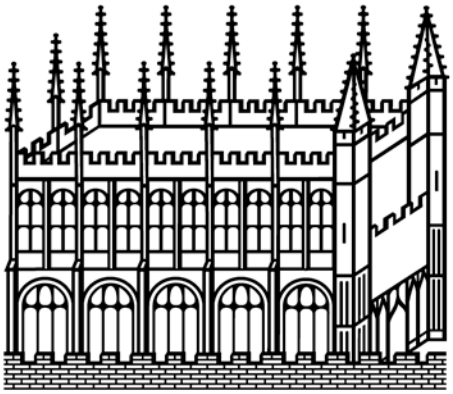

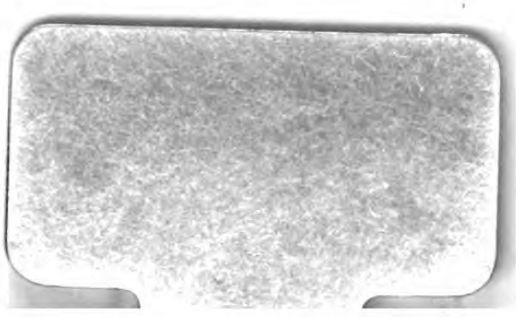

THE

CONCHOLOGIST'S COMPANION.

BY

MARY ROBERTS.

AUTHOR OF "WONDERS OF THE VEGETABLE KINGDOM;" "SELECT FEMALE BIOGRAPHY;" "ANNALS OF MY VILLAGE;" "A CALENDAR OF NATURE." ETC.

THE NAUTILUS.

"Light as a flake of foam upon the wind."—*Montgomery.*

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ADVERTISEMENT.

THE following letters have been written amid scenes of tranquillity and beauty, calculated to inspire an ardent love for the admirable works of nature, with the habit of observing them. They are designed to exhibit the rich materials afforded by the science of Conchology for reflection and amusement, and to lead the admirers of this elegant department of natural history, to consider, how much it is capable of being improved by associations of the highest nature.

MARY ROBERTS.

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ERRATA.

Page 111, bottom line, *read* Arca, *instead of* Area.

— line above, *read* Tellina, *instead of* T. Minna.

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THE

CONCHOLOGIST'S COMPANION.

LETTER I.

CONSTRUCTION OF SHELLS.

To * * * *

THE elegant science of Conchology, my friend, comprises the knowledge, arrangement, and description of testaceous animals; a science, according to Linnæus, which has for its basis the internal form and character of the shell, and is totally independent of the animal inclosed within the calcareous covering, though undoubtedly its instincts and construction are included in the researches of the Conchologist.

Each individual is composed of two parts: one of which is the animal itself, and though soft and boneless, it is furnished with organs peculiarly adapted

to its nature; the other is its shell, or habitation, which is generally hard, stony, or calcareous, partially, or entirely covering the inhabitant, which is attached to it by means of ligaments or muscles; and however small or unimportant some of the species may appear, we shall certainly discover that they are as exquisitely contrived, and as carefully wrought for the place and station which they are designed to fill, as the higher orders of creation. Nay, further, if we consider, the prodigious number of individuals, the shape and construction of their little bodies, their motions, instincts, and to say no more, the incomparable beauty and lustre of the colours with which their coatings are shaded and adorned, where shall we discover more striking demonstration of an Almighty Creator, than in this minute, and till lately, neglected branch of natural history?

Some species inhabit the sea, others fresh water, others again the land; their instincts in general appear superior to those of their relatives, the undefended Mollusca; and with regard to every other class of organized beings, there subsists, besides several points of resemblance, a general relation of a very peculiar kind. This is the relation of inversion, the law of contrariety. For as in other animals the bones, to which the muscles are attached, lie within the body; in shell-fish they are placed externally. The testa-

ceous coatings perform the offices of bones, by furnishing to the tendons that fixed basis, without which, mechanically, they could not act. All this most strikingly evinces a carrying on of the same plan.

But how, it may be asked, are the shells of testaceous animals constructed? They appear of two descriptions, with regard to the substances of which they are composed.

I. Shells with a porcelainous aspect, and enamelled texture, such as the Volute and Cowry. These, when submitted to the test of experiment, evidently consist of carbonate of lime, cemented by a very small portion of animal jelly.

II. Shells, furnished generally, if not always, with a strong epidermis, which is principally composed of the substance called mother-of-pearl. The Oyster and River Muscle, furnish familiar examples. Shells of this kind differ in their composition from the preceding only by possessing a smaller proportion of carbonate of lime; which, instead of being simply cemented by animal gluten, or jelly, is intermixed with, and serves to harden a membranaceous or cartilaginous substance; and this substance, even when deprived of the carbonate of lime by infusion in diluted nitric acid, still retains the figure of the shell.

The animals which inhabit these stratified shells, increase them every year by a stratum of carbonate of lime, secured by a new membrane; and thus the age and growth of the animal may be readily ascertained.

The two substances of which shells are composed, may be separated from each other by an easy chemical experiment, in the gentle operation of which they become exhibited distinctly to the view, without any material alteration from the nature of the solvent employed for that purpose. Thus, if a sufficient quantity of nitric acid, considerably diluted either with water or spirits of wine, is poured upon a shell or fragment of one, contained in a glass vessel, it will soon exhibit a soft floating substance, constituting the animal part of the shell, and consisting of innumerable membranes resembling a net. These membranes retain the exact figure of the shell, and afford a beautiful and popular object for the microscope. They exhibit satisfactory proofs that this membranaceous substance is, in fact, an appendage to the body of the animal, or rather a continuation of the tendinous fibres, that form the ligaments, by means of which it is fixed to the shell. They also prove that the shell itself owes its hardness to the earthy particles perspired through the vessels of the animal, which gradually incrust the meshes formed

by the filaments of which this membranaceous substance is composed. In analysing shells of a finer texture than such as are generally submitted to the test of experiment, the greatest circumspection is necessary. So much so, that M. Herissant, whose attention was particularly devoted to the subject, after placing a porcelain shell in spirits of wine, added from day to day, for the space of two months, a single drop of spirits of nitre, lest the air, generated or let loose by the action of the nitric acid on the earthy substance, should tear the net work of the fine membranaceous structure. This gradual operation was attended with complete success, and a delicate and beautifully reticulated film, resembling a spider's web in texture, rewarded the patience of the operator; the organization of which, from its extreme fineness, he was not, however, able to delineate. In shells of peculiar delicacy, even five or six months are sometimes necessary for their complete development; but, in others of a coarser texture, the process is soon completed.

Many beautiful configurations and appearances are afforded by the membranaceous part of different shells; those especially which are disclosed in the laminæ of the Oyster, River Muscle, and Sea-Ear, after exposure to the action of diluted nitric acid.

These elegant marine productions are well known

to present a constant succession of rich and changeable colours, that—

> Flying several from each surface, form
> A trembling variance of revolving hues,
> As the site varies in the gazer's hand.
>
> *Thomson.*

Nature, always magnificent in her designs, but singularly frugal in the execution of them, produces these brilliant decorations at a small expense. The membranaceous substance is plaited and rumpled in such a manner, that its interior laminæ, being incrusted with earthy and semi-transparent matter, form an infinite number of little prisms, which refract the rays of light, and produce all the changes of colour observable in these brilliant shells.

> Oh! who that has an eye to see,—
> A heart to feel,—a tongue to bless,
> Can ever undelighted be
> By Nature's magic loveliness!

The most beautiful shells are generally brought from the Red Sea and East-Indies. Those of the West are less brilliantly tinted; and as we advance towards the temperate and arctic regions, they gradually diminish in lustre and variety, till at length a few solitary specimens of the genera Trochus, Buccinum, and Limpet, are occasionally found on the

barren shores of the Frozen sea; and these, though extremely elegant in their construction, are plain with respect to colour.

This remarkable difference is owing, undoubtedly, to different degrees of solar heat, and probably the vast seas of the equatorial regions, which are not liable to be weakened by the pouring in of such a "liquid weight" of fresh water, as the Oronoque, Orellana, and "sea-like Plata," continually bear into the Atlantic Ocean, may afford a greater quantity of nourishment to such molluscous animals as inhabit them, and thus augment the size and brilliancy of their testaceous coverings.

It appears from the accurate investigations of Leuwenhoeck and Reaumur, that an infant shell-fish is uniformly furnished with a testaceous coating, which gradually increases by means of a viscous exudation from the aperture, or hinge round the circumference of each valve, and forms a coat of mail, shed, or marine pavilion, adapted to the exigencies, and proportioned to the shape of the wearer. These, as the animals increase in size, increase also in thickness though not in length; while the elevations, depressions, striæ, tubercles, and spines, which distinguish individual subjects, may be attributed to corresponding projections, tentacula, and other irregularities in the fleshy form of the constructing

agent.* The same admirable economy, which gave rise to the arrangement of little prisms in the membranaceous part of different shells, is also apparent in their configuration, notwithstanding the various decorations with which they are frequently embellished. This curious fact is strikingly exemplified in the spiral form of many of these elegant receptacles. Round or oblong cases would effectually defend the animal inhabitants from external injury; but these require in their construction a considerable quantity of the viscous exudation already noticed; whereas, a thin coating, fitted to the shape of each individual, answers the purpose equally as well, and enables it to feel the vibrations of the aqueous element in which it frequently resides.

Thus, in subserviency to this general system of economy, as well as in accordance with the instincts of the animals themselves, we find that different species of shell-fish are inclosed in various kinds of testaceous coverings. Those which defend the active family of Donax; enable them to dart away on the approach of danger; while the shells of their less active relatives, the perambulating Razor-sheaths, are admirably adapted to assist their movements through the yielding sand. The warlike Chitones, walk abroad in coats of mail closely fitted to their

* Burrows.

shapes, and surrounded with narrow belts or margins, covered with scales. The shields of the Pholades bristle with points resembling a file, by means of which they are defended from external injury, when occupied in slowly excavating the hardest substances; and the hospitable mansions of the peaceful Pinnæ, are sufficiently large for the admission of their unassuming guests. The conical shaped shells of the Patellæ (limpets) remind the traveller, of Anchorites dwelling by the sea-side in solitary tents: the Helices, or Snails, slowly perambulate the garden walks, with coverings that resemble the awnings of broad-wheeled waggons; the Cardia, or Cockles, are provided with thick coatings, which enable them to endure the rough beating of a boisterous sea; and the shells of such species as are fragile, and transparent, and scarcely able to resist the slightest pressure, are found in still ponds and muddy ditches. A considerable number of Bivalves resemble little boats, and float upon the billows with their shells expanded to catch the breeze; others may be compared to vessels of a larger size, and are provided with sails, pumps, cordages, and every requisite for navigation. Such are those of the Pectines, Nautili, and Argonautæ of the English, Mediterranean, and Indian seas. Others again, as the Mytilus, or Pearl Muscle, are inclosed in diving bells of an oblong or compressed form, with

which they emerge from the deep recesses of the ocean, or visit "the bottom of the monstrous world," as instinct or inclination lead them. The Cypræ are said to throw aside their vestments when continual accumulations render them cumbrous to the wearers; while their brethren of the Voluta,* Strombus,† Buccinum,‡ and Nerita|| tribes, carry about their houses with them, and are moreover furnished with materials for repairing any accidental dilapidations in the moving walls.

Paley has justly observed, "that the works of the Deity are known by expedients. Where we should look for absolute destitution, where we can reckon up nothing but wants, some admirable contrivance always comes in, to supply the privation."

The truth of this remark is no less confirmed by the singular adaptation of the shells which envelope molluscous animals, to the sites of ocean or of land, which they are designed to occupy, than in the colours with which their Maker has invested them. The testaceous coverings of such species as move readily from one situation to another, and are consequently able to choose their places of retreat, are generally varied with brilliant tints. This is particularly obvious in different individuals of the numerous

* Volute, or Wreath.
† Winged or Claw Shell.
‡ Whelk.
|| Nerite, or Hoof-Shell.

families of Turbo, of Voluta, of Conus, and of Cypræa, some of which, either exhibit the glowing colours of the rainbow, or the tints of the finest tulips, or else resemble little marine lamps, suspended in the crevices of dark rocks; while a considerable number appear invested with silver armour, as they walk under the spreading shades of the madrepore.

Such, on the contrary, as seldom move from their places of abode, or may easily be discovered, are uniformly of the same colour as the sites which they occupy, or the party-coloured stones, or sea-weeds to which they cling. We may adduce, as a familiar example, the common Snail, which is scarcely to be distinguished from the ground over which it creeps; or the still more helpless Limpet, that adheres to the surface of the rocks by means of a vacuum, which it produces at pleasure, like the inhabitants of the little cones which are seen on the broad leaves of the pear-tree.

The same extraordinary compensation with respect to colour is also obvious in the Oysters of the Red Sea, which hide themselves in the fissures of the rocks; in the Muscles, that ride at anchor in the shallows of the sea-shore; in the Fin-shells, which moor their fragile barks to the pebbles by means of silken cords; in the silver-tinted Anomiæ, or antique lamps, which attach themselves to floating tufts of

sea-weed, and appear like foam upon the billows, and lastly in the Nautili of the Sicilian seas, which often resemble vessels on the stocks, when calmly reposing in the little coves that are formed by the stony, tree-like fabrics of innumerable corals.

The Shell Collector has frequently observed this striking similarity on the coasts of the Mediterranean. In walking over the island of Cyprus, he was particularly struck with the number of brilliant Limpets for which that classic spot is so much celebrated. A considerable number had fixed themselves to branches of white coral, where they resembled the delicate blossoms of the peach; others, which appeared inlaid with mother of pearl, opal, and amethyst, clung to the sheltering rocks, as if fearful of being separated from them by the agitated waves of the surrounding element. The rocks were also gorgeously attired; and some of the most conspicuous, streaked with lichens, and dotted over with marine plants, appeared nearly as beautiful as the adhering shell-fish.

St. Pierre notices the same striking effect on the rocks of the Straits of Magellan. He observed, at the base of such as sweep along the sea-coast of the district of Caux, a variety of black Periwinkles, azure-coloured Lobsters, legions of Muscles of a deep cærulean blue, Oysters mottled with red and brown, and Limpets of a sober grey. Each of these

beautifully harmonized with a multitude of marine plants, that fringed the black and white rocks with tints of purple, grey, rust-coloured brown, and green, and presented, in the variety of their forms, long tufts of various colours, garlands, festoons, and cordages, agitated by the waves in every possible manner.

Different kinds of shell-fish, such, especially, as seldom move from their customary stations, are clothed, obviously with the same design, either in a brown and shaggy garment, mud-coloured tartar, or thin epidermis, in accordance with the colours of their respective places of retreat. This extraordinary provision is particularly observable in different species of Solen, Tellina, Patella, and Venus, and in several individuals of the numerous division of Univalve; while they conceal beneath their gloomy upper coats, pearly tints and appearances, which not unfrequently exceed the brilliant hue of the most gaudy shell-fish. Thus the Magellan Limpet, when disrobed of its unsightly garment by the application of muriatic acid, presents a polished surface resembling the finest tortoise-shell, blended with burnished gold. The Trochus-Iris conceals in like manner a splendid metallic lustre; and numerous species of the genus Mya, which are covered with a thick brown or green epidermis, present a brilliant and polished surface, glowing with the colours of the rainbow.

St. Pierre, with his accustomed elegance of thought, conjectures that Nature has veiled the beauty of these singular productions, in order to preserve it for the admiration of her sons: that she has placed them among the shallows of the sea-shore, where the agitated element purifies them by the continued motion of its waves, in order to throw them within their reach; and that, as if to excite the astonishment of even the most untutored men, she places shells of unrivalled lustre in regions exposed to the fury of the elements, while at the same time she presents the poor Patagonians with spoons and cups, the lustre of which surpasses the richest plate of polished nations.

But why, illustrious naturalist, did your observations extend no further? Saw you nothing in these darkly-coated and brilliantly-tinted shells, but an arrangement of bright colours to please the eye of taste, or cups and spoons for the rude inhabitants of savage districts? Saw you not, that the Almighty Creator of the universe, without whose permission a single hair does not fall from our heads, nor a sparrow from heaven to the ground, nor a shell, nor a pebble, is tossed with the billows on the shore, by investing them in these simple colours, and causing the waves to cast them on the most uncultivated and sterile regions, provides against their

utter extinction, by the depredations of sea-birds and rapacious fishes, while at the same time he spreads abroad for these a constant supply of food, in the desolate sites of earth or ocean which they are appointed to occupy?

The Roman naturalist noticed with admiration the transformation of several species of caterpillars from an intermediate state to that splendid investitude in the Spring, when still preserving their identity, and having passed from the baseness of a worm, they burst the silken shroud which envelopes them, and traverse the air in a form that is dazzling to the eyes. The Egyptians apparently referred to this intermediate state, and to the change which follows it, in the configuration of their mummies; for the most ancient are swathed and filleted, so exactly after the fashion of the Eruca, or Chrysalis, that the resemblance could not be accidental. The sages of that country, who expressed all their notions by symbols, also signified the suppositious transmigration of the soul by the transformation of the insect; and Grecian poets, improving on this idea, made use of the same symbol to designate its immortality. In like manner the botanist confesses, in the unfolding of the calyx which covers the gaudy head of the oriental poppy, an attractive emblem of the expanding of the human mind, as it emerges from a state of ignorance; or in

the gradual development of a plant, the progressive advancement of every moral excellence.

And shall no tender, or appropriate emblem rise on the mind of the Conchologist, when he observes the tints of the aurora, or the colour of gold, or purple amethyst emerging from under a rough tartar, or shaggy epidermis? The Christian philosopher confesses in the humble shell-fish, a striking emblem of human nature in a savage or unconverted state; without beauty, without comeliness, destitute of all those graces which exalt the man, or adorn the Christian. But, behold! the hand of the refiner is upon him; he emerges from the veil of obscurity which had previously invested his moral faculties; or rather, to borrow the emphatic language of inspiration, "he is quickened, when dead in trespasses and sins;" * he stands forth in all the perfection of his nature; and remembering that he is no longer his own, that he is bought with a price, he seeks to glorify his Maker with his body and his spirit, which are his.

To return from this digression to the immediate subject of my letter. We admit that shells are beautiful, and that they are admirably adapted to the exigencies of the wearers: but how shall we account

* Eph. ii. 1.

sharp at one end, and terminating in a point, by the aid of which, a hole is dug; it then alternately assumes the shape of a hook, and the spade already mentioned; one serving the purpose of shovelling out the sand, the other to assist the wary animal in his precipitous descent. When the Solen wishes to change his place of abode, the leg is again put in requisition; it then takes the shape of a ball, and is stretched as wide as possible. This ball prevents the creature from slipping back, while the reaction of the muscles throws him forwards.

He has also a mantle in front, a curtain before the opening of his cell, which enables him to exclude the rough beating of the tide; and, moreover, he is furnished with two united breathing tubes, about three or four inches in length, from the upper end of the shell; and these he projects through the soft sand, for the evident purpose of maintaining a constant communication with the water.

Without these admirable appendages, the Solen would be the most helpless of all shell-fish. He can neither moor himself to the nearest rock, like his relative, the Oyster, nor can he run upon his feet, nor raise himself from off the ground. These inabilities are made up to him by the mantle, and the breathing tubes, and above all, by the cylindrical leg, which enables him to bore into the sand. In each of

these the Deity has deviated from the construction of shell-fish in general, and this deviation obviously refers to the peculiar habits of the animal.

The generic appellation of the Solen is derived from the Greek word signifying a tube. Considerable numbers are found in the European and northern seas, and especially on the coast of Normandy, where they bury themselves in the sand. Among these, a gigantic variety furnished, according to the legends of Scandinavia, a handle for the dagger of the Gaulish Cupid, who was armed, not with a bow and quiver, but with an enchanted cutlass. Hence, it is related, that when the Queen of Beauty descended on the Gallic coast in quest of pearls for her own dress, and a knife-handle for her son, a Triton, instigated by the envious Thetis, stole her apple from the rock, and bore it to the goddess of the sea. Thetis immediately broke asunder the golden prize, and scattered its seeds along the shore; whence arose the apple trees of Normandy, whose brilliant fruit perpetuates the memory of her triumph and revenge.

The coverings of different shell-fish, both with regard to the variety, and the suitableness of their several natures, are extremely beautiful; and here we have occasion to observe that the former, independent of the latter consideration, or indeed of any other with which we are acquainted, was apparently a motive in the mind of their Creator. This

quality is, I think, nowhere more conspicuous than in the forty-six different species which constitute the genus Mytilus. And in these what endless variety! Some are smooth, beautifully marbled, and variegated with delicate colours; others, elegantly radiated with white and purple; others, again, consist only of one colour, being either black or blue, green, brown, or yellow, coarsely ribbed, and grained with minute tubercles.

Some of these exhibit internally a pearly appearance; others, when uncoated of a shaggy or bearded epidermis, and finely polished, display considerable brilliancy. The *M. margariteferus*, especially, is celebrated for its irridescent colours; and is, besides, the Pearl-Muscle of the Indian seas; though beautiful and costly pearls are occasionally found in the *Mya margaritifera*, or Pearl-Gaper, as well as in Colchester Oysters, and even under the armour of the Sea-hare. Nor is the inhabitant of the *M. lithophagus*, which abounds in the Indian, European, and Mediterranean seas, where he burrows in rock and coral, less extraordinary for his silvery tinted shell, crossed with delicate oblique striæ. He shines like phosphorus in the dark, and hence the fishermen of the bay of Naples frequently place the animal in the sun, and afterwards rub their hands and faces with the moisture, till they render them luminous.

Another species, the rare and beautiful *M. hirundo*, or Swallow-Muscle, which inhabits the Asiatic, West Indian, and Mediterranean seas, evinces the greatest variety in thickness, form, and hue. One of the most elegant of its varieties is green, with white rays; a second is of a dusty citron colour, rayed with brown; a third is white, beautifully dotted with green.

The *Mytilus demissus*, or Silvery-Muscle, a favourite decoration among the Indians of North America, also deserves a brief description. It is called the White-Conch, and principally constitutes the breast-plate of their high priest. This breast-plate is worn on the great annual festivals of the natives, when, clothed in a white raiment of finely dressed doe-skin which resembles the ephod of the Jews, this great beloved man, as he is termed by his brethren, enters the holiest division in their place of worship, and offers the sacred fire, as a yearly atonement for the sins of his people.

Specimens of the *Cassis cornutus*, or Great Conch-shell, has been found in ancient Indian tumuli, in the neighbourhood of Cincinnati. They were, most probably, drinking cups, or sacred utensils, and were used by the aborigines in connexion with the rites of sacrifice, or in making libations. These interesting specimens become of some importance as regards

the Asiatic origin of the American Indians. All recent authorities assign the shores of Asia, or those of the contiguous islands, as the native territory of this great species of Conch; all indeed, except Linnæus, who evidently mistook its locality. The discovery of this shell, in one of the ancient Indian tumuli, affords a strong presumptive proof of the long asserted migration of the present race of Indians from Asia: taken in connexion with other evidence, it may, indeed, be regarded as corroborative of that popular belief.*

Shells of this division abound in the cabinets of the curious, or serve to embellish the apartments of the rich: there, as well as on their native rocks, or when deposited by the tide upon the shore, we admire, but too frequently consider them as merely gratifying to the eye of taste. Yet the construction of the inhabitants is still more worthy of admiration than the exquisite variety of the floating citadels in which they are enclosed. Those valves which are frequently so remarkable, close or open according to their inclination or necessity; and this is effected by means of a fleshy protuberance of a reddish colour, divided into two lobes, and answering the purpose of feet. Thus, when a River Muscle is inclined to leave

* James's Expedition to the Rocky Mountains.

his station, the shell is gradually opened by the help of this protuberance, which, assuming a new form, pushes forward and makes a furrow in the sand, into which the shell is drawn in a vertical position. From this position he almost immediately changes into his former horizontal one; the tentacula shovelling back the sand and lengthening the furrow, while the animal journeys on his way, with a motion resembling a continual topsy-turvy. These tracks, most probably formed by the Muscle in quest of food, may be readily discerned in shallow clear streams, and resemble small furrows upon the sandy bottom; they are seldom straight, but deviate into traverses and triangles, like the course of a vessel when contending with adverse winds.

Muscles found in the salt springs of Nubia, journey during the rainy season to a considerable distance from their usual places of abode. They even migrate occasionally so far, that when the rains abate, they have neither strength nor sufficient moisture left to enable them to return to their companions.

Such as inhabit the sea-shore are also furnished with the means of progressive motion; they can open and shut their shells at pleasure—remove to a considerable distance—fasten themselves to the rocks with threads similar to those of the silk-worm,

respire water like their finny neighbours, and even sport upon the surface of the billows.

Now, from this we might suppose that the inhabitant was, at least, provided with the usual requisites for moving his feet, in order to walk upon the sand, or that he can swim at ease in the wide ocean by means of such appendages as obviate in aquatic natures the necessity of wings. Neither of these are assigned to him. But the Creator, who varies his means with the obstacles to be surmounted, has contrived a peculiar and appropriate mechanism, which answers the purpose equally well. The inhabitant is fastened to the upper and lower shells by two white flat cords of muscular substance, which extend about two inches from the thick part of the body, and gradually decrease in size. The extremity of each ear lies loose from the body of the animal; it is surrounded with a double brown fringed line, and is capable of being moved at pleasure. Next to these, above and below, are situated two other double fringed moveable substances, like the bronchiæ of a fish. Now mark the purpose to which the ears and the fringes are applied. They are joined to a cylindrical piece of hard and muscular flesh, which is capable of being contracted by the animal, for the purpose of closing the doors of his impregnable citadel; when, on the contrary, he wishes to throw

them open, he relaxes the muscle and expands the fringes, which act as wedges, and separate the shells. Moreover, every part of this floating pavilion is inlaid with a membrane, or epidermis, which, after having been saturated with water, unites so closely as not to admit the passage of a single drop.

But what I have always the most admired in the Mytilus is, the position of the animal itself, which is so placed as not to interfere with the opening or shutting of the shell. The mouth is enveloped in a veil with a double flap, or lid, on each side, whence the throat descends like a thread into the stomach; and close to this appears a curved, brown, and pointed tongue, half an inch in length; while on the concave side is placed a furrow, which the Muscle enlarges or shuts up, and most probably uses in the conveyance of his food. The tongue is supposed materially to assist the motions of the fish, as he alters his abode in search of food, or when disturbed by an enemy; and in the middle of this member, as sentries to direct its movements, are two blueish spots, which seem to be the eyes. Nor is this all. Another extraordinary contrivance is discoverable. The tongue is provided with a beard, or bryssus, fastened by two fleshy roots, and consisting of one hundred undivided, parallel lines, an inch in length, of a dark-green tint with a metallic lustre,

and terminated by a circular gland resembling the stigma of several plants. But what is the use of this singular appendage? As the tongue compensates the want of feet, so the byssus answers the purpose of innumerable hands. It enables the Pearl-Muscle to attach himself to rocks and corals, and to adhere, when young, to the parental shell. It even answers the purpose of a line, or hook, and is capable of being extended or contracted, in order to entrap sea insects or small fish. There is still another admirable contrivance, which compensates for certain deficiencies in the animal economy. The Mytilus frequently buries himself in the sand, in order to escape his marine enemies. How, then, is he supplied with air and water, for these are essential to his welfare? Long breathing tubes are projected through the sand, and thus a constant communication is maintained with both.

"Go to the ant, thou sluggard," said Solomon; "consider her ways, and be wise." Let the unbeliever in the superintending providence of his Creator, examine the structure of this insignificant creature, and he will be constrained to acknowledge—unless blinded by prejudice, the moral cataract of the human mind, that the hand of Deity is conspicuous even here.

The female of the common Muscle deposits her

eggs in small cavities on the outside of her shell, to which she attaches them by means of a glutinous substance: but it is not certain that the numbers which are often seen adhering, are all deposited by the inhabitant; as this species of shell-fish, like the cuckoo, frequently appropriates a neighbour's shell, for the temporary reception of her offspring.

But to proceed with our compensations. A peculiar class of Muscles, the *M. lithophagus*, and *M. rugosus*, Burrowing and Rugged Muscles, possess the extraordinary faculty of penetrating coral, and calcareous rocks, and thus elude the vigilance of their marine enemies; nay, they are so firmly fixed in their holds, that it is impossible to extract them without breaking the enclosing substance. Others congregate together in immense beds or layers, and others invariably attach themselves to extraneous substances, by means of a coarse silky byssus. The works of the Deity are known by expedients. These extraordinary instincts prevent the total extirpation of the species; for they furnish a supply of food to different kinds of fish, marine birds, and animals.

But are not the Muscles defended with a testaceous coating? How, then, is it possible for a bird to open and devour them? These instinctive creatures pounce upon their prey, when left uncovered by the

efflux of the tide, and mount with it to a considerable height; they then let go their hold—the shell is broken by the violence of the fall, and the inhabitant easily extracted.

Monkeys also devour Muscles, as well as other shell-fish, in considerable numbers. They watch the ebbing of the sea, and whenever an unfortunate Muscle opens his shell for the purpose of imbibing or rejecting water, a stone is immediately slipped in, which prevents the valves from closing, and renders him an easy prey to his sagacious adversary. Birds, also, occasionally avail themselves of this propensity in the Muscle to open his shell, but not always with equal success. A crow seeing one day an Oyster with his valves expanded on the beach, incautiously darted her claw into the open shell, with the intention of dragging forth the inmate; but the Oyster, aware of her design, instantly closed her doors, and in so doing, took the thief prisoner. A gentleman found them in this situation, and made a double capture.

Muscles are common to the Indian, Atlantic, American, and Northern oceans; they are also met with in New Zealand; in the Red, Mediterranean, and Russian seas; and a few occasionally diversify the inhospitable shores of Hudson's Bay.

Large beds of a minute species have also been discovered on the eminences of the Jouratzkaine

coast, which borders the Frozen ocean. They are evidently a species unknown in the subjacent sea, and were most probably brought thither by such marine birds as resort to the Arctic flats, for the purpose of eating them at leisure.

The genus *Anomia*, or Antique Lamp, a general inhabitant of the European, American, and African oceans, as well as the Mediterranean and Northern seas, evinces in his construction, both an inconvenience and a compensation. The shells are generally thin, delicate, and semi-transparent, peculiarities rarely discoverable, in such as inhabit the wide ocean. But in order to remedy this inconvenience, or to prevent their slender habitations from being ruptured in the violent tossings of the waves, a small perforation is obvious near the beak, and through this a strong ligament is protruded, whereby the little sailor securely fixes himself to different marine substances, such as to fuci, crabs, the spines of echini, and especially to the stars of the Madrepora Prolifera. The shells evince considerable variety, and some of them are singularly beautiful. The Snake-head (*A. caput serpentis*), when seen in profile, resembles an antique lamp, and the *A. psittacea* is very similar in its construction to the forked or curved beak of a parrot; while the *A. placenta*, or Cake-Anomia, is capable of being rendered so transparent, that it is

frequently used by the ingenious Chinese as a substitute for window glass.

The excessive weight and thickness of the ponderous Gaper (*Mya ponderosa*) indicate that it is found in rapid rivers, and cataracts; in short, shells of this division are generally thick, and their inhabitants, which hide themselves in sand and mud, constitute a large proportion of the food of birds and land animals in some inhospitable regions of the globe. They abound in that part of the Congo territory, through which the Zaire flows into the southern Atlantic, and here they are eagerly sought for by the natives, who assemble for this purpose with their canoes, in companies of three or four hundred. Considerable numbers are also taken by the women, in scoop nets made with the fibres of creeping plants, or from the herbaceous cotton, which is common on the Congo. In some parts of the river they are caught in baskets placed along the water's edge; in others, by means of poisonous plants.

There is One, my friend, whom greatness cannot overpower, nor minuteness perplex. The tall umbrageous trees that clothe the banks of the rapid Zaire—the numerous islands that rise above the water, mantled with thick mangroves, or covered with Egyptian papyrus, resembling at a distance

fields of waving corn, or clumps of the majestic wine-producing phœnix, which cluster round the native villages, "plead haughtily" for the greatness and magnificence of Him who called them into being; whilst the humble Mya, enclosed in a solid and ponderous shell, that enables it to resist the action of rapid and agitated waters, tells us, in accents soft as the dew of Heaven, that "His tender mercies are over all his works."

The shell of the Donax resembles a wedge. It is broad and thick at one end, and gradually tapers towards the other: a construction which considerably assists the animal in excavating his subterraneous dormitory. The hinge is furnished with two small teeth, consequently the anterior slope is generally gaping. Now, to remedy this apparent inconvenience, a ligament is placed near the fissure, which effectually prevents the valves from separating, when the inhabitant of the Donax has occasion to expand them. The meanest creature is in itself a collection of wonders. The peculiar construction of the Wedge-Shell; the slight adhesion of the hinges; the gaping of the valves; the ligament which prevents them from separating; and the power arising from all these, of readily procuring his food, or changing his position, afford, when compared with the dissimilar construction of other shell-fish, convincing

proofs of new and appropriate mechanism. The generic appellation of the Donax is derived from a Greek word, signifying a reed; and a flying reed is, by one ancient writer, used for an arrow. The name, therefore, aptly describes the shape of the Donax, which resembles the head of a javelin. This species delights to burrow in the sand, or among loose pebbles on the sea coast, and is found in almost every part of the known world.

The Chama, Camp, or Gaper, signifying a gaping, an hiatus, an opening, produces occasionally large and costly pearls, and is believed to be thus named from the gaping observable in two of the species, of which the *C. gigas*, or Giant-Clam, is the largest shell in the order Testacea. We are informed by Linnæus, that a specimen once weighed four hundred and ninety-eight English pounds; that the inhabitant furnished one hundred and twenty men with provision for a whole day, and that the sudden closing of its valves was sufficient to snap a cable asunder. A manuscript in the library of the late Sir Joseph Banks, also notices the dimensions of a specimen brought from Sumatra, and preserved at Ano's Vale, in Ireland: the weight amounted to five hundred and seven pounds; the largest valve measured four feet six inches in length, two feet five inches and a half in breadth, and one foot in depth. A shell of the

same species, forms the baptismal fort at the church of St. Sulpice at Paris; it was presented by the Venetians to Francis the First.

Ancient artists engraved a variety of figures on different species of this interesting genus. Availing themselves of the colours infused by nature into the strata of the shell, they accurately expressed by the depth of their incisions, the delicate tints of the finest white or red complexion, or blue and yellow drapery, according to the kind of Chama which they selected for the purpose. Several specimens are still extant, and to these we owe, most probably, the first idea of that kind of engraving which is termed a cameo.

Large pearls are occasionally found in the *Chama gigas.* One, exhibited at Sir Joseph Banks's, in June, 1804, was valued at two or three hundred pounds. The colour of this extraordinary shell is of a dirty white, or yellowish or reddish brown. The hinge is furnished with a cartilage of a dull brown colour; but when cut and polished, is as beautifully irridescent as the opal.

I have previously had occasion to observe, that the component parts, or superficies, of many animals are highly ornamental, and that the properties by which they are so rendered do not apparently conduce to any other purpose. In shells and flowers, the

principle of beauty holds a considerable place in their composition, and is still more predominant than in animals. Why, for instance, are the shells of the genus Cardium, or Cockle, frequently of a dark brown colour, varied with white hollow elevated ribs? Why are those of the Tellina, or Tellen, so remarkable for their beautiful radiations; and why are so many species of the Venus unrivalled in the brilliant tintings and lustre of their shells; the rich purple (*Venus mercenaria*), or Money-Venus, especially, which is used by the Indians of North America to form the purple and white beads of their wampum, or treaty belts? The purpose, so far as we can see, of animal nutrition might have been carried on as well under the sober coating of the garden snail. Or, if this could not be in every species, for reasons inexplicable to us, why break into such a variety of colours? It is not an effect of age, or of any declension in the vigour of the subject, for the young and active are generally most distinguished for the brilliancy of their tints. This property in the shell is evidently independent of the inhabitant; it is solely calculated for beauty, intended for display. In none of the numerous family of Testacea is this property more remarkable than in the hundred and fifteen species of this elegant genus, most of which are celebrated for the smoothness and brilliancy, as well as the rich

and high colouring of their surfaces. Ancient poets were not inattentive to their merit. They fabled that Venus selected one of the most beautiful for the car, that bore her in triumph to the shores of Paphros; and a modern writer, improving on this idea, has thus elegantly described the heroine of his tale:—

> E'en as the blue enamoured waves, when first
> The sea-born goddess, in her rosy shell,
> Sailed the calm ocean. *Martyr of Antioch.*

Different species of the same interesting genus are used, in both hemispheres, for purposes of decoration.

> "And oft a scattered ornament bestow
> The tinctur'd rivals of the showery bow."

The females of the North-American Indians, especially, cover with them the shoes which they use in dancing, and thus produce a sound somewhat resembling the tinkling of the little bells that were worn on similar occasions by the Jewish ladies: a mode of decoration noticed and reprehended by Isaiah, in his energetic admonition to the unthinking daughters of Zion, that the Lord would take away "the bravery of their *tinkling ornaments about their feet*, and their cauls and round tires like the moon," because of their haughtiness, and their forgetfulness of him.—Isaiah iii. 16, 18.

Little is known, with certainty, respecting the

peculiar instincts of the animal inhabitants of the Cardium, Tellina, and Venus, excepting that they are admirably adapted to the various stations which they are designed to occupy. The two former inhabit the American, Indian, and Atlantic oceans; the Mediterranean, Caspian, and Indian seas. The latter are found in every part of the known world, and furnish a constant supply of food to marine animals, and birds of various descriptions.

In another species, the Pinna, Finshell,* or Seawing, a beautiful and well known genus, we shall shortly have occasion to observe a most extraordinary compensation, not resulting from any peculiarity in the structure of the animal itself, but supplied by the deficiencies of another. At least twenty different species are included under this division; and here it is not unworthy of remark, that however different individuals may vary in size and colour, the usual form of their testaceous coatings uniformly resembles that of the larger species of Muscles, being long and tapering towards the opposite extremity. They are, also, generally brittle and horn-like, and are occasionally enriched with a steel-like blue, or copper

* Pinna, or Piuné, is the Greek name for this fish: it was eaten by the ancients, and occasionally called the Naker, Naire, or Nacker; a word, the meaning of which seems unknown.

colour. Some peculiarity in the animal inhabitant uniformly furnishes a clue to its mode of life. The construction of the Pinna points out its adaptation to smooth waters and sheltered bays; and, though generally found in the Mediterranean, Indian, American, Atlantic, and European oceans, as well as in the Adriatic and Red seas, they are seldom seen on bold and rocky coasts, exposed to the furious surgings of the tide. The classic shores of the Mediterranean are, consequently, one of their favourite resorts; and hence the rocks under Cape St. Vido, once celebrated for an abbey of Basilican monks, as well as the shores of the Mare Grand, are completely studded with the interesting shell-fish.

> Thousands of spinning worms,
> That in their green shops weave the smooth-hair'd silk,
> To deck her sons. *Milton.*

They are elegantly termed the silk-worms of the ocean, in allusion to the fine silky beard, or byssus, by means of which they moor themselves firmly to the rocks, or allure small fish by the floating or trembling of the filaments in the water.

This they possess in common with the Muscle. But instead of an hundred undivided, parallel, and flattened fibres, terminated with a circular gland, furnished with absorbents, and growing from the body of the animal, we have here a machine as

incontestably mechanical as that of a wire-drawer's mill. The Pinna is provided with an extensile member, like a finger, and this contains a glue, which the animal protrudes at pleasure, through a variety of minute perforations in the tip. This glue, or gum, as in the instance of the common spider, or the silk-worm, having passed through these apertures, becomes threads of almost imperceptible fineness; and these threads, when joined, compose the silk which is so much valued by the Sicilians. But the animal first attaches the extremity of the thread, by means of its adhesive quality, to some crag, or pebble, of unusual size; and when this is effected, the Pinna receding from that point, draws out the thread through the perforation of the extensile member by a process, which Paley, in describing the similar operations of the terrestrial silk-worm, justly compares to the drawing of wire. One difference only subsists. The wire is the metal unaltered, except in figure: whereas, in the forming of the thread, the nature of the substance is somewhat changed, as well as the form; for, as it exists within the insect, it is merely a soft and clammy glue; the thread acquiring, most probably, its firmness and tenacity from the action of the air upon its surface at the moment of exposure. This property is, consequently, a part of the contrivance.

The mechanism itself consists of the extensile member, which the animal propels at pleasure; of the reservoir in which the glue is collected, and of the external holes communicating with it,—while the action of the machine is seen, in forming the thread, analogous to that of making wire, by forcing the prepared material through holes of proper dimensions. The secretion is an act too subtile for our discernment, except as we perceive it by the produce. But one thing answers to another: the secretory glands to the quantity and consistence required in the secreted substance, and the reservoir to its reception; while the outlets and orifices are constructed, not merely for relieving the reservoir, but for manufacturing its contents into a form and texture of great external use to the life and functions of the insect. But the texture is not only essential to the welfare of the inhabiting Mollusca, it also constitutes an important article of commerce among the Sicilians; for which purpose considerable numbers of Pinna are annually fished up in the Mediterranean, from the depth of twenty or thirty feet. An instrument, called a cramp, is used for the purpose: it is a kind of iron fork, with perpendicular prongs, eight feet in length, each of them about six inches apart, the length of the handle being in proportion to the depth of the water; for, notwithstanding the extreme delicacy of

the individual threads, they form such a compact tuft, that considerable strength is necessary in separating the shells from the rocks to which they adhere.

This tuft of silk, termed by the Sicilians *lanapenna*, is then broken off, and sold, in its rude state, for about fifteen carlini a pound, to the countrywomen, who wash it thoroughly in soap and water. They then dry it in the shade, straiten the threads with a large comb, cut off the useless root by which it adhered to the animal, and card the remainder; by these means a pound of coarse filaments is reduced to about three ounces of fine thread. This is fabricated into various articles of wearing apparel, such as stockings, caps, gloves, and waistcoats. The web is of a beautiful yellow brown, resembling the burnished golden hue which adorns the backs of some splendid flies and beetles; an effect produced by steeping it in lemon-juice, and afterwards pressing it with a warm iron.

A considerable manufactory of stuffs and various articles of wearing apparel is established at Palermo; they are extremely elegant, and vie in appearance with such as are fabricated from the finest silk.

In the year 1754, a pair of stockings were presented to Pope Benedict XV., which, in consequence of their extreme fineness, were enclosed in a small box about the size of one for holding snuff. A robe

of the same singular materials is mentioned by Procopius, as the gift of a Roman emperor to the satrap of Armenia.

It is even conjectured by some writers, that the fine byssus produced in India, Egypt, and about Elis, in Arabia, was no other than the threads of this interesting shell-fish, from which the richest apparel was anciently made, and afterwards dyed purple, for the sacerdotal vestments of the Jewish and Egyptian priests. Some interpreters of the Scriptures, render the Greek word, denoting byssus, by fine linen; but other versions, such as Calvin's, and the Spanish printed at Venice in 1556, explain it by silk; though undeniably of a different kind than the produce of the silk-worm, as appears from the testimonies of several ancient writers. Commentators usually distinguish two sorts of byssus,—one of Elis, the other of Judea: from the latter the sacerdotal vestments were uniformly made; the former being assigned to the Levite.

Thus elegantly has the Earl of Shaftesbury referred to the productions of these industrious insects:—"How shining, strong, and lasting are the subtile threads spun from their artful mouths! Who beside the All-wise, has taught them to compose the beautiful soft shells, in which, recluse and buried, yet still alive, they form those beautiful threads, when not

destroyed by men, who clothe and adorn themselves with the labour of these sweet creatures, and are proud of wearing such inglorious spoils?"

We now proceed to that extraordinary species of compensation which supplies the deficiencies of the Pinna Marina,—not by any contrivance in the animal, but through the agency of a resident in the cell. The Creator has placed the eyes of the common Muscle in the tongue. And why? Because this member answers the purpose of feet, in enabling her to travel from one station to another; but to the present subject of our inquiry he has denied the faculty of vision. The animal inhabitant of the Pinna is therefore nothing more than a blind slug, surrounded with innumerable enemies, and particularly obnoxious to the Sepia, or Cuttle-fish.

"Ambushed in weeds, or sepulchred in sand!" he watches all his motions; and no sooner does he open his bivalve shell, which occasionally exceeds two feet in length, than he rushes upon him like a lion. Now, it will naturally be asked, how such a blind, defenceless creature, can either procure food or protect himself from the attack of his implacable enemies? Nature uniformly redoubles her exertions in favour of the weak; or rather, it may be said, that the God of nature offers, by this new and affecting compensation, an additional reason for unreserved

confidence in him. A kind of crab, naked like the hermit, and very quick-sighted, is the constant companion of the Pinna Marina. They live and lodge together in the same shell, which belongs to the latter. When the Pinna has occasion to eat, he opens his valves, and sends out his faithful purveyor to procure food. If any foe approaches, the watchful crab returns with the utmost speed and anxiety to his blind protector, who, being thus warned of danger, shuts his valves, and escapes the rage of the enemy; when, on the contrary, the crab loads himself with booty, he makes a gentle noise at the opening of the shell, which is closed during his absence, and when admitted, the two friends feast together on the fruits of his industry.* This curious fact, although well known to the ancients, escaped till lately the observation of the moderns. Aristotle tells us, that the Pinna kept a guard to watch for him; that there grew to the mouth of the Pinna a small animal, having claws, and serving as a caterer, resembling a crab, and termed the *Pinnophylax*. In like manner, Pliny mentions a small animal, called *Pinnotheres*, which, he says, is liable to injury, and therefore prudently hides itself in the shell of oysters. He also speaks of the Pinna as belonging to a genus of shell-fish, produced in muddy water, and constantly attended by a companion.

* Hasselquist.

One room contains them, and the partners dwell
Beneath the convex of one sloping shell;
Deep in the watery vast the comrades rove,
And mutual interest binds their constant love:
That wiser friend the lucky juncture tells
When in the circuit of his gaping shells
Fish wand'ring enter; then the bearded guide
Warns the dull mate, and pricks his tender side;
He knows the hint, nor at the treatment grieves,
But hugs the advantage, and the pain forgives;
His closing shell, the Pinna sudden joins,
And 'twixt the pressing sides his prey confines;
Thus fed by mutual aid, the friendly pair,
Divide their gains, and all their plunder share.

Oppian.

LETTER IV.

PEARLS.

To * * * *

We now pass on to a very different portion of our subject, and have solely to consider the formation of the Pearl, the "Margaron," or globe of light, from which, and the Persian name Mervarid, that is, the offspring of light, was derived "Margarites," the appellation in southern Europe.

Neither ancient nor modern naturalists have accounted satisfactorily for the formation of this valuable gem. Pliny, and after him Solinus, struck with its similarity to a drop of dew, imagined that the Pearl Oyster rose every morning to the surface of the water, and expanded its shell to imbibe the dew of heaven, which silently descending like a liquid pearl, entered the body of the creature, and assumed the

texture, shape, and colour of a real pearl. This elegant hypothesis was probably suggested by the various transformations observable in nature; such as the conversion of the nectareous juice of flowers into wax and honey.

A similar opinion is still entertained by the natives of Ceylon, and recorded in the Sanscrit books of the Brahmans. The Persians hold the same idea, of which the following ingenious fable is an interesting proof. Addison introduces it at the conclusion of one of his fine moral essays, in which he shews the presumption of ascribing our successes to our good management, instead of considering them as the bounty of heaven.

"A drop of water fell out of a cloud into the sea, and finding itself lost in such an immensity of fluid matter, broke out into the following reflection:— 'Alas! what an insignificant creature am I, in this prodigious ocean of waters; my existence is of no concern to the universe! I am reduced to a kind of nothing, and am less than the least of the works of Omnipotence.' It so happened, that an Oyster which lay in the neighbourhood, chanced to gape and swallow it, in the midst of its humble soliloquy. The drop," says the fable, "lay a great while hardening in the shell, till by degrees it was ripened into a pearl; which falling into the hands of a diver, after

a long series of adventures, is at present that famous pearl which adorns the top of the Persian diadem."

Many equally wild and extravagant opinions were advanced, to account for the formation of the pearl, by different European naturalists, and succeeded by others of a similar description, till the year 1717, when M. Reaumur, in a curious paper which appeared in the Memoirs of the French Academy, on the structure of both shells and pearls, conjectured with great probability (and his conjectures are now generally admitted), that pearls are formed of a juice extravasated out of some ruptured vessels, and detained and fixed among the membranes of the Oyster.

To evince the probability of this ingenious supposition, he shews that oceanic and river shells are formed wholly of a glutinous and stony matter, which oozes from the body of the inhabiting Mollusca; and that, consequently, an animal furnished with vessels fraught with a sufficient quantity of stony juice to build, thicken, and extend a shell, is fully capable of forming pearl, if the juices designed for the increase of its habitation should chance to overflow among the membranes, or to fill up any accidental cavity in the body of the animal itself.

In proof of which, he has further shewn, that when pearls of two colours are found in the Pearl

Muscle of Provence, the tints of each are precisely the same with those of the shell; and that each kind of coloured pearl is found in the corresponding coloured part of the shell itself; thus clearly evincing that where a certain juice had formed, and would have continued to form, a coat or layer of a peculiar tint, the vessel that conveyed the juice had become ruptured, and occasioned a small deposit, which hardened gradually, and retained the colour of the shell. Of this, the structure of the pearl, and the shell itself, is a convincing proof; for the silver, or pearl-coloured part of the Pearl Muscle, is formed of strata lying one upon another like the coats of an onion; and also of the reddish part of a multitude of small, short, close, cylindrical fibres; which peculiarity of texture is also discoverable in the different coloured pearls of the Muscles of Provence.

The intrusion of some heterogeneous substances, such as particles of sand, into the stomach of the animal, frequently produces these curious extravations. M. Reaumur elegantly terms them the nuclei, or primary causes of the formation of these valuable gems; as the sagacious animals cover them from time to time with exudations of pearly matter, in order to obviate the disagreeable friction which they necessarily occasion; and these exudations, as already

noticed, form several regular lamellæ, resembling the coats of an onion, or different strata of bezoars, though considerably thinner, and more delicate in their construction. Loose pearls are often found within the shelly covering of the Mytilus; but when this occurs, they have been undoubtedly rejected from the stomach of the animal, and have fallen into the cavity of the shell; whilst such as are fixed, most probably owe their origin to some interior roughness.

The exterior of the *Mytilus Margaritiferus* generally indicates the value of the gem which it contains. Such as are varied and incrusted with thick calcareous substances, and with zoophytes of different kinds, enclose the finest pearls; those on the contrary, which present a smooth unbroken surface, have only begun to form these valuable secretions, and are sometimes entirely without them.

The observation of this curious fact, most probably suggested the first idea of forcing the Mytilus to produce pearls. It was known in the first centuries of the Christian era, and acted on by the ancient people who inhabited the coasts of the Red Sea, as we are informed by the philosopher Apollonius. "The Indians," said he, "dived into the sea after they had rendered it calm, and perhaps clearer, by the pouring in of oil; they then induced the Muscles,

by means of some attractive baits, to expand their shells, and having pricked them with a sharp-pointed instrument, the liquor which exuded from the wound was received into a perforated iron vessel, where it hardened gradually, and formed pearls of the finest water."

Modern naturalists are undecided with regard to the accuracy of this narration; yet there are various reasons to conclude, that the people who lived on the shores of the Red Sea were acquainted with an artificial mode of producing pearls; and this opinion is additionally confirmed by the method now in use among the modern Chinese, who retain, with few alterations, the arts and customs of their ancestors. Pearl Oysters, at certain seasons of the year, congregate in considerable numbers on the surface of the water, where they open their shells, and enjoy the influence of the sun. At this period the Chinese fishermen throw into each of them a small string of beads, formed of mother-of-pearl, which becoming incrusted in the course of a few months, present the appearance of real pearls. No sooner is this curious process supposed to be completed, than the Muscles are drawn up, and robbed of the treasures which they contain. The truth of this extraordinary statement may be implicitly relied on; it is confirmed by the testimony of respectable travellers, and the result

of various experiments; to which Professor Fabricius adds the testimony of having seen, in the possession of Sir Joseph Banks, several Chinese Chamæ, the shells of which contained bits of iron wire, covered with a substance of a pearly nature. These wires had evidently once been sharp, and it seemed as if the sagacious Muscles, anxious to secure themselves against the intrusion of such unwelcome visitors, had incrusted, and thus rendered blunt, the points with which they came in contact. May not, therefore, the process employed by the ancients be still practised? And are we not authorized in conjecturing that these bits of iron, which probably had slipped from the hands of the Chinese workmen, and remained in the animals, resembled the spikes noticed by Philostratus as being used by the ancient people who inhabited the banks of the Red Sea, for the purpose of pricking Muscles.

The invention of Linnæus cannot, therefore, be considered altogether new; though he was undoubtedly the reviver of this ancient art, in Europe. It was announced to the Swedish King and Council in the year 1761, with an offer of disclosure for the benefit of the kingdom. But various circumstances having prevented the acceptance of his liberal offer, the secret was purchased by a Gottenburg merchant of the name of Bagge, for the sum of five

hundred ducats. The sealed manuscript containing the receipt was afterwards disposed of, by the heirs of this gentleman, to the highest bidder; and is said by Dr. Stover to have passed into the hands of our distinguished countryman, Sir J. E. Smith.

The emblematic coat of arms, which typified the feelings of an admiring country, while it ennobled the celebrated Swedish naturalist, is stated to have been given in consequence of this important invention; but it appears from the historian of Linnæus, that the patent of nobility was granted previous to the year 1756: and that the pearl, which superficial observers have assigned to his arms, was in fact an egg, designed by the blazoner, M. Tilas, as an emblem of maternal nature, after the manner of the ancient Egyptians. The arms of Linnæus are, indeed, equally elegant and appropriate. They are divided into three fields, representing the three kingdoms of nature: the red signifying the animal, and the green the vegetable; the whole is surmounted by an helmet, and the beautiful Linnæa forms the crest. The phalaena linncella, shining with its silvery colours, is displayed around the border in preference to festoons of drapery, and below the motto, "*Famam extendere factis*," designates the active genius of Linnæus.

The appellation of Margion, or Globe of light,

by which the Orientalists designate their favourite gem, is elegantly expressive of its peculiar form and lustre, as the true shape of the pearl is that of a perfect round. When its contour resembles a pear it is less valuable; and is then generally used for ear-rings, and ornaments of a similar description. The natives of the East, like the ancient Romans, prefer it to any other kind of precious stone. The finest are used for personal decoration, while those of an inferior description are seen to sparkle on the trappings of their horses. We are even told that, in the magnificent hunting equipage of the Sultan Mahmoud, consisting of four hundred greyhounds and bloodhounds, each was decorated with a collar set with jewels, and a covering, edged with gold and pearls.

These beautiful productions are frequently alluded to by Oriental writers.

Hafiz has thus admirably illustrated from them a maxim of the ancient Arabs, which says to the virtuous man, "confer benefits on him who has injured thee."

"Learn from yon orient shell to love thy foe,
And store with pearls the wrist that brings thee woe;
Free, like yon rock, from base vindictive pride,
Emblaze with gems the hand that rends thy side;
All nature cries aloud—can man do less,
Than heal the smiter and the railer bless?"

It is customary among the Turks to send letters to their distant friends entirely composed of various little articles, to which some appropriate meaning is attached; in these the Margion always holds a conspicuous station, and signifies "fairest of the young;" as a rose, "may you be pleased, and your sorrows mine." There is, indeed, no kind of colour, flower, weed, or fruit, herb, gem, or feather, which has not some meaning assigned to it by the natives of the East.

The Persian poet Meskin Aldaramy, in allusion to these fanciful associations, has thus elegantly compared his friends to a string of pearls; himself to the cord on which they are suspended.

"With conscious pride I view the band
Of faithful friends that round me stand,
With joy exult that I alone
Can join these faithful friends in one:
For they 're a string of pearls, and I,
The silken cord on which they lie.

"With joy their inmost souls I see
Unlock'd in every heart to me;
To me they cling, on me they rest,
And I 've a place in every breast:
For they 're a string of pearls, and I,
The silken cord on which they lie."

The following allusion to this beautiful production of the Indian seas is certainly not inferior to the preceding:

Farewell—farewell to thee, Araby's daughter,
(Thus warbled a Peri beneath the dark sea);
No pearl ever lay under Oman's green water,
More pure in its shell than thy spirit in thee.

Oh, long upon Araby's green sunny highlands
Shall maids and their lovers remember the doom
Of her, who lies sleeping among the Pearl Islands,
With nought but the sea-star* to light up her tomb.

Farewell—be it ours to embellish thy pillow
With every thing beauteous that grows in the deep;
Each flow'r of the rock, and each gem of the billow,
Shall sweeten thy bed, and illumine thy sleep.

Around thee shall glitter the loveliest amber
That ever the sorrowing sea-bird has wept,
With many a pearl, in whose hollow-wreath'd chamber
We, Peris of ocean, by moonlight have slept.

MOORE.

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* Star-fish: one of the greatest curiosities in the Persian Gulf. It is circular, and so beautifully luminous at night, as to resemble the full moon surrounded by rays.

Let us now consider the Pearl, with reference to its value in a commercial point of view.

As early as the days of Solomon, a considerable trade was carried on by the Phenicians of Sidon and Tyre, who, both in their manners and policy, resembled the great commercial states of modern Europe. Among the various branches of their commerce, that with India for pearls may be considered as one of the most lucrative and most considerable. Having wrested from the Idumæans some commodious harbours towards the bottom of the Arabian Gulf, they rendered them the great emporiums of Oriental commerce, whence they diffused these costly productions, in common with many others, along the eastern and southern coasts of Africa. The distance, however, from the Arabian Gulf was considerable, and the conveyance of goods by land carriage attended with so much inconvenience, that these enterprising people at length took possession of Rhinoculura, the nearest port in the Mediterranean to the Arabian Gulf. Thither all the commodities from India were readily conveyed, re-shipped, and transported by an easy navigation to Tyre, and by "her merchants who were as princes, and her traffickers the honourable of the earth," distributed throughout the world. But at length the declining glory of the merchant city

bore ample testimony to the validity of the prophetic declaration, "That the Lord had given a commandment against it," to "destroy the strong holds thereof;"* whilst it afforded a melancholy earnest that the period was rapidly approaching, when the site of imperial Tyrus was destined to become as the top of a "barren rock, even a place for the fishermen to spread their nets upon."† Alexandria was erected by the enterprising genius of the monarch whose name it perpetuates, and at length monopolized the advantage of supplying Europe with the productions of the East.

Upon the conquest of Egypt by the Romans, pearls, in common with other Oriental productions, continued to be brought into Europe by the same channel; and, amid all the various articles of luxurious decoration in which the Romans so much delighted, it is recorded that a decided preference was given to pearls. They were eagerly purchased by persons of every rank, and worn in every part of the dress; the most expensive were considered as necessary appendages to rank and fortune; while smaller ones, of inferior quality, displayed the taste, and gratified the vanity of persons in an humbler sphere. Indeed, so ardent was the general admiration, and so enormous the

* Isaiah xxiii. 8—11. † Ezekiel xxvii. 14.

prices given for this kind of gem, that we are informed by Pliny that Julius Cæsar presented Servilia, the mother of Brutus, with a pearl, for which he paid forty-eight thousand four hundred and fifty-seven pounds. The famous ear-rings which the profligate Cleopatra dissolved in vinegar, and drank to the health of Mark Antony, were valued at one hundred and sixty-one thousand four hundred and fifty-eight pounds. In emulation of which, the dissipated Clodius presented each of his guests with a glass of vinegar in which a valuable pearl had been dissolved.

Nor were pearls of Oriental growth the only ones worn: the rivers of Germany and Saxony were ransacked for this favourite ornament; and it is recorded by Suetonius, that the reports which had reached Rome concerning the British pearls, were the actuating motives which induced Cæsar to attempt the conquest of the island.

His expectations were not entirely realized; but a buckler formed of English pearls was carried by the conqueror to Rome, where it was dedicated to Venus, and hung up in her magnificent temple as an offering worthy of the sea-born goddess.

As such was the general predilection, it will not appear extraordinary, that, while the imperial city was filled with patricians who had scarcely any other

occupation than to enjoy and dissipate the wealth acquired by their ancestors, the demand for their favourite gem, as well as for every thing elegant, rare, or costly, which exotic climes afforded, should continually increase, in order to support their pomp, or to heighten their pleasure. Hence extraordinary efforts were continually made, and as the commerce with India increased, new channels of communication were successively opened. From the earliest ages some intercourse had subsisted between Mesopotamia and other provinces on the banks of the Euphrates, and those parts of Syria and Palestine which lay near the Mediterranean, of which the migration of Abram, from Ur of the Chaldees to Sichem in the land of Canaan, is a convincing proof. As the intercourse increased, the possession of this station became an object of such importance, that Solomon, when he turned his thoughts towards the extension of commerce among his subjects, built a fenced city there. Its Syrian name of Tadmor in the Wilderness, and its Greek one of Palmyra, are both descriptive of its situation in a spot adorned with palm trees. This place was not only plentifully supplied with water, but surrounded with a portion of fertile land, which, though of no great extent, rendered it a delightful residence, in the midst of barren sands and an inhospitable desert. Its present state "pleads haughtily

for its past glories." It rises like an island out of a vast plain of sand, covered with the magnificent ruins of temples, porticoes, aqueducts, and other public works, which in splendour and extent, and some of them in elegance, were not unworthy of Athens, or of Rome, in their most prosperous state. The Arabs of the desert now pitch their tents amid the ruins; and at Palmyra, as well as at Balbec, thousands of little lizards crawl over the ground, the walls, and stones of the ruined buildings.

Such is the present state of Palmyra. In ancient times it was the emporium of Eastern commerce, and its inhabitants traded with the Romans, and their rivals for empire, the Parthians. Indeed so great was its power, that Zenobia contended for the dominion of the East with the Romans, under one of their most warlike emperors: a power, which evidently resulted from the opulence acquired by extensive commerce. Of this the Indian trade was undoubtedly the most considerable and most lucrative branch.

But while the merchants of Egypt and Syria exerted their activity to gratify the increasing demands of Rome, the eagerness of gain (as Pliny observes) brought India itself nearer to the rest of the world. Navigation began to occupy the attention and exercise the ingenuity of experienced seamen. Hippalus,

the commander of a ship engaged in the Indian trade, ventured, about fourscore years after Egypt was annexed to the Roman empire, to relinquish the slow and gradual course through which the commodities of India had found their way into Egypt, and stretching boldly from the mouth of the Arabian Gulf across the ocean, was carried by the western monsoon to Musiris, a harbour in that part of India, now known by the name of the Malabar coast.

The discovery of this route to India was considered of great importance, and Musiris as well as Barace, a harbour not far distant, were continually resorted to by the Indian and Egyptian merchants. Hence the splendid productions of the East, its elegant manufactures, spices, aromatics, precious stones and pearls, were more readily diffused among nations possessed of wealth sufficient to purchase them; and Rome, the ancient capital of the empire, and Constantinople, the new seat of government, were supplied with the precious commodities of that country by the merchants of Alexandria.

Under the Emperor Justinian, Persia became a rival to Rome, in the Indian seas. About fourscore years after his decease, the conquests of Mahomet occasioned a considerable revolution in Oriental commerce; and at length the same com-

mercial spirit which prompted the Mahomedans of Persia to visit the remotest regions of the East, animated the Christians of that country.

But while the Christians and Mahomedans continued to extend their knowledge of the East, the inhabitants of Europe found themselves almost entirely excluded from any intercourse with their Oriental neighbours. Egypt had passed from under the Roman yoke; Alexandria shut her port against them; and the new lords of the Persian Gulf, satisfied with supplying the demand for Indian commodities in their own extensive dominions, neglected to convey them, by any of the usual channels, to the trading towns of the Mediterranean. The opulent inhabitants of Constantinople and other great cities of Europe, bore this privation of luxuries to which they had been accustomed with extreme impatience; and the surprising efforts which were then made to open fresh channels of communication with the East, strikingly evince the high estimation in which its commodities were held. The endeavours of the European merchants were ultimately crowned with success: Constantinople became a considerable mart of Indian and Chinese commodities, and thus the pearls of India were again circulated throughout Europe.

It is foreign to our purpose to notice the various

commercial revolutions which the long wars between the Christians and Mahomedans occasioned.

Amalphi and Venice, with Genoa and Portugal, successively diffused throughout Europe the costly productions of the East. Other nations also gradually arose upon the commercial platform; and at the present period the pearls of India, with its spicery and rich perfumes, gold, frankincense, and myrrh, muslins, shawls, and chintzes, are widely circulated, through the medium of innumerable channels.

Having thus completed a general survey of the various sources of communication through which the pearls of India were introduced into Europe, it now remains to shew the different places from which they are derived, as well as to point out the pearl fisheries of ancient times.

These, to a considerable extent, formerly subsisted in the Red Sea, the pearls of which, are supposed by Mr. Bruce to have been produced in the shell of a species of Pinna. He conjectures that this kind of pearl was the penim or peninim of Scripture, and that the name is derived from its redness, peninim being literally translated by the Greeks, pina, or pinna, and the shell pinnicus. This shell abounds in many places mentioned by Strabo, Theophrastus, and Ptolemy. The same species is noticed by Solomon as the most precious of all productions.

Job also refers to them in the following memorable passage; "No mention shall be made of coral or of pearls, for the price of wisdom is above rubies."—xxiii. 18.

The peninim is said to have been the most valued or the best known in India; and though Pliny acknowledges that the excellency of pearls consists in their whiteness, yet this opinion was, to a certain degree, a local one, for those of a yellow cast are as much esteemed in India as the peninim, or reddish pearl, was in Judea, during the reign of Solomon.

Considerable pearl fisheries formerly subsisted on several of our rivers, particularly the Conway and Esk. Sir Richard Wynn, of Gwydir, chamberlain to Catherine, Queen of Charles II., presented her majesty with a valuable gem taken from the former of these rivers; which was placed, and still continues, in the royal diadem, as a beautiful specimen of the English pearl.

The habit of wearing Oriental and other foreign pearls has superseded those of Welch and English growth; but the *Mya margaritifera*, or Pearl-Gaper, is still common to many of our native rivers. The Shell Collector remembers to have met with a remarkably fine specimen on the banks of the Conway, within sight of its ancient castle; a most majestic

ruin, rising proudly from the shelving sides of the rock, and washed by the high tides of the river. It was a fine evening, in the month of June. The sun was setting in mild majesty, his tempered beams shed a soft radiance on the aged ruin, and tipped with silver the dark drapery of ivy and festoons of wild honeysuckles which streamed down the broken walls. All was silent, except the rushing of the stream, or the gentle sighing of the wind, as it murmured through the ruined chambers, and shook the long fantastic tufts of withered grass, "wherewith the mower filleth not his hand, nor he that bindeth sheaves his bosom." This scene of desolation brought to his remembrance the days of ancient times, when the sun rose as gloriously, and set as mildly over the proud battlements of Conway Castle, as then on its deserted ruin. He thought, too, of the joy and grief with which, for more than ten centuries, those must be familiar, who were once its glory and its boast, but are now forgotten; and his thoughts recurred to the busy multitudes who once resorted to the Conway in quest of its valuable gems, but whose remembrance has passed away like the billows of its mountain stream.

Chateaubriand preserved as memorials of his travels the waters of the different rivers that he visited. With the same view the Shell Collector has added to the

Mya of the Conway, those of the rapid Teith, and Ythan, rivers of Scotland, with a specimen from the tranquil Elster, that waters the plains of Saxony. Each of these rivers produces Pearl Muscles in abundance; and their gems, though certainly inferior to those of oriental growth, are used in necklaces, the price of which is sometimes estimated at a thousand crowns. As late as the beginning of the last century, Ireland also boasted her pearl fisheries, and several beautiful specimens were brought from the rivers of Tyrone and Donegal; one of which came into the possession of Lady Glenlearly, who wore it in a necklace, and refused eighty pounds which was offered for it by the Duchess of Ormond.

Modern history furnishes several instances of the value attached to this kind of gem. One in the possession of Philip II. of Spain, was estimated at fourteen thousand eight hundred ducats: another belonging to the Emperor Rudolph, was called Peregrina, or the Incomparable. It was pear shaped, and weighed thirty carats: a third, mentioned by Tavernier, in the hands of the Emperor of Persia, was bought in the year 1633, of an Arab, for thirty-two thousand tomans; which, at three pounds nine shillings the toman, amounted to one hundred and ten thousand, four hundred pounds sterling.

The city of Nepehoa, situated on a lake of the same name in Chinese Tartary, produces Pearls in abundance, though of inferior quality. This fishery occasioned a dreadful war, between the Chinese and Muscovites, which was at length amicably concluded towards the end of the seventeenth century, by the intervention of two individuals, who benevolently suggested a division of the Lake between the contending parties, each of whom had laid claim to the whole.

The Pearl fisheries of the Bornian islands were formerly much frequented, but are now of little consequence; such is also the case with those of the South Seas.

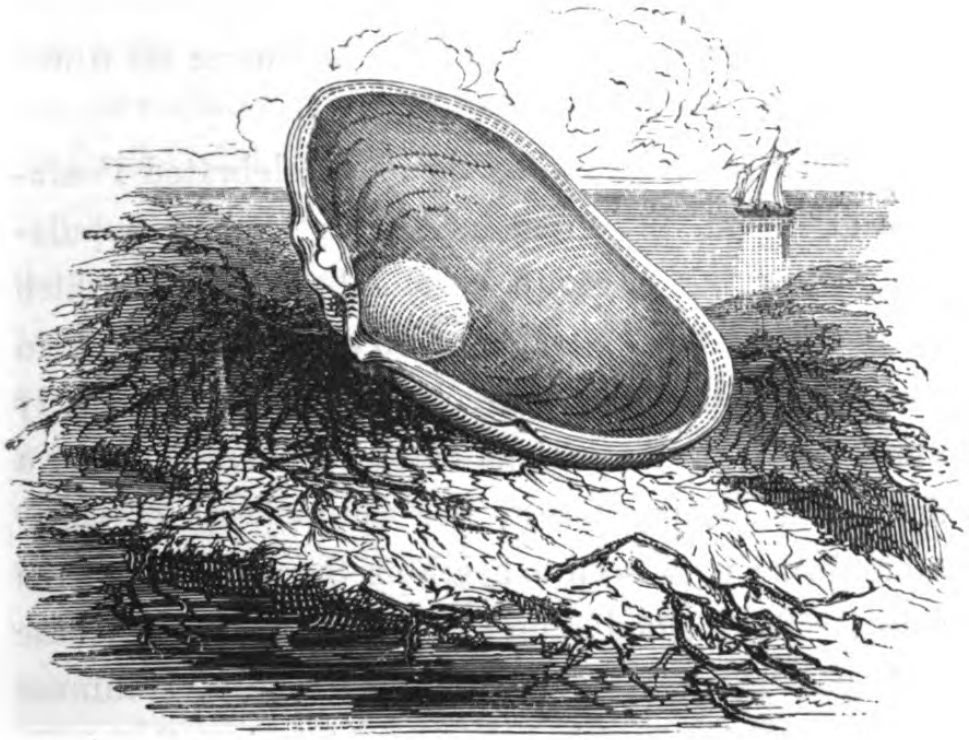
Some historians have maintained that the aborigines of South America were unacquainted with these valuable gems, but this opinion is incorrect. The Spaniards who first landed in Terra Firma, Mexico, and Peru, assert that the natives were adorned with necklaces and bracelets of the finest Pearls; and this assertion, supported by the narratives of modern, as well as the details of early writers, receives additional confirmation from the discovery at Basalt, of the statue of a Mexican priestess, whose head-dress resembling the Calantica on the head of Iris, is profusely ornamented with brilliant gems of this kind. To which we may add the corroborating testimonies of

Las Casas, and Belzoni, who accurately describe the cruelties that were exercised on the unhappy Indian slaves and negroes employed in the fisheries, and that even as far back as the commencement of the sanguinary contest which marked the reign of Ferdinand and Isabella, the beautiful little palm-encircled island of Loche alone, furnished Pearls to the value of fifteen hundred marks each month. In short the trade was so considerable, that till the year 1630, the value of these gems exported into Europe, amounted on an average to eighteen hundred thousand piastres. These were sought after with the more avidity as the splendid decorations of the East were introduced into Europe by two opposite channels; that of Constantinople, where the Paleologi wore garments covered with strings of Pearls, and that of Grenada, the residence of the Moorish kings, who strove to emulate the splendour of the Oriental caliphs. Undoubtedly the Pearls of Asia were preferred to those of South America, and were generally monopolized by the great; but still a vast demand subsisted for the latter, while the exportation of the former scarcely experienced the slightest diminution; and hence in Italy, as well as at Grenada, the island of Cubaqua became the object of numerous mercantile speculations. That, especially of Lampagnano, an unfortunate Castilian, who having obtained permission

from Charles V. to fish for Pearls along the coast of Cumana, was proceeding to exert his prerogative, when the colonists sent him back this bold answer: "that the Emperor, too liberal of what was not his own, had no right to dispose of the oysters, which live at the bottom of the sea." The ill-fated adventurer finding himself unable to repay the merchants of Seville, who had advanced money for his voyage, remained five years at Cubaqua, where he at length died insane. Alas! wherever commerce has fixed its abode, acts of rapine and injustice invariably succeed.

The Pearl fishery of Cubaqua diminished rapidly towards the end of the sixteenth century, and according to the testimony of Laet, it ceased entirely before the year 1683. Two causes operated powerfully in producing this effect. A Venetian discovered the art of imitating Pearls, so as to deceive the most accurate observers; and in Italy, the use of cut diamonds introduced by Lewis de Bergner, decreased the demand for occidental Pearls, and consequently rendered the fisheries of South America far less lucrative.

The Pearl-producing Muscles also gradually decreased in number; not indeed, as popular tradition has recorded, because being frightened by the noise of oars, they conveyed themselves away, but because the vast, and often unnecessary destruction, occasioned by the divers, continually impaired their numbers.



Mya-margaritifera: Pearl-Muscle.

At present the Pearl fisheries of South America are principally confined to the gulf of Panama, and the mouth of Rio de la Plata, to the coast which surrounds Cubaqua, to the vicinity of Araga, and Coche, and to the island of Margaretta. But these, as I have previously observed, are less productive; the Pearls also, which they produce, are not so brilliant as on the first arrival of the Spaniards. A fact which has exercised the ingenuity of several distinguished naturalists,—for who can explore the trackless basin of the sea? Earthquakes may have altered its general character, or subterraneous currents exercised

some inexplicable influence on the temperature of the sea-water, or else destroyed the molluscæ on which the muscles are supposed to feed.

When Humboldt visited the once celebrated Peninsula of Araga, little remained of its ancient population, excepting a group of small dwellings, which clustered round the ruins of an ancient castle, from whence the prospect partook of a character rarely found in the warm regions of the globe. Neither a deep and gloomy forest, nor the majesty of vegetable forms were seen to heighten the grandeur of the ruins. They stood alone, on the summit of a base and arid mountain, crowned with agave, columnar cactus, and thorny mimosa, resembling less the works of man, than such bare and unclothed masses of primeval rock, as were ruptured in the earliest convulsions of the globe. It was a scene much to be remembered. The disk of Venus appeared at intervals between the yawning crannies of the castle—the night was cool—and swarms of phosphorescent insects glittering in the air, and over the soil, appeared like innumerable scattered and moving lights, which emulated along the vast extent of the savannas the starry vault of heaven.

There is something in the scenes of early life: which seem to entwine themselves as with a power and a spell around the heart, and which, in proportion as

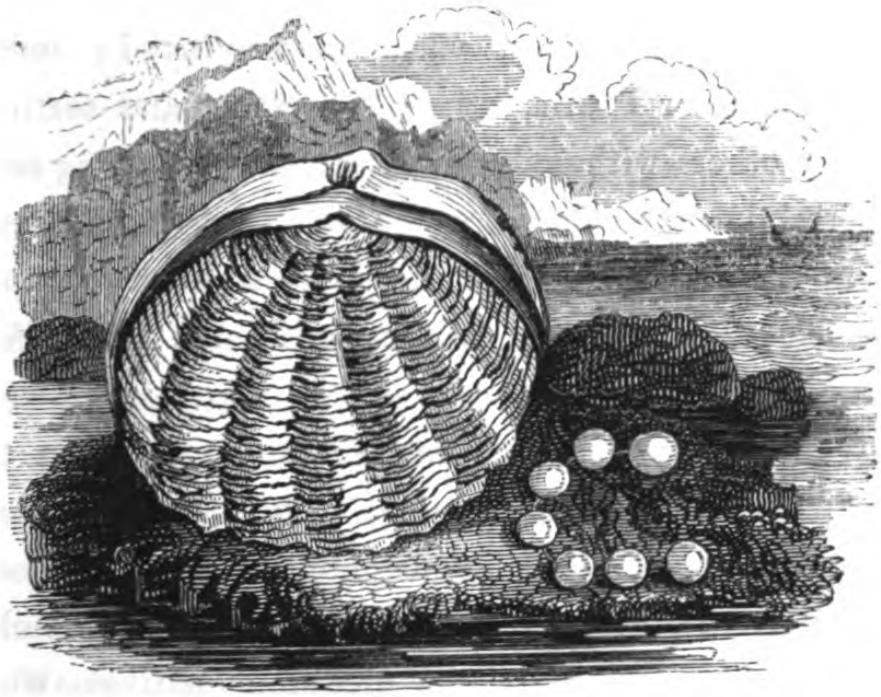
ulterior comforts are withdrawn, exercise a stronger and more efficient sway. The aborigines of Araga, are powerfully attached to their native soil. They prefer the wild and barren spot which gave them birth, to the attractions of more polished life; and support themselves by catching fish, which is extremely abundant on the coast. When asked why they have neither gardens nor culinary vegetables,—" Our gardens," they reply, " are beyond the gulf: when we carry our fish to Cumana, we bring back plantains, cocoa-nuts, and cassava."

One of these was a mulatto, the sage of the plain, who professed to know the virtues of plants, the symptoms of earthquakes, and the marks which distinguish the neighbourhood of precious metals. When the traveller entered his humble dwelling, he found him employed in sharpening arrows, and stretching the strings of his bow. Delighted with an opportunity of imparting his scanty stores of knowledge, he readily communicated some interesting particulars relative to the Pearls of Cumana, which as objects of decoration he treated with contempt; and in order to evince his familiarity with the Sacred writings, he frequently referred to the patriarch Job, who preferred wisdom to Pearls. After a long discourse on the emptiness of human grandeur, he drew from his leather pouch, a few small opake gems, which he desired Humboldt to

accept, enjoining him at the same time to note on his tablets, that a poor shoemaker of Castilian race had gratuitously resigned without a sigh, Pearls, which on the other side of the great waters, were anxiously sought after.

There is so much naïveté in the observation of this honest man, that I am confident the little digression to which the mention of Araga has unavoidably led me, will not displease you.

But the finest Pearls are, unquestionably, not of occidental, but of oriental growth. From the earliest periods of authentic history, the Indian seas and rivers were celebrated for the production of these valuable gems. "They are rich," says a native writer, "with Pearls and Ambergris; their mountains are stored with gold, and precious stones; their gulfs inhabited by creatures yielding ivory; and among the plants and trees with which they are shaded and adorned, are ebony, red-wood, aloes, cloves, and sandal, and all other spices and aromatics; parrots and peacocks are the birds of the forest; musk and civet, the productions of the land." To these exotic regions we must therefore look for the finest Pearls: they are brought from the island of Bahrein, or Baharem, in the Persian Gulf; from Catisa, on the coast of Arabia Felix, and from Ceylon, and Japan.



Mytilus Margaritiferus. Pearly Muscle.

The fishery established at Manaar, a sea-port in the island of Ceylon, is one of the most considerable. It commences in February, and ends about the beginning of April. During this period, Candatchy, about ten miles from Manaar, presents an interesting and novel spectacle. The bay is thronged with vessels; the coast with an incredible multitude, from all parts of India, consisting of persons of different complexions, countries, castes, and occupations. Here, are to be seen boat-owners running to the shore with anxious faces, and looks of joy, in hopes of a rich cargo, stepping on the rocks that project into the sea, and wading as far as they can venture.

There, groups of jewellers, brokers, merchants, foreigners and natives, variously employed; some bargaining for Pearls, others separating and sorting them; others with scales in their hands, weighing and ascertaining the value of each; others again hawking them about; while a considerable number occupy themselves in drilling and preparing the Pearls for future use.

Occasionally a few fantastic figures are seen to mingle with the motley groups. These are conjurers, known in the Malabar language by the appellation of Pillal Karras, or binders of sharks. They are held in great veneration by the credulous natives, who firmly believe in their miraculous pretensions. Each boat is accordingly accompanied by one or two of these impostors, who frequently carry off the finest Pearls; whilst others take their stations on the shore, where they spend the day in muttering prayers, distorting their bodies, and performing a variety of unmeaning ceremonies.

In the mean time, the bay is thronged with vessels of various descriptions. The boats employed in the fishery assemble at the same period, and wait the signal for setting sail. This signal is the firing of a gun at Arippo, which is answered by a loud huzza; each boatman then plies his oar, the vessels sail out together, and reach the pearl bank, twenty

miles distant, before day-break. Here they continue busily occupied, till warned to retire by the sea breeze, which rises about noon. Again a signal gun is fired, and again the respective owners hail the arrival of their boats.

A number of people are now seen busily employed in depositing the Oysters in holes or pits, dug in the ground to the depth of two or three feet; or on small square places, covered with mats and fenced round, where they are suffered to remain till the inhabitant of each is completely dried away; the pearls are then taken out, and prepared for the market.

Each boat is manned with twenty men, and a tindal, or chief boatman, who acts as pilot. Of these, ten are employed in rowing, and in assisting the divers: the others go down alternately, five at a time, and thus enable their companions to recruit their strength, which is frequently exhausted by the excessive fatigue of diving.

The business of a diver appears extraordinary and full of danger to a European; but to the Asiatic, it affords a lucrative and familiar occupation. His chief risk and terror arises from the ground shark; a common and terrible inhabitant of the Eastern seas, and a source of perpetual uneasiness to the adventurous Indian. It, however, rarely happens that any lives are lost,—for the real or imaginary appearance of a shark immediatly spreads dismay

throughout the whole fleet; each diver then rapidly ascends, and the boats return to Condatchy, whence they seldom venture out during the day to recommence the business of fishing.

In order to facilitate the descent of the divers, the boats are separately furnished with five large perforated stones, round at the top and bottom. These are fixed to different ropes; and each diver, when about to plunge, seizes one of them with the toes of his right foot; while with the other he suspends a bag of net work; for these people are so extremely dexterous in the use of their feet, that they employ them, as well as their hands, for the most common purposes, and sometimes pick up the smallest stones or straws from off the ground. The diver then takes hold of another rope in his right hand; and endeavours with the other to prevent the water from entering his nostrils, while he plunges into the sea, and speedily reaches the bottom; where he is eagerly occupied in tearing up the shells, and cramming them into his bag, which he suspends around his neck, and in running from side to side, in order to render the water turbid, and to elude the vigilance of his marine foes.

As soon as the bag is full, or the appearance of any danger warns the diver to retreat, he resumes his position, makes a signal to those above, by pulling the rope in his right hand, and immediately ascends.

The fatigue attendant on the act of diving is very great, and the men employed in the Pearl fishery frequently discharge not only water, but even blood from their ears and nostrils, on being drawn into the boat. But this does not prevent them from making forty of fifty plunges during the course of the day; for persons accustomed to the water from their infancy acquire a sort of amphibious nature, and appear to retain the same self-possession, while in this deceitful element, as when on land. Savage nations, as well as the adventurous Indians, are remarkable for this peculiarity; and according to the accounts of several voyagers, the inhabitants of the South-Sea islands are such expert divers, that when a nail, or any piece of iron, is thrown overboard, they will instantly plunge into the sea, and never fail to recover it, notwithstanding the quick descent of the metal.

Each of the Pearl-divers, generally remains under water about two minutes at a time, though instances have occurred in which four, or even five have been devoted to this dangerous employment; and a diver from Anjanga, in the year 1797, absolutely remained under water during the space of six minutes.

Such is the general method of obtaining Pearls; such are the dangers connected with this adventurous trade. Yet these costly gems have no pretensions to any actual use,—their value arises merely from their rarity and beauty, united to that general predilection

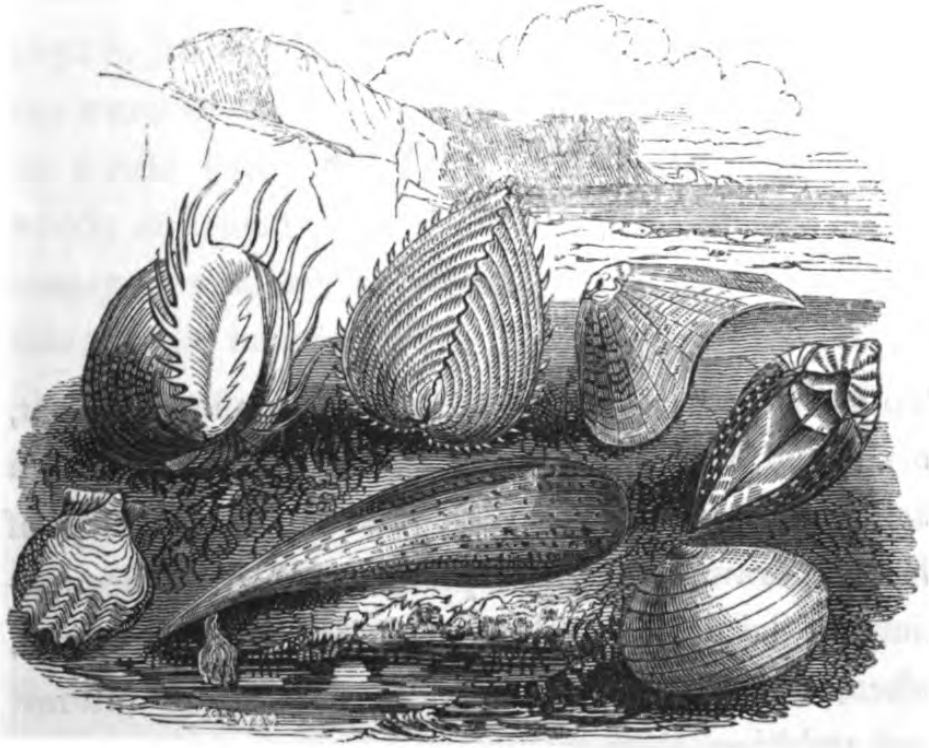
for ornamental decorations which appears natural to mankind in both a savage and civilized state; for, whilst uncultivated people adorn themselves with feathers and with shells,—pearls and jewels, among luxurious nations, are generally the insignia of riches or of rank. The former are undoubtedly the most perfect and beautiful of precious stones. Every other description owes something to the hand of man; but the "Margion" emerges in full beauty from its ocean bed, where maternal Nature silently and secretly performs her work, and gives to it a lustre and a perfection, which her sister Art has frequently sought to emulate, but can never fully equal.

How many impressive recollections are associated with this little gem! It recalls to mind hours of toil and watching—busy days and sleepless nights—journeyings over land and sea—exotic climes, and foreign manners. But there is yet another, and far more interesting point of view, in which this "offspring of the light" may be regarded. "For the kingdom of heaven," said our Saviour, "is like a merchantman seeking goodly Pearls; who, when he had found one Pearl of great price, went and sold all that he had, and bought it."—Matt. xiii. 45. Thus admirably illustrating this important truth: that the utmost energy and devotedness ought to prompt the exertions of a Christian, for the attainment of that heavenly treasure, which can never fade away nor be

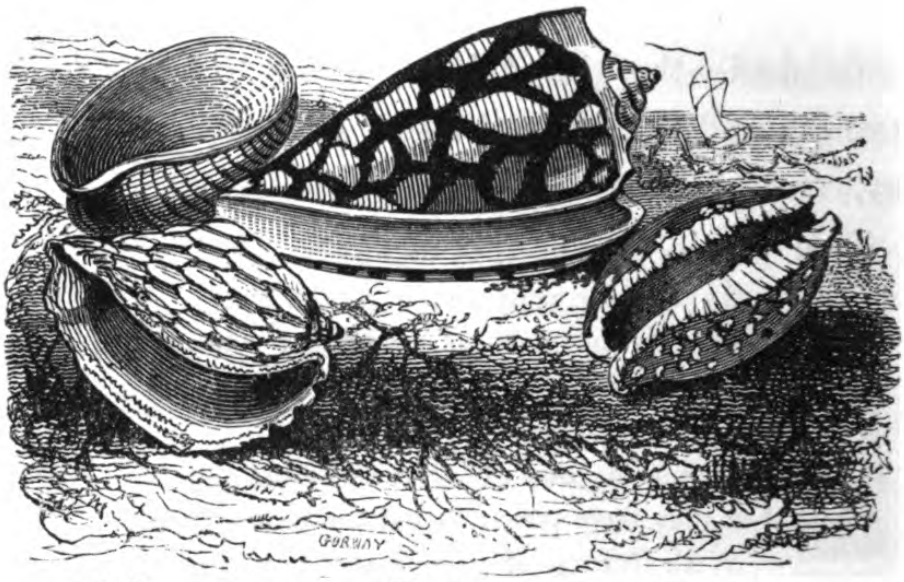
diminished—the gift of Him, whom to know is life eternal; and the fruits of whose Holy Spirit are love, joy, and peace.

" And truly are they, in the inmost heart,
As the deep waters of a hidden well;
Whose living freshness have a pow'r to impart,
Far more than e'en the poet's page can tell
Of pure enjoyments inexhaustible,
Valued beyond old Ocean's rarest gem;
For they have power to bid the bosom swell,
With feelings of delight that flow from them,
E'en as the morning's rays from the sun's diadem."

BARTON.



Mytilus. Venus. Cardium. T. Minna.
Area. Pinna. Mactra.



Bulla. Conus. Cypræa.

LETTER V.

UNIVALVES.

To * * * *

To gather shells and pebbles on the shore, is not, my friend, a frivolous pursuit: Cicero, whom Seneca designates as a genius, "equal to the majesty of Rome," draws a delightful picture of the rural occupations of Scipio and Lælius, at Caieta and Laurentum, when, retired from the restless pursuits of interest and ambition, they grew young in their amusements, and again derived pleasure from gathering shells on

the sea-coast. Cranch too, the elegant and scientific explorer of the Congo, delighted in the same pursuit. Neither difficulties nor dangers impeded his researches. He climbed rugged precipices, he was frequently lowered down by the peasants from the summits of tall cliffs, he waded through rapid streams, explored the beds of muddy rivers, and sought the deepest recesses. He would even sometimes relinquish the comforts of domestic life, and venture out to sea, at Dawlish, for several days, entirely alone, or in the small skiffs of the fishermen, during which he dredged when the tide was full, and examined the coast when it was out. At night, he slept in his boat, which he drew to shore; and when the weather was too stormy for marine excursions, he would leave his little skiff, and examine the woods and fields, for birds and insects. No inclemency of weather, no vicissitudes of storm and sunshine, ever interfered with his favourite pursuits,—the discovery of a new shell or bird, or insect, amply repaid the most hazardous exertions.

The beautiful shores of Tenby, are equally rich with those of Devon, in marine productions. But venture not upon the sea, my friend, like Cranch, in a little boat, scarcely able to surmount the billows; rather delight yourself, as Cicero, in collecting those elegant specimens which the sea

deposits within your reach. I cannot share with you these pleasing labours, but mind can gravitate to mind, through intervening seas and mountains. Listen then to me, and while you fancy that I am walking by your side, let me tell you something of the numerous family of Univalve. The shells of this division are in general extremely beautiful, with names indicative of their origin or shape. Thus the generic appellation of the *Conus*, signifies a cone; its shells are remarkably elegant, and singularly varied, and some of the rarer species are valued at twenty guineas. The genus *Cypræa*, was early dedicated to the fabulous divinity of Cyprus. It admits of six divisions, of which the *C. moneta* is collected by negro women of the Indian islands, three days before and after the full of the moon, and thence transported into Bengal, Siam, and Africa, where it is used by the natives as a substitute for money. Vast quantities are imported into this country, for the purpose of traffic; and at least one hundred tons of them are annually sent to Guinea.*

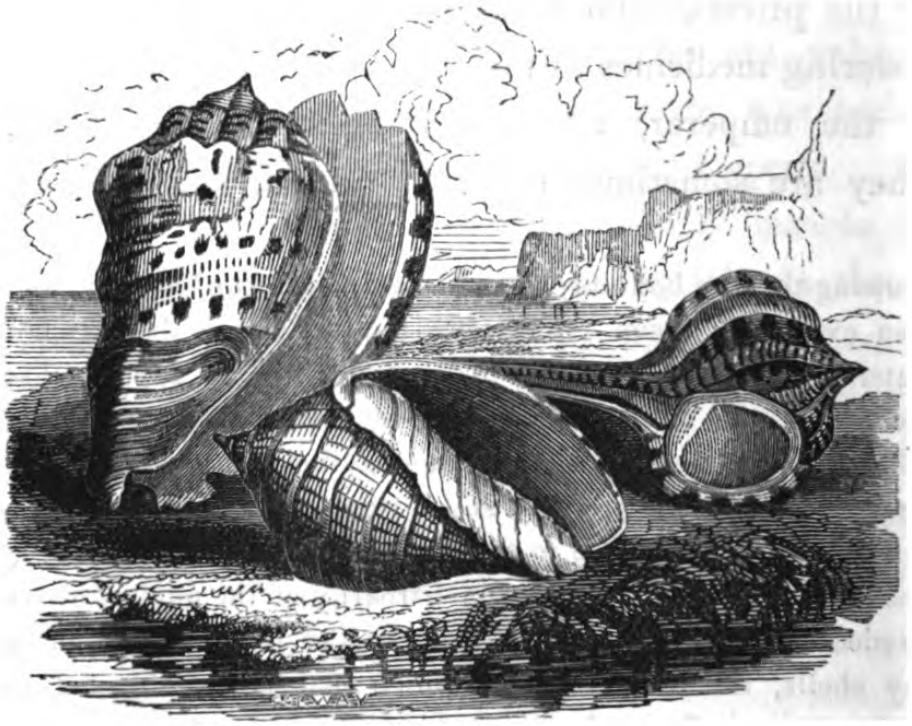
* The following observations are extracted from the Catechism of Conchology. They refer to a custom which, although foreign to the subject of this letter, the author is anxious to notice with decided reprobation.

"One thing, my young friend, I would forcibly impress upon your mind: let nothing induce you to adopt the savage, the barbarous custom of putting live shell-fish into cold water, and

The genus *Bulla* is aptly named, from its general similarity to a bubble. The form of the shells composing the elegant genus *Voluta* naturally suggested its appellation, which signifies rolled up cylindrically. Of these, the *V. pyrum*, or Pear-shaped Voluta, an oval, ponderous, smooth shell, about half an inch long, and nearly half as broad, of a dusky white colour, is held sacred in China. Shells of this species are valued at considerable sums, and kept in pagodas by the priests, who occasionally use them in administering medicines to the sick, and at the coronation of the emperor, when they hold the sacred oil. They are sometimes elegantly carved, and used by

allowing them to boil over the fire, as the means of killing, and then extracting them. Throwing the shells into boiling hot water answers the purpose equally as well, and it appears that the life of the animal is immediately extinguished, whereas a different mode inflicts a slow, excruciating death upon these innocent, unoffending creatures. I would also urge you to recommend the same mode to the shell-collectors, pointing out to them the excessive and wanton barbarity of the method above alluded to. I would even go farther, and refuse to purchase any shells, the inhabitants of which had been subjected to similar torture. I once knew a lady, whose benevolent exertions entirely did away the barbarous custom of pegging live lobsters, which formerly subsisted on the western coast. If ladies and gentlemen would act with similar firmness, they would often have it in their power to do much good, and not a little to diminish the aggregate of national cruelty, and consequently of national crime."

the Indians for drinking cups. The Spectre Shell, *Concha Spectrorum*, belongs to the same division. This elegant species is thus named from a variety of strange figures on the surface, which represent rough draughts of terrible phantoms. The ground is white, the figures of a reddish tint, forming three large bands, as if encircling in a mystic dance, the top, the base, and middle.



Strombus. **Buccinum.** **Murex.**

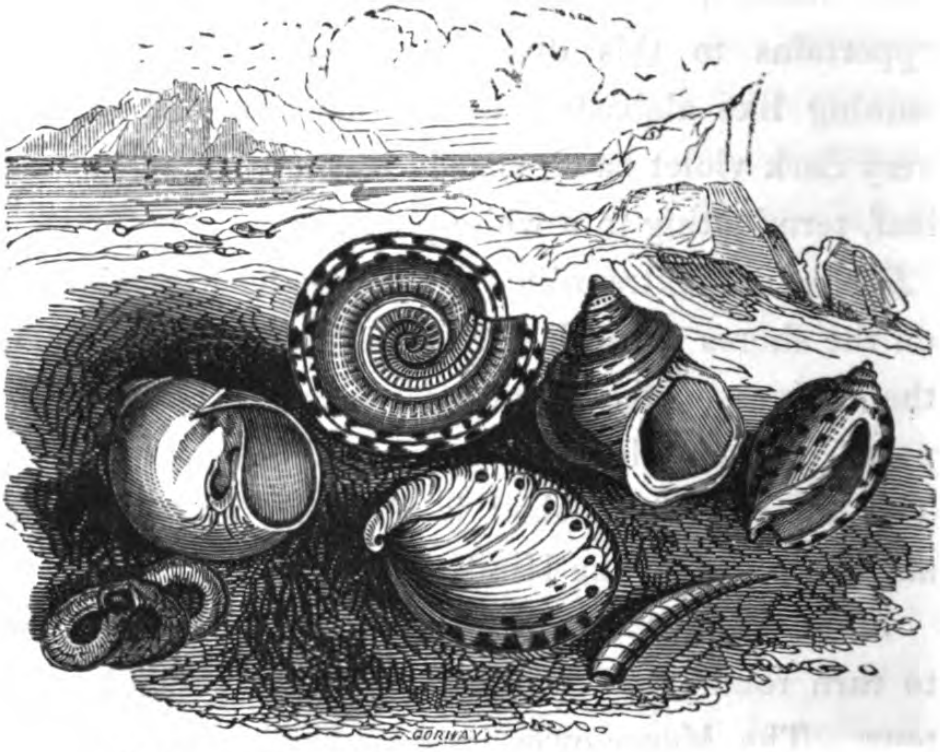
Many valuable shells are included in the genus Buccinum, which signifies a trumpet. The rare and beautiful *Bifasciatum*, or, as it is elegantly

denominated, the Grass-girdled Indian Unicorn, appertains to this division. The shell is white, shining like alabaster, and twice encircled with a very dark violet band, shaped like a tongue or wheat leaf, terminating in a white point.

Buccini, of extraordinary size and beauty, abound on the shores of the Red Sea. According to Strabo, the natives of the country wore large collars composed of them, both for ornaments and as amulets. The same kind of shell is also mentioned in the ancient books of the Hindoos, who call it Sancha.

Strombus, the Greek name for a species, signifies to turn round, and well expresses its general contour. The *Murex* owes its designation to a number of its shells, which are rough and rock-like. Several of its species inhabit the English coasts. The Shell-Collector has occasionally found the beautiful *M. Subulatus*, or awl-shaped *Murex*, among sea-sand at Scalasdale, in the Sound of Mull. It is a rare shell, long, slender, and white, with about fifteen slightly elevated whirls, defined by a purplish-brown spiral line, and elegantly decorated with two rows of beads, divided by a depressed line, and marked with minute elevated longitudinal striæ.

Ancient Syrian coins sometimes bear the *Murex* and *Buccinum*, in commemoration of the Tyrian purple.



Nerita. Trochus. Turbo. Serpula.
Haliotis. Dentalium. Voluta.

Trochus signifies a top, of which the *T. conchyliophorus*, or Carrier, is invariably covered with extraneous substances closely adhering to the whirls of the shell. This singular species admits of two distinct varieties, one of which is familiarly called the *Conchologist*, from its being loaded with perfect shells or fragments; or the Coral-Carrier, when merely the bearer of polypiferous insects; the second, the *Mineralogist*, as its adhesions consist of stones and ores. The beautiful *T. vernalis*, or Green Trochus, belongs to this division of Testaceæ: it

inhabits the East Indies and the Bay of Naples. A transverse row of nodulous belts gracefully diversifies the surface of a shell, to the delicacy of whose tinting the beautiful description of the poet of the "Seasons" is applicable, with a slight alteration:

> "Nor" *softer* "verdure dyes the robe of Spring,
> When first she gives it to the southern gale,"
> Than the *Vernalis* shews.

Between the nodulous belts the sutures are marked by an elevation resembling a pearl necklace.

The solid, ponderous, and iridescent coloured shells of the genus *Turbo*, which has the same signification with the Greek derivative of the preceding genus, are many of them extremely beautiful; especially the *T. chrysostomus*, *T. vitreus*, *T. scalaris*, or Golden-mouthed, Glassy, and Wentle-trap Turbines. The first inhabits the Asiatic Ocean, Red Sea, coasts of Amboyna, the Moluccas, and Friendly Islands. The shell is about two inches and a quarter long, of a yellowish white, tinged with green, and marbled with chestnut brown; the inside is of a rich gold colour. The second is white, and smooth, and so beautifully pellucid, as to render the columella visible through the shell. The Shell Collector has frequently met with them on the Cornish coast. The third is a rare and elegant

species, of a snowy white, or pale flesh colour. Large and perfect specimens formerly sold at very high prices; one, in the possession of Mr. Bullock, has been valued at two hundred guineas. This kind of shell inhabits the coasts of Tranquebar, Batavia, Ceylon, Amboyna, the Philippine Islands, and Japan.

The brilliant Nerita anciently derived its generic appellation from a suppositious power of swimming in the ocean. The shells included in this genus are extremely beautiful, and no art can equal the delicacy of the miniature paintings with which many species are adorned. The *Nerita littoralis*, of a bright yellow colour, is common to the Glamorganshire coast, and a considerable number were recently discovered with ivory bodkins, rods, and balls in the cave of Paviland, fifteen miles west of Swansea, between Oxevick Bay, and the Worm's Head. This exposed and solitary cave had once, most probably, been the scene of human labours. Fragments of charcoal, and the bones of oxen, indicate the fact; and it was evident that the small Nerites had either been preserved for their beauty, or used in a simple kind of game which is now common in that part of Glamorganshire.—The remains of a Roman camp are also visible on the summit of the hill that rises above the cave; a fact that seems to throw some light on the character and

date of the bleached skeleton that lay there; and whatever might have been the occupation of the spirit that once inhabited it, the vicinity of a camp would afford a motive for residence, and the means of support, in what is now an exposed and uninviting solitude.

But to return from this digression. *Haliotis*, a beautiful and well-known species of sea-shell, takes its name from a Greek word, signifying sea-ears. *Patella* is derived from a Latin word used for a dish with broad sides, probably the origin of our platter. It also means the knee-pan, which is not unlike the inmate of the shell. *Dentalium*, from dens, a tooth; which aptly expresses its miniature resemblance to an elephant's tooth. *Serpula*, from serpo, to creep, in reference to the vermiform character of some of the shells.

Different species of this interesting genus attach themselves to shells, stones, wood and algæ; others are found on the Corallina officinalis; and a rare and elegant species, the *Cornu-copiæ*, inhabits the Mauritius, where it burrows into stone and coral.

Such are a few of the most conspicuous among the elegant assemblage of Univalves which occasionally diversify the shores of our own and foreign countries.

Many others are equally deserving of attention, but it is impossible to particularize them here; and the

foregoing are merely noticed in reference to your observation, "that the science of Conchology led, in your opinion, to no beneficial result."

"Drink deep, or taste not the Pierian spring."

To know little of a science, is frequently to disesteem it; to know much, is to yield it a just tribute of admiration. "The cultivation of a fine taste for the beautiful works of nature," as Dugald Stewart justly observes, in reference to a taste for general literature, "not only enables us to enjoy more fully those primary pleasures which are afforded by an appropriate object; but superadds to these a secondary pleasure, peculiar to itself, and of no inconsiderable value. The secondary pleasures connected with the study of natural history, in even its minuter divisions, may be readily explained. They tend to excite a predilection for intellectual pursuits, in preference to such as are frivolous and unsatisfatory; and to quicken that general admiration of the wonders of creation, which the Deity has wisely implanted in the mind of man. The primary are of a higher character. They are derived from a due consideration of the works of nature in connexion with their Divine artificer, and the feelings associated with them are those of adoration and delight. They are such as were experienced by the royal prophet, when he

exclaimed with devout admiration, "All thy works praise thee, O Thou who madest the heavens and the earth, the sea and the fountains of water." The Conchologist is naturally led to these, and similar reflections, by the exquisite specimens of beauty and contrivance which crowd upon him at every step of his inquiry. His researches also tend further to convince him, that even in this department of natural history, the manifestations of that Beneficence are eminently conspicuous, which constrains every part of the creation to act in subserviency to the general benefit.

The preceding divisions of Testaceæ are extremely numerous, and abound in the most dissimilar situations. Some inhabit ditches and stagnant waters, where they afford a constant supply of food to such birds as frequent their banks; others, no doubt with the same benevolent design, incrust marine plants in sandy barren places, near the sea; a large proportion remain concealed in the deep recesses of the ocean, where they furnish food to the finny tribes; others adhere to floating sea-weeds, and abundantly supply the wants of marine birds; and, lastly, exotic snails abound in many uncultivated regions of the globe, where they frequently afford a welcome repast to the fainting traveller.

In some species of Univalves the forms of the con-

structing agents are extremely curious. The inhabitant of the *Buccinum purpurea* has two horns, like those of the common snail: but the eyes, instead of being placed at the extremities, are situated in the centre of each. He is by nature a rover, and one of the most voracious inhabitants of the deep; while his relative, the stationary *Murex*, generally adheres to rocks and stones. These dissimilar shell-fish furnished the gorgeous purple of imperial Tyre. It is recorded, that the ancients were originally indebted for this discovery to the accidental circumstance of a shepherd's dog having stained his mouth of such a colour, by the breaking of one of these shells on the sea-shore, as to excite the admiration of all who saw it.

Some historians assign this event to the reign of Phœnix, second king of Tyre, who flourished rather more than five hundred years before the Christian era; others, to the time when Minos first reigned in Crete, 1439 years before the advent of our Lord. But the greatest number agree in giving the honour of the invention to the Tyrian Hercules. This renowned hero is said to have presented the first efforts of his ingenuity to the king of Phœnicia, who was so much delighted with the splendid effect produced by this new colour, that he forbad the use of it to any of his subjects.

Others again relate the story differently. By them

it is recorded that a favourite dog of Hercules having stained his mouth with a shell, which he had broken on the shore, Tyras, a nymph to whom Hercules was attached, was so charmed with the beauty of the colour, that she vowed never to see her lover again, unless he procured her a purple suit; and that Hercules, anxious to gratify her wishes, immediately gathered a considerable number of the shells, and having extracted the colouring matter, presented her with the robe she so ardently desired. Such are the different traditions respecting the origin of the purple dye, though involved in that obscurity which pervades the discovery of all the arts connected with the ordinary wants and necessities of man; which have originated in times beyond the reach of authentic history or tradition, and are the offspring of his natural faculties, directed by the great primitive wants of food, shelter, and raiment.

But though neither history nor tradition has preserved any authentic information with regard to the origin of this interesting art, yet, from analogy, as well as observation on the practice of barbarous nations at the present day, we can readily credit the fables of the latter with regard to the rude beginnings from which the art has sprung. The rich and gaudy plumage of birds, the finely-spotted skins of animals, coloured shells, stones, and such other substances as

nature herself supplies, afford the first materials for savage finery, and indeed suggest the idea of imitating them.

Such was the case in Otaheite, before the light of Christianity arose on that benighted country; and Pomarre, in abjuring his idols, renounced also the savage customs of his ancestors. The caps and mantles of the chiefs were almost wholly composed of feathers, richly coloured, and decorated with the most beautiful shells. Of these a considerable number were the native productions of the country; others derived their lustre from the juices of herbs and flowers.

The high antiquity of the Tyrian purple is confirmed by Homer, who ascribes the wearing of purple ornaments and robes to the heroes of Greece and Rome, and assigns the preparing of them to queens and princesses.

This beautiful colour was held in such esteem by the ancients, that it was, at one period especially, consecrated to the service of the Deity. Moses used purple stuffs for the works of the tabernacle, as well as for the habits of the high priest; and among the presents which the Israelites made to Gideon, the Scriptures notice purple habits as some of the spoils of the kings of Midian.

It is not easy to give a clear and concise idea of

the process followed by the ancients in the production of this highly valued colour. The works of Aristotle and of Pliny contain some details, but they are not sufficiently circumstantial; according to the latter, the purple dye was procured from different shell-fish. The most valuable for this purpose were found near the island, where New Tyre was erected; and fishermen were also employed to obtain them in various parts of the Mediterranean. The coasts of Africa were famous for the purple of Getulia; and those of Europe supplied the purple of Laconia, which was held in great esteem.

Pliny ranges in two classes the shell-fish which produced the purple. The first, comprehended the smaller species, under the denomination of Buccinum, from their resemblance to a hunting horn; the second, included those denominated Purpura. These, Fabius Columna conceives to have been also distinguished by the generic name of Murex, though others suppose that the term included several different shades; and that from their compounds, other varieties of colour were produced.

A few drops of the precious dye were obtained from each fish, by extracting a white vein found in the throat of the animal; but with the smaller species this troublesome process was avoided, by pounding the whole fish in a mortar; a practice, according to

Vitruvius often adopted with the larger. The liquor, when extracted, was mixed with a considerable portion of salt, and suffered to remain three days; after which it was diluted with five or six times its quantity of water, and digested, in a moderate warmth, during ten days, in a leaden or tin vessel, being frequently skimmed for the purpose of removing all impurities. The wool having been previously well washed, cleansed, and prepared, was then immersed in the fluid; after soaking five hours, it was taken out, carded, and again returned to the boiling dye, till all the colour was completely absorbed. To produce particular tints, nitre, and a marine plant, called fucus, brought from the rocks of Crete, were occasionally added.

The Tyrians, by the confessions of all antiquity, succeeded best in dyeing purple stuffs. Their process slightly differed from the one narrated by Pliny, as they merely used such purple shells as abounded on the shores of the Mediterranean, and made a bath of the liquor extracted from the fishes. In this they steeped the wool for a certain time, then took it out, and threw it into another boiler, which contained an extract from the Buccinum or Trumpet-fish only; and hence the wool which had been submitted to this double process, was so highly estimated, that in the reign of Augustus, each pound sold for one

thousand Roman denarii, about thirty-six pounds sterling. We need not indeed wonder at this enormous price, when the tedious nature of the process is considered, and also the small quantity of dye; not more, on an average, than a single drop being afforded by each shell fish. For fifty pounds of wool, the ancients used no less than two hundred pounds of the liquor of the *Buccinum*, and one hundred pounds of that of the *Purpura*, or six pounds of liquor to one pound of wool: consequently, the real Tyrian purple vied in value even with gold itself. Ancient writers mention several different shades of purple; one of which appears to have been a kind of dark violet, inclining towards a reddish hue; another, less esteemed, resembled crimson; but the most valued of all, was a deep red purple, of the colour of coagulated blood.

A fourth kind, of a whitish tint, has been discovered in modern times.

The wearing of purple robes, was, in Italy, originally confined to the first officers of Rome; but as luxury increased in the capital of the world, they were progressively adopted into the lower ranks of patrician society, till every one who had wealth sufficient to purchase them, appeared in the Circus, and at the Theatre, arrayed with these costly trappings. But the Emperors could not endure that

plebeians should thus appropriate a style of dress, which had hitherto designated the highest officers of the state. A law was passed, to render it a distinguishing mark of imperial dignity, as well as a symbol of inauguration; and hence to assume the purple, was a phrase synonimous with that of ascending the throne. Till at length, came One of prouder character than any that had preceded him, and he not only appointed officers to superintend the manufactories of this imperial dye, but also denounced the punishment of death against any of his ambitious subjects, who dared to usurp the prerogative of the throne, though concealed by garments of another colour. The penalty so tyrannically denounced against this whimsical kind of treason, doubtless occasioned the loss of the art of dying purple, first in the west, and afterwards in the east, where it flourished till the eleventh century.

The finest kind of purple preserved its brilliancy for a considerable time, and long survived the wreck of those for whom it was designed. Plutarch relates, in his Life of Alexander, that the Greeks found in the treasury of the Persian King, a great quantity of purple, which had not lost its beauty, though nearly one hundred and ninety years old.

The ancients also obtained from the Coccus, now known by the name of kermes, a colour nearly equal

to the Tyrian dye, with which, according to Pliny, it was indeed occasionally confounded, under the name of scarlet. The use of the coccus in dyeing is very ancient, since it appears from commentators, to be alluded to in Exodus :—

" And of the blue, and purple, and scarlet, they made cloths of service, to do service in the holy place, and made the holy garments for Aaron.

" And a girdle of fine twined linen, and blue, and purple, and scarlet, of needle work; as the Lord commanded Moses."—xxxix. 1, 29.

In after times the lighter kinds of Tyrian purple were used in dyeing parchments, or vellum, with the design of rendering still more splendid the gold and silver letters with which they were adorned; and these, Casiri tells us, reflected objects like a mirror. But as Tyrian robes were confined to the palace, and person of the Emperor, so this magnificent and expensive style of writing was appropriated to Biblical manuscripts and the libraries of princes. Hence Theonas admonishes Lucian, the grand chamberlain, not to permit any transcription upon purple vellum, in gold and silver letters, unless especially required by the Prince; and hence, I entreat you, says Boniface, Bishop of Mentz, the Apostle of Germany, in a letter to the Abbess, Cadburga: " I intreat you, send me the epistle of the Apostle St. Peter, written

in letters of gold, that by exhibiting them in preaching, to the eyes of the carnal, I may procure the greater honour and veneration for the Holy Scriptures. Such is the Book of the Gospels, which Louis the Pious gave to the monastery of St. Medard, at Soissons, now in the Royal library of France; and such is the Book of Prayer, written in letters of gold upon purple vellum, bound in ivory, and studded with gems, formerly belonging to Charles the Bald, but now in the celebrated Colbertine library.

The fourth and fifth centuries were especially remarkable for magnificent specimens of Chrysography, and of Illumination, or ornamental decorations of Biblical manuscripts.

At the sale of the late Sir William Burrell's library in 1798, a manuscript Bible, beautifully written on vellum, and highly illuminated, was disposed of; it contained the autograph of the writer, Guido de Jars, in which he stated that the work had taken him half a century to execute; that he had begun it in his fortieth, and finished it in his ninetieth year; during the reign of Philip the Fair, in 1294.

Similar transcripts were also occasionally made in England. The famous Wilfred, ordered a copy of the four Gospels to be written for the church of Rippon, in letters of the purest gold, upon leaves of parchment, purpled in the ground, and variously

coloured on the surface. But such were extremely rare, as we learn from the observations of the Venerable Bede, who notices the one at Rippon, as a kind of prodigy, before unheard of. The Gregorian Bible, presented by a monkish missionary, and his companions, to the first Christian church erected at Canterbury, was also of a similar description. It was written in red letters, with several splendid purple and rose-coloured leaves inserted in the beginning of each book.

Thus are we indebted to the Moluscous inhabitant of the Murex, and Buccinum, for the imperishable dye which distinguished the vestments of the Roman Emperors, and for the brilliant decorations of our earliest manuscripts.

LETTER VI.

UNIVALVES.

To * * * *

THE following extracts from a series of experiments by Mr. Cole, and M. du Hamel, relative to the method of extracting the Tyrian dye, will serve to elucidate the brief description I have already given you.

When the shells of the purple-producing *Murex* and *Buccinum* are broken, and the mutilated fragments carefully removed, so as not to injure the inhabitant, the white vein already noticed as the reservoir of this brilliant colour, may be observed lying transversely in a little furrow, or cleft, near the head of the fish.

The juice from which this beautiful colour originates, is perfectly white during the time that it

remains in the body of the shell-fish, and while the creature is in health; but no sooner is it exposed to the sun, than it begins to change, and in less than five minutes passes through several gradations of pale, yellowish, and vivid emerald-green; after which it becomes of a duskier hue, then blue and red, and finally, of a deep and very beautiful purple. Here the action of the sunbeams terminates, but by washing the linen in hot water, and afterwards drying it, the colour ripens to a bright and brilliant crimson. It is worthy of remark, that if a piece of linen be rubbed with this juice, and partially exposed to the action of the sunbeams; that part of it only will turn red, which is so exposed; the other retaining the natural tint, without any alteration; and that if a needle, or any other opake body, be laid upon the linen while it is yet green, the spot on which it is laid will remain unaltered, while a rapid change has taken place in every other part.

A plate of glass, though it be three inches thick, will not prevent the colour from changing to purple by being laid over it, but the thinnest metal effectually precludes any alteration; the one being opake, and the other pellucid, are evidently the occasion of this difference. But if the coloured linen be successively covered by three pieces of paper, the one blackened with ink, the other in its natural state, and the third

rubbed over with oil, it will change colour on being exposed to the sun in different degrees, and that exactly in proportion to the degree of transparency in each of the papers.

These experiments were made in the months of January and February, by M. du Hamel, in Provence.

The vividness of this beautiful purple renders it particularly valuable, especially as the pieces of stained cloth retain their colour: even if dipped several times in different liquors.

The *Buccinum* as well as *Murex*, was used by the ancients for purposes of dyeing. They are both obtained in great plenty in the gulf of Tarentum, as well as in various parts of the Mediterranean.—*Buccini* of a prodigious size are also frequently surprised by Sicilian fishermen, asleep and floating on the smooth bays of the Mare Grande.

The seas of the Spanish West Indies about Nicoya, furnish a shell-fish, which perfectly resembles the ancient purpura, and in all probability is the same. These fish, usually live about seven years: they conceal themselves in the sand a little before the commencement of the Dog-days, where they continue for several months. On their reappearance they are collected in considerable numbers; and by rubbing them one against another, a kind of saliva,

or thick glue is obtained, resembling soft wax; but the purple dye is situated in the throat, and that of the finest hue, in a small white vein. The chief riches of Nicoya consist in these shell-fish. They are used in dyeing the cloth of Segovia, which is often sold for twenty crowns the ell; as the wearing of it, is entirely confined to nobles of the highest rank.

The coasts of the South Sea, near the equator, in the neighbourhood of point St. Helena, in the province of Guayaquil, also furnish some shell-fish of a similar description, which are termed by Don Antonio de Elloa, sea-snails. They adhere to such rocks and stones as are covered by the sea at high water, and are about the size of small nuts, containing a liquor or juice, which has the true colour of purple. This colour is very bright, and so durable, that washing rather increases than diminishes its lustre; nor does it experience any perceptible alteration in consequence of use or wearing.

The Carribbee Islands have likewise their purple fish, which resemble our perriwinkles. The shell is of a brownish azure — the flesh white, and the intestines of a bright red, the colour of which appears through the body. On being taken from the water the creatures exude a considerable quantity of froth, which is received on a linen cloth, and becomes purple as it dries.

The *Purpura* lives on other fish. It usually hides itself at a small depth in the sand, sometimes even in fresh-water rivers; and as it lies hid, it thrusts up a pointed tongue, which wounds and kills such diminutive fish and animalculæ as heedlessly approach too near. Sea shells are frequently found perforated with round holes, as regularly as if made with a boring instrument; these are generally supposed to be formed by the tongue of the Purpura, in order to its feeding on the fish within.

Shell-fish yielding the Tyrian dye, have also been discovered on the Somersetshire coast, and in South Wales, where they are used by the country people for staining their linen. These are the *Murex* and *Buccinum*, common deposits of the ocean, on the shores of the Principality. Beautiful specimens of each are frequently brought from among the magnificent arcades, which the incessant toiling of the waves have excavated in the rocks of Gower, a romantic little peninsula in Glamorganshire, and as much distinguished for the primitive simplicity, politeness, and intelligence of its singular inhabitants, as for the grandeur of the sea views, ancient castles, and beautiful home scenes, with which it is surrounded and diversified.

The *Buccinum* undoubtedly suggested the first idea of a trumpet, as by breaking off, or making a hole

near the apex, an instrument is formed from which a variety of sonorous sounds may be produced. This kind of trumpet is still employed by Italian herdsmen for directing the motions of their cattle; similar ones are also common in North Wales, where I have often heard their deep and hollow sounds, breaking on the silence of those Alpine districts, when used by the farmers in calling to their woodsmen. Triton, the trumpeter of Neptune, is generally pictured with a shell of this description in his hand, with which the ancient poets feigned that he convened the river deities around their monarch. It is wreathed like those called Sicankos, or sea-horn, common to India, Africa, and the Mediterranean, and still used as trumpets for blowing alarm, or giving signals; a custom thus elegantly noticed in the following animated lines:—

"Then the roused youth impatient flew
To the tower wall, where, high in view,
A ponderous sea-horn hung, and blew
A signal deep and dread as those
The storm fiend at his rising blows,
And there, upon the mouldering tower,
Hath hung this sea-horn many an hour,
Ready to sound o'er land and sea,
The death-dirge of the brave and free."—MOORE.

Shells of the same description are used in Lithuania and Muscovy, where they are also applied to pastoral purposes. No sooner is a herdsman risen in

the morning than he winds his horn, and the horses, mules, oxen, asses, goats, and sheep, immediately leave their respective places of retreat, and assemble round their conductor. He then advances at their head, and leads them into such pasturage as he thinks proper for the day; a second signal conducts them to the waters, and a third commands them home, when every one repairs to his shelter for the night.

Thus beautifully has Isaiah referred to this ancient custom, which is still common in the east: "The ox knoweth his owner, the ass his master's crib; but Israel doth not know, my people do not consider."

In Palestine, bee-masters summon their bees by blowing a small whistle, formed of bone or shell. They sometimes collect the humming population of a village, who follow them as orderly as sheep obey the voice of their shepherd, and lead them from one meadow to another, till an impending shower, or the approach of evening, cautions them to return. This singular custom is noticed by St. Cyril, who flourished in the fourth and fifth centuries, as a thing which he had frequently seen. He also mentions, that Isaiah refers to it in the following passage, in which the future conquests of the Assyrian monarch are foretold.

"And it shall come to pass in that day, the Lord shall hiss (or whistle) for the bee that is in the land of Assyria.

"And they shall come, and shall rest all of them in

the desolate valleys, and in the holes of the rock, and upon all thorns, and upon all bushes."—vii. 18, 19.

A sort of speaking trumpet, made either from the shell of the Buccinum, or the bark of a cherry tree, is also used among the Alps. When the last rays of the setting sun appear on the horizon, the shepherd who dwells highest on the mountains, blows his horn, and calls aloud, "Praised be the Lord." The neighbouring shepherds then leave their huts, and repeat the words. The sound lasts for several minutes, while every cave and mountain echo repeats the name of God. How solemn is the scene! Imagination can scarcely picture any thing more sublime! The profound silence that succeeds, the grandeur of the mountains, the brilliant rays of the setting sun which illumines their highest peaks, the deep gloom of the valleys below — all conspire to awaken the most solemn reflections. Meanwhile the shepherds bend their knees, and pray in the open air; soon after which they retire to their huts.

When varying hues of parting day,
O'er evening's portals faintly play,
The Alpine horn calls far away,
Prais'd be the Lord!

And every hill and rock around,
As though they lov'd the grateful sound,
Send back, 'mid solitudes profound,
Prais'd be the Lord!

Just Heaven! has man so thankless grown,
He brings no anthems to thy throne,
When voiceless things have found a tone,
To praise the Lord!

Ah, no! for see, the Shepherds come,
Though hardly heard, the "welcome home"
From toil of day—they quickly come
To worship God.

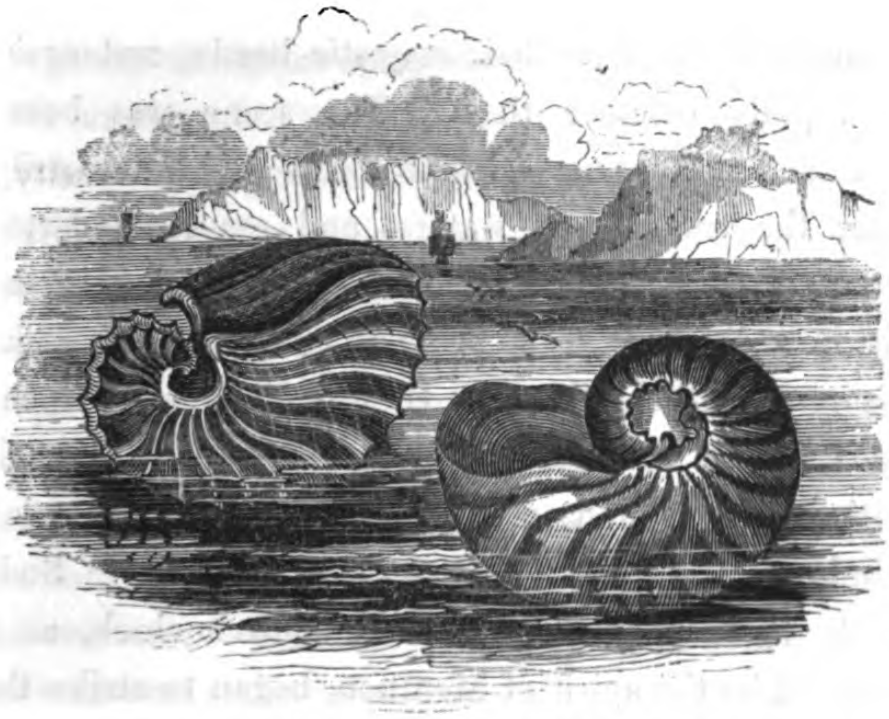
The look that taught their hearts to bow;
And childhood's laugh, and sunny brow,
All, all by them forgotten now,
In praise to God.

How lovely such a scene must be,
When prayer and praise ascend to Thee,
In one glad voice of melody,
Eternal Lord!

All space thy Temple—and the air
A viewless messenger, to bear
Creation's universal prayer,
On wings to heaven!

Oh! that for me some Alpine horn
Both closing eve, and wak'ning morn,
Would sound, and bid my bosom scorn
The world's vain joys:

Its treasur'd idols all resign
That when life's cheating hues decline
The one undying thought be mine,
To praise the Lord!



Argonauta Argo. Nautilus Pompilius.

LETTER VII.

UNIVALVES.

To * * * *

THE cliffs of Tenby first rose upon the view of your friend, on one of those delightful mornings in July, when a fresh cool breeze gently ripples the surface of the deep; and the distant mountains, beautifully varied with light and shade, are occasionally obscured with floating mists, which

sometimes envelope their majestic heads, and again as rapidly disclose them. The scene was beautiful and animating. Light skiffs glanced merrily over the transparent waters, and sea-birds darted from their coverts in the rocks, now rising in the air, now diving into the sea, and again appearing like foam upon the billows. In the distance, stupendous masses of black granite stood forth in all their native majesty, and on the nearest cliffs the glittering windows of a range of houses met the view. Suddenly the mellow tones of the church clock, as if inspired by the spirit of Memnon, began to strike the hour at the moment when the beams of the now rising sun burst in full glory on the surrounding scene, and a long line of radiance streamed upon the face of the waters, occasionally lost or broken by the huge shadows of distant rocks. Meantime the vessel advanced to the shore, and the voyager sprung on land,

> "Seeking whate'er of beautiful or new,
> Sublime or dreadful, in earth, sea, or sky,
> By chance, or search, was offered to his view,
> To scan with curious and romantic eye."
>
> BEATTIE.

A variety of sea-shells, including several fine specimens of the *Turbo interruptus*, or Streaked Turbo, and the *Mya declivis*, or Sloping Gaper, had been recently thrown on shore; the former, half buried in

the sand; the latter attached to a group of sea-weed, with an elegant little *Rotatus*, or Wheel Nautilus, a species of shell-fish commonly found on the British coasts, though one of the least valuable of the numerous family of Nautilus. Among which the superb *N. scrobiculatus*, or Sunk-spire Nautilus, and the *N. pompilius*, or Great Chambered Nautilus, are two of the most conspicuous for beauty and evident design. The shell of the latter is often converted by the inhabitants of the East into a drinking-cup, on the surface of which various ornaments and devices are engraven: they also frequently remove the outer coatings, and thus render visible the pearly appearance of the shell beneath. An exquisite specimen was exhibited among the curiosities of Fonthill.—The decorations were executed in the first style by Hillican; the subject, the Triumph of Neptune and Amphitrite. It was mounted in the most elegant manner in silver gilt; embossed, and decorated with finely engraved shells, with mosques, and Cupids, and a coat of arms and helmet, beautifully pierced and worked in gold.

These curious shell-fish differ considerably in size: some are so exquisitely minute, that they can only be defined by the aid of a high magnifier, others are nearly a foot in diameter. And yet, however dissimilar in this respect, the same admirable arrangement

is conspicuous in each, the same high finishing on the exterior, the same attention in the interior to the comfort of the inhabitant. This, as the generic character of the Nautilus implies, is either a Sepia or a Clio, though most probably the former; and its appearance, and manner of life are so singular and interesting, that they did not escape the notice of some among the earliest writers on natural history.

How sterile is the imagination of man, when compared with the infinite variety that surrounds him! What has he produced, that may not be found in far greater perfection among the wonders of creation. The *N. siphunculus*, or Ringed Nautilus, which is often brought from the coral reefs of the Silician shores; and the *N. scrobiculatus*, already mentioned as the rarest species of the genus, are conjectured to have originally taught mankind the use of sails, from the skill which they evince in directing their fragile barks.

> "For thus to man the voice of nature spake—
> Go, from the creatures thy instructions take;
> Learn of the little Nautilus to sail,
> Spread the thin oar, and catch the driving gale."

Hence the generic appellation of this extraordinary species, which signifies both a ship and sail.

Delightful it is to contemplate the infinite variety of means, by which one and the same purpose is

effected. The *Mytilus*, *Pecten*, *Sea-snail*, and innumerable others, are enabled to float on the water, either by the assistance of strong muscles, or of bladders, which they inflate at pleasure, or else by adhering to such heterogeneous substances as are borne about by the waves; but in the *Nautilus* a different mode of structure, and a different process it discoverable. We observe, accordingly, that the testaceous coverings of this interesting shell-fish are univalve; the partitions arched and perforated; that it is divided into forty or more cells, which open one into another, by means of a perforation in the middle of each partition, and decrease in size as they approach the centre of the cell: that, further, the animal resides in the largest apartment, and keeps up a communication with the others by means of a slender syphon, running spirally through the perforations of the shell.

But this is not the only purpose for which the syphon is designed. The office of this tube, ingeniously conjectured to be analogous to that of the swimming-bladder in fishes, is, consequently, essential to the movements of the animal; for the gravity of the shell is so admirably counterbalanced by its empty apartments, that the weight of the whole apparatus is capable of being increased or diminished, according as the syphon is filled with air

or water. Thus, if the animal is stationary at the bottom of the sea, saturated with food, and having the syphon filled with water, we may conjecture from analogy, that in proportion as the food becomes digested and decomposed, detached gas will pass into the syphon, and gradually exclude the water, and so considerably diminish the specific gravity of the shell as to enable him to ascend readily to the surface. When, on the contrary, the *Nautilus* is inclined to descend, he lowers a small membrane which answers the purpose of a sail, contracts himself within his boat, and filling the remaining cavity with water, immediately disappears.

The facilities for thus escaping to his native dwelling in the fathomless abyss, are beautifully noticed in the following animated lines, which refer to the dangers of a sailor's life.

"The tender nautilus, who steers his prow,
The sea-born sailor of this shell canoe;
The ocean Mab, the fairy of the sea,
Seems far less fragile, and alas! more free!
He, when the lightning-wing'd tornados sweep
The surf, is safe, his port is in the deep,
And triumphs o'er th' armadas of mankind,
Which shake the world, yet crumble in the wind."

This ingenious little sailor is frequently seen in fine weather, calmly riding on the billows with his

sails expanded to the wind, and extending two oar-shaped tentaculæ for the purpose of rowing his fragile bark; thus steering his course without chart or compass, self-taught in the art of navigation; and at once both vessel and pilot.

> "No star has he to guide his way,
> Or Tyrian cynosure."

Yet still he sails along, regardless of adverse winds, and undeterred by the perils of the deep, apparently conscious that he contains within his shell all the necessary requisites for navigation; rudders, sails, oars, and cordage. In short, a vessel which no human hand has formed, and guided by no human skill; a striking proof, amid the terrors and the wonders of the deep, that whilst nothing is too great for the controlling power of Omnipotence, nothing is too humble for his protecting care.

The human mind, even when unassisted by the light of revelation, could arrive at this conclusion, so wonderful and consolatory: and hence not only the trees that covered the earth, and the fruits and flowers that grew beneath them; nay, even the most curious shell-fish which the waves had placed upon the shore were supposed under the control of, and peculiarly favoured by some presiding Deity. Thus, while in Syria, the *Buccinum* was anciently dedicated to

Astrate; in Greece, the elegant *Chambered Nautilus* was peculiarly the care of the famous Egyptian priestess Arsinoe, who was worshipped as a goddess under the names of Zephyrites, Venus, and Chloris. A fact which Callimachus has recorded in the following beautiful lines, wherein he commemorates the dedication of a Nautilus to this supposititious deity by Silenæa, the daughter of a nobleman of Smyrna.

"A sacred shell, Zephyrites, divine,
Fair Silenæa, offers at thy shrine;
And thus, thy Nautilus is doubly blest,
Since given by her, and still by thee possest.
Of late, small tackling from my body grew,
Thin sails I spread, when winds propitious blew;
But when the seas were calm, to gain the shores,
I stretch'd my little feet, like lab'ring oars,
And from my busy limbs, and painted side,
Was call'd a Polyp, as I stemm'd the tide,
Till driven by winds, on Coan's rocks I shone,
And now recline before Arsinoe's throne.
Depriv'd of life, no more on seas I rest,
Or draw young Halcyons from the watery nest.
But be this boon to Clineas' daughter given,
A virtuous maid, and fav'rite of high heaven;
The precious boon may Silenæa gain,
When she from Smyrna, ploughs the watery main."*

It appears from this exquisite little poem, that the

* From the Translations of Callimachus, by K. W. Tytler, M.D. Fifth epigram.

Nautilus was not only supposed by the ancients to feed on the eggs of the halcyon, or kingfisher, but that the appearance of these birds upon the water was considered a favourable omen, and thus Silenæa propitiates the goddess, that she may be indulged with the sight of them during her voyage.

The shells of the genus *Argonauta*, or Paper-sailor, are nearly as extraordinary in their appearance and formation as those of their relative the Nautilus, and in these we observe the same extraordinary configuration, the same subserviency to an evident design. They are remarkable for excessive thinness and brittleness, and are perhaps surpassed by none in the delicacy and elegance of their construction. The form resembles that of a scroll, with a very large aperture; and the surface is ornamented with numerous channelled grooves, which extend from the summit to the outer margin, while the colour of the shells is commonly a bluish or dingy white, relieved by the delicate brown tinting of the keel. Argonautæ differ considerably in size and value. A few of the most curious are produced at the Cape of Good Hope, Mediterranean, and Indian Ocean; whilst others are commonly found in the Atlantic, Northern, and Greenland seas.

This interesting genus, the Nautilus of Pliny, has been separated from the Chambered genus, bearing

that name in the Linnæan system, and is denominated *Argonauta*, from a favourite companion of Jason, in the celebrated voyage of the ship Argo. The art of navigation is supposed to have owed its origin to the expert management of this instinctive sailor, as well as to that of the *Nautilus*. Like the latter, he frequently rises to the surface of the sea, by ejecting a quantity of water, and thus diminishing the specific gravity of his shell; nay, more, he guides his mimic vessel by means of several oar-shaped tentaculæ, and also expands a little membrane which answers the purpose of a sail. These, on the approach of danger are immediately lowered down, and by a rapid absorption of water, the *Argonauta* descends into the deep. A fact, thus accurately noticed and described by Pliny:—

"One of the greatest wonders in creation is a certain shell-fish, called by some the *Nautilus*, and by others *Pompilus*. When this extraordinary creature wishes to rise above the water, he turns upon his back, raises himself by little and little, and in order to swim with greater facility, throws out all the water contained in his shell. His body being thus lightened, he lifts up his two foremost claws, or arms, and stretches out between them a fine membrane. This serves him for a sail above water, and with his other he works his way beneath it, directing his course with

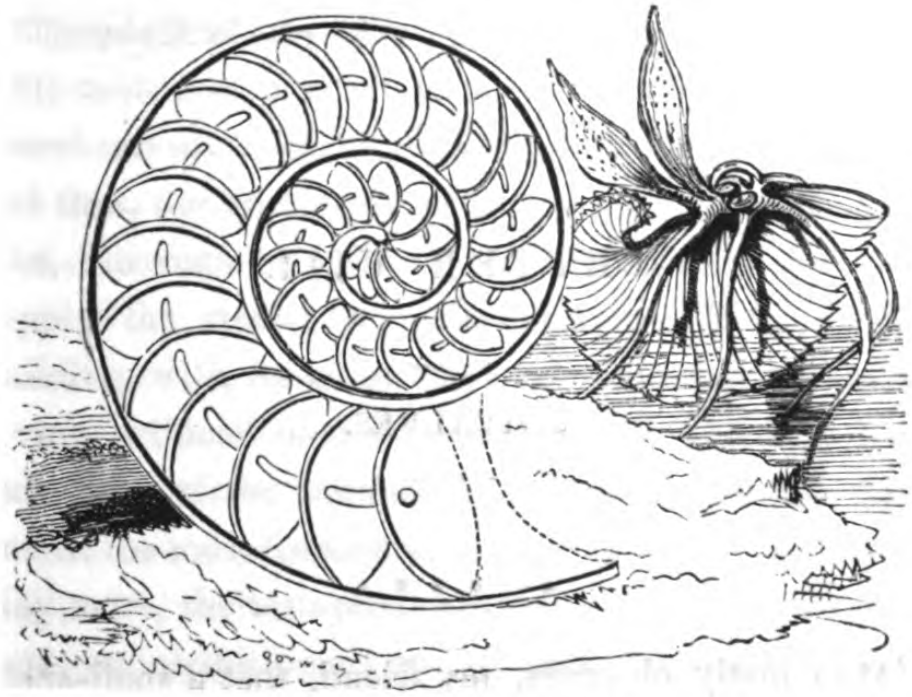
his tail, which serves the purpose of a helm. Thus he traverses the ocean like a ship in full sail; and if any thing occurs to frighten him, he immediately fills his little shell with water in order to increase his weight, and betakes himself to his dwelling in the fathomless abyss." Hence the sagacious little mariner is seldom taken in the act of sailing, but is usually drawn up from marine rocks, or entangled in the nets of the fishermen.

Cicero refers to the ocean and its inhabitants as affording irrefragable proofs, in connexion with the general wonders of creation, of the existence of a presiding deity. " How beautiful," says this enlightened heathen, " is majestic ocean! How delightful to contemplate its vast expanse of waters, varied with islands and continents! How innumerable and diversified the multitudes of living creatures which it contains: some dwelling in its deep recesses, others sporting on the waves, others again adhering to the rocks!" " Who can observe the beauty of the universe, the order of the celestial bodies, the rising of the sun and moon, and the motion of the stars, without being convinced that the world was not formed by chance—that God alone is able to be the creator and director of so many wonders?"

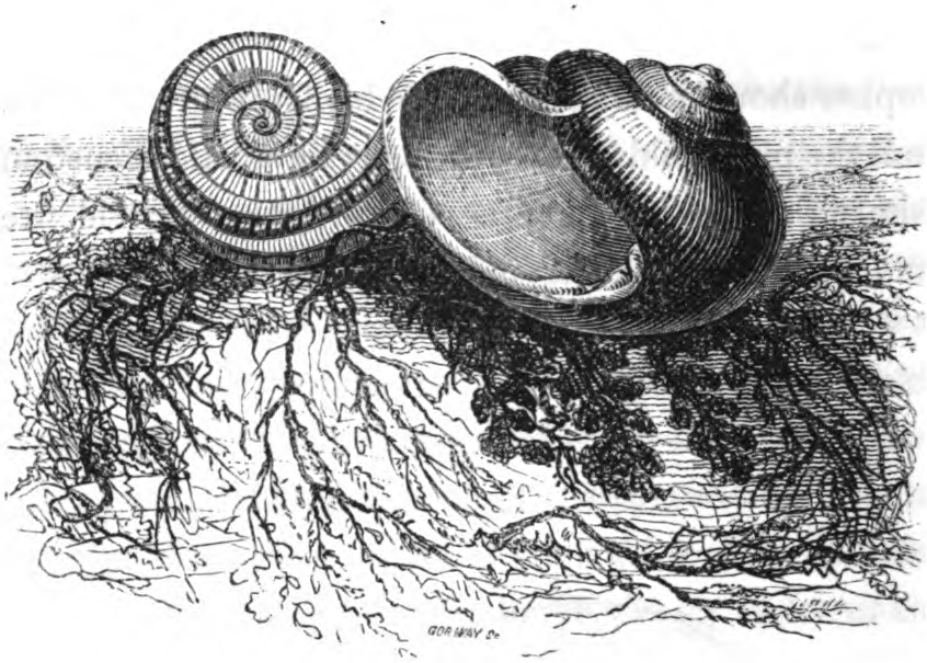
This enlightened heathen, and his equally enlightened countryman, the Natural Historian, Pliny,

delighted to acknowledge in their works the shadowy forms of Pagan superstition, which they supposed to control, not only the passing events of life, but also the varied wonders of creation. They brought to bear upon the subject which engrossed their profoundest contemplations, all the feeble light which they possessed. They regarded as through a darkened glass, the dispensations of all-ruling Providence, and faintly looked up to the Parent of gods and men. And shall we, who walk in the clear light of the Gospel dispensation, refuse to acknowledge Him, who framed this well-ordered world—who spread the firmament above as a tent to dwell in—and who gives to his own glorious heaven, all its unalterable joys, and splendours which no mortal eye could steadily behold.—Shall we be ashamed to acknowledge, that once travelling in human form, he entered this magnificent museum, and sojourned among the wonders which his hand has made, to reveal at once what God is, and what man ought to be? Heathens might discover an eternal power, a surpassing wisdom, an indefinable benevolence, in the signs and wonders of creation. Heathens might acknowledge a stupendous liberality in the grant of the whole fabric, and its garniture, and astonishing accompaniments for the use of man. But the Christian philo-

sopher should ever bear in mind his forfeiture of them, and the price paid to redeem them; he should accustom himself to receive the gifts of a benignant Providence as from the hand of an indulgent Mediator.



Section of the Chambered Nautilus Argonauta.



Helices.

LETTER VIII.

UNIVALVES.

To * * * *

PALEY justly observes, my friend, that a snail-shell is a wonderful, a mechanical, and, if we may so express ourselves concerning the works of nature, an original contrivance. "Other animals have their proper retreats, their hybernacula also, or winter quarters, but the snail carries these about with him. He travels with his tent; and this tent, though, as

was necessary, both light and thin, is completely impervious either to moisture or to air." The young *Helix*, like his numerous brethren of the family of Univalve, emerges into life with a covering adapted to his exigences, and this enlarges with his growth, by means of a certain viscous exudation from innumerable pores. Now the aptness of this secretion to the purpose for which it is designed, its property of congealing into a firm and hard substance, independent of any effort on the part of the inhabitant, cannot be referred, as the same admirable writer has observed, to any other cause than express design; and that, not on the part of the unconscious architect, who, although he might build the house, could not supply the materials. Moreover, the form of the building, with its pillar and convolution, is not only a very artificial one, but admirably adapted to the exigences of the inhabitant; which is, confessedly, one of the most feeble and unprovided of all artificers. Nay more, the testaceous coverings of such as live on land, or inhabit ponds and ditches, are scarcely able to resist the slightest pressure; while in others, their defensive strength suits well with the lives of those that have to sustain the dangers of a stormy element, and a rocky bottom, as well as the attacks of voracious fish. The sealing up of the mouth, which serves in several species as an effectual protection

against the cold of winter, is also admirably adapted for warmth, and for security. But the cerate is not of the same substance as the shell; evidently because the animal would be then unable to break down the enclosing barrier, when the return of spring invites him from his winter quarters. In the midst of an almost endless variety, a striking regularity is nevertheless discoverable. However different individuals may vary in form and colour, according to the sites which they are designed to occupy, in one point they almost universally agree. The number of whirls in the same species is generally, if not always, the same; and these, with a few exceptions, are uniformly in one direction, that is, from right to left, like the motion of the globe, when the mouth of the shell is turned northward, with the base towards the ground.

These admirable receptacles, when deserted by their artificers, serve as temporary habitations to insects of various kinds. The *Caracol Soldato*, or Soldier-snail of Carthagena, takes up his abode in the hollow apartment of a marine *Helix*. This singular creature, which resembles a snail in his general construction, while the head and claws differ little from those of a crab, is destitute of any kind of covering, and from the tenderness and flexibility of his body is peculiarly liable to injury. He, accordingly, no sooner becomes sensible of his helpless

situation, than he hastens to secure a safe retreat in some empty shell. This borrowed citadel, or armour, is borne about by the *Carocol*, who occasionally deserts it in quest of food, but on the slightest appearance of danger hastens to resume it with the utmost alacrity. Being too bulky to turn round in his dwelling, he obviates the inconvenience by walking backwards into it, and filling up the entrance with his formidable claws; where he sits looking out, and inflicting deadly gripes upon all who approach too near; the symptoms attendant on which are as dangerous as those produced by the bite of a scorpion. When grown too large for the comfortable occupation of his mansion, the Soldier-snail retires to the sea side, where he wounds some defenceless *Buccinum*, the shell of which is more commodious; turns out the owner, and occupies his dwelling.

The Caracol Soldato of Carthagena resembles in its habits the *Cancer Barnhardus*, Diogenes, Soldier, or Hermet Crab; an industrious little animal, which commonly inhabits the coasts of Europe, and occupies himself in clearing the sea-shore of such fragments of small fish and marine insects as the waves have from time to time deposited. That beneficent Being who denies to the *Barnhardus* the coat of mail, in which he has invested every other individual of the same genus, compensates for the deficiency by instructing it to

take refuge in the empty cavity of a turbinated shell. This species is parasitic. It affords a striking instance of the powerful effect of instinct; of that propensity which is prior to experience, and independent of instruction. No sooner does the young Hermit emerge from under the protection of its parent, than he hastens to the deserted shell of some simple *Nerite*, which he continues to occupy for a considerable time; but as his desires increase in proportion to his growth, he removes from one residence to another, till at length, like the *Soldato* mentioned by Don Ulloa, he takes up his abode in the spacious mansion of a marine *Helix* or *Buccinum*. With either of these he can travel rapidly over the soft sand, retire at night into its "hollow wreathed chamber," or render it an impregnable citadel, by withdrawing to the farthest end; and inflicting severe pinches upon such as venture to attack him. Now mark the extraordinary manner in which the *Hermit*, or *Soldier Crab*, is enabled to carry his tent from one place to another; for as it is sometimes considerably larger than the inmate, it must, without some peculiar expedient for obviating the inconvenience, be continually left behind. The Creator of the *Hermit Crab*, who consigned it to a borrowed habitation, foresaw the difficulty, and admirably provided for it. The tail is furnished with a bent claw

exactly in the form of a hook, by which the *Hermit* attaches himself to any accidental projection, crevice, chink, or roughness in his moveable habitation. Without this admirable appendage, the parasitic Crab would be one of the most helpless of all animals, obnoxious to every kind of injury, and totally unable to ward off the insults of his enemies. The want of armour is thus completely made up to him; and while he hooks himself by the claw to the walls of his apartment, he travels with a thin commodious tent, impervious to air and moisture; which he is moreover able to throw aside, whenever it becomes too small for his convenient reception.

Nothing can be more amusing than to observe the movements of this little animal when about to change his habitation. He is seen busily parading along that line of pebbles and of shells which is formed by the extremest wave, and still dragging after him his incommodious dwelling, as if wisely resolving not to part with one, however inconvenient, till certain of obtaining another, more congenial to his wishes. Then stopping at a shell, he turns it over, and having contemplated it for a short time, he slips out of his old mansion, and tries on the new. If this does not appear to suit him in every respect, he quickly re-enters that which he had left, and moves onward in quest of another, more to his mind.

It is very amusing to observe one of these active little crabs, examining and rejecting different kinds of shells, till he has at length provided himself with a light, roomy, and convenient habitation. Yet it is not till after many trials, and some battles also, that the *Hermit* is completely equipped; for it sometimes happens that a warm combat ensues with a Crab of a similar description, for the occupation of a well-looking and favourite shell. Both endeavour by fraud or violence to obtain an entrance. They strike with their claws, and bite each other; till the weakest is obliged to yield, and give up the object in dispute. The victor then triumphantly takes possession, and parades backwards and forwards on the strand, as if in defiance of his discomfited antagonist, who travels off to seek a habitation among the fresh deposits of the ocean.

Nor is the construction of the common *Helix* less deserving of attention, than that of the occasional resident of its deserted mansion. This feeble animal is soft, spungy, and transparent, and is provided with horns, or antennæ, at the extremity of which the eyes are situated, appearing like small dark spots, black, sparkling, and obicular. These, on the approach of danger, are rapidly drawn down, together with the horns, into the head, which immediately disappears beneath the shell. In the course of a few

seconds the horns reappear; the eyes run up the narrow transparent channel, down which they had descended, and the *Helix* journeys on its way.

Now the reason of such a peculiar construction is obvious. The snail is thus enabled to command a more extensive sphere of vision, than if the eyes were situated in the head. Moreover, the pliability of the antennæ enables them to turn in different directions, while the ease with which they are capable of being extended, or contracted, like a pocket telescope, admits of the ready withdrawing of the head into the shell; an arrangement which beautifully harmonizes with the extreme weakness of the animal.

Shakspeare notices this striking peculiarity. "I can tell," said the faithful adviser of King Lear, "why a snail has a house." "Why?" replied his unfortunate master. "Why to put his head in; not to give it away to his daughters, and to leave his horns without a case."

The movements of the common *Helix* are remarkably slow. How shall we account for this extraordinary fact, since the snail is light, and small, and apparently by no means incapable of comparatively rapid motion? Probably by the viscous nature of its juices, which are extremely tardy in their circulation, and consequently produce a considerable degree of sluggishness in the movements of the animal.

This idea was first suggested by Mr. Braidley. He observed their circulation in a Snail just hatched, the body and shell of which, being quite transparent, enabled him to discover that the pulsations of the heart succeeded each other at intervals of three seconds. A casual observer might be inclined to pity the poor animal for the deficiency of its moving powers. But let it not be forgotten, that this defect of the *Helix* is amply compensated.—The peculiar nature of its juices seems to have a reference to its mode of life; for no degree of natural, or artificial cold, has ever been known sufficiently powerful to congeal them. Thus, while the common worm, which incautiously has left its shelter in the garden mould, is frequently discovered in a frozen state; and even birds and small animals fall victims to the severity of the weather, the Snail is rendered insensible to cold, and either burrows in the earth, or seeks the shelter of some hollow tree till invited from his temporary retreat. Appian beautifully notices the creeping movements of this curious little animal, in the following characteristic lines:—

"When lov'd Arcturus leaves the main to rise
A star, bright shining in the evening skies,
Then prune the vine; 't is dangerous to delay,
Till with complaints the swallow breaks the day;
When with their domes the slow-paced snails retreat
Beneath some foliage, from the burning heat."

Helices belong to a very numerous and comprehensive tribe of terrestrial animals, which are unprovided with feet. But the want of these is obviated by such a disposition of the muscles and fibres of the trunk, as to render it capable of a progressive and undulatory movement, in any direction to which the will of the animal determines it. This undulatory motion occasions the exudation already noticed, which not only materially assists the common *Helix* in adhering to extraneous substances, and climbing walls and trees in quest of food, but is also essential to its safety, as it has frequently occasion to travel along ceilings with the shell reversed. Snails, however, generally remain quiet, and seldom move abroad, excepting when in search of food.

But why such care to provide for the security, and promote the comfort of an obscure shell-fish? Let this great truth be solemnly impressed on our minds: God has made nothing in vain. It is a clue that will safely conduct us through many intricate mazes of the great labyrinth of nature, as far, at least, as it is permitted for finite beings to explore them. In many instances we are unable to comprehend the intentions of the Deity with regard to the construction of his creatures: in others, their uses are so obvious that they cannot

be mistaken. The common Chickweed, and the different species which constitute the genus *Helix*, are apparently of little worth: yet the former, during winter, is nearly the sole support of innumerable flocks of birds; and, without the latter, a considerable proportion of the animal creation would be entirely destitute of food. In the formation of both, the Creator has deviated from his usual course, to provide for their security, and to compensate for all their various and necessary defects.

The numerous species which compose the genus *Helix;* Snail, or Spiral, are principally land or fresh-water shell-fish. A considerable number inhabit aquatic plants; some are found on trees or shrubs; and others in decayed wood. They also abound in the most unfavourable and arid situations. The few solitary vegetables which occasionally diversify the extensive sands on the south side of the Tagus, are incrusted with a species of small snail. Such is also stated by African travellers to be the case in the deserts of Sahara.

Two hundred and fifty-three species are assigned by naturalists to this extensive genus: some of which are beautifully marked; and some of rare occurrence. Of these, the *H. sultana* and *H. hæmastoma*, Variegated and Rose-lipped *Helices*, are two of the most admired; particularly the latter, for its elegant zones and rose-coloured lip.

The *Helix pomatia*, or Edible Snail, differs little in appearance from the common species; it was introduced into England by the celebrated Sir Kenelm Digby, as food, or medicine for his lady, who died of a consumption. Various attempts have been made to naturalize them in Northamptonshire, but without success, as they uniformly refuse to emigrate from the southern woods of England. They are more susceptible of cold than other species; and towards winter, close their apertures with a calcareous lid, and remain in a torpid state until the spring.

Edible Snails are used as food during Lent in several parts of Europe. They are fattened for the purpose in large reservoirs, the floors of which are covered with herbs and flowers. These creatures formed a favourite dish with the luxurious Romans, who fed them on bran and wine, till they grew to such a size, that, if we may credit the testimony of Varro, the shells would contain ten quarts. Admitting the truth of this account, the temperance of the younger Pliny will no longer be a subject of admiration, whose suppers consisted of a lettuce for each guest, three snails, two eggs, a barley cake, sweet wine, and snow. Fulvius Hirpinus is said to have introduced this luxury, a short time before the wars of Cæsar and Pompey.

Several extraordinary instances of design stu-

diously directed to produce important consequences in the animal economy, are discoverable in such species as either inhabit aquatic plants, or are decidedly oceanic.

The *H. vivipara*, and *H. tentaculata*, Viviparous and Olive *Helices*, are furnished with small pieces of shell, that answer the purpose of doors or shutters, by means of which they close their dwellings, and completely exclude the water.

The inhabitant of the *H. ianthina*, or Violet *Helix*, swims at liberty in the sea. It is furnished with four horns, or horn-shaped tentacula, and a membranaceous bag, consisting of small bladders, which it inflates at pleasure, and is thus enabled to float on the surface of the water. It is also endowed with the property of emitting a phosphorescent light, and stains the hand of a rich purple colour, which is not easily removed. These small bladders mark the character of the animal; as a creature floating in the ocean, or as one attached to marine substances.

It is highly interesting to observe these little *Helices*, either inflating their marine balloons, and skimming the surface of the billows, or seeking, in the hollow of the waves, a shelter from the wind: to watch them as they slowly retire into those sea-covered regions, dotted with plants of innumerable shades and colours, which, like the animals

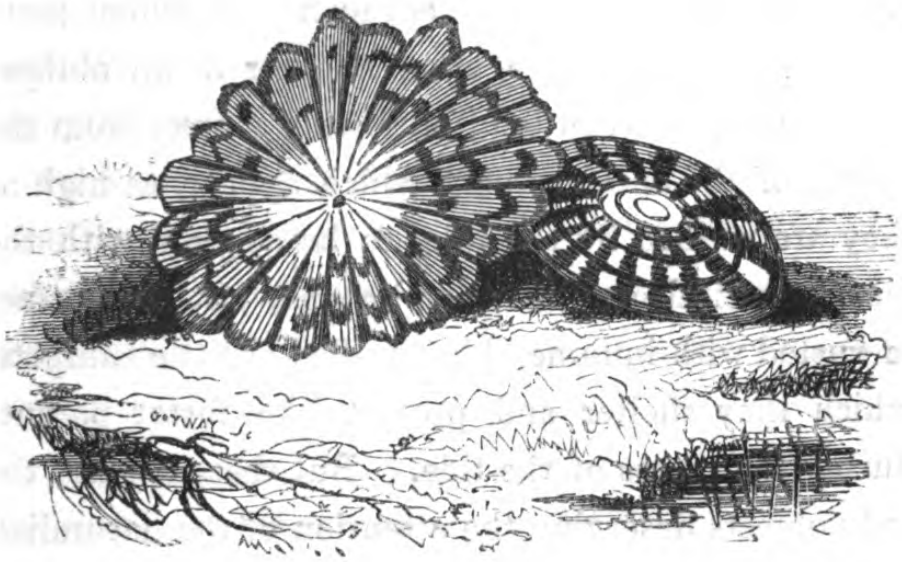
that inhabit them, never receive the rays of light but through the medium of water: where the valleys are clothed with elastic plants, such as the sea-peacock, the leaves of which are perforated like a sieve, for the evident purpose of admitting the currents, that gush through them, as if they were sluices: where the hills stand thick with bristly beds of madrepore, festooned with floating garlands of fuci, algæ, and innumerable sea-weeds, the colours of which are nearly as splendid as those of the showery bow of Iris.

Such are the objects which amuse the leisure hours, and occupy the thoughts of those who delight to trace the footsteps of unerring Wisdom, as they appear impressed on the oozy bed of ocean. Nor let him who is confined to inland scenes, lament that these researches are beyond the reach of his fortune, or exertions. The mossy lanes which surround his quiet dwelling, or the river that waters his native town, will afford subjects of investigation and improvement. In the shady recesses of the one, or on the margin of the other, he may learn that the wonders of creation are inexhaustible.

For my own part, I confess that when I see a poor little Muscle, who seems by her helplessness to lie at the mercy of every passing wave, mooring her fragile bark under the shelter of some projecting stone,

by means of strong tendinous threads, which she has the faculty of spinning on every emergency; or when I watch the common Snail, slowly ascending the cavernous trunk of some aged oak, or climbing up a garden wall without the aid of wings, feet, or thread, solely by means of the viscid humour discharged from her skin; and consider the secret spark of life which is in each of them; "that where we look for absolute destitution and can reckon upon nothing but wants," some admirable contrivance amply compensates for every apparent deprivation, and preserves them, and their still more feeble offspring; my mind is carried up to the praise and adoration of that Gracious Being, whose wisdom, beneficence, and power are thus conspicuous in the humblest of his works.

Helices abound in almost every part of the known world. They furnish an important article of food on the shores of the Mediterranean, where they are boiled in the shell, and served up with rice. They possess much of the quality of oysters, and are extremely nutritious. The use of them not unfrequently retards the fatal termination of that less active form of consumption called a decline; and so long as a sufficient quantity could be procured, many patients have appeared convalescent, from the rapid recovery of their strength by the use of this nutritious food.



Limpets.

LETTER IX.

UNIVALVES.

To * * * *

One of the most imposing spectacles in nature is afforded by the ocean, when the billowy waves are seen to toss on high their crests of broken foam: one of the most delightful, when on a fine summer morning, the bright emerald waters sparkle and murmur in their retreats, and gently ripple upon the shore. What beauty is then beheld on earth! what loveliness in ocean! what majesty in those immense strata

of rocks, several hundred feet in height, which seem to have been laid one upon another in an oblique direction, or start in bold projecting masses from the bosom of the ocean; rocks which appear, as high as they are washed by the tide, to be covered with the most beautiful grey moss or lichens, but are in fact incrusted with innumerable families of little Limpets, which they shelter and protect like foster parents during the recess of the tide. But these are not the only objects deserving the attention of the naturalist. The excavations formed by the toiling of the waves, apparently encircle diminutive groves and gardens, formed of crimson, green, brown, and pink-coloured sea-weeds, and occasionally diversified with strings of beads, which fancy pictures, as the work of invisible fingers, for the decoration of fairy-sized sea nymphs. Some are in the perfect form of minute trees; others trail like ribbons, floating and trembling in the waves, or simply expanded by the motion of the tide. Of these, a considerable number are either incrusted with minute shells that shine like silver; or else afford shelter to innumerable little fishes, " their coats bedropt with gold," and varied with tints of azure, green, and purple. For the supreme Creator of the universe, as if wishing to communicate some scattered rays of his glory, and his blessedness, to this extended world, has replenished every leaf, and

every drop of water, with myriads of inhabitants, each of whom He has endowed with facilities for enjoying the gift of life.

Such were the reflections that arose within my mind, and such were the beautiful variety of marine objects which attracted my attention, during a solitary walk on the beach at Weymouth.

" Whose intervening billows' snowy foam
Rising successively, seem'd steps of light,
Such as on Bethel's plain the angel's clomb,
When to the slumbering patriarch's ravish'd sight
Heaven's glories were reveal'd in visions of the night."

The scene was indescribably pleasing. The earth, the air, the water, teemed with delighted existence. Myriads of " insect youth were on the wing," trying their early pinions, and sporting in wanton mazes with inconceivable rapidity. Shoals of little fishes darted through the sparkling waves, or bounded from the shallow margin of the water, as if rejoicing in their newly-discovered faculties; while on the nearest rocks, a few Molluscæ, in the shape of sea-anemones, expanded their imitative petals to the sun.

In the fore-ground, a group of dark weather-beaten stones was covered with Limpets *(patellæ)*; the conical summits of which, as the waves occasionally dashed them with their spray, presented a beautiful variety of forms and colours. They stood, like

Ossian's "lonely dwellers of the rock," solitary in the midst of numbers, and apparently incapable of sharing in the general joy.—But softly: has not Providence assigned to every class of being, its peculiar sources of enjoyment? and is not the solitary Limpet exempt from dangers which continually surround the finny natives of the deep? Gradually, the beams of the sun illumined the summit of the rocks. One of the shells began to open. A kind of leg, or foot, was carefully projected from beneath the shell, which gently erected itself on one edge, as if to diminish friction, and by a sudden spring, the creature actually advanced to a considerable distance.

"This," said a fisherman, to whom I pointed out the movement of the Limpet, "is their common method of proceeding. The form of the leg which you observed may be altered at pleasure: it answers the purpose of a foot, or hand, by the help of which they are able to sink into the mud, rise from it again, and even spring, as you have just observed, from the rocks, to which they generally adhere so closely that it is impossible to remove them without considerable force; unless, (for it seems that their sense of hearing is very exquisite,) you come upon them unexpectedly."

We boast of our inventions in the arts and sciences, forgetting, that we are frequently anticipated, by even

the feeblest of created beings. The Torpedo, defended himself from his enemies by means of an electric shock, long before academicians thought of making experiments in electricity. The Limpet, acted as if he understood the pressure of the atmosphere, and attached himself to the rock, by forming a vacuum in his pyramidical shell, more than five thousand years before the air-pump came into existence!

Limpets* are generally found adhering by their base to rocks and stones, to fuci, and other marine substances, from which, as I have before observed, they are not easily detached. They are common on the shores of every ocean; but the island of Cyprus is particularly celebrated for the beauty and variety of its specimens.

Shells of this interesting genus are frequently discovered in a fossil state. The *Patella mitrata* of Linnæus, and the *P. cornucopia* and *dilatata* of Le Chev. de Lamar, are each attached with a small ligament, or muscle, to an operculum or under-valve. By the aid of this singular appendage, they not only fix themselves to rocks and marine pebbles, but also rise occasionally above them, like sentry boxes on an elevated station.

Little is known with certainty respecting the pecu-

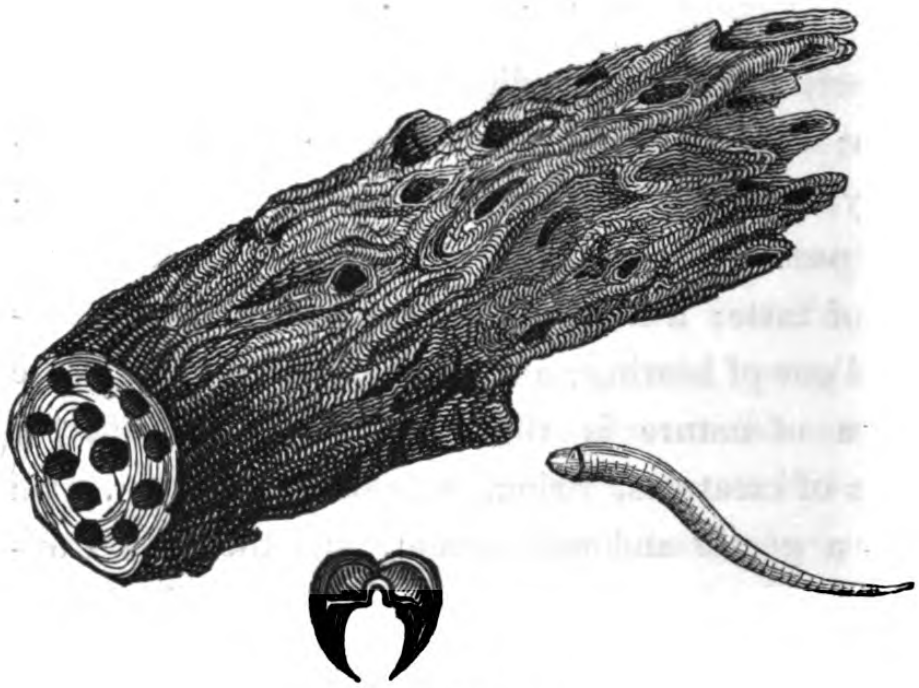
* Seven divisions are assigned by naturalists to this extensive genus, the distinctions of which are strongly marked.

liar habits of the *Patellæ*, or the purposes for which they are designed. They are placed on the boundary line, between those shells which are furnished with a regular spire, and those that have none; and such is the accordance of one part with another, that the shells of the third division, with a recurved apex, form a natural link between the *Haliotis*, or Sea-ear, and the genus *Patella*, of which they are an interesting portion. For the Most High has adorned the excellent productions of his wisdom, and so admirably adjusted them, that every part of the vast creation constitutes one beautiful and perfect whole. To this splendid superstructure, nothing can be added; neither can any thing be taken from it, without producing a chasm in creation, which, however imperceptible to us, would materially affect the general harmony of nature. All things were made by Him, and without him cannot any thing subsist; besides, it seems as if he designed to teach us by the admirable arrangement of his creatures, that the different gradations in society, are designed by his providence, and appointed for our good. Keeping this in view, we contemplate with redoubled interest, the infinite variety of shapes and species, through which the world of life progressively advances, before a creature is formed, complete in all its parts. Thus, in the instance of the solitary

Limpet, some kinds adhere to the surface of the rocks; others, as the *Haliotis*, or Sea-ear, are apparently but one remove from these; a third description, possesses no other senses than those of feeling and of taste; a fourth, are furnished with an additional one of hearing; a fifth, of smelling. The whole chasm of nature is thus filled up with different kinds of creatures, rising, in regular gradation, with such a gentle and easy ascent, that the little transitions are almost imperceptible. Class is linked to class, with a just and admirable precision, by means of an order, trespassing on both; order to order, by an intermediate genus; genera to genera, by a doubtful species; one species to another, by continual varieties. The mineral, and vegetable kingdoms, are united in like manner, by the Amianthes and Lithophytes; Zoophytes, form a connecting link between animals and vegetables. Tube-worms unite insects to shells and reptiles; the latter are joined to fishes, by sea-eels and water serpents. Flying fish connect the finny natives of the deep, with those that skim the air; and bats, associate birds and quadrupeds with each other.

"Thus the vast chain of being, though widely extended,
Unites all its parts in one beautiful whole,
In which grandeur and grace are enchantingly blended,
Of which God is the centre, the life, and the soul."

BARTON.



Ship Worm.

LETTER X.

UNIVALVES.

To * * * *

THE perforations in the timbers of the gallant vessel which you lately saw at Deptford, were occasioned by the *Teredo Navalis*, or common Ship-Worm, of which the generic appellation is derived from a Greek work, signifying to bore. This singular animal has two hemispherical, calcareous, and truncated valves: with a shell, tapering, flexuous, and capable of penetrating wood.

Thus constructed, the *Teredo* readily enters the stoutest timber, and insinuates itself into lofty vessels, which it destroys, like the evil genius so admirably pourtrayed by Captain Morris, whose visitations no earthly bulwarks could impede.

" Care mounts Rideaux, with four-and-twenty pounders,
Nor heeds our light troops, nor our Indian warriors,
Swifter than moose deer, or the fleeter east wind,
Pushing the crowds on.—"

Imitation of Horace, Mon. Mag.

The construction of this indefatigable insect, bears an obvious reference, as well to the purposes for which it is designed, as to the substance in which it is inclosed. The head is well prepared by nature for encountering difficulties, being surmounted with a helmet, and provided with a tooth, adapted for perforating the hardest substances; the neck is also furnished with strong muscles, which materially assist the operations of the head; and the body is covered with a thin, transparent horn, through which its internal operations may be easily discovered. The shell is composed of carbonate of lime, and a gelatinous substance; greater in proportion than that of the *Chama gigas*, but considerably less than in the shell of the common Oyster. The heart is situated on the back, between the mouth and the lower part of the stomach; and admits of only a single

circulation, as in animals respiring in an aqueous element: an organization which clearly demonstrates the care of a benevolent Creator. In like manner, the extraordinary fact, that the breathing organs of the Ship-Worm, (in common with such animals as are unprovided with a cavity for the reception of salt-water), are placed externally, evinces that their construction is in exact accordance with their mode of life. This wonderful provision is particularly obvious in the *Actiniæ*, or Animal Plants, of the West Indies. Their beautiful membranaceous expansions, which resemble the petals of flowers, and glow beneath the water in vivid tints of yellow, green, or purple, are in fact, breathing organs, not merely tentaculæ for catching food.

The *Teredo navalis*, or Ship-Worm, when arrived at its full growth, closes up the end of the shell; and it has been inferred that the animal, by this act, formed his own tomb, since he could no longer destroy the wood in which he was contained. But Sir Everard Home has ascertained, that in the *Teredo gigantea*, or Gigantic Teredo, death is not the consequence of this seclusion. He adduces a variety of curious facts to prove that the Ship-Worm, when arrived at its full growth, or when prevented from increasing in length, closes up the end of his shell, and lives a long time afterwards; being fur-

nished with food from the sea-water, which he receives, like the Actiniæ, through the medium of several small tentaculæ.

Teredines, turn readily in their respective shells; to which they merely adhere, by means of a slight connexion at one particular part; and this arrangement is evidently designed to prevent the tubes from being disturbed by the motion of the inmates, which resembles that of boring. As the *Teredo gigantea*, or Great Bifurcated Borer, burrows in the mud, on which he cannot be supposed to subsist, a question has arisen, whether the *T. navalis* receives any support from the wood which he destroys; or is solely supplied with food from the sea. The latter opinion is now generally adopted. It appears, on a close investigation, that the sawdust received by the animal, does not experience the slightest change; as when exposed to the action of fire, it emits the odour of wood, and forms a charcoal, which readily consumes into white ashes, in every respect resembling those produced by a vegetable substance.

When the hull of a vessel continues for any length of time in water, the *Teredines* appropriate it to their use. They commence their operations by perforating the softest parts of the wood, and as they have seldom at this period attained their full growth, the perforations are frequently so small as to be

scarcely discoverable. As soon as they have entered, and completed their habitations, their next care is to beautify, and render them commodious. This they effect, by means of a white glutinous fluid, exuding from their bodies, like the viscous juices of the common Snail, which hardens into a sort of crust, and forms a thin, smooth lining to their respective cells. This lining, by filling up the cavities, and smoothing every inequality, protects their tender bodies from being injured by the roughness of the wood; it also enables them to move in various directions without inconvenience or danger.

A social compact apparently subsists between these shelly anchorites, as the greatest care is taken to avoid injuring each other's habitations. Each case, or shell, is preserved entire; and even where a piece of wood has been so completely perforated as to resemble a honey-comb, the slightest passage, or communication, has never been discovered between the different compartments, though the divisions have frequently not exceeded the thickness of fine writing paper.

Thus far are we indebted to the observations of Sir Everard Home.—And is there nothing humiliating in the conclusions to which these facts lead? Would it not appear as if those floating castles, which open communications between different countries,

"Armaments, whose thunders strike the walls
Of rock-built cities, bidding nations quake,"

were liable to be destroyed by the bite of an insignificant reptile, in order to teach mankind the weakness of their boasted strength. But mark the protecting care of Providence. The destructive operations of these insidious animals are in a great degree obviated, by the singular fact of their generally perforating the wood in the direction of the grain.

The fossil cases of the *Teredines*, are termed Tubuli Fossiles. They are found buried in the earth, and vary considerably in appearance. Some are discovered, in a more or less perfect state, in strata of earth or stone; others, which are immersed in masses of the *Ludus Helmontii*, or *Septariæ*, constitute a kind of pipe stone; but the most beautiful of this description, are broken fragments of vessels, or marine posts, which have been originally pierced by *Teredines*, and afterwards petrified, with the cases, or tubuli of the worms, remaining in them.

Elegant specimens of these are brought from the shores of Sheppy, and the London and Richmond clay-pits.

Teredines abound in the richest provinces of Holland, where the inhabitants behold the frightful spectacle of their great rivers held up by dikes at the height of twenty, or even thirty feet above the

level of the land. Here the *Teredines* frequently work their way into the piles of timber which sustain these important barriers; and threaten their total demolition, when the precaution of sheathing their lofty sides with copper, or a composition of tar and glass, has been neglected. In the year 1731, considerable apprehensions having been excited on the subject, persons were appointed by Government, to examine into their state. On drawing up one, which had been driven into the sea rather more than twenty years before, it was found, though apparently sound on the outside, to be completely perforated by innumerable *Teredines*, some of which exceeded a foot in length.

One question may possibly have dwelt upon your mind, during the perusal of these observations. Why is a pernicious reptile so wonderfully constructed, the instincts of which are fraught with destruction to the noblest works of art, and even to man himself?

Patience, my friend. Is not man, endowed with faculties, to reason, and apprehend; ardent, to investigate, and skilful, to obviate inconveniences; fully adequate to cope with, and counteract, the depredations of an obscure insect?

All the various parts of nature are beautifully designed to act in concert. We see the hand of God employed in forming the lowest, and frequently, in our opinion, the most despicable creatures; assign-

ing to each its station, and so admirably adjusting the mighty whole, that every particle of matter, and every living thing that creeps, or moves, upon the surface of the earth, is formed in subserviency to the general good. Indeed in various instances, the lower we descend in the scale of creation, the more obvious are the uses, and the more extraordinary the instincts, of many of the creatures which compose it. Providence has mercifully appointed that such should be the case; and the reason is obvious: for, if the destructive, and congregating propensities of the Whale, and Shark, were similar to those of the *Teredo navalis*, the skill and ingenuity of man, would be almost inadequate to counteract the machinations of such sagacious and persevering foes.

Sea-Worms, though apparently so pernicious to our shipping, have the same office assigned them in the water, as *Termites* have on land. You are perhaps aware that these extraordinary insects, which to a casual observer appear solely occupied in spreading terror and destruction wherever they advance, are nevertheless of infinite importance to the well-being of mankind in the sultry regions of the globe. They consume decaying vegetable substances, of various kinds; they also resemble common flies in their general operations; those indefatigable little labourers, the pioneers of cleanliness and order, which conti-

nually employ themselves in perforating animal substances, and enabling the elements speedily to decompose and dissipate them.

Changes conducive to the general benefit are continually going on in the animal and vegetable kingdoms; for nothing is imperfect. Their various productions successively experience a gradual, or rapid deterioration, in accordance with the character of each, and recede from the sites they occupy, in order to make room for others. When aged trees, or even forests, particularly in the East, are overthrown by a tornado, or partially consumed by fire, innumerable agents hasten to complete their demolition; the Termites, especially, are so expeditious, and effectual in their operations, that companies of them have been known to destroy, and carry away, in the course of a week, the bodies of the largest trees. They clear the ground, and afford room for vegetable productions of various kinds, which rapidly assert their right, and occupy the places which nature has assigned them. Ruined houses also, frequently, become a prey to these indefatigable insects; nay, even the sites of populous villages, when abandoned by their inhabitants, as is frequently the case in Arabia and in Senegal, have, by their agency, in the course of two or three years, been covered with grass, or trees, and not the vestige of a single post has remained.

To such scenes of desolation, and subsequent fertility, the following stanzas most probably refer. They afford a fine specimen of oriental poetry, and were translated by Sir William Jones from the Moalaket, one of the seven Arabian poems, which are suspended in the Temple of Mecca.

I.

Desolate are the mansions of the fair, the stations in Minia, where they rested, and those, where they fixed their abodes! Wild are the hills of Goul, and deserted are the summits of Rijaam.

II.

The canals of Rayaan are destroyed; the remains of them are laid bare, like characters engraved on the solid rock.

III.

Dear spot! many a year has been closed, many a month, holy, and unhallowed, has elapsed, since I exchanged vows with thy fair inhabitants.

IV.

The rainy constellations of spring have made their hills green and luxuriant; the drops from the thunder clouds have drenched them with profuse, as well as with gentle showers.

V.

Here, the wild eringo-plants raise their heads; here, the antelopes bring forth their young by the sides of the valley; and here, the ostriches drop their eggs."

I have entered more particularly into the natural history of the *Termites*, because their operations tend to elucidate those of the *Teredines*, with which

it is impossible to become so accurately acquainted, from the nature of the element in which they subsist. We are, however, fully warranted in concluding, from well-known facts, and recent observations, that were it not for their incessant labours, those mighty rivers,

> " To whose dread expanse,
> Continuous depth, and wondrous length of course,
> Our floods are rills,"

would, in time, become impeded by the vegetable masses, and innumerable trunks, and branches, of large forest trees, which are continually carried into them by adventitious causes; and that a considerable proportion of these, from the preservative nature of salt-water, would otherwise, probably, last for ages, form a basis for fresh accumulations, and eventually become productive of evils, of the extent of which, in the present harmonious and admirably balanced state of things, it is impossible to form an adequate conception.

Nor is this all. The feeble *Teredines* open a source of considerable riches to the inhabitants of Sweden, and to those persons who reside on the borders of the White Sea, by employing the vigilance of the Dutch. The necessity which they impose upon these active people, of continually tarring and repairing their dikes and vessels, forms a bond of union between these two com-

mercial nations, by occasioning a perpetual demand for oak, pitch, and fir. And as these, apparently, pernicious insects are continually at work at Amsterdam, for the advantage of Stockholm and Archangel, so the labours of others in the north are equally profitable to the Hollanders, by promoting the consumption of their salt, spices, and grocery, which are annually exported in large quantities, either for the purpose of seasoning and preserving the provisions of their northern neighbours, or to cure the fish, which they use instead of bread.

Cease then, my friend, to regard those creatures as decidedly obnoxious, the use of which you do not readily perceive. The *Teredo* is, apparently, an insignificant reptile, nay, more than insignificant; it appears, on a slight acquaintance, to be injurious: yet the Creator has assigned it an important station among his works. The evil which it produces, is readily obviated by a little care and contrivance; but the good which it is appointed to effect, is incalculably great in the mighty scale of universal nature.

Adieu.

LETTER XI.

FOSSIL SHELLS.

To * * * *

FROM the natural history of testaceous animals, the transition is easy to those Fossil Shells, which diversify the strata of the earth.

The lowest, and most level parts, of the great globe which we inhabit, exhibit, when penetrated to a considerable depth, horizontal strata, composed of various substances, and, generally, containing innumerable marine productions. Such is also the case in more elevated regions, where, occasionally, fossil shells so far preponderate, as to constitute the entire body of the stratum. These are generally in such a perfect state of preservation, that even the smallest retain their most delicate parts, and their sharpest ridges. They are found in situations far above the

level of the sea; and in places to which the sea could not be conveyed by any existing cause. They are not only enclosed in loose sand, but also incrusted by hard stones. In short, both hemispheres, every continent, and every island of any size, exhibit the same phenomenon.

The traces of revolutions become still more apparent and decisive, when we ascend a little higher, and approach nearer to the foot of the great chain of mountains. These contain many beds of shells, some of which are even larger and more solid, and as well preserved, though not of the same species with those of less elevated regions. And, whereas, in the plains, low hills, and valleys, it is necessary to dig deep, in order to detect the succession of the strata; here we perceive them by means of the rents, and excavations, which time, or violence, has occasioned, and which disclose their edges to the view of the observer. At the bottom of these declivities, huge masses of their wrecks are frequently collected, and form round hills, the height of which is continually augmented by the operation of every thaw, and every storm.

In Chili, some of the loftiest mountains are formed entirely of shells; and on the Descaheyado, whose towering summits aspire nearly to the height of the magnificent Chimborazo, Oysters and Periwinkles are

discovered in a calcined and petrified state. That magnificent range of the Andes, which passes through the narrow Isthmus of Darien, into the kingdom of Mexico; as well as the lofty sweep of the Apalachian Hills, offer similar indications. The low grounds which extend from the base of the latter, are varied with small risings, composed entirely of shells; incredible numbers are also found, at the depth of fifty, or eighty feet, in the vast plains of Virginia and Carolina.

Bivalves are frequently discovered on Mount St. Julian, in Valencia, bedded in gypsum, and surrounded by detached pieces of slate; while large masses of sea-shells start forth amid the sultry plains of Asia.

The famous rock of Gibraltar is principally composed of lime-stone, traversed by fissures, or hollowed into caves, in which the osseous breccia is contained. Cuvier notices that the shells which it exhibits, are uniformly sea, or land species. The high hills of Spain are frequently composed of river and oceanic-shells, blended with other marine substances, and layers of dark earth. Even the Ammonites, inhabitants of deep and tempestuous oceans, have been discovered in Alpine regions. Large beds of Oysters diversify the calcareous strata of Bergieres, in France. An assemblage of marine petrifactions

has recently been found in the depth of a marble quarry, near Aix, fifteen miles from the Mediterranean, and six hundred and fifty-eight feet above its level; principally consisting of non-descript *Patellæ*, and *Tellinæ*. A vast mass of diluvian marine shells is deposited near the summit of Haldon Hills, to the north of the town of Teignmouth, at an elevation of eight hundred feet above the level of the sea. On the same level is another distinct accumulation of shells, mostly composed of various species of *Cardium*, *Mactra*, and *Arca*, mineralized into a mass of blood-red calcedony or cornelian.

In the exotic regions of South America, and on the frozen mountains of the North, are several organic remains, indicating the former dominion of the ocean. Asia and Africa also, bear ample testimony to the validity of this wonderful event. Sea-shells are found in Peru, at an elevation of ten thousand feet above the waters of the ocean. On the lofty mountains of Arsaga, the bivalve-shells of the Caspian are spread abroad in all directions; and rings for cables are still observed on the rocks near Sesatopole, in Tartary. Thus, while fossil-shells have been discovered in the quarries of Flanders, and among the Alps, on the Pyrenees, Caucasus, Athos, Lebanon, Ararat, the Riphaean ridge, and the steep mountains of Iceland; the Andes, and the Cordilleras, present strata,

either of shells, sea-weeds, or the skeletons of fishes, amphibea, and other animals, not only at their feet, but in their girdles, and near their very summits.

Sea-shells of various descriptions are discovered in the large fragments of loose stones, which lie scattered round the base, and extend far up the rocky side of Glyder-var, or the Eminence of Tempests, a terrific mountain on the banks of Lyn Peris, near Capel Carig, in North Wales.

Snowdon, the monarch of the British Alps, whose lofty summit rises three thousand five hundred and seventy-one feet above the level of the Irish Sea, also exhibits similar indications. Marine shells, or medals, commemorating the Deluge, as Cuvier elegantly denominates them, are found bedded in the slate of which the mountain is composed.

The long ranges of sand-hills which skirt both slopes of the Appenines, through almost the entire length of Italy, contain every where perfectly well preserved shells; these are often found retaining their colour, and even their natural pearl-like polish, and several resemble those still found in our own seas. Leaves of trees, and the trunks of bituminous wood, mixed with the bones of fish and other marine animals, are also brought from the same range of mountains; while on the sides of Mount Sarchio, between Rome and Naples, shells are discovered, mixed with

blue marl. Similar remains are visible on Lebanon; and at the foot of the Ligurian Mountains, a considerable tract contains shells of various descriptions, both bivalve and multivalve, with a profusion of madrepores bedded in pieces of quartz. Among the lofty range of mountains which divide the land, and Orange river, north-west of the Cape, in Africa, numerous petrifactions of shells are discovered; many of them in situations at least one hundred and fifty feet above the level of the ocean.

Enormous beds of shells were also found in Touraine, situated thirty-six leagues distant from the sea. Oceanic shells have been recently brought from the fissure of a lead mine at Pontpian, near Rennes: they were found with the remains of a beech tree; the centre of which had been converted into coal, the bark into pyrites, and the sap-wood into jet. The lake Garda furnishes similar organic remains. The borders of Mount Baldo exhibit large pieces of grey marble, beautifully diversified with sea-shells; innumerable cockles are found imbedded in the stones which form the walls of Megara; oysters incrust the fossil remains of enormous marine animals found near Valdarno Superiore, and Placentia; while the ruins of Agrigentum rise upon the partial ruins of the ancient world, an eminence formed of a concretion of sea-shells, hard as marble. The well waters

of Modena, spring from beds composed of gravel and marine shells; the latter, though more than sixty feet in depth, occupy a line of country one hundred and thirty feet, above the level of the Mediterranean.

Descending from these elevated regions, we trace the same diluvial deposits in the plains, and valleys, of our own, and other countries.

France offers a rich mine to the geologist. Its metropolis is situated in the midst of an extensive plain, which for horizontal or secondary stratification, is one of the most remarkable with which we are acquainted. Great masses of rock, containing thousands of marine exuviæ, alternate regularly with others, in which the shells of fresh-water fish are similarly imbedded. The bones of land animals, of which not only the species, but even the genera, are entirely unknown, occupy extensive districts; while other bones, belonging to large animals, to which we find nothing analogous excepting in remote and exotic regions, are scattered near the surface: characters of a mighty torrent are also discoverable from the south-east, impressed on the forms of the hills, and in the directions of the principal ridges.

The fossil remains which diversify the south of England, very nearly resemble those of the lower marine formation in the basin of Paris; a similarity of no small importance, as it leads to the probable

inference, that the lower marine formation of our own country belongs to the same deposit; an inference which derives additional strength from the well known similarity in the minerals of each.

Beds of oysters-shells are found at Reading, nearly two feet thick; at Donnington, in Berkshire, and about Winchester, where they are occasionally interspersed with sharks' teeth. In the neighbourhood of Broughton, in Lincolnshire, fresh-water shells, consisting of *Pectinidæ Ecinites*, and with pieces of coral, are often discovered, in quarries of blue stone. Kent has also its beds of shells; and twenty-eight different fossil species diversify the sands at Harwich.

The digging of a moorish pasture in Northamptonshire, produced abundance of snail, and river shells, of various kinds. This place had no doubt been formerly overflowed with water, and its deposits had accumulated in the course of years to a bed of considerable thickness. Reculver, in Kent, is celebrated for its alluvial deposition of white *Conchites*: these are at least twelve feet in thickness; they are imbedded in green sand, and occasionally varied with a few scattered pieces of wood. *Trochitæ*, or St. Cuthbert's beads, as they are termed by the country-people, occur in the fissures of the rocks at Broughton and Stock, small villages of Craven. They are

also found in Holy Island, the theme of legend and of song; are eagerly sought for by the sailors, who endow them with supernatural qualities.

Many important conclusions result from a serious consideration of these extraordinary depositions of *Testacæ*. Cuvier has already proved, from the observation of them in common with other organic remains, that the crust of our globe has been subjected to a great and sudden revolution, which buried all the countries before inhabited by men and animals. Who can look upon the surface of the globe, and refuse his assent to this? The sea, evidently, has not only covered our plains, but rolled above the highest mountains, where it must have remained for a long time in a state of considerable tranquillity; how else shall we account for the formation of such solid, thick, and widely extended deposits, containing exuviæ so perfectly preserved? especially, when it is obvious, that previous to the formation of the horizontal strata, others were deposited, which by some means have been broken, lifted up, and overturned in a thousand different ways. This extraordinary fact is accurately demonstrated to every one who will take the trouble of carefully observing the remains by which it is illustrated, and proved.

The same enlightened geologist has also clearly shewn, that these eruptions of the great waters have

been neither slow nor gradual, especially in the instance of the last; and that the momentous era of the Deluge, is not only confirmed by the history of all nations, but indelibly recorded on the surface of the globe. He further demontrates, that the breaking up of the waters of the great deep, and the opening of the flood-gates of heaven, as recorded in the book of Genesis, cannot be referred to a more remote period than is assigned by the sacred historian; a fact, undoubtedly, the best established, though perhaps the least attended to, of any in geology, notwithstanding its importance, as connecting natural and civil history in an uninterrupted series. Hence it is evident, that at this eventful era, when every thing of human origin was swallowed up in the great waters; cities and palaces, majestic pyramids, and perhaps triumphal arches, embellished with the trophies of ancient kings!—when there remained on the earth no traces of the glory, or felicity of the antediluvian race; but all was swept away! and not only these, but the still more splendid monuments of nature's greatness involved in one common ruin; innumerable mementos of this event were impressed on the clay, and still subsist, as memorials of that devastation: relics of a primeval world, which proclaim with a loud voice the instability of earthly affairs, and impress upon the minds of those who

seriously consider them, sentiments of piety and feelings of devotion. In reference to which, Professor Jamieson has elegantly observed, "If the antiquary dig from among the ruins of Herculaneum a piece of ancient money, a vase, or a statue, we rejoice with him, in finding the mode of life, the manners and arts, of an ancient people, placed before our eyes: if he find an old record, illustrative of the history of his country, however limited in extent that country may be, we are grateful to him for the particle of knowledge which he has added to our store;—but if, among the ruins of the common country of the human race," or rather in the traces of those mighty revolutions with which Omnipotence was pleased to prepare our present habitation, "we linger at the great sepulchre of animated beings, who can look upon it without sentiments of piety? It is not here the statues of Polycletus that we admire, but the admirable monuments of the workmanship of nature, taken from the ruins of the great Herculaneum overwhelmed by the occan, that we look upon with feelings of the deepest wonder and devotion!"

LETTER XII.

GENERAL REMARKS.

To * * * *

"THE sea, the sea, the deep blue sea," what treasures are concealed within its waters: how many important lessons may be conveyed by the consideration of them, to the heart!

We have spoken of the industrious *Pholas*, that ingenious little miner, which readily excavates his subterraneous dormitory in the hardest substances; of the *Lepas*, or Sea-acorn, which travels far, and yet never quits his home; of the *Chiton*, chased in armour,—and how wonderfully they are adapted for their respective spheres of being. In looking at them, we have remembered that the same Almighty Being who directs the one, to form a secure abode,—who provides the dwelling of the other with a door, by

the aid of which, it excludes the rough beating of a boisterous sea,—who enables the third to fold itself in a coat of mail resembling a perforated pebble, and thus, to elude the vigilance of its marine foes; has determined the bounds of our habitations. We have, also, dwelt at large on the dissimilar abodes of the Bivalve race, and the singularity of their construction; and while thus engaged, our hearts have glowed within us, to think how wonderfully the meanest creature is provided for the situation it is designed to fill. Nor have the exquisite, and varied, tints, which distinguish the beautiful family of Univalve, been disregarded; and as often have they brought to mind the goodness of their Creator, in drawing us by the wonders which he has made, to consider, that his tender mercies are over all his works.

Shells and flowers, especially, bring home these feelings to my heart. They are often so small, so beautiful, so helpless, and yet so wonderfully made, that their safety is as well provided for, as that of the great globe, on which we are now speeding with its myriads of inhabitants, amid suns, and systems, through the immensity of space.

" There are feelings of all that is sweet and mild,
Dreams that are pure as the dreams of a child;
Many an innocent holy thought,
By gazing on them, to my bosom brought.

" I think, ye beautiful shells, of the wave,
That birth to your peerless beauty gave;
I think of the rolling waters, that sweep
Over your brethren of the deep:

" And I think of the pearl, or the tinted shell,
As it lies enshrin'd in its native cell;
And I dream of the Nereid's fabled song,
That floats those sparry halls along:

" I remember the venturous diver, who first
Beheld you amid the sea-weeds nurst,
And snatch'd you eagerly away,
To smile again at the smiling day:

" And I think of the tranquil, tranquil sea,
When the stars are burning steadily,
As if they were looking the clear wave through,
To see if their glances could rest on you.

" But there are better thoughts than these,
That rise when I see you, shells of the seas.
Ye are like pure spirits, that dwell through life
Unharm'd, amid its billows and strife.

" And there is a hand that shall bear them away
At last, to the light of a cloudless day,
And treasure them more than ocean's gems,
And crown them with heavenly diadems."

It now remains to notice the unassuming *Sabella*,* or Sand-shell, the last and most insignificant

* The Sand-shell is included by Linnæus among the shell tribe, although omitted by some modern naturalists.

family of Univalve. How wonderful is the adaptation of this feeble creature to its little sphere of being! Undefended with a shell, and, consequently, exposed to innumerable dangers, the *Sabella* requires a peculiar compensation, and we find it, accordingly, enwrapped in a glutinous membrane, a garment well fitted to the creature's shape, yet leaving it to move at will. Thus clothed, the garment soon becomes a dwelling, by the adhesion of particles of sand, or broken shells, and even vegetable substances.

One of the most interesting species of this unassuming genus, is the *Sabella alveolata*, or Honeycomb shell, which consists of numerous parallel tubes, communicating by an aperture, and presenting the appearance of a honey-comb, whence its name. It is found on the English coast, as well as in various parts of Europe, and often clothes the rocks for a considerable extent. The *T. corticalis*, or Bark-shell, is covered with fragments of bark; the *S. Indica*, or Indian, with particles of quartz; and the *S. dimidiata*, with various shells.

The *S. vegetabilis*, and *S. arundinacea*, or Vegetable, and Reed-sand shells, are covered with fragments of twigs, with the bark of stems, and broken pieces of the beautiful Tellina Cornea.

The geography of animals and plants, has often

engaged the attention of naturalists; the geography of shells is equally deserving of attention.

Open your map, my friend, and observe the shores of Asia. They are enriched with Pearl Oysters and Scallop shells; while the Maldive and Philippine islands, Bengal, and the coast of Malabar, abound with the most elegant species of Helix; China with Procelains, and Japan with the thickest Bivalves.

Beautiful Heart-shells are scattered beside the Gulf of Mexico, and along the Brazilian shores; and those of Cayenne exhibit the finest specimens of Buccini. St. Domingo is enriched with almost every species of East India shells, though far less beautiful, either as regards their shape or colour.

The lakes of Canada are varied with pale olive, and red Muscles: some of these are remarkably light, and elegant, while others are equally ponderous and ungraceful.

But no part of the world exhibits such an exquisite variety of richly tinted shells as the Red Sea: Porcelains of all kinds abound there, elegant purple shells, and innumerable Sea-stars.

Nautili and Argonauti unfurl their sails on the coast of Zanguebar: Muscles, too, open their gaily painted shells to the bright sun-beams, in the same quarter of the globe.

The gulf of Tarentum, and the coast of Naples

and Sardinia, also afford an exquisite variety of Nautili, Porcelains, and Oysters, of all hues: the island of Sardinia is celebrated for a fine species of white Oyster; and Corsica, Majorca, and Minorca, for the Pinna Marina, the silk-worm of the ocean.

Magnificent Gondolas abound on the coasts of Syracuse; and around Ancona, the Pholades especially delights to burrow.

Spain and Portugal yield a variety of shells, similar to those of India, but of fainter colours, and inferior in beauty. The Baltic affords some fine specimens, especially an orange-coloured Pecten, unknown in any other part of the world.

We might speak more at length respecting the marine deposits on the coasts of Cayenne, with those of Madeira and Magellan; that the most beautiful specimen of the Trampet-shell, and the Midas-ear, has been discovered on the former; that the Auris Marina, is abundant in the second, and that the rare Pyramidal Muscle is common to the third: but the instances we have already cited, will suffice to shew, that shells, as well as animals and plants, have their localities; and that some specimens of great beauty, appear as if restricted to certain portions of the globe.

Such, then, are a few of the localities of the shell

tribe; of those deposits of the ocean which make the heart beat with delight in discovering, and possessing them. How vividly that bright moment recurs to my remembrance, when the deep, proud sea, first rose upon my sight,—when I first heard the loud cry of the returning sea-gull; and saw the dancing breakers bound upwards, as if in proud defiance of the rocks that repelled them. And how pleasingly, too, arises the thought of those glad hours when the sportive billows threw up their beautiful borders of sea-weeds and shells, of long trailing fuci, and light grey corallines: when ocean seemed to say—stranger, you have, perhaps, travelled far, and seen much of groves and gardens, of inland valleys and green hills; but the earth from which you spring, and on whose bosom you must lie down to rest, brings not to the heart or the fancy, that vivid delight which my ever varying productions yield. There is somewhat of sadness often blended with all of earth's productions: they fade and change; they tell of by-gone days, and of friends who may not greet again her beautiful interchange of fruits and flowers; but mine are always new: no sad thoughts are blended with them; for the walks of mortals are not upon my fields. — All that my billows throw forth to the bright sun-beams, are fresh and beautiful, and it

is not till they have been received on earth's dull bosom, that they partake of her nature, and begin to fade!

" The sea! the sea! its lonely shore,
The billows crested white;
The clouds that flit its bosom o'er,
Or sun-beams dancing bright:
The breakers bursting on the strand,
In thunders on the ear;
The frowning cliff, the silvery sand,
Each, all to me are dear.

" The sea! the sea! Oh tell me not
Of art's triumphant power!
The proudest trophies are forgot
In one lone sea-side hour.
Yon giant bark, that breasts the tide,
Though beautiful and brave,
Beats not the curlew in its pride,
Which mounts the stormiest wave.

" The sea! the sea! the moonlit sea!
How calm its slumbering tides!
A weather-shore upon its lee,
The bark in safety glides:
The steersman keeps his watch alone,
What time his messmates sleep,
While to the strand, in gentlest tone,
The murmuring billows creep.

" The sea! the sea! the stormy sea!
How dreadful in its wrath,
When bounding o'er the billows free,
The bark pursues her path.
A hidden rock arrests her keel,
She founders in the surge;
Her seamen's knell, the thunder peal,
The howling winds their dirge.

" The sea! the sea! the treasured sea!
What mines of wealth untold,
(Could human art but set them free)
Thy hidden coffers hold!
The spoils of navies in their might,—
The young, the fair, the brave;
With shells, and gems of lustre bright,
All sleep beneath thy wave.

" The sea! the sea! the glorious sea!
What has the earth so fair,
Of hill or valley, grove or lea,
Which with it may compare?
Oh! I could sit for hours, to look
Upon its wide expanse;
And read in its unwritten book,
Fresh charms at every glance.

" The sea! the sea! the solemn sea!
It has a voice for all:
And e'en to heart of happiest glee
May sober thoughts recall.

To me it speaks of distant days,
Of vanished hopes and fears:—
Who silently can on it gaze,
With eyes undimmed by tears?

"The sea! the sea! the changeless sea!
Of tears I take my leave;
It half recalls a smile from me,
To think for what I grieve:
The hopes and fears I sorrowed o'er,
Were hopes and fears of time;
Thou art the type of something more,
Unchanging and sublime."

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