

## LIFE IN THE SEA.\*

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Though the land is inhabited by thousands and thousands of different kinds of animals, differing in shape, size, and mode of life, life in the sea shows still greater abundance and variety. To further establish this assertion shall be our object in a few plain remarks based upon natural history.

## I.—THE LARGEST ANIMALS LIVE IN THE WATER.

The water surpasses the land in more respects than one. It occupies by far the larger portion of our globe; so great, in fact, is the extent of water over its surface that it much rather deserves the name of "water globe" than that of terrestrial globe. If we could leave our earth and, floating through the vast expanse of the heavens, take a bird's-eye view of it, it would, seen from a certain point, show hardly anything but the water. Not only does the water occupy a greater portion of our globe than the land, but the animals living in it are also larger. This agrees with a remarkable law of nature, according to which the size of the larger species of animals is proportionate to the extent of territory limited by nature. You will pardon me if we leave the sea for awhile to take a cursory view of the land; and I hope you will become convinced of the actual existence of this law of nature.

The Old World, comprising Europe, Asia, and Africa, is the largest continent rising from the water; and here we also find the largest quadrupeds; the gigantic elephant, the heavy rhinoceros, the stout hippopotamus, the long-necked giraffe, whose head is eighteen feet above the ground, the camel, so useful to travelers in the arid desert, and the horse, so strong and at the same time so docile in man's hand.

The next largest continent is America. It was no misnomer when this continent, upon its discovery, received the name of the New World, for everything was new; and the eyes of the astonished Europeans beheld plants and animals differing from anything they had seen hitherto. Here the large animals of the Old World were wanting; not one was found as large as the horse or the ox. To-day all this is changed, for these useful animals, long since introduced into America, are numerous throughout all parts of the New World. In South America they even

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NOTE.—I have omitted numerous quotations of Scripture from the translation.—EDITOR.

live in a wild condition in herds of many thousands; but they are all descended from horses and cattle originally introduced from Europe. The largest animals of the New World, living there when it was discovered, is the tapir, or water-hog, which in its appearance really resembles the hog somewhat, and the llama, or camel-sheep, so called because it seems to be a cross between the camel and the sheep. As regards the size of these two genuine American animals, they can only be compared to the donkey.

We will now pass from the New World to Australia, the largest island of our globe, entirely surrounded by water, but as large as Europe, which forms such a small portion of the continent of the Old World. On this island—if such a name may properly be applied to so large an extent of land—we find horses and cattle, but they have been introduced there by man. The largest animal peculiar to this country is the kangaroo, a most remarkably shaped animal. Its fore feet are so short as to be entirely useless for walking; but all the longer and stronger are its hind feet, which it uses for leaping an almost incredible distance. As regards its size the kangaroo is surpassed by the American tapir and llama.

One of the largest islands of our globe—next to Australia—is Madagascar, near the eastern coast of Africa, but as regards large animals peculiar to it, it is far surpassed even by Australia. Among the small islands of Oceanica, which in large number are scattered throughout the vast Pacific Ocean, there are some whose inhabitants know only birds and the water animals found near the coast. Land animals were unknown to them until the arrival of foreign navigators. The first animals thus introduced were unfortunately such as could easily have been spared—rats and mice—which often are very numerous in vessels, and which during the unloading of the cargo were brought on shore with some of the boxes or barrels. These examples will suffice to prove that the wider the natural limits of a land, the larger are the animals peculiar to it.

In making a general comparison between land and water, we shall find another corroboration of this rule. In the ocean, which in extent far exceeds the land, life appears in much more colossal shape. The largest of all animals are the monsters of the deep. Man feels overawed on seeing for the first time the enormous elephant; but what is the elephant compared to the whale, measuring from sixty to a hundred feet in length, and correspondingly thick? This animal, although outwardly entirely resembling a fish, can, nevertheless, not be classed among the fish. It gives birth to live young ones, whilst fish lay eggs, from which the young come forth after some time. Fish breathe under the water through gills, whilst the whale has lungs, and therefore must, from time to time, come to the surface to breathe; if it remained under the water, it would either pine away or suffocate, like other animals which are accustomed to live in the open air. The head of the whale is

disproportionately large, for it takes up one-third of its entire body. The mouth resembles a cave in which a company of twelve persons could easily find room. It may well be imagined what a strong current is reated in the water when the whale opens its mouth, carrying myriads of living beings into the open jaws of the monster.

There are different kinds of whales. They are found in nearly all parts of the ocean, and everywhere they appear quick in their movements. It is of course understood that they do not live in the immediate neighborhood of the coast, for such monsters require a great deal of space; and in shallow waters they are as much exposed to the danger of foundering as ships. Whenever such an event takes place, it gives rise to a terrible spectacle. The whale begins to struggle violently in order to get free; the water is lashed into a seething foam by the desperate tossing of its tail; and for a great distance the air resounds with the loud noise of the struggle. All these endeavors have frequently no other result than to cast the unfortunate animal still higher on the shore, where it falls into a sort of torpor and finally dies.

Under the skin of the whale there is a thick layer of fat, from which, by pressure or warmth, an oily liquid flows. This liquid, known as train-oil, is used for many purposes, and from a single whale sometimes a hundred and twenty tons of train-oil are obtained. No wonder that these animals are so eagerly sought after, dangerous though this chase will always be! How great is man in creation! He engages in combat with this powerful monster, which, by a single blow with its tail, can cast a boat with all its crew high up into the air like a ball. "To me," man says, "belongs this immense animal with its huge body and all the oil it contains! The monster may crush my boat like a nut-shell, if it has the chance; but in spite of this I shall approach it so close that my hand shall deal the blow which ends its life!" And thus it really happens.

## II.—THE SEA IS MORE DENSELY POPULATED THAN THE LAND.

So far we have only given attention to large animals; but if we examine every living being we must say that, as far as the number of its inhabitants is concerned, the water by far surpasses the land. Is there among the land animals any which are found in as large numbers as the herring and the codfish, which for centuries and centuries have been caught by hundreds of millions without any apparent diminution of their number?

The farther north we go the fewer is the number of living beings on land; the faculty of growth seems to diminish, the plants shrink, and gradually animals become scarcer and scarcer. The sea, on the other hand, is always full of life; and in latitudes where the soil, frozen nearly all the year round, does not yield any harvest to man, he finds ample compensation for this in the fisheries, for the water which laves these northern shores contains such an abundance of provisions that it can never be exhausted.

We must here state a remarkable observation relative to the animal kingdom, from which it will be seen how great a difference exists between the population of the land and that of the sea. The large carnivorous animals, like the lion, the tiger, &c., hardly ever live in herds; as a general rule one only finds a couple of them occupying a considerable extent of territory. "This is our own exclusive kingdom," say the lion and lioness; "whoever hunts here is a poacher, and will have cause to regret his presumption. Here there is never too much game for us and our young ones."

In the sea we find still greater carnivorous animals than the lion and the tiger. Among these we must mention the different kinds of dolphins, which, from a scientific stand-point, must be classed with the whales, because they also have lungs, and are obliged to come to the surface to breathe. Although not as large as the whale, the dolphin must nevertheless be classed among the large sea animals, for its length varies from eight to twenty and even forty feet. In olden times the dolphin was considered a friend of man. It was even said that the dolphin could show affection; but, to tell the truth, its only love is for prey, and the dolphins are in reality barbarous gluttons, which make said havoc among the inhabitants of the sea. This bloodthirsty animal does not live in couples like the carnivorous land animals, but they are found in large herds or schools. Could this be possible, if those animals on which these pirates of the sea live did not increase in extraordinary numbers?

The whale also lives on live animals, but these are necessarily small, for its narrow throat is utterly disproportionate to its immense body. It may well be imagined in what enormous numbers, and how close together, these little marine animals must swim, if they are to satisfy the appetite of a monster like the whale.

In passing from the whales and dolphins to the real fish, we find that they too, with hardly an exception, are carnivorous. It may truly be said that the water is an enormous battle-field, where life is only maintained by constant slaughter. It is very easy to observe the cruel and gluttonous character of the fish. Put some of the little fish—for example, sticklebacks, so common in all our brooks—in a large glass full of water. As they are very lively, they will, in the beginning, afford more pleasure than gold fish, which please the eye by their beautiful red color, but which are so slow in their motions that one might think they are pining away or are sick. If a little worm has the misfortune to attract the attention of the sticklebacks, it is made the object of violent attacks, and is soon devoured. If you put in the glass small fish, hardly a few days old, and not any larger than little worms, not one of them will escape these greedy gluttons. So greedy are these little wretches after flesh that if properly fed they can easily be tamed. As soon as some small pieces of flesh are thrown into the water they will approach rapidly, and by repeating this experiment four or five times,

they can be made to come to the surface as soon as they see the hand stretched out over the water. This spectacle, however, is soon followed by another pitiable one. The sticklebacks, confined within the narrow limits of the glass, do not find food enough, and begin to attack each other, and soon a desperate civil war is waging in the glass. The stronger pursue the weaker, and although they are not able to swallow them entire, they nevertheless inflict terrible wounds on them. Soon some of the fish may be observed which are hindered in their movements, because their tail has been bitten off either entirely or in part. The wound soon grows worse, and the poor little animal pines away and dies; but even in its death agonies it is assailed by its cruel enemies. The fish continue this war until only two are left, which retire each to a different corner of the glass. Here they sit and watch each other with eyes full of hatred and envy; and if one of them is bold enough to enter the domain of his adversary the result is a mortal combat.

If this is the way the little sticklebacks act, what can we expect from the greedy pike, the scourge of the fresh water, or the dangerous shark, which reaches the size of the large dolphins and is continually roaming about the sea, devouring everything that comes in its way? Woe to the unfortunate sailor who falls overboard in waters where there are sharks.

If we consider that nearly all fish are carnivorous and live by robbing and murdering, we must confess that the population of the sea must be infinitely larger than that of the land, for otherwise fish would not find food enough.

### III.—A QUERY AND ITS ANSWER; FURTHER OBSERVATIONS.

After the foregoing the reader will perhaps be tempted to say: "If that is the way things are carried on in the water, I am inclined to believe that life in the water must eventually die out. How can any race of animals exist when such a continuous slaughter is going on? How is it that the larger of these insatiable animals have not long ago entirely destroyed the smaller ones, finally to die themselves of starvation, leaving nothing but their skeletons floating in the waters of the ocean which has by that time become a howling wilderness?" Those animals which are intended to serve as a prey to others have greater fecundity; they produce more young ones than those animals which live on them; the carnivorous animals are therefore never in want of food, which consists of weaker animals, and still the races of the latter do not die out.

It will readily be seen how life in the water does not become extinct, in spite of all the scenes of murder which are there enacted, if we remember that, as a general rule, the water animals increase much more than the land animals. There are animals which are destroyed in innumerable quantities, both by their natural enemies and by man. Such are the herring and the codfish, whose number does not seem to have

materially decreased in the course of centuries. This will easily be understood when we state the fact that a single herring produces 60,000 eggs, whilst the codfish matures as many as 2,000,000. It should also be remembered that the young fry hatched from these eggs grows up without any great difficulty. Young fish know how to take care of themselves the moment they leave the egg, and father and mother need not look after them. The work of the codfish would be truly enormous if, like the birds, it had to feed its innumerable young.

The sea is not only enormously rich in fish, but also in other animals. In its depth there live and thrive a very large number of different kinds of animals, all differing from each other in size and shape, and frequently of such curious form that the limits of a brief lecture would not suffice even to give a mere enumeration of them. We must, however, devote a few words to the crustaceans, some kinds of which, like the lobster, the shrimp, and the crab, are well known to every one, because they form common articles of food.

The crustaceans are a war-like race, encased in a coat of armor from head to heel. This armor consists of a thick, chalky skin, whose joints are both strong and flexible. Besides this they are furnished with different weapons of attack. Some have shears, which in the larger kinds may even prove dangerous to man; others have a long and spear-like protuberance in front of their body; and all have powerful jaws, composed of many sharp and notched pieces.

These rascals, fully armed and almost invulnerable, do not do as much harm as might be expected, for they prefer to feed on dead bodies, even such as have already begun to decompose. Do not let us criticise this morbid taste too harshly. The crustaceans and some other animals have the duty to keep the shores of the sea clean, and for this very reason they are possessed of this desire for decaying flesh. Everything which the waves of the sea cast on the shore, and which the action of the atmosphere decomposes, falls a prey to the swarms of crustaceans, which can live out of the water for a considerable length of time.

It sometimes happens that the waves cast the dead body of a whale ashore. What great injury might be caused thereby? The air, for a great distance, becomes impregnated with the mephitic exhalations arising from this enormous mass of decaying flesh. There is danger that the entire region may become uninhabitable, for contagious diseases may be bred by the foul miasma.

But all such fears are ungrounded. The crustaceans are on hand; and on these very occasions it will best be seen in what enormous numbers they are found in the sea, especially near some of the northern coasts. From all directions they come marching in dense columns, and so great is the number of these gluttons, and so eager are they to get their fill, that all danger of the air becoming foul is speedily averted, and soon nothing is left of the enormous bulk but the skeleton. All this

flesh, which had begun to putrefy, has gone into the stomachs of numberless crustaceans, and is, in part at least, to be transformed into live, healthy flesh.

#### IV.—WHAT WAS THOUGHT IN FORMER TIMES OF THE HABITABLE- NESS OF THE DEEP.

Ought we not, in our discourse, to make a difference between the surface of the sea and its depths? "It may be," some one will say, "that life is richer in the sea than on land; this may apply not only to the shallow waters near the coast, but also to the surface of the open sea; but in the great depths life cannot exist, or at least it cannot be varied in form and number. Physics teach us that an animal thrown into the water must bear the weight of the entire quantity of water which rests upon it. For this reason the pressure, at a depth of 500 meters, is 50 kilograms per square centimeter. Is it possible that any living being can stand such a pressure without being crushed? And what is 500 meters compared with the immeasurable depth of the ocean? Depths of 3,000 and 4,000 meters are common, and there are even some of 8,000 and more meters.

"It is true that light will penetrate the water, but not without losing some of its strength; and one generally calculates that a layer of water 100 meters thick is sufficient to entirely intercept the light. The sunshine, therefore, only acts on the surface of the sea, and a short distance below the surface everything is shrouded in impenetrable gloom. In that dark abyss no plants can grow and no animals can live; in its depths the ocean is nothing but an unmeasured, dark, and dead desert."

Thus scientists talked hardly five and twenty years ago, and this idea was then very generally entertained. Experience had not taught this, for scientists had not descended into this dark abyss with a lantern to examine it. They had not gone to sea and let down nets into the depths for the purpose of seeing what they would bring to light; for in those days suitable instruments for making such observations were unknown.

Little more had been done than to sound a few depths with a lead weight covered with glue, so that objects at the bottom of the sea might stick to it, and thus be brought to light. This way of sounding was moreover so tedious a work that it was but rarely undertaken. The plummet must be tolerably heavy, for otherwise the current will not allow it and its interminable line to reach the depths. To let the plummet down was easy enough, but to haul it up again was a labor at which even sailors could easily work themselves weary.

No, it was assuredly not from experience that scientists derived their idea that the depths of the sea were a dark desert; they only reasoned so from speculations, to engage in which they need not leave their comfortable studies. In our time it has been shown how deceptive such speculations may be, and how necessary it is to examine nature herself,

and, so to speak, catch her in the very act, if you wish to learn her mysteries. Because we know that the animals of the upper world live under such and such conditions, we do not have the right to conclude therefrom that the depths of the sea remain uninhabitable.

#### V.—THE FIRST INVESTIGATIONS OF THE DEPTHS OF THE SEA.

About a quarter of a century ago hardly anything was known regarding the bottom of the sea. In 1855 the first serious attempt was made to study this subject, when it was proposed to connect England and America by means of a telegraph wire, which was to be laid across the depths of the Atlantic Ocean. To enter upon this important undertaking with some chance of success it became necessary to commission competent men to investigate the dark cavern of the sea with the view of finding suitable places where the cable could rest on even ground and avoid sharp rocks, where the motion of the water might cause it to wear out and break.

These investigations were made from both sides of the Atlantic by the two countries mainly interested in the undertaking, England and the United States. The vessels sent out on this expedition were supplied with all the latest and most improved instruments, especially with an entirely new kind of plummets for deep-sea soundings. These consisted of a hollow stem, with a lid at the lower end, allowing mud and other matter from the bottom to pass in, but safely retaining everything that had passed in. This is much better than the glue which was formerly put on the plummet. This stem is not heavy. In order that it may sink perpendicularly, weights are attached to it in such a manner as to cause them to drop off the moment the plummet touches the bottom. This, of course, renders the hauling up much easier, but care should be taken to have a good supply of these weights on board, as they can only serve once. It is hardly necessary to add that nowadays steam is employed in this work.

“This is all very well,” people will say; “but this will not aid in solving the question whether there is any life in the depths of the sea. It would be the same as if a blind man wanted to assert that no birds fly in the air, because he does not happen to catch any in his outstretched hands.”

Let us not judge rashly. The first observations showed that the bottom of the ocean was sufficiently even for the object in view. The soundings also showed that the bottom was covered with very small shells, exceedingly thin and brittle. This circumstance raised the question: How did the little animals to which these shells belonged live? Did they live near the surface, enjoying the light of the sun, and had these shells, therefore, slowly sunk to the bottom after the death of the animals? Or had they lived in these dark depths where their remains had been found? That this latter supposition might be true, was shown by the fact that starfish and other creeping animals were brought up

by the plummet, animals which certainly must have lived on the bottom. These starfish, when brought up, were alive, and in their stomachs shellfish were found in an almost complete condition. It was then that scientists felt that the old belief of the uninhabitableness of the sea was giving way.

About the same time some Swedish and Norwegian naturalists began to penetrate as far as possible into the depths of the sea with the common fishing implements. They reached a depth of about 100 meters below the surface. According to the old established opinion they ought, at that depth, not to have met with a single living being. But they found, on the contrary, that at this depth life was by no means wanting; the animals which were brought up, moreover, were of strange kinds, and differed materially from those living near the surface.

A new, and hitherto entirely unknown, world seemed to open out. No time was lost in gaining further knowledge of this interesting subject, and it was not merely a thirst for knowledge which urged men to pursue these observations. The laying of the submarine cable between England and America had been accomplished, and new cables were being laid in many other parts of the sea; it was therefore important to know in what company these expensive cables found themselves at the bottom of the ocean.

It is well known that they consist of copper wires inclosed in gutta-percha tubes. Along these wires the electric spark was to travel, and there was a possibility that the tube might be injured. There might be among the inhabitants of the deep some which, attracted by the gutta-percha, could lay the metal wire bare, and thus render it useless. This suspicion was well founded, for, among the very large number of well-known marine animals, there were some which could bore holes not only in the wall of a vessel, but even in the hard rock. It was therefore necessary to learn what sort of animals lived at the bottom, and keep a strict watch over them.

English naturalists directed the attention of their government to this important subject, and requested its aid in solving this problem. Their request was granted, and a man-of-war, the *Lightning*, was in 1868 placed at their disposal. This was an unfortunate selection, for the *Lightning* was a small vessel, entirely unsuited for the purpose which it was to serve. Nevertheless Mr. Carpenter and Mr. Wyville Thomson went on a cruise of two months in this vessel between Scotland and the Faroe Islands. Everything seemed to go against them; the weather was very stormy nearly all the time, and there were but few days when they could progress with their labors; and still they succeeded in this short time in recording some important and interesting observations. They endeavored to extend their observations to greater depths than their Scandinavian colleagues. Although the sea in those parts has a depth of more than 1,000 meters, they found an abundance of life at the bottom, and the animals, which at that depth swam or crept about, did

not only belong to the simple kinds, but were of many different kinds; among them also some fish.

Like the Scandinavian scientists before them, they found that the animals of the deep have quite a peculiar character, and differ in many respects very materially from those usually found near the English coasts; they seemed to be closer related to those antediluvian animals known to us by the many petrefactions dug out from the earth.

These observers expected to find the water in these depths to be nearly ice-cold, as it would be the nature of this water—being more compressed—to weigh heavier, and therefore sink to the bottom. But, on the contrary, they found sometimes cold and sometimes warm water in all different depths, according to the places from which the currents came. They found even parts of the water which, though in close proximity to each other, differed widely in their temperature, and were consequently inhabited by entirely different kinds of animals.

The results of this expedition, although undertaken under very unfavorable conditions, seemed so remarkable that the English Government resolved to continue these investigations, and during the two following years (1869 and 1870) placed another man-of-war at the disposal of the scientists. This was the Porcupine, much better adapted to the purpose than the Lightning. The naturalists also had the good fortune to meet with much more favorable weather than during the preceding year. They eagerly pursued their investigations of the mysterious world of the deep, and did not only see all their former observations corroborated, but also added many new ones. During the former expedition they had only penetrated to a depth of about 1,000 meters, but this time they reached a depth of 2,000, 3,000, and 4,000 meters, and yet did not find the uninhabitable desert which they had expected to find. At the depth of nearly a mile they found many kinds of invertebrates. If one takes into consideration the circumstances that these soundings of the deep have to be made in entire darkness, it must be confessed that, if by blindly groping about in the deep animals are constantly brought up, life in these depths can by no means be scarce, but seems on the contrary to be exceedingly abundant.

#### VI.—THE CHALLENGER SCIENTIFIC VOYAGE ROUND THE WORLD.

It may well be imagined with what eager attention all the naturalists of Europe followed these first observations on an entirely new field. Even the public, which is constantly taking greater interest in the progress of science, was surprised at these unexpected discoveries. From all sides the desire was expressed not to stop at these first attempts, but to continue the investigation of the world under the sea.

So far, however, soundings had only been made in the neighborhood of the European coasts. Important as the result had been, it must be confessed that all these endeavors were but trifling compared to the illimitable extent of the field. An expedition carefully prepared for

exhaustive observations of the depths of the ocean all over the globe would undoubtedly prove of immense interest to science. And what nation was better fitted to take the matter in hand than England, which proudly "rules the waves," and therefore, more than any other nation, would derive benefit from a thorough knowledge of the ocean?

The English statesmen were fully aware of the vast importance of this subject, and with the consent of Parliament they opened the door of the treasury wide. A fine frigate of the Royal Navy, called the *Challenger*, was selected for this expedition; the guns were taken out, and she was fitted out anew, with the special view of taking observations. The vessel was manned by picked officers and men, and a number of prominent naturalists became members of the expedition, at the head of which was Mr. Wyville Thomson, who had had charge of the first observations mentioned above.

Toward the end of the year 1872 the *Challenger* departed on her voyage around the world, cruising in all directions in the Atlantic and Pacific. The expedition occupied three years, and on its return the *Challenger* had sailed more than 20,000 miles. The observations had been directed to different subjects: the temperature of the water from the surface to the bottom; the depth of the sea in various places; the nature of the bottom and the animals inhabiting it; whether the water was stationary or whether there were currents, the direction and swiftness of these currents, &c. With the excellent instruments plummets were hauled up from great depths, among them one of 8,363 meters. This was the greatest depth which was sounded, which of course does not imply that there are no greater depths in the sea, for it can hardly be expected that by chance the plummet would sink into the greatest depth of the sea.

And what do we learn, regarding this very interesting subject, from the expedition of the *Challenger*. The naturalists made everywhere the same observations which they had made in the first waters examined by them. Nowhere did they find a lack of living beings, and at the bottom of the sea they found all kinds of invertebrates. They also hauled up some fish which were evidently intended to live at the bottom, and which could not live anywhere else. When the fish were brought up their air-bladders protruded from their mouths, and their eyes protruded from their sockets; nothing but the great pressure existing in these depths is able to keep these organs in their places.

From the depth crustaceans were brought up as well formed as those of the surface waters, but they were either entirely blind or had no eyes at all. "No wonder," people will say, "for these organs are entirely useless in the dense darkness prevailing in these depths." Granted; but what do those animals which have eyes, and which also live in the depths, do with those organs? Are we certain that there is in these depths an entire absence of light? A remarkable statement made by the naturalists of the *Challenger* seems to make this matter

somewhat doubtful. Who does not know the glow-worm, which shines so brightly in the darkness? Such light-giving animals are also found in the water, some of them even in such vast quantities as to make the entire surface of the sea to shine. Polyps have been brought up from the deep, small animals which grow fast to the bottom, and are there found in enormous numbers, outwardly resembling a vegetable product. To illustrate this, imagine every grain in an ear of corn to be a living animal, and imagine even the stalk full of them. These polyps also give out light when they are touched. Behold here the living corn fields of the deep! If a fish swims over them his track is marked by a streak of light. Might it not be possible that, under certain conditions, these submarine living corn fields could throw out light and thus banish darkness from these depths?

Another question has also attracted the attention of the naturalists, "On what do the animals of the deep live?" We have spoken above of the large number of carnivorous animals in the sea, but all these animals cannot possibly live in this same manner; some kinds, which become a prey to others, must necessarily find their food in the vegetable kingdom. This kingdom is represented in the sea, but only near the surface; it does not, like the animal kingdom, extend into the depths. What food, therefore, is found in the depths on which those primitive animals, which serve as food for other higher animals, could feed? To this the naturalists reply that the water of the sea contains nutritive matter, originating from the rivers which empty into the sea, from the waters of the surface, from the numberless decaying animals, &c. The water must, therefore, be considered as the food and drink of some animals.

The naturalists of the *Challenger* were the first to confess that they are still far from possessing a complete knowledge of the ocean. Astronomers assert that the human race, even after a thousand centuries, shall not have exhausted the study of the heavenly bodies. Who would, therefore, maintain that the same cannot apply to the animals of the sea? How can we ever expect to finish the observations of the illimitable deep if a single glass of water from any of our ponds, when viewed through the magnifying glass, shows enough living beings to occupy the lifetime of a man.

We know, however, enough of the sea and its bottom to conquer the prejudice which only twenty-five years ago was very widespread, viz, that the sea—inhabitable near its surface—presented in its depths nothing but a dark, dead, and eternally silent desert.