

CLASSIC LIVING BOOK

LIFE AND
HER CHILDREN

Arabella Buckley

COMPLETE AND UNABRIDGED

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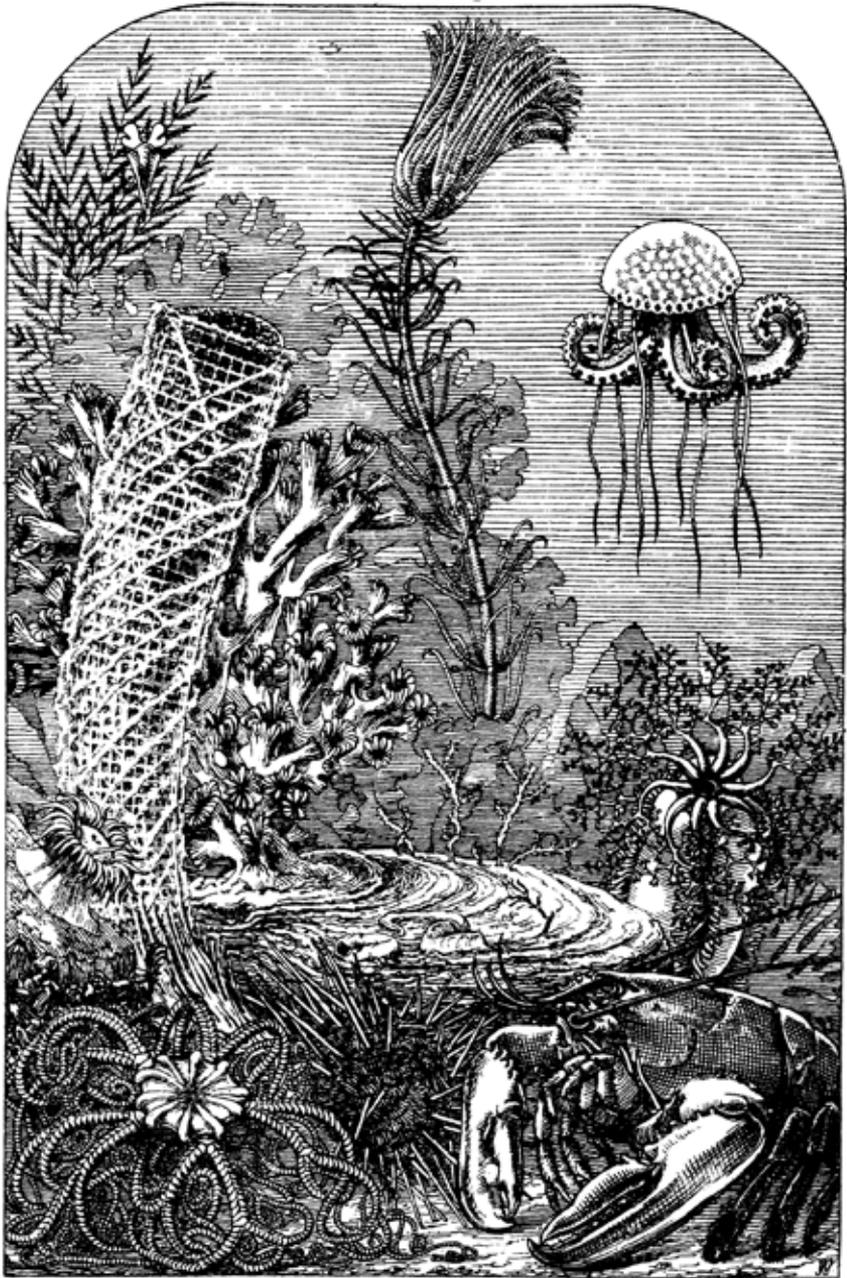
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Life and Her Children

by

ARABELLA BUCKLEY





LIFE IN THE DEEP SEA

Contents

	Preface.	ix
1.	Life and Her Children.	1
2.	Life's Simplest Children: how They Live, and Move, and Build.	12
3.	How Sponges Live.	30
4.	The Lasso-throwers of the Ponds and Oceans.	46
5.	How Star-fish Walk and Sea-urchins Grow.	72
6.	The Mantle-covered Animals, and How They Live with Heads and Without Them.	96
7.	The Outcasts of Animal Life, and the Elastic-ringed Animals by Sea and by Land.	126
8.	The Mailed Warriors of the Sea, with Ringed Bodies and Jointed Feet.	143
9.	The Snare-weavers and Their Hunting Relations.	166
10.	Insect Suckers and Biters Which Change Their Coats But Not Their Bodies.	186
11.	Insect Sippers and Gnawers Which Remodel Their Bodies Within Their Coats.	215
12.	Intelligent Insects with Helpless Children as Illustrated by the Ants.	247

‘His parent hand,
From the mute shell-fish gasping on the shore,
To men, to angels, to celestial minds,
For ever leads the generations on
To higher scenes of being; while supplied
From day to day with his enlivening breath,
Inferior orders in succession rise
To fill the void below.’

AKENSIDE.—Pleasures of the Imagination.

PREFACE.

THE plan of this work is so fully explained in the Introductory Chapter that but little preface is needed. Its main object is to acquaint young people with the structure and habits of the lower forms of life; and to do this in a more systematic way than is usual in ordinary works on Natural History, and more simply than in text-books on Zoology.

For this reason I have adopted the title "Life and her Children," to express the family bond uniting all *living* things, as we use the term "Nature and her Works," to embrace all organic and inorganic phenomena; and I have been more careful to sketch in bold outline the leading features of each division, than to dwell upon the minor differences by which it is separated into groups.

I have made use of British examples in illustration wherever it was possible, and small specimens of most of the marine animals figured may be found upon our coasts at low tide.

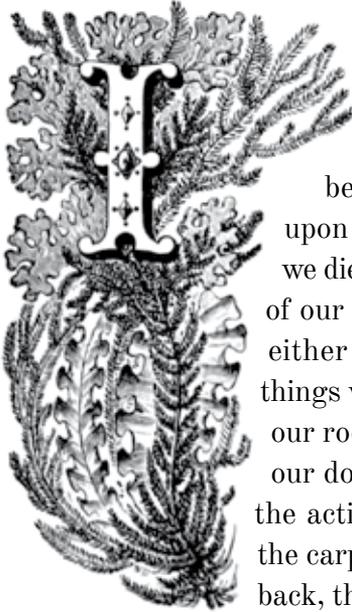
In conclusion, I wish to express my great obligation to Mr. R. Garnett of the British Museum, for his most kind assistance in finding works of reference on the special subjects; and to many men of science, especially Mr. Lowne, F.R.C.S. and Mr. Haddon, Demonstrator of Comparative Anatomy at Cambridge, for their valuable criticisms on the proof-sheets.

The Illustrations of the marine animals have been drawn by Dr. Wild, artist of the 'Challenger' Expedition, and those of the insects by Mr. Edwin Wilson, to both of whom my thanks are due for the care and assiduity with which they have carried out my instructions.

ARABELLA B. BUCKLEY.
LONDON, *November* 1880.

CHAPTER I.
Life and Her Children.

Wisdom and Spirit of the Universe!
Thou Soul, that art the Eternity of Thought!
And giv'st to forms and images a breath
And everlasting motion!—*WORDSWORTH.*



WONDER whether it ever occurs to most people to consider how brimful our world is of life, and what a different place it would be if no living thing had ever been upon it? From the time we are born till we die, there is scarcely a waking moment of our lives in which our eyes do not rest either upon some living thing, or upon things which have once been alive. Even in our rooms, the wood of our furniture and our doors could never have been without the action of life; the paper on our walls, the carpet on our floors, the clothes on our back, the cloth upon the table, are all made of materials which life has produced for us; nay, the very marble of our mantelpiece is the work of once living animals, and is composed of their broken shells. The air we breathe is full of invisible germs of life; nor need we leave the town and go to the country in search of other living beings than man. There is scarcely a street or alley where, if it be

Life and Her Children

neglected for a time, some blade of grass or struggling weed does not make its appearance, pushing its way through chinks in the pavement or the mortar in the wall; no spot from which we cannot see some insect creeping, or flying, or spinning its web, so long as the hand of man does not destroy it.

And when we go into the quiet country, leaving man and his works behind, how actively we find life employed! Covering every inch of the ground with tiny plants, rearing tall trees in the forest, filling the stagnant pools full of eager restless beings; anywhere, everywhere, life is at work. Look at the little water-beetles skimming on the surface of the shady wayside pool, watch the snails feeding on the muddy bank, notice the newts putting their heads above water to take breath, and then remember that, besides these and innumerable other animals visible to the naked eye, the fairy-shrimp and the water-flea, and other minute creatures, are probably darting across the pond, or floating lazily near its surface; while the very scum which is blown in ridges towards one corner of the pool is made up of microscopic animals and plants.

Then, as we pass over plain, and valley, and mountain, we find things creeping innumerable, both small and great; some hidden in the moss or the thick grass, rolled up in the leaves, boring into the stems and trunks of trees, eating their way underground or into even the strongest rock; while others, such as the lion, the tiger, and the elephant, roaming over Africa and India, rule a world of their own where man counts for very little. Even in our own thickly peopled country rabbits multiply by thousands in their burrows, and come to frolic in the dusk of evening when all is still. The field-mice, land and water rats, squirrels, weasels, and badgers, have their houses above and below ground, while countless insects swarm everywhere, testifying to the abundance of life. Not content, moreover,

Life and Her Children.

with filling the water and covering the land, this same silent power peoples the atmosphere, where bats, butterflies, bees, and winged insects of all forms, shapes, and colours, fight their way through the ocean of air; while birds, large and small, sail among its invisible waves.

And when by and by we reach the sea, we find there masses of tangled seaweed, the plants of the salt water, while all along the shores myriads of living creatures are left by the receding tide. In the rocky pools we find active life busily at work. Thousands of acorn-shells, many of them scarcely larger than the head of a good-sized pin, cover the rocks and wave their delicate fringes in search of food. Small crabs scramble along, or swim across the pools, sand-skipper dart through the water, feeding on the delicate green seaweed, which in its turn is covered with minute shells not visible to the naked eye, and yet each containing a living being.

Wherever we go, living creatures are to be found, and even if we sail away over the deep silent ocean and seek what is in its depths, there again we find abundance of life, from the large fish and other monsters which glide noiselessly along, lords of the ocean, down to the jelly-masses floating on the surface, and the banks of rocky coral built by jelly-animals in the midst of the dashing waves. With the exception of the sandy deserts, there is no spot on the surface of the earth, in the depths of the ocean, or in the lower currents of the air, which is not filled with life whenever and wherever there is room. The one great law which all living beings obey is to “increase, multiply, and replenish the earth;” and there has been no halting in this work from the day when first into our planet from the bosom of the great Creator was breathed the breath of life,—the invisible mother ever taking shape in her children.

No matter whether there is room for more living forms or

not, still they are launched into the world. The little seed, which will be stifled by other plants before it can put forth its leaves, nevertheless thrusts its tiny root into the ground and tries to send a feeble shoot upwards. Thousands and millions of insects are born into the world every moment, which can never live because there is not food enough for all. If there were only one single plant in the whole world to-day, and it produced fifty seeds in a year and could multiply unchecked, its descendants would cover the whole globe in nine years.¹ But, since other plants prevent it from spreading, thousands and thousands of its seeds and young plants must be formed only to perish. In the same way one pair of birds having four young ones each year, would, if all their children and descendants lived and multiplied, produce *two thousand million* in fifteen years,² but since there is not room for them, all but a very few must die.

What can be the use of this terrible overcrowding in our little world? Why does this irresistible living breath go on so madly, urging one little being after another into existence? Would it not be better if only enough were born to have plenty of room and to live comfortably?

Wait a while before you decide, and think what every creature needs to keep it alive. Plants, it is true, can live on water and air, but animals cannot; and if there were not myriads of plants to spare in the world, there would not be enough for food. Then consider again how many animals live upon each other; if worms, snails, and insects, were not over-abundant, how would the birds live? upon what would lions, and tigers, and wolves feed if other animals were not plentiful; while, on the other hand, if a great number of larger animals did not die and decay, what would the flesh-feeding snails, and maggots,

1 Huxley.

2 Wallace.

Life and Her Children.

and other insects find to eat? And so we see that for this reason alone there is some excuse for the over-abundance of creatures which life thrusts into the world.

But there is something deeper than this to consider. If in a large school every boy had a prize at the end of the half-year, whether he had worked or not, do you think all the boys would work as hard as they do or learn as well? If every man had all he required, and could live comfortably, and bring up his children to enjoy life without working for it, do you think people would take such trouble to learn trades and professions, and to improve themselves so as to be more able than others? Would they work hard day and night to make new inventions, or discover new lands, and found fresh colonies, or be in any way so useful, or learn so much as they do now?

No, it is the struggle for life and the necessity for work which makes people invent, and plan, and improve themselves and things around them. And so it is also with plants and animals. Life has to educate all her children, and she does it by giving the prize of success, health, strength, and enjoyment to those who can best fight the battle of existence, and do their work best in the world.

Every plant and every animal which is born upon the earth has to get its own food and earn its own livelihood, and to protect itself from the attacks of others. Would the spider toil so industriously to spin her web if food came to her without any exertion on her part? Would the caddis worm have learnt to build a tube of sand and shells to protect its soft body, or the oyster to take lime from the sea-water to form a strong shell for its home, if they had no enemies to struggle against, and needed no protection? Would the bird have learnt to build her nest or the beaver his house if there was no need for their industry?

Life and Her Children

But as it is, since the whole world is teeming with life, and countless numbers of seeds and eggs and young beginnings of creatures are only waiting for the chance to fill any vacant nook or corner, every living thing must learn to do its best and to find the place where it can succeed best and is least likely to be destroyed by others. And so it comes to pass that the whole planet is used to the best advantage, and life teaches her children to get all the good out of it that they can.

If the ocean and the rivers be full, then some must learn to live on the land, and so we have for example sea-snails and land-snails; and whereas the one kind can only breathe by gills in the water, the other breathes air by means of air-chambers, while between these are some marsh-snails of the tropics, which combine both, and can breathe in both water and air. We have large whales sailing as monarchs of the ocean, and walruses and seals fishing in its depths for their food, while all other animals of the mammalian class live on the land.

Then, again, while many creatures love the bright light, others take advantage of the dark corners where room is left for them to live. You can scarcely lift a stone by the seaside without finding some living thing under it, nor turn up a spadeful of earth without disturbing some little creature which is content to find its home and its food in the dark ground. Nay, many animals for whom there is no chance of life on the earth, in the water, or in the air, find a refuge in the bodies of other animals and feed on them.

But in order that all these creatures may live, each in its different way, they must have their own particular tools to work with, and weapons with which to defend themselves. Now all the tools and weapons of an animal grow upon its body. It works and fights with its teeth, its claws, its tail, its sting, or its feelers; or it constructs cunning traps by means

Life and Her Children.

of material which it gives out from its own body, like the spider. It hides from its enemies by having a shape or colour like the rocks or the leaves, the grass or the water, which surround it. It provides for its young ones either by getting food for them, or by putting them, even before they come out of the egg, into places where their food is ready for them as soon as they are born.

So that the whole life of an animal depends upon the way in which its body is made; and it will lead quite a different existence according to the kind of tools with which life provides it, and the instincts which a long education has been teaching to its ancestors for ages past. It will have its own peculiar struggles, and difficulties, and successes, and enjoyments, according to the kind of bodily powers which it possesses, and the study of these helps us to understand its manner of existence.

And now, since we live in the world with all these numerous companions, which lead, many of them, such curious lives, trying like ourselves to make the best of their short time here, is it not worth while to learn something about them? May we not gain some useful hints by watching their contrivances, sympathising with their difficulties, and studying their history? And above all, shall we not have something more to love and to care for when we have made acquaintance with some of Life's other children besides ourselves?

The one great difficulty, however, in our way, is how to make acquaintance with such a vast multitude. Most of us have read anecdotes about one animal or another, but this does not give us any clue to the history of the whole animal world; and without some such clue, the few observations we can make for ourselves are very unsatisfactory. On the other hand, most people will confess that books on zoology, where accounts are given of the structure of different classes of animals, though

Life and Her Children

very necessary, are rather dull, and do not seem to help us much towards understanding and loving these our fellow-creatures.

What we most want to learn is something of the *lives* of the different classes of animals, so that when we see some creature running away from us in the woods, or swimming in a pond, or darting through the air, or creeping on the ground, we may have an idea what its object is in life—how it is enjoying itself, what food it is seeking, or from what enemy it is flying.

And fortunately for us there is an order and arrangement in this immense multitude, and in the same way as we can read and understand the history of the different nations which form the great human family spread over the earth, and can enter into their feelings and their struggles though we cannot know all the people themselves; so with a little trouble we may learn to picture to ourselves the general life and habits of the different branches of the still greater family of Life, so as to be ready, by and by, to make personal acquaintance with any particular creature if he comes in our way.

This is what we propose to do in the following chapters, and we must first consider what are the chief divisions of our subject, and over what ground we have to travel. It is clear that both plants and animals are the children of Life, and indeed among the simplest living forms it is often difficult to say whether they are plants or animals.

But it is impossible for us to follow out the history of both these great branches or *Kingdoms*, as naturalists call them, so we must reluctantly turn our backs for the present upon the wonderful secrets of plant life, and give ourselves up in this work to the study of animals.

First we meet with those simple forms which manage so cleverly to live without any separate parts with which to do their work. Marvellous little beings these, which live, and

Life and Her Children.

move, and multiply in a way quite incomprehensible as yet to us. Next we pass on to the slightly higher forms of the *second* division of life, in which the members have some simple weapons of attack and defence. Here we come first upon the wonderful living sponge, building its numerous canals, which are swept by special scavengers; these form a sort of separate group, hovering between the *first* and *second* division, and from them we go on to the travelling jelly-fish, with their rudiments of eyes and ears, and their benumbing sting, and then to the sea-anemones with their lasso-cells, and to the wondrous coral-builders. Already we are beginning to find that the need of defence causes life to arm her children.

The *third* division is a small, yet most curious one, containing the star-fish with their countless sucker-feet, the sea-urchins with their delicate sharp spines and curious teeth, and the sea-cucumbers with their power of throwing away the inside of their body and growing it afresh. This division goes off in one direction, while the next, or *fourth*, though starting with creatures almost as simple as the coral-builders, takes quite a different line, having for its members mussels and snails, cuttle-fish and oysters, and dividing into two curious groups: the one of the shell-fish with heads, and the other of those without any.

The *fifth* division, starting also in its own line by the side of the third and fourth, includes the creeping worms provided with quite a different set of weapons, and working in their own peculiar fashion, some living in the water, some on the earth, and some in the flesh of other beings, feeding upon their living tissues. An ugly division this, and yet when we come to study it we shall find it full of curious forms showing strange habits and ways.

The *sixth* division is a vast army in itself, with four chief

Life and Her Children

groups all agreeing in their members having jointed feet, and subdivided into smaller groups almost without number. The first group, including the crabs and their companions, live in the water, and their weapons are so varied and numerous that it will be difficult for us even to gain some general idea of them. The other three groups, the centipedes, spiders, and six-legged insects, breathe only in the air. This sixth or jointed-legged division contains more than four-fifths of the whole of the living beings on our globe, and it forms a world of its own, full of interest and wonders. In it we have all the strange facts of metamorphosis, the wondrous contrivances and constructions of insect-life, and at the head of it those clever societies of wasps, bees, and ants, with laws sometimes even nearer to perfection than those of man himself.

Lastly we come to the *seventh* and vast division of back-boned animals which will claim a separate volume to itself. This division has struggled side by side with the other six till it has won a position in many respects above them all. Nearly all the animals which we know best belong to it,—the fishes, toads, and newts (amphibia), the reptiles, the birds, and the mammalia, including all our four-footed animals, as well as the whales, seals, monkeys, and man himself.

Under these seven divisions then are grouped the whole of the living animals as they are spread over the earth to fight the battle of life. Though in many places the battle is fierce, and each one must fight remorselessly for himself and his little ones, yet the struggle consists chiefly in all the members of the various brigades doing their work in life to the best of their power, so that all, while they live, may lead a healthy, active existence.

The little bird is fighting his battle when he builds his nest and seeks food for his mate and his little ones; and though in

Life and Her Children.

doing this he must kill the worm, and may perhaps by and by fall a victim himself to the hungry hawk, yet the worm heeds nothing of its danger till its life comes to an end, and the bird trills his merry song after his breakfast and enjoys his life without thinking of perils to come.

“While ravening death of slaughter ne’er grows weary,
Life multiplies the immortal meal as fast.
All are devourers, all in turn devoured,
Yet every unit in the uncounted sum
Of victims has its share of bliss—its pang,
And but a pang of dissolution: each
Is happy till its moment comes, and then
Its first, last suffering, unforeseen, unfear’d,
Ends with one struggle pain and life for ever.”

So life sends her children forth, and it remains for us to learn something of their history. If we could but know it all, and the thousands of different ways in which the beings around us struggle and live, we should be overwhelmed with wonder. Even as it is we may perhaps hope to gain such a glimpse of the labours of this great multitude as may lead us to wish to fight our own battle bravely, and to work, and strive, and bear patiently, if only that we may be worthy to stand at the head of the vast family of Life’s children.

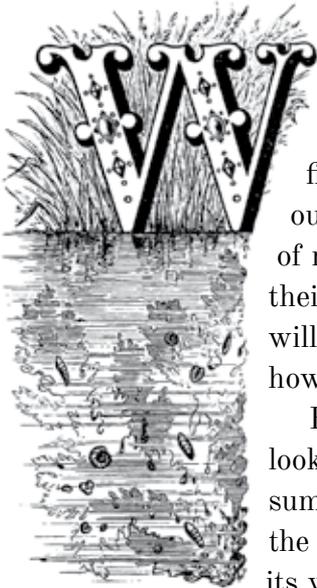


CHAPTER II.

Life's Simplest Children:
how They Live, and Move, and Build.

“The very meanest things are made supreme
With innate ecstasy. No grain of sand
But moves a bright and million-peopled land,
And hath its Edens and its Eves, I deem.
For love, though blind himself, a curious eye
Hath lent me, to behold the heart of things,
And touched mine ear with power. Thus, far or nigh,
Minute or mighty, fixed or free with wings,
Delight, from many a nameless covert sly,
Peeps sparkling, and in tones familiar sings.

LAMAN BLANCHARD.



HO are Life's simplest children, and where are they to be found? Let us try to answer the second question first, and rubbing the scales from off our eyes, peer into the hidden secrets of nature; and when we have tracked to their home the tiny beginnings of life, we will examine them and try to understand how they live.

How calm, and lovely, and still the sea looks on a warm, sunny, breezeless day of summer, and how happy we can imagine the myriads of creatures to be that float in its waters! We know many of them well,

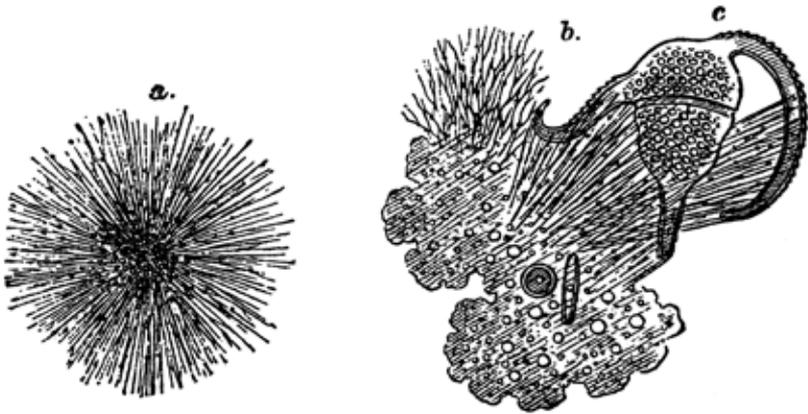
especially those which come close up to the shore. The small fry of the fish, the shrimp and the sand-hopper, the large jelly-fish, and the tiny transparent jelly-bells (see 3', Fig. 22), only to be seen by the keenest eye, as we dip out the water carefully in a glass. Surely these minute jelly-bells with their invisible hanging threads must be some of the simplest and lowest forms of life. Not so, they are really very high up in the world compared with the forms we are seeking.

If, indeed, we come out late some autumn evening when, after the sun has set and the sky is dark, the sea in some sheltered bay appears all covered with a sheet of light, we may see some of the beings of the lowest order of life with the naked eye; for when we dip the liquid fire out in a glass vessel and examine it, we find in it hundreds and thousands of tiny bags of slime giving out the bright specks of light, and these little Noctilucae, or night-glowers (2, Fig. 3), are, as we shall presently see, some of Life's simplest children, although not by any means the most simple of the order.

No; to begin at the very beginning and find the first known attempts at a living being, we must search long and carefully, not merely with our own eyes, but with the microscope. Then we may perhaps be fortunate enough to discover some wondrously small creature like that on the next page, which Professor Haeckel took out of the sunny blue waters of the Mediterranean, near Nice, in 1864. The largest specimen to be found will be smaller than the smallest pin's head, yet when seen under the microscope, this tiny speck appears with outstretched threads, a living animal (see *a*, Fig. 1), floating in search of food. Examine it how we will, we can find in it no mouth, no stomach, no muscles, no nerves, no parts of any kind. It looks merely like a minute drop of gum with fine grains in it, floating in the water, sometimes with its fine threads outstretched,

sometimes as a mere drop; and if we take it out and analyse the matter of which it is made, we find that is much the same as a speck of white-of-egg. Is it possible that it can be alive? How can we be sure? In the first place it breathes. If it be kept in a drop of water, it uses up the oxygen in it, and makes the water bad, by breathing into it carbonic acid; then it moves, and, as we shall see presently, can draw in and throw out its fine threads when and where it chooses; again it eats, feeding on the minute jelly-plants in the water, or even on animals higher in the world than itself; and lastly, it grows and increases, for when it is too large to be comfortable it splits in two, and each half goes its way as a living animal.

FIG. 1.



THE THREAD-SLIME.³ —*Haeckel*.

a, IN ITS NATURAL ROUND SHAPE, IMMENSELY MAGNIFIED; *b*, SPREADING ITSELF OVER A SMALL ANIMAL, *c* (*Ceratium*), TO SUCK THE SOFT BODY OUT OF THE SHELL.

Let us see how one behaved which Professor Haeckel took

3 Protogenes.

out of the sea and kept in a watch-glass under a microscope. When he first looked at it he found that it was drawn up in a lump with a minute animal and a plant-cell in the middle of its slime, and close by it in the water lay a small living animal called a Ceratium (*c*, Fig. 1), which has a hard case or shell. After a while, as he watched, he saw the thread-slime put out its fine threads on all sides (*a*, Fig. 1). Soon the threads on the right side touched the shell of the Ceratium. Here was food, and the body of the *Thread-slime* evidently became aware of it at once, for all the little grains in the slime began to course to and fro, and the threads touching the Ceratium lengthened out and stretched more and more over it, while all those on the other side which had not found any food were drawn in, (*b*, Fig. 1). Six hours later when Dr. Haeckel looked again, to his astonishment the thread-slime had disappeared, but on examining more closely he discovered it completely spread in patches over the shell of the Ceratium. It had drawn its whole body after the pioneering threads and wrapped itself round its prey. Next morning when he looked again, lo! it was back in its original place, and by its side lay the Ceratium shell *quite empty*, together with the skeletons of the other two forms which had been inside the Thread-slime!

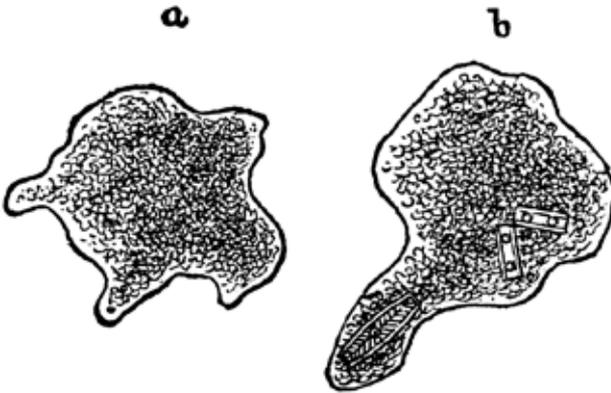
This little drop of slime without eyes or ears or parts of any kind, knew how to find its food; without muscles or limbs it was able to creep over it; without a mouth it could suck out its living body; without a stomach it could digest the food in the midst of its own slime, and throw out the hard parts which it did not want.

This is the history of one of Life's simplest children.

Here is another (Fig. 2), which lives not only in the sea but also in pools and puddles, and in the gutters of our

streets and of our house-tops. Anywhere that water lies stagnant these little drops of slime will grow up and make it their home. Sometimes few and far between, sometimes in crowds, so that the whole pond would seem alive if we could see them, they live, and multiply, and die under our very feet. Can anything be less like an animal than this shapeless mass (*a*, Fig. 2)? Yet under a strong microscope it may be seen moving lazily along by putting out a thick slimy finger and then letting all the rest of its body flow after it. When it touches food it flows over it just as the Thread-slime did, and dissolving the soft parts sends out the hard refuse anywhere, it does not matter where, for it has no skin over its body, being merely one general mass of slime.

FIG. 2.



THE FINGER SLIME.⁴—*Haeckel*.

a, AT REST. *b*, FEEDING ON MINUTE SLIME-PLANTS.

And now, before we go on to other forms, let me ask you to pause and think what these little slime-specks tell

4 Protamoeba.

us about the wonderful powers of Life. Can you guess at all how these creatures do their work? We are obliged to have eyes to see our food, nerves and muscles to enable us to feel and grasp it, mouths to eat it, stomachs which secrete a juice in order to dissolve it, and a special pump, the heart, to drive it into the different parts of our body. But in these tiny slime-animals life has nothing better to work with than a mere drop of living matter, which is all alike throughout, so that if you broke it into twenty pieces every piece would be as much a living being as the whole drop. And yet by means of the wonderful gift of life, this slime-drop lives, and breathes, and eats, and increases, shrinks away if you touch it, feels for its food, and moves from place to place, changing its shape to form limbs and feeling-threads, which are lost again as soon as it no longer needs them.

Nor have we yet learnt one-half of the marvels which can be wrought in living specks of slime. For, on further inquiry, we find these simple forms developing two quite different modes of life. In the one case the slime is moulded itself into delicate forms, making creatures with mouths, with suckers, and with delicate lashes to drive the body through the water; while in the other case, remaining a simple drop with delicate threads, it has learned to build a solid covering of the most exquisite delicacy.

To the first class belongs our little *Noctiluca*, and the forms drawn by its side in Fig. 3. To the second belong the microscopic shells (Fig. 4) which form our chalk. Look at the little wriggling creatures at 1, Fig. 3, small as they look here, they are drawn many thousand times larger than they really are in life, and yet they are much