



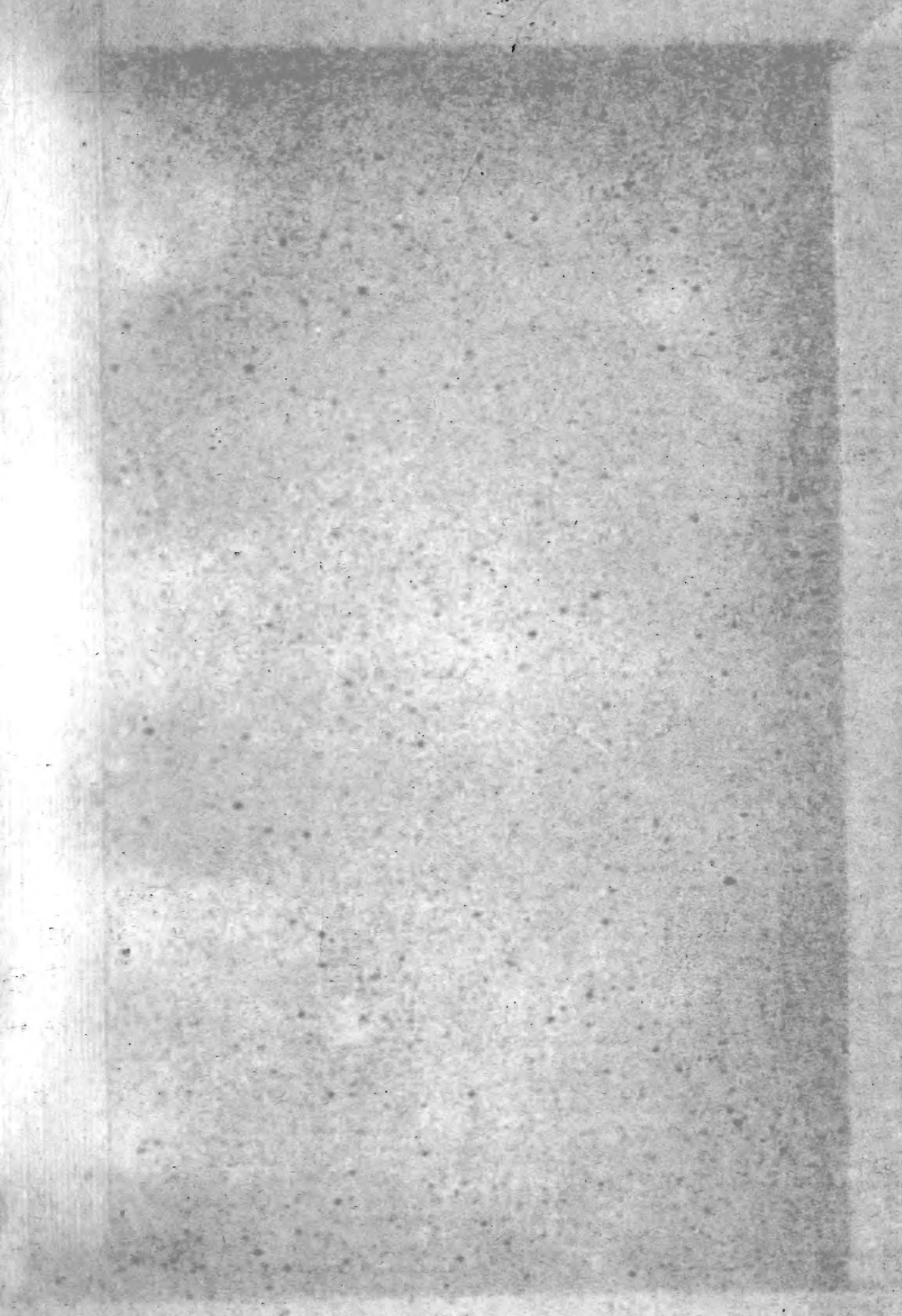
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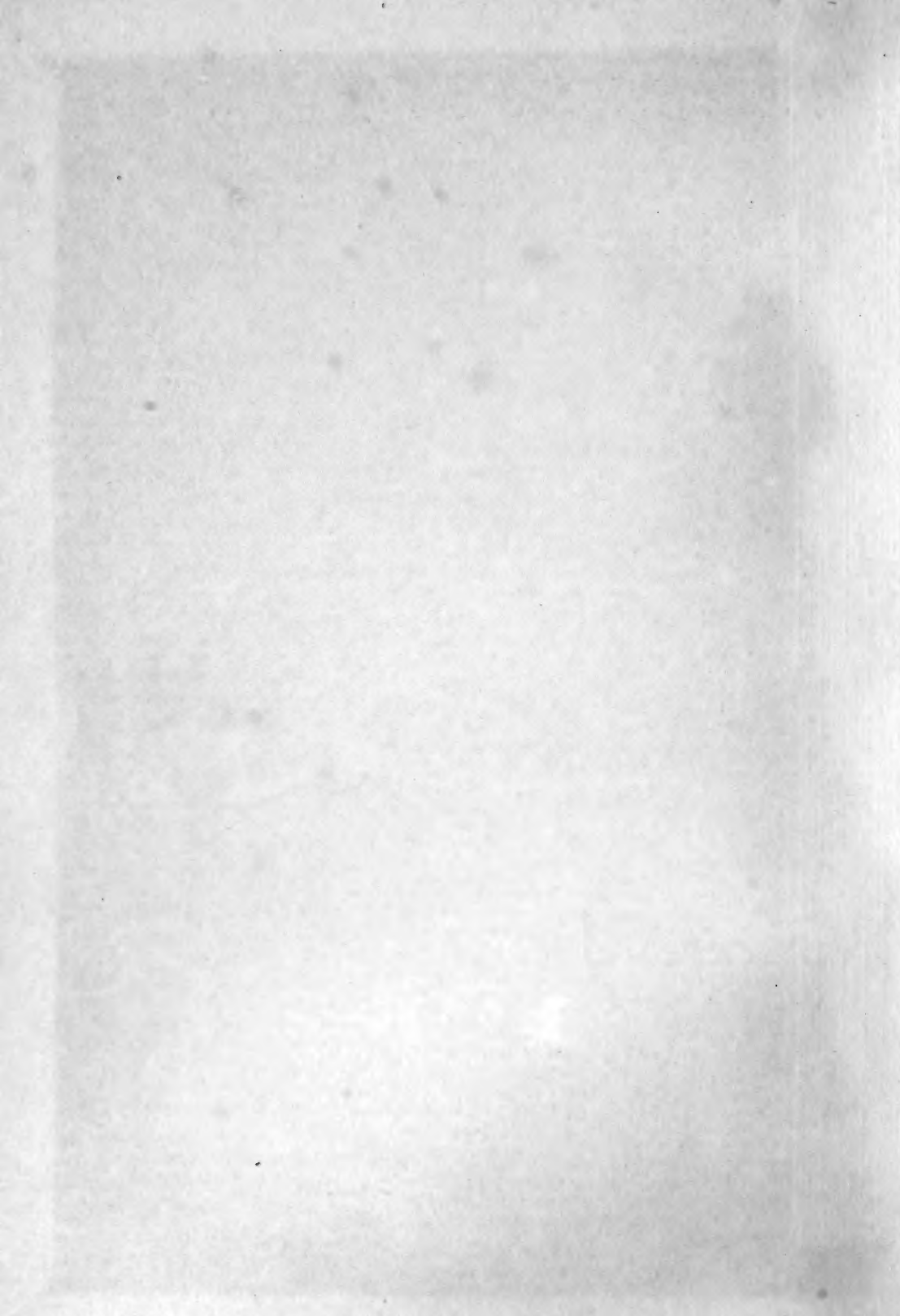
BRITISH REPTILES,
AMPHIBIANS AND
FRESH-WATER FISHES

BY
W. PERCIVAL WESTELL, F.L.S.

JAMES A. PETERS

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THE ABBEY NATURE BOOKS

Edited by W. PERCIVAL WESTELL, F.L.S.

BRITISH REPTILES, AMPHIBIANS,
AND FRESH-WATER FISHES



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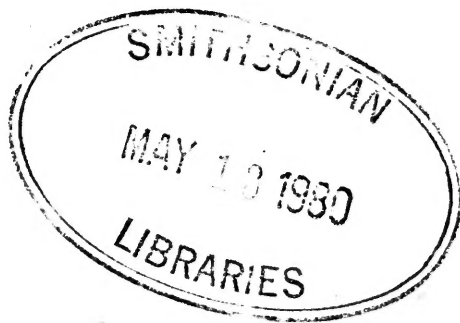
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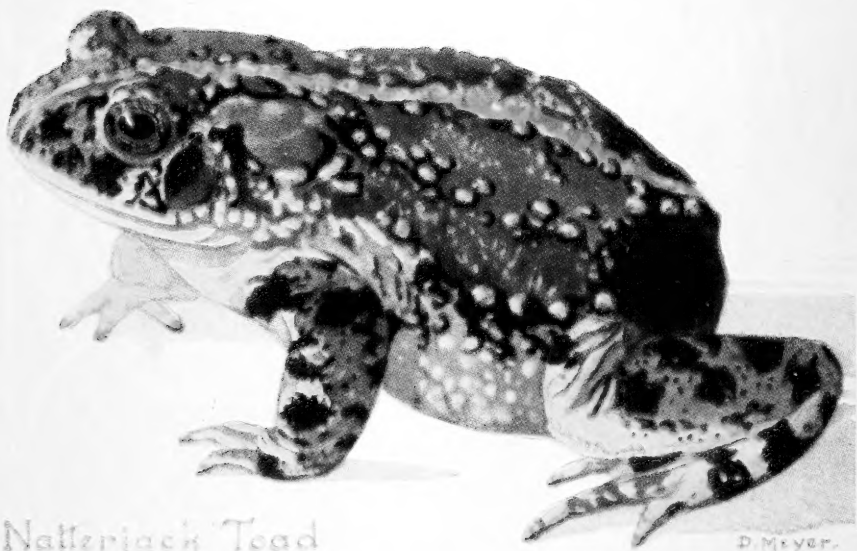
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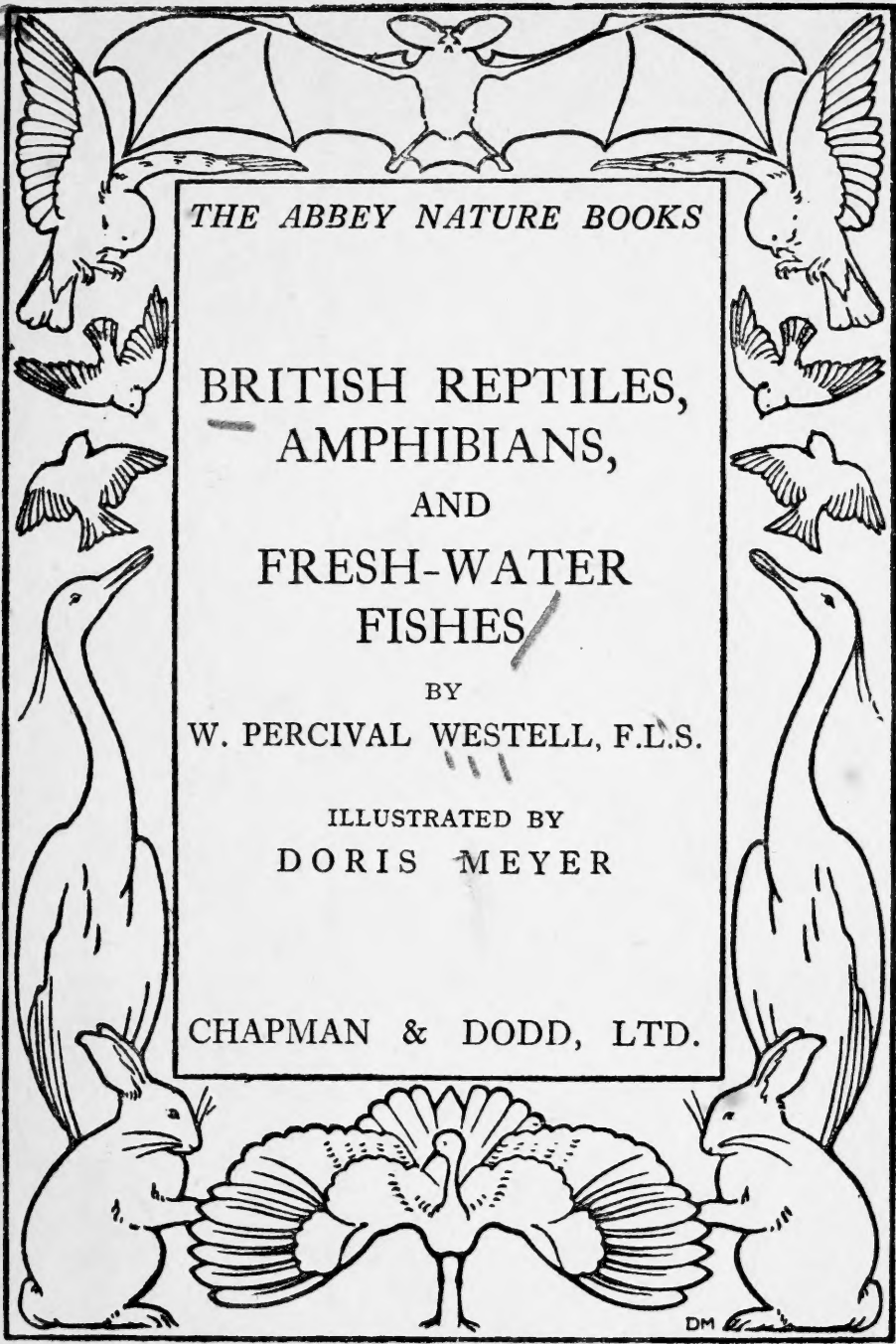
Edible Frog



Natterjack Toad

D. Meyer.

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THE ABBEY NATURE BOOKS

BRITISH REPTILES,
— AMPHIBIANS,
AND
FRESH-WATER
FISHES /

BY
W. PERCIVAL WESTELL, F.L.S.

ILLUSTRATED BY
DORIS MEYER

CHAPMAN & DODD, LTD.

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INTRODUCTORY NOTE

It is hoped that this third volume of "The Abbey Nature Books" will be no less popular than the preceding volumes devoted to British Mammals and British Birds. A feature of this third book in the series is that practically every species included is illustrated, and these illustrations, together with the descriptive matter, will, it is hoped, result in more attention being paid to these classes of animals than heretofore. The Author has to acknowledge his indebtedness to Mr. Frank Gibson's "Superstitions about Animals," and to Mr. C. Tate Regan's admirable book on "The Fresh-Water Fishes of the British Isles," to which the reader is confidently referred for more detailed information concerning the third class of animals included in this volume.

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BRITISH REPTILES, AMPHIBIANS,
AND
FRESH-WATER FISHES

I. CLASS REPTILIA, OR SNAKES AND LIZARDS

Introduction.—Whilst in certain parts of Great Britain both Snakes and Lizards are of frequent occurrence, there are many districts where neither are found, and although on odd occasions introduced Snakes have been unexpectedly discovered in Ireland, the Emerald Isle does not include even one species of *Ophidia* in its native fauna. Moreover, our own island-fauna as a whole contains very few species of Snakes, or Lizards, and if at the outset it is stated that only three species in each of the two Orders of *Ophidia* (Snakes), and *Lacertilia* (Lizards), are entitled to inclusion, the truth will at once be told. Of a fourth kind of Snake (the Small Red Viper : *Vipera rubra*) something will be said at a later stage, and as regards Lizards I have myself caught, or had in my possession, specimens from foreign climes

BRITISH REPTILES

which had without doubt made good their escape from captivity. One very large specimen of a handsome Green Lizard was caught in my own garden, but it does not come within the province of this book to include such events in its survey.

Before dealing with the few species of Serpents indigenous to our own Country, it will be as well to give some general particulars, and instances of folk-lore, old-time beliefs, and superstitions, concerning them. It is probable that Snakes, or Serpents as they are so often designated, are the most unpopular of all living creatures, and the reasons for this, rightly considered, are difficult to ascertain. Included in the Class *Reptilia*, there are to be found, in addition to the Snakes and Lizards, the Tortoises and Turtles (Order *Chelonia*), and the Alligators and Crocodiles (Order *Crocodylia*), but these latter reptiles do not concern us here as they are, of course, not found in a wild condition within the borders of our own land. Other countries, such as North America, where no less than over 350 different species of reptiles occur, are more fortunate, or unfortunate, according to the point of view adopted, but it is probable that few people will lament the fact that our own reptilian fauna is so poorly represented. Whilst, too, there are a great number of Serpents inhabiting the great Continent of Australia, and among them at least seventy venomous kinds, we have in our own island only one species which is harmful. This is the Adder, or Viper (*Vipera berus*). Of the three species of Snakes we do possess, one, the Smooth Snake

INTRODUCTION

(*Coronella austriaca*), is believed to be very rare, and whilst in some districts the two remaining species (Adder and Grass Snake) are plentiful, there are, as has been stated previously, many places that are Snakeless regions, and our own three species are confined to certain parts of England, Scotland, and Wales.

Being inhabitants of warm, or, at any rate, temperate countries, our own changeable climate is apparently unsuited for these disdained creatures of the wild, yet Lizards do find a congenial home much further North than Snakes, and at higher elevations. Further points are dealt with under the life history of the three species included hereafter, but it should be pointed out how much original work requires to be done to enable us to piece together the place these despised animals occupy in the economy of life. For countless centuries Snakes have been regarded with awe, fear, or superstition, and the whole of this little volume could quite easily be filled with quotations from poets and philosophers, as well as scientists and sages, who have perpetrated sad errors concerning them. Strange indeed that the Class *Reptilia*, coming as it does between our feathered bipeds on the one hand and the amphibians on the other, should be so looked down upon when, as a matter of scientific lore, the reptiles are cousins of them both. Our earliest known birds can be popularly referred to as Flying Reptiles, for as such they are revealed by fossil remains which the earth has yielded. These weird creatures were devoid of feathers, had large bulbous eyes, great

BRITISH REPTILES

jaws with teeth, and bat-like wings. Some forms of these extinct flying reptiles, however, were toothless in the same way as our present-day birds. The largest of the *Pterodactyls*, as these flying reptiles are called, had a wing-stretch of at least twenty feet, so that its presence in the air in those far-off times may be compared for breadth with a modern aeroplane scudding through space. It should be stated here that these flying reptiles of the bygone (their remains occur in jurassic and cretaceous rocks), were not the ancestors of our birds. They belonged to a group of reptiles now extinct, but nevertheless scientists are agreed that the ancestor of our birds *was* a reptile, and the first bird of which we have any evidence is known as the *Archæopteryx* which means "ancient bird." It was about the size of a Rook, and the jaws contained sharp teeth.

Geology teaches us that at one long period in Earth's history all the largest animals then dominant were reptiles, and these were divided into those which were "huge dragons of the land, big bird-like reptiles in the air, and fish-like creatures in the sea." * At least four hundred fossil reptiles have been found in the British area, including those of some existing forms. But we must not be tempted to pursue this fascinating topic in this volume, its mention here being made so as to prompt the young student to prosecute enquiry on his own account, and to show what an important position these

* See "Every Boy's Book of Geology" (R.T.S.). By Trueman and Westell.

INTRODUCTION

bygone reptiles have occupied in the past history of the world.

Some kinds of reptiles still existing are equally well at home on land or in water, and there are others which spend part of their time on one and the remainder in the other. Snakes can and do take to water, though this was for long disputed, but, as a rule, the Grass Snake is more fond of this than the Adder, which exhibits a liking for dry situations. *Natrix*, the specific name of the Grass Snake, means Water Snake, and it should be stated that all Snakes are fond of drinking. Whilst Snakes and Lizards are closely related, there are easy distinguishing features, such as the absence in Snakes of any functional limbs, and also the absence of eyelids. The eye of a Snake has only a thin transparent covering, and when, as happens, a Snake changes its skin, this covering peels off in the form of a lens. On the other hand the Slow, or Blind, Worm is not a Snake, and it is certainly not a Worm. Neither is it blind. It is a legless Lizard, having distinct eyelids. There are other anatomical differences between the two Orders dealt with in this first section, but these need not detain us, and it only remains to be recorded that the greater majority of the creatures contained in the Class *Reptilia* deposit eggs, which are oblong in shape, and have a soft leathery covering, or shell. In some kinds of Snakes, however, especially those inhabiting fresh and salt water, and also Lizards, the eggs are hatched within the parent's body. This is so in the case of our own British Adder,

BRITISH REPTILES

Slow Worm, and Common Lizard. Superstitions concerning Snakes are many, and it is only possible to draw attention to a few of these. These interesting animals are both loathed and feared. Any creature of the nature of a Snake is regarded as harmful, or obnoxious, and is killed at sight. The harmless Grass Snake, and the still more harmless Slow Worm, both suffer the penalty of death on this score. Even in Biblical history there is evidence to show the disdain, distaste, and distrust with which these tenants of earth and water were regarded, for Christ referred in his condemnation of the Pharisees in the words : “ Ye Serpents, ye generation of Vipers.” The Serpent entered into the Biblical story of the Garden of Eden as the betrayer of Eve, and although the latter did not regard the reptile with aversion, in the days of Pharaoh this fearlessness had changed to one of terror. A poor London urchin is said to have died of fright on seeing a Snake by his bedside, yet in olden times, arising out of fear and insufficient knowledge, Snakes were objects of much veneration, and extraordinary powers were believed in regard to them. Dryden in his translation of Virgil speaks of a serpent which “ rolls ” and “ rides,” and of how “ the sacred monster *shot* along the ground.” Longfellow in his wonderful epic of “ Hiawatha ” makes “ great serpents ” and “ fiery serpents,” “ with their blazing crests uplifted,” breathe, if you please, “ fiery fogs and vapours.”

Snakes are almost invariably referred to, or regarded, as *slimy* creatures. This they are not. They are cold-

INTRODUCTION

blooded, and perhaps clammy to the touch, but they have a dry covering which is certainly neither "slimy," nor "slippery." Several poets have fallen into grave error by a repetition in their verses of old beliefs and misconceptions. Thus, Chatterton talks of "the slimy Serpent"; Byron even goes so far as to refer to the *black slime* which betrays a Snake as it crawls. The greatest bard of any age, and an Englishman to wit, William Shakespeare, joins the merry throng, for in "Antony and Cleopatra" he writes of fig leaves having the trail of the *Aspic* (a Snake) upon them in the form of slime. That Snakes can, and do, "sting" is another erroneous and unscientific statement. The forked tongue, shot in and out with lightning rapidity, has given rise to this belief, but all Snakes are by no means poisonous, and certainly none of them can "sting." Those which are venomous perform the operation of inserting poison by means of poison-fangs contained in the upper part of the jaw, but no Snake is capable of *stinging*.

The Prophet Job, who was a keen and loving interpreter of Nature, made the error of saying: "The Viper's *tongue* shall slay him," and other references in the Holy Word could be given if necessary.

Ovid talks of a Snake having a "barbed sting"; Virgil warns all and sundry to "beware the secret Snake that *shoots a sting*," and of others that "wind," and "grind."

Chaucer refers to Snakes as "Neders," and Shakespeare again makes several references to the Snake's

BRITISH REPTILES

stinging capacities, of Snakes that with double tongue “may with a mortal touch throw death upon thy sovereign’s enemies.” Spenser speaks of “the *stings* of Aspes that kill with smart,” and Dryden again has a liking for saying that “a Serpent *shoots* his *sting*.”

Snakes also are still believed to have a power of fascinating their prey, and one would hardly credit that, as late as the time of John Wesley, we find that eminent divine stating that a Swallow seeing a Snake beneath, stops his insect-catching, flies over the crafty reptile on the ground, and finally sinks until the bird drops into the mouth of the expectant host!

Shakespeare in “King Henry VI” says: “What! Art thou like the Adder waxen deaf?” In the Psalms there is a reference to “the deaf Adder that stoppeth her ear,” and although Snakes have no external ears, is there any reason to suppose that any of them are deaf?

The poor despised Slow Worm has been the target for much ridicule and abuse, but three instances must suffice. Shakespeare christens it: “The eyeless venom’d worm,” and actually advises, as one of the ingredients of the witch’s cauldron, “a Blind Worm’s *sting*.” Herrick philosophises thus:—

“No will-o’-th’-wispe mis-light thee:
Nor Snake or Slow-worme bite thee.”

Lastly, our beloved Scott helps to perpetuate the fable as to this creature’s slimy and slow character thus:

ADDER

“ There the slow Blind Worm left his slime
On the fleet limbs that mocked at time.”

Whereas, let it be stated here once again that the Slow, or Blind, Worm is not slow, not blind, not venomous, not eyeless, and not slimy. It may be repeated that it is not a Snake, that it is not harmful in any way, and that it is a legless Lizard.

So much by way of brief introduction concerning the Class *Reptilia*, British representatives of which we may now proceed to consider.

ORDER OPHIDIA, OR SERPENTS

Adder.—*Vipera berus* (Fig. 1) Belongs to the Family *Viperidæ*, the whole of the members of which are poisonous. It is believed that all the species included in this Family produce their young alive. The Adder is found in various English Counties, and is commoner in Scotland than the Grass Snake. It is well distributed in certain parts of Wales, but is curiously absent from others. As already indicated, Snakes are not found in Ireland, although the species now under review occurs on one, or more, of the islands off the western seaboard of Scotland. The Adder is particularly plentiful in the New Forest, Hampshire. It haunts dry moors

BRITISH REPTILES

commons, woods, hillsides, grassy and sandy banks, heaths, rides, quarries, etc. A chalky soil appears to be a favourite retreat, yet, curiously enough, we have rarely met with this species on our own Chalky Chilterns in Northern Hertfordshire. The average number of young is given as 13, though less and much larger figures have been stated. I knew of a dam Adder in Sussex which was accompanied by a family party of 16. The young are born in late Summer or early Autumn, this being a viviparous species. The usual dietary consists of ant-pupæ (often erroneously referred to as ant-eggs), birds and their eggs, insects, lizards, mice, moles, and slow worms. Newts, young rats, and even water-voles, have also been known to be taken. Adders vary a great deal in colour, and my old friend Professor Gerald R. Leighton has no hesitation in stating that they vary from black to white! He gives as a general description of the body-colours those of deep and pale blue, mottled-grey, orange, and yellow. The black, brown, or warmer colour marking on the head, and along the back, is not subject to such variation as the body-colourings. By these dark markings the Adder may at once be distinguished from other Snakes on the British list, and especially by the curious V-shape mark on the crown of the head. The average length of an adult is 20 to 25 inches. Female preponderate (it is said in the proportions of as many as three or four to one), but *Vipera berus* is for the most part a shy, if not nervous creature, and will do all that is possible to glide out of harm's way if danger

ADDER

threatens. It will not attack unless escape is impossible. It is an adept at taking cover, and loves nothing better than to sun itself close by a heather or fern patch in which it can hide if occasion demands. Most of the stories one hears, and often from accredited witnesses, of Adders *springing* and *darting* through the air when about to strike a person, savour more of imagination than truth. It is an earth-creature, keeping exclusively to ground, and by its very structure is unable to perform the prodigious feats with which it has been credited. When in repose the Adder assumes a coiled position, but raises its head and neck when preparing to strike. On the vexed question of whether or not this animal swallows its young in the time of danger we cannot hope to enter here. Whilst it is possible that this event can and may happen, at present the matter is not proven, or rather is not accepted as a scientific fact. I have myself made a practise of asking for information on this point from most of the field naturalists I have met in this country during the last forty years, and only on one occasion have I received a reply in the affirmative. Neither is it possible to enter into a detailed description of the ill effects suffered by human beings from poisoning by the Adder, or the most useful remedies to apply. Cases of Snake-poisoning in our own island are very rare, but old Brusher Mills, the Snake-catcher in the New Forest, swore by an ointment, or oil, he made from fat obtained from the Adder's own body, as a most successful antidote.

Another contentious matter has reference to the sup-

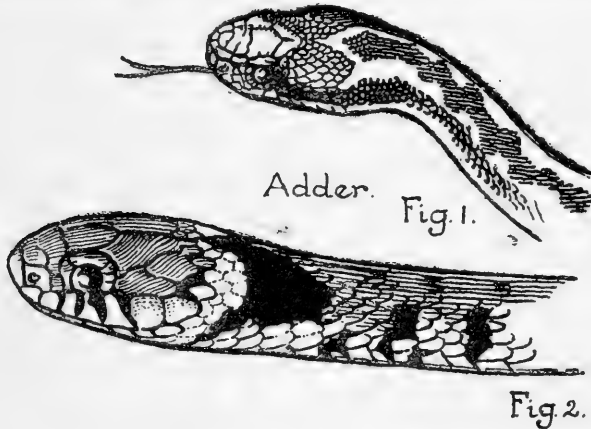
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posed occurrence in Britain of a second distinct species of Viper, known as the Small Red Viper, which might be called *Vipera rubra*. It is said to have occurred in my own native Hertfordshire, as well as Berkshire, Devon, Dorset, Lincolnshire, Oxfordshire, Somerset, Sussex, and Scotland. Indeed it has now been recorded from fifteen English counties. In both colour and size it is quite distinctive, and it seems high time that this Snake was promoted to specific rank. It is much less timid than *V. berus*, hisses more vigorously, and shows fight to a much greater extent. An average length may perhaps be given as 12 inches (almost one half less than the average length of an adult Adder), and the coppery, ferruginous, or red colour, *with darker markings of the same*, at once distinguish it. The one natural enemy of the Adder in Britain seems to be our wily old friend the Hedgehog who, it appears, maddens the Snake to such an extent that the latter eventually strikes at the Hedgehog, and breaks its own neck as a result of the force of the impact against the profuse armour of spines. The popular name of Adder comes from the Anglo-Saxon "a neddre," "an eddre," "an adder."

Grass Snake.—*Trepidonotus natrix* (Fig. 2). Belongs to the Family *Colubridæ*, and is also known as the Green, Hedge, Ringed, and Water Snake. The specific name *natrix* indicates that this Snake is fond of inhabiting places near water. It is one of our commonest reptiles, and yet in districts where one would expect to locate it, it is strangely absent. Whether this is due to the

GRASS SNAKE

absence of a suitable food supply, egg-depositing area, character of the soil, or what not, seems undetermined. It inhabits commons, heaths, uncultivated grassy tracts hedges, woods, and waste places. It is rare in the North of England and Scotland, and in districts which seem admirably suited for it. It is the commonest Snake in Europe. The Grass Snake differs from the Adder in depositing eggs, and does not produce living young. These eggs are laid in late Spring, or early Summer, and



Grass-snake.

may number from 15 to 30. Perhaps the average number produced during the season is 20 to 30. These egg-masses, each separate egg being joined to its fellow by a sticky substance exuded for the purpose, are usually found in manure or refuse heaps, old walls, under bundles of faggots, and similar places. After being deposited, it takes several weeks for the young to emerge, and they are provided with what is called a "temporary horny tooth" on the snout so that the leathery mem-

BRITISH REPTILES

brane forming the "shell" can be cut through. The food consists of birds and eggs, frogs, insects, mice, newts, slugs, water-voles, and, it is said, fish. I have known one to consume a nest full of young nightingales which I had under observation. This species is much thinner in proportion to its length than the Adder, and tapers much more towards the extremity. This is not an invariable rule, but holds good in most cases. The general colouration is olive-green, with darker above, and greenish-yellow lower down. There is a conspicuous orange, or yellow, ring or collar, with a narrow line of dark colour on the back of the neck. Behind this there is a dark band, which is more pronounced on the neck-sides than on the back. There is a single row of black markings on either side of the body. The young are darker at first, but soon assume the colouring of the parents. It attains a much greater length than the Adder, the average being between 30 and 36 inches. Larger specimens have been recorded, one of 5 feet 8 inches having been obtained in Hampshire, but this may be regarded as phenomenal. In addition to haunting marshy situations, this species is fond of entering water quite voluntarily, and propels itself along with its head just protruding from the liquid element. Its movements are graceful and well worth watching. As with all the reptiles, it casts its skin regularly, turning itself inside out as it were, head and eye-coverings included, and during Winter passes its time, like its congeners, in a state of torpor. It makes a most interesting

SMOOTH SNAKE

pet, provided that, when not in hibernation, a sufficient food-supply can be secured to keep it going.

Smooth Snake.—*Coronella austriaca* (Fig. 3). Belongs to the same Family as the last-named species, but is much rarer in Britain, although it occurs elsewhere over the greater part of Europe. Although it sometimes haunts damp situations, it appears more fond of dry retreats, where it can secure during the Spring, Summer and Autumn an abundance of sunshine, in which it appears to revel. It produces about a dozen eggs during August, or early in September, and these are advanced



Smooth Snake Fig 3



Skull of
Smooth Snake
Fig 4

in incubation to such an extent that the young soon afterwards make their exit from their shelly covering. One writer distinctly states that the young are produced alive. The food appears to consist of other reptiles and mice. The body colour may be brown, brownish-yellow, reddish-brown, or rusty, and there is a double array of irregular dark spots on the back. The eyes are small,

BRITISH REPTILES

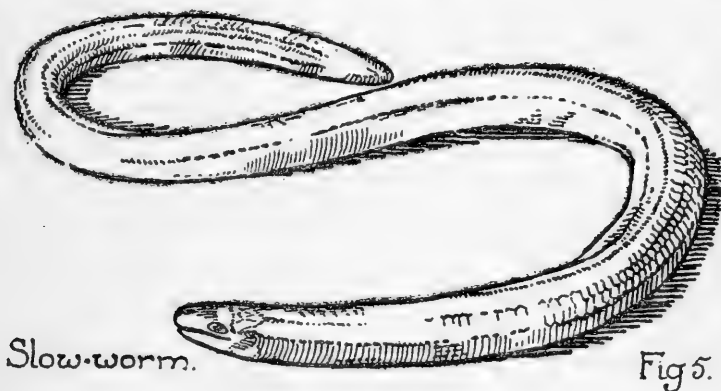
and the body scales smooth. The average length is given as 24 inches, the male being the shorter of the two sexes. As in the case of the Grass Snake, an obnoxious secretion is emitted for the purpose of defence. The first authentic record of this rare British species dates from 1853, when a specimen was secured in Dorset. Although of fierce disposition, the Smooth Snake only possesses minute teeth, and is a harmless species. True, it possesses two fang-like processes right at the back of the jaws, but it has been suggested that these may serve the purpose of more securely holding its prey which might otherwise be able to make good its escape.

ORDER LACERTILIA, OR LIZARDS

Slow Worm.—*Anguis fragilis* (Fig. 5). This Snake-like Lizard—for such it is in spite of its misleading English name—belongs to the Family *Anguidæ*. It is the sole representative of its genus, and has acquired its specific name of *fragilis* because, when handled, it has the habit of not only becoming quite rigid, but if doubled up or struck, it snaps, or breaks, in two. Indeed when in this rigid state its body can be broken into several small pieces. Although it does not occur in Ireland, it is a familiar object in England, Scotland, and Wales, but it often escapes detection because of its fondness for

SLOW WORM

keeping perfectly still. It is probably because of this that it has obtained its name of Slow Worm. I have found it most frequently in Kent and Cornwall, but there are few, if any, counties in which it does not occur, though in several it is of local distribution. It haunts commons, downs, heaths, grassy waysides, and woods, and when discovered may be picked up and handled without fear of any harm accruing to the captor. But care must be taken not to interfere with the tail, as many species of Lizards have a knack of snapping off a portion of that appendage with the idea apparently of making



good their escape. Moreover, it is a capital device for enabling the Slow Worm and its cousins to escape from natural enemies when a hold is secured of the tail end. The reptile, minus a part of its extremity, goes off to all intents and purposes no worse for its adventure, and its pursuer has obtained a meal. Lizards reproduce either by depositing eggs, or bringing forth living young. The present reptile comes under the last-named category.

BRITISH REPTILES

The eggs are carried by the female until they are hatched, and the young has little or no difficulty in breaking the transparent egg-membrane, and making good its exit. Early in Autumn the thread-like young ones make their appearance, and they number from six to twelve, sometimes less. It takes several years for them to reach the adult state. The favourite food of this gardener's friend is slugs, and these are sought for when it is getting dusk. One instance is recorded of a male which ate no less than seventeen slugs at a "sitting." Earth-worms are also sought after, but if slugs are obtainable these are preferred. In view of this, every tiller of the soil should encourage, rather than destroy, this beneficent creature. It appears to be the common grey slug of our gardens which is most relished, and it is interesting to note that, so unconcerned is the former, it does not realise that the Slow Worm is intending to make a meal of it, and no effort is put forth to get out of harm's way. The young are at first silvery-white on the upper parts, and inky black beneath. The line of demarcation along the centre of the back is very conspicuous. Later on, the underneath becomes mottled-grey, with brownish, polished copper, or grey above. The skin is covered with smooth rounded scales, and this is a characteristic feature, as also the moveable eyelids. The average length of a full-grown specimen, with the whole of the tail intact, is from 12 to 15 inches.* Although the

* Whilst this book was passing through the press, a specimen was brought to me which measures $15\frac{1}{2}$ inches, and is now in Letchworth Museum.

COMMON LIZARD

Slow Worm may often be discovered in a state of repose, and some of its movements are not of a quick nature, it can, if needs be, move along at a rapid rate. When in motion it is most fascinating to watch, and this too often despised reptile should occupy a much worthier place than it does in the fauna of our land. The slough, or body covering, is cast either in pieces or entire, starting at the head and gradually working towards the tail. When the old skin is shed both the colour and activity of the Slow Worm increase, and it then feeds more readily. It hibernates during Winter, but is tempted to emerge from its hiding place on a mild day, the warm sunshine being much to its liking. Its greatest enemy is probably the Adder, but other creatures also prey upon it. Man himself is its relentless foe.

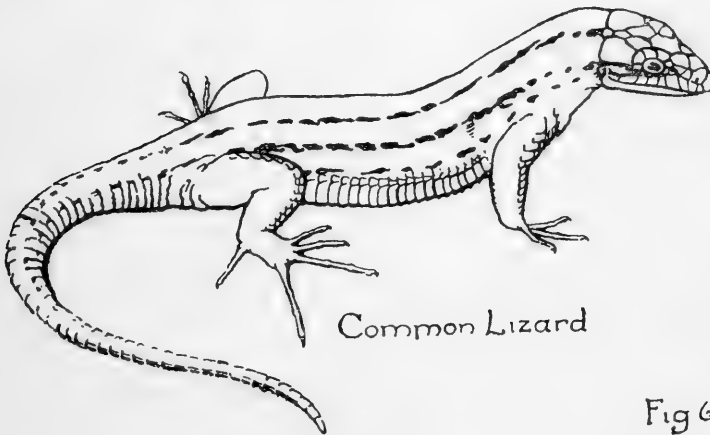


Fig 6

Common Lizard.—*Lacerta vivipara* (Fig. 6). This is the first reptile coming within our survey which occurs in Ireland. As a matter of fact, it is the only reptilian

BRITISH REPTILES

representative we have in the Emerald Isle, and with this one exception, therefore, Saint Patrick was eminently successful in his decree banishing all such animals from that unfortunate island. It is a familiar inhabitant of various parts of the other three provinces which constitute Great Britain, but as with other reptiles already dealt with, it is strangely absent from places which seem quite suited for it. It is asserted that it is fond of high lands and mountainous districts, and whilst this is certainly true, it is, nevertheless, absent from many of them, and yet occurs in much more low-lying areas, as many authentic observers can testify. That reptiles can be, and are overlooked, is to be expected, and especially so where there is an abundance of cover. I have in mind a fine stretch of ancient common opposite my own country study at Letchworth Garden City, where I have many times seen and caught Lizards, and it may here be mentioned that I once took one, when there were several inches of snow on the ground, as early in the year (for a Lizard to be found abroad) as March 10th. It lived for some weeks in captivity, and may now be seen preserved in spirits at Letchworth Museum. Most visitors to the common in question would doubtless be surprised, if not alarmed, to see a Lizard there, but it is the old story of eyes and no-eyes all through. The haunts of this Lizard are commons, downs, heaths, moors, sandhills adjoining the coast, and walls. They seem to prefer open country, but the most I ever saw were sunning themselves on a roadside wall near Morthoe,

COMMON LIZARD

in North Devon. For a mile or more specimens of this active little species were in almost constant view, in several instances little companies of half a dozen or so being happily gathered together. It was mid-August, and the reptiles were represented in various sizes. The specific name of *Vivipara* is somewhat misleading as, although this species does bring forth living young, it also deposits unhatched eggs. In the latter case the egg-membrane is burst soon after extrusion, but this is not invariably so, as I have known a group of eggs (they number from 6 to 12) to be some time before the young emerged, and instances have also come under my observation where the eggs have *not* hatched, being apparently infertile. The small black-coloured young scamper about directly they are born, and after a few days learn to obtain their own living. Insects of various kinds go to make up the food, and these are captured with much dexterity and cunning. As with other members of the Order *Reptilia*, the colour-variation in *Lacerta vivipara* is a distinctive feature, and it may here be stated that the factors governing this colour-variation may, according to Professor Gerald Leighton, be given thus : Age, Climate, Food, Heredity, Light, Locality, Moisture, Sex, or Temperature. Gadow mentions that the general colour of our present species is brown or reddish above, spotted with darker and lighter colour. In many individuals there is a blackish vertebral streak, and a dark lateral band with yellow edging. Orange to red is the general colour of the male on the under parts, prominently

BRITISH REPTILES

spotted with black. In the female pale orange or yellow predominates, and there may or may not be any spots. The male measures about 6 inches. The female is somewhat larger. Possessed of amazing fleetness of movement, this Lizard is well able to evade its human, and very often its natural, pursuers. Even if it is caught, careful and secure grasp are necessary, or the creature is bound to make good its escape. It casts its skin in the same way as others of its race, and also hibernates.

Sand Lizard.—*Lacerta agilis*. Although belonging to the same Genus as the last-named, the Sand Lizard (see Coloured Plate II) is a much rarer animal, being restricted, it is believed, to the Counties of Dorset, Hants, and Surrey. Thus its distribution is almost identical with that of the Smooth Snake already dealt with. It appears to occur mostly where the country is low-lying, and certainly prefers a light dry soil. That it has occurred in at least one Northern County in days gone by seems authentically proved, but the opening up of the countryside for buildings, parks, and formal open spaces, has driven it, like so many other items in our fauna, from its one-time haunts. It affects a sandy region, as this is suited to it for assisting in hatching the eggs (this species *not* being viviparous), and the Sand Lizard is also fond of burrowing out of harm's way when the temperature is uncongenial. It is susceptible to cold and sudden change, and is a great lover of warmth when same can be secured. It is also fond of burrowing in loose sandy soil when hibernation is due. The five to

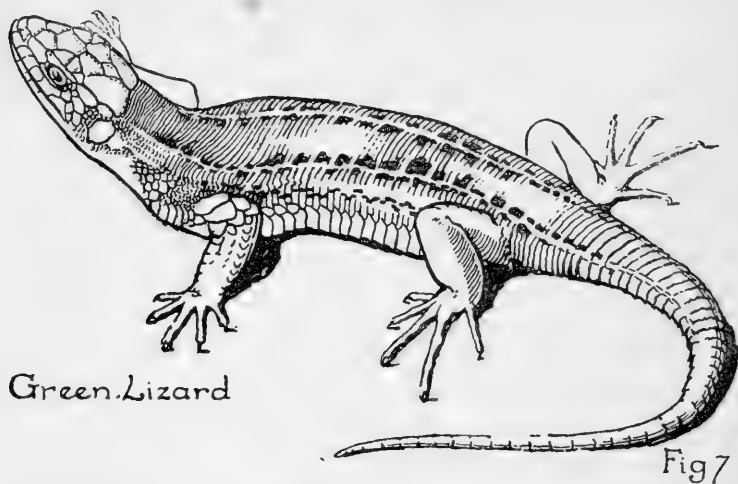
SAND AND GREEN LIZARDS

eight or more eggs are laid during July, a depression being made by the female into which she can deposit her treasures. If the district frequented is not sandy, then the eggs are deposited under leaves, or other suitable cover. Insects constitute the food. The male is green in colour, with a tinge of the same on the yellow under parts. There is a series of black dots on the sides, each with an eye-spot of whitish. There are black spots on the under parts. The female is brown or grey above, with large spots of dark brown, each having a centre spot of white. The cream-coloured under parts of the female may, or may not, be specked with black. The young are not black as in *Lacerta vivipara*, but are grey-brown above, with white spots having black edges. Their under parts are whitish. The average length of the adult Sand Lizard is about $7\frac{1}{2}$ inches. The female is a little larger. The Smooth Snake is the mortal enemy of this species, and both, as has been stated, are found inhabiting the same territory.

Green Lizard. — *Lacerta viridis* (Fig. 7). If, as is accepted in some quarters, the Channel Isles can rightly be included as a province coming within the survey of British wild life, two other species of Lizards have to be included in our reptile fauna in the persons of the Green Lizard (*Lacerta viridis*), and Wall Lizard (*Lacerta muralis*). As neither of these, however, occur on the mainland, except as occasional escapes, it is not necessary to do more than briefly refer to them. The Green Lizard is, with the exception of the Slow Worm, the largest species

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on our list, as it attains a length of 12 to 15 inches, although larger specimens are not infrequently recorded. Green is the dominant colour above, with yellow below. It is a good climber, although its more usual habits mark it out as an earth-dweller. The eggs number from 8 to

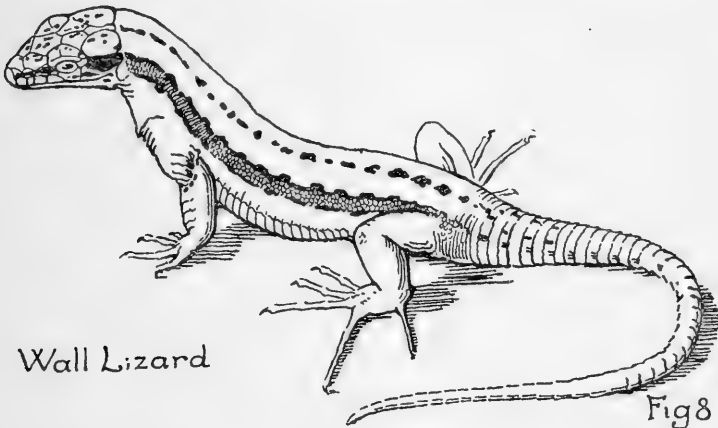


10, and they are partly incubated inside the female before being deposited.

Wall Lizard. — *Lacerta muralis* (Fig. 8). The Wall Lizard attains an average length of 6 to 8 inches, and whilst colour-varieties are very numerous, the general dress may be given as brown or greyish on the upper parts, spotted or streaked with blackish. In some specimens a bronze-green sheen is present. The colour underneath is subject to much variation, such as pink, red, white, or yellow, and this may be self-coloured, or ornamented with spots of black. It resorts, as its specific name indicates, to walls. It is oviparous, and will come

WALL LIZARD

from its hibernating quarters during mild weather in Winter. The members of the Family *Lacertidæ*, or True Lizards, are most common in Africa, but they have a wide distribution in various parts of the Old World, and frequent Northern lands where one would hardly expect to find creatures of this nature eking out an existence. Being so difficult to study at close quarters in their own haunts, much remains to be discovered concerning these useful, harmless, and active little reptiles. Fortunately they take more or less kindly to



captivity, and soon regard their owners with familiarity. They may thus be highly recommended as suitable pets for a Vivarium, and if careful observation is kept and notes made, the young reptile student is quite likely to be able to assist in helping to unravel some of the unsolved mysteries still surrounding them.

BRITISH AMPHIBIANS

II. CLASS AMPHIBIA, OR FROGS, TOADS, AND NEWT

Introduction.—The British Amphibians consist of seven species, so that they resemble in this respect the Reptiles previously dealt with. But although the number of species is almost identical, they differ in many ways, and a brief introduction of their salient features may here be attempted. Of the seven species with which we have to deal, four, the two Frogs and two Toads, do not, except in their tadpole stage, possess tails ; the remaining three species, the Newts, carry tails all through life. Further, the *Ranidæ* (the Frogs), have teeth in the upper jaw, whilst the *Bufo* (the Toads), are toothless. Frogs have a clean smooth skin ; Toads have a warty covering which at once distinguishes them. Newts are highly ornamented and coloured in the breeding season as we shall presently discover. It may well be asked : What constitutes an Amphibian ? And the reply may be given : it is a cold-blooded animal which passes through various stages before reaching the adult state, and at some period of its existence spends part of its time in water and the remainder on land. Indeed, even when

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in the adult state, all the seven species of amphibians upon the British List visit water for the purpose of spawning, and their young are at first exclusive water-dwellers. When in the latter state they have gills, and later breathe by means of lungs. Some kinds, however, retain their gills during all their various stages, but none of these occur in Britain. When Frogs and Toads have become mature, and hence have developed lungs, they have the habit of immersing themselves in water with the head just protruding at the surface so as to take in a sufficient supply of air. Even so, they can and do remain well below the surface for quite a long time, and if a pond is frozen in early Spring, and they are imprisoned beneath the ice, they emerge after a thaw none the worse for their adventure. Newts, on the other hand, are much more reconciled to an aquatic life, and although our British species do not possess any gills in the adult state, they appear to experience no difficulty in remaining submerged in the same position under water for hours at a stretch. All the amphibians with which we are concerned have four legs when in the final stage of development, although limbless amphibians do exist, but not in our own country. There are several anatomical features of interest in Frogs, Toads, and Newts, but these need not detain us as, at best, they can only be described in dry-as-dust terms, and that is not the idea aimed at in these popular books, but rather succinct life-stories of the animals under review. Far be it for us to write, for example, that "the hind legs have an

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additional segment owing to the elongation of the astragalus and calcareum in the metatarsus." This is all important to the student of anatomy, and is A.B.C. to the scientist, but to the general reader it is useless information, likely to deter him from following our story any further. Frog and Toad tadpoles are born with tails, and possess these essential appendages during the first part of their existence. Gradually, however, the tail, or rather its constituents, are absorbed, and eventually disappear altogether. The *Caudata* (Newts), however, are differently fashioned, having narrow lizard-like bodies, to which is attached throughout the whole of life a prominent caudal appendage, which is of distinct service in helping the somewhat sluggish creature to propel itself through the water. Some members of the *Caudata* have teeth, others are toothless. Some again have only two limbs, others have four. Some have moveable eyelids, others do not possess any. These remarks do not, however, refer to our British species of Newts, all of which have two pairs of limbs, teeth in both jaws, and moveable eyelids. The metamorphoses through which Frogs, Toads, and Newts pass is one of the most wonderful events in the whole realm of wild life, and perhaps passes our comprehension more than the marvellous processes undergone by an insect before it reaches the perfect state. Whilst Frog's eggs are deposited in masses, a familiar enough object in early Spring in any wayside pond, those of its first cousin, the Toad, are laid in strings. Very beautiful objects these

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strings of Toad's eggs are when (a difficult proposition!) they are taken from their native element and held suspended, the dark chocolate-coloured eggs resembling round beads set in a translucent chain of quicksilver. Quite the reverse holds good with regard to Newts, as they are much more particular in regard to their domestic affairs. Newt's eggs, as a matter of fact, are rarely discovered, except by the enthusiastic pond-dipper, as each egg is separately enveloped, or wrapped, in a leaf which is sealed up until such time as the young tadpole is ready to make good its escape. After hatching, the Frog and Toad tadpoles breathe by means of gills. So also, for that matter, does the tadpole Newt. The former cling for a time to the shapeless mass of jelly-like substance, which thus serves the purpose of a floating raft, but they soon become restless, and wriggle violently until they free themselves from their temporary anchorage. They have, like most young people, ravenous appetites, and as they eat, so they grow. The head assumes a bull-dog-like appearance, they become more active as the days pass by, and congregate in *shallow* water in immense numbers so that the warmth of the greatest alchemist that ever was—the Sun—shall infuse them with energy and gathering strength. At times, the margin of a pond is a seething mass of these animal-torpedoes, and it is a mercy that all do not come to maturity. A great many fall a prey to other tenants of the pond, and as by this time the adults have left its precincts, the youngsters have perforce to shift for themselves.

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In due course, as the tadpole develops, the hind pair of legs first make their appearance. Then there is a halt. Later, it will be observed, if a close watch is kept, that the tail shows signs of disappearing. It does not drop off, or wither up, but Nature has provided that it shall become absorbed, and afford sustenance to the little creature in setting up the necessary life-motion to bring forth a second (and front) pair of legs. When these hind legs show themselves, the tail has become a mere pointed stump, and the bull-dog appearance of the head, as well as the fat under parts, have given place to the familiar baby Frog known to all who live in the country (See Figs. 9 to 17). Sometimes the little fellows come to land, for the gills have now disappeared and lungs have been formed, still bearing a remnant tail behind them, but it soon disappears altogether. A capital account of the disappearance of the tail of the Frog is given by P. M. S. in the *Glasgow Citizen* as follows:—

“ Everyone is conversant with the outward appearance of the Frog in its tadpole phase, but the manner of the metamorphosis which takes place within, as it passes from the minus-forelegs-plus-tail state to the plus-forelegs-minus-tail one, is not so well known.

“ The relatively large amount of reserve protoplasm which is stored in the caudal part, is gradually transferred to the other structures, and especially to the upbuilding of the anterior appendages.

“ The work is in the hands of a most energetic and capable company of removal contractors, in the form

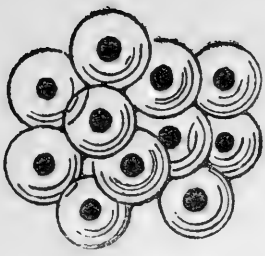


Fig 9

Fig 10

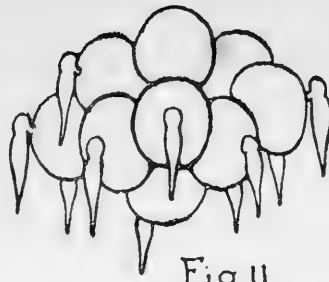


Fig 11



Fig 12



Fig 13



Fig 14

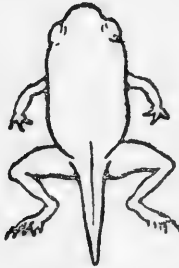


Fig 15



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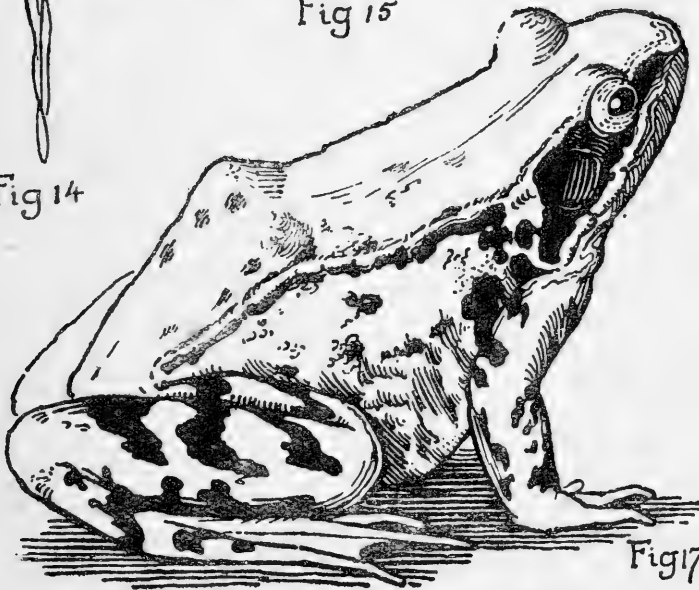


Fig 17

Fig. 9, Eggs. Fig. 10, Egg hatching. Fig. 11, Tadpoles just hatched. Fig. 12, Tadpole without legs. Fig. 13, Tadpole with hind legs. Fig. 14, Tadpole with front and hind legs. Fig. 15, Tadpole with tail disappearing. Fig. 16, Perfect Young Frog. Fig. 17, Adult Female Frog.

BRITISH AMPHIBIANS

of a host of very minute but active *amœbocytes*—little creatures who comprise the very simplest form of life. These set to, and by dint of sheer unremitting toil the labour is at last accomplished.

“ But tragedy crowns the efforts ; the *amœbocytes* have so overwrought themselves that they die actually of overwork, and with the sudden stoppage of their labour death supervenes—no profiteering, no unemployment benefit, no old-age pension, no retirement of ease, not even thanks from the beneficiary, for these hardy workers.”

If an army of young Frogs or Toads is encountered at the time they have just vacated their hatching quarters, and they are on the march, a wonderful sight is presented. Many, like their human prototypes, fall by the way, a prey to the numerous enemies that beset them, for, let it be said, a young Frog, just fresh from its life in a pond, is too tempting a morsel for birds and other wild creatures to pass over. Many, too, get crushed under foot, especially by motor traffic, as these Frog armies have a distinct liking for crossing roads during the great marches upon which they engage. Whither are they travelling ? What instinct is it within them that prompts this perilous, but uncontrollable desire to press forward ? Curious, that in after days, when they have reached the adult state, some of these little amphibians return to the same pond they left in days gone by. They return, of course, for breeding purposes, and have an unfailing habit of returning to the same pond year after year. Social in

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disposition when in the tadpole state, and again when leaving their watery home for the first time, it is strange that a more or less solitary life is led until parental calls come to them in Spring. Strange too, but none the less true, that all the Frogs (and later the Toads) of one's own neighbourhood should arrive at the conclusion *at about the same time* that spawning time is due. During the Winter they have been in hiding, passing the lone days and cold nights in a state of suspended animation, in odd corners and places safe from danger. Then, at the magic call of the sun, they awake from their torpor, and the great rush to the old breeding quarters comes to pass. If one catches them at the height of their journey, a wondrous sight meets the eye as the amphibians are seen approaching the water from all four points of the compass. Many, as in the march during infancy, perish by the way, impaled by the Heron's dagger-like beak, or a Hawk's fierce claw. Others again are crushed under foot, or run over. But the fittest pass through the great journey unscathed, and they make for the water where, the battalions having taken up positions at the breeding ground, they commence to search for partners with much croaking and ceremony. True they exhibit at such time somewhat repulsive antics, as groups of several individuals may be found in one writhing mass, but this must be overlooked when one remembers the low type of creature which sometimes carries out the perpetuation of its species in the manner indicated. The male of both Frog and Toad is distinctly the smaller of

BRITISH AMPHIBIANS

the two sexes, and when engaged in mating this distinguishing feature is very apparent. A word should be uttered on behalf of these defenceless creatures. They are quite harmless, indeed are among the most useful animals we possess. They are entirely incapable of inflicting any hurt, and they certainly do not, as is still believed in some country districts, "spit fire." This leads us on to consider a few superstitions, beliefs, and old-time fallacies which are still rife regarding them.

With regard to the statements still made with annoying frequency in the papers as to Frogs and Toads being found embedded in a solid block of stone where, we are gravely informed, they must have been entombed for hundreds, if not thousands, of years, this of course is sheer nonsense, as experiments that have been made prove conclusively that such an event is quite impossible. True that fossil remains of amphibians have been discovered in Britain, including our own two species of Frogs, the Toad, and one of the Newts, but these unwarranted records of hermetically-sealed living creatures being discovered deserves the emphatic denial here given.

Of the making of fables (still received, be it noted, with a modicum of truth) there is no end, and our friend the Toad is associated with several of these. That it has beautiful eyes is undoubted by all those who see beauty in such things, but the famous Bedfordshire Tinker whose travelling anvil I handled the other day, should

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never have suggested in "Pilgrim's Progress" that "a pearl may in a Toad's head dwell," even if the supposed jewel that it carries, or wears, there *is* its bright and beautiful eye. Shakespeare falls into grave disfavour when he refers to the Toad as being "ugly and venomous," and he perpetrates another blunder when he accuses it of "wearing a precious jewel in his head," unless he had the animal's eye in mind when writing thus in "As You Like It." The Bard of Avon, not content with jewels, ugliness, and venom, talks of this harmless creature's "poison" in "Richard III," and emphasises the venom reference again in "King Henry VI." Pope goes one better for he describes a Toad as "spitting venom," and Chatterton prefers to say: "Ye Toads, your *venom* in my footpath *spread*."

Gifford hangs, draws, and quarters our warty old friend without mercy, for in referring to one Weston, he accuses him (the said Weston) of swelling "like a filthy Toad with secret spite," and "envying the fame he cannot hope, *spits his black venom* at the dust of Pope. Reptile accursed." It is all very interesting, and savours in these more enlightened days of a fund of humour. Browning certainly ought to have known better for he has an unmerited reference to four creatures, of which only one is harmful, in his "Pied Piper," thus:—

"Creatures that do people harm—
The Mole, and Toad, and Newt, and Viper."

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That the Toad exudes a sticky secretion from its skin, for the purpose of protecting itself from enemies, is quite true, but it even ceases to do this harmless act when it realises that no danger is likely to come to it. The tongue, too, is coated with a viscous substance to enable the amphibian to more easily capture its prey, and this has given rise to many misconceptions. Gilbert White of Selborne was sorely puzzled as to the supposed venomous character of the Toad, but many extraordinary things were still believed in his day which have since been entirely exploded. Yet, it should be recognised that some good was thought of the Toad in the days of the stage coach and wind-mills, for we are told that, in White's time, the foul and apparently incurable disease of cancer was actually cured by the application of a Toad to the affected person. A curious superstition, or belief, still existent in country districts has reference to the sudden appearance of showers of Frogs, but the phenomenon is due to the fact already referred to of armies of young Frogs migrating from the pond in which they were born, and as these marches often take place in rainy or showery weather, the illusion is all the more complete.

Newts, inoffensive and sluggish creatures at all times, are not immune from these old-time fallacies, and the whole subject is brim full of interest as revealing how an animal's blameless character can be distorted. It is the way of the world to-day in human life and endeavour. A man, or woman's, good deeds are woefully, or in-

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tentionally, overlooked, and all the bad points are brought into play. Newts, or Wet Efts, as they are frequently called, are often accused (and of course wrongly) of being poisonous, and of stinging. With the welcome dawn of a new era in Nature Study we may reasonably expect to find these misleading statements gradually subsiding, but it is difficult to stamp them out when they have become so firmly rooted, and for so long a time. Personal observation and experience are the prime tests.

That fear of Newts has existed for more years than one cares to recount is proved by Shakespeare's passage in "A Midsummer Night's Dream," thus:—

“ Newts and Blind worms do no wrong,
Come not near our fairy Queen.”

They certainly would not do any wrong because they cannot! The Fairy Queen seems doomed to close association with these "dreadful creatures," for Edmund Spenser has more than a sly dig at them when he says:

“ These marishes and myrie bogs
In which the fearfull Ewftes do build their bowres.”

Needless to add, Newts need not be regarded as "fearfull," and they do not build "bowres." Spencer's use of the word "Ewftes" serves, however, a useful purpose as it shows how our modern word "Newt" has become

BRITISH AMPHIBIANS

Anglicised from the Saxon word "Efete," thus=an "Efete," an "Ewfte," an "Ewt," a "Newt."

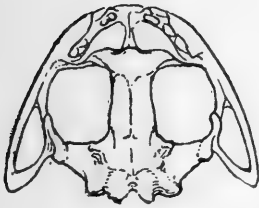
Of the belief still rife that pains in the stomach may be caused by the afflicted person having swallowed the egg of a Newt, and of cattle being made ill from a like cause, mention need only be made as showing how natural history is misunderstood and misinterpreted by the masses who know little, and care less, about the wonders of life. These silly superstitions and beliefs still obtain, but may be dismissed as being equally ridiculous with the Crocodile that sheds tears.

ORDER ECAUDATA, FAMILY RANIDÆ

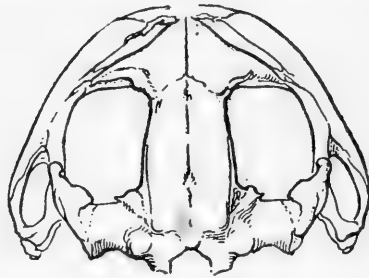
Common Frog. — *Rana temporaria* (Figs. 9 to 18). This familiar creature is known to country dwellers in its various stages of existence from egg to tadpole, and from tadpole to the perfect little amphibian. In spite, however, of the wonderful life-cycle being performed, as it were, before our own eyes, one is bound to admit that it is this very familiarity that breeds contempt. The Frog's general unpopularity is, nevertheless, difficult to explain, for lovers of wild nature should be able to appreciate the lower as well as the higher forms of creation, and to judge each accordingly. The bird which sings from the elm-tree top, perchance that master-

COMMON FROG

musician, the Thrush, inspires us with hope afresh and captivates the ear. The majestic sweep of a Buzzard in ever-widening circles, or the love-flight of the Skylark, cannot fail to hold one entranced, but these creatures of the lowly earth, especially if they glide, creep, crawl, or hop, are looked upon with disdain. It is indeed a poser for which I cannot suggest an explanation. The Common Frog is well distributed, and there are few



Skull of
Common Frog.
Fig 18.



Skull of
Common Toad
Fig 19.

ponds, ditches, and other water courses in Spring that are unfrequented by it. At other times it resorts to lush meadows and shady places, though there is no telling the curious situations in which it may be found. In Winter it hibernates, seeking any retreat likely to serve it best, and in Autumn it puts on a surplus supply of fat to tide it over its fast. The males and females make their way to their breeding quarters in March, sometimes earlier or later according to the season, and after mating the eggs are deposited in the water. At first they sink

BRITISH AMPHIBIANS

to the bottom, but as the gelatinous substance with which they are surrounded begins to swell, and thus becomes lighter and more buoyant, the mass of spawn rises to the surface where the warmth of the sun, with the gracious influence of light and air, helps to complete the hatching process. As soon as the dark chocolate-coloured tadpole emerges (and the egg can easily be observed changing shape within the transparent jelly-sphere), it is the owner of external gills, and a fringed sucker on the under part of the head enables it for a time to cling to any surrounding object. In due course the external gills are exchanged for internal ones, and the sucker is discarded, there being no further use for it. The head becomes bull-dog like, the mouth is formed, and the hind limbs appear. The front pair of limbs poke through last of all as, until they emerge, they remain hidden within the gill-chambers. After several weeks, the internal gills disappear, lungs are formed, and the tadpole comes to the water-surface to take in air. It is a vegetarian in diet up to now, but there comes a time when it seems to lose its appetite, and perhaps there is small wonder for this when one realises the wonderful changes taking place both within and without. The tail becomes shorter, the mouth widens, the lip-frills wither, the horny jaws disappear, the eyes pierce the skin, the front pair of legs poke through, and these things completed, the tadpole commences to feed again. But, meanwhile, it has ceased to be a vegetarian, indeed has developed the ways of a cannibal, as it will readily

COMMON AND EDIBLE FROGS

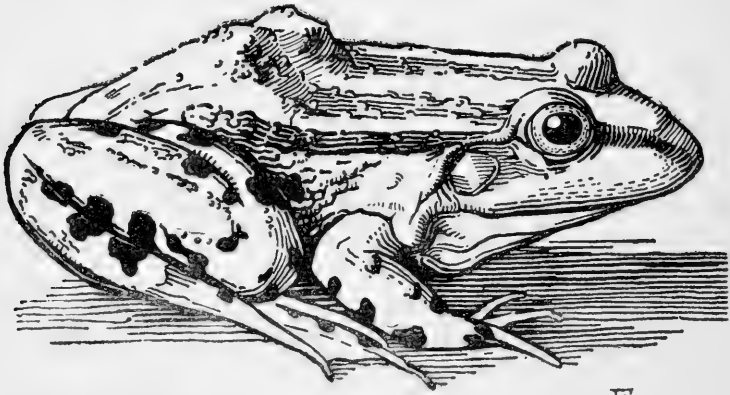
consume other tadpoles. If these are not procurable, it will take other animal food, and as it pursues its busy life it is all the time evolving into a perfect little Frog, a familiar enough object to all. Its metamorphosis complete, the young Frog leaves its watery home equipped for the great struggle in which on land, as in the water, it is about to play its part. The food of the adult Frog consists of earth worms, insects, slugs, snails, and other creatures. It does a great amount of good, and is a gardener's friend. The present species is some shade of brown on the upper parts, spotted with darker colour, but the males may be known by having yellowish-white below, and the females orange. The colour varies a good deal in even the same locality, but in a different environment, and light and dark specimens are frequently found not far apart. The length acquired is about three inches. The male is much the smaller of the two sexes.

The pleasant croaking noise made by the Frog, especially during the spawning season, is quite a rural feature, though I have seen a number of people look up *aloft* to discover the cause of the unfamiliar chorus. One need only mention in conclusion its remarkable hopping feats, and its great ability as a swimmer.

Edible Frog. — *Rana esculenta* (Fig. 20). Although this species is stated by a well-known authority to be "common in England" (particularly in Cambridgeshire and Norfolk), it is a fact that I have met many naturalists who have never encountered it during their outdoor

BRITISH AMPHIBIANS

wanderings. I cannot think it is nearly so well distributed as *Rana temporaria*, but it may be that, unless closely examined, some confusion between these two species occurs. It is certainly most common in the Eastern Counties. The Edible Frog is much more fond of water than its commoner relative, and its chief characteristics are "the pointed tips of the toes, smooth under-surface of the body, a broad glandular fold along the sides, and the marbling of the thighs." The hind



Edible Frog

Fig 20

feet are completely webbed (those of the Common Frog are only partly so), and the male has a conspicuous globular sac on either side of the head. This is the external vocal apparatus with which it croaks. It has a louder and more musical note than that of its cousin. The colour is subject to considerable variation. The upper parts may be bronze-brown, greenish, or olive, with spots or marbling of black, or dark brown. There are conspicuous light stripes along the back. The under

COMMON TOAD

parts are smooth, whilst the upper bear a few excrescences. The male may also be distinguished by having a grey pad on the inner side of the first finger. The food resembles that given for *Rana temporaria*, and it swims like that despised amphibian with the hind legs only.

FAMILY BUFONIDÆ

Common Toad. — *Bufo vulgaris* (Fig. 21). Belonging to a different genus, the Toad is probably more



Common Toad.

Fig 21.

despised than the Frog, its more sluggish disposition, warty skin, sticky secretion, and general unkempt appearance (at least it is thus regarded), all add to its unpopularity. It is not such a familiar object as the

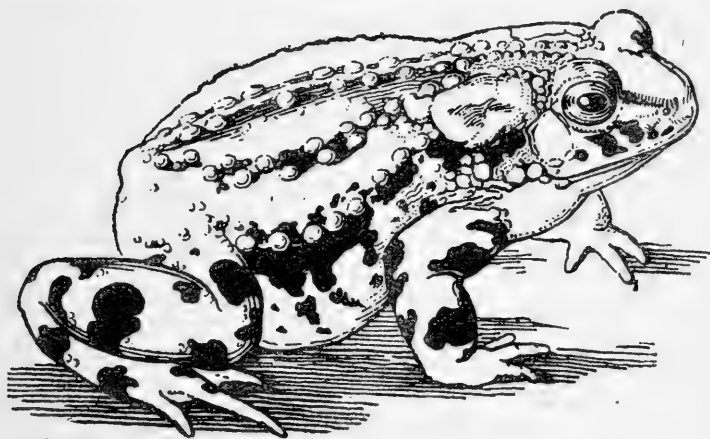
BRITISH AMPHIBIANS

Frog, and is often found in dry situations. It delights to hide under a rock, stone, or outhouse, and a quarry is a very favourite retreat. It makes its way to its spawning ground later than *Rana temporaria*, and the Cuckoo and Nightingale have usually arrived from overseas ere *Bufo vulgaris* repairs to its favourite breeding haunt. The eggs, as has already been mentioned in the introductory notes, are laid in strings, not in closely packed masses as with the Frog, and there is a double row of the dark eggs enclosed within the jelly-like substance. The metamorphosis resembles that of the Frog, and need not be repeated. The same remark applies to the food. Toads, unlike Frogs, do not possess any teeth. They have stumpier and heavier limbs, placed further forward than in the more active amphibians last described. As a matter of fact, *Bufo vulgaris* has cumbersome powers of locomotion, and often loses its equilibrium when negotiating rough ground. Being less adapted for quick movement, cover is taken whenever necessity demands, but the Toad does not appear to have many natural enemies, and is fairly immune from attack.

Although the Toad is dirty looking, it is not, in reality, an unclean creature as it changes its attire every few weeks, and even has a use for this, as it swallows it out of the way. The colour does not vary to any appreciable extent, some shade of brown predominating above, with whitish beneath. The presence of warts on the skin at once distinguishes it from a Frog, but in spite of this, confusion is still rife. It attains a length of about

NATTERJACK TOAD

five inches, and its squat appearance, thick body, large head, flat crown, wide mouth, and unforked tongue are features of interest. A friendly Toad in a garden or greenhouse may be looked upon as a useful servant at all times, and once it has taken up its abode and all goes well, the interesting animal will remain thereabouts for quite a lengthy period. If there is a scarcity of water, it will take up its quarters in a drain, or ground-sink.



Natterjack Toad.

Fig 22.

Natterjack Toad.—*Bufo calamita* (Fig. 22). Of local distribution, the Natterjack is of much smaller dimensions than *Bufo vulgaris*, and may be recognised by its greenish colour, and the possession of a yellow stripe along the back. The light underparts are generally spotted with black. It has more projecting eyes, and both sexes resemble one another in size, but the male has brushes on the fingers. It is a more active species than its more familiar cousin, and can move a good deal

BRITISH AMPHIBIANS

faster on the ground. The Natterjack is more independent of water than its relatives, only resorting to it for spawning purposes.

ORDER CAUDATA, FAMILY SALAMANDRIDÆ

Smooth Newt. — *Triton vulgaris* (Figs. 23 and 24). This is the most familiar British species, and there are few ponds which do not contain examples during Spring and Summer. Newts produce their eggs later than Frogs and Toads, May and June being the months usually selected. The Smooth Newt occurs in Ireland, as well as on the mainland, and differs from the two following species by depositing several eggs—from four to six—in a string. These are attached to the roots of aquatic plants at the bed of the water, whereas the eggs of the Palmated and Great Water Newts are wrapped singly in a leaf as mentioned in the introduction to this section. Newt-tadpoles may be known by having a couple of black stripes along the back, but in the case of *Triton vulgaris* the tadpole is distinguished by a number of yellow dots. Contrary to the development of Frog and Toad tadpoles, those of Newts produce the front pair of legs previous to the advent of the hind ones, an exactly reverse action. The latter do not appear for several weeks after the advent of the front pair, and it takes some

SMOOTH NEWT

months before the young Newt is ready to crawl from its watery home. It then becomes a land-lubber for three years, but on reaching maturity during the fourth year, it returns to the water for some three months each year for the purpose of helping to carry on the destiny of its race. Earthworms, insects, molluscs, tadpoles, and various water creatures are devoured, and to observe a Newt seizing its food is an apt illustration of how an



Fig 23

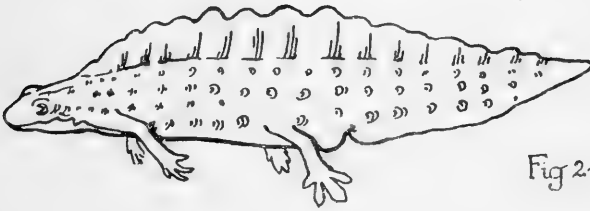


Fig 24

Smooth Newt.
female & male.

otherwise slow-moving animal can, if needs be, get a move-on when occasion demands. The Smooth Newt is so-called because of the clearness of its skin. It is brownish-grey above, with lines of black spots, which are also present on the crest of the male. The yellow colouring below is relieved with spots of black, the male being more distinctly ornamented than his mate. The male has a red edging on the tail, whereas that of the female is orange, and the former has a stripe of blue

BRITISH AMPHIBIANS

along the side of his prominent caudal appendage. The length obtained is about $3\frac{1}{4}$ inches. The female slightly exceeds this measurement.

Palmated Newt.—*Triton palmatus* (Figs. 25 and 26). Also known as the Webbed Newt by reason of the webbed toes of the male. It is the rarest of the three British species, and although it is found in Scotland, it is absent from Ireland. In haunts, breeding season, food, and habits it closely resembles others of its race, though a single egg is separately deposited in a green envelope made by forming a sheath from the leaf of an aquatic plant. This tailed amphibian as it may be called is, like its two other relatives, of nocturnal habits, resting by day, feeding by night. It is very tenacious, and if frozen under, or even in the ice, emerges none the worse for its adventure. If, too, during prolonged drought their breeding pond becomes dried up, they have the power of sustaining life until such time as rain or flood rescues them from their muddy bed. What perhaps is still more remarkable, they have the habit of reproducing a limb if one, or more, should be lost. In Newts there is no actual union between the male and female, as the latter seizes the receptacles containing the spermatozoa produced by the male, and transfers them to her own reproductive chamber. In swimming, Newts make free use of the all-important tail, hence its full development and retention all through life. The dress is brown, or olive above, spotted with darker colour on the body, and streaked on the head. The under parts, if an orange

PALMATED AND GREAT WATER NEWTS

line dividing the upper from the lower parts is excepted, are uncoloured. If any markings are present, they will be a few small dots of blackish. The male has this latter colour also on the back part of the crest, and its hind feet are the same. On the under part of the crest the male is bluish-grey, and the female orange. After shedding its skin frequently, the Palmated Newt, as with its congeners, comes to land, when it assumes a much more

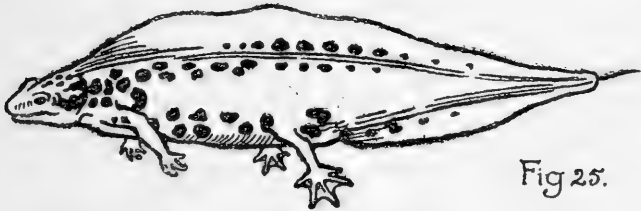


Fig 25.



Fig 26.

Palmated Newt.
male & female.

sombre hue. It is during the breeding season that these amphibians are seen at their best, both in regard to marking and ornate crest. The length of the Palmated Newt rarely exceeds 3 inches.

Great Water Newt.—*Triton cristatus* (Figs. 27 and 28). Also called Crested, Great Crested, and Great Warty Newt. It is easily the largest species of the three found in Britain, attaining a length of 5 to 6 inches, though the female often exceeds this, and is the larger of the two.

BRITISH AMPHIBIANS

It spends about a fourth of the year in water, and during hibernation several adults—evidently firm believers in the old motto that “union is strength”—may be found clinging together. The young, however, seem to prefer solitary confinement, passing the torpid state in any convenient retreat out of harm’s way.

Newts, it should be noted, never seize their prey unless it is in motion, and in capturing same they display, as has already been noted, very considerable agility and cleverness. They have four fingers on each of the front pair of limbs, and five toes on each of the hind ones. They possess moveable eyelids, palatal teeth as well as in the jaws, and *flat* tails. This latter in spite of the fact that they are cousins of the well-known *Salamanders* which have *round* extremities.

The serrated dorsal crest of the male Great Water Newt is a characteristic feature, and many specimens of this large species fall a prey to the young angler in Spring when, without hook or even bent pin, these creatures are caught by line and worm only, as once a Newt has firmly seized the tempting bait, it can easily be pulled ashore. The poor captives are often confined in small glass bottles which are all light and no shade, and they must often experience a sad time of it unless, as happens, they can at a favourable opportunity make good their escape. It seems strange that those of us who are always on the look-out for these things rarely come across Newts in their hibernating quarters, or making their way to or from the water. Occasionally

GREAT WATER NEWT

one is encountered, but being so much less social at breeding time than Frogs and Toads, it is only to be expected that introductions to them (except in water) are few and far between. Blackish, brown, or olive, with dark spots, is the colouration above. There are white spots on the sides, and the orange under parts bear spots of black, or marblings. The dorsal crest of



Fig 27.



Fig 28

Great Water Newt,
male & female.

the male has already been mentioned, but it remains to be stated that in this sex the head is marbled with black and white in Spring, and the tail is relieved with a band of silver-colour along the sides. The female's appendage is orange without any markings. The yellow toes are ringed with black, and the toes of the hind limbs are free and not webbed. The skin is warty, and the crest is carried well over the back, being highest in the centre. The serrated edge is a prominent feature.

III. *CLASS PISCES*, OR FISHES—FRESH-WATER
FISHES

Introduction.—If Reptiles and Amphibians are difficult to study *in their own homes*, Fishes are more so, even if the vast array of these creatures inhabiting the mighty deep are left out of account, and attention is merely given to the species occurring in fresh-water. It is quite true that, thanks to the opportunity of studying their forms and habits at various Biological Stations, or in Zoological Collections, a good deal of information may be obtained. The angler, too, is able to impart a certain amount of useful information, also the ichthyologist (as the student of fishes is called) builds up for us a great deal of data by examining, comparing, and reporting upon specimens in museums. He is able, too, to note their habits in their own haunts, but with certain limitations.

The great importance of fishes in the food-supply of the world need only be mentioned in passing, and whilst it is not within our province to treat of marine representatives of the finny tribe, it should be noted that several species of fresh-water fishes are quite suitable

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for the table. The remains of fish-ponds dating from manorial and monastic days go to prove that fresh-water fishes and their consumption were more popular in those times than they are to-day. Of the anatomy of fishes it is not proposed to write at any length. The general appearance of a fish's body is familiar enough to young and old alike, and it will be agreed how well fashioned they are for the life they lead. Some, it is true, are less prepossessing than others. Some are quite good-looking, others are very much the reverse. Some are fast swimmers and expert hunters, others are of sluggish disposition, and seem resolved at all times to exert themselves as little as possible. Some delight to dwell in a shallow clear-running stream, others are only found in deep still pools where it is difficult to follow them in their home life. Some revel in a pond or stream where there is a profusion of mud, others much prefer a clean gravelly bed upon which to disport themselves. Some are rarely found far away from water containing an abundant supply of weeds actually growing in the environment, others are not averse to showing themselves in open situations well away from cover. Some species flourish in a stagnant pool (where there is nevertheless an abundant food-supply), some are quite out of their element except in a fast-flowing stream or river, others seem equally well at home in either. Some appear to congregate more near an outlet to the sea, such as an estuary, others seem to prefer a land-locked mountain tarn, so high up and so far away from any

BRITISH FRESH-WATER FISHES

source of supply that one wonders how, unless artificially introduced, they ever came to be there. Some are discovered in waters that, unless in flood or spate, are often almost dried up, or in inaccessible pools; others are found inhabiting dykes, ditches, small water courses, and other unlikely places. The distribution of fresh-water fishes, and their likes and dislikes, are extremely interesting, and so one might continue the fascinating story. Some, let it be noted, keep at the bed of the water, others are surface-lovers, and rarely condescend to go to the bottom unless for spawning purposes. Some are of solitary disposition, others appear to find it imperative, or rather essential, to adopt "shoaling" habits.

Fishes deposit eggs, but this is not true of them all as, in one of the Museums at Cambridge (and doubtless elsewhere), there is a very wonderful specimen of a small Roach-like fish (although I believe it is a marine species), showing the female carrying her own young, packed inside her body like the proverbial "Sardines in a tin!" A viviparous fish is surely an intensely interesting creature, and whilst they are all of supreme interest in their various capacities, this one in particular must be singled out for special mention. As a rule, however, eggs are laid. These may be found among gravel, mud, or rocks, or placed upon water plants. After the female has produced her eggs (and she deposits an abundance of them so as to guard against accidents, enemies, and waste), the male passes over them for

INTRODUCTION

fertilising purposes. This accomplished, no further heed is paid to what happens, and fishes seem to resemble insects in this respect. Exception must be made, however, in the case of that plucky little "soldier," the Stickleback, who not only builds a nest, but jealously guards it and his wife against invasion. It is a notable exception of great interest, and will be referred to later when the life-story of this favourite species is being unfolded.

Of the external appearance of a fish it need only be said here that, whilst some have large scales—like the Roach and Rudd—others bear very small ones—like the bottom-loving Gudgeon—and others again—like the Eel and Tench—are practically scaleless as compared with their heavily-plated brethren. The tapering body, that is, having the head and hind quarters narrower and more torpedo-shaped than the deeper central parts, is well known, and its use in permitting the owner to propel itself through the water with the least resistance is equally familiar. Not that all our fishes are thus shaped, for the Eel and Lamprey are snake-like in appearance, and certain marine species are far different in form, but the typical example will serve our purpose. The body bears upon it fins equivalent to the limbs possessed by a quadruped, or the wings and legs of a bird. If we take that voracious and social fresh-water inhabitant, the Perch, as a basis for explanation, we find that along the back it has two fins, the one in front being called the first dorsal, and the one immediately behind is the second

BRITISH FRESH-WATER FISHES

dorsal. The tail bears the caudal fin. On the lower part of the body there is the pectoral fin behind the hind portion of the gill-covers, the ventral fin is right at the base of the belly, and the anal fin is situate where the body perceptibly narrows towards the tail. The position of these fins varies in certain kinds of fishes, and this will be referred to when we are considering our own fresh-water species individually, but it will be as well to set out the uses of the fins just described. I have not read a better account of these than appears in one of Mr. W. J. Gordon's useful Handbooks, and I feel sure he will allow me to repeat what he has written in his excellent book "Our Country's Fishes." Mr. Gordon says: "The caudal fin is the fish's main propeller, with the paired fins he retains his trim, and the dorsal and anal he uses as a keel to keep him straight on his course. With his tail he does most of his steering, but he brings in his pectorals to help him. A stroke of the tail to starboard and a stroke or two with the starboard pectoral, with the port pectoral held against the body, sends his head to port; a stroke of the tail to port with a stroke or two of the port pectoral, and the starboard pectoral held in, sends him round to starboard; in fact the pectoral thrown out of action serves as a pivot on which he turns. Cut off a pectoral and he falls on the opposite side; cut off both and his head sinks; cut off all his fins and he capsizes, owing to his upper half being the heavier."

Some fishes have the eyes to the left, others to the right.

INTRODUCTION

Some possess barbules (as in the Barbel), others have none. Some have jaws alike on both sides, others are not alike, the mouth being situate at the end of the snout, or the snout protrudes beyond the mouth. Some have spines (as in the Sticklebacks), many, if not most, are spineless. Some have teeth, others are toothless. Some have horizontal bodies, in others the body is vertical. Some have the upper and lower sections of the tail equal, others have the tail uneven, one lobe being larger than the other. Some have a cylindrical form, others (as in the Flat Fishes, such as the Plaice), have the body flat and unsymmetrical.

Of the variety of colour and markings it is not possible to enlarge, nor of the many other features of interest regarding the external differences that exist in even our comparatively few fresh-water species. The examples that have been given will be amply sufficient to reveal the interest to be obtained from a study of these tenants of our lakes, lochs, streams, rivers, brooks, burns, and ponds, and when it is stated that in one item at least they are certainly all alike, namely, in the possession of a *vertebræ*, or skeleton, we must pass on.

The angler soon discovers that some fishes are shy and retiring, but that others are bold and pugnacious. Some are ravenous feeders, others are very fastidious in regard to their diet, and manner of procuring same. Some are tender-mouthed, others have strong jaws which, although sadly interfered with on occasions, does not seem to unduly upset the finny owner.

BRITISH FRESH-WATER FISHES

The illustrations accompanying the history of the Trout (Figs. 33 to 36) will convey a better impression than any written description of the life-cycle of a fish, and it may be taken as a typical example of many, if not most, of them. Reference should be made to the above illustrations, and also to the notes upon the Trout on page 67.

Fishes obtain oxygen from the air dissolved in the water, by means of internal gills, but it should be pointed out that all creatures that live in water, although vertebrates, like fishes, do not belong to the finny tribe. The Whale and Seal need only be mentioned as examples of these, both, of course, being mammals and not fishes.

For lessons on the geographical distribution of fishes the reader must be referred to a larger treatise than this popular little volume pretends to be, but a few words must be written, by way of concluding this introduction, as to what constitutes a fresh-water species. It does not follow that because the familiar Stickleback is found in a wayside streamlet, so tiny that one can leap across it, that it does not also inhabit the sea. The reverse is also true, namely, it does not follow that because the Shark is found in the sea that it also occurs in fresh water. The fact is some kinds of fishes are equally well at home in fresh or salt water, and the same species is also found occupying both territories. Then again there are exclusive fresh-water dwellers, as there are exclusive sea-water dwellers, and there are again others, like the Salmon, which spawns in fresh water, and others,

RIVER LAMPREY

like the Eel, which goes to its ancestral home, the sea, to perform that all-important operation.

Mr. C. Tate Regan, M.A., gives a list of 23 species of fresh-water fishes that are peculiar to the British Isles. Of these no less than 15 of the 23 species belong to the Char kind, and Char, as Mr. Tate Regan says, "are essentially fishes of mountain lakes, which are usually deep and cold; in our islands they are found in Scotland, Ireland, the Lake District of England, and North Wales, in fact in all parts where there are suitable lakes."

For the purpose of this book it has been thought best to include those kinds of fishes with which the average individual is likely to come into contact, and as to which the general reader requires information, but we have stretched a point in including those familiar species which, like the Eel and Salmon already referred to, pass part of their time in fresh-water and part in salt.

Thirty-two species await attention, and these may now be dealt with.

River Lamprey.--*Lampetra fluviatilis* (Fig. 29). The name Lamprey is derived from an old Latin word *Lampreda* which is corrupted from a more ancient word *Lampetra*, from *lambere*, to lick, and *petra*, a stone. It is also called Nine-Eyes and Stone-Eel, the former from its eye, nasal slit, and seven gill-openings, and the latter because of its habit of attaching itself to stones. This small eel-shaped fish, the possessor of a long tongue, with a rasp attached to it which enables it to rip other fishes to pieces so as to feed upon their flesh, is

BRITISH FRESH-WATER FISHES

silvery-white in colour, with bluish or greenish on the back. It attains a maximum length of about 16 inches, and is a common inhabitant of many of our larger rivers, especially the Severn. It has only one nasal opening, but makes up for this by having seven small gill-slits on either side of the body at the back of the eye. There are no fins along the front two-thirds of the body-length, and even then only a small, succeeded by a larger one, is present on the back, and the pointed tail is more or less finned above and below. Lampreys possess a sucking disc, and with this they attach themselves to their prey. It seems agreed that they belong to a very low type of animal life, but in spite of this their metamorphosis is most interesting, and we have a good deal to learn respecting them. Some individuals appear to spend their whole time in fresh water, others proceed to the sea, ascending rivers, like the Salmon, for spawning. This latter event happens in Autumn or Winter, and the Lamperns, as they are also called, gradually make their way nearer the source of rivers until they have travelled so far that only small tributaries of the main artery are occupied. They delight in a gravelly bed, and are of social habits, for little companies of thirty or forty assemble together in Spring and early Summer. Although so low in the scale of life, Lampreys construct a "nest," and it is interesting to note that several pairs will share the one abode. Their ideas on co-operation are, to say the least, put to a very practical test. A word should be written as to the "nest" as it merely consists

RIVER LAMPREY

of a little pit hollowed out of the bed of the river. Both sexes help in its construction, and by the aid of their suckers these industrious builders fasten upon and remove stones both up and down stream. When the female has deposited her eggs in the nest, they are covered with a sticky secretion which fastens them



River Lamprey

Fig 29

together, and in addition, stones are removed from above the receptacle so that sand is carried by the flow of the water towards the abode, and some of this settles upon and helps to more securely cover the eggs, the lower part having been banked up with stones previously removed. After the young have passed through their



Planer's Lamprey

Fig 30

various stages, some descend to the sea, but in some rivers, and in my favourite Scottish Loch, Loch Lomond, many never leave its precious shores. I could wish that I myself was similarly favoured. They thus number among them migratory individuals and permanent residents. In addition to attaching themselves to, and feeding upon, the bodies of other fishes, Lampreys are

BRITISH FRESH-WATER FISHES

also stated to partake of insects and worms. The manner of propulsion through the water reminds one of the movements of an Eel, and like that fish, the present species and its cousin to follow, are very tenacious, and will live for quite a long period out of their native element. In olden days a dish of Lampreys was considered a great delicacy, but to-day this interesting tenant of our rivers is mostly used as bait for other fishes.

Brook, or Planer's Lamprey.—*Lampetra planeri* (Fig. 30). The larval form of the Lamprey is known as the Pride. It has no teeth, but on the front of the mouth there is a fringe of barbules which serves the purpose of a sieve for sifting food. It resides in a tube, and although open at one end, the inhabitant works its way further in if danger threatens. This larval state of existence lasts for three or four years, and it is not until the creature has attained a length of several inches that the adult form is reached.

Planer's Lamprey does not grow to a greater length than 8 inches, and haunts smaller streams than *Lampetra fluviatilis*. Moreover, it restricts itself entirely to fresh water, and does not migrate to the sea. It is well distributed in our smaller waterways, and extends to Scotland, and is common in Ireland.

In general appearance this second species (there is a third species, the Sea Lamprey, *Petromyzon marinus*, which enters fresh water to spawn, and is a much larger fish, attaining a maximum length of 36 inches), is dis-

SALMON

tinguished from the first-mentioned by having blunter teeth, a more pronounced fringe at the edge of the suctorial disc, and more continuous dorsal fins. In other respects it resembles its congener, and it may be mentioned in conclusion that, after the all-important time of spawning is at an end, Lampreys, as with Eels, emaciate and die.

Salmon. — *Salmo salar* (Fig. 31). Has obtained its generic name of *Salmo* from the root of another Latin word meaning—to leap, in reference to its well-known habit of leaping falls, or weirs, when ascending rivers to spawn. During the years that it is passing through various stages, and according also to the processes it undergoes, the Salmon is known by several different names, and it will be as well to give a list of these in the order in which they are conferred :—

1. An Alevin. The Fry, or young fish, when first hatched.
2. A Parr. When a few months old. From the old English parren, to enclose, in reference to the marks on the sides resembling the bars of a fence.
3. A Smolt. When it first visits the sea. Derived from an old English word, meaning shining, in reference to the dress.
4. A Grilse, or Peal. When it first returns *from* the sea.

BRITISH FRESH-WATER FISHES

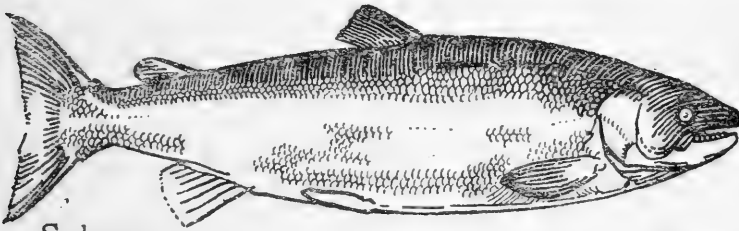
5. A Salmon. When it returns for *the second time from* the sea.
6. A Kelt, or Slat. A Salmon that has spawned.
7. A Kipper. A male Salmon.
8. A Grilse-Kelt. When the fish spawned as a Grilse.

The Chars and Trouts belong to the same genus as the Salmon, and although a number of different kinds are now recognised as occurring in various British waters, it is impossible to include them all in this book, or to discuss the differences between them. Suffice it to say that the Salmon is well entitled to be called the King of British Fishes, for it undoubtedly affords the finest sport to the angler, and attains the largest size of any fresh-water inhabitant. It ascends rivers for the purpose of spawning, and there remains for several months. It overcomes obstacles met with during its up-river progress with amazing cleverness, leaping falls and weirs with comparative ease, and never giving in until all efforts to clear the obstacle have failed. If watch is kept, the fish will be seen to make the attempt on several occasions.

It is a great sight to watch a Grilse or Salmon returning to its home-waters from the sea, as when the river is in suitable condition for the ascent to be made, great activity prevails, and a large number of big fish may be observed. During a visit I paid to the upper reaches of the beautiful North Tyne River in the Autumn of 1921,

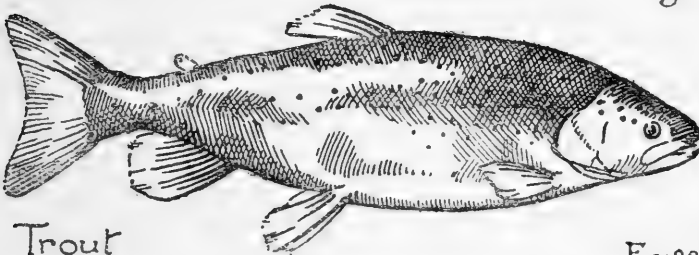
SALMON

and again in 1922, over 300 fine Salmon were caught at one spot in a fortnight, but at another part of the same river no less than 370 large fish were netted from one deep pool at the first cast of the net. Does this constitute a record? A friend of mine tells me that he has caught a Salmon with rod and line on April 1st, and he actually landed a 15 pounder on the morning of his 72nd birthday.



Salmon

Fig 31



Trout

Fig 32

The same keen and accurate observer has identified over 130 different species of birds from his study window, including several rare birds of unsurpassed interest. Salmon deposit their spawn among gravel, and will seek out and lay up in deep burns for this all-important operation. They become very lethargic at such time, and let it be said here that, when in fresh water, Salmon (except in the Parr state), do not feed. They make up

BRITISH FRESH-WATER FISHES

for their fast when they go down to the sea, especially between the stages of Smolt and Grilse, and Grilse and Salmon. Once having reached the sea it is an oceanic wanderer, visiting the North Atlantic and elsewhere, and feeding upon herrings, mackerel, sand-eels, and other fish. The young prey upon fresh-water shrimps, insects, and other aquatic creatures. It is stated that the ova (or eggs) will not develop in salt water, hence the visits of this species to fresh rivers, and it has been proved that it is possible for *Salmo salar* to pass the whole of its life, from birth to death, in fresh water. The alevins, or fry, are hatched about March, and at first the contents of the yolk-sac, carried on the under part of the body, are sufficient to keep them going, as is also the case with their cousin, the Trout, shown in Fig. 32. After a Kelt has spawned it is in a weak condition, but has perforce to make its way to the sea. It is also subject to more than one disease. Thus weakened, it falls an easy prey to human as well as natural enemies, and many never reach the sea at all. The descent to the sea usually takes place in early Summer, sometimes earlier or later, according to the favourability of the season. It is not possible to enter into detailed descriptions of the appearance of the fish during each stage of its evolution, and it must suffice if reference is made to the beautiful silver coat of the adult Salmon, and the fine pink or red colour of its flesh. This latter is due to the storage of extra oxygen. The record weight for an adult British specimen seems to be 70 pounds, from the River

SALMON AND TROUT

Tay in Scotland, and it is interesting to note that, as recently as October, 1922, a 64 pounder was caught in the same river by Miss J. Ballantine who had to play her fish for nearly two hours. The previous record for a Salmon caught in Scotland by a lady was the 47 pounder taken from the River Spey by Miss Phyllis Spender Clay. My friend Lord Lytton, now Governor-General of Bombay, and a great lover of Nature, once gave me a graphic description of a large Salmon which he hooked in Norway, but which, after he had played it *all day*, he eventually lost towards evening after several hour's hard work. The line, running for so long a time between his fingers, severed the flesh to the bone, and after such an ordeal I am sure the reader will agree that the distinguished angler-statesman deserved a better reward for his labour.

Trout.—*Salmo trutta* (Fig. 32). When it is stated that one well-known authority includes no less than twenty or more so-called species of Trout as occurring in British waters, the reader will recognise the difficulties with which an author is confronted in a popular book of this kind. Of the making of species there seems to be no end, and we have little, or no, patience with those who never seem happier than when turning a variety into a species for no apparent reason worth considering. Lists, after all, are poor compensations for life-histories, and the complete story of no one animal or plant has yet been told. Sir Robert Ball once said that "a whole lifetime devoted to the study of the Common Daisy would

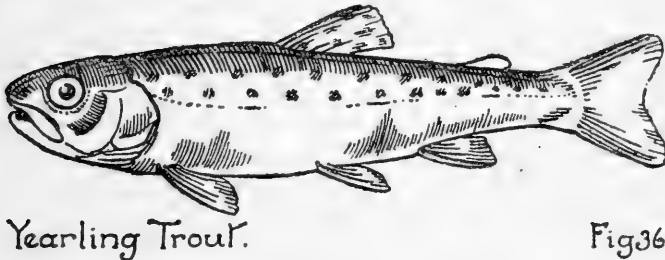
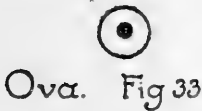
BRITISH FRESH-WATER FISHES

be insufficient to reveal all the mysteries of its life.” The noted astronomer was right, and if those who are so fond of manufacturing *species* would take his dictum to heart, it would be all the better for Natural History, and would not deter the many from taking an interest because of the high falutin’ of the privileged few. A Trout is a Trout, and whilst in our own rivers, ponds, lakes, lochs, streams, and brooks this favourite game-fish does exhibit great variety in colour, marking, and size, it is its life-history we wish to consider, and we can afford to leave the question above mentioned to those whose quest does not, by its very nature, take them to where the wind whispers beneath the pliant willows, and the Kingfisher—like a bolt from the blue—flashes past for one wonderful moment when Summer is aglow with life. There are Trout in our seas, there are Trout in our fresh waters. There are those which ascend fresh water, there are others which descend to salt. Some Trout are always found in fresh water, and whilst food, temperature, climate, light, and environment all have some, and at times very marked, effect upon these various water-dwellers, the lives they lead are very much the same, and the Trout known to us since boyhood is good enough for our study. Trout then are, above all, lovers of pure, fast-running streams. That they resort to lakes and other land-locked waters is true, and to all intents and purposes flourish there, if conditions are suitable and the food supply is plentiful. They inhabit deep as well as shallow water, for I have myself caught *Salmo trutta*

TROUT

when fishing in several feet of water in an open river swimming-bath, and I have bagged as many as ten brace of two pounders in one day from a fast-running brook across which one could almost walk dry shod ! The two largest fresh-water Trout that have passed through my hands turned the scale at 8 pounds and $7\frac{3}{4}$ pounds respectively. These were caught in the River Ivel,

Development of the Trout.



near Baldock, Hertfordshire, a few years ago. The Trout is very partial to the same haunt, and I know intimately many specimens that are always to be seen at a certain spot where they have thus remained ever since I was a boy. That they attain a ripe old age seems certain. Possessed of very quick powers of movement, the Trout keeps pretty much to the bed of its environment, and it varies in colour even in the same stream. Artificial

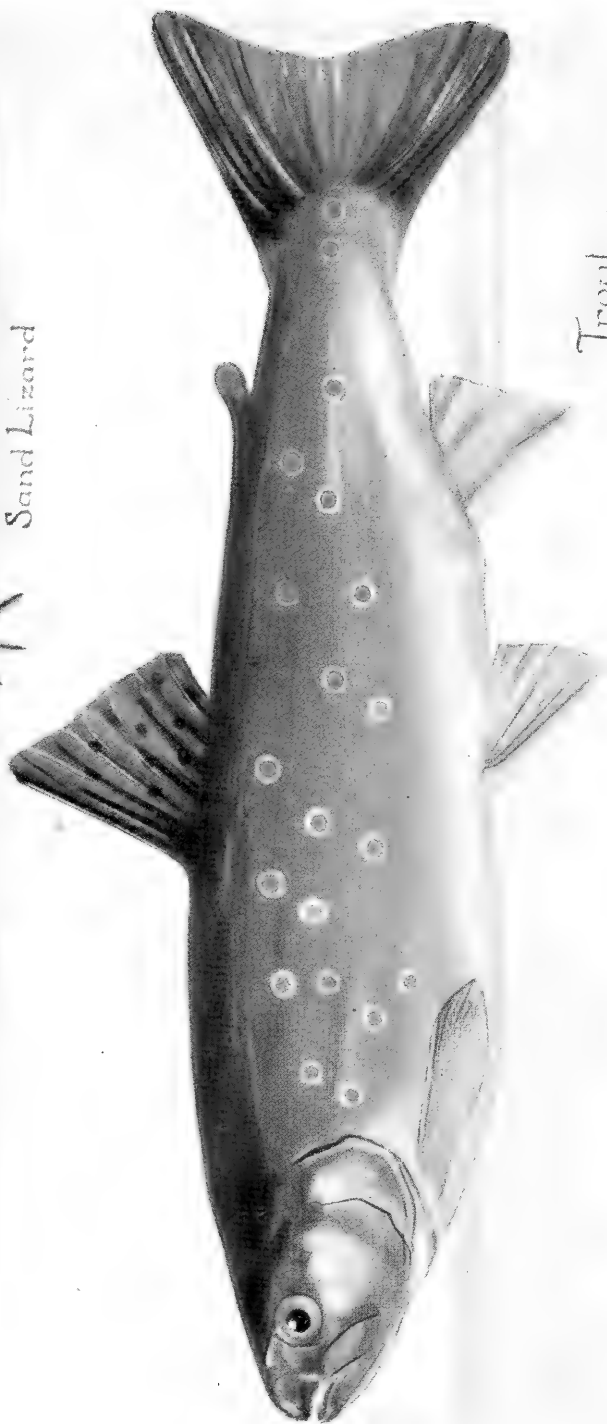
BRITISH FRESH-WATER FISHES

rearing has perhaps had something, if not a great deal, to do with this. A visit to a Trout-farm is a wonderful education in fish-culture, and may be strongly recommended to those who are unacquainted with the various stages that are passed through before the perfect little fish has celebrated its first yearly birthday. The egg, when swollen with water, is about the same size as that of the Frog, but the yolk is orange-colour, instead of chocolate, and the surrounding substance is greenish-yellow, instead of white.

Careful watch will reveal a perceptible change taking place in the centre as the orange yolk darkens, and the eyes of the little fish that is in process of development soon appear. Later, there are still further changes until, at last, the young fry, or alevin as it is called, bursts through its covering, with the yolk-sac adhering to its belly as shown in Fig. 34. The contents of this latter keep the little fellow going for some few days. Meanwhile it is experimenting with its swimming capacities, and developing in other ways. Once the reserve food is used up, however, the perfect alevin has, of necessity, to shift for itself. Numerous enemies beset it, but if it survives it commences to feed upon various water creatures, such as insects, molluscs, and shrimps. But it takes time before any perceptible increase of stature is manifest as, at a year old, the young Trout has only attained a length of a few inches. A year-old Trout is shown life-size in Fig. 36. Brook, or Burn Trout as they may be called, do not grow to any size, indeed many of them are not much



Sand Lizard



Trout

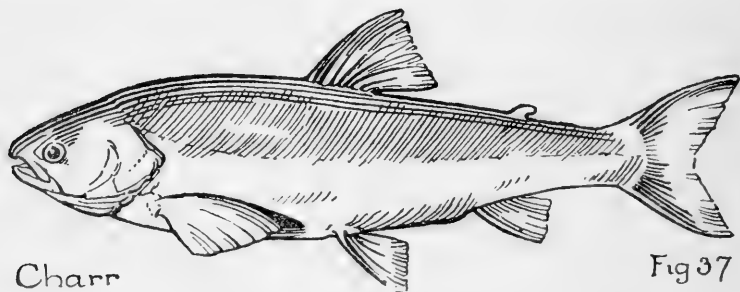
TROUT AND CHAR

larger when several years old than the one shown in Fig. 36. Of these I have caught as many as 60 in one day in a sequestered glen in the glorious Island of Arran. Although so small these little fish afford quite good sport, being strong-willed and very tenacious. As a rule, Trout spawn in late Autumn. When that wondrous episode, the rise of the Mayfly, takes place, many a cool-bellied Trout has the feast of his life. The momentary airy creatures soon fall upon the surface of the water to the dance of death, and whilst being borne downstream, wary old fish that have carried out a similar proceeding in years gone by, just wait and watch their opportunity. As long as the flight lasts the Trout have a right royal time, as also the Swallows which are also attracted to the feast. Whilst some Trout are silver, light-yellow, greenish, or even purple in ground colour, others are very dark, almost black. Others, probably old warriors who have seen their best days, take on a greyish, old-age look. The ornate spots which are found on various parts of the body, sometimes in profusion, at others only sparsely distributed, may be black, brown, or red. They also vary in shape and size. The dorsal fin is often spotted, as well as the body. The Trout has a fine array of small sharp teeth.

Char. (Fig. 37).—As has been mentioned in the introductory notes to the third section of this volume, no less than 15 so-called species of Char are claimed as British fishes. Most of these occur in deep and cold mountain lakes in Great Britain and Ireland, and it is quite im-

BRITISH FRESH-WATER FISHES

possible to do more than refer the enquirer desirous of following up the matter to a more elaborate work than this can hope to be. This is not the time or opportunity to discuss the merits, or demerits, of these different reputed species. Char belong to the Genus *Salvelinus*, and there are structural differences that mark them off from their relatives, the Salmon and Trout. Char, too, have smaller scales, red spots instead of black, brown, or red, and the name itself—Char—is indicative of the predominating colour below, as the word comes from the



Charr

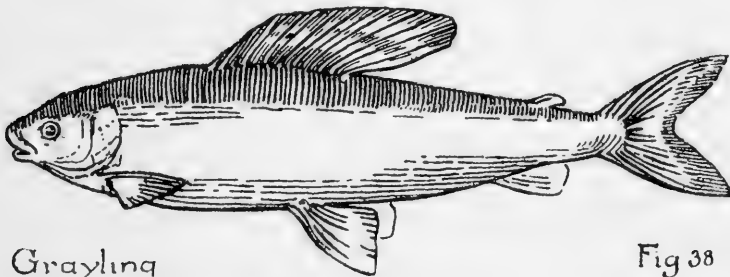
Fig 37

Celtic *cear*, meaning blood, or *ceara*, meaning red. Their distribution, and the reason for their presence in several isolated sheets of water situate at high altitudes, is as fascinating as a fairy tale, and will amply repay following up. We must not, however, be tempted to digress. Three pounds seems to be about the maximum weight attained in British waters. Spawning takes place from Autumn to Spring, a gravel bed being selected where the water is not deep. Perhaps the four most distinct species (if such they be) are the following :—

CHAR AND GRAYLING

1. Torgoch, or Welsh Char (*Salvelinus perisii*).
(Various Lakes in North Wales.)
2. Haddy, or Killin Char (*S. killinensis*). (Loch Killin, Inverness-shire.)
3. Shetland Char (*S. gracillimus*). (Loch Girlsta, near Lerwick, Shetland Isles.)
4. Gray's Char (*S. grayi*). (Lough Melvin, Fermanagh, Ireland.)

Lydekker says that "in the spawning-season the upper parts of this fish are brownish-green, and the sides lighter; the under surface passing through all shades of orange to vermilion, from the throat to the pelvic fins, where the colour attains its greatest intensity. The sides are ornamented with rounded spots varying from white to red in colour; the dorsal fin has dark markings, and the pectoral and pelvic fins are brilliant red." The form described is said to attain a length of 8 or 9 inches, but the ones found in Northern waters are much larger.



Grayling

Fig 38

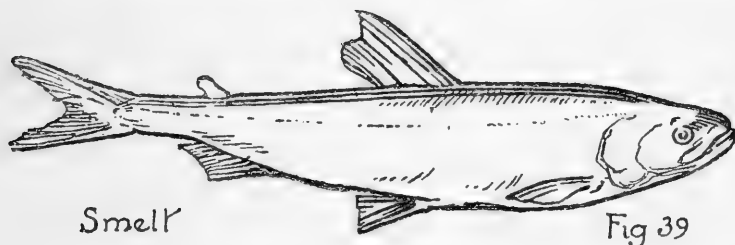
Grayling.—*Thymallus thymallus* (Fig. 38). The Grayling is of local distribution in England and Wales. It does not occur in Ireland, and has only been introduced

BRITISH FRESH-WATER FISHES

to a few parts of Southern Scotland. It claims kinship with the *Salmonidæ* Family, and the scientific name of *Thymallus*—thyme—has been conferred because of the delicate flavour of the white flesh resembling the aromatic herb mentioned. It is a beautiful silvery fish, and is characterised by the long and rounded dorsal fin, bearing from 20 to 25 rays. It has gentler habits than its cousin, the Trout, quietly searching for insects at the surface without any attempt at showing off. It revels in a clear fast-flowing stream, and whilst waters that shelter Grayling also contain Trout, all waters that hold Trout do not also hold Grayling. At times, it resorts to the shallows, but the angler knows full well that the big fish must be sought for in the deep pools. It is said to perpetrate harm by consuming the spawn of Trout, but it also takes molluscs, shrimps, the larvæ of insects, etc. It spawns from March to May on a shallow gravel-bed, the eggs being laid in a depression made by the fish. These hatch out in about fourteen days. The Grayling comes into request when the Trout is out of season, and is then much sought after by the disciple of Izaak Walton. Silvery-grey and white are the dominant colours on the sides and under parts, with greenish-brown, or purplish, along the back. The dorsal fin is barred with several rows of bluish-black spots, and as a rule there are some of these on the sides of the body. The name Grayling (it is also called the Umber) has been accorded because of the greyish colour. The maximum weight in Britain is 4 to 5 pounds.

SMELT AND EEL

Smelt.—*Osmerus eperlanus* (Fig. 39). Also known as the Sparling. This small species rarely attains a length of more than 12 inches, and 8 ounces in weight. It moves about in shoals, and is a voracious feeder. The scales are transparent, and the silver colour is relieved with olive-green along the back. The Smelt visits fresh water for spawning purposes early in the Spring, and there are a few land-locked waters where it appears to



do well all round the year. It is a valuable fish for food. It feeds upon other fishes, as well as shrimps, worms, and aquatic creatures of various kinds. The yellow eggs are shed promiscuously, and become attached to any objects with which they happen to come into contact. The eggs hatch in 7 to 21 days, and the young visit the sea for the first time when ready to look after themselves, paying their first return visit to fresh water the succeeding Spring. They commence to be egg-producers when about three years old. The word Smelt is apparently derived from the Anglo-Saxon *Smeolt*, meaning smooth and shining.

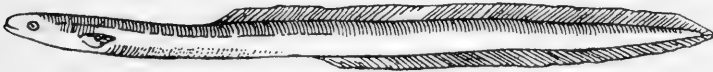
Eel.—*Anguilla vulgaris* (Fig. 40). This interesting species acts in an exactly reverse way to the Salmon, as

BRITISH FRESH-WATER FISHES

it makes its way to the deep sea for the purpose of spawning, and when that all-important operation is over the adult Eel dies. Whilst it is stated that the female exceeds the male in size (the former attaining a maximum length of 5 feet, and a maximum weight of 12 to 15 pounds, and the latter is said not to exceed more than 2 feet long), I put on record the fact that I have myself caught male Eels 3 feet in length, and on one occasion I landed a male and female within a few minutes of each other from the River Ver at St. Albans which both measured 3 feet each in length, and were about the thickness of one's wrist. Unfortunately I did not ascertain the weight. Eels will soon smash up one's tackle unless carefully handled. They bite like a Tench, the float disappearing under water in a slanting position. Directly the float is out of sight is the time to strike, and on no account should the line be slackened, or the fish will twist his snaky body round any obstacle that comes in the way. If this happens, it is only with great difficulty that the Eel can be shifted from its position, and unless the tackle used is very strong, all is over. An effort should be made to land the Eel direct, and when hooked, to keep it in clear water, and on the move. Lob worms (not too large) are a good bait. When young Eels, or Elvers as they are called, ascend our fresh waters from the sea where they were born, their numbers are legion, and in the River Ouse at St. Neots, Huntingdon, I have known them to be so numerous that they have actually dammed up the sluices, and had

EEL

to be removed wholesale before the water was freed. When they make their first appearance from the sea, the young are almost thread-like, and one imagines that it must be several years before the adult state is reached. They are often found inhabiting isolated lakes and ponds, and one wonders how, unless artificially introduced, they come to be there unless, as seems proven, they have the power of making their way overland. If this is so, it seems strange that field naturalists so seldom meet with the Eel when engaged upon such journeys. They are very fond of tenanting water that has for its bed a thick



Common Eel

Fig 40

deposit of mud, and it is stated that during Winter they remain concealed there in a torpid condition. Frozen water certainly does not affect them, indeed I have myself seen Eels taken from a solid block of ice which have at once shown signs of activity when immersed in tepid water. It is mostly a nocturnal-feeder, as is proved by the number that are caught on Eel-lines and traps put out at night. But that it also feeds during the day is evidenced by the number caught by anglers on the Norfolk Broads and elsewhere. The Eel is a ravenous feeder, and when once it is on the feed a number are likely to be secured. They are often on "the run" during, or after, a thunderstorm, the reason apparently

BRITISH FRESH-WATER FISHES

being that the disturbance caused to the water sets them wandering. One Eel has been known to travel nearly 800 miles in 93 days, the specimen in question having been marked and recaptured. Their food consists of a varied diet of aquatic birds, cray-fishes, frogs, fish, water-voles, etc.

When handled, the Eel, unlike Snakes, is very slimy to the touch, and its body is covered with small groups of minute scales. It is possessed of great tenacity, and will live for a long time out of water. When in their growing dress, these fishes are referred to as Yellow Eels, and in their breeding attire as Silver Eels. The former have brownish, greenish, or greyish on the back, with yellow on the sides and underneath. When the Yellow Eel is ready to go to the sea for spawning, it changes its under-dress to silver, the back being blackish. Both externally and internally there are other distinguishing features as between one form and the other. Many points in the life-history of this interesting species still require elucidation, and the different changes undergone by the young are still imperfectly known. Only during the last 25 years has our knowledge of the wonderful transition stages of the Eel become manifest, and much of its story is still wrapt in mystery.

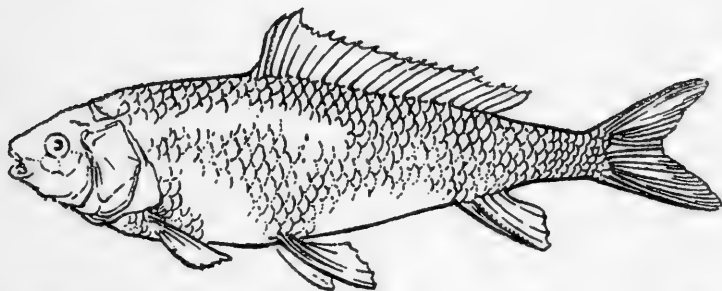
As showing that mistaken ideas still prevail regarding wild creatures, the following extract from a book by a Danish author (Carl Ewald) recently published clearly shows. The translation reads as follows :—

“ When the Eel puts his head above the mud, Mrs.
78

EEL AND COMMON CARP

Reed-Warbler exclaims, 'I can't stand that person; he's so like the Adder, who ate my little sister last year when she fell to the ground as she was learning to fly. He has the same offensive manners, and is just as slippery.' "

True the Eel *is* slippery, as has already been stated, but to compare it with the Adder in this respect is an injustice to the latter, though it is more than probable the Snake in question *is* capable of devouring Mrs. Reed-Warbler's "little sister."



Common Carp

Fig 41

Common Carp. — *Cyprinus carpio* (Fig. 41). Whilst there are three species of Carp on the British list, two species—the Common Carp and the well-known Goldfish (*Carassius auratus*)—have been introduced from China, and the third—the Crucian Carp (*Carassius vulgaris*)—is of European origin, but probably is not entitled to inclusion in our own native fauna. As my own family used to have the fishing rights in the old pool belonging to Sopwell Nunnery, I have a personal interest for mentioning that the first reference to the Carp as a British

BRITISH FRESH-WATER FISHES

species is contained in Dame Juliana Berner's "Boke of St. Albans," which was first published in 1496, and dealt with the subjects of Hawking, Hunting, and Fishing. She was an Abbess of the Nunnery in question. As will be noticed, the present species belongs to a different genus to the other two, as it has two barbels on each side of the mouth, and may be at once identified by this means.

It is an inhabitant of lakes, ponds, and rivers that are not too fast-flowing. The largest fish I am acquainted with have resided for many years in a deep pool of the River Lea near Hatfield. They delight in a muddy bottom, and even a wayside pond is likely to contain a good many specimens. These, however, will be found to be small in size owing, apparently, to the meagre food-supply. They are very hardy fish, and do well in an aquarium. The diet is made up for the most part of water-weeds, but animal food is also taken, such as insects, shrimps, worms, and the like.

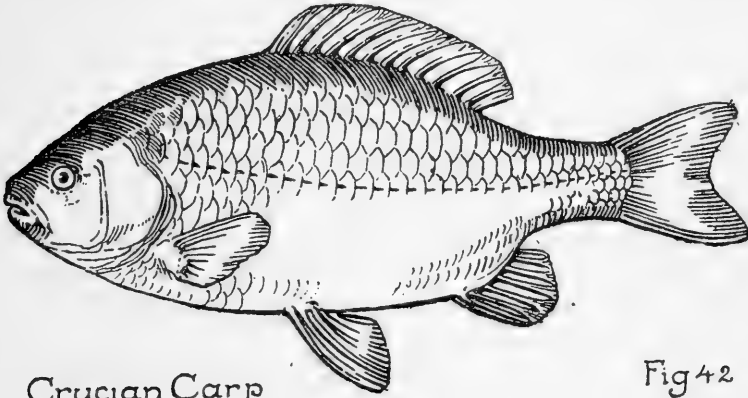
As with Eels, Carp resort to the bottom during Winter, and will pass the time huddled together with their heads just protruding from the mud. They do not feed when in this torpid condition. The adult fish are difficult to catch with rod and line, as an old Carp is a wary creature, and is not readily caught napping. Young Crucian Carp are much more easily lured.

It spawns in the early days of Summer in secluded retreats, depositing a large number of small eggs where the water is shallow, and there is a good supply of weeds.

CRUCIAN CARP AND GOLDFISH

The limit weight seems to be about 25 pounds, but this may be considered a large specimen in this country. It is, as a rule, greenish-brown, with rich bronze-coloured sides. It not only lives to a ripe old age, but will also exist for a considerable time out of water.

Crucian Carp. — *Carassius vulgaris* (Fig. 42). The Crucian or Prussian Carp is minus the barbels of *Cyprinus carpio*, and also differs in other respects. It,



however, resembles the latter in colour. It does not attain such large dimensions, the maximum weight being about 7 pounds, and a length of about $1\frac{1}{2}$ feet is attained. It has not, so far, been found in Scotland, Wales, or Ireland, and hence is much more locally distributed than the species last under notice. The generic name *Carassius* is the Latin form of a German word *Karausche*, and that of the Common Carp—*Cyprinus*—is believed to be derived from the island of Cyprus.

Goldfish.—*Carassius auratus*. In a wild condition the

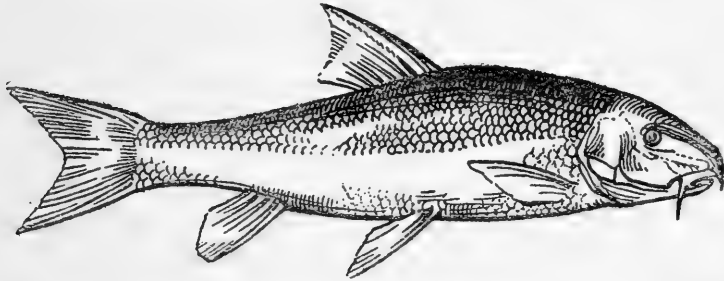
BRITISH FRESH-WATER FISHES

familiar Goldfish (*Carassius auratus*) has the same sombre dress as its two relatives last dealt with, but when kept under artificial conditions it assumes both gold and silver forms which make a strong appeal to those who have ornamental waters, or who are desirous of keeping such brilliant fishes in an aquarium at home. Many piebald varieties may be encountered, indeed there seems no end to the "sports" that are to be met with.

Barbel.—*Barbus vulgaris*. From *Barbellus*, the diminutive of *Barbus*, in reference to the barbels on the mouth. Hence also its English name (Fig. 43). This is a very locally distributed species, and may be known by having two barbels on either side of the mouth. It occurs in the Thames and Trent, and further north in certain rivers of Yorkshire. With these exceptions, its appearance is rare elsewhere. It is greenish-olive in colour, with golden sides, the somewhat elongate body being covered with moderate-sized scales. There are on frequent occasions some small dark spots on the body, and also on the fins. It seems to attain a maximum weight in Britain of about 20 pounds, but on the Continent turns the scale at considerably more than this. It feeds upon various water-creatures, both animal and vegetable, searching for its provender by grubbing about with its snout, and is probably aided by its barbels being used as feelers. In Winter it lies up in a torpid state, several individuals keeping one another company. The eggs are laid in early Summer, either in shallow or deep water where there is a gravelly bed. It is stated that

BARBEL AND GUDGEON

the eggs are covered over by the parent fish. The Barbel is a tenacious species, and affords good sport to the angler, but its habits must be well known to lure it successfully. Care should be taken in eating this fish as, if it contains roe, this should be removed to guard against poison contained therein.



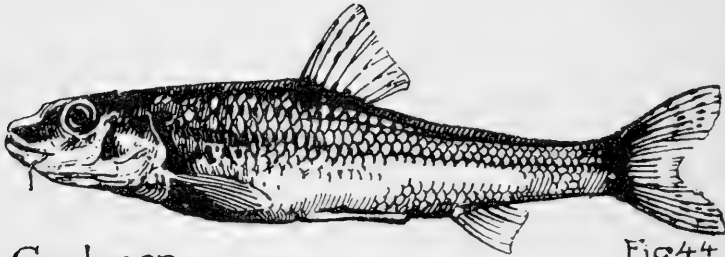
Barbel

Fig 43

Gudgeon.--*Gobio fluviatilis* (Fig. 44). This happy-go-lucky little fish is indelibly linked up with one's boyhood days, when either big fish or little were considered "great game." It is a most sociable species, and loves to congregate on gravel or mud where the water is fast-flowing. It keeps very low in the water, but is so fastidious in its taste that it will allow most tempting baits to pass right over the shoal without effect. If, however, the fish are on the feed, a large number may be caught in a very short time. A small red worm, or the larva of a caddis fly, are the best baits to use. It may be looked upon as a small edition of the Barbel, but it is relegated to another genus because of the arrangement of the teeth. It has one barbel **only** on each side of the mouth. The general colour is brownish or greenish on

BRITISH FRESH-WATER FISHES

the upper parts, with golden, or silvery, on sides and underneath. On various parts of the body, and also on the fins, there are dark spots. It does not attain a greater length than 6 to 8 inches. It is a common inhabitant of many of our rivers and streams, but is not known beyond the northern border of England. I have known shoals of Gudgeon to haunt a particular spot in a certain river for over forty years, and force of habit makes me look to see if any of the little fellows are in the old spot whenever I chance to pass that way. I am rarely disappointed. It is by no means an active species, and



Gudgeon

Fig 44

seems to take life very quietly. It feeds upon various kinds of aquatic life, and in searching for same displays similar habits to its larger first-cousin, the Barbel. As in the latter, the male Gudgeon has tubercles on the head during the breeding season, and this latter may last over a period of several weeks, commencing in April or May. The eggs are laid in little groups among the stones forming the gravel bed of the stream. The curious name comes from the Latin word *Gobionem*, but is indirectly derived from a French word=*Goujon*, which has become Anglicised into=*Gudgeon*.

TENCH

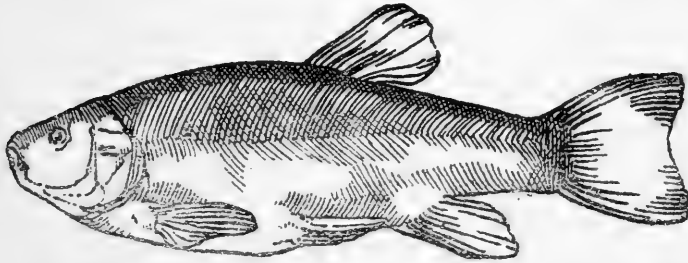
Tench. — *Tinca vulgaris*. The generic name *Tinca*, the Latin word for Tench, comes from an old French word = *Tenche* (Fig. 45). This fat-bellied species is a lover of deep back-waters and lakes whose surface is covered with lily leaves. In consequence of this, the Tench is rarely seen, and as it revels in mud and keeps very much to the bottom, only the angler is likely to encounter it. To many it is known as the Doctor Fish, it being stated that the healing properties of its slime are such that wounded fish will rub up against it in the hope and expectation of being cured. I have often seen Pike that have been wounded in the head burying their fore-parts in mud with the apparent idea of stopping the bleeding, but I cannot substantiate from personal observation the statement that my old friend, the Tench, is a member of the healing profession. June, July, or early August are the best months to catch this fish, as after then, it seems to retire to its Winter quarters, from which it is difficult to tempt it. When seizing bait, the Tench is quite likely to deceive an inexperienced fisherman. When taking a worm in its mouth, the fish commences to chew it and then disgorges. As it does this, the float bobs slightly, warning the angler that something is happening in the unseen depths. When the float quivers, then is the moment to strike. If the float disappears quickly and a strike is made, the fish will be missed, as it merely has the end of the worm in its mouth. Super-patience is required in catching the Tench, though I remember landing two fine specimens

BRITISH FRESH-WATER FISHES

weighing $3\frac{1}{2}$ pounds each within five minutes of one another in a tributary of the River Colne, near Watford. It cannot be considered a solitary species as, when on the feed, a number may soon be caught in the same spot. Quietness is essential when angling for Tench, as it is very shy, and seems to be acquainted with every movement taking place on the bank. The best bait is a medium-size lob-worm. Sweet paste is also considered a luring "dish." To attract the fish, and work different holes, it is a good plan to slightly bob the float up and down without disturbing the water, resting occasionally so as to wait results. The bait moving below will probably have the desired result. This species is well distributed in Britain, and is found as far north as the Southern Highlands of Scotland. It is an animal as well as a vegetable feeder, and except in Spring, when it emerges from its Winter torpor, is always in a fat and healthy condition. The Tench is a tenacious species, and can exist not only for some time out of water, but is none the worse for being buried in mud when its liquid haunts have disappeared during drought. It spawns in June, the tiny eggs being shed, without restriction as to numbers, on aquatic plants growing in shallow water. In about seven days the small eggs hatch out, and at the end of a year the young weighs about 4 ounces. After then, it is said to increase in weight to the extent of 16 ounces per annum. An 8 pound fish may be regarded as a very fine specimen. One of the finest I have seen was caught by my sister—Mrs. E. J. Bryant—in the

TENCH AND ROACH

River Lea on Lord Salisbury's estate at Hatfield. It turned the scale at 4 pounds. The colour apparently varies according to the age of the fish. Greenish-yellow to greenish-black, with whitish on the belly, may be given as a general colouration. At times a golden variety is encountered. The body scales are very small. This was a favourite fish in monastic days, and I have frequently caught large Tench of three to four pounds weight from ponds which were once the pride of the monks of old. Although it has a firm white



Tench

Fig 45

flesh it has a muddy taste, but this is said to disappear after scalding. Perhaps the monks were not so fastidious in their tastes as we are to-day, though from all accounts they did not leave much to chance where provision for their appetites was concerned.

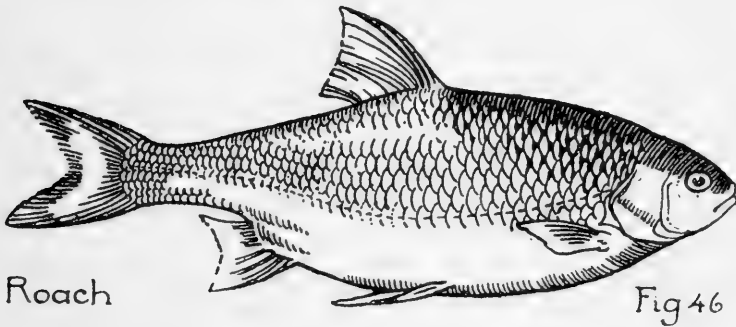
Roach. — *Rutilus rutilus* (Fig. 46). The name is derived from an old French word, the meaning and origin of which are obscure. The deep silvery body and greenish back, covered with large scales almost as large as a threepenny piece, is admirably shown off by the lower fins of the adult being tinged with red, whilst those

BRITISH FRESH-WATER FISHES

on the back and tail have blackish edges. A Roach of $1\frac{1}{2}$ to 2 pounds is a good fish, but it sometimes exceeds that weight. It is a lover of lakes, ponds, canals, slow-moving streams, and rivers. It keeps close to the bottom in shallow water, but when it haunts, as it frequently does, a deep hole or favourite bend of the river, it comes nearer the surface. It is a social species, travelling about in shoals, and when once a Roach "swim" is discovered, and the fish are on the feed, large hauls may be expected. A long rod, or Roach-pole as it is often called, about 18 feet in length, is best, but it must be light in weight. The extra length enables the angler to get well out into mid-stream where the fish congregate, and the bottom joint of the rod can be withdrawn when pulling in the line. On adding the bottom joint and pushing out the rod to its fullest extent, the line can then be dropped into the water without any splash or noise. Roach bite in a niggling fashion, and the float scarcely responds to the touch, even if a light quill is being used. Large Roach, however, sometimes take the bait with the least fuss, whilst small fish drag the float under water almost out of sight. The angler should not strike at the first shudder of the float, as experience can alone teach the Waltonian the right second to hook his quarry. For successful Roach-fishing, it is best to find a good swim of fairly fast water where the line quickly travels down-stream, as in this way the area being fished can be worked to the best advantage. The swim should be somewhat deep, with a gravelly bottom

ROACH

free from weeds. It is a good ruse to throw in soaked bread, or boiled wheat, to bring the fish on the feed, and thus get them to assemble in the vicinity. For bait, use bread crust, maggots, gentles, grubs, or larvæ as they are variously called, and in season the larva of the caddis fly is a very killing lure. Always plumb the accurate depth of the water, and fish just clear of the bottom. Fine tackle is essential. This species deposits its greenish eggs (which turn red when boiled), in April or May,



and it then visits a tributary of the main stream, or resorts to shallow water where there is a good supply of weeds. They congregate in large numbers at spawning time, and are said, like the Gudgeon, to make a noise by the movements they carry out. As with the Barbel and Gudgeon, the male Roach acquires small tubercles on the head and other parts during the breeding season. The natural food is made up of insects and their larvæ, molluscs, weeds, etc. Although not a shy fish, the Roach is very wary, and at times it is most aggravating to see a shoal of big fish in clear water which simply refuse

BRITISH FRESH-WATER FISHES

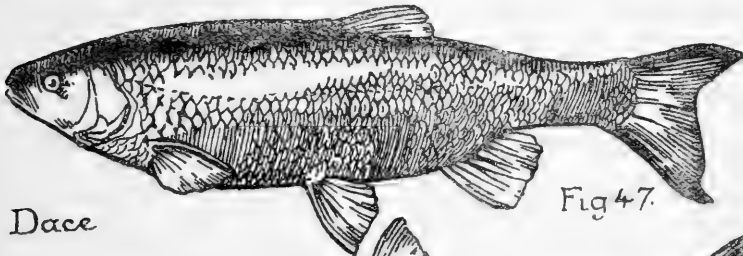
to be tempted to sample the bait put before them. This they frequently do.

Dace.—*Leuciscus leuciscus* (Fig. 47). This sportive little fish is, like its relative last described, of social habits, moving about in shoals. When a couple of inches long and about the size of a Sprat, the Kingfisher seeks them out, and many of the company are commandeered by this handsome British bird. The Dace is a narrow fish, with fairly large silvery scales, and dark along the back. A half-pound fish is quite a good weight, and although it grows heavier than this, it rarely attains the weight and dimensions of a specimen now in Letchworth Museum which is 14 inches in length, and weighs 1 pound 8 ounces. It was caught in the River Ivel, near Baldock, and is, I believe, one of the largest specimens ever taken in this country. It inhabits our rivers, streams, lakes, and ponds, but does not occur in Scotland or Ireland. It loves to congregate in shallow water, and it is an engaging sight to watch a number of them at play, their active habits and silver bodies lending attraction to the sylvan surroundings. This is a bold biting fish, and affords capital sport. It is fond of small red worms and maggots, and is often caught with the fly. Its natural food is made up of insects, shrimps, and worms. It seeks deep pools in Winter. The active disposition of this gay little water-sprite has given it the name Dace, as this word is acquired from an old English word Darse, or Dart. It has an amazing turn of speed, and can dart through the water against the stream with ease and facility.

CHUB

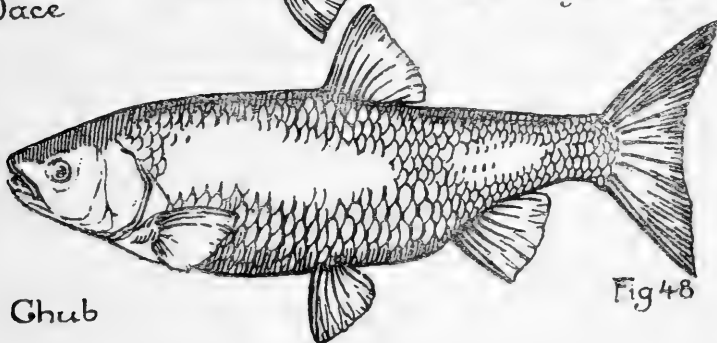
The anal fin has concave edges, and this at once distinguishes it from its close relative next to be described.

Chub.—*Leuciscus cephalus* (Fig. 48). Belongs to the same genus as the much smaller Dace. The silvery colour becomes more coppery with age; the back is brownish or greenish. The scales are large and prominent. This is, as its popular name implies, a chubby-



Dace

Fig 47.



Ghub

Fig 48

looking fish, but by no means ill-proportioned. It attains a weight of about 8 pounds, but a specimen of five pounds may be looked upon as a good fish. It is fairly well distributed, but does not occur in Ireland. It frequents rivers and tributaries thereof, the larger fish showing a preference for deep channels cut out by the action of the water, and where there is some seclusion. I have many times fished for fine specimens of Chub

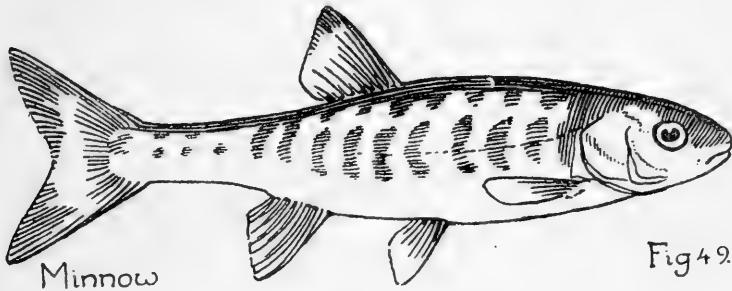
BRITISH FRESH-WATER FISHES

which always resorted to a certain spot overhung by bushes in a backwater of the River Colne at Bricket Wood, Hertfordshire, but never succeeded in catching one of those wary monsters. It responds to the art of the fly-fisherman, and is also caught with lob-worm, or greaves and paste. It is a hardy customer to deal with even when securely hooked, but "its dogged that does it," as Charles Darwin used to say, and the fish is soon overpowered. It feeds upon other fishes, as well as insects, shrimps, worms, and weeds. The eggs are deposited from Spring to early Summer, and the antics of the parent fish whilst engaged in the propagation of their species are most entertaining to watch, as they leap out of the water and add a touch of animation to the environment. The males have small tubercles on the head during the breeding season, and the scales are rougher than at other times.

Minnow.—*Phoxinus aphyia* (Fig. 49). This gay little species, active and beautiful withal, is a prime favourite dating from boyhood days. One thinks straight away of quiet stretches of the River Colne on a hot day in June. Standing on the old wooden bridge and peering into the clear stream beneath, a shoal of Minnows were always to be seen disporting themselves, and very engaging they were as one watched them at both work and play. Of voracious disposition, I often used to catch these silvery little tenants of the Colne by using a maggot, or caddis worm, as bait. So eager were the fish for the fray, that I have often hooked them other than in the mouth.

MINNOW

Those were thrice-happy days when, with rod and line, I stole out of the old home at daybreak, and was by the water's edge before the sun had dispelled the dew from the lush meadows across which I expectantly meandered. The Minnow occurs in a great many of our rivers and streams, but it must have clear-running water and a good current for it to thrive to advantage. It is only a small species, rarely attaining a length of more than a few inches. What it lacks in stature, however, it makes



amends for by its pretty colouration. This shows considerable variation, though, as a rule, it is silver-grey, with a green or darker back, and a band of golden colour along the upper part of the side. In some specimens a number of dark vertical bars occur from the back downwards, and other markings may also be present. It spawns in early Summer when the male, as in the still more familiar Stickleback, puts on a red waistcoat, and there are little white tubercles on the head. The Minnow leads a follow-my-leader life, as it seems to be agreed that its movements are well-regulated, loyal response being made by the shoal to the directions given

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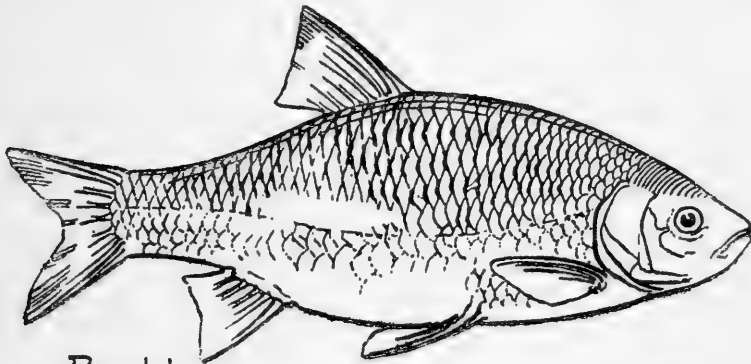
BRITISH FRESH-WATER FISHES

by the commander of whatever expedition is undertaken. Minnows appear to have constituted a favourite dish in days gone by, and the name is given in ancient writings as Menoun, Minoe, and other renderings.

Rudd.—*Scardinius erythrophthalmus* (Fig. 50). It is hoped that the unwieldy scientific name of this really beautiful flat-bodied fish will not deter the young ichthyologist from learning all he can about it. Curious it should have such a short and simple English name, and yet a long and difficult Latin onym. It may be distinguished from the Roach by being a beautiful bronze or golden colour on the sides, and when taken fresh from the water bright-coloured specimens are very lovely to behold. A Rudd weighing 3 pounds is a good fish, and I have seen members of my family catch a large number of specimens even heavier than this, baiting with dry bread and allowing same to travel on the water, no float being used. It frequents lakes and rivers, and delights in dwelling where water-lily beds abound. It also disports itself in shallow water, especially where one sheet overflows into another. The bait is often seized as soon as it touches the water, there is a short struggle, but the prize is soon secured. A good ripple on the water is an incentive to fish for Rudd, and as it is a voracious feeder, when once its favourite haunt is discovered good sport may be expected. My father and self, fishing in the River Lea, near Luton, in 1900, landed 120 Roach and Rudd between us from one restricted "swim" in the course of two or three hours. But even this compares

RUDD AND WHITE BREAM

unfavourably with another experience in which I am told I took part as a small boy. Fishing in a lake at Aldenham Abbey, near Watford, about forty years ago, my father, grandfather, and uncle (three rods) had a catch of $2\frac{1}{4}$ hundred weight of Bream, Rudd, and Tench in the course of $2\frac{1}{2}$ hours! The fish came suddenly on the feed after a heavy thunderstorm, with the remarkable result above recorded. When spawning in April or May



Rudd

Fig 50

in shallow water, I have often heard Rudd make a pouting noise with the lips as they have shown part of their dappled bodies above the surface of the river. It will fraternise with other fishes, and hybrids between Roach and Rudd have been recorded. The name is probably derived from the colour of the scales.

White Bream.—*Blicca bjærnka* (Fig. 51). This somewhat uninteresting and distinctly local species is also known as the Silver Bream. It is much less common than the next fish upon our list, and is a good deal

BRITISH FRESH-WATER FISHES

smaller as its maximum weight is only about $1\frac{1}{4}$ pounds. It is an inhabitant of sluggish waters, and keeps fairly close to the bed of the lake, or river, it frequents. It there searches for food, which consists of insects, molluscs, worms, and various vegetable matter. When spawning-time arrives in May, shallow water is resorted to, the eggs being laid on the weeds. In Winter deeper water is sought. Bream cannot be regarded as the possessors of sportive dispositions, and when once hooked there is no effort to make a bold bid for liberty. The silver colour of the scales has given this species the names of White or Silver Bream, but it is greenish on the back, and has greyish fins. It has a larger eye than *Abramis brama*, a less protruding snout, but a more prominent mouth. It is a very slimy fish, and although it can be easily caught, is of little service for the table. The name has been acquired from an old French word, the origin of which is obscure.

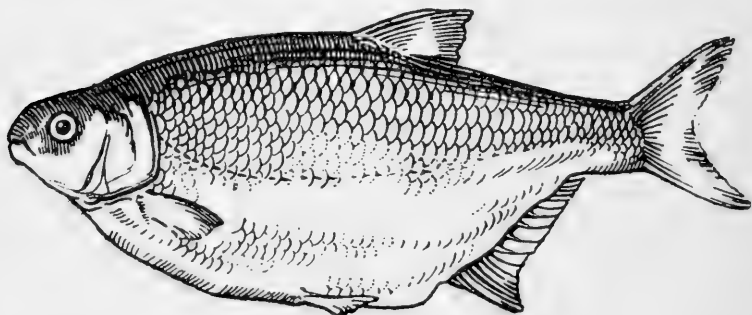
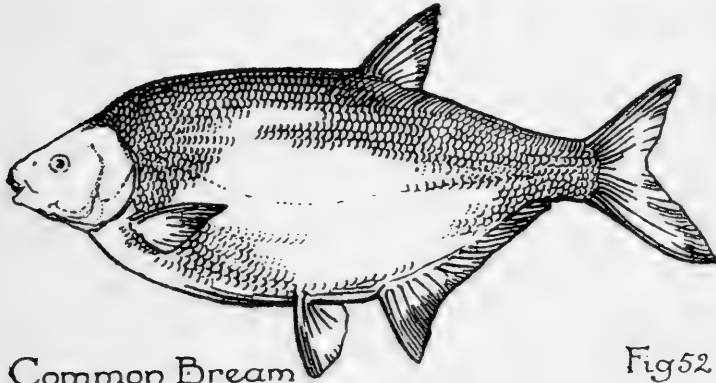


Fig. 51. White Bream.

Common Bream.—*Abramis brama* (Fig. 52). This species belongs to a different genus to the last-named, and is much more plentiful. It thrives exceedingly on the

COMMON BREAM

Norfolk Broads, and when I was a boy I remember seeing hundreds caught in one day, only to be thrown away. I have known a large catch of these poor sporting fish to be used as manure. It bites with annoying frequency, and one gets rather tired of landing so many specimens which afford such little resistance. Maggots, worms, or pieces of raw meat may be recommended for bait, and it is advisable to ground-bait the swim overnight with either greaves or boiled wheat. In deep slow-moving streams



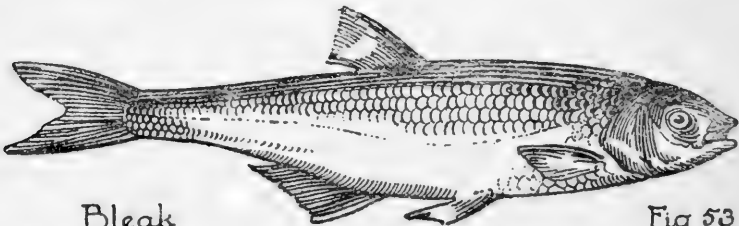
Common Bream

Fig 52

float-tackle can be used, but where large Bream occur (and this species attains a weight of several pounds), the gut-trace must be of the best quality, and from four to six feet in length. The Bream is a peculiar biting fish, as when it seizes the bait, it rises with it towards the surface. As it does this, the float falls flat on the surface of the water, and as soon as this happens the strike should be made, as the fish is already hooked. Early morning and evening twilight are the best times to catch Bream, as they seldom bite in daytime, except in large lakes, or

BRITISH FRESH-WATER FISHES

pools. Whilst the young of this species closely resemble those of the White or Silver Bream, the adults are distinguished by the brownish or greenish colouration, relieved with a metallic sheen on the sides of the body; and blackish on the fins. It is a social species, and large shoals move about in company. Some very old Bream used to frequent the surface of a small lake in which I have had rare sport in days gone by, and on a hot Summer's day it was most annoying to observe these big fellows, grey with age, sunning themselves for hours on end, whilst I was patiently waiting for a bite. Nothing would tempt them, and although we caught a great many other fish in the same stretch of water, so far as I remember we never succeeded in landing one of these 8 to 10 pounders. That this fish is both cunning and shy, especially when it has attained any size, I can personally testify. Food and spawning time resemble those of the last-named, and at the latter season there is a great deal of display. Various hybrids occur between Bream and other species, but it is unnecessary to give details of these here.

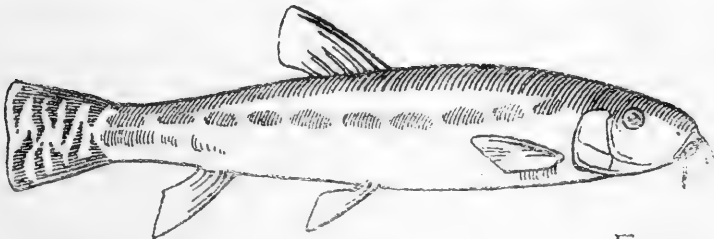


Bleak.—*Alburnus lucidus* (Fig. 53). This small fish makes amends for its diminutiveness by its engaging

BLEAK AND LOACH

habits and pretty appearance. It is of social disposition, and a lover of clear water. It keeps close to the surface, and its sporting proclivities cannot fail to arrest attention. It does not occur in either Ireland or Scotland, but in other parts of Britain it is more or less a fairly familiar species. It has a silvery-white dress, ornamented with greenish on the back. It rarely exceeds 6 to 8 inches in length.

At spawning time the Bleak comes close inshore in large numbers, and as with many other fishes, it shows great excitement at such time. June sees the egg-depositing at its height, and the eggs are cast promiscuously into shallow water where they become attached to weeds, or stones. The curious name is indicative of the silvery-white or bleached colour. Many different hybrids have been described, and from the brilliant scales various commercial articles are manufactured.



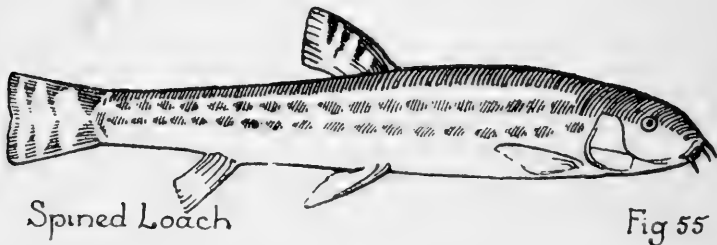
Stone Loach

Fig 54

Stone Loach.—*Nemachilus barbatula* (Fig. 54). This little tenant of fast-running streams where there is a plentiful supply of stones, is linked up in one's memory with boyhood days, and I remember the exciting adventures we had during those happy hours when

BRITISH FRESH-WATER FISHES

we boys endeavoured to catch one of these "bearded" fishes. The Loach is an adept at taking cover under a stone, and as it keeps very close to the bottom it is difficult to locate. It belongs to the *Cobitidæ*, and is not distantly related to the Carp. The very small body scales can hardly be discerned even on close examination. The colour may be brownish, greenish, greyish, or yellowish, marbled and spotted with darker colour, with whitish underneath. There are small spots of blackish on the fins. It rarely exceeds 3 to 5 inches in length, and has three pairs of barbels. Night appears to be the feeding-time, as in daylight the Loach hides itself under stones, and even if dislodged will make haste to take cover under another stone in the near vicinity. The food is made up of the more usual fish diet which has so frequently been mentioned in our account of other species.

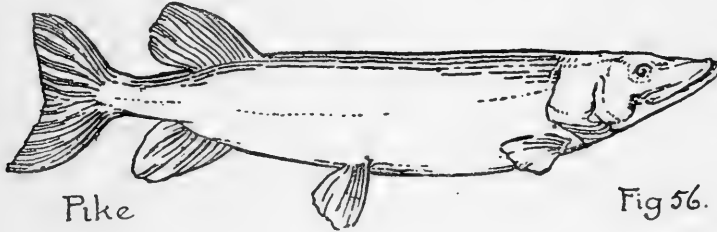


Spined Loach.—*Cobitis taenia* (Fig. 55). This still smaller species has the prefix Spined attached to its name because of the possession of a kind of two-forked "spine" which is only raised when the fish is moving about. When in repose, the spine fits into a small groove

LOACH AND PIKE

under the eye. When held erect, the spine on either side of the head is used for the purpose of defence. It has a more arched back than its cousin, and is also distinguished by the more prominent dark patches underneath the lateral line. It is not nearly as common as the last species under review, but it is probable that further observation will reveal its presence where previously unrecorded.

Pike.—*Esox lucius* (Fig. 56). This voracious species is in no way particular as to its haunt, and provided there



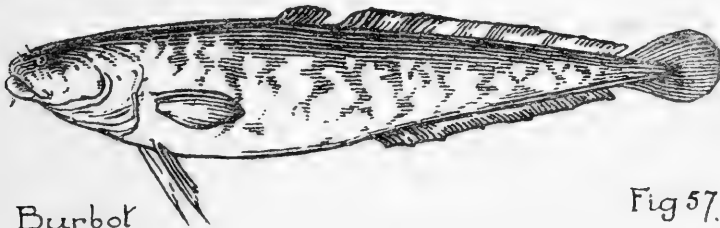
is a good food-supply, makes itself equally well at home anywhere. It is found in lakes, lochs, ponds, pools, rivers, streams, and even dykes and ditches. It is a solitary fish, although many may be found inhabiting the same sheet of water. It has a most voracious appetite, and will eat almost anything that comes its way. I have even seen it seize and swallow a large cork float when the patient angler was hoping it would rather take his bait. If other fish are scarce, the Pike will not hesitate to prey upon its own kith and kin, and if these are not forthcoming, frogs, toads, water-voles, and water-fowl are greedily sought after. As showing its cannibalistic

BRITISH FRESH-WATER FISHES

nature, there is an authentic instance recorded of two Pike being discovered inside a third, the smallest of the three having been hooked and then swallowed by a second, and the second by a third, thus all three specimens were secured at one time when the line was pulled in. Pike have even been known to attack human beings. Shallow and deep water are both frequented, but the latter is more often sought in Winter. It is a great lover of the surface. Spawning takes place in Spring, and at that time the more usual haunt will be left for some quiet backwater until the egg-laying process is at an end. Several hundreds of thousands of eggs are capable of production by one female, but the greater majority never hatch out, and young fish (called Jack) often pay the death-penalty in their eagerness to swallow a stickle-back whose spines do not permit the latter to travel down its captor's throat. It is fairly well established that Pike attain a good age, and as regards weight a very large fish in prime condition may turn the scale at anything from 40 pounds upwards. Between 60 and 70 pounds seems to be the record weight for a Pike from British waters, but a fish of half that weight may be looked upon as a very fine specimen. That the Pike is the king of coarse fish is generally agreed, and it affords the greatest sport of them all. It is a game fighter, and rarely gives in until its energy is thoroughly exhausted. Yet I caught one beautifully marked specimen (now in Letchworth Museum), which was exactly three feet in length and 13 pounds in weight, which gave me little or no

PIKE AND BURBOT

trouble to secure without the use of a landing net or gaff. My father once caught a 9 pound Pike at Kingsbury Mill, St. Albans, when fishing for Roach with the finest tackle and the smallest size hook procurable. The bait used was the larva of the caddis fly. That certain species of fishes sometimes congregate in the same hole has been the experience of many anglers, and I can myself testify as to Bream, Chub, Eels, Perch, Pike, Roach, Rudd, and Tench all being caught with the same bait (worm) in one very deep hole in the Duke of Bedford's water at Oakley, Beds. This was in 1904, A well marked Pike is dark greenish along the back, with mottled sides of yellowish, and darker bands. The small scales, pointed head, long body, large mouth, strong jaws, array of sharp teeth, and backward position of the dorsal and anal fins, are all worthy of note.



Burbot.—*Lota lota* (Fig. 57). Also known as the Eel-Pout, and the only representative of the Cod family (*Gadidæ*) inhabiting fresh water. It is of local distribution, only occurring in rivers having an outflow into the sea on the East Coast. It is a bottom-loving fish, and frequents the deeper parts of clear water. It

BRITISH FRESH-WATER FISHES

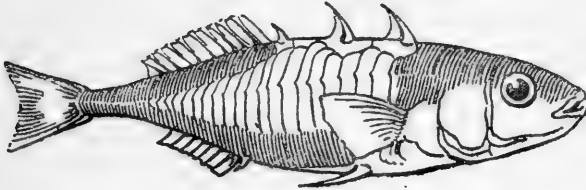
does not show itself to advantage, as it delights to hide among stones or weeds. For all that, it is an active enough species when, as often happens, its hunger must be appeased. It is an inveterate enemy of other fishes, and greedily devours their eggs as well. Eel-like in form, with a prominent belly, tapering body, and large head and mouth, the Burbot (from an old French word *Bourbotte*) may be brownish, greenish, greyish, or yellowish in colour, with dark brown or black markings on the back and sides, and paler below. The maximum weight attained in our home waters is about 3 pounds. Larger specimens have been captured, but they are of rare occurrence, except on the Continent and elsewhere.

Three-Spined Stickleback.—*Gastrosteus aculeatus* (Fig. 58). This familiar little fish is both a fresh and salt-water inhabitant, and is unlike its ten-spined relative in this respect. It is indelibly linked up with the days of our youth, and many specimens succumb every Summer owing to the small receptacles in which the poor mites are imprisoned by too enthusiastic disciples of Izaak Walton. It is easily lured, and can be caught without a hook, as it seizes a worm as big as itself and simply refuses to let go. Several will rush to the feast, and will even impale one another with their spines rather than be defeated in their frantic quest. This is one of the few fishes which builds a nest. The male does this unaided, and then invites a female to enter the portals to deposit her “clutch” of eggs. This accomplished, the “Soldier” Stickleback, as boys call the gay-clad male,

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THREE-SPINED STICKLEBACK

guards his wife and home with immense bravado, and woe betide any enemy that approaches too near the citadel. The greater the excitement, the more the brave little male glows with vivid colours and increasing courage. It does not possess scales, but a series of bony plates (if such they may be termed) extends vertically down the body. The general colour is greenish and silvery, and the three spines are borne along the back, the two front ones being larger than the small one near the dorsal fin. There is also a spine in front of the anal



Three-spined Stickleback. Fig 58

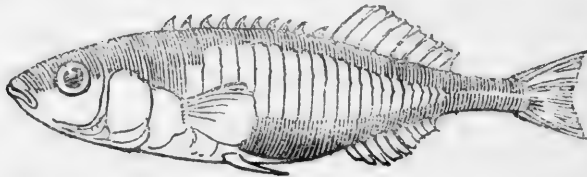
fin, and one on the middle part of the belly. This fish does not attain a greater length than 2 to 4 inches. It moves about in shoals, and inhabits shallow, as well as deep, water. The merest rivulet, or water-cress bed, having a clear current of water, will contain some of these gay little tenants whose appetite is prodigious when one remembers the smallness of this species. The male is a model father in so far as the young are concerned, as he not only tends them with great fidelity, but will even carry them back into the nest if they leave it before he considers it safe for them so to do. One wife does not suit the male Stickleback as, apparently, she does not

BRITISH FRESH-WATER FISHES

produce sufficient eggs to satisfy his desires. After the first batch are laid, a second female is invited to add to the number, and this operation is repeated by others several times. If the nest is damaged the male will undertake the necessary repairs, and he will aerate the water by quick movements of his fins. The materials composing the nest are fastened together by a sticky substance with which this species is provided.

It should be mentioned that rough-tailed and smooth-tailed forms of Three-Spined Sticklebacks occur in Britain, but the latter are mostly found in inland waters, and there are also intermediate forms. These, however, need not detain us.

Ten-Spined Stickleback.—*Pygosteus pungitius* (Fig. 59). This well-distributed species is at once distinguished by the larger number of short sharp spines along the back. Although called Ten-Spined, the back spines may consist



Ten-spined Stickleback

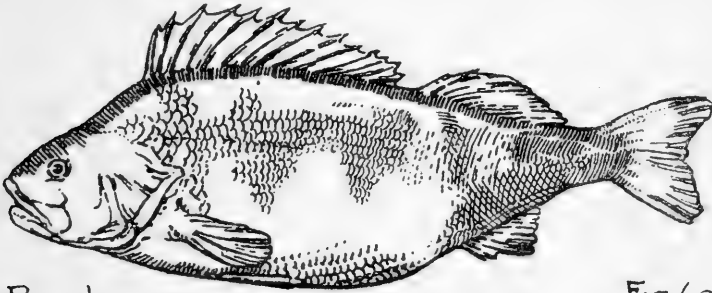
Fig 59.

of from 7 to 12, and there are others below as in the species last under review. This is smaller than *Gastrosteus aculeatus*, rarely exceeding 3 inches in length. In its general life-history this species closely resembles its lesser-spined cousin, but it is more of a fresh-water inhabitant. It is dark greenish, dotted with black.

PERCH

Unlike the Three-Spined Stickleback (the male of which is red underneath, and the female pale yellow, during the breeding season), the Ten-Spined lacks these brilliant colours and becomes dark brownish.

Perch.—*Perca fluviatilis* (Fig. 60). This hump-backed tenant of our rivers, lakes, and other sheets of water is one of the handsomest of all with its rough bronze-green body, dark back, and vertical bands, and very prickly front dorsal fin which begins almost above the head. The Perch wanders about in shoals, and is so ravenous



Perch

Fig 60

that, when on the feed, the whole number can be caught in a very short time. Even if a hook is lost, the same fish may be re-captured with the missing hook inside its mouth. It is a bold-biting and game little fish, and one is often deceived at the smallness of the specimen that has shown so much fight before being landed. The larger fish are more wary, but even so, I have had splendid bags of Perch which have weighed an average of 2 pounds each. Larger specimens weighing 3 to 4 pounds have fallen to my rod, but the maximum weight is heavier than this.

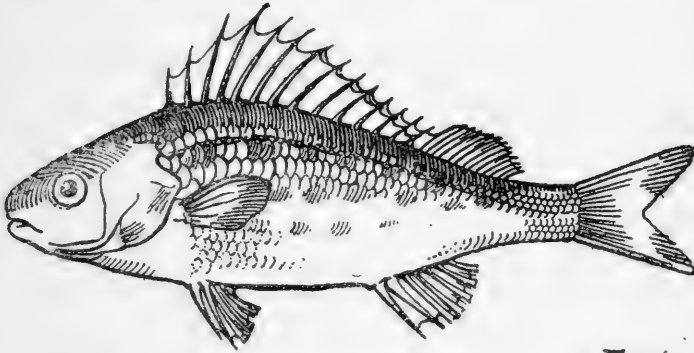
BRITISH FRESH-WATER FISHES

The food consists of other fishes—a minnow is a splendid lure for a big Perch—as well as insects in various stages, molluscs, and worms. The favourite feeding-time in Summer is morning and evening, and it is interesting to notice how a shoal that has been under irritating observation all day suddenly comes on the feed. Spawning takes place in shallow water where there is a clean bed. The eggs are not shed singly, but the whole appear in the form of a band which the female cleverly contrives to attach to a weed or other object. The eggs hatch with comparative quickness, but it takes at least three years before the fish is advanced enough to propagate its species. Possessed of great tenacity, I have frequently noticed the length of time this fish will live out of water, and its boldness is such that many authentic stories might be told. The name is derived from the Latin *Perca*, a word of Greek origin which, literally translated, may be associated with the markings on the body.

Ruffe.—*Acerina cernua* (Fig. 61). Also known as the Pope. Haunts canals, lakes, and other sluggish waters. I have found it very plentiful in various parts of the Grand Junction, or Bridgewater Canal, in Hertfordshire. It is of restricted distribution, and does not occur in either Scotland or Ireland. Very similar to the Perch, except that it is more greenish in colour, with markings of black or brown; has a smaller mouth; does not attain nearly such a large size, and the dorsal fins are practically joined together along the back. It moves about in shoals, and prefers deep water. Of inactive disposition, the

RUFFE AND BASS

Ruffe is not a very interesting species, but its flesh is quite good eating, although it used to annoy me (the fish not the flesh) in days gone by when I used to catch scores of Daddy-Ruffe's, as we boys called them, and rarely anything else. Spawning takes place in early Spring, when the fish make their way to weedy margins or shallows. It has acquired its name because of the roughness of the scales, but it is difficult to throw any light on the alternative name of Pope.



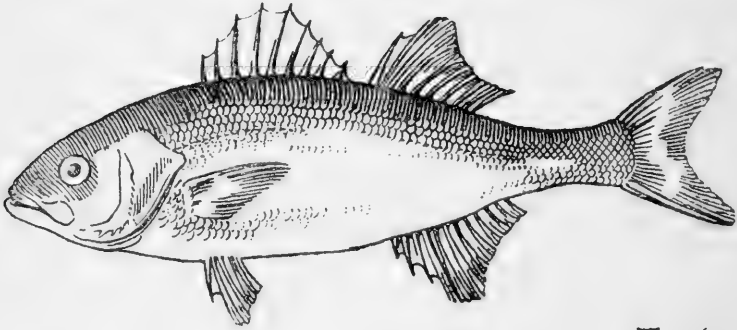
Ruffe

Fig 61

Bass.—*Morone labrax* (Fig. 62). This species is both a salt and fresh-water inhabitant. It is a marine relative of the Perch, but differs from the members of that family by having three spines instead of one or two on the anal fin. It is quite a nice-looking fish, and a 10 to 15 pounds Bass may be looked upon as a rare prize. It exceeds that weight, but a specimen of a few pounds is a good capture. It is more or less silvery in colour, with the prickly dorsal fin resembling that of the Perch, except that the spines are fewer. It resorts to the sea until it is

BRITISH FRESH-WATER FISHES

ready to ascend some of our rivers, and this it does in shoals. It spawns in the sea. Fish and other food constitute the diet. Possessed of great cunning and fastidiousness, the Bass is nevertheless held in high estimation for the excellence of its flesh, and to the angler its sporting proclivities make a strong appeal. The Anglo-Saxon name for Perch was *Baers*, and from that word our modern *Bass* has been derived.



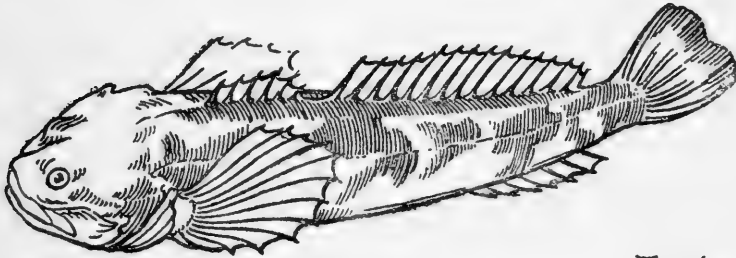
Bass

Fig 62

River Bullhead.—*Cottus gobio* (Fig. 63). This little species is also known as the Miller's Thumb, and belongs to the same family as the sea-loving Gurnard. It has no scales. The arched back; close proximity of the two dorsal fins; small eyes; broad head, and tapering body, are features of interest. As far as is known, it only occurs in England and Wales, and prefers clear-running brooks, or streams, where there is an absence of mud. It lives a solitary existence, and like the Loach, is an adept at taking cover under stones or other obstacles. Generally speaking, it is of sluggish disposition, but it

RIVER BULLHEAD

can, and does, move quickly when occasion demands. It is a voracious feeder, and not only takes insects, shrimps, and worms, but will viciously attack and devour other fish at least its own size. The spines help it to impale, or stab, its victims. Spawning takes place in early Spring, when a depression made in the bed of the water serves as a nest. This the male jealously guards, and woe betide any invaders who approach too near the chosen territory. It has great tenacity, and will exist for some time out of its natural element. It should



River Bull-head

Fig 63

also be mentioned that this species has the power of rapidly changing its colour if and when necessity arises. This happens, not only by reason of the change of environment, but also as a result of excitement on the part of the irate owner. The general colour is brownish, or yellowish-olive, on the upper parts, with black, or dark brown markings, some of which, by fusing together, form transverse bars. The underneath colour is yellowish-white, and most of the fins bear upon them dark spotted bars. The average length is 3 to 4 inches.

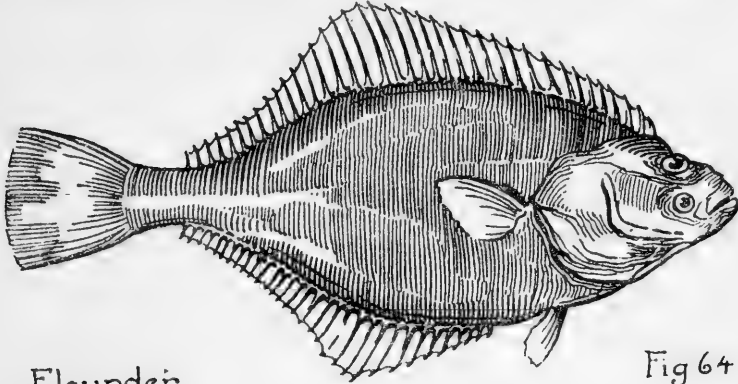
BRITISH FRESH-WATER FISHES

Flounder.—*Pleuronectes flesus* (Fig. 64). This, the last species which it is desirable to include in our list of fresh-water fishes, migrates considerable distances up-river, and although there are many other species of marine fishes which frequent brackish and even fresh water, there is not much amiss with the selection that has been made in this volume, and the Flounder is certainly entitled to inclusion in preference to several others. It is, as is well known, one of the flat-fishes, having an ovate body, with an array of fins extending at least three-fourths of the whole. The body is covered with small scales, and along the inside length of the dorsal and ventral fins there is a row of spinous tubercles, as also a little group at the head end of the lateral line. The general colour is greyish-olive, but there is considerable variation, and one writer says "it varies from nearly yellow to almost black." In some specimens there are orange spots, as in the Flounder's nearest relative, the Plaice. Left-sided, as well as right-sided, examples are frequently forthcoming, as also specimens coloured alike on both sides. It resorts to shallow water close inshore and delights in a sandy bottom. Although of sluggish habits, it regularly ascends a number of our rivers, and when swimming, its movements are most fascinating to watch. When I was on Loch Lomond in the Autumn of 1922 a Flounder was captured in the famous Loch, the first that had been known to appear there for over twenty years. The food consists of crustaceans, molluscs, worms, and small fishes. The spawning time is of ex-

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FLOUNDER

tended duration, and may take place during any of the first six months of the year. A great number of eggs are laid, and these are so light that, instead of sinking, they float on the surface of the sea. The young fry are



Flounder

Fig 64

at first kept going by the absorption of the remaining yolk, but in a few weeks the perfect little Flounder finds itself in an immense world of life in which, perchance, it may be destined to play no unimportant part.

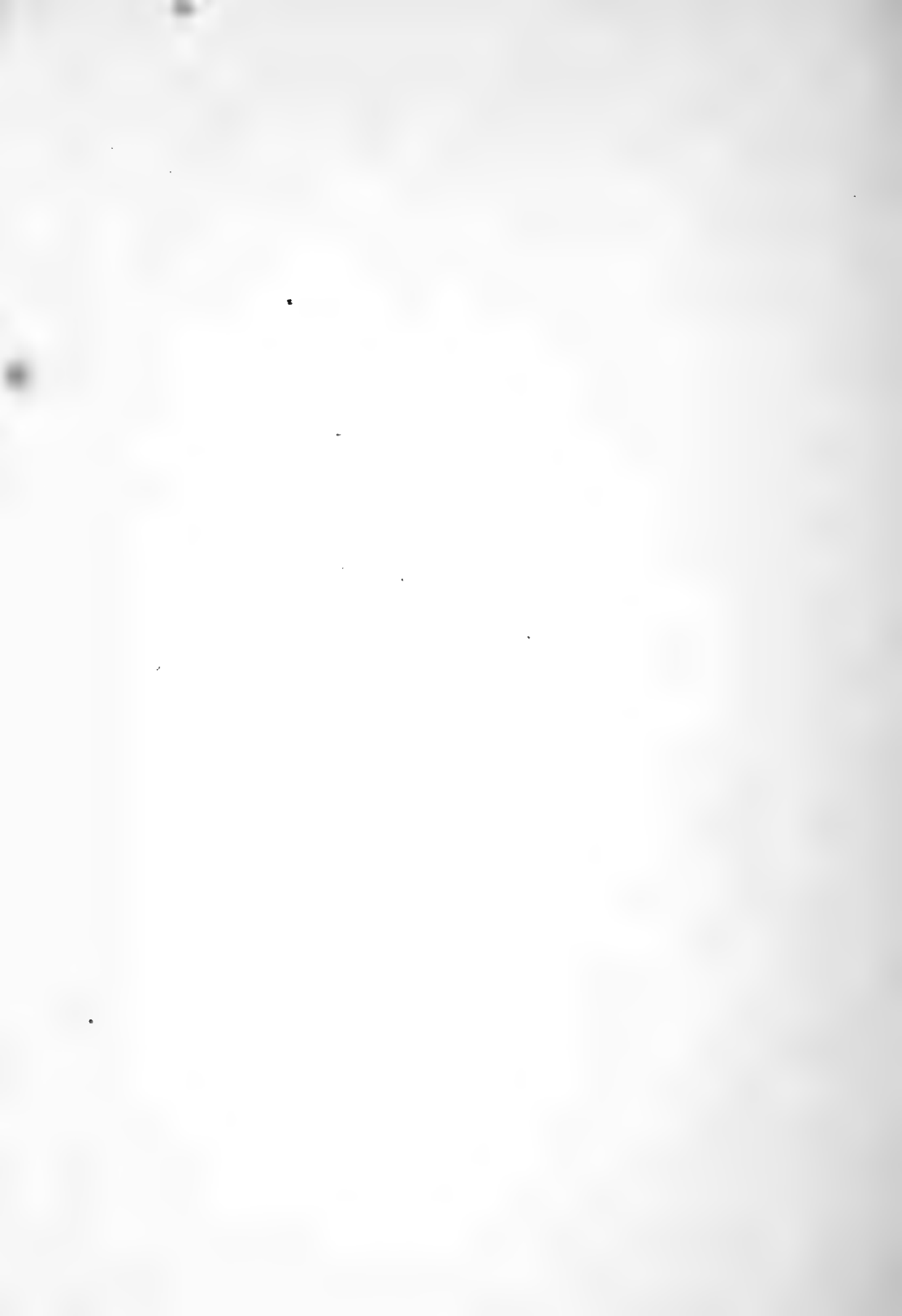


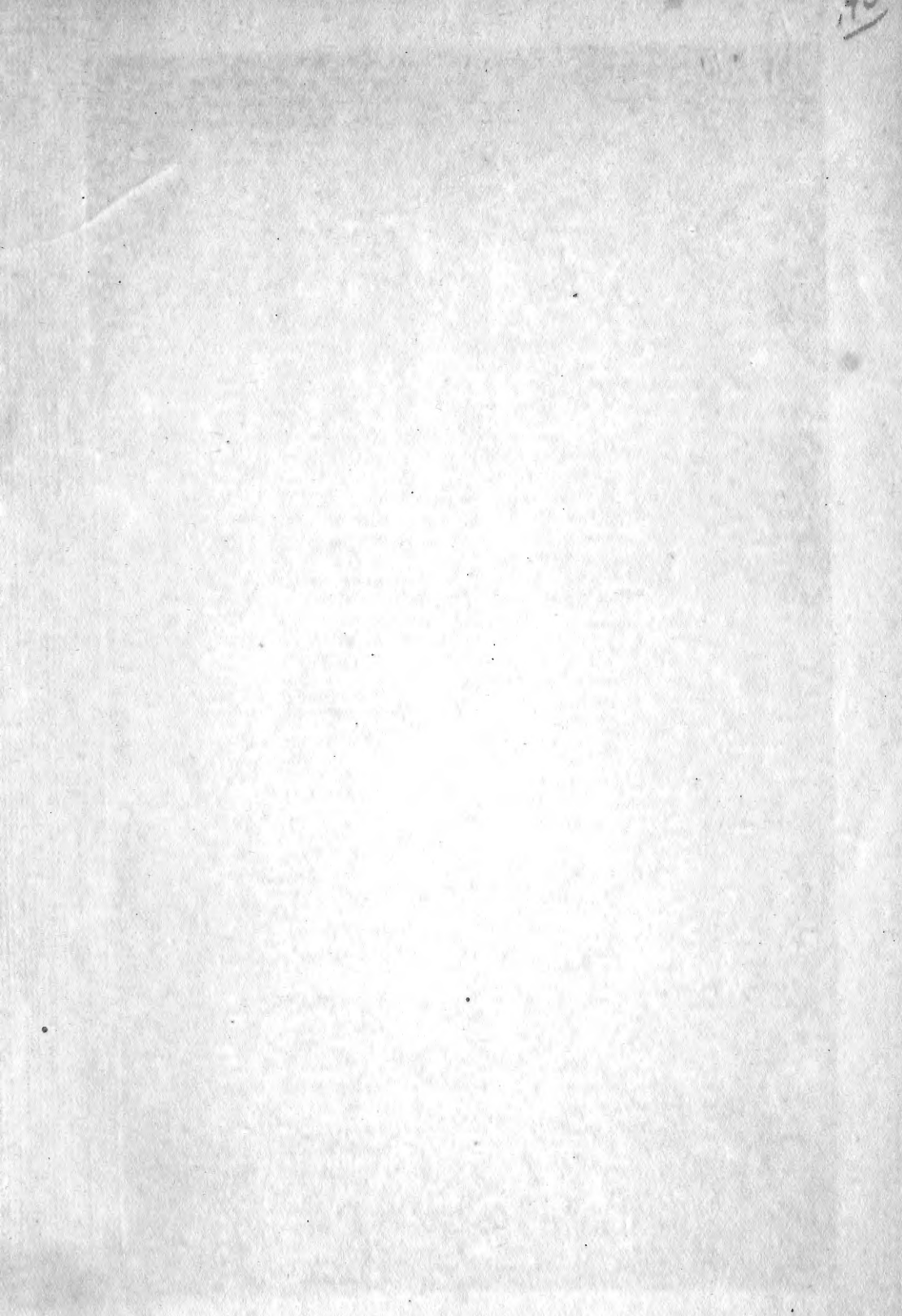
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