive our respect for those diligent observers who found out so much without microscopes.”

“ Aunt,” said Lucy, “ do you remember reading about the Swedish rock called *mountain meal*? Do you think that is a sort of fossil? for you know in times of famine the cottagers used to eat it.”

“ That *berg mehl*, as it is called, is certainly composed of minute animal remains ; and to the small portion of nutriment still left we must attribute its use for food ; but it is not wholesome, even when mixed with flour or rice, always producing a sensation of weight and pain, and, when eaten alone, it invariably caused death by slow degrees ; so that it is never resorted to except under the pressure of extreme want.”

“ It seems, aunt,” remarked Frank, “ that our earth is but one large grave, full of the remains of plants, animals, and people long since dead, and who after all spent a very little time in life.”

“ True, Frank,” replied his aunt : “ but while in nature everything in turn lives, flourishes, dies, and decays, nothing is lost ; for the destruction of one generation is the vivification of the next. But in the moral and spiritual world

there is incessant creation, and no annihilation. Looking back upon the fifty-eight centuries from which the human race first dates, each individual course seems short indeed; and a rational spectator who could appreciate the knowledge that this brief probation was but the prelude to an eternal existence of happiness or misery, to be determined by the conduct here, would deem it the height of folly or madness to affect indifference to the consequences, or risk the result with only a vague hope of safety; when certainty and confidence are easily attainable by studying the book of revelation, and seeking for pardon and holiness in that Saviour who has declared, 'He that believeth on me hath everlasting life:' 'I will raise him up at the last day;' and he 'shall live for ever,'" John vi. 47, 54, 58.

CHAPTER III.

“TREES OF THE FIELD,” AND “TREASURES HID
IN THE SAND;”

OR,

PLANTS, ZOOPHYTES, AND SHELLS.

EVERY fresh visit to the British Museum, instead of satisfying the curiosity of the youthful visitors, increased the interest they had begun to feel in the study of Natural History, and revealed new fields of research and information.

Permission had been obtained for Frank and Lucy, with their aunt, to inspect the Botanical Department, which is not open to the public at large, as its specimens of dried plants are too perishable to admit of constant exposure, or very frequent handling.

A door in the Zoological Gallery being unlocked, admitted the party into a suite of apartments opening one into another. The outer one, where two or three students were busy, is furnished with closed cupboards all round, and solid library tables filled with drawers of specimens, and containing not only Sir Hans Sloane's original collection of plants, but those which he acquired by purchase, or by gift, from many eminent botanists of the seventeenth and eighteenth centuries, such as Tournefort, Boerhaave,

Plukenet, etc., amounting altogether to 10,000 varieties of plants. In this room, too, is kept an interesting collection of plants presented to the Royal Society by the Apothecaries' Company during the seventy-four years beginning in 1722 and ending 1796. Sir Hans Sloane gave the Botanic Garden at Chelsea to that Company, on condition that they thus paid an annual rent of fifty new plants. Each fifty are carefully preserved between boards, and kept in one of the table cases—not now in these days of advanced science as botanical rarities, but as historical reminiscences. In the year 1820, however, the rich herbarium of Sir Joseph Banks was added to the Museum, comprising not only the plants he had collected during his voyages with Captain Cook, as the naturalist of the South Sea expedition, but those of all the great naturalists of that period, especially the collection of Mr. George Clifford, a wealthy Dutch banker, which had been arranged and classified by Linnæus, and contains the identical plants from which he compiled one of his earliest and most celebrated works.

Frank and Lucy had commenced a small *hortus siccus* for themselves, and listened therefore with much interest to this information communicated by the senior botanist—a venerable gentleman who had accompanied Sir Joseph Banks in his later voyages to Australia, and had himself gathered and arranged many of the plants from the eastern isles.

The Banksian collection is kept in the inner

room, which, lighted from the ceiling, is completely lined with cupboards full of shallow shelves, which draw out, and have the plants in small parcels, each specimen in a sheet of paper, on which is written its name, order, etc., the date and place of its growth, and the name of its contributor; all so classified that they can be readily referred to for inspection. The tables in this room are also full of drawers, and their surfaces covered with packets of plants from all parts of the world, awaiting arrangement and deposit in their final resting places. Some were brought by Sir Gardner Wilkinson from Egypt; others from the oases of the desert, Arabia, India, etc. The young people noticed some glass



THE NUTMEG.

(a) The whole fruit. (b) Nutmeg and mace. (c) Nutmeg alone.

jars with the entire nutmeg fruit preserved in spirits, so as to show the beautiful network of

scarlet mace enveloping the fragrant nut. A bunch of palm oil nuts, and other curious specimens, were under examination by the professor and his assistants.

As these dried plants require seclusion from the air, it is necessary to visit this part of the Museum with some definite plan of investigation, when every assistance is courteously rendered.

Aunt Edith inquired what system of arrangement was adopted, and was informed that Sir Hans Sloane's collection remains untouched. Part of the Banksian collection was arranged by Linnæus on his own system; but in later additions Decandolle's natural classification has been adopted, and every effort is now made to render this department as complete as possible. Already about 100,000 species have their representatives there.

As it was hopeless to attempt examining all these, the party were led into another apartment surrounded with glass cases, containing the preserved seeds and fruits bequeathed by Sir Hans Sloane, and the flowers and succulent plants preserved in spirits by Sir Joseph Banks; a suite of models of fungi, etc. Here they saw a stem of the vegetable lace bark of Jamaica, which being partially cut through, exhibits numberless thin layers of elegant appearance. Palms in many varieties of date, sago, cocoa nut, and cabbage palm—plaintain and banana, with their fruits; there are two hundred species, but none in England; the leaves of the talipot,

stems of bamboo, rattan, and sugar canes, one which measured fifteen feet,—all delighted the young people, to whom the *names* of these things were more familiar than their appearance.



1. Betel Palm. 2. Talipot Palm. 3. Cocoa-nut Palm.
4. Date Palm. 5. Wax Palm.

One of the most interesting objects was an entire nut, or rather cluster of nuts, of the vegetable ivory tree, *phytelephas macrocarpa*. It looked like a large oval ball, about the size of a

gigantic human head, cased with a brown shell, and covered with excrescences, each of which contains one of the smooth nuts, whose inner kernel furnishes the beautiful material now used in the arts. Humboldt first drew attention to this substance. It grows near the Andes, and at the southern extremity of South America, where the natives called it, from its appearance, the "nigger's head" palm tree. The fruits of the bread-fruit palm, the African butter nut, and locust tree, were curious. The latter is a long hard pod, yielding beans enveloped in a nutritious farinaceous pulp, which is liked by the natives; the beans are seldom eaten except by horses. There is a smaller leguminous plant called locust, common in Palestine, but not very palatable. The African ground nut is singular, each legume being furnished with a point, by which it buries itself in the ground to ripen, and is then used for slaves' food.

The first specimen of gutta percha ever brought to this country was exhibited here, with a branch of coffee and its fruit berries; the soap berry, which lathers as well as soap, and is the usual substitute for that article in Jamaica. Some pretty seeds of a grass plant (*Coix lachryma*), called "Job's tears," used for bracelets in the tropics, and many other vegetable treasures, with curious branches of trees and dried grasses, rice plants, etc., from New Holland, were successively displayed by their collector. A very beautiful series of polished blocks of wood are arranged in glass cases, while entire slices of

many trees are placed against the walls so as to show the curious annular growth, or the complicated network of the sap vessels.

Several varieties of cotton plant were displayed, from the East and West Indies, the United States, the Sandwich Islands, and Egyptian oases; all of different degrees of whiteness, and with flowers yellow, purple, or buff colour. The buff cotton from China furnishes the cloth called *nankeen*. All these grow on dwarf shrubs, and supply an annual crop for a few years only. Silk cotton grows in pods upon bombax trees, which rise in Demerara, India, and most tropical countries to a magnificent size. Their trunks are often ninety or a hundred feet in girth, but they are more spreading than tall. In Africa, their heads are often cut off, and the trunks left standing as water tanks, or for resting places for the dead. They yield a fresh crop every year for a very long period. Some pods are very long and hard, filled with glossy white or cream-coloured silk; others are round, and have a woolly drab-coloured silk; but in all the substance is destitute of those little roughnesses in the fibre which are necessary to allow of its being spun. It is therefore of no use except for stuffing mattresses and cushions.

The lotus plant and oriental lilies were then examined, but, of course, their colours had much faded in drying. The *nepenthes* or pitcher plant, in several varieties, pleased the young visitors. They also looked over the lichens and seaweeds, of which numbers are being added

to the collection. They were told that many plants were grown for the botanist in the Gardens at Kew, as it was difficult to preserve



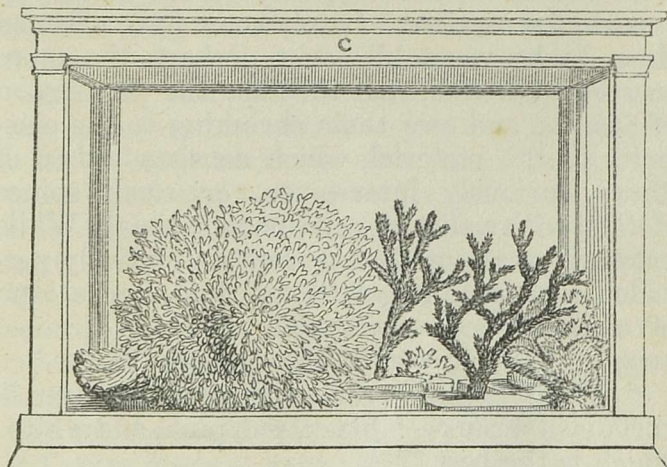
PITCHER PLANT.

the beauty of the plants, and show off their fruits when dried; so that the trustees of the Museum regarded their living specimens at Kew to be the most valuable and interesting part of their botanical possessions.

A whole morning was pleasantly spent among these plants, to which the chemist resorts for ascertaining the genuineness of his medicinal barks and herbs; the cabinet maker for determining the value of his fancy woods; the silversmith and porcelain maker for models for his imitation; as well as the artist and naturalist who are in quest of scientific information; with the theologian, who finds amidst these stores confirmation of Scripture record, and abundant evidences of the exquisite skill and boundless provision for the ornament of this spacious world, and for the comfort and use of man, with which God has so richly clothed the earth.

Frank and Lucy had expected to examine plants, zoophytes, and shells in one morning; but these were so numerous, they found it quite impossible to accomplish that plan without losing much of the advantage of the examina-

tion. They therefore devoted a morning to each department; and as the zoophytes, that is, corallines and sponges, seem to occupy an intermediate place between plants and animals, they appropriately follow the botanical collections.



GROUP OF CORALLINES.

The *corallines* are arranged in such attractive groups in upright glass cases in the South Zoological Gallery, that many a visitor is beguiled by their beauty to pass a long time amongst them.

“What is sponge, aunt?” asked Lucy; “and how many varieties are there? I have heard papa speak of several; and he brought us some specimens from his last voyage; but I see many more here.”

“There are, I believe,” replied Aunt Edith, “about thirty species; ten of which may be

found in the British Isles, though none of these are very useful. Sponge has long been a subject of investigation by naturalists. From Aristotle and Pliny down to the last century they were deemed animal substances, as, when torn from their native rocks, they shrink as if possessed of sensation. Lately some have affirmed them to be vegetable; but perhaps the more correct opinion is, that they are the production of insects, and owe their shrinking to the elasticity of the material, which consists either of fibres curiously interwoven, or small spines clothed with a sort of gelatinous cuticle. While growing or accumulating they are entirely pervaded with a thin gelatinous fluid, and a kind of circulation is observable. This is drained away in hot water to fit the sponges for use."

"What beautiful corals and corallines, aunt!" exclaimed Frank—"black, red, pink, and white; which is the best?"

"Black coral is the rarest, Frank, and was formerly used for divining rods; but the red is the most valued, being more compact, and allowing of a better polish than the others. These again are the deserted tenements of innumerable tiny insects, who, preferring to work just above high water mark, are driven higher and wider, thus forming those immense coral reefs which surround, and indeed constitute so many of the South Sea Islands. Tournefort enumerates thirty-six species, and modern science is adding to the number.

"These beautiful shrubs of cabbage leaf coral-

line are very elegant, and may well puzzle the naturalist whether to banish them from the class of plants or not, with many other delicate varieties which look more like seaweeds, till the microscope reveals the tiny cells in which the different coral insects have lived and laboured at their fairy mansions. Each species forms a different shaped coral: hence some of these corallines, you perceive, are tubed like organ pipes, others are cellular, jointed, or covered with a bony network—the honeycomb coral, which is often found upon our southern coasts; and delicately thin as its walls appear, they contain double rows of cells so close that Mr. Gosse estimates 5,760 in a square inch. The insect population, therefore, of any well-grown mass of honeycomb coral, would equal in number the multitudes of Vienna, Paris, or even perhaps London itself.

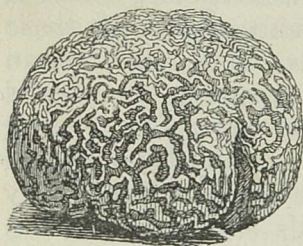
“Other corallines wave like feathers with every breeze, and are tinted with many delicate hues. It is said that the red coral attached to rocks and shells appears as if clothed in living flesh when its little artificers are busied in its construction; and that each



CORAL, WITH ITS COVERING AND
LITTLE ARTIFICERS.

of the small anemone kind of insect is connected with its companions by a system of nerves or vessels traversing the fleshy substance."

"What are these curious round masses of cells, aunt?" asked Lucy; "how beautifully they are arranged!"



MADREPORE.

"They are called *madrepores*, or brain stone, from the resemblance to the disposition of the animal brains, and are the homes, or '*polypidoms*,' as one writer aptly calls them, of a family of polypi, whose habits lead them to form long tor-

tuous furrows instead of round cells. Others are perforated with innumerable star-shaped cells or endless rays, all centering on one. Some of these are called sea mushrooms, sea fans, sea pens, or clove-coral, from their shapes; others resemble petrified feather and cup mosses. Many of these corallines are mingled almost in a mass with shells, or, like the substance called millepore, entirely encrust whatever comes in the way."

"Are there any specimens of modern stone-lilies, aunt," inquired Frank, "like those we saw among the fossils?"

"There are very few now living, not more than about twelve species. The nearest specimens here are the comatula, or sea-wigs."

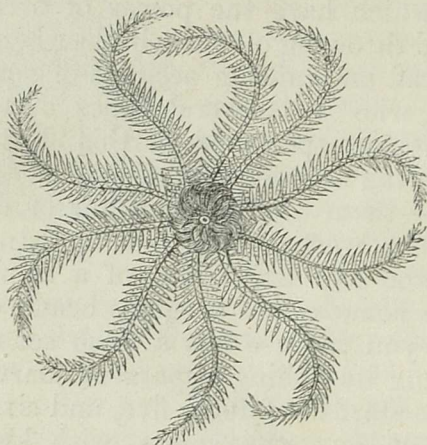
"But those sea-wigs do not look much like

the stone-lilies, aunt," remarked Lucy; "so why should they be classed together?"

"Because naturalists have found, by watching, that the small zoophytes which they at first took for stone-lilies, as they approached maturity, changed into the species of starfish they well knew. There are many varieties of starfish, some of which have the power of breaking to pieces and throwing off their limbs when caught. I have read an amusing account of some grave professor who was several times disappointed by his choicest specimens of this 'brittle star' dismembering themselves whenever he attempted to remove them whether in water or out of it. They can, however, when left undisturbed, reproduce the lost limbs, but of a smaller size. Here are some called gorgon's heads, each arm of which you can see has a fresh set of limbs, multiplying its fishing apparatus marvellously.

"These starfish of four, five, and six rays are common on our own coasts, with knotted or fluted surfaces, beneath which the animal moves on innumerable little feet. The round ball-shaped echinidæ, or sea urchins, are very plentiful, sometimes being covered with those little hollow spines you used to call sea horns, Lucy. The tubercles on the shell form a regular and ornamental pattern, and it is often delicately tinted pink, buff, or orange colour. The spines drop off so easily when the animal is dead, that there is rarely a perfect one to be found. Those flat sea pancakes are of a similar kind, also the sea hearts."

There are several table cases of insects and some animals in this gallery; but as the arrangements are not yet completed, Aunt Edith advised her young companions to pursue their examination as nearly as possible in the natural scientific method of inspecting each class separately, and rising from the lower to the higher



ROSY-FEATHER STARFISH.

orders of animal existence: they therefore went on to the table cases in the Eastern Zoological Gallery, which contain the shells of Molluscous animals, divided not only into univalve, or one shelled—bivalve, or two shelled—and multi-valve, or many shelled species, but classed under five names which indicate the form or habits of the creature within the shell."

"Please to explain those names to us then, aunt, as they are written on the cases," said Lucy.

“Different naturalists give different classifications, and various names; but those adopted here, are, I. *Gasteropoda*, or belly-walking mollusks; II. *Conchifera*, which are all bivalve, and have no distinct head—such as an oyster; III. *Brachiopoda*, having branched arms, instead of feet; IV. *Pteropoda*, moving by fins on the head, and destitute of feet; and, V. *Cephalopoda*, or head-walking mollusks, because they move on tentacula encircling the head. There are subdivisions to most of these; but you can study them at your leisure, as they refer more to the animal itself, which is not here, than to his skeleton, the shell.”

“What a variety!” exclaimed Frank, as he glanced down the long range of Tables 1—26. “Come, Lucy, we shall find some like our own here, I dare say.”

“These shells, you must remember,” said Aunt Edith, “were all made by animals creeping like snails in the bed of the ocean: they lodge generally in the open mouth of the shell. The pink-mouthed *strombi* of the West Indies (Cases 1, 2) are esteemed, not only for their beauty, but for a rare pink pearl which they occasionally yield, and which, when well shaped, is very valuable. The spiders’ claws, or sea scorpions, you have seen before. Some of the trumpet shells are often used as musical instruments by the South Sea islanders. The frog shell is so called from its flat shape.

“The murex, or rock shells, are numerous and beautiful, with their curly protuberances

indicating their annual increase; the inner tints are sometimes very brilliant. A small species of murex in the Mediterranean Sea is supposed to have yielded the far-famed Tyrian purple dye, as its figure distinguishes early Tyrian coins. The cone shells (4, 5) are much admired, and used to be so rare, that £100 was paid for that variegated '*gloria maris*' from the Philippine Isles.

"Among the spindle and pear shells (5, 7), some have the whorl on the opposite side to that which is usual; hence they are termed *reversed* shells. The turnip shells are often used as oil vessels in the Indian temples, and are carved and ornamented. When these are reversed, the Ceylonese will pay a high price for them. The tulip shell, ostrich foot, and pelican's foot, are so named from their shape and marks."

"We have some of these at home, aunt. But what a strange variety are put with our old acquaintance, the common whelk! Surely he does not belong to such grand relations."

"You may well be surprised, but I believe the aspect and habits of the animals within these beautiful shells prove the relationship: in most cases you see a cast of the creature. Those helmet shells (Cases 7, 8) are sometimes very large, and are cut into cameos in Italy. One large species, the tun helmet, is often used in tropical countries for baling out boats. The harp shells derive their name from the ribs left on the surface by each successive addition to its growth. In some they are double; but these used to be very rare. The purpura, or purple

whelk, also yielded a purple dye, and is portrayed likewise on Tyrian coins. That shell (Table 9), which has a single tooth like horn on its outer lip, is called the monoceros, or unicorn. The mulberry shells have been thought to resemble the fruit, and are usually covered with spines."

"What is this in Table 10? it looks more like a pipe than a shell," said Lucy.

"It is the magilus, for a long while supposed to be a stalactite, but it is now ascertained to belong to an animal scarcely differing from the purpura. While young, it has a thin white shell of the ordinary form; but as it lives on corals, it is obliged, in order to prevent itself from being enclosed in the growing reef, to project a straight tube from the mouth of the shell, along which it creeps, filling the useless space behind it with calcareous matter, and thus at the surface of the coral it is able to procure its food."

"What a sensible little animal!" remarked Frank.

"Nay, my boy," rejoined Aunt Edith, "you should rather say, what wisdom in its Creator, thus to enable it to deviate from the usual practice of its kindred, to meet its own peculiar necessities. Here are the true whelks, so common as to require no remark."

"That long tapering shell is called the needle. Those pretty polished shells (on Tables 11—14) are the varieties of olive or butter shells, and numerous genera of voluted shells, such as the melons used as domestic utensils by the Chinese;

the bishop and abbot mitres; the papal crown; the orange flag, and cracked mitre, names suggested by their peculiar aspect. The date-shaped shells are numerous, and varied by almost endless patterns on them—spotted, lined, and marbled.”



GROUP OF SHELLS.

“The *cowries* (Table 14) are a wide-spread race, and named by various nations according to their colour or spots; as, the morning dawn, or orange cowrie, used as ornaments in the Friendly Isles, and therefore seldom seen here without drilled holes; the map cowrie; the lapping egg; the mole; the white-toothed cowrie; and the money cowrie, still current in Africa.”

“We found some little ribbed cowries on the English coast.”

“Yes, the pig cowrie, so called from its shape and scored back, is common on most sandy beaches. The large China cowrie is so valued as an ornament in its native country, that cones and other large shells are often cut into its shape. These shells being called ‘porcelains,’ are by some supposed to have given the name to China ware.”

“What splendid mother-of-pearl shells!” exclaimed the young people as they paused over Tables 15—18.

“They are all from tropical or oriental seas, and are vastly superior to their tiny representatives on our own coasts. These beautiful turbo and trochus, or top shells, are from New Zealand, the West India Islands, Japan, the Cape of Good Hope, or Australia; and are named, from their aspect, the pomegranate, the golden sun, the pheasant, pyramid, rosary, ear-drop, gold button, etc. You are aware that the nacre, or mother-of-pearl, is during life shielded by a cuticle, or epidermis, which after death gradually decays, or peels away; and when the shell is procured in its healthy and perfect state, conchologists remove it by acids.

“The large *haliotis*, or sea ears (Table 17), are used as drinking cups by the natives of New Zealand. In our country this shell has been much used for inlaying boxes and cases. Some of these are called limpet shells, but they differ from the real patella tribe. Table 18 has a beautiful variety of *Nerites* or hoof shells, from both fresh and sea water. The apple snails and

the ianthina, or purple floating snail, when alarmed, tinges the sea with a deep blue fluid, under which he escapes in safety from his enemies."

"What curious means of protection God gives to these little creatures; no human being would have thought of that expedient."

"None are too mean, you perceive, to enjoy their Maker's thoughtful care."

"In Tables 19—21 you see the pagoda shell, the staircase, the clubs, the turritella or screw, and the wentletrap or ladder shell, which was formerly very rare, and is now brought from China; the pond snails and the vermetus, not unlike the serpula."

"Are these varieties of limpet shell, aunt?" asked Lucy, turning to Table 22.

"Some are; but you see there also shells that are somewhat similar, as the fool's cap, the slipper, the cup and saucer, Neptune's cap, and the phorus or carrier, so named from its peculiarity of attaching to the outer surface of its shell, as it enlarges, any substance which happens to be handy for use: it is sometimes called the *conchologist*, sometimes the *mineralogist*, as shells or minerals predominate in its collection. Some of these creatures have this habit only in youth, but others retain the practice throughout their existence, and have the margin of the whorl expanded into a broad disk, furnished with long tubical rays; these are termed sun carriers. The bubble shells and tooth shells, like small teeth or elephants' tusks, belong to this tribe.

Tables 23, 24 exhibit horny shells under the skin of sea hairs from the Indian seas; also the delicate glassy and paper nautilus."

" 'Learn of the little nautilus to sail,
Spread the thin oar and catch the driving gale,' "

repeated Lucy.

"You must regard that only as a pretty poetic fiction, my dear Lucy; for watchful naturalists declare that these dilated arms are only used to keep the shell in its place when the animal rushes through the water. Here, too, is the flat shell of the Chinese umbrella, and the true limpets, whose inmates move like slugs, and feed on seaweed, rasping it down by a long ribbon-shaped tongue armed with hooks or spines. The chitons, or sea wood-lice, are of different kinds—scaly, spiny, and leathery. The chitonella, or sea caterpillar, is among this group.

"Tables 24—30 contain a series of land and freshwater shells, by no means so brilliant as those which inhabit the depths of the ocean. Snails, however, were fattened as delicacies among the Romans; and an old English writer testifies that, 'boiled in spring water, and seasoned with oil, salt, and pepper, they make a dainty dish.' They are esteemed as a medicine still by the poor of some rural districts. Some of these snails deposit an egg covered with a shell as hard as that of a bird, of which there are specimens in Case 28."

"We have sometimes found snails' eggs as large and white as sugar-plums in our garden,"

said Frank, "but then they were soft and leathery. These coil shells are very common on the chalk downs, and striped shells too."

"Now," resumed Aunt Edith, "we come to the *bivalve* shells; and these are generally inhabited by mollusks, less able to move about than those of the univalves, and most of them belonging either to the second order, *conchifera*, or the third, *brachiopoda*. Many are furnished with a muscular fleshy substance called a *foot*, with which they can project themselves along the sand or rocks; especially the cockles, which will sometimes jerk themselves out of the fishermen's boat into the sea again, and play amusing pranks in a dish. Others can swim freely; but most of these creatures use the foot for burrowing, and attach themselves by a byssus, or hair-like band, to the rocks on the shore, or in the bed of the ocean."

"Are both bivalve shells enlarged at the same time by the animal, aunt?" inquired Lucy.

"It is supposed so, as the additions to each one in a pair of shells corresponds in number. The enlargement proceeds from within, so that every increase is marked by a ridge more or less conspicuous, some needing microscopic observation; others, like the furbelow clam (Tables 31, 32), showing a succession of plaited frills. Some are armed with spines, others with rounded tubercles; some are fanshaped, with shells, varied from smooth by long flutings, or a number of overlapping tucks. They are enriched with tints of all hues and all shades, and range in size

from minute beauties invisible, unless placed on black silk, to those gigantic clams you see under these tables, which were brought from the Indian Ocean. They have been found weighing more than five hundred pounds, and yielding a day's provision for a hundred and twenty men; while the sudden snap of the valves will cut a ship's cable in two. The shells are often used to receive water from small fountains; and on the continent are sometimes employed as fonts in churches."

"I wonder how clams are fished up," said Frank.

"As the animals are valued for food, the natives of the Molucca Isles seek them out; and being generally in water not more than a few feet deep, they can be seen, and when the valves are slightly open, a pole is pushed down between them, which the animal, in its frightened efforts to close its shell, grasps so fast that it can be thus entirely lifted from its bed.

"The hinges of bivalve shells deserve attention, as they differ from each other in the number and contrivance of their toothings, but each part is exactly adapted to its fellow; you never find either duplicate or defect, so that the design of the great Creator is as evident here as in all the rest of his works.

"The scallop or *cockle* shell (Table 33) was generally worn by pilgrims as a sign they had crossed the sea in their way to the Holy Land. It is sometimes used in the Highlands for skimming cream. The *mactra* and *tellina* tribes

form pretty shells—the latter class beautifully polished, and with very delicate tints; their minutely toothed edges are fitted very accurately.

“In this Case (34) you see specimens of our old Devonshire acquaintance, the *pholas*, with proofs of his ability in perforating stone; also the *solen* or razor shell, with its long knife-handle-looking shell.

“These pretty freshwater bivalves (38—41) are interesting, not only from the beautiful pearly lustre of the interior, but for yielding the British pearls of early Roman renown. Similar ones are peculiar to North America and to China. There are a great variety widely scattered upon our globe, affording food both to men, beasts, and birds; indeed, the swan and duck mussels are so called from affording sustenance to those birds. Crows are known to drop them from a height to break the shell.



THE PINNA.

“The cockscomb mussel, with its folded shell and shiny lips, is very beautiful, as well as the violet coloured specimens from the Southern Ocean (Tables 42, 45). All these shells are sometimes fastened to the rocks by a byssus or beard. In some species of pinna, this is of such a silky texture that the Italians collect and manufacture it into stockings, gloves,

etc. Even dresses have been made of this marine silk, and sold at enormous prices to the grandees of the earth. This is the shell that harbours a friendly little crab, who is said to give notice to the pinna of any approaching enemy."

"I have read of him in some poetry," said Lucy.

"Another use is sometimes made of the byssus of the common mussel, which affords such protection to mason work where a rapid tide washes away all ordinary mortar, that mussels have been planted in the interstices of a bridge at Bideford,* and a by-law made, rendering their removal punishable, except it be done by order of the trustees."

"What useful little guards!" exclaimed Frank. "Are these real pearl oysters in Table 45?"

"They are the true pearl shells," rejoined his aunt, "though not exactly oysters. It seems generally agreed that pearls are either the consequence of a diseased state in the fish, or arise from its efforts to cover over some irritating substance which has intruded into the shell."

"If that is the case, I wonder people do not try and make the fish produce pearls."

"It has been frequently tried in many different ways, but the pearls so formed are not nearly so beautiful as those produced naturally. Those pectens, with their ears, are curious; and the anomia shells are remarkable for having a third shelly plate on one side, by which they fix

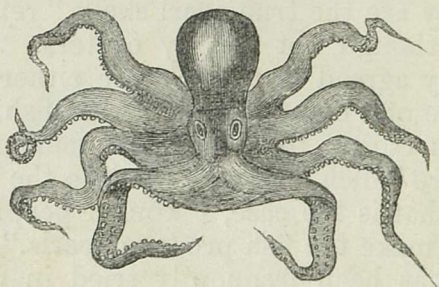
* Verified by a letter from the Town Clerk, 1856.

themselves. The lamp shells and duck mussels belong to deep seas, and have one shell perforated to admit the fleshy footstalk by which they are fastened to the rocks."

"Are cuttlefish shells, aunt?" asked Lucy, looking over the contents of Table 49. "I thought they were only petrified fish."

"They are by some regarded as mere skeletons, and are more frequently found in a fossil than a recent state. There are, however, a few existing families of *cephalopoda*, as these creatures are called—the sepia furnishing the ink for your sepia drawings, Frank—the nautilus, the octopus, and the spirula or crosier shell."

"Well, I should never have thought of classing those frightful cuttlefish and octopods with the beautiful paper nautilus," said Frank.



OCTOPUS VULGARIS.

"Look at that octopus; what resemblance can there be?"

"Not much outwardly, it must be confessed, Frank; but there is considerable similarity in

the animals inhabiting them, by their long arms placed round their heads, their eyes, mode of swimming, etc. Cuttlefish grow to a large size in tropical seas, and are more dreaded than sharks. The smaller species were eaten as delicacies by the ancients, and indeed are still used for food in some countries. The true nautilus shell is claimed as the habitation of one of these creatures, and differs from the pearly and paper nautilus you saw in Table 23, by being furnished with a multitude of air chambers, by means of which the animal living in the outer one can rise and sink at pleasure in the water. The fossil ammonites near it seem to be constructed in the same manner. In this case, too, is the lancelike skeleton of the loligo, known by the name of sea pen."

"Where are the multivalve shells, aunt?" asked Lucy.

"There are but few—the chitons you have seen in Table 24; and in Table 24 of the fourth Zoological Room, is the sea acorn or balanus, consisting of several pieces fitted together like a cone cut off at the top, and affixed by different species to rocks, drift wood, whales, corals, and sponges. The insect in early life is shell-less, and frisks about like a shrimp, as you may see on our southern coasts. On reaching maturity it fixes itself, and the shell forms over it.

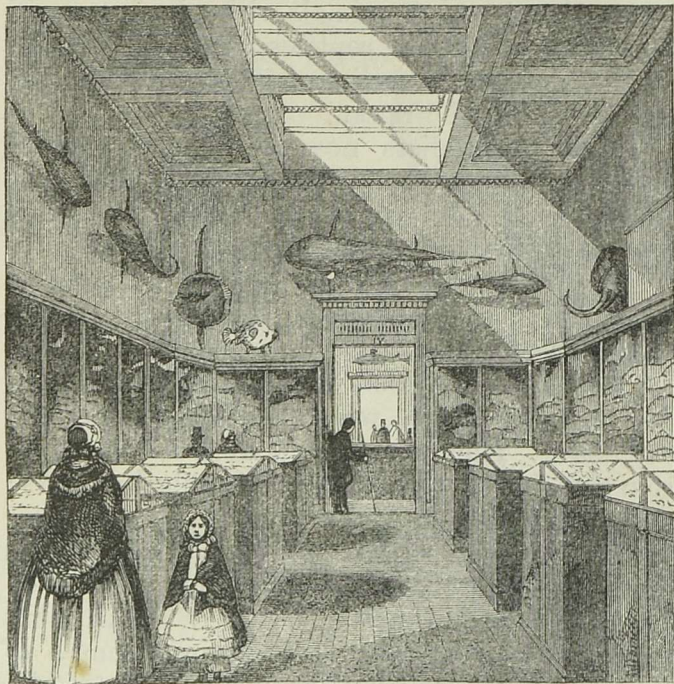
"Beautiful as these shells are, the construction and habits of the inhabitants are almost more worthy of admiration, and afford equal proofs of the benevolence which has adapted

them to their watery homes, and prepared them to obtain food and enjoyment suited to their capacities. In the aquarium at the Zoological Gardens, or even in a glass vessel at home, you would find both amusement and instruction in watching their operations."

"Ah! I remember when you were staying with us at the seaside, what entertaining scenes you used to describe among those little creatures under the weeds on the beach."

"True; and their perfections and happiness have often sent me in renewed confidence to appeal afresh to Him who not only 'feedeth all flesh' on earth, but supplies all spiritual necessities; so that 'they who hunger and thirst after righteousness shall be filled,' through the grace of our Lord Jesus Christ."

CHAPTER IV.

WINGS AND FINS;
OR,
INSECTS, FISHES, AND REPTILES.

ZOOLOGICAL GALLERY.

THE next time Frank and Lucy went to the British Museum, their aunt led them to the North Zoological Gallery, explaining that the

collection of stuffed animals was arranged in the four great divisions classed by the celebrated Cuvier.

I. *Radiata*, or radiated animals—comprising animalcules and zoophytes.

II. *Articulata*, or jointed animals—including crabs and insects.

III. *Mollusca*, or shellfish.

IV. *Vertebrata*, or animals with a back-bone—comprehending fishes, reptiles, birds, and beasts.

“Does every naturalist adopt those divisions, aunt?” inquired Frank.

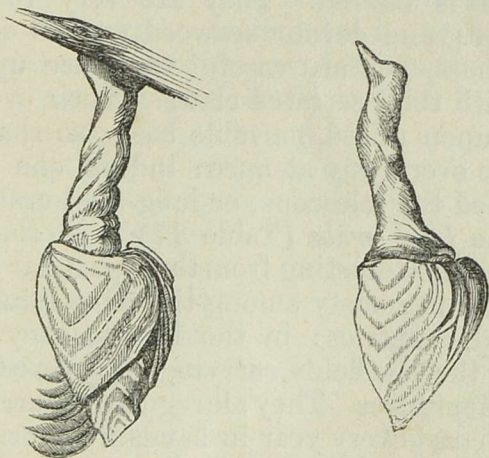
“Most naturalists now do; but I believe they differ about subdivisions, so I have not named any. You can adopt those you think most useful as you gather fresh knowledge.”

“Well, we shall not see any animalcules or soft worms here, I suppose,” said Lucy; “and we have seen the shells.”

“You must just look at the celebrated *barnacles*, or goose shells, which belong to the class *articulata*. They hang down from the rocks, or from ships’ keels and sides, by long fleshy stalks; and when putting out their feathery-looking feelers in search of food they gave rise to the idea, still credited in some districts, that they contained the barnacle goose. We will next examine the crabs and lobsters in Room 4 of this gallery, where they are deposited in Table-cases 13—24.”

“Do crabs change their shells every year?” asked Frank; “for there are some specimens covered with oysters.”

“It is not yet ascertained by naturalists. If they do not change, it seems that oysters must grow to a large size in a short time. That spider crab so resembles the common spider that you cannot wonder that the *cancer* or *crab* and *lobster* genus should be reckoned as large insects by some naturalists.”



BARNACLES.

“How many varieties are there?” inquired Lucy. “There are several here, square, round, oval, and fin-footed, etc.”

“Including their little cousins, shrimps and prawns, there are at least eighty-seven species, distinguished generally by their length of tail, and the shape of the breast. They usually inhabit the clearest water near rocky shores, though some are found in the ocean near the equator, and in different parts of the world.

They were well known to the ancients, and are accurately described by Aristotle.

“Lobsters appear to be afraid of thunder, and will cast their claws not only under a loud peal of thunder, but even on the firing of a large cannon; so that it is a common joke on meeting a lobster boat, to threaten a salute if a bad bargain is offered. They are very voracious creatures, and devour seaweed and all sorts of substances, yet are careful to mince up their food with their serrated claws. Their eyes protrude upon raised, movable bases, so that they can see every way at once: indeed, one species is named the telescope, or long-eyed crab.

“The *land crabs* (Table 17) from the West Indies are interesting from their peculiar habits; they live in society among the mountains of all tropical countries: in the Deccan they swarm among the rice fields, carrying off sheaves bigger than themselves. They all regularly march down to the coast every year in bands numbering millions, finding their way in the straightest line, and endeavouring to climb houses and mountains rather than turn aside. If a river interpose they are obliged to follow its course, and seem to prefer marching in the night, or during rainy days. They are sometimes three months making this journey, and generally change their shells before returning to the mountains. Some land crabs are palatable food, but the black and dark coloured species are unwholesome and poisonous.”

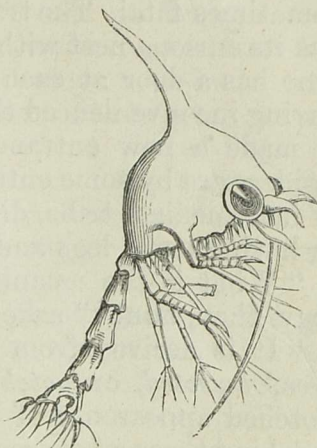
“What are those odd crabs which seem to

carry a rubbish heap on their backs?" asked Frank.

"They are called the death's-head crab, and make their cases of bits of sponge and shell. Your old friend the hermit crab is sometimes named Diogenes, from his cynical fashion of lodging in a deserted shell; but if modern observers be correct, he is too particular in his choice of 'houses to let' to be named after that ancient philosopher, and is sometimes guilty of turning out the lawful owner by violent means.

"The young of the crab is protected by a remarkable spectaclled sort of helmet, which so disguises them that they were long deemed a distinct race under the name of *zoea*; but they are now identified as baby crabs.

"Amongst the lobsters you must notice the *tree lobster*, which is said to climb cocoa nut trees to get at the fruit. The *scorpion lobster* lives on land, and is accused of destroying new roads in India by its excavations. The transparent glass-like *alima* and *phyllosoma* are found in the ocean near the equator; as is the extraordinary *limulus*, or king crab, with



ZOEAL, OR BABY CRAB.

its long pointed tail and large circular head (Case 22)."

"Shrimps and prawns seem like sea insects too, aunt," remarked Lucy.

"They really are sea insects, as well as many others too perishable for museums. The scorpions of different countries have either very long tails armed with stings, or very long claws. The velvet crab, too, does not look so very different from the cardinal spider of Hampton Court, which can catch a bird, and the tarantula of Italy, the bite of which is always painful, and sometimes fatal. The trapdoor spider (Table 11) has its curious nest with its movable door by it. One has a door at each end; the clod of earth having inconvenienced the spider by being upset, it made a new entrance at the opposite end. Spiders are by some entomologists deemed a sort of intermediate tribe, differing from true insects in having eight legs and no wings."

"What is the meaning of the word entomology, then, aunt?" asked Lucy.

"It is derived from the Greek word 'entos,' *insected*, or *notched*, from the divided or notched appearance of the body usually distinguishing these creatures; and 'logos,' *a discourse*. Insects, also, generally pass through the grub, or larva, and chrysalis state, before arriving at maturity. Insects are extremely diversified; there are no less than forty thousand varieties of beetles alone, already known to the student, besides twelve thousand sorts of butterflies and moths; and as some of these are to be seen

everywhere at all times, you may always improve your acquaintance with some one or other."

"I perceive a great difference among those in these cases, aunt; are they arranged in some order?"

"Certainly, the centipedes, fleas, etc., belong to the *apterous*, or wingless order, 'pteron' being the Greek word for *wing*. Next (in Table 10) are the *hemipterous*, or half-winged insect, such as the cochineal and its brother bugs, insects which seem to have been unknown in England at the end of the sixteenth century. Some of these are the kermes of the dyer, and others the gum lac of commerce; the boat-fly, which rows along in the water on its back; and the cicada or frog hopper, the singing insect celebrated by Greek poets as the emblem of cheerfulness: its image in gold was a favourite ornament in the hair of the Athenian ladies."

"I thought the crickets enjoyed that honour," remarked Frank.

"Popular feeling used to attribute good luck to the presence of the house cricket, and some people hail their noise as cheerful; so possibly the cicada and the cricket, though different insects, have been confounded in your mind."

"Next, we must observe the *dipterous*, or two-winged insects, such as flies and gnats. Many of these are pretty, and nearly all are curious for some wonderful contrivance or other: as the gnat, with his tiny warning bugle; the fly, with his curious brush-like feet; gadflies, mosquitoes, etc. Among the seventeen hundred

European flies, there are many that, if sometimes annoying to man, effect a very important service for him, by removing animal and vegetable refuse which might otherwise produce pestilence. So useful and so prolific is one species, that Linnæus used to say three musca vomitoria, and their progeny of twenty thousand each in one season, would devour a dead horse sooner than a lion could."

"I can imagine that," said Lucy, "for I remember how quickly such a nuisance was eaten up on the sea-shore once; it was always covered with myriads of flies. But what beautiful moths and butterflies in Tables 5, 9: what is their scientific name, aunt?"

"*Lepidoptera*, or scaly-winged insects. There are about twelve thousand varieties, two thousand of which may be found in Britain. They are exceedingly brilliant; and some foreign species measure ten inches across the expanded wings."

"Papa caught some moths that size in Montserrat, but the cockroaches ate them all up in the night," said Lucy.

"Very likely they resembled those large owl moths from Brazil (Table 9). The silkworm moths are in Table 8; that bunch of cocoons on birch twigs is from Siberia, where the white mulberry flourishes sufficiently for their food. The Tusseh silk moth, with some of the silk worked up, shows another variety. The leopard and goat moths feed on wood during their larva state. The ghost moth is particularly destruc-

tive to hop grounds. The humming-bird moth, or bee bird, hovers over flowers, making a low



1. Death's-head Moth (*Acherontia atropos*). 2. Tiger Moth, scarlet (*Heraclea dominula*). 3. Six-spotted Burnet Moth (*Anthrocera filipendula*). 4. Humming-bird Hawk Moth (*Macroglossa stellatarum*).

musical humming. The death's-head moth is one of the largest British specimens, and derives its name from the skull-like marks on the back of its neck. Its evening squeaking has often filled ignorant minds with superstitious terror; but its chief crime is robbing beehives of honey, its favourite food. The sphinx, or hawk moth, is so called from the attitude assumed by its caterpillar. All these are hatched from eggs to caterpillars, and prepare various curious cocoons of silk, or cases of leaves, hair, etc., in which to pass their pupa or chrysalis torpor, resulting at length into these brilliant beauties.

“The early Christians saw so great an analogy between this natural change of an insect, and the resurrection of the body for its renewed immortal soul, that they often adopted the figure of a butterfly on their tombs as an expression of their faith in the doctrines taught by the Saviour respecting our future existence.*

“Among the nests of insects are some very curious pupa cases from Australia; but as they are not yet finally arranged, it is not always easy to find them. Table 4 contains the *hymenopterous* or membrane winged insects, such as bees, wasps, hornets, ants, sawflies, ichneumons, and sand-wasps; many of which you have watched, or whose productions of honey and wax you use. The ichneumon is useful for

* *Psyche* means the soul, and is personified by a butterfly, but was not so applied by ancient writers before the Augustan age, coeval with the Christian era (see *Classical Dictionary*).

destroying garden caterpillars by depositing its eggs in their soft bodies.

“The *neuropterous*, or nerve-winged insects, comprise the beautiful dragon flies, the ant-lion, whose curious larva prepares a sort of sand pit-fall to entrap the insects it feeds upon; the scorpion fly, with its formidable sting; the destructive termites, or white ants, which bore the interior of timber in every direction, leaving the surface apparently sound and firm, till some slight accident reveals their ravages by breaking up their habitation. The cases of the caddis fly are curious; the young larvæ float about in them in ditches and brooks till they are mature.

“The *orthoptera*, or straight-winged insects, generally have four wings equal in size, and folded evenly side by side when at rest. Some are beautiful, and all are curious. The earwigs have elegant fanlike wings.”

“Do they really creep into the ear, aunt?” asked Frank.

“If they did they would soon gladly creep out again. But that is quite a mistaken notion, and they do no harm to any one beyond tickling. Here, Lucy, on Table 3, are specimens of the kind of cockroaches which destroyed your papa’s moths in Montserrat. To this order, too, belong the locusts, whose ravages are so vividly described in Scripture as ‘my great army which I sent among you:’ see Joel ii. 25; and whose visitations are equally to be dreaded in the present day. Preserved in butter they are con-

sidered a wholesome and palatable food in the east, and no doubt were eaten by John the Baptist with the wild honey still to be found in many districts."

"What are those dead leaves and sticks, with the heads of insects sticking out at the end?" asked Frank.

"They are actual insects; some called walking leaves, from their broad green or brown wings; and others more appropriately named walking sticks, having closely folded fanlike wings; many of the latter are, however, quite destitute of wings. The *praying mantis* is remarkable from its peculiar habit of walking on the hind legs, and holding up its paws as if in devotion, but really for the purpose of tearing off the heads of its adversaries, for they are a most ferocious and quarrelsome race, enemies to all other insects, and even to their own species. The true crickets and grasshoppers belong to this order. One from China is called the monster from its size, and has curiously curled wings and peculiar toes.

"But the *coleopterous*, or sheath-winged insects (Cases 1, 3), are by far the most numerous order, forty thousand species being already known to naturalists. Some of these live on land, others in the water; some feed exclusively on vegetables, others upon animal food. They vary in size, and are of all hues, from the deepest black to the most gorgeous green and gold, or decked, like the diamond beetle from Brazil, with rows of brilliants on the wing cases. Lady-

birds, glowworms, and the cantharides or blistering flies, all belong to this order, as well as the scarabæus or sacred beetle of Egypt."

"How beautiful the cantharides are!" exclaimed Lucy; "I can hardly believe they produce such terrible blisters as we see they do when spread on a plaster."

"They are difficult to procure on account of this property. Like all the other beetles, their colour is suited to conceal them in their homes among the green olives and laurels of the south of Europe. For the same wise reason the ground beetles are dark coloured; and those of the tropics rival the gorgeous hues of the flowers under which they take refuge. The metallic sheaths of the buprestidæ are often used as spangles for ladies' dresses in the countries where they are native. The spring-jack and lantern spring-jack are noted for their high leaps; and the rhinoceros, elephant, stag, kangaroo, and tortoise beetles, are all so called from some fancied resemblance to those animals in shape or habit."

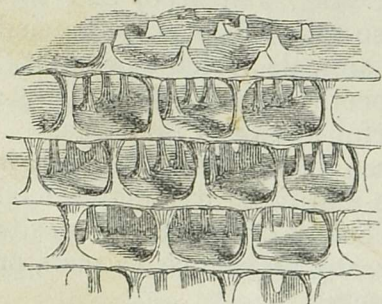
"Is the burying beetle here?" asked Lucy: "I have read wonderful stories of its deeds."

"Yes, you may see it in Table 1; but it buries the dead frogs and birds it finds as food for its young, in the bodies of which it deposits its eggs, and not for any assistance to man, or dislike of lifeless objects.

"You have now seen specimens of the different insect orders, but there are stores of individual varieties in the Museum, to which students with proper introductions can resort for any special

investigation. We must not pass over the beautiful insects' nests in Room V. of the North Zoological Gallery. There are several varieties of wasps' nests taken in England, Quebec, India, Brazil, and Africa. Most of these are made of a sort of papier maché produced by the insects themselves, who tear off particles of woody fibre and reduce it to a pulp, of which not only the cells, but the coverings of their houses are formed. Some of these are lodged among the leafy branches of trees; others are suspended from the boughs, and others again buried in the earth. Some are like round smooth balls; while others are rough, and covered with protuberances which would repel any animal who sought the honey stolen by the true wasp, and hoarded up for winter use."

"Those wasps' nests are very pretty," remarked Frank. "Some I see are cut open, and have cells inside them like those of bees."



GALLERIES OF THE JET ANT.

"Yes, there are also many pieces of timber perforated by the mason and carpenter bees, and by the white ants, as well as the galleries of the jet ant. Here, too, are the curious cocoons of the atlas moth from

Australia, made apparently of thorns and sticks, with the lace-work cocoons of a curious little moth.

"In this room, too, is part of a boat's keel bored by the teredo or ship worm; nests of the oriole, and several runs of the bower bird made of sticks or reeds; the feathery nest of the king duck; the paste-like nests of the esculent Chinese swallow which are eaten in soup, with nests of the social spider, etc."

"Well, I shall examine insects and their habitations with double pleasure now," said Lucy.

"If you do, you will soon be surprised how much you may see with your own eyes close to your own home; for although insects are scattered abroad over the whole earth, and every country has some peculiar to itself, they are rather fond of wandering about; and every year careful observers of the same locality perceive many changes among the insect population."

"How is that, I wonder?"

"An alteration in the soil, or the plants cultivated, will often bring an entirely new set of insects, and cause the disappearance of old acquaintance: an accurate journal of natural history would soon show you this fact. But time flies, and we have much to see still.

"We now pass on to the VERTEBRATA, or animals with a back bone, as they are placed in the wall cases surrounding the same room which contains the collection of insects."

"There are several on the top of the wall cases," said Frank, taking a survey of them.

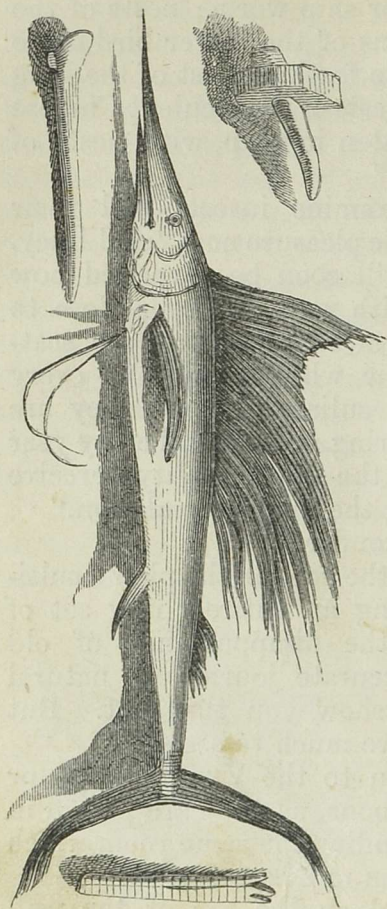
"Those specimens, you perceive, are too large to put in their proper places amongst the smaller specimens, which are divided into *osseous*, or

bony, and *cartilaginous*, or grisly fish. The flying swordfish, from the Indian Ocean, is worthy of notice. It grows to a large size, and when swimming rapidly, if it encounters a ship, it will pierce the timber, as you see that large sword near the ceiling has done."

"We have a small one at home," interposed Lucy; "so I know how strong and sharp they are."

"There are also some large sharks here; and in the lobby near the Eastern Gallery is a large specimen of sunfish, looking more curious than pretty."

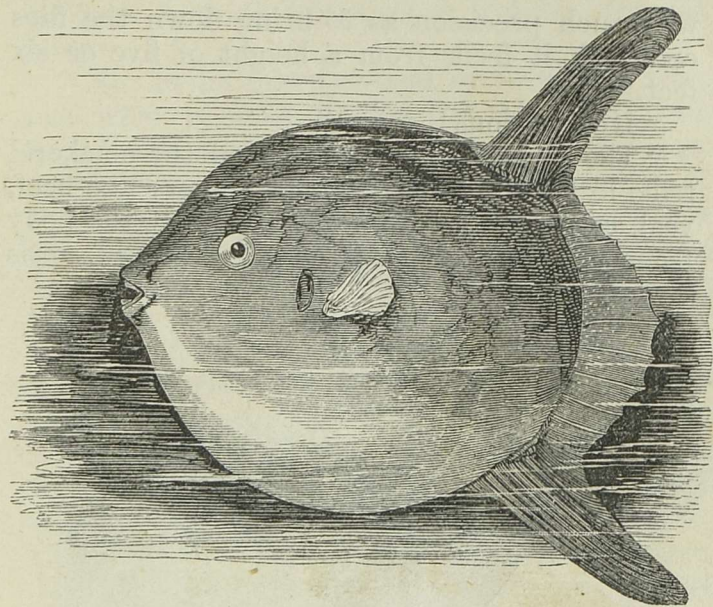
They went to examine it, but did not deem its name very appropriate till Aunt Edith remind-



SWORDFISH, AND PIECE OF TIMBER
PIERCED BY ITS SWORD.

ed them that, in life, its skin shone with a brilliant golden or silvery hue, which gave rise

to its name. It is sometimes termed moon fish, and during the night shines with phosphorescent brightness. It often weighs three hundred pounds, and is sometimes eaten as food, but people give very opposite reports of its qualities.



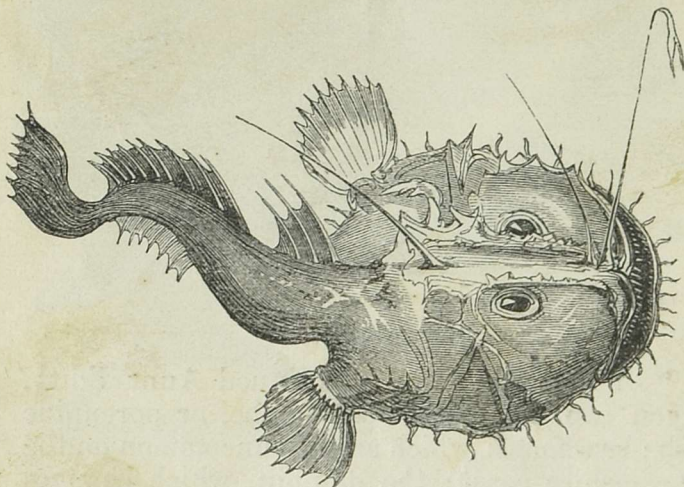
SUNFISH.

“In the wall cases,” continued Aunt Edith, “you can study the spiny-globe, or porcupine fish; sea-horses, which are not uncommon on the Devonshire coast; the dolphin, which changes colour so rapidly when caught; the tobacco-pipe fish, carp, pike, sturgeons, sharks, rays, torpedoes; the lump-fish, eels of various sorts, cod, ling, whiting, salmon, surgeons, which have

a lancet-like spine on the side of the tail, wolf-fish, gurnards, bull-heads, hog-fish, etc. The collection of fishes is not yet complete, and is still in process of arrangement. The long-beaked chaetodon, in Case 6, with teeth like bristles, shoots a drop of water from its tubular snout with such precision as to bring down the flies on which it feeds from a height of five or six feet."

"How curious!"

"The flesh of the tunny, one of the mackerel tribe in the Mediterranean, tastes very like beef, veal, or pork, according to the part of the body from which it is taken. The fishing-frog is



FISHING FROG.

curious, from its mode of taking its prey. It buries itself in the mud, leaving only those

worm-like filaments on its head exposed, which being red, and constantly moved, attract small fishes to feed on them, when they are suddenly caught in the large jaws of the fishing-frog."

"Some of the oddest looking and most repulsive creatures seem possessed of the cleverest instinct, I think," remarked Frank, thoughtfully.

"No doubt every animal is furnished with just what is most needed for its welfare and happiness; and perhaps some we deem most repulsive would not be so did we know more of their habits and necessities. The hand-fish is interesting from the peculiar shape of its side fins. Fish are very extensively scattered, being found in all seas and rivers; and many have supplied food to a large portion of mankind from the earliest times. In some countries laws have been enacted for their preservation. Cod and salmon are peculiar to northern regions. Salmon was formerly so very plentiful in the north of England that it was customary for servants to stipulate, when taking a fresh place, that they should not be obliged to eat it more than three days in the week. So greatly has the herring fishery promoted Dutch prosperity, that it is common to say that Amsterdam is founded on herring-bones.

"The lump-fish is one of the sucking fish tribe, and is brought to market chiefly as a curiosity; but when stripped of its thick oily skin it furnishes a delicate and nourishing food. Common eels are familiar to you; but the

gymnotus, or electrical eel, is a native of South America, and is seldom seen in England. The torpedo possesses similar electric powers. It belongs to the formidable shark tribe, of which you have heard such truly terrible accounts: the dog-fish, saw-fish, and hammer-headed shark, are all related; the latter is so called from its singularly prominent eyes. The rays are sometimes very large, and when first taken out of the water have a most unpleasant odour, which they lose when exposed to the air."

"I have often noticed it when the fishermen's boats come in with their loads," interrupted Frank.

"The sting-ray," resumed Aunt Edith, "has been found in Holland weighing four hundred-weight. It does not really sting, but inflicts on its adversary a severe wound with a sharp notched bone under its tail: savages use this bone as a saw."

"I suppose the fishes lose colour by being taken out of the water and stuffed," said Lucy; "for they are not nearly so pretty as the paintings I have seen of them in books."

"Most probably; and perhaps the same cause prevents any of the bright colours showing on the reptiles in Room II., which are described as adorning some of them in life."

"How are the reptiles classed here, aunt?" inquired Frank.

"In five divisions:—the *sauria*, or lizards; *ophidia*, or serpents; *testudinata*, or tortoises; *loricata*, or crocodiles; and *batrachia*, or frogs.

All are cold-blooded, though greatly differing in their outward appearance. About twelve hundred and seventy species of reptiles are now known to the naturalist, of which serpents and lizards are the most numerous, and the former the most dangerous. Great Britain furnishes only fourteen varieties; and in Ireland, according to the prevailing notion, St. Patrick killed all but five. The collection in the British Museum is considered the most complete in Europe, excepting that of Paris. Some specimens are preserved in spirits, but most are stuffed and displayed in glass wall-cases."

"The lizards come first, I suppose," said Lucy, going up to Case 1.

"Yes. The monitor lizards from Africa and India are greatly venerated by the natives, who assert that they hiss at the approach of crocodiles, and thus warn people of their danger. In Case 5 are heloderms from Mexico, which differ from other lizards by having a groove in the back of the teeth like serpents, and are reputed poisonous, but this is uncertain. In Case 6 are the American tropical lizards, called safe-guards, which are said to rob beehives by frightening away the bees. They grow four or five feet long. The scincs, and other similar serpent-like lizards (Case 7), are common in the warm countries of both hemispheres, and have always polished, shining skins. Some have strong distinct legs; others, such as the blind-worm, have leg-bones hid beneath the skin. All these are harmless."

"The *geckos*, or night lizards (Cases 8, 9), are also abundant in tropical regions, climbing up glass windows, and running along the ceiling like flies. Their toes are curiously formed, differing so greatly that seven varieties are observable. Some have skin between the toes, which are also armed with claws, enabling them to jump from tree to tree. They feed on spiders and flies, hiding themselves during the day; and in twilight are so quick and noiseless in their movements, that when alarmed they seem to vanish as if by magic. They are not venomous, though their feet produce redness when allowed to tread on the skin. They are singular in the power of reproducing the tail when lost, but a swelling at the joint marks the disaster.

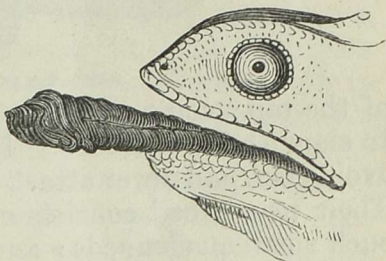
"The *anoles* are nearly allied to the geckos, but are much prettier; they live on trees, and change their colour. They are quarrelsome creatures, and can bark like small dogs; and when running they curl up the tail over their curious crested backs. True lizards have a forked tongue. In Case 10 are varieties of *agama*, which are peculiar to the warmer parts of our own hemisphere; the molochs, covered with large spines, and the dragons of India."

"Are not dragons fabulous creatures?" inquired Lucy.

"The dragon of ancient fable was described as made up of limbs never found existing in the same animal, but these lizards so far resemble those imaginary monsters, that they are distinguished by the name. Their apparent wings

consist only of the skin of the sides spread out upon very long ribs, which acts like a parachute as they leap from tree to tree. The most curious creature in this Case is the frilled agama from Australia, which has a large folded membrane round its neck, reminding us of queen Elizabeth's ruff.

"In the lower shelves are the varieties of chameleon from Africa and India. They have long been celebrated for their quickly changing hues, but are still more remarkable for their peculiar tongues, which they can protrude to a length equal to their whole body, as you see by one specimen in which it is fully extended. The feet are something like a parrot's, adapted for grasping a perch, and the tail is prehensile. The eyes are very prominent, and look different ways at the same time, and one will appear to be asleep while the other is wakeful and disturbed by light."



TONGUE OF CHAMELEON.

"Those snakes look very formidable," said Lucy; "I should not like to meet one."

"For your comfort, however, naturalists assure us that there are but fifty-eight venomous species, while there are two hundred and seven non-venomous. Serpents cast their skins every year, and swallow their food whole. Their teeth

are placed inclining inwards, so that the prey can easily pass into the mouth, but cannot get back again.

“In Case 11 are specimens of poisonous serpents. The rattlesnakes of America derive their name from the rattling sound of loose joints, or rings fitted into one another at the end



RATTLESNAKE.

of the tail: some of these rattles are detached to show their structure. It is agreed that they avoid man, and never attack him unless provoked. Their usual food consists of rats, squirrels, and such small quadrupeds; and though their bite is fatal, their flesh may be eaten with impunity. The cobra di capello, or hooded snake, you have often heard described. The bite of the fers-delance, of South America, is very deadly, as are those of the adder, puff-adder, asp, and cerastes of Egypt. The whip snake, and coral snake of Australia, are none of them very attractive here, though in life some exhibit brilliant colours. Vipers are the only venomous snakes in England. In the lower shelves are the sea-snakes, some of which grow to a very large size, and all are highly venomous.”

"Then the sea serpent is not altogether fabulous."

"Perhaps not; these, however, all belong to the tropical seas of Asia. They sometimes float sleeping on the surface, and some species haunt the ditches and rice fields of India. The boas of America, and pythons of India and Africa (Cases 12, 15), are the only serpents which have anything like legs, all being furnished with a pair of hooked claws near the tail, enabling them to coil round trees so as to exert greater power in crushing their prey, as they are not venomous, but swallow their victims without mastication. These serpents are very large when full grown, yet are eaten with appetite in some countries. They were well known to the ancients, both in the Old and New World, forming subjects for the sculptures and traditions of each. Cases 16, 17 display the coluber kindred snakes, some of which are furnished with a poison-fang. The water snakes and coral snakes of Florida are pretty, and are often kept as tame pets; as are also the ring and black snakes of England."

"I remember my cousin Charlotte used to keep one, and allow it to creep up her arms and coil round her neck, to our great terror. Are there any of those the snake-charmers boast of here?"

"Yes, the naja tribe are used both by African and Indian jugglers. Some are hooded, and others marked as if spectacted; but in spite of the boasted influence of the charmer, their masters sometimes pay dearly for their feats, and

it is not uncommon for life to be sacrificed to an angry bite. The tree snakes are interesting, from their rapid method of flinging themselves from one tree to another, so that in some countries they are termed flying serpents. The coachwhip is very long and slender, and marked very like whipcord. Another species is remarkable for its singularly long snout."

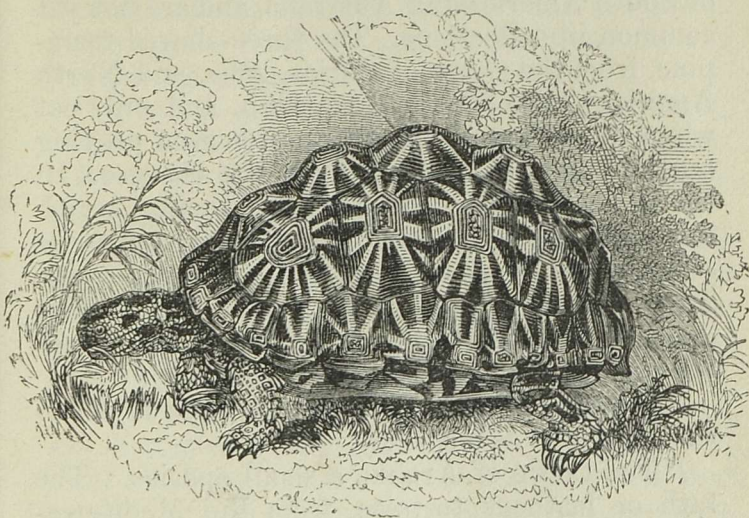
"There seems a natural dislike to snakes, I think, aunt, notwithstanding Charlotte's peculiar fancy for them; and I often wonder what causes it, especially as they are so generally worshipped by pagans."

"It is not at all improbable, Frank, that this general dislike may be a remnant of the hereditary hatred of Adam's posterity, in consequence of the evil tempter having assailed him in that form; while the worship you mention seems invariably a sort of propitiation prompted by fear of the mischief it was deemed capable of doing. In the Scriptures, Satan is so often mentioned as 'the old serpent,' 'the dragon,' etc., that, we naturally associate ideas of all that is wicked and horrible with the name. But it is our privilege to remember the Redeemer, who has bruised the head of the old serpent, and promises to deliver from his power all who trust in his name for salvation, and seek holiness from the Holy Spirit; and none shall pluck them out of his hand."

"There are several varieties of tortoise," remarked Lucy. "How many are there?"

"About seventy are now known. In Cases

18, 19 are the land tortoises, all living on vegetable substances, and used for food. Those from Gallipagos are much in request by sailors. The geometrical tortoise is beautifully variegated by



GEOMETRICAL TORTOISE.

exact yellow lines. They are very long-lived, and from their tameness are often kept in gardens, and will recognise and testify an awkward sort of pleasure at the approach of their benefactors.

“Cases 20, 22 contain the freshwater tortoises or terrapins, which prefer animal food. They belong to warm climates, and are eaten by the natives. Some grow very large, and are called the crocodile tortoise, from the practice of snapping at their prey, from which habit incautious persons have lost a finger: they are very vicious,

and have amazing power in their jaws. The chelydæ, or long-necked terrapins, bend their heads back under the shell, being unable to draw it within as their relations do. They are natives of South America and Australia, and are not yet common in collections. The three-clawed terrapins, from the rivers of Africa, Asia, and North America (Case 23), feed on flesh, and only eat when in the water. They are often seen preying on the bodies which float down the Ganges. In the lower shelves are the marine turtles, which live on seaweed and shellfish. The green turtle of the tropics is most prized for soup by epicures. They sometimes grow very large, but the smaller ones, of five hundred or eight hundred pounds' weight, are the most delicate."

"Which of these creatures yield our tortoise-shell, aunt?" asked Lucy.

"The turtle of Arabia, a small species. The luth or leathery tortoise, from the Mediterranean, is said to have suggested the lute to the ancients. It is the largest of all the tribe, being sometimes several feet long, and weighing fifteen or sixteen hundred pounds. It is tenacious of life, and utters piercing cries when wounded.

"In Cases 24, 26, on the lower shelves, are specimens of the formidable alligators or caymans of America; the crocodiles of the Nile, and the gavials of India, distinguished from each other, chiefly, by the peculiarity of their heads; alligators having a comparatively short snout, while gavials have remarkably long, narrow, beak-like snouts; but all have most formidable teeth, and

are capable of swallowing large victims. Crocodiles have been known from the earliest times, and in some parts of Egypt were treated with divine honours. You remember there were several embalmed among the Egyptian mummies. In Dongola, Barbary, and Brazil, their flesh is reckoned a delicacy by the inhabitants."

"Well, I should be very hungry, I think, before I ventured to taste them," said Frank. "But what are those odd-looking creatures on the upper shelves of the crocodile case?"

"You mean the *amphisbæna*, found in Brazil and Cayenne, and believed by the natives to have a head at each end. They can move either way, and usually burrow in the winding passages of termites ants, on which they feed.

"The reptiles of the *batrachian*, or frog genus, are displayed in the lower part of Case 26. The least repulsive of these are the little green tree or edible frogs of France, which are sometimes kept in a glass cage as a weather token. Their feet are remarkably adapted for attaching themselves, by suction, to the polished leaves they creep over. The noisy bull-frogs of America and horned toads of Brazil are not very attractive, but the whole race possess extremely brilliant eyes, and are most useful in gardens for destroying slugs and caterpillars. I have heard that nurserymen will sometimes give five shillings each for full-grown toads.

"The siren of Carolina looks like an eel with legs, and the proteus found in subterranean lakes blushes a deeper red when exposed to

the light, like the wax model you see at its side.

“All these creeping things fulfil the word or bidding of the Creator in their appointed way, clearing away refuse vegetation, or noxious vermin; furnishing food for man or beast, and by the marvellous adaptation of their structure to their wants, continually testifying to the skill and benevolence of the Being who made them; while the very fact of his perpetual care over such myriads of tiny insects, and the checks he has interposed against the ravages of the larger reptiles, impress an observing mind with a renewed sense of God’s presence and God’s care over all his works.”

CHAPTER V.

BEAKS AND CLAWS;

OR,

VARIETIES OF BIRDS.

THE animals of the British Museum are so numerous, and so various in size, that it is almost impossible to allot space enough for their exact arrangement in scientific order. Indeed, naturalists class them so differently that it would not be easy to meet the views of every one. Most of the British species have been collected into the British Zoological Room, and therefore do not appear among the foreigners.

“What creatures do naturalists reckon next to reptiles, aunt?” inquired Frank, as our party entered the Zoological Gallery.

“*Aves*, or birds,” replied Aunt Edith; “among which we find such bountiful provision for their welfare, and such special contrivance for their peculiar necessities, that the intelligent observer is irresistibly impelled to ascribe all wisdom, as well as all goodness, to their great Creator.”

“They are very pretty creatures,” answered Frank, “but I do not know much about their peculiarities.”

“In some respects they are alike,” said Aunt Edith; “as in their bones, which are hollow for lightness. Then as they are intended to spend

most of their time on the wing, and comparatively little on the ground, the muscles of their legs are small, while those of the wings are so large as to be four times the weight of all the others together. The broad breast-bone, too, is furnished with a sort of prominent keel, to which these large muscles are firmly fastened; the wing feathers are curiously hooked together, and are arranged to form a hollow on the under side, so as to press more securely on the air. The blood of birds is much warmer than that of other beings, and circulates far more rapidly through the lungs, being also otherwise exposed to the air; so that they are thus enabled to endure the immense fatigue of their long and lofty flights."

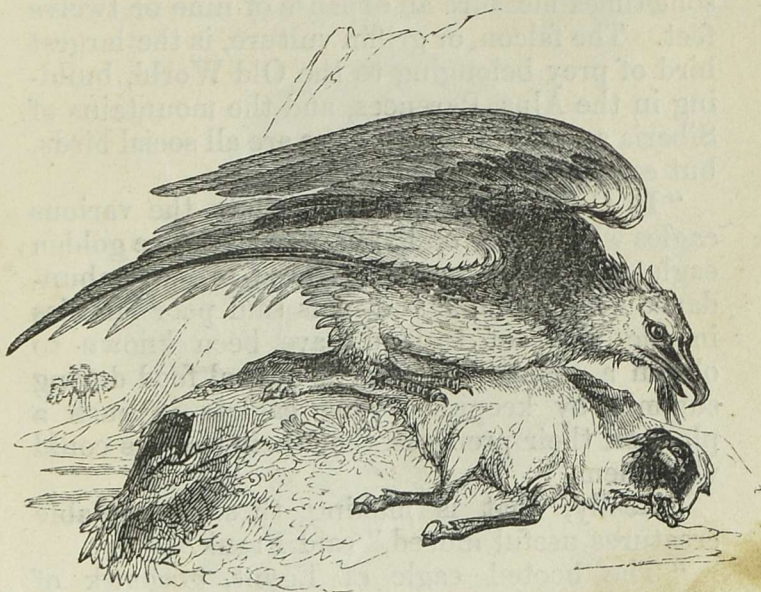
"How many kinds of birds are there?" asked Lucy.

"More than five thousand species are already known to naturalists, who group them variously. Here they are classed in five orders:—I. RAPTORES, or birds of prey; II. INSESSORES, or perching birds; III. RASORES, or scraping birds; IV. GRALLATORES, or wading birds; and, V. NATATORES, or swimming birds. There are in this Museum specimens of all the four hundred and ninety European species, and nearly all the others. It is not difficult to distinguish these orders by their different forms, but their names are all printed over the cases, and each bird's place is indicated on its own pedestal."

"I see," said Lucy, "with a little help we may learn a great deal from these cases; but please, aunt, to give us that little help."

“Well then,” rejoined Aunt Edith, “these *birds of prey* are distinguished by their strong, hooked bills, stout legs, and sharp powerful talons. Some are diurnal, or seek their prey by day; others at night, or are nocturnal in their habits. The diurnal birds of prey are contained in Cases 1—30.”

“What large, formidable looking vultures!”



THE BEARDED VULTURE.

“Observe, most of these birds have the neck free from feathers, as they live chiefly on carrion—indeed, may be regarded as the useful scavengers of the torrid zone. They are assembled here from all quarters of the globe. The

bearded vulture is often found in a wild state in England. It preys upon small animals, as young goats, lambs, and hares. The king vulture is so called, not only from his gay plumage, but from the seeming deference paid by the plainer tribes, who patiently wait at a distance till his majesty has satisfied his appetite. The condor is peculiar to the Andes, and its powerful wings sometimes measure an expanse of nine or twelve feet. The falcon, or griffin vulture, is the largest bird of prey belonging to the Old World, building in the Alps, Pyrenees, and the mountains of Siberia and Abyssinia. These are all social birds, but extremely fierce and ravenous.

“In Cases 8—17 you can study the various eagles which prey on living animals. The golden eagle of Europe procures these in such abundance for its young, that it is said poor families in the West of Ireland have been known to obtain a constant supply of animal food during summer by keeping young eaglets in such a place on their premises, that their parents could visit them.”

“Really, that is making these formidable creatures useful indeed,” said Frank.

“The booted eagle of Egypt, goshawk of South America, the Brazilian eagle, the laughing falcon from British Guiana, the osprey from various parts of the world, and the Pondicherry eagle, which is worshipped by the Indian Brahmins, are all ferocious birds; and, as Benjamin Franklin observed of the bald eagle, the American ensign, they are ‘creatures of such bad moral

character that one rather wonders that any states should adopt them as representatives.’ ”

“Perhaps, aunt, their propensities were not much known when they were so adopted.”

“Probably not. Case 18 is devoted to the South American caracaras, such as the red-throated falcon and Brazilian kite. Cases 19—24 exhibit the sluggish buzzards, which pounce on their prey on the ground. Some of the kites



PEREGRINE FALCON.

feed chiefly on insects, but all are the terror of the chicken yard. The falcons (Case 26) are

very courageous, and in former times used to be trained to hunt down herons, partridges, etc., as they are still used in the east for hunting gazelles. The peregrine falcon was most esteemed for this purpose, and was purchased at an enormous price. Only people of rank were permitted to use them, and injury to the nests even on one's own grounds was a crime punishable with imprisonment for a year and a day.

"Most birds are possessed of a nictitating membrane to shield the eye from dust or cold in their rapid flights; but the falcons and eagles have this membrane in extraordinary proportion, while a compact crown of feathers close over their eyes gives these tribes a very dignified aspect, and easily distinguishes them from the bare-necked vultures. A falcon has been known to fly thirteen hundred and fifty miles in twenty-four hours; but the sparrowhawks are so swift, that they seize their prey on the wing, and can fly ninety miles an hour for several hours together. The harriers generally fly low over the marshes, and strike their prey on the ground. The most curious of these is the secretary bird of South Africa, so called from the feathers projecting from the back of its head, as if pens were stuck behind the ear. It is sometimes termed the snake-eater, from its service in destroying the reptiles which abound near the Cape of Good Hope."

"He is rather a handsome fellow," remarked Frank, "and looks very knowing with his quills."

"You will deem him, then, a fit attendant upon

these wise-looking owls, almost buried in their counsellors' wigs, and with their spectacle shaped eyes.



THE SECRETARY BIRD.

“No wonder that Minerva, the heathen goddess of wisdom, had the owl allotted to her as her emblem; and it is curious that the North American Indians still distinguish their priests and students by the badge of a stuffed owl, borne either on the head or the wrist.”

“Some of these owls are very pretty,” said Lucy, “in spite of their solemn night-hooting and screeching.”

“Their soft, light feathers are admirably adapted to screen them from the damps of night, and to render their flight almost inaudible. Their large prominent eyes are peculiarly suited for sight in the dusk, when the rats, mice, and

small birds, on which they feed, are abroad. The ears of all the owl tribe, too, are extremely large, and curiously covered with a kind of door or lid of feathers, which can be opened or shut at pleasure; and, like all other birds of prey, they disgorge the hair or feathers which they swallow, in little pellets.

"All the birds in the Museum are nicely stuffed, so as to show their attitudes or habits; the snowy owls, with their nest of young, show the difference between the early and mature plumage. The large horned owl sometimes masters a rabbit. The smaller owls, or owlets, including our brown barn owl, are common almost everywhere, from England to Java, and are much esteemed by agriculturists for their destruction of vermin which attack grain."

"Then people should rather rejoice at their screeching than be frightened," remarked Lucy.

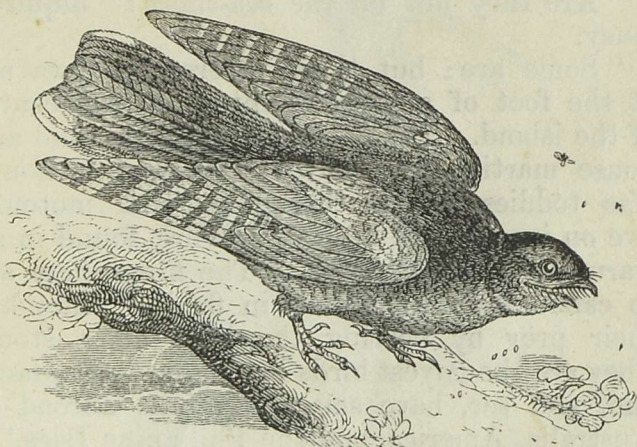
"Surely," replied Aunt Edith; "increasing knowledge banishes superstitious fears, and strengthens our confidence in God's protection, by showing us the wisdom and skill which dictated sometimes even the very peculiarity which alarmed our ignorance."

"Now, aunt, for the *INSESSORES*, or perching birds," said Frank, moving on to Case 36. "I often wonder they do not fall off their perches when they roost at night."

"Their toes are divided, and arranged for grasping rather than walking," answered his aunt. "Some have one, and others two, placed behind, and are furnished with long tendonous

cords, reaching from the lower part of the skeleton, and so contrived that the simple weight of the bird, in the crouching posture of sleep, causes these toes to hold more firmly on to the perch. The perching birds are so very numerous that they are subdivided into fissirostres, or wide-gaping perchers; tenuirostres, or slender-beaked perchers; dentirostres, or tooth-beaked perchers; conirostres, or cone-beaked perchers; and scansores, or climbers.

“ In Cases 36—42 there are specimens of the goatsuckers, who, from their custom of hovering



THE GOATSUCKER.

round goats in search of insect prey, have been falsely accused of stealing their milk, whereas, in truth, they devour large moths and cockchafers. They abound in Trinidad, New Holland, Carolina, and Africa, as well as in Europe; and all

have large eyes for seeing their prey during their swift movements.

“The swifts and swallows of England are familiar to you during their summer sojourn. The esculent swallow of China produces those edible nests which orientalists esteem in soup: there are two varieties, black and white. The nests are usually fixed in caves, in regular rows, from fifty to five hundred feet long. In Java, the gatherers always first offer a sacrifice to a goddess, whose priest lays his hands upon every one who engages in this dangerous occupation.

“Are they not on the sea-shore?” inquired Lucy.

“Some are: but these caverns in Java are at the foot of a high mountain in the centre of the island. The chimney swallows, sand and house martins, you have watched near home. The toddies, rollers, broadbills, and motmots live on insects and berries, and are found in all warm parts of the world. The kingfishers are so called from their skill in fishing; they kill their prey by beating the head on a stone. They are the gayest birds belonging to England, and, you see, have smart relations abroad in Australia, America, and the Philippine Isles.”

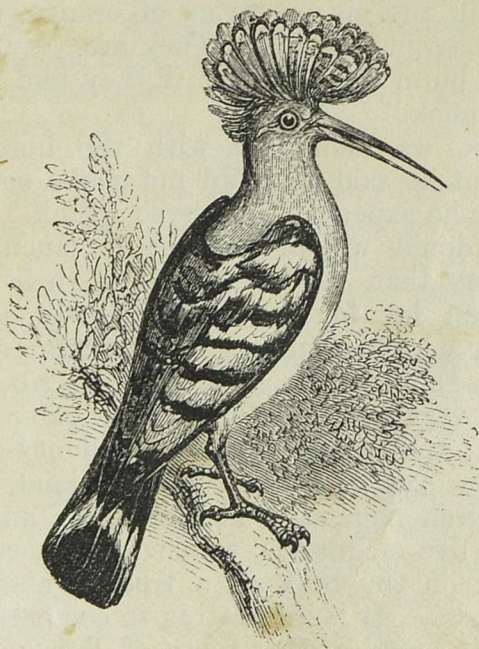
“Is not the kingfisher the same as the halcyon?” asked Frank.

“Its classical name was halcyon, and the phrase ‘halcyon days’ is derived from an ancient fable that it hatched its young in a floating nest, and that while this bird was sitting there was always a calm at sea. The common bee-eater of Europe belongs to this tribe, and is

sometimes caught by fastening a bee to a hook at the end of a fine thread."

"What brilliant birds are those in Cases 43—47?" said Lucy. "Some, I see, are humming-birds."

"Those with orange and black crests are hoopoes; with their long slender bills they fish out of the marshes tadpoles, worms, beetles,



THE HOOPOE.

and other insects. They are rare in England, but common in solitary places on the continent. The tongues of hoopoes, as well as those of most

slender-billed birds, are very long, and curiously divided into filaments like a brush, which enables them to gather up the nectar of flowers which they like. Both hoopoes and sun-birds sing agreeably. All those humming-birds are peculiar to America and the West Indies; they are exquisitely beautiful, and are either shot with sand or water, or secured by an insect net. Some of their nests are very curiously made, and suspended in the air on twigs of orange, citron, and pomegranate trees. They are very tame, and will build in the house if they find a convenient nook."

"Papa was delighted with the humming-birds, but he said they did not make so much sound as he expected," observed Frank.

"No doubt we all imagine it much more melodious than the whizzing of their wings really can be, for we unconsciously connect harmony with such pretty little creatures."

"Those brush-like tongues you describe, aunt, must be very useful to these honey-eaters."

"Yes; and travellers report of plenty of wild honey in Australia and New Zealand, where these birds abound. The creepers and nuthatches live on insects, which they procure by striking on the bark of a tree to alarm the inhabitants. It is interesting to compare those of South America with those of Europe. The nuthatch makes a very loud noise, and is so impatient of confinement that he will peck at his cage till his captor is weary of the incessant hammering. He eats away to recruit his strength,

unabashed by spectators, and is at work early in the morning and late at night, till relieved by freedom or death. The little wrens are our smallest European birds, but they cannot compare in plumage with their cousins the humming-birds.

The *dentirostres*, or tooth-billed birds, generally feed on insects and worms, but do not refuse fruit and grain when their favourite food runs short. Among these the most welcome are the warblers, such as redbreasts, nightingales, and willow-wrens, which, though plain in appearance, add so much by their song to the pleasure of country life."

"What is this bird, aunt, peeping out of his nest so curiously formed of dried leaves?"

"It is the tailor-bird, who in India and Australia constructs varieties of this peculiar pendant nest by sewing leaves together with his beak: some are dome-shaped. In this Case 48 are specimens of the black-cap and wheat-ear: perhaps you have seen them with the titmice, which are pretty lively little birds, but apt to injure fruit-buds in their efforts to obtain insects. These build curious long nests with a feather door to keep out intruders, and are hence called 'pudding-pokes' by rustics. Wagtails are easily recognised by the habit which gives them their name. They are patterns of neatness in their homes, removing every scrap of paper, straw, or other unsightly object. The superb *mænura*, or lyre-bird of Australia, is remarkable for the shape of his spreading tail feathers.

The thrush tribe are valued chiefly for their song now, but the ancient Romans reared them



THR LYRE BIRD.

for food; they were considered great dainties, and thousands were carefully fattened for table in immense aviaries. The ant-thrushes are most abundant in the tropics, where they are variously named according to their peculiar habits—the king thrush, rock thrush, alarum thrush, missel thrush, song thrush, red-winged thrush, fieldfare, and mocking-bird of America.”

“Why does it have that name, aunt?”

“For its singular powers of imitating, not only the songs of almost every other bird, but the barking of a dog, the mewling of a cat, the scream of a wounded chicken, the crowing of cocks, etc.; so that a single mocking-bird will

sometimes put a whole farm in commotion by the notes of alarm, or joy, which he will counterfeit; especially during a quiet moonlight night, when he not only sings, but seems even to dance with enthusiasm at his own exploits."

"Then I do not wonder they are so often kept in cages; they must be amusing pets, notwithstanding their plain dress."

"In a wild state the mocking-bird hangs its nest near that of wasps, and is thus secure from the attacks of monkeys and cats, who never touch him while under such protection. Cases 56 and 57 contain varieties of *fly-catchers*—some are warblers as well; their names are on the pedestals.

"In 58 and 59 are the *chatterers*, which generally live in pairs, and during the breeding season exhibit remarkable beauty of plumage. They are mostly named after some peculiarity—such as the thick heads, the tiny manakins, purple-breasted, or purple-throated, chatterers. The caterpillar eaters of South America, India, and Africa, collect their food from the highest trees. Some of these, especially that fork-tailed shrike, sing as sweetly as our nightingale. In Case 60 are the *shrikes* or butcher birds."

"Do their habits deserve that name, aunt?" said Lucy.

"They really do; for when they have caught their prey, a young frog or grasshopper, they deliberately push it on to a thorn, or, if caged, on to some sharp stick, and then tear it to pieces at leisure. They are common in many

parts of the world, and have been seen with a considerable store of victims hung round awaiting their appetite. The *conirostres*, or cone-beaked birds, feed chiefly on grain or fruit. To these belong the numerous families of crows."

"I see some *jays* in Case 62," remarked Frank.

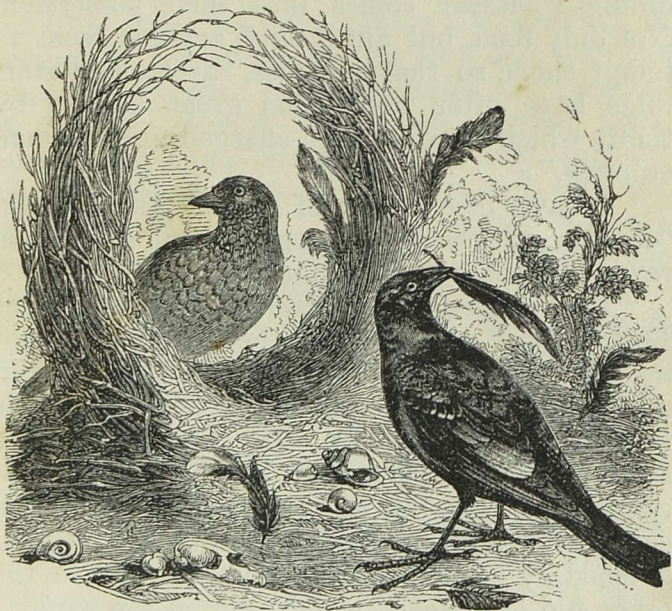
"The blue jay of America," rejoined Aunt Edith, "is a bitter enemy to owls; and no sooner discerns one than he summons the whole feathered fraternity, who attack him on all sides till he retreats beyond the reach of his persecutors. Another species of jay takes especial pleasure in tormenting the sparrowhawk, by imitating his cry whenever he sees him, and then squealing out as if caught—a sound which never fails to bring a crowd of jays to the rescue, who join in the frolic till the enraged hawk sweeps down among them, and puts an end to the fun by snapping up some unwary straggler. Jackdaws and ravens are also kindred to this tribe."

"Here are *birds of paradise*, too," exclaimed Lucy; "they are not crows, surely."

"They are in habit, though not in aspect. These beautiful creatures are natives of New Guinea, and the islands of the Indian Ocean. They never live long in this country; indeed, formerly their skins only were imported without legs, giving rise to the ridiculous notion that they had none, and hovered incessantly over some earthly Eden. The Indian merchants finding now that they fetch a better

price whole, no longer deprive them of their legs.

“The satin *bower birds* are singular for the arbour of twigs, decorated with shells, bones, and feathers, which they construct to play in.



SATIN BOWER BIRDS.

There are several specimens of these bowers in the ante-room. The *grakles* and *starlings* (Cases 65 and 66) feed on the larvæ which infest the skin of cattle. The beef-eater of Africa thus relieves the rhinoceros of a troublesome insect, and affords another proof of the mutual dependence of the great and the little, the strong and

the weak, which is observable throughout creation; for thus 'God sets one thing over another.' These birds fly in flocks, and have handsome plumage. The whole tribe have a remarkable propensity for hoarding up and hiding whatever comes into their possession. Not only food, but any bright articles seem to tempt them, so that magpies, ravens, and starlings have often occasioned great trouble by thefts which were at first charged upon human culprits."

"I have often read of them," said Frank, "and heard grandpapa complain of a thievish raven at his school when he was a boy."

"The *orioles* and *weavers*," resumed Aunt Edith, "are peculiar for their long, pendant nests of woven grass. Some lay their eggs in other birds' nests, instead of taking the trouble to build for themselves. In Cases 69, 70 are the small *finches*—sparrows, linnets, goldfinches; canaries, so named from the islands whence they come; the bunting and snow bunting, distinguished by their colour chiefly. In 71 are the *larks* and *bullfinches*, which sing on the wing.

"The *crossbills* have their beaks crossed so as to crush the hard seeds on which they feed. They are but seldom seen in England, and when they do come, make sad havoc in orchards by splitting the apples to pieces in order to obtain the pips. They feed chiefly on fir cones, and the crossed bill enables them to separate the hard scale which protects the seed, which latter, by means of its curiously jointed tongue, it

jerks into its mouth. Its eyes, too, are placed so that it can watch the whole process. Anatomists, therefore, justly regard this bird as an evidence of exquisite contrivance to meet its wants. It breaks up nuts and walnuts in a moment, and in captivity it tears its cage to pieces.

"The *colies* are remarkable for sleeping in companies suspended by one foot, and with the head downwards. The *hornbills* are peculiar to the Old World, feeding on reptiles, fruit, mice, and small birds, which they swallow whole, tossing them in the air and catching them in the throat. The rhinoceros hornbill is so named from the strange horny excrescence on the upper bill. This is cellular in its structure, and therefore is not heavy, but varies in size with the age of the bird: its exact use is not yet known."

"What splendid *parrots*," exclaimed Lucy, stopping before the gorgeous display in Cases 74 and 76.

"Notice the peculiarity of the SCANSORES, or *climbers*; they have two toes before and two behind; their legs are placed rather far back, and most of them have a hooked beak, by which they are assisted in climbing. Macaws, parrots, cockatoos, parroquets, lories, and loriot, are all varieties of the same tribe, and all live on fruit and build in hollow trees. They are inhabitants of most warm countries except those of Europe, where, however, they flourish as pets. The cockatoos are distinguished by their crests—lories and loriot by their long tails. They are

pretty birds, and distinguished by so accurate an imitation of the human voice, that a penitent sailor, who in the days of youthful wickedness had been an awful swearer, was long painfully reminded of his early guilt by the oaths his parrot had learned of him; for his poor bird had not sense to acquire his better lessons so quickly as was desired."

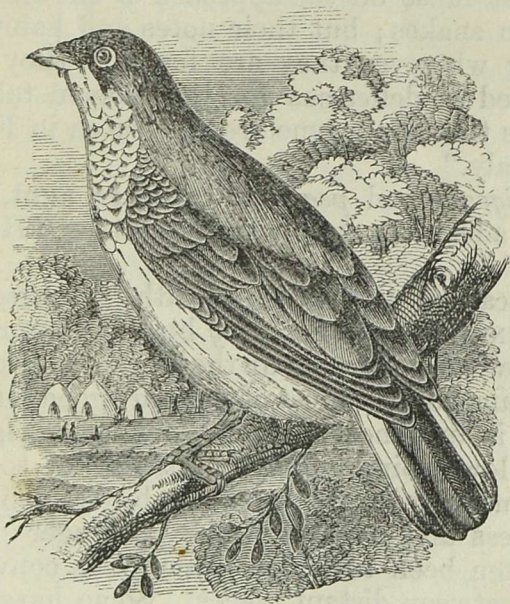
"How shocking to teach a bird to swear!"

"But how still more so is it to hear parents teaching their children to use profane language, or even to let them hear it; for the child has an immortal soul capable of being still more corrupted than it is by nature. You cannot be too thankful for having been kept from the conversation of the wicked; though you, like all others, 'have done evil as thou wouldest,' and therefore need to be pardoned and cleansed by the blood of Jesus through faith in him, ere you can be admitted amongst the just made perfect in heaven.

"Case 77 contains the *toucans*, with their extraordinary beaks. They are peculiar to the New World, and resemble our hornbills in habit and food, but are easily tamed. They do not live long when brought to England."

"The *woodpeckers* (78, 80) are almost universal, and may be heard tapping our forest trees with their hard bills, and then seen inserting their long glutinous tongues into every crevice, in search of ants or other insects on which they feed. Some of the South American species eat also the eggs of small birds. The *wrynecks*

derive their name from the facility with which they can twist and elongate their necks about in every direction. Amongst the *cuckoos* you will be interested to notice the honey-bird, which guides to the nests of wild bees by fluttering before the hunters."



HONEY-BIRD.

"I wonder they do that if they like the honey themselves," said Frank.

"It is supposed that they guide men because they are unable to obtain this luxury without assistance. The cuckoo is a migratory bird, and only visits us in the summer, when she lays her

eggs one at a time in some other bird's nest, leaving the young to the tender mercies of its foster parent, whom the young cuckoo repays by turning all the young brood out of the nest, and devouring all its nurse can bring it. There are several varieties: the rain cuckoos make the greatest noise on the approach of showers, and feed on snakes; but their notes and habits are similar wherever they are found. They were regarded as delicacies for the Roman table in Pliny's time, and some are still eaten in France and Italy."

"*Pigeons* and *peacocks* together, aunt," said Lucy, advancing towards Case 84. "How is that?"

"Because," replied Aunt Edith, "they are both GALLINACEOUS, or *scraping* birds, like our common fowls, who scratch up the ground in search of fruits and seeds. Most of these are good for food. There is an almost endless diversity of pigeons. Their low cooing and their attachment to their nests make them favourite pet birds; while the swiftness and docility of the passenger pigeon has often been turned to account in conveying news between distant places. Some have been known to fly thirty-four miles an hour for five or six hours consecutively. Flights of these birds are watched for in America, especially on the banks of the river Ohio, where the inhabitants sometimes feed for a week on them, and it is common to drive pigs from long distances to their roosting places to fatten on the spoil. Eyewitnesses describe the scene as almost terri-

fying from the immense quantity of pigeons which alight, one above another, till solid masses, almost as large as hogsheads, break down the branches on which they perch. After the inhabitants have spent the whole night in shooting and catching the birds, the survivors fly onwards at sunrise in a different direction to that in which they had arrived the evening before."

"It can hardly be pleasant to live near one of those roosting places," said Lucy.

"The visitation is only once a year, you know. The *curassows* (Case 90) are peculiar to South America. *Peacocks* have been admired from the time of Job, and prized from the days of king Solomon. Like most of our domestic fowls, they are natives of Asia, where they still roam wild among the woods of India. The *argus pheasant*, though not so brilliant, is almost as beautiful. Pheasants derive their name from the river Phasis, whence, it is said, the Greeks of the Argonautic expedition brought them. The finest specimens are still found in the neighbourhood of Colchis, but very brilliant ones are brought from China, Sumatra, and Java. *Turkeys*, *partridges*, and *quails* are common in the plains of both hemispheres. *Grouse* and *ptarmigan* are peculiar to the northern regions."

"Here are varieties of *ostrich*," remarked Frank.

"They commence the series of GRALLATORES, or *stilted* birds, having generally very long legs. Some naturalists make a separate class called *runners* for these birds, as they depend entirely

on the power of their legs for escape from their enemies, their wings being too short to lift their large bodies from the ground, though when spread open like sails they add materially to their speed. The ostrich of Africa, emu of America, and cassowary of New Holland, differ in the nature of their plumage, though in other respects they are much alike. They all feed on grain, fruit, and herbs."

"What is that head and foot, aunt," asked Lucy, "and only a picture instead of a real bird, in Case 108?"

"They are remains of a bird called the *dodo*, said to have inhabited Madagascar, but supposed to be now extinct. The painting was done in Holland, and reputed to be from the living bird; but these remains, and the painting, exhibit so little correspondence of parts, that it is doubtful whether there really was such a creature."

"Did we not see some gigantic fossil eggs from Madagascar in one of the other rooms?" said Frank.

"Yes; and Professor Owen has been at work on some fossil bones from the same island, which may throw light on the subject. The *apteryx*, or wingless bird of New Zealand, is in this Case, but it is not entirely destitute of these appendages, only they are so short as to be easily concealed under the feathers.

"Cases 110, 111 display the *bustards* of the eastern hemisphere, which are our only representatives of the ostrich race; they were once frequent in England. *Coursers* of Africa, and

plovers of Europe, resemble each other in speed and manners. The *turnstones* are so called from their practice in seeking small crabs and shell-fish, much as our sandpipers do. *Oyster-catchers* can insert their bills between the shells of bivalves for the fish. The *trumpeters* are peculiar to



THE APTERYX, OR WINGLESS BIRD.

South America, and are named from their cry; and being easily tamed, they are very useful to the owners, as, however far they may wander in the day, they invariably return to the poultry yard at night, and compel all their companions to do the same.

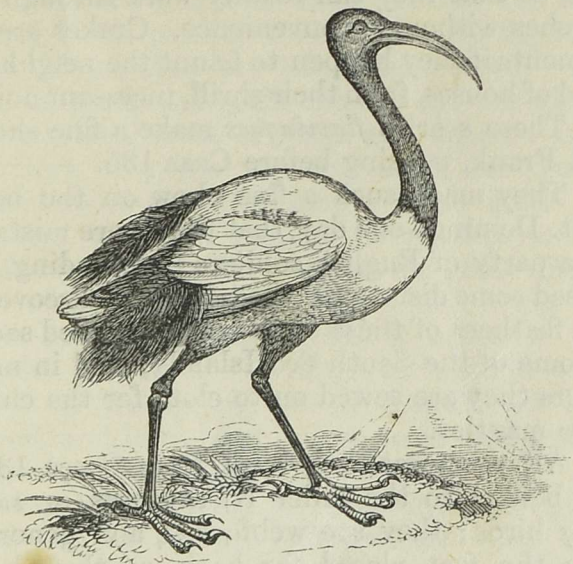
“Cranes, herons, egrets, bitterns, are all large birds, haunting solitary pools or the sea-shore, where they feed on fish. The gigantic crane of India is named the *adjutant*, from its resemblance, at a distance, to a man with a white waistcoat and dark trousers. It is venerated by the Indians, who believe it to be inhabited by the soul of a Brahmin. The *bittern* is mentioned in Scripture as the evidence of desolation, it so delights in deserted places, making the silence more dismal by an occasional prolonged solemn note which can be heard a mile off; hence the prophecy that Babylon should be ‘a possession for the bittern,’ and it should ‘lodge in the upper lintels of Nineveh,’ points to the utter decay and desertion of those once gay and populous cities, Isa. xiv. 23; Zeph. ii. 14.”

“I understand, aunt,” said Frank; “but the expressiveness of the allusion never struck me so forcibly as now that I see the bird.”

“The poetic figures of the Scriptures are so often drawn from natural history that it is almost necessary to study its various branches, if you wish fully to gather all its teachings.

“The *boatbills* and *spoonbills* are so named from the shape of their large beaks. The *storks* have long enjoyed the special favour of mankind from their social qualities; and the young storks are so attentive to their parents that their name was adopted for a law among the ancient Greeks obliging children to support their aged parents. Among Arabs and Turks, the presence of the stork is supposed to insure safety and prosperity.

The Dutch encourage its building on their houses to clear them of rats, mice, and frogs. The *ibis* is frequently found embalmed amongst other animals worshipped by the ancient Egyptians.



THE SACRED IBIS.

They are common in various warm countries, in America, India, and New Holland, and lands liable to inundation, where they seek their favourite food of worms and snails among the slimy weeds.

“Cases 127—130 contain the *godwits*, *snipes*, *sandpipers*, and *avosets*; birds with remarkably long legs, and feet partially webbed, to enable them to wade in deep mud at the mouths of rivers. *Ruffs* are distinguished by ornamental feathers round the neck. The *jacanas* (Case 131)

walk upon the floating leaves of water plants, and, like the trumpeter bird, they are valuable and faithful guards of a poultry yard.

"The *rail* tribe are very noisy birds, with large toes, so that they can readily walk through wet marshes without inconvenience. Crakes are sad torments if they happen to haunt the neighbourhood of houses, from their shrill, incessant noise."

"These scarlet *flamingoes* make a fine show," said Frank, pausing before Case 135.

"They made such a fine show on the beach of St. Domingo one day, that they were mistaken for a party of English soldiers just landing, and caused some dismay till the truth was discovered. The feathers of these birds are considered sacred in some of the South Sea Islands; and in many others they are sewed on to cloth for the chiefs' state mantles.

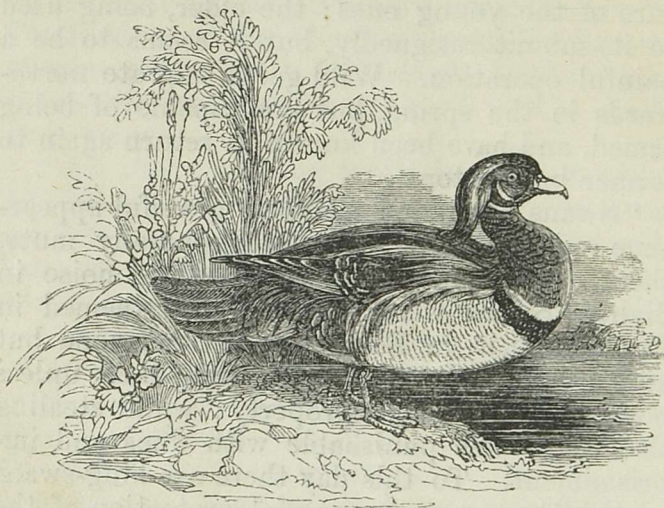
"All the remaining birds from Cases 136—166 belong to the order NATATORES, or *swimming* birds; they are webfooted, and generally have the feet placed far back, so that, being adapted chiefly for swimming, they cannot walk gracefully on shore. In most birds the length of the neck corresponds with that of the legs, permitting them easily to pick up their food from the ground; but among swimming birds this rule is varied, as in the swan. The plumage of some is so close and fine as to resemble hair more than feathers, and is perfectly waterproof. The colour of the plumage varies with age so greatly in some tribes, that the young and old birds have been classed as different species."

“Those changes used to puzzle me among the swans in the park till I learned the reason,” said Lucy. “What a variety of *ducks* and *geese* there are in Cases 136—149.”

“They are found in most parts of the world during some part of their periodical flights, at least where they are not domesticated. They feed on grass and grain chiefly, but are glad of an occasional treat of slugs and snails. Large numbers of geese are reared in the fens of Lincolnshire for the sake of the quills and feathers, of which they are often deprived two or three times in the year, to the great displeasure of the young ones; the elder, being used to it, submit resignedly, but it seems to be a painful operation. Wild geese migrate northwards in the spring, but are capable of being tamed, and have been known to return again to former benefactors.

“Swans are noted for their graceful appearance on the water, but are generally mute, though wild ones make a whistling noise in flight. Swans were formerly so esteemed in England, that, in Edward IV.’s time, none but king’s sons were permitted to keep them unless possessed of freehold property; while stealing their eggs was punishable with fines and imprisonment. To this day there are king-swans on the Thames, under special protection of the Lord Mayor of London, who has to go up the river at certain times to mark the young swans. Black and variegated swans are peculiar to Australia.

"*Widgeons, teal*, and other ducks are used for food. The *eider duck* (Case 149) is celebrated for its soft and plentiful down, so elastic that three quarters of an ounce will fill a large hat. They build their nests so exclusively on the sea-shore or on rocky islands, that the Icelanders have taken the pains to form islands, leaving only very narrow footpaths to the mainland. They are very timid, and build so midway on the cliffs, that it is equally perilous to reach them from above or below, and many a tale of horror is related of the eider duck



THE AMERICAN SUMMER DUCK.

hunter's adventures. The summer duck of America is one of the most beautiful of its race.

"The *merganser* tribe (Case 150) inhabit the

arctic regions, and have narrower bills than the ducks, armed at the edges with small saw-like teeth pointing backwards. They are destructive creatures, living on fish. The large goosander sometimes fixes its nest in a tree."

"There are some curious looking birds in Cases 152—160," remarked Lucy.

"Yes; the *grebes* (152) have their feet only partially webbed; they inhabit most parts of the world. The *puffins*, *razor-bill*, and *sea parrot* all belong to the auk tribe, as do the various *penguins* with their short paddle-shaped wings. These droll-looking birds inhabit both arctic and antarctic regions. The Patagonian penguin is valuable not only for its close downy plumage, but for the oil it yields from its skin. These birds are fond of lonely islands. Their relatives, the *guillemots*, are so indifferent that they will quietly suffer themselves to be taken by hand, so that sailors sometimes call these birds boobies, as well as the gannets. However, the chief reason for their seeming stupidity is, that they cannot easily escape when on land or on the deck of a vessel; but they usually place sentinels over their young when leaving them for food, as they are sadly tyrannized over by the frigate pelican, or man-of-war bird, who pounces down upon the poor booby, and forces him to disgorge the provisions he is taking to his family.

"Case 155 contains the *petrels*, so called from their appearing to walk, like Peter, on the sea. Some are pretty little birds, seldom seek-

ing the shore except for hatching their eggs, but appearing to delight in storms, so that sailors justly forebode windy weather when 'Mother Carey's chickens,' as they term them, are specially frolicsome. They are endowed with a peculiar mode of self-defence in a tube which communicates between the bill and the stomach, through which they can suddenly squirt a quantity of oil into the eyes of enemies, and thus render them for a time quite blind. The giant petrel, or *albatross*, is the largest of all water birds, and feeds so greedily on fish as sometimes to be found incapable of flying.

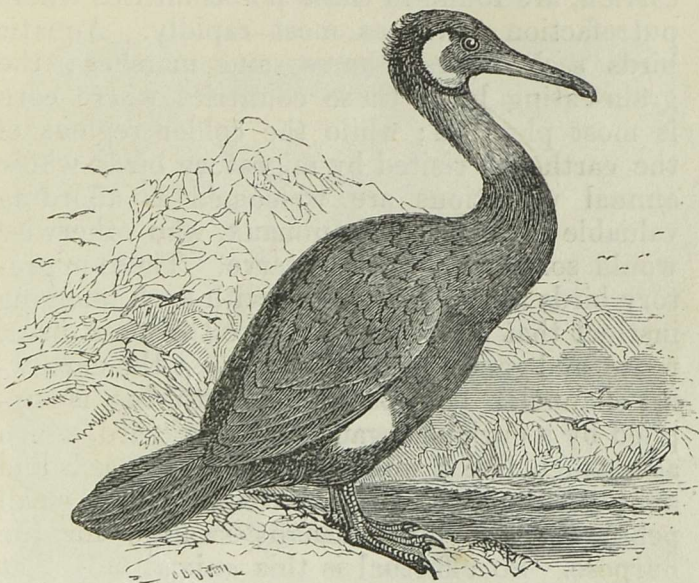
"The various *seagulls*, white, black, and grey, are numerous everywhere, as are the graceful little *terns*, or sea swallows. Among these are the *noddies*, who will sit quietly to be knocked down, but sometimes bite and scratch fiercely when seized. The gayer looking *tropic birds*, as their name implies, are peculiar to the warm countries where their favourite flying fish is to be found."

"Here are some of the *pelicans*, with their pouched necks filled with fish," said Frank, stopping at Case 162.

"They inhabit marshes, and seldom go far from land, generally returning at night. They are natives of Africa. Their pouches will sometimes contain fifteen quarts of water, and hold fish enough to dine sixty men. The bill is tipped with scarlet, and when pressed against the breast to disgorge the fish for home consumption, the contrast of colour gave rise to

the ancient notion that pelicans fed their young with their blood.

“The *cormorant* is so clever at fishing as to be regularly employed in that vocation by the Chinese, who put a collar round the neck to prevent their swallowing the prey. They were once trained for the same purpose in England;



THE CORMORANT.

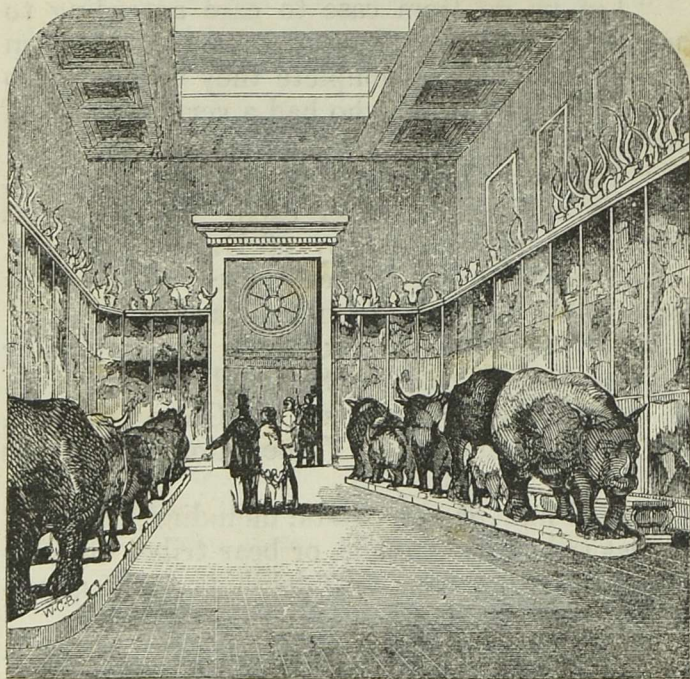
and so lately as the reign of Charles I. there was an officer named Master of the Cormorants. The larger *frigate bird's* wings will expand ten or twelve feet. It is often found a thousand miles from land, feeding on the wing without

any sign of fatigue ; it seems almost to live in the air, and is supported partly by an inflated air-sac under the throat.

“ Birds in general are very widely dispersed over the earth according to the food they need, or the habits which render them useful to their fellow-creatures. Thus vultures, which feed on carrion, are found in those hot countries where putrefaction advances most rapidly. Aquatic birds seek rivers, shores, and marshes ; the grain-eating birds those countries where corn is most plentiful ; while the colder regions of the earth are visited by migratory birds whose annual visitations are welcomed as affording valuable food to the Esquimaux, who otherwise would sometimes almost starve. These migratory birds are gifted by God with such unerring instinct that they always choose the most direct route, and generally cross the sea at the narrowest channel. The absence of teeth, too, is supplied by a curious organ called a gizzard, which acts much like a mill to grind down seeds and hard substances, assisted by coarse sand or small pebbles, which birds usually swallow for the purpose. So effectual is this animal mill, that pieces of glass, and needles, and lancets have been found ground to powder without any apparent injury to the gizzard. Thus may ‘ the flying fowl praise the Lord,’ for ‘ his tender mercies are over all his works,’ Psa. cxlv. 9 ; cxlviii. 10.”

CHAPTER VI.

TEETH AND PAWS;
OR,
THE FIRST MAN'S SUBJECTS.



MAMMALIA ROOM.

ON ascending the great staircase of the British Museum, the long procession of stuffed animals which first greeted the young visitors' eyes

reminded Frank of the Noah's ark of his childish days; but Lucy said it made her think of that verse in the Bible which said that "God brought all these creatures to Adam to see what he would call them;" and as they stood closer together than the living specimens in the Zoological Gardens, they gave her a clearer idea of the first man's subjects.

"Let us go from case to case according to scientific order, please, aunt; for perhaps when the arrangement is complete they will all be so placed," said Frank, who had a very methodical taste.

"They are divided here, then, into five orders, with five divisions under each," replied Aunt Edith, taking out a copy of Dr. Gray's plan, based partly upon Cuvier's discoveries, partly on the observations of Linnæus and Ray.

"I. PRIMATES; including, 1. Hominidæ, or man-shaped animals. 2. Sariguidæ, or monkeys. 3. Lemuridæ, or lemurs. 4. Galeopithecidæ, or flying lemurs. 5. Vespertilionidæ, or bat tribe.

"II. FERÆ, or wild beasts; including, 1. Felidæ, or cat tribe. 2. Ursidæ, or bear tribe. 3. Talpidæ, or mole tribe. 4. Didelphidæ, or kangaroo tribe. 5. Phocidæ, or seal tribe.

"III. CETÆ, or whale-like animals. 1. Balachidæ, or whales. 2. Delphinidæ, or dolphins. 3. Trichecidæ, or walrusses. 4. Manatidæ, or manatees. 5. Halicoridæ, or dugongs.

"IV. GLIRES, or dormouse-like animals. 1. Muridæ, or mouse tribe. 2. Hystricidæ, or

porcupines. 3. Leporidæ, or hare tribe. 4. Jerboidæ, or jerboa tribe. 5. Aspalacidæ, or vole tribe.

“V. UNGULATA, or hoofed animals. 1. Bovidæ, or ox tribe. 2. Equidæ, or horse tribe. 3. Elephantidæ, or elephant tribe. 4. Dasytidæ, or armadillo tribe. 5. Bradypidæ, or sloth tribe.

“All these are included in the class MAMMALIA, as feeding their young with milk, and belong to the great department of VERTEBRATA, or backboned animals. Amongst them man occupies the highest position; but there are always living specimens around, so he needs not to be included in a museum of this kind. Of brute animals, the *chimpanzee* has the highest organization among the *quadrumana*, or four-handed animals (in Case 1 of the Mammalia Saloon). Its arms are short, and it can utter sounds something like the human laugh. It did not live long when brought from its native Africa to this country. The *ourang outang* of Borneo resembles it, but has, you see, much longer arms. The mandrill is a native of Guinea, and of a very fierce nature. The *siamang* of Java is remarkable for its indolence; the *proboscis monkey* (Cases 1—13) of Borneo for its very prominent nose. Some monkeys have very long prehensile or grasping tails, by which they cling to branches, and swing themselves from one tree to another. Some are lively by night, and hence are called nocturnal. The *howlers* (Case 16) make a most annoying

noise at night, and on the approach of strangers. Others have large owl-like eyes, adapted for dim twilight.

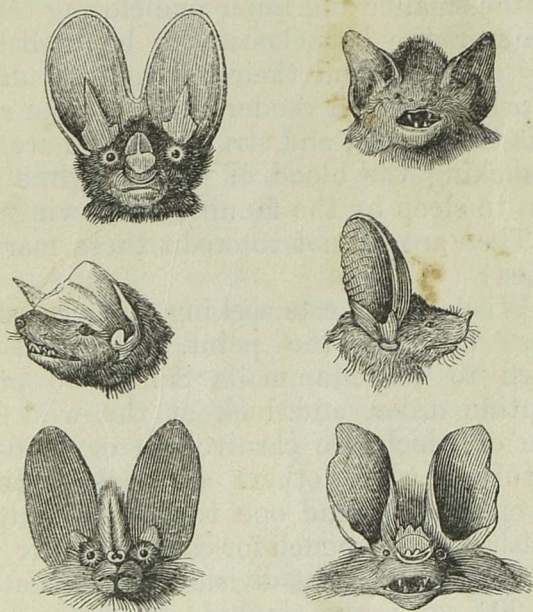


THE MANDRILL.

“*Baboons* are larger and more unpleasing than monkeys. The *preacher* (Case 18) is so named from the long harangue with which he appears to interest his brethren.

“The *lemurs*, from Madagascar (Cases 19, 20) and the eastern tropics, seem to connect the monkey tribe more with the brute creation, as their heads, faces, and ears resemble those of various animals, and their hands are more paw-like. The *flying lemurs* (Case 20) suspend themselves by their feet to trees so as to form

a kind of hammock, in which they swing their young. The fifth division of this order, *bats*, are in the wall cases 21—24 of the Central Saloon.”



BATS' HEADS.

“Let us go and look at them now, please, aunt,” said Frank. “What a number there are! I have rather a liking for bats, with their little hooked claws and leathery wings.”

“They are sometimes called *cheiroptera*, or hand-winged animals; for indeed their wings are more like a web between the fingers of a hand,

and fastened by its edge to the feet. They feed on insects, and hybernate or sleep during the winter season when insects are not plentiful. When awake, they are particularly quick at hearing, being furnished with a sort of double ear, the smaller and inner one closing the other whenever the bat chooses to be undisturbed. They can also find their way in total darkness when blinded and rendered deaf. The *vampire bat* is the largest, and strange stories are told of its sucking the blood of persons while lulling them to sleep by the fanning of its wings."

"Then are we not to credit these marvellous stories?"

"Wisdom suggests seeking further testimony before deciding the point. We must now return to the Mammalia Saloon to preserve scientific order, and look at the wild beasts, some of which are carnivorous or flesh-eating creatures; while others are insectivorous, or live on insects, and one tribe is marsupial, or furnished with a pouch for carrying their young.

"The *feline*, or cat division of animals (Cases 21—29), of course include lions from Africa and Asia, tigers from India, jaguars and ocelots from America, with leopards, lynxes, hyænas (30 and 31), and wild cats of every description. These are all distinguished by formidable teeth, expressly adapted for tearing flesh, and equally dangerous claws by which to catch and hold their prey, but which most of them can so sheathe at pleasure as to be perfectly concealed. Some yield a perfume called civet. Most of

these were known to the ancient Romans, and kept by them for those combats in which so many of the early Christians lost their lives to afford amusement by their dying agonies to their bloodthirsty persecutors. It is possible that St. Paul refers to one of these encounters in 2 Tim. iv. 17, where he says, 'The Lord delivered me out of the mouth of the lion.'

"Here, too, are *dogs* of all sorts, from the mastiff and magnificent Newfoundland, to the pretty little lapdog of Mexico. *Wolves* and *foxes* are of the *canine* race.

"*Martens* and *sables* are valued for their fur, as is also the *polecat*. The *stoat* is curious from its fur changing colour in northern regions, from its summer hue of reddish brown, to the winter dress of snow-white. Its long tail alone retains its black tip, which, under the name of ermine, is esteemed worthy to adorn the state robes of royalty."

"I suppose the ermine is always sought in winter, then," said Lucy.

"Fur of all sorts is taken then, as it grows much thicker and warmer, by God's care, for the comfort of the animal.

"The *gluttons* (Case 44) also yield a beautiful fur, and the Esquimaux women think no ornament exceeds the white paws of this animal. They are broad and flat, so that it can easily traverse snow. It has a most voracious appetite, as its name implies, and feeds on the wild reindeer till it can scarcely move. That curious little creature in the same case is the *ratel* of

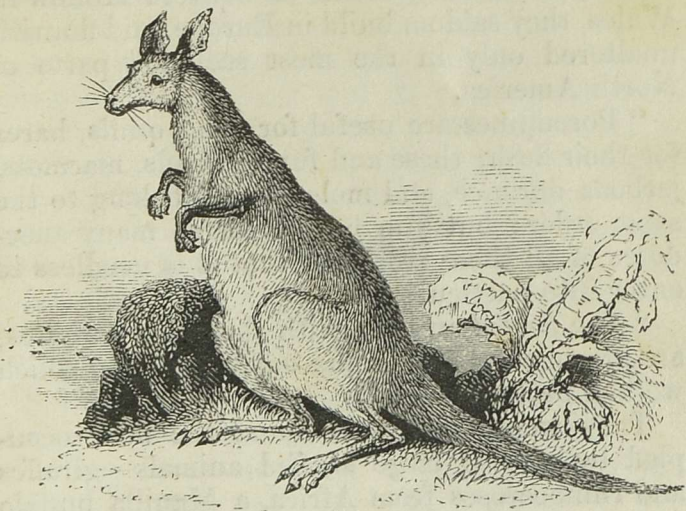
the Cape, which feeds on honey, and discovers the combs by watching the bees in their homeward flight at sunset. The *otters* (Case 45) feed entirely on fish, and are admirably formed both for swimming and diving. The eyes are furnished with a kind of curtain, which the animal can draw over them to secure them from injury in the water."

"Are bears also fond of honey?" inquired Frank; "for these bears remind me of the old fable of the bear and the bees."

"Yes, they are; so that very likely it is founded on fact. *Bears* are widely dispersed, and are said to be no less useful than sheep to mankind in some parts of the world, yielding food, light, fuel, clothing, and arms to the Kamschatkans. They are patient and quiet in captivity if confined to vegetable diet, but formidable enemies in a wild state. The European *badger* somewhat resembles the bear. It is sought for the long hairs of its fur, which make valuable paint brushes for artists who use oil colours.

"Those animals which feed on insects are placed in the lower shelves of Cases 51 and 52. Amongst them the varieties of *mole* are interesting from the curious winding galleries they prepare underground. Its tiny little eyes are so shielded from danger of the dust it makes in scooping out its habitation, that it was long deemed blind. *Hedgehogs* and *shrewmice* belong to this tribe. *Opossums*, *kangaroos*, and *wombats* are chiefly from Australia, New Zealand, and America; but their habits are not yet fully

known. In Case 64 are the smaller specimens of *seals*, chiefly young ones, with their white baby fur. On the top of the wall cases in this room are specimens of the *cete*, or whale tribes."



THE KANGAROO.

"But why are they not among the fishes?"

"Because they suckle their young. There is no whale here—its enormous size and large proportion of oily blubber render it difficult to preserve. Dolphins, seals, manatees, and porpoises are here, and there is a morse or walrus in the outer saloon. These animals and the seals have faces which no doubt have suggested the fables of mermen and mermaids, which from time to time have excited the vulgar wonder. Cases 65—81 contain the five varieties of *glires*, com-

prising mice, rats, and beavers, with their broad tails for plastering their curious dams. These animals were formerly much more widely spread than they are now; and though early writers describe their settlements at Beavers' Hollow in Wales, they seldom build in Europe, and flourish unaltered only in the most secluded parts of North America.

"Porcupines are useful for their quills, hares for their flesh; these and fur squirrels, marmots, jerboas, dormice, and mole rats all belong to the same order: but you have read so many anecdotes of all these creatures that it is needless to enter into particulars here.

"The *hoofed* animals, with their five varieties, are arranged partly in the outer lobby, to which we had better return."

They went there, and found the floor occupied by several large stuffed animals—giraffes and rhinoceroses from Africa, a Manilla buffalo and a morse or walrus from the North Sea. Over the wall cases are placed the horns of different species of oxen; and the cases are filled up by varieties of the *ungulata*, or hoofed animals.

"Many of these animals are mentioned in the Bible, aunt," remarked Lucy.

"Yes, all these were well known to the ancients, and are represented on the Egyptian and Assyrian tombs. The *giraffes* are gentle, graceful creatures, feeding on the leaves of trees which their long necks enable them to reach. The walrus is a singular animal, and though

apparently so meek, is very savage when provoked, upsetting boats with its enormous back, or splitting open the planks with its sharp ivory tusks.

“In the wall Cases 1—5 are various *antelopes*, distinguished from deer by not having the horns branched, though they are often curiously curved and twisted. They belong chiefly to warm climates, the chamois and ibex being the only native European specimens. The waterbuck is peculiar to Africa; the nyi-ghau and gnu might be useful but for their violent disposition when excited. One at the Surrey Zoological Gardens killed his keeper. The Cashmere goat, the argali from the Altai mountains, and the bearded sheep from Africa, with our own domestic sheep, will interest you.”

“Why are they classed together, aunt?—sheep and antelopes look so very different.”

“They all resemble one another in some important respects; all have hoofs, hair, and horns; all feed on herbs. All the antelopes are swift, and some remarkably graceful in their actions, carrying their long slender horns proudly, and bounding lightly from crag to crag of mountainous regions. Goats have been valuable domestic animals from the earliest times. In Scripture narrative we read continually of ‘cheese of goats’ milk,’ ‘tents and coverings of goats’ hair,’ and ‘trumpets of rams’ horns;’ while ‘a kid of the goats’ was then, as it is now, a favourite delicacy for food.

“Sheep vary much in different climates; the thick warm wool which clothes them in cold

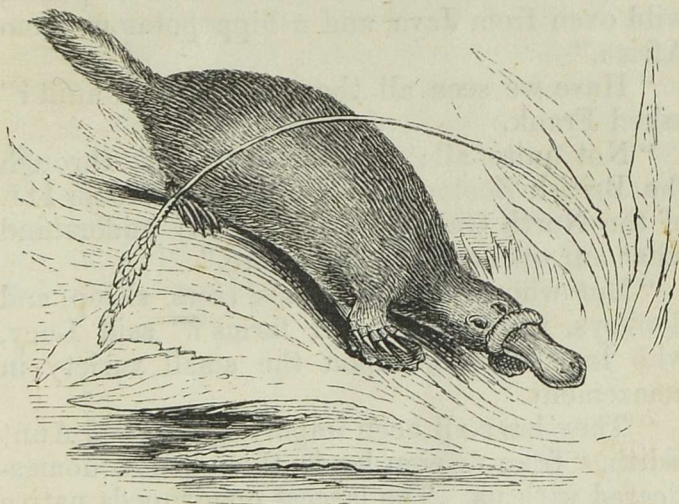
countries giving place to long silky hair in warmer regions. Those of North Africa have long beards, and others in the South are remarkable for broad tails. In Thibet the sheep is a beast of burden, and, laden with tea, crosses high mountains difficult of access to other animals. Among the Jews they were selected for some of the most solemn and significant sacrifices; indeed, its young, the 'lamb without blemish,' was honoured to be the type of Jesus, that 'Lamb of God, which taketh away the sin of the world.' Its harmless innocence well fitted it for this, and its patience in suffering is especially remarked by the prophet Isaiah when depicting the demeanour of the sinner's Friend; and oh, how precious to the anxious inquirer after pardon are these characteristics of that Jesus who is to be his Judge at the last day.

"In the South Zoological Gallery are continued the *hoofed quadrupeds*. Cases 1, 2 contain the varieties of camel, dromedary, and llama, both wild and tame. The llama may be termed the camel of America. Like its eastern relatives, it can live long without water, and will lie down immovable when tired or overloaded; yet trudge on to the utmost of its strength when kindly treated.

"Cases 3—16 have in the lower divisions the musk ox, bulls, and bisons. The upper shelves contain tapirs; the European boar, with its young; the peccary, which feeds on serpents and lizards, and emits a most disgusting odour; the daman or coney of Syria, whose rocks they

people as abundantly now as in the days of king Solomon; the armadillo and its kindred; the pangolin, which, when alarmed, rolls itself up like a ball. The ant-eater is celebrated for its mode of eating ants by its long slender tongue.

“The curious animal called *ornithorhynchus*, or duck-billed *platypus*, is peculiar to New South Wales, but none have yet been imported alive.



DUCK-BILLED PLATYPUS.

The sloth is so named from its slow movements on the ground, though, in traversing the trees whose foliage forms its food, ‘he travels,’ says Mr. Waterton, ‘at a good round pace, and any one seeing him thus would never think of calling him a sloth.’ They walk on the sides of the

feet, but generally use their paws only for climbing: they inhabit the warmer parts of America. Cases 17—30 contain the stag, red and fallow deer of Europe, the wapiti from America, the cheetut from India, and reindeer from Hudson's Bay, as well as the elk, zebra, and wild ass."

"That is prettier than our donkeys, I think."

"You can fancy that coming up to Job's description of it in its native desert. On the floor of this saloon are the Indian elephant, wild oxen from Java, and a hippopotamus from Africa."

"Have we seen all the animals now, aunt?" asked Frank.

"Not quite all; we must just walk through the British Zoological collections in Room III. of the North Gallery, that you may understand what our own animals really are."

"But where are the horses, cows, sheep, and donkeys, which stock our farms?" said Lucy, who looked round upon the small variety in amazement.

"They have all been imported," replied Aunt Edith, "from foreign lands, though now domesticated with us. The largest quadrupeds native to England are the stag, roebuck, and fallow deer. Even now, out of fifteen hundred varieties, only eighty quadrupeds are found in England.

"The *birds' nests* and *eggs* fill an interesting case in this apartment; they are generally so cleverly hid by the instinct with which God has endowed even the meanest of his creatures, that they are not easily seen in their natural homes;

and though worthy of being sought out for admiration, and for scientific purposes, it is not right to disturb the inmates, or destroy their work for mere idle and useless gratification."

"I do not wonder now, aunt, at the enthusiasm with which the Botanical, Zoological, and Entomological Societies carry on their inquiries. I shall read their reports in future, and try and learn more of nature's wonders."

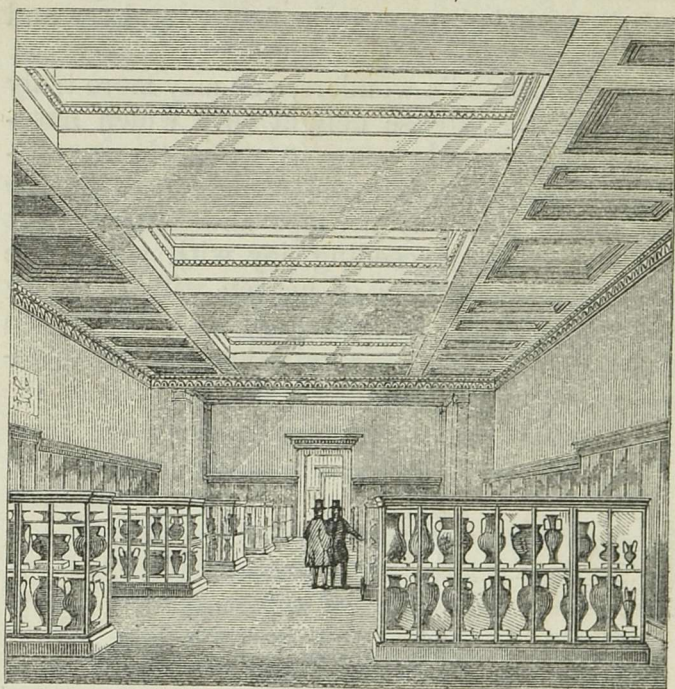
"More of God's wonders, you may more truly say; and the intense delight with which naturalists will spend years in patiently investigating the harmonies and contrivances of the material world, may perhaps afford some faint emblem of the exceeding joy with which the redeemed inhabitants of heaven will gradually comprehend the mysteries of God's love in giving Jesus Christ, his only Son, for the salvation of the world."

CHAPTER VII.

VASES AND PICTURES;

OR,

INTELLECTUAL PROGRESS IN PAGAN AND CHRISTIAN ART.



ETRUSCAN ROOM.

ON entering the Etruscan and Bronze Rooms at the British Museum, their contents looked so unattractive to uninitiated eyes that Frank and Lucy both exclaimed—"There is nothing here

but old painted jars ; we shall not be interested in them."

"Most people say so," responded Aunt Edith, "but a little examination will prove the mistake; for in these ancient vases may be traced the gradual fluctuation of the human mind, not only in art, but in science, philosophy, and religion."

"How do you make that out, aunt? Where do these things come from?" said Frank.

"From Etruria, in the north of Italy, which, judging from the antiquity and character of its remains, must have attained a high state of civilization so early as 1100 or 1200 B. C.; and therefore these rooms appropriately follow the still more ancient Egyptian antiquities. So ancient were the Etruscans that even their language is lost, and the most learned student has hitherto failed to interpret any of the numerous inscriptions which still exist, written in the ancient Greek character. The only accounts we possess of their history and opinions are contained in those early Latin writers who either adopted some of their words, or explained them for the information of those Romans who had then, about 250 B. C., established themselves in the old Etruscan cities of Tarquinia, Veii, Volsci, Cœre, and Clusium. In all of these cities, and some others in Tuscany, hundreds of ancient tombs have been discovered during the last three centuries, revealing not only numerous vases, but large paintings on the walls, in which the Etruscans are portrayed in lively colours, and in every phase of social and domestic occupation."

"Indeed! Are any of these paintings here?"

"Only copies; the originals themselves are found to fade soon after exposure to the air. There are two sets on the wall of the Bronze Room, and three more on those of the Vase Room, representing various dances, games, races, and banquets; also a scene of death and mourning, with a few pictures of deities and religious ceremonies; but these are so mutilated that only the figures of Pluto and Proserpine can be distinguished."

"How can they be recognised if the Etruscan language is lost?" inquired Frank.

"From the ancient Latin writers, who were evidently acquainted with it. The emperor Claudius is known to have written an elaborate work on these people and their history, which has unfortunately perished. Cases 1—5 in the first Vase Room contain the earliest specimens of Etruscan art, and are made of earthenware, ornamented by figures of animals painted brown on a lighter ground. Some are of heavy black composition resembling basalt. In Case 3 is a vessel (No. 1) made in the shape of the rustic cottage used by the early inhabitants of Italy. It contains burnt bones, and was found at Monte Albano near Rome. In Cases 6—11 are vases of finer make and more elegant shapes; some with inscriptions in the old Greek character, and representing Grecian games and heroes, with such legends as the exploits of Hercules, Jason, etc. They are in all shapes, from legs and heads to ewers and cups; and from Cases 12—20 the

experienced eye can trace a continual improvement in design and execution, till in 30—40 the art seems to have risen to its perfection, and the colours vary from black and red, to white and orange, while the horses, men, and women are artistically drawn."

"Then is the Barberini or Portland vase of which we have heard so much among these?"

"No; for after having stood here safely for thirty years, an idle youth, one afternoon in 1845, dashed it to pieces with a stone. It has been carefully mended, and therefore still exists, but it is no longer shown to the public."



PORTLAND VASE.

"I wonder what it is like," said Lucy.

"I have seen it, and can show you an engraving of it. It is made of dark blue glass, with the figures raised in white enamel. It was found in a marble sarcophagus, or coffin, about two miles from Rome in a sepulchre supposed to be that of Alexander Severus, A. D. 223—235, and his mother Mammea; hence it is deemed to have been the cinerary urn which contained the ashes of one of those personages; and the scenes

depicted on it are supposed to be some incidents of their lives."

"How mischievous to break such a relic!"

"A severe law was immediately made to deter any such deeds in future, for it is unpardonable wilfully to injure curiosities which can never be replaced, especially when belonging to those who permit a free inspection of them."

"In Cases 50—60 are vases found in Greece,



ANCIENT WINE-JUG.

or the Greek Isles, some of which are very beautiful, though art appears to decline again among these specimens. A small pyxis or unguent box is much admired for the lively little white, blue, and red cupids which dance on a

black ground; also a small œnoché or wine-jug with a figure of a little boy in white, crawling towards an apple placed on a low stool. Some of these are considered to have been made about the time of Pericles, B. C. 430.

"Cases 56—60 contain the most ancient Greek vases; eight especially from Corfu, which were most probably some of the celebrated amphoræ which contained the wines exported from the Adriatic: all were found in or near tombs."

"What were they buried for?"

"Some, the plainer sort, were undoubtedly cinerary urns, as bones or ashes of the dead were found in them; others appeared to have contained wine, oil, and other articles of food, as eggs were discovered entire after the lapse of three thousand years. Some, it is evident from their inscriptions, were prizes obtained at the national games, and were possibly interred as the favourite possession of the deceased; and some, doubtless, were the memorials of affection, as there is one actually bearing the sentence in Greek—'My dear Phile, farewell. This vase to be placed in the second sepulchre.' It is moreover divided into four compartments, two painted red, and two white, indicative, it is supposed, of the wine and milk they once contained."

"Poor things!" sighed Lucy; "to furnish and decorate the tomb only, seems very little consolation if they could not look beyond it."

"True, my dear Lucy," replied Aunt Edith; "to those who thought at all, the question, 'If a man die, shall he live again?' was a perpetual anxiety, and these relics from pagan sepulchres show strikingly the conjectures which varied the mental gloom under which they groped for the life and immortality afterwards so clearly taught by Jesus Christ. Nothing more surprised the heathen than the simplicity with which the early Christians buried their dead, and the confidence expressed in their epitaphs of the happiness of departed believers in the gospel—a difference which is still sufficiently obvious to all travellers who have explored the catacombs

near Rome. Cicero says—‘The souls of worthy patriots *appear* to me to be divine and eternal; they *seem* to have moved out of this mortal life to immortal worship and holiness;’ but the Christian can with certainty say with the apostle Paul, ‘For me to die is gain; henceforth there is laid up for me a crown of righteousness, which the Lord, the righteous Judge, shall give me at that day;’ and, ‘This mortal must put on immortality;—and so shall we ever be with the Lord.’”

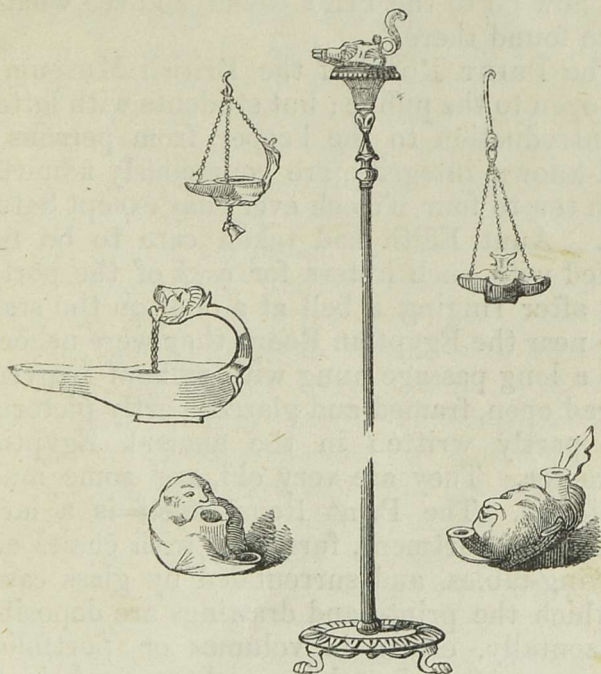
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The BRONZE ROOM displays a great variety of useful and ornamental articles either for domestic use, or for warriors’ requirements—helmets, swords, lamps, candelabra, tripods, clasps, etc., as well as figures of ancient deities and heroes found at Pompeii, Herculaneum, Syracuse, and other famous cities of antiquity.

“The people who made these things must have been clever workmen,” remarked Frank; “many of them look as if but lately finished.”

“It is, I believe, generally allowed that the ancients excel the moderns in the composition and working of bronze, as they knew how to temper the metal so as to produce the hardness and elasticity of steel. The word ‘brass,’ as used in the Scriptures, signifies *bronze*, as the metal we term brass was unknown to the ancients. These various tongs, sacrificial saucers, dishes, etc., may therefore give you a clearer idea of the articles used in the Jewish tabernacle and temple. These tripods were used to hold fire;

one from Etruria has the charcoal still in it. In one case is a bronze helmet, which antiquarians please themselves by fancying may have been seen by Herodotus, as it was the



ANCIENT LAMPS, ETC.

gift of Hiero I. of Syracuse to the temple of Olympia, in honour of a victory obtained over the Etruscans B. C. 474. This was the same king who sent a present of corn to the starving Romans in the days of Coriolanus."

"These memorials of ancient times are very interesting, and quite enliven our history lessons."

"They do so," answered Aunt Edith; "and it would be pleasant if we could trace an uninterrupted series of such memorials; but in every museum there are many vacant periods. We will now go to the Print Room, and see what is to be found there."

THE PRINT ROOM of the British Museum is not open to the public; but students with letters of introduction to the keeper, from persons of well-known integrity, are courteously admitted from ten to four o'clock every day except Saturday. Aunt Edith had taken care to be furnished with such letters for *each* of the party; and after ringing a bell at a door on the staircase near the Egyptian Room, they were ushered into a long passage hung with rolls of papyrus, spread open, framed and glazed, partly pictorial, and partly written in the ancient Egyptian character. They are very old, and some much mutilated. The Print Room itself is a large handsome apartment, furnished with chairs and drawing-tables, and surrounded by glass cases, in which the prints and drawings are deposited horizontally, either in volumes or portfolios. All are under lock and key, and arranged chiefly in schools, the Florentine school, the Roman school, etc., so that they can be easily found for reference or copying; and artists gladly seek such an opportunity for improvement.

Sir Hans Sloane's own drawings have been removed to the MS. department.

Frank and Lucy were very desirous of seeing early wood engravings, and a large portfolio was

spread before them containing works by early German artists, whose names are unknown. They were very rudely executed, and all Scripture subjects—the scenes of the passion week on a single page; the crucifixion, with centurions on horseback; and a good and bad angel receiving the souls of the respective thieves: the angels with peculiar musical instruments, one resembling an accordion with note keys. One of the most interesting of these wood engravings was a large letter T with a sketch of the crucifixion, supposed to have been pasted on a German house during pestilence, as it has an inscription begging the prayers of passers-by on behalf of the afflicted. Some later drawings and prints by Albert Durer, about 1515, were worthy of inspection; but a wonderful piece of carving in German hone-stone exhibited this artist's still greater talent. It represents the naming of John the Baptist, and is so full of minute and delicate detail, that its price, five hundred guineas, does not seem very extravagant.

The visitors next inspected a fine collection of drawings by the early Italian school, but the artists' names are no longer known. The most frequent subjects were taken from the Scriptures—such as the garden of Eden, the deluge, the queen of Sheba and Solomon, the final judgment, a curious pictorial commentary upon Matt. xxv., a horrid picture of hell, with Satan devouring his votaries, and inflicting all imaginable torments calculated to inflame the cruel temper of the inquisition.

The Florentine school is of more peaceful character; and the young people gazed with delight upon Giotto's disciples at sea, and a series of early drawings of Joshua, Isaiah, Moses, Amós, Daniel, and the nine Roman sybils; Leonardi de Vinci's last supper, the execution of John the Baptist, with king Herod looking on from a window. The interior of a painting school, where the pupils were learning various branches of their art, reminded Frank and Lucy of scenes they had read in the lives of artists.

In the Roman school were some early Scripture prints by Raphael, and engravings of the eight celebrated cartoons in Hampton Court; Michael Angelo's very dismal deluge, with the ark in the distance, passage of the Israelites, touching execution of St. John, martyrdom of the apostle Peter, and a series of prophets, still show that Scripture subjects were deemed of most popular attraction. Many early drawings by Rubens, Vandyke, and Rembrandt must delight the lovers of art, and interest the philosopher who seeks to ascertain how similarly, or how differently, the same subject or the same words affect the minds of different individuals.

There is an instructive series of original portraits in progress of collection—Henry VII. and VIII., Edward VI., Linacre, Latimer, Strafford, Sir David Lindsay, Sir Thomas More, Ridley, etc.; numerous prints from all artists of celebrity, besides botanical and architectural drawings of great value; also drawings of antique gems, sculptures, and articles of vîrtu; so that

students of various tastes are frequently in search of illustrations to their studies, which are readily found for them to copy. Of course, it is utterly impossible to examine every item, but the letters of introduction, being filed, are perpetual, as long as the privilege is not abused.

There are some monuments of patient industry in the collection of local illustrations, among which may be mentioned an illustrated copy of Pennant's History of London. It is in fourteen large folio volumes, and contains every print, drawing, or ballad that could be procured upon the subject, the expense amounting to £7000. It is valuable for reference.

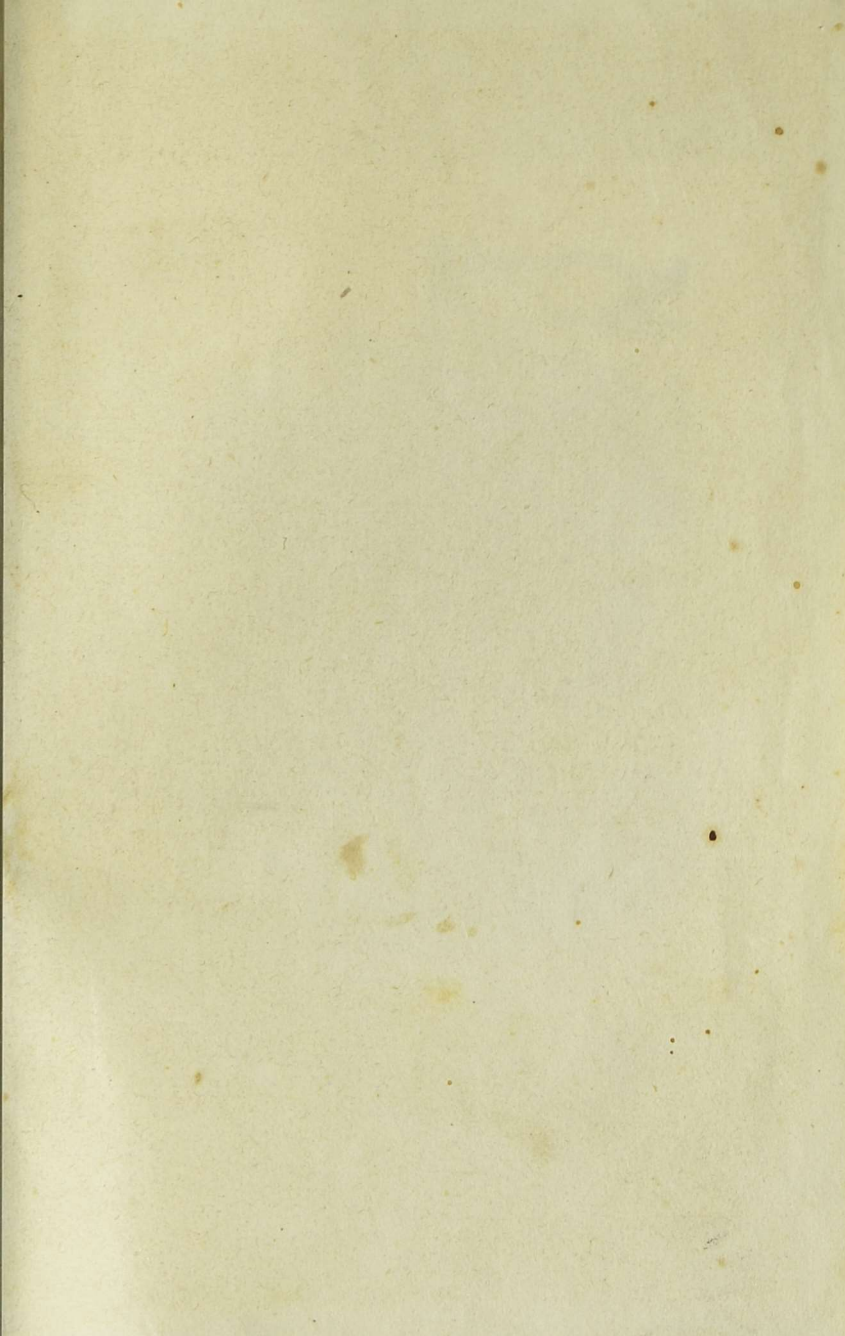
There is also in this room a splendid silver cup, designed and chased by the celebrated Benvenuto Cellini, and several specimens of nielli, that is, silver vases and plates, engraved, and all the graving lines filled up with black, so as to exhibit complete pictures on the surface. There are also sulphur casts filled up in the same way, as if for proofs. These are now very rare, but are esteemed not only for their beauty, but from the idea that they led to the invention of printing pictures from engraved plates. One of these sulphur casts by Thomas Finnequerra, a Florentine goldsmith, a niellist, and inventor of plate engraving, was purchased by the Museum at a cost of two hundred and seventy guineas. Most of these articles are kept under glass cases to preserve them from dust, and are only brought out by special request.

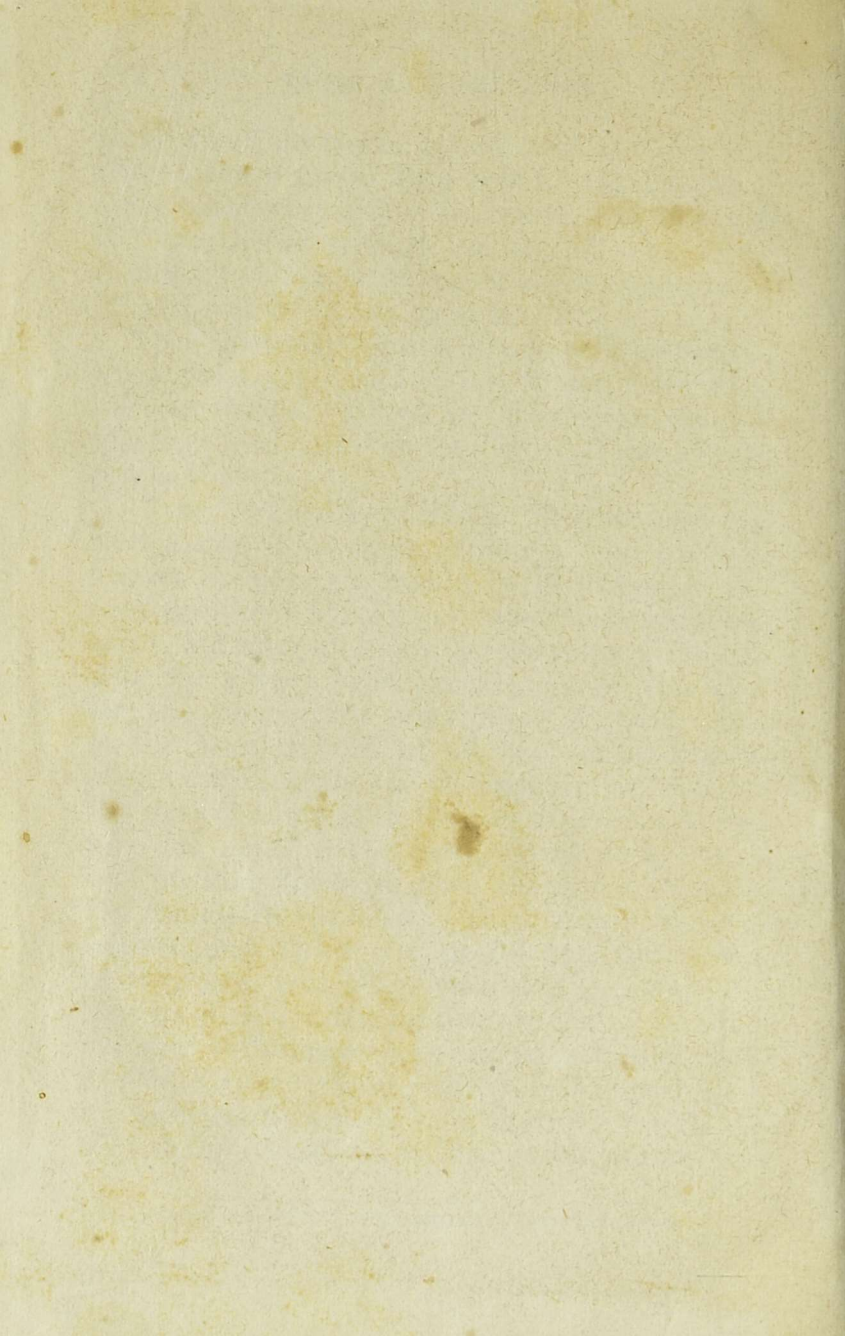
The young people were too busy in looking

at all these treasures to converse at the time; but in the evening they had a long discussion upon what they had seen, when Frank began to "wonder what work he should wish to be stored up as a remembrance of *his* existence, if offered a niche in any museum."

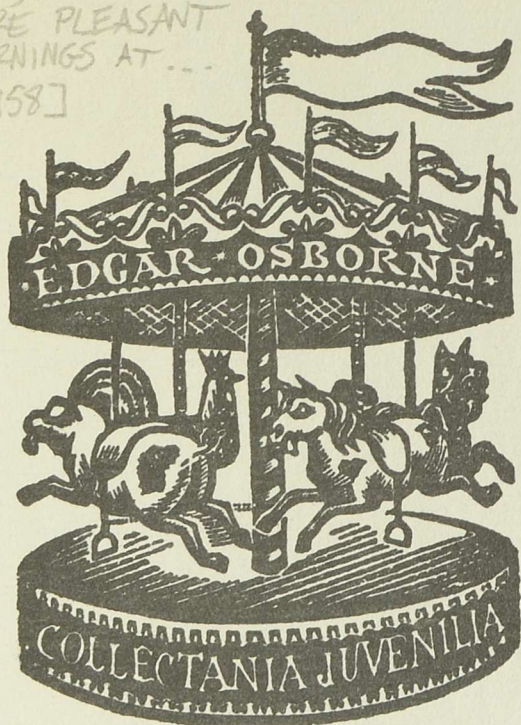
"But posterity are sometimes very perverse," remarked Lucy, "and choose to remember very inferior things. I dare say these drawings and writings were not the very best of the artists' productions."

"True," replied Aunt Edith. "Moreover, if you were always bent upon gaining a high place in human opinion, you would be in danger of becoming either a frivolous or an artificial character, and could after all enjoy the pleasure of renown only for a very brief period; but if you seek for the honourable inscription of your name in the Lamb's book of life, and endeavour to obey his will, he says to all his disciples, 'I know thy works,' and will at the day of judgment dignify and approve the smallest act done out of love to him, far more than the grandest sacrifice for man's applause. Then indeed, history, science, and philosophy, useful and fascinating as they are, will be of small value, except as they have guided the intellect to truth; or fired the soul with deeper love and adoration of that Divine Majesty whose perfections are past finding out, even in that long eternity which we shall delight to spend in their investigation."





(NS)
MORE PLEASANT
MORNINGS AT...
[1858]



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