

THE
Origin of the Silver Gel,

WITH REMARKS ON

Bait & Fly Fishing.

BY DAVID CAIRNCROSS.

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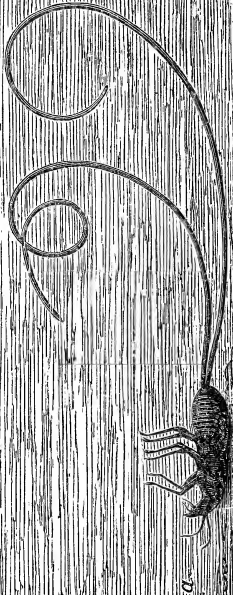
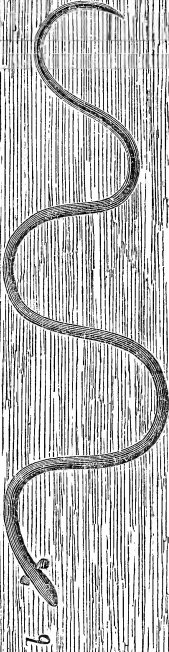
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a The Beetle in the act of Parturition.

b The Eel fully developed.

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DAVID CAIRNCROSS.



LONDON :

G. SHIELD, 30, LOWER SLOANE STREET, S.W.

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TO THE
Honble. the President, Vice-President, & Members
OF THE
BLAIRGOWRIE ANGLING CLUB.

GENTLEMEN,

Being privileged with a full share of your confidence individually, and having been honoured with the same distinction by you in your associated capacity, my being allowed to dedicate this humble treatise to your honourable Club, proves beyond a doubt not only the deep sincerity of all your past favours, but also a desire on your part (expressed in a way most congenial to my heart and honourable to my mind) that these favours should be perpetuated; and although separated from you, it is the wish of your honourable Society not only to acknowledge me as a Brother, but so to extend the favours of the brotherhood, as to patronize the efforts of my mind, and stamp with your approbation my little work. Suffice it to say, that this last act of your kindness recalls some of the happiest scenes of my life, and goes far to gladden me in the land of my adoption, lending a bright gleam to my setting sun, and shedding a chastened joy over my closing years.

With deepest gratitude to each and all of you for your numerous acts of esteem and goodwill, and with a hearty prayer for long life and prosperity to your honourable Club, and to each individual member, allow me, for "Auld Lang Syne," to subscribe myself,

Your obedient Servant,

THE AUTHOR.

LONDON, August 19th, 1862.

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Prefatory Remarks.



I WAS reared in one of the rural districts of Scotland, near the mouth of the Tay. Here education was small in quantity and inferior in quality ; little of it came my way, and what did come was very elementary indeed, English grammar and the art of composition being entirely excluded. Quietly, it was the opinion of many of the elder pupils that the teacher should have been at school a little longer himself. These facts will in some measure prepare my reader to excuse the style of my simple treatise ; also, I may say what of it I possess was formed in the hurried moments of an engi-

neer's apprenticeship, and mainly to assist me in decently stringing together my few scientific observations. Books on the arts and sciences seldom or never made their appearance in the place of my nativity; and so few were my opportunities of reading, and so incessant my toils, that all my knowledge through means of books could be collected in the space of a few hours. My never-failing fountain of supply during my investigations has been an old trusty copy of Bailey's Dictionary, enabling me to state, as nearly as I could in plain English, the observations made by me from time to time.

I never expected to publish these remarks; they are simply the jottings of a progressive experiment, having for its object the unfolding of the origin of the silver eel. The series of inquiries, and the notes recording them, extend over a period of

sixty years. If the taste of my reader will make every allowance for the note-like style of my composition, I feel quite assured I shall be fully able to satisfy his judgment that I have discovered the real origin of this hitherto mysterious creature.

The reader may at once be informed that that the progenitor of the silver eel is a small beetle. The study of its nature and habits has occupied my attention for the period above mentioned. That it truly is the progenitor of the silver eel I feel fully satisfied in my own mind, from a rigid and extensive comparison of its structure and habits with those of other insects. This will be the reader's opinion too, I feel assured, after he has fairly weighed the array of facts brought before him, and tested the conclusions naturally flowing from them by actual experiment. As my own mind is now fully made up on the

subject, I have at last yielded to the solicitation of my scientific friends, and fearless of the result I send it forth to the world.

Although my library was small, and, as far as natural history was concerned, limited in the extreme, yet the broad fields of nature so abundantly supplied this defect as to surround me with materials so various in kind, and so vast in quantity as completely to overwhelm me. Under these feelings I kept on the outskirts of them, delighted to pick up, and carefully to examine such things as I could comprehend. While so employed, the eel-beetle came in my way, which, I could perceive stood unparalleled in its natures among all the other amphibious animals that had crossed my path. In each of the others I could see the two natures mixed, but in the eel-beetle its two natures were nearly separate and distinct; the fish nature being only

couched in the alimentary canal, and the secreted juices passing through these canals for the support of the beetle, gives it a tinge that by nature makes it strive, if possible, to live near water in order to be ready to give up its second nature to its proper element when the time arrives. This may seem strange; the strangeness, however, disappears when we look round among the members of the vegetable kingdom. There, through a caprice of gardening, one tree may be made the possessor of two diverse natures. The ash, for example, may be grafted on the elm. In the spring, the elm would be sowing its seed, while the ash would be breaking the bud to grow. Could not, therefore, the Great Creating Gardener graft a foreign nature on that of an insect? Whilst one nature was sending forth its offspring, the germs of the other would be lying dormant till its period of development

arrived; when, by means of the beetle, it might be distributed among the bogs, where no other fish could live, and thence emigrating to the sea about the end of July, supply a nicely-flavored dish to thousands.

I could not be expected to be acquainted with the names and terms used by naturalists in their classifications of the different animals, my knowledge of such from books being limited. To make up for this deficiency I had to employ names and terms of my own.

Classification.



I HAVE divided my classes of every species into three grand divisions ; these again may be sub-divided into thousands, according to the different modes and forms of life. I will now bring before the reader my names and terms, and the meaning I attach to them, so as to be understood by him throughout.

By the expression, “returning to original,” I mean altering back to parents or begetters.

By “not altering back to originals,” I mean altering to another class.

By “not the same,” or “altering their form,” I mean not the same in one class, or

going through other forms until they come to originals.

I. All animals that live and breed on land or in the water, remaining where they breed, have a simple nature whatever forms they may pass through before they die; but if they change to another form, and do not return back to that of the originals before they die, they have a compound or mixed nature.

II. Next are all that live on the land and deposit their ova in or upon the waters, their young remaining in it until they are perfected by passing through different forms, and then changing back to their originals on land; some of this class may return yearly to breed in the water; all these have a compound or mixed nature.

III. The last class embraces all bipeds,

quadrupeds, and insects that breed on land, yet may alter their form to live in or on the waters, and there are others that live between land and water. These also have a compound or mixed nature.

PART II

Origin of the Silver Era.

Origin of the Silber Eel.



CHAPTER I.

THIS little treatise contains a series of observations extending over sixty years connected with the history, habits, and origin of the fresh-water eel.

The eel has been my study all my life. I commenced my observations at the age of ten, and as opportunity occurred they were continued over a period of sixty years. But before I can convey any idea of the facts involved, I must give a record of incidents, times, and places. My father rented a farm upon Lord Panmure's estate in Forfarshire, close to the south-east corner of his lordship's deer park. There was a small rivulet that ran down through the park, forming the northern boundary to my

father's farm. In a low-lying haugh by the side of the stream there was a drain, required to take away the water from a spring that was in it. The drain was 30 yards long. The man that made it, not being very well acquainted with levels, made it deepest next the spring, and consequently water to the depth of three inches stood at the upper end for a distance of three yards. It was opened in the first week in April, and stood open till the first week in May, 1803. During this period, one Saturday afternoon, I went to this spot with my father's herd boy and his cows. It was called the lady's haugh. My attention was attracted to the open drain, and looking at the water standing round the mouth of the spring, I observed a great number of hair eels swimming about, and asked my companion to assist me in counting them. They numbered thirteen. I put the question to him, "What can they come from?" He replied, "They fall from the tails of the horses while drinking, and the water brings them to life." My companion was thirteen years old, and I was ten. Young as I was,

I could not believe that water could make hair live. On being left alone I still gazed upon the water, and again counted the eels. While so employed, I saw a number of beetles lying at the bottom of it, on their backs, dead. There were eight of them. This excited my curiosity. I wondered and considered long as to what brought them to the water. Their position also struck me. Surely they did not come down to drown themselves. I immediately captured a few and immersed them, but they were out of the water in a moment. The query that now rose in my mind was, if there could be any connection between the eels and the beetles, no other animal being visible in the drain, themselves excepted. Believing they did not come there for the purpose of self-destruction, and unable to trace any connection between them, I returned to the school on Monday, but often did my mind revert to the mystery.

I stayed at home for the next six years; and in bogs and rivulets I often saw swarms of hair eels, sometimes finding them, while fishing, in the mouth of a trout, half-

swallowed, but never came upon anything sufficiently clear to satisfy my mind as to their origin; or if they were produced in any particular month (it was then May), or throughout the whole summer.

Time passed on. I went at the age of sixteen to serve my time as an engineer. After my apprenticeship expired, I travelled through different counties in the prosecution of my trade. During these journeys I took every opportunity to examine all eels that came in my way, large and small. I searched every work on natural history that fell in my way, for information as to the origin of this animal, but found nothing to satisfy me. I always believed that something would fall in my way which would reveal to me the mystery.

I came to the town of Dundee in the spring of 1817, as manager and principal engineer at the works of Messrs. J. and W. Brown. My dwelling-house was situated in a low-lying place. In the garden immediately before the window I had a bed of fine ranunculuses. On the 2nd of May, 1825, whilst weeding this bed

of ranunculuses, I saw a beetle coming from the garden wall, and approaching my fingers. It passed towards the pump, which was a few yards from me. I stopped it in its journey, but could not turn it back. I looked at it, and could perceive that its abdomen was twice the size of any ordinary beetle of the kind I had seen before. My thoughts flashed back twenty-two years, to the drain in my father's haugh when but a boy. I always thought I would get the query solved. "Why, this is the day, for by what I can see, that insect has something to do, otherwise why is it so intent on reaching the water?" I exclaimed. I followed it to the pump; there was a small pool near it, about three feet broad. The beetle makes for it, and swims over to the other side, gets out of it a small way, then stands, looks about a little, back it comes, swims over again, and comes out at my feet in a very troubled state. I could perceive now two hair eels protruding from it, about the fourth of an inch. From this, I thought it would be the last time it would swim over the pool; when it came to the centre it sank,

and I could see the eels twisting about its legs to get themselves free. As to the beetle, its life went with the birth of the eels. It had ceased to move before they had half extricated themselves. After they were fairly separated from it, I brought up the beetle and examined it. I saw nothing in it but a white slough that covered the intestines, and they were hardly perceptible.

This year, two of the most striking events in my life occurred. First, the discovery of the origin of the silver eel, a subject that had puzzled me for twenty-two years. Second, the invention of the conical spindle and the construction of a frame fitted for working it. I had been annoyed for twelve years with the old plan; it was utterly unmanageable by any mechanic. My plan came up to my expectations, and has not yet been superseded, although forty years have elapsed since I invented it, and it has been as widely spread as the art of spinning. I may refer the reader to whom the subject may be of any interest to William Brown, Esq., Dundee, who was then managing partner of the extensive mills

I had the honour of superintending for years; and also to the *Mechanic's Magazine*, published in London, in 1826, Vol. V., page 150. It was communicated to this periodical by my employer.

CHAPTER II.

MY next experiment was upon the eels themselves. I went in search of a glass globe with a wide mouth, and put two of them into it. They both died. I now tried to ascertain when the beetle began to shew signs of pregnancy. I collected a large number of them, and kept them in a box among moss kept moist with water. I could see about January the pregnant ones beginning to grow thicker about the abdomen, and by March, on opening some of them, I could perceive signs of life in the eels and a change of colour; by April, I have taken them alive out of the beetle, and kept them alive two weeks among water. These experiments led me to believe that the period of gestation is about ten months, which corresponds with that of the salmon and trout, and all fish that spawn once a year.

In 1828 ill-health made it necessary for me to leave Dundee. I settled near Blairgowrie, where I took a lease of a small spinning mill and a few acres of land. The land abounded with springs and water, and thus I had every local advantage for pursuing my eel experiments. This year, 1829, while building my dwelling-house, about the beginning of April, I dug a well in a low place for building purposes. The water came up eight inches below the surface, and two beetles appeared in this well and gave birth to two eels each. In order to free them from danger from any lime that might adhere to the buckets of the workmen when drawing water, I removed them to another well. The whole four died in the course of a few weeks. I now began to see that standing water would not answer. I looked out for a spring that ran constantly, and dug a well at the mouth of it about a foot in diameter. The orifice by which the water flowed into the well was four inches below the surface of the water standing in the well. I covered the orifice with a piece of brass

wire cloth, of very fine texture, which allowed nothing to pass out of, or into, the well but the water: This well was made in April, 1830; but no pregnant beetle appeared in it till May, 1834, when one came and deposited two eels, one of a light yellow and the other of a dark brown colour. To protect this well against all intruders I put a stone on the well's mouth, and only lifted it up when examining the progress of the eels to maturity. I watched the motions of these eels for six days for hours together. One day I could perceive the brown one come near the orifice by which the water entered the well, making efforts to enter it. That day I had the pleasure to see the brown one come up to the opening, which was about two inches in diameter, near which were some roots of grass growing. I could perceive that the extremity in which the head would ultimately appear was always put first when in the act of swimming. It pushed its head into the spring, round a root of grass, then turning the other extremity, aiding the motion by another root of grass—releasing

itself, it pushed the headed extremity into the spring, and I lost sight of it. I went back the seventh day, and found the light coloured one swimming about; it disappeared the eighth day, and I concluded that it followed the other one into the spring. I went every day for a month to see if any of them had issued from the spring, but during that period none made their appearance. I went occasionally during the winter months, but none of them were visible. Had they been so, I must have seen them, as the water was as clear as glass and had not at any time been covered with ice. At first I resolved not to disturb them till May, 1835, when they would be a year old, but I became impatient, not seeing them all the winter, nor observing the retiring of the yellow one, so one fine day in March I took a jug, and lowered the water in the well below the mouth of the spring, and down came both the eels, one yellow, the other dark brown—precisely the colours they had when they disappeared. This convinced me they were the same deposited by the beetle the first week

in the previous May. I allowed the water to rise in the well again, and each once more took refuge in the spring. Now, however, they were finely proportioned, and as finely formed as if they had been ten years old. In May I again emptied the well, and they appeared. They measured three-sixteenths of an inch in diameter and about six inches in length, perfectly formed in every part, and could swim as quick as thought if I dared to touch them. As I wished to keep them another year to note the progress of their growth, I made another reservoir below the well, where they were kept from May 1834 to May 1835, with the object of preserving them to May 1836. This time I made the well larger, and used wire cloth as formerly for the escape of the water. This cloth was sufficiently small in the mesh to keep all other fish out, and prevent the escape of the eels. I put a frame of wood round the whole to make sure no other eel could enter, and deposited two flat stones at the bottom of the well to afford them a retreat in case of danger. Here I kept them till May 1836, when I emptied

the well and lifted the stones—both were there, the same in colour, healthy and large. They had grown three-sixteenths thicker and two-and-a-half inches longer during the year, making them now three-eighths thick and eight and a half long. This one instance may not be sufficient to form a rule as regards the growth of the eel in general, knowing that variety prevails in the growth of all animals, but I once caught an eel which, from its appearance I believed to be six years old; on measuring it, I found it to be three and three-eighths inches in girth, that is, one and one eighth inch in diameter, and eighteen and a half inches in length. Now this agrees with the facts above stated. On this, I would not, however, insist.

The next fact I felt anxious to ascertain was the length of time it required the hair-eel to pass into the form we behold it in our rivers. In May, 1842, a beetle visited one of my wells, and produced one eel. For this one I had a glass tube prepared about one foot long, and three inches in diameter, open at both ends, being simply covered by very fine wire cloth. I placed the eel in

the tube and a few grass stems along with it. I then inserted this tube containing the eel into the mouth of the spring, so as to allow the water to flow through the tube from the spring into the well. I visited the well every month and examined the tube. I did not observe much change in the eel for three months. About the 1st of August it began to grow large in diameter, and by September I could discern the fins beginning to appear, and by the 1st of October the eyes were visible, and it was able to swim away from your finger; and by the 1st of November it was fairly formed and trying to get out of the tube. I kept it until May, 1843, and measured it. The dimensions in every way corresponded with those of the other two I had seven years before.

Two farmers were the first to credit my statements concerning the origin of the silver eel; one of them had some land lying near a marsh whose water ran over a projecting rock from 30 to 40 feet high, and falling over it with such force as in no part of its descent to touch the rock. They

drained this marsh by digging an open ditch through the centre of it. As the work of draining proceeded they came upon quantities of silver eels, for whose presence in that spot they could in no way account. Hearing of my discovery, they applied to me for information. Going up the drain one day with them, I captured a few beetles, and informed them that these insects were the parents of the eels; they believed me, and rejoiced in the solution of the mystery.

CHAPTER III.

1. These practical experiments shew the wisdom of the great Creator, and his kindness, in making this small land-insect to produce millions of eels a thousand times larger than itself every year—thus stocking our rivers, bogs, and mires with a fish, which, after a visit to the sea, is so well fitted to form a part of the food of man.

2. The parent beetle is small and black, and lurks about stones in marshy places and river banks. It is less than the working bee of the hive. It has a couple of hard wing cases. It seldom uses its wings, although I have seen them on the wing in a hot day in July. It breeds in the ordinary way of insects. I have seen both the male and female sitting beside their nest, which was a small hole below a stone. There would be ten to twelve eggs beside them,

about the month of June. The eggs were whitish, a little transparent, and as large as a mustard seed. These they produce by ordinary generation. They are prolific, and the young turnip suffers for their food. But a part of these beetles changes every year to bring forth a species of the fish kind by propagating eels in them, and bringing forth from May to July. Some of them have one and others two, owing to cold or hot situations. Most of them have two. About the time of giving birth to their eels, nature has taught them to seek the water, and some of them travel upwards of sixty yards. They die in the act of parturition, whether in water or on land. I have come upon them dead, and two eels twisting round their limbs, in water left after rain in the foot-prints of the horse, and at a great distance from running water.

3. The origin of the eel as above described accounts for finding them in mosses, moors, mountains, marshes, glens, and old quarries where there are springs; also in bogs, where no other fish could move a fin on account of the rushes. They are

so formed by their length and serpent-like motion as easily to glide through the thickets of grass and rushes.

4. I have opened eels at all seasons of the year, but never could find milt or roe in one of them. On this point I have consulted many anglers, and of the existence of such a thing they were equally ignorant. To me there appears no arrangement for anything like productive parts in the creature. I therefore conclude the Silver Eel to be a NEUTER. It is my opinion that there are a few of the smaller animals that produce neuters, and these are to be included among the characteristics of the class from which they spring, *e. g.*, the bee and the ant, the eel-beetle, and the other beetle previously described, and the prickly bog minnow. I was informed by a veteran angler that the prickly bog minnow was the progenitor of the horse leech, and that he himself had taken them alive out of them with his knife. I may also add to the above list a small tufted caterpillar, whose nature and habits have engaged my attention for some time. It feeds on the lime-tree, and produces eggs while in the caterpillar

state, and these eggs pass through several changes in a period of about two years, before their inmates have eggs themselves, but the original caterpillar changes into a chrysalis, and comes out in a short time a beautiful red butterfly, and, as far as I can see, has no connection with its own class, although I have closely watched them during the remainder of the summer. The eel frequents our rivers and lakes, eating what comes in its way, and has none to provide for but itself. If in a locality where food is abundant, it is always fat and in good season, which is not the case with spawning fish.

5. The migratory habits of the eel is the next point worthy of notice. It takes place in the autumn. At this season they begin to come down our rivers, some scarcely two ounces in weight, others many pounds. Allow me to offer a few remarks concerning this variety in the size of the eel. I remember in my early researches there was a marsh on the south side of my father's farm, about a mile in length, which emptied itself into a small rivulet, which ran round the northern side, as a boundary.

At the top of this marsh was a well, and stretching from it was a ditch, which ran towards a cutting 100 yards square, and four feet deep, dug a hundred years before for turf. A skin of grass covered its surface. At the age of thirteen, I frequently saw, among the grass and clear water, great numbers of eels and dead beetles, but none in the act of parturition. How they came there I could not at that time understand. In this place I have also seen eels of immense size. One sprang up in pursuit of a shoal of young ones which I am certain must have been five feet long, and four inches in diameter. Now, why I mention this matter is simply to say that the attacks of the larger eels in some measure accounts for the emigration of the younger ones. I also believe that many of these monster eels lie in these localities twenty years before emigration.

We have another species of eel that spawns in our rivers, called the lamprey eel. I captured one in autumn as full of roe as would stock a river. There could not have been less than 20,000 in it.

There is another eel about the mouths of our rivers, called the sandling. They make an excellent dish. I think they spawn in November. Their young visit us in May. I went to Perth to examine them, and along the banks of the Tay they came in vast numbers streaming along close by the edges, evidently to keep themselves beyond the reach of the trout and the salmon. I threw two or three on the land and could discover no resemblance between them and the fresh-water eel. They were not the same species. I think our earlier naturalists have mistaken them for the fresh-water eel, supposing our rivers and lakes to be stocked from the sea, and believed they found their way back again.

CHAPTER IV.

I MAY here mention there is another beetle smaller than the one I denominate the eel-beetle. It is half an inch long, and is a well-shaped, active creature; its colour rather darker than that of Port wine. It breeds in the ordinary way of beetles, by eggs, in damp places, and finishes its career thereafter by giving birth to two wire-like worms, one-thirty-second of an inch thick, and four inches long, which may be seen creeping about in damp places and corners of gardens frequented by these beetles. If they take refuge below a small stone from the sun's rays, they lie till they become black and hard, and quite brittle like hairs of glass, but what they grow to, and whether they be neuters, I know not. I believe they are. This I leave to others, especially to that class of naturalists who have already noticed this insect, and pronounced these

worms to be parasites. I simply mention the fact to prevent the reader confounding it with the eel-beetle and its offspring.

I come now to describe the pillars on which my theory rests—the habits and history of two beetles. They are about three-quarters of an inch long, and are one in species, although two in colour. One is of a dusky yellow colour about the legs and belly; the other darker, and the more numerous of the two. Both have eels, and the same variety of colour prevails among the eels as among the beetles.

I find the following remarks concerning the eel-beetle among some old notes on insects. After two eels had been discharged from a beetle, I examined its inside and found nothing in the shape of intestines remaining; a thin film being all the abdomen contained. Again, some months afterwards, I examined a few more, and in them I found nothing but eels. This decided the matter to my mind, and my opinion is that the intestines are the eels.

It may be said that the produce of the eel-beetle is a parasite. I was of this

opinion myself for five years ; but, on further investigation, I lost every hook to hang a thought upon. What I understand by a parasite is this—a class of animals whose bodies are so constructed, and their natures so inclined, that the one enables them and the other compels them to deposit their embryo progeny in the bodies of other animals, either by piercing their bodies, or placing them so as to be taken by the tongue into the system, where they are lodged until they are perfected, whence they issue forth the very image in every respect of the progenitor which deposited them. Now, this cannot be the case with the silver eel. It was never known to have spawn in it ; it is consequently a neuter, a fact which has been known for many years. My great fisher-father, Walton, knew that the silver eel was a neuter, and argues they have neither roe nor milt as known organs of generation ; but he solves the mystery in another way than I do. He stoutly argues that they are bred of corruption, in the same way as some kinds of bees and wasps. I have myself seen diseased and corrupt

blood in animal bodies breed small vermin, which found their natural aliment in the bodies of their victims, but never so large as eels. The poor milch cow has to carry the small vermin on her belly (her only comb for cleaning them out being her barbed tongue), and the large "warbie," as the farmers call it, on her back. *This* I consider a parasite. But I will be more explicit if ever for amusement I write upon parasites.

I have now described the nature and habits of the eel-beetle. I have also shewn that the eel can in no way be considered a parasite. The only thing that remains for me is clearly to shew the derivation of the eel from its insect-parent by natural laws.

I put the eel-beetle in my third class, among the animals that breed on land and change to live in water. I believe the eel-beetle has two natures; and that these two natures spring from the same original at the same time, and coupled together as the nature of the beetle-form and the nature of the eel-form within it, and the first, or beetle-form, could not subsist without the second

or eel-form being its intestines, and in these intestines lies the germ of the eel in all its parts. The one nature progresses in growth with the other, the nourishing process being mutual. When the beetle has finished the propagation of the species, then the germ of the eel begins to come forward, and the insect is instinctively urged towards water. Here the eel is deposited in a half viviparous state, that is with life but not perfect, where through the action of water for seven months what could not be attained in the beetle is completed. This is the same period that the salmon roe requires to come up a living fish. I believe from what I have seen in the growth of the beetle, that it is three years old before it begins to breed, and continues to breed four years before it stops, which gives seven years as the period the eel and the beetle remain together before separation. When seven months are added to this period, for its stay in the water, during the whole of which time its growth is being perfected, we cease to wonder at the eel's tenacity of life. From all I know and have seen, there could not be a more likely progenitor for

the silver eel. The beetle is a very timid creature, and always hides except when in search of food. It protects itself from frost, by burrowing in the earth, under bushes of heath, beside springs on hill sides, or among moss, where it is completely sheltered from the blasts of winter. It is a lurking animal, taking its prey by cunning—for instance, it pounces upon the disabled fly, dragging it into its retreat, as also such heavy bodies as worms ; and, as far as the water will allow, the eel has a similar mode of securing its food. It lies between large stones on the edge of the stream, its head only being visible, and when the minnow comes past, the little fish is pounced upon, dragged under the stone, and devoured. I have lost many a minnow tackle by the eel.

CHAPTER V.

I HAVE been a keeper of bee-hives for thirty years. My object in keeping them was to become acquainted with the government, manners and modes of life of the bee. As little is known of this insect as of the beetle, and the facts of its history are as difficult of discovery. The bee is the most perfect insect I know. All its work is performed in the dark, with wonderful ingenuity and skill. Every proprietor of bees is aware that there are three distinct forms of the insect in his hive, each performing its own part for the good of the whole community. He is equally aware there are three distinct cells or combs, for nursing and rearing the young. The queen requires the longest; the male, the widest; and the common cells for the working neuters, are of the same width as that of the queen, but not so deep.

In spring, when the queen commences to prepare a new hive, she has three different varieties of sex in her—male, female, and neuter. Here a marked parallelism between the bee and the beetle subsists: for like it the beetle has its male, female, and neuter; and it is just as great a mystery that the queen of the common bees should produce a male, female, and neuter, as that the beetle should do so. It may further be remarked, that although the working bee, from natural causes, is unable to assist in the direct propagation of the species, yet nevertheless by its determined energy, strength of muscle, and large wing, it overcomes every obstacle in the collecting of honey for the support of itself and others, as also pollen for the young. In a similar way, the neuter silver eels, by acting as the alimentary canals of the beetle, take in what food the insect provides for supplying nutriment to themselves and the beetle forms. There is something singular in these two neuters. The beetle gives out a species of food which is prized by thousands as the most dainty dish of the fish tribe, and is always in season, not

requiring to breed. The neuter of the hive produces another—honey—which in addition to supporting themselves, is esteemed by thousands the richest luxury of the floral and insect worlds.

The toad is another parallel case in some respects. It has a compound nature, like the beetle, only it reaches its last form of existence in a reverse order. The one alters its form from that of a fish to that of a quadruped, to live on land; and the other alters its form from that of an insect to that of a fish, to live in water. The toad resembles both our land animals and the fish tribe. It spawns like the quadruped-begetting and the fish-producing, all in the same process. The spawn leaves the female like a thread of clear beads, the ova being dark specks in the middle of each. This thread of beads is sometimes thirty yards in length, warped round the rushes in about five inches of water. The young toads come to life in six or eight days, according to the weather. The glutinous bead supports them before they come forth in swimming trim. The frog spawns in the same

way, but its ova are deposited in lumps, not in threads. The toad remains three or four months in the water, swimming about as a fish, until a foot springs out at each side of the insertion of the tail, and one at each side of the breast. After its limbs are fully developed, it comes out of the water, and begins to leap, and loses its tail for swimming. I think it comes back to the water to spawn in about two years, and continues to spawn four or five years, while young; at this age it is an inch and three-quarters in breadth, and three inches in length. It then gives up spawning, and increases in size to three inches in breadth, and four inches in length. It does not change to neuter internally, I believe, but acts as such externally, looking out for the warmest place it can find, and keeping away from the water at spawning season.

I wish the reader specially to note, that as the result of close observation, I am of opinion a very marked change takes place in the animal's nature at this period, as well as in its size. At the commencement of its life, the fish nature predominates; after

spawning, is given up, the land animal's nature prevails.

Now, in the reverse order a similar change takes place in the eel-beetle—when it begins life, the land animal's nature prevails, and when it ceases to breed, it alters its form to the fish nature. It is evident, however, that the eel in the early stages of its career, even in the water, is to some degree tinged with the beetle nature, for I have seen them out on the edge of a loch in search of food, but after they are older they never leave the water, and I believe that when they are a long time in the sea, the beetle nature leaves them entirely.

It appears that age alters some of these amphibious animals in their nature—the toad, frog, water-newt, and eel, for instance. To test this opinion by actual observation, I tamed a specimen of the toad family. I will give the reader a short memoir of him, which if it does not instruct, may possibly amuse.

There were two young toads that frequented my garden for two years. They left it in spring, and returned again in a

month. One year, while they were away, a larger one made his appearance. When I first saw him, he was scratching a hole in a warm corner in an elevated terrace near the edge of a walk leading to a summer-seat. I wondered why he came there, as I knew the other two had gone to spawn. I had never seen one so large among the spawners of his race, and I determined to keep my eye upon him. In order to keep him about me, I dug him a house in the spot he had chosen, about nine inches deep, and laid a handful of moss at the bottom of it. He entered it, looked around, and appeared perfectly satisfied with his new abode. He and I got very friendly, and in a short time he allowed me to put my hand upon his head, and would take a fly from between my fingers. My daughters named him, "Oberon in his Hall." He knew every one of them, but when they wished to introduce him to any of their acquaintances, he slipped back into his hole, flatly refusing to show his face to strangers. If he heard me coming round his way, in my customary morning walk, he would be

up at his door, to see what I had brought him.

As time wore on, he would follow me down to the summer-seat, and catch flies before me. This he did in a manner that I could not account for. When he got his eye on a fly, the insect could not take wing; he then quietly approached his victim, keeping his eyes steadily fixed upon it; and when within an inch of it, he opened his mouth quickly, and in went the fly. His mouth closed with a smack so quickly as to be scarcely perceptible. My conviction is, that he possessed some fascinating power in his eye, which affected the fly; and also that at a certain distance he could exert a power of suction sufficient to draw the fly into his mouth—just as I have seen a perch below a boat in clear water, draw in a worm-bait three inches from its mouth, and when it felt the hook, eject it to the distance of six.

Another striking incident in this toad's life came under my notice. I was one day sitting in the garden, with my dog beside me, when down came Oberon and crawled upon my foot. The dog, in frolic, and

partly from envy, pretended to bite him, when the toad lifted up his head with a jerk, scratched it on the dog's tooth, causing him to run away, lie down, and foam at the mouth for half-an-hour. Oberon made off to his hall as fast as he could (the toad cannot leap after he grows old and large). Looking at the toad, slow and unwieldy in his movements, one is reminded of the proverb, "He can neither fend nor flee." This is a mistake, for he is provided with a nauseous scurf all over his skin, which very effectually protects him from enemies, and particularly from the pike in the spawning season. Oberon showed his respect for me by putting his fore-paws on my foot, and looking up in my face with all that was beautiful about him. He always closed his hall door with grass on the approach of winter. After having lived with me for six years, I found him dead, one morning in April. I felt as sorry for him as I afterwards was for my favourite dog.

The last parallel case with which I will illustrate the natural history of the eel beetle is that of a dark coloured amphibious fly

with a compound nature. I place it in my third class. It is very like the eel-beetle, because it breeds on land, and changes its form to live on the water.

This fly is about five-eighths of an inch long, of a slender make, with long thin legs. It is of a dark colour, and its wings are clear, tinged with a shining bluish red. It breeds in the sand banks on the rivers of Scotland. It rises out of the sand, and pairs about the beginning of June, depositing its ova among the grass on the bank, wherever it is thin. The ova remain among the roots of the grass until the hot sand brings them to life, when they work down among it, beyond the reach of the frost. In the following May, when the banks become heated with the sun, it appears in the shape of a small grub. It then goes into chrysalis, and comes out about the 1st of June, the dark-coloured fly previously described. It chooses a bank not far from the river, and is constantly going between the bank of sand where it was hatched and the water. It has the power of flight, but generally walks, and when it comes to the water, it travels

upon it the same as on land; this it is enabled to do by a membrane upon each foot, which confines as much air as balances its weight, and this membrane, when reversed, forms a sucker by which the insect can cling to smooth stones. This is the only amphibious fly that has a compound nature, breeding on land and going to the water, in the same way as the eel beetle. This being the difference: in the case of the eel beetle, a neuter is produced and sent to the water, but this fly goes itself. Of the second class of amphibious flies with a mixed nature, there are many more than I can now describe. They are nearly one year in the water in different forms, then rise out of it, spawn, fly about the rest of the summer, and die on the approach of cold weather.

PART III.

Bait and Fly Fishing.

Bait and Fly Fishing.



CHAPTER I.

HAVING from my earliest days lived near water, much of my leisure time was spent in fishing. The result of many years experience in angling, and the record of some of its pleasing reminiscences may form a variety to the reader, and a suitable close to my little work. I will simply give a *general description* of bait fishing for eels and other fresh water fish. From experience I can testify that fishing is one of the most healthy recreations to which any persons can betake themselves. The motion of the rod backward and forward gives to the whole body, but especially to the muscles of the breast, much strength and power, enabling the viscera easily to perform their functions. The love of the sport sometimes gets so intense, as occasionally to lead the angler to dis-

regard the solicitations of the stomach, and the cry of hunger is met with the reply, "Stop till another trout is caught," which generally gives time to the lower regions to balance accounts. This fast often converts into a feast the simplest fare, supplying in abundance that excellent salad, hunger, and producing health and vigour to the whole system. One abuse of an intense love of angling is, that of wading with boots not water tight, which is sure to be followed by rheumatics, thus hurting the health more than the sport helps it.

As a matter of course, good tackle is indispensable to success. Permit me, therefore to make a few remarks on its structure and use. I was in the habit of using rods of three different sizes, 16, 20, and 24 feet, the last I used for broad rivers to enable me to throw my point fly (if the wind was favourable) so as to drop 25 or 30 yards from me across the stream. The rod I used for bait and minnow fishing was 20 feet long; my first casting line was 4 feet in length, made of three-ply gut with a catch for joining the second to it; the second was

two-ply gut, tapering towards the end by smaller gut. A swivel was attached to the top to let the second turn round with the point bait; and the first or upper bait catch between the first and second knot at the upper end of the casting line was made with two holes in it — one to let the line turn round, the second to join the loop on to the gut for the hook. Another catch is put on at the end of the casting line, to join the point hooks for altering to try what bait will take best. This catch is made of small wire put through as if making a knot, leaving one end as a hook for the loop; the other turned round like a screw. I put the loop through, and fasten it on the catch hook, the other end being turned into the screw that goes down to the hook. These catches can be made as large as will take in a double gut for salmon fly. This saves a great deal of time and trouble in taking the hooks through the loop of the casting-line, as is commonly done with three fly hooks on it; it also has the advantage of enabling the angler to use double hooks, which he could not easily according to the old plan. Baits can be put on by passing a

long needle through the worm or minnow, the needle being previously cut on one side in the upper part of the eye to take in the loop through the baits that join the catch upon the line. The fisher should keep three of them—one at hand and two spare ones in his book.

To give a full account of bait fishing as applied to every kind of fresh water fish, would occupy more space than can be devoted to it in this little volume. I will only therefore, attempt a short general sketch. I will begin with the eel.

It is the opinion of a great many fishers, that minnows or worms are the best bait, on a Limerick hook. Some prefer a strong needle an inch and three-quarters long; they put the gimp or gut through the eye of the needle, bring up both ends and tie them hard in the middle with a silk thread coated with resin. They then insert the needle with the eye foremost into the worm until it projects three-quarters of an inch over the point of the needle; when the eel gorges the bait, in drawing it back the point comes across the gullet. But there is another and

I think a better way, that is, by what are called "set lines" immersed at night, or by wires and garths in the summer when they migrate to the sea.

In fishing for trout, my first consideration on reaching a stream, always was, what sort of food the fish had been feeding on the few preceding days. If they were leaping for flies, I put flies on; if the water was muddy or flooded with rain, I used a large round bend, No. 3 or 4, and fished with worms; but if the water had decreased after a flood, I put on a minnow tackle, throwing it across the stream and letting the minnow come round and down by jerks, about two feet at a time, bringing it up again to the spot on which I was standing; taking it four feet farther down each cast, and landing the trouts where I stood. When I fished with fly, I commenced at the foot of the current where it ran into the pool, taking the trouts and landing them at the first slope on the bank of the pool, not to disturb the rest farther up.

My minnow tackle was made with seven hooks, one large enough to go through the

minnow (say No. 3), and three double hooks (No. 8) tied back to back ; the first pair tied up the gut from the point of the large hook the length of a minnow—allowing one of the upper pair of hooks to go through the head of the minnow, and one of the second pair to go in at the dorsal fin, and one of the third pair to go into the middle of the tail at right angles to it. I kept six minnow tackles, some of them of different sizes, and some of them made of small gimp which I used where pikes were numerous, and some smaller ones for clear water or for smaller minnows. My minnow tackle had a loop to put on the catch hold on the casting line, about four inches long down to the swivel, with two lengths of small, strong, clear gut below the swivel, making in all a length of two and a half feet down to the hooks. I put the large hook into the mouth of the minnow, and bending the tail that the hook might go down through the centre of it, then twisting it so as to come out at the lower edge of the tail where the fins commence. Here great care must be taken so as to give the tail such a skew as by a forward

jerk the pressure of the water upon the tail shall make it turn once in four inches forward. If the minnow be short for the tackle, the guts can be turned round the hooks until they all bear alike.

Minnows can be angled with in different ways. I have loaded my large hook by putting round the stem a piece of sheet lead, making it taper down to the bend sufficiently sharp to go down through the centre of the minnow. When fishing, let it sink into a deep pool where the wind causes a ripple, jerking it up at an angle of 45 degrees; let this be done several times; in this way I have captured some large trouts. I have also used a minnow without a sinker in a narrow stream with bushes on both banks; let it down the centre of the stream, and give out line at every jerk, and when a fish grips, let the line be wound up quickly to prevent its becoming entangled among the roots and bushes at the edge of the stream. It requires good tackle to haul up a trout a pound and a half in weight. If you fish a narrow stream without bushes or trees, stand up ten yards above the pool, and let your

minnow down the stream as before, till it reach the pool. This precaution keeps you out of sight; no trout will look at bait if it see the angler first. There is another way which may be tried with success; take a hair of gut or small gimp; tie on two No. 8 hooks back to back, and take a needle, as I have described before, and put it into the mouth of the minnow, bringing it out at the tail; draw the hooks up so as to protrude at its mouth on each side; put the loop on the catch at the foot of the casting line; then throw it into the pool where the stream begins to run slow, using a pellet of lead so as to keep it at the bottom.

I never hesitated to fish up or down a river according to circumstances. The eyes of trouts project on the same principle as those of the hare, so that they see behind as well as before, looking up the stream for food, and down for enemies. My main object was to draw the hooked ones upon the water I had already fished, either with worm or minnow; this in most cases I could do only with a small fly, which takes a smaller grip. I worked them down the pool and landed

them at the first slope I could get, if the river was broad.

The greatest number of trouts I ever caught in the shortest time was with dried minnow, in the river Tay, a mile below the "Boat of Caputh," near the foot of a back water, on the north side; there I killed 15 lbs. in an hour; in two casts I caught four—the first pair was about 4 lbs. and the second $2\frac{1}{2}$ lbs.

Minnows can be preserved a long time amongst common salt in a jar, keeping them separate from each other and dry; also, they may be kept soft by putting them into a strong solution of salt and water for half an hour, then cork them up in a bottle of glycerine, or purified cod liver oil.

CHAPTER II.

MY tackle for pike was the same as for trout, but the hooks larger and stronger. I used strong small gimp, the swivel close up to the hooks for holding the head of any small fish known as their food in loch or river. I kept my tackle three inches long, which would take on a small fish or trout about four inches long,* but the hook that goes through the centre of bait to turn the tail, would require to be a No. 1 round bend, put through so as to put a skew on the tail that it may turn once in six inches,

* I was always very reluctant to take par for pike bait, it having been my opinion for thirty years that they were young salmon. I have seen them, when they were three years old, spawning with the large female, and the male chasing them away until he ran himself aground. The female first migrates to the sea, and comes back and spawns when about five or six years old. While watching the spawn beds in May, I have seen the young par come wriggling through the gravel, with the brand on their side, but ill-proportioned, having large heads.

going forward by a jerk of four feet each. I always let the bait fall to the bottom (if it were clean) and lie a short time before I commenced to jerk it to the edge. It requires a strong rod and tackle to troll for pike.

There are many kinds of bait. If the water were flooded with rain and muddy in colour, I used as bait the red hay or common garden worm, also the brandling. If, where I was fishing, a hill stream flowed into the river, I always found the pool below the best for trout fishing; I commenced at the top of it and kept my bait in the ripple inside the strong stream, bringing it down and round upon the sand or gravel bank; if not successful with worm bait, I tried salmon roe; if nothing would take, I shifted my ground, either up or down the river. I have often seen the young angler lose much valuable time from his ignorance of the different sorts of bait, believing he was sure of fish if he cast his bait into any pool in the river. There are some parts of rivers, especially if flooded, where it would be impossible to take a fish of any sort. Every fish has its

retreat to which it resorts, according to the height of the water. The knowledge of these facts gives a great advantage to the fisher residing on the banks of a river, over one who may visit it once or twice in a summer. When I went to a strange river in a flooded state, and did not get a nibble in ten minutes, I moved on; if I caught no fish, I caught no cold. As long as my legs were willing to act, I tried every eddy, not unfrequently walking six or eight miles.

I will now make some remarks on clear stream fishing, at an ordinary or mean height of water. On reaching the river, I went to a pool that, according to its locality, appeared to have fish in it. I tried fly or minnow, according to circumstances; if these failed me, I generally resorted to an ordinary small hook round bend, No. 6, using as a bait the red hay worm or brandling. These worms when used as bait ought to be kept in a flower pot a few days amongst damp moss, in order to purify them from earthy matter, and to make them tough, so as not to be easily torn from the hook. I drew the worm up over the hook about an

inch, leaving half an inch over the point of it. I commenced at the top of the stream where the water runs down to the pool, and cast my bait over and up the stream, letting it come round and down six yards below where I stood, going down four or five yards for the next cast; but taking care not to let the trouts that were hooked run farther down to disturb those that were below, but brought them up at my feet. The best angling spots in spring are the head and foot of pools, but after the season is advanced, say about May, I have fished between pools with fly, minnow, and worms.

Low water is the reverse of flooded water fishing. Walking up and down the bank of a river in this condition is useless, as the trouts see you a great deal better than you see them. I generally looked out a pool sheltered with bushes to screen me from view, and allow me to fish over them or between them. Sometimes I selected a deep pool with high banks, whilst I stood well back out of sight, making very little motion on the surface of the water, simply allowing the bait to drop gently down. I first tried

two Limerick hooks, No. 6; I made them after this fashion. I cut a hair of gut about four inches long, tied on each end a Limerick hook, brought both hooks down, tied the double at top to one hair to go up to catch on casting line; I then put on two small red worms or brandlings on the hooks. I took off the upper loop of catch on casting line, and then took my needle and put on a larger worm on top, drew it down to the other two worms, which were drawn up over the hook one inch; this holds them together. Sometimes I used three smaller in a similar way. I had a float to keep the bait six inches from the bottom, and a pellet or two on the foot of the casting line; I have tried salmon roe in the same way in still water; I always used the paste; I put on two hooks of the Kerby make, tied back to back, No. 7 or 8.

As salmon roe fishing may be stopped, there may be a substitute employed; a very good one may be made by boiling the head and shoulders of a salmon to a jelly; when cold let them be strained through a cloth and mixed with an equal quantity either of glycerine or refined cod liver oil; put a part

of this mixture amongst old loaf bread, roll it with a roller on a board until it become tough enough to cling to the hooks; let it be fished with the same day. Minnows can be tried in the same way, also trouts or any kind of animal known as the food of fish. I have tried worms with success; put a quantity of them into a bottle, cork it and put it into hot stable dung, let it remain there till the worms are dissolved to an oil, then mix them with glycerine or sperm oil, and let the mixture be made into a paste as above.

Another clear water bait I used was a grub or worm which crawls about in back waters and eddies with a parcel of twigs for a case; sometimes this case was made of grains of sand glued together by the animal itself; this is the first fly that comes out in spring. I have turned these grubs out of their cases and put the hook through the middle of one crosswise, or at right angles, then I drew the second up the hook, the same as a worm to hide the hook; I kept the float so as to let the bait be six or seven inches from the bottom, with a lead pellet at the foot of the casting line, the hook

being a No. 7. I have tried gentles in the same way with great success.

The bait I fished with for clear water was sometimes the fresh water whelk. I broke the shell and put on a small No. 7 or 8 hook, and kept them the same distance from the bottom as in the last case. All these are for deep pools when the fish are compelled to leave the streams for want of water.

I have made an imitation of the maggot which answered exceedingly well, the trouts supposing it either a maggot, small minnow, or fly; I have tried it as a substitute for any of these. It is constructed as follows:—tie on the end of a hair of gut two No. 10 or 11 hooks back to back; close up from these tie on a single one so that there may be a space between the top of the single hook to the foot of the double hooks of five-eighths of an inch, then dress the upper hook as a small fly with a wing feather of the fieldfare or bunting for its wings, and a light red rolling feather or heckle; keep two of these in your book, and after sunset cut out of the belly of a trout or minnow a small strip about three-quarters of an inch

long, let it be one-eighth longer than the hooks ; put in the single hook so as to cause the upper end to go up to the heckle of fly and to press the other end on one of the double hooks, tie it with a light yellow silk thread softly, and keep every turn apart like a screw to resemble the rings on the body of a maggot ; if minnows cannot be got, keep two of this sort of bait in your book made of a bit of sheep skin put on in the same way, but I approve most of the strip of minnow for the scent. They may be preserved by putting them into a bottle of glycerine up to the fly and corking them down ; if not so preserved, the strips will require to be replaced each time they are to be used. This is a deadly bait, to be used during the twilight of a summer evening ; allow it to float over the surface of the water with a short stop at every two or three feet. Be sure to strike softly and quickly when a fish rises.

CHAPTER III.

I CONSIDER loch fishing similar to small dead river fishing; but it may be altered in its mode and its bait, according to the kind of fish angled for. I sometimes trolled for pike with a minnow or trout, or any small fish, my tackle being as before described. If I did not succeed by trolling, I used hooks for dead bait, that is, two twisted loop wires about five inches each, joined in the middle—a hole in each end. I put one end up the vent of the bait fish until it came out at its mouth; then put through the double hook, drew it back so that the points protruded at each side of the mouth. I tied a cord round the bait fish not to allow the pike to tear it off. The other end or hole was fixed to the whip cord or line. I held it about the float and gave it a turn or two round my head making it fly off at a tangent, as far into the loch as was required for depth

of water. I loaded the foot of casting line with one or two pellets, making the bait hang one and a half foot from the bottom. There is another mode that can be tried with this double hook and small fish bait. Take the bladder of an ox for a float, put to it the fish bait, the line attached. In a strong wind let it take the same direction into the loch keeping the rod perpendicular, letting the float go as far as necessary, then walk slowly round the edge until a pike is caught, which makes excellent sport. I fish for perch with worms and float, keeping the bait one a half foot from the bottom. When I fished with minnow, I carried them alive to the loch in a tin vessel, shifting the water as often as necessary, with a wet cloth for a lid, and all round it to keep them cool in the boat. I put on a round bend, No. 5, put it through the root of back fin, let it swim about mid water with a float, and very light sinkers; trouts can be taken the same way. If for eels, let the minnow swim close at the bottom; if with worms do the same, as they seldom come up. Every fish must be angled for according to its

nature, whether it lies at the bottom or swims near the surface. He may try any or all the baits that I have mentioned in clear or dead water, as the case may be.

CHAPTER IV.

HAVING given the young angler a general sketch of my mode of bait fishing, permit me now to introduce him to the mysteries of Fly Fishing; by the former, the trout is deceived by the taste; and by the latter, it is deceived by sight. Fly fishing resembles angling with artificial minnow; its success very much depends upon the skill with which Nature is imitated in the production of artificial minnow, maggot, or fly, as also in the skilful handling of the rod while angling; trouts are not to be caught by the work of imperfect head or hands. The angler's defects in imitation are in some measure compensated by the ripple on the water, which deceives the voracious fish as it darts up from the first impulse of sight, fearing the escape of its prey, by wing, wind, or water. The speed with which the fish rises through the water dims its sight, until

the supposed fly be in its mouth ; it then discovers its mistake, but cannot at once rectify it, for it has to close its mouth and take water in by the gills, in order to eject the cheat. At this moment the stream, or wind, or the movement of the rod draws in the hook over the barb, which secures the fish ; the angler's next step being the working it down the pool and landing it on the first sloping bank.

I will now turn the attention of the reader to the principal amphibious flies which frequent large quick running streams, generally resorted to by salmon. There is a grey fly (No 1), that appears in March. I will be very particular in my description of this fly, because it has the same habits as all flies, which, when resting, keep their wings erect, and have two hairs or prongs projecting from the extremity of the abdomen about five-eighths of an inch. These prongs it has in both forms. In its water form, these hairs give steadiness to all its movements ; in this form it nearly resembles the fly, only it is flatter and thinner, affording facility for creeping under stones, and

having its wings folded up under the skin; after emerging from the water form, and passing into the fly form, the prongs assist it in the act of spawning; it spawns above the water as the salmon and the trout do under it. The milter takes a sweep round before they unite, and both the male and female flies take a direct upward flight for a distance of three yards, then separate, and descend singly, poising themselves on their wings, and re-uniting when within a foot of the surface of the water. Sometimes the feet of the one catch the wings of the other, and both fall into the water, when the wary, watching trout gives them short credit for their mistake. If the male parts off first, the female flies over the surface of the water, striking it about every three feet until it has finished its spawning. When this fly first appears, it is of a grey colour, with mottled wings, five-eighths of an inch long, and prongs of the same length. It changes its colour from a grey to a red body, with clear wings, after being a few days out of the water. I have imitated this fly as it first appears, by making its wings out of the

wing feather of the woodcock, and its body and legs out of a red rolling feather with a black root; its wings may also be made from the wing feather of the landrail, and its body and legs from a red rolling feather with black root; and for a bright day, its wings may be made from the wing feather of a hen pheasant, and its body and legs from a bright red rolling feather.

No. 2 is a small lead-coloured fly about half an inch long which appears in April; the middle of its body is tinged with red, and its breast and end are of a dark hue. It is similar in form to No. 1, having its wings erect, and two prongs. This fly may be imitated by making its wings of the wing feather of a starling, and its body of the fur of the water rat. For a brighter day its wings may be made of a light brown field-fare wing feather, and its legs and breast of light fur or wool, bound round with yellow silk thread.

No. 3, is of a greyish colour, similar to No. 1, and has erect clear wings. It is of the same size and makes its appearance at the same time as No. 2. It may be imi-

tated by making its wings of a small quantity of landrail wing feather, and its body of mottled hairs; for a bright day, its wings may be made of the wing feather of a jemie, and its body of light mottled hairs, tied on with yellow silk thread.

No. 4. This fly appears in May; it is small at first, but grows to about three-quarters of an inch in length; it has no prongs, and its wings lie close to its body. It comes out at the same time, passes through the same forms, and is nearly the same colour as the cloth moth, and may not improperly be called an amphibious moth. It spawns by reeling about upon the top of a tree that overhangs the water, and the ova is carried down the stream until it reaches the shallows, where it rests among the moss on the stones. It appears first as a small grub, feeds on the moss for a few months, then goes into chrysalis, and comes out in May in its moth form. The empty chrysalis cases are sometimes met with, clustered together like a honey-comb, among the stones. This fly may be imitated by forming its wings of the wing feather of the

landrail, and its body and legs of a light rolling feather from the neck of a red cock. A lighter fly may be made by using the wing feather of a hen pheasant for its wings, and the yellow fur of the seal for its body and legs. Another may be made by taking a brownish feather from a drake's breast for wings, and rabbit's fur for body and legs, tied on with orange silk.

No. 5 appears in June, and is commonly known as the salmon fly. It is about seven-eighths of an inch long, and is the largest fly that rises from quick running streams. It is a flat crawling insect when it leaves the spawn, similar to No. 1; and when about to change from this form to its original, it comes out upon a gravel bank above a ford. It pairs after passing into its original form. The male is smaller than the female; he has small prongs, and his wings are covered by a short case. The female is without prongs, but is furnished with small hairs at the end of the abdomen, that serve to protect the ova (which is fixed upon the upper end like small red strawberries) until it is matured. Her wings

are large, but seldom used for flight, and are employed by her in delivering her spawn to the water, which she does while fluttering over it, switching them off in rotation with her wings, but seldom escapes being caught by the young salmon or par, as it is called, which gives them a taste, and tempts them to leap and lose their life by an imitation of this fly afterwards. Although this insect is called by anglers the salmon fly, they will take any kind. When I was fishing for trout in July, with a small dark midge, a No. 14 hook, and gut as small as horse hair, I took two salmon in Ericht, one weighing 11 lbs., and the other 12 lbs.; and at Islay I captured one weighing 15 lbs., which required an hour and a quarter to lay it on the bank—never relaxing pressure on the rod, excepting when it leaped, during the whole of that time.

The salmon fly may be imitated by using the tail or wing feathers of a turkey, or the many-coloured side feathers of a drake, or the tail feathers of a pea-hen, for its wings; and one side of a feather of a heron's neck, or one side of a mottled feather of a drake

(any colour according to taste) for body and legs, and worsted threads of different colours for abdomen.

When dressing them, I tied a two-ply gut up the hook, within three thicknesses of the thread at the upper end; I then laid the wings up the gut, took two turns, clipped off the ends of the wings, brought them back, taking a turn to keep them so. I then divided the wings equally, bringing the thread between them, and reversing the following turn to keep them apart. I then tied a loop knot, putting in the rolling feather, three threads of worsted of different colours, and the tinsel, and drew the knot firm. I next bound the worsted threads—say black, white, and red—round down the hook, side by side; I then put round the rolling feather and the tinsel, adding a little dyed pig's hair at the end, and tying all up with four knots. The worsted threads may be altered by tying the dark first over the other two for three-eighths of an inch, keeping them tight down the hook; then taking the next colour in the same way, and finishing with the last, and fixing them all

in the manner described above. I thought the more tartan-like the better.

No. 6. This fly is found on most of the rivers in Scotland. I have described it before, comparing it to the eel beetle, which I put with it in my third class—breeding on land and afterwards going to the water. In its habits of life, it is more peculiar than any of the amphibious flies that have come under my observation. It chooses a dry sand-bank near the edge of a river, and deposits its spawn among the sand where the grass is thin. After passing through the ova, grub, and chrysalis states, it comes out in the following June in its original form. It then pairs, spawns, and goes to the water, between which and its native sand-bank it is constantly traversing. It seldom takes wing, but on very bright sunny days may occasionally be seen flying close over the surface. It stands and walks on water the same as on land. This fly may be imitated by a feather out of a land-rail's wing, or a brown fieldfare's tail, for wings; and dark wool or hair, or a dark feather from a black cock, for body and legs.

No. 7. This is a small fly, called by fishers the dark midge, and rises in July in small streams as well as in large rivers. It is a short, dark fly, about a quarter of an inch long, with clear, flat wings. I have seen them so numerous, in their sporting, pairing reels, below trees, in a mild afternoon, that the water was scarcely visible through them. They fly so quickly, by circular crossings, up and down the stream, that they completely nonplus the trout, who, however, waits until two stop to pay compliments, when he pays his respects to them, by sending them both home to rest. This fly may be imitated with a fine, short, jet black feather, about an inch long, for a heckle, to turn down on a No. 13 or 14 hook, about an eighth of an inch, which makes a good imitation of the two flies together.

No. 8. This fly is also called a midge; it is the same length and colour as No. 7, but flies slow, has broad dark wings, and feelers turned back like those of a small butterfly, which it closes resembles. This may be dressed the same as No. 7.

No. 9. This fly rises in August; it is about half-an-inch long, and of a slightly greyish hue, with clear erect wings. It may be imitated by the wing feather of a jemie for its wings; and the hair of a water rat, mixed with that of a hare's ear, mottled, for its body, tied on with light yellow silk, the threads being kept apart to resemble a screw.

During the month of August, a great number of flies of all colours are to be met with, which may be imitated by using the wing or tail feathers of the teal, drake, fieldfare, bunting, &c., for wings; and hair from the ear of the rabbit or hare, black fur, yellow seal's wool, and tinsels of various colours, for body and legs.

CHAPTER V.

HAVING in the preceding chapter given an account of the flies that frequent quick-running streams, I will now attempt to describe those which rise from deep, slow-running rivers.

No. 1. This fly makes its appearance in February, and is the first that rises. It has no prongs, and its wings lie close to its body; it is of a lead colour, and about five-eighths of an inch long. When it leaves the spawn, it crawls about in the grub state for two months, keeping in old water-courses and back waters; it then constructs a kind of tubular dwelling from small straws, twigs, and gravel, cemented together. It remains in the grub state for nearly two years, after which it returns to its original form, when it pairs, and deposits its spawn by fluttering over the surface of the water. When in

the fly state, it is readily devoured by the trout, but I have found the grub, tube and all, in his stomach, when closely pressed by hunger, after a long drought.

No. 2. This fly rises in March and April, and throughout the summer, in deep waters, and lochs where streams enter. It is of a brown or greyish hue, and casts its coat like a crab, after which its colour is lighter. It is about half-an-inch long, and has erect wings and prongs. It may be imitated by a wing feather of fieldfare for its wings, and a little mottled hair from a cat's back, mixed with wool from the belly of a water rat, for body and legs; and another with a landrail's wing feather for wings, and fur from a hare's ear, or one side of a small mottled drake's feather of brownish colour, for body and legs.

No. 3. This is called the May fly by fishers; it is about three-quarters of an inch long, with large erect wings, like a small butterfly, and three prongs about the same length as its body. It spawns in the same way as the No. 1 fly of the quick-running streams. In its water form it is like a

miniature fluke ; its wings are folded down by its sides and act as fins, and the three prongs serve as a tail. They are generally of the same colour as the sand or clay on which they lie. This fly is very difficult to imitate, having such broad wings. I made its wings from a feather out of a drake's side, dyed yellow, and its body and legs of coarse yellow wool, tied on with orange silk thread.

No. 4 is a white fly. It rises at the same time as No. 3, and is similar in size and habits. I imitated it with the feathers of a drake for wings, and white wool for body and legs, tied on with light yellow silk.

I have also taken the fly itself as bait, dressing it as follows :—I tied on a No. 7 round bend, the same as a bait hook, and tied a sharp pointed bristle so as to lie up nearly the length of the hook. I then put the point of the bristle into the abdomen of the fly, and pushed the insect down until the hook was covered. Some small pieces of cork were attached to the line, above the fly, to give it buoyancy. When there is a breeze of wind, this makes an excellent de-

ceiver, letting it slowly down on the surface of the water, to float about with the wind.

No. 5 is a small yellow fly of slender make, and is also to be seen in quick running streams; it is about three-eighths of an inch long, with flat wings and no prongs. Its wings may be imitated with the wing feather of a fieldfare, dyed yellow, and its body and legs with yellow wool.

No. 6. This fly rises in June, and is to be met with where the water runs steadily. It is an amphibious fly, about three-quarters of an inch long, and is called in Scotland the spinnail or spinner. Its wings are set out at right angles on a level with its body. It has no prongs, but the female has a large sharp ovapositor, which she uses in sand-banks that are covered with water in winter. She deposits her spawn with great regularity. After selecting a place, she makes a hole with her ovapositor, puts in one spawn, and then goes forward an inch and drops in another, until she finishes a drill nine inches long; she then steps down an inch, and makes a similar drill parallel to the first; and continues working down the bank in

like manner, for about a foot. The spawn comes to life in the form of a grub, and remains until the bank becomes dry the following year, when it goes into chrysalis and comes out as originals. I imitated this fly by the wing feather of a fieldfare or light landrail for its wings, and long mottled fur with a little brown wool, for its body and legs. I have succeeded well with this fly after twilight, by letting it touch the water and drawing it forward about a foot at a time, being careful that only the fly touched the water. I have filled my basket in two hours when the trouts were numerous.

No. 7. This fly is similar in nature and form to No. 6, but smaller, being about half-an-inch long; its colour is yellow; it is amphibious, depositing its spawn on the under side of a leaf of grass or herb that floats on the surface of the water, where it comes to life and feeds; it then goes to the bottom of the water, where the mud protects it from the frost, and after going into chrysalis the following summer, it comes out in its original form. I imitated it with a light landrail's wing feather for its wings,

and a small light rolling feather from the head of a cock, with a little yellow wool, for its body.

No. 8 is the dark midge described as No. 7 of quick running streams. This and the two preceding flies are to be found on quick large rivers as well as on slow deep rivers, flying about till dark.

No. 9 is what is called the dragon fly, and by some fishers the pike fly. It is the largest and most beautiful of the slow deep water kind. The female deposits her spawn below a leaf or herb in the stagnant back water of rivers or lochs; the spawn comes to life and remains on the leaf until its water form is perfect, when it crawls about at the bottom, and begins to swim. It is something like the fly, but shorter and flatter; it has six legs, and its wings lie flat below the skin; it swims swiftly, devouring all water insects that come in its way. I think it remains in this state nearly two years, when it crawls up a reed, and goes into chrysalis, coming out in its original form about July. I have seen them two inches and a half long. Their wings are of beau-

tiful structure—the nerve stretchers crossing like the most perfect net-work. While on the wing, they take insects with their bat-like mouth, and are just as great devourers in their aerial flight as in their aquatic form. There are several kinds of them, one being about an inch and a quarter long, with broad blue wings, which goes through the same forms as that just described. The large one may be imitated with a No. 2 hook tied on strong gimp, with wings out of a turkey's brown tail feather, and for body and legs a mottled side feather of a brown drake, with red woollen thread. I have seen fishers try two small moons from a peacock's tail for wings, with a red rolling feather from a cock's neck for body and legs. The second one I dressed the same, but a smaller hook, with two feathers from the side of a jemie's wing, blue and mottled, for wings; with blue worsted, and a dark rolling feather or half of a blue feather from a parrot, for body.

Oh! the beauties great of the Divine art,
No artisan on earth can this impart,
With lacy wings and thousand lensed eye,
Yea, none can imitate this lovely fly.

I have endeavoured to give the young angler a description of the largest of the amphibious flies that came under my observation when fishing, and which I saw the salmon, trout, and other fish relished for food. There are, however, hundreds smaller which are beyond my power of description, many of them being not more than the 80th of an inch in length, and numbers smaller than that, requiring a microscope to bring them under observation. It is my opinion that all fresh water contains the spawn of flies and other small insects, which is as light and small as the globules of which the water is composed; and that they rise into the atmosphere with the mist or fog, go into the clouds, and descend with the rain. After standing in a pool, or reservoir, or among the roots of damp grass, exposed to the action of the sun's rays, the heat brings the spawn into animalcule life, which goes through different forms, coming out in the original. I believe, from the experiments I have made, that the spawn of the smallest kind of pluffy headed midge is the heaviest which the air carries. It is to be seen with

the naked eye, in its chrysalis or water form, in rain-water cisterns, like a small root of shrub, or the seed of the herb aven. Its head is large, being extended by the pluff, which the insect requires in its water form for exchanging the air around its head—(the young of some amphibious insects require air in their water form). After it has got a supply of air, it descends by a zigzag motion, something like a figure 7, coming to the surface when it wants more air. But I have digressed, and forgot I was an old fisher.

Before closing my little treatise, I must give the young angler some hints on making trout flies. Begin in spring with a No. 7 hook round bend, and reduce the size as the season advances; but after a rise of water by rain put on a larger fly, because these rise until the water decreases again. In making your fly, take the hook in your left hand, between your finger and thumb, the bend being to the right; resin a thread of orange silk, making the end of it small with your teeth, and flatten the end of the gut in the same way. Place the small end of the thread about half an inch down the

hook, and overlap it by bringing the thread above toward you, so as to hold the end firm. Then put the small end of the gut close up to the thread, and bring the thread twice round both gut and hook towards you. Then turn the hook so that the bend is to the left, and wind the thread from you until within two thicknesses of thread from the end (which is left for the wings), drawing all tight with a knot. For the wings—take two portions of feather; lay the one above the other, and put them between your finger and thumb and the hook; take one or two turns round the hook and wings, put them forward, and slip a knot behind them; with your scissors clip off the ends of the feathers that extend beyond the iron; then divide the wings equally, and bring the thread round to separate them, putting it behind the wing next you and before the other; then turn the thread round, reversing it by putting it before the wing next you, and behind the other wing. For the body—have the rolling feather ready, and a small piece of spare thread; make an open knot, and put in the ends of the feather and

thread, drawing the whole tight behind the wings to hold them forward. Then with the thread put on a little dark yellow wool, to swell the breast, as the trouts are fond of large sized flies in the spring. Take your nippers and turn down the rolling feather for body and legs, letting the nippers hang until you come down to them with the other thread ; then take them off, and wind down to the end of the first tying, making three knots to hold all firm. Finish your fly by clipping off the thread or anything that offends the eye. When the thread inserted in the loop knot with the rolling feather has been well resined, you can put on any kind of fur for legs and body, by working it upon the thread until it adheres. Of course every angler has his own way of making flies, and the foregoing was the method which I adopted.

In conclusion, there are a few things that the young angler should bear in mind when he begins the art of fishing. First, he should not use a heavier or longer rod than he has strength to manage so as to lay his line fair upon the water. Secondly, when

fishing with fly, he should be careful to draw back his line in a circular direction, so as not to snap off his point fly. Thirdly, if he is compelled to pass between trees or bushes with his rod up, he should twist his casting line round his rod, fixing the hook in the reel, and if he has fly on, the other two hooks below the casting line, and take care to keep the point of his rod before him.

The difficulties of the art of angling are only to be overcome by patient study and constant practice; and the young fisher will become expert and acquire experience in his art in proportion to the amount of attention which he gives to it. Each change in the atmosphere affects the taking of fish, and there are peculiar circumstances connected with every locality, which must be closely watched and taken into consideration by all who would be successful. I would advise every tyro to cultivate, if possible, the acquaintance of some open-hearted, experienced angler in his locality, or in any place which he may be visiting, and accompany him in his piscatorial expeditions, observing his baits and the colour and make of his

flies, and which take best—endeavouring himself to make improvements upon what he sees. He must not be discouraged by returning home with an empty basket, or by an occasional want of success, for some who have thought themselves the best have had to bear this crook in the fisher's lot, but let him persevere in the face of difficulties and discouragement, and he will be crowned with success.

