

NEWTs AND SALAMANDERS.

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THERE are few persons, it may be well believed, who are unacquainted with the newts or "efts" that swim in our ponds and ditches, and which are invested, by the credulity of ignorance and superstition, with poisonous properties and a perfect array of venomous qualities; the "eye of newt" forming an element of importance in the spells of the witches in *Macbeth*. Familiar as are the newts, a very wide-spread

Briefly answered, an "Amphibian" is a near ally of the fish, and is an animal which begins life as a gill-breathing creature, and which, on attaining its majority, breathes by lungs, whether the gills of early life remain persistent or not. The chronicle of our newt's babyhood and youth will serve to illustrate the above remarks. Selecting the common newt (*Triton cristatus*) as a good representative of the whole eft race, we may observe the deposition of the eggs during

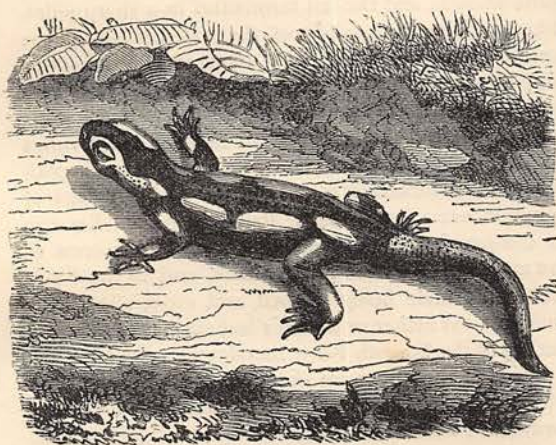


THE GREAT WATER-NEWT (*p.* 686).

error prevails regarding their position in the animal series. Their lizard-like appearance would seem to justify their being regarded as "reptiles," and in this light they are viewed by the great majority of persons whose studies in natural history have been of an elementary character. A very superficial acquaintance with even the early history of the newts, however, would serve to show that they are in no sense reptiles, but are rather to be regarded as near cousins of the frogs and toads. These latter animals—also denominated reptiles in a popular sense—are named "Amphibians" by the zoologist; and it behoves us, in the first place, to inquire what manner of creature an "Amphibian" may be.

spring and sometimes also during the summer months. The eggs are carefully placed on the leaf of a water-weed, the mother-newt folding the leaf with the hind feet, and placing the egg within the cavity thus formed. The egg itself is surrounded by an outer envelope of jelly-like matter, within which the embryo undergoes a process of "rotation;" the first appearance of the young newt being heralded by the lengthening of the central part of the egg, and by its division into a head, body, and tail. Before it breaks through the outer covering of the egg to enter for the first time into active life, the body of the young newt is so far developed as to be perfectly recognisable. The head, body, and fish-like tail, the latter fringed by a fin of a very definite kind, are

readily perceived, as also are the outside gills which sprout from each side of the neck. When it leaves the egg we note that it possesses a pair of little organs situated just below the head: these organs being known as "claspers," and being used by the creature to attach itself to water-weeds and other fixed objects. Behind the gills, and on each side of the body, care-



THE SPOTTED SALAMANDER (p. 686).

ful observation may detect two little protuberances; these latter being the beginnings of the fore-limbs of the future.

After its escape from "durance vile" in the egg, the baby-newt grows rapidly. In about twelve days after its liberation, it has increased materially in size; the gills have grown, the fore-limbs have become well developed, and three toes have appeared. The young newts, like kittens, are born blind, but the eyes are now apparent; and if we are skilful enough in the way of microscopic manipulation to imprison our newt comfortably in a "live box," and place a portion of its gills under water, we shall be able to see not merely a beautiful and interesting sight, but also gain a practical and clear idea of how the wondrous current of the circulation in the tiny being before us is carried on. The "claspers," being no longer required, disappear; and with its increased growth the young animal becomes bolder in its demeanour, swimming freely by aid of its powerful tail-fin, and darting after the water-fleas and other small fry which are its co-tenants of the water.

At the close of about the third week of its existence, an acute observer might be able to detect that a new era of an important kind was being inaugurated in the biography of the newt. The animal begins to ascend to the surface of the water, and may be observed to swallow air—a sure indication that new breathing organs in the form of *lungs* are being developed.

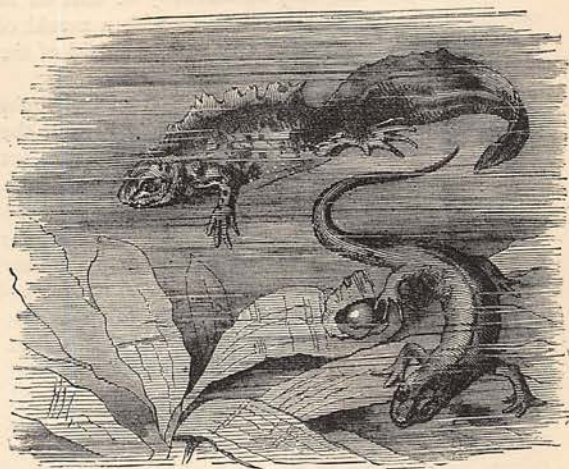
At this latter period a fourth toe has appeared on each of the fore-feet—four toes being the total complement of the front limbs. Then, also, the hind-limbs begin to bud out, and by the thirty-sixth day of its

life these latter appendages are seen to be well formed, and furnished with four of the five toes with which they are provided. The internal examination of its body would reveal the fact that the lungs have grown large; and when the sixth week of its existence has terminated, the final series of changes in its structure are to be witnessed.

Then the characters and colour of the adult body begin to be assumed. Notably, the gills decrease in size and finally shrivel up and disappear; the openings through which the gills were protruded gradually close; and the tail-fin becomes shorter and of firmer consistence. And thus, with the disappearance of the gills, the perfect development of lungs, and the full development of its internal organs, the newt passes from the stage of adolescence, and emerges into the full vigour of its adult existence.

Thus it appears that the newts, although inhabiting water, require to ascend to the surface for the purpose of obtaining a supply of atmospheric air. They are thus as truly air-breathers as are the frogs and toads, which, by-the-way, begin life in a similar fashion in the guise of "tadpoles," breathe by outside gills, then by internal gills; and finally developing legs and lungs, reject gills and tail, and are practically terrestrial animals throughout their after-lives. The chief differences between a newt and a frog, in fact, consist in the rejection by the latter of the "tail" with which in the days of their youth both are provided, and in the prior development of the fore-legs in the newts; the hind-limbs being first formed in the frogs and toads.

We are now in a position to discover how and why a newt, frog, or toad is not to be called a reptile. No



THE SMOOTH NEWT (p. 686).

reptile is provided with gills at any period of its life, but from the first moment of its inhaling air breathes by lungs. This distinction is a paramount one between our efts and the reptilian "lizards," with which they are commonly confused. And it is hardly needful, in the pursuit of a popular study, that we should dip further into the special province of the

zoologist, save to remark that an absence of scales, the possession of a tail-fin, and a general deficiency of teeth, are characters which are to be regarded as the heritage of the newt, and as distinguishing it from its nearest *fac-similes* amongst reptiles.

The study of newts and their habits is not merely an interesting employment for a period of leisure-time, but presents certain features of a rather remarkable kind for observation. One highly notable feature of the efts consists in the marvellous reproduction and renewal of lost parts—a faculty which the newts possess to the envy of their human neighbours, whose powers of supplying bodily wants of this kind are sometimes exceedingly limited, even in the matter of nails and other extraneous structures. It is a small matter for a newt to lose a toe, and a circumstance of little moment if a leg be left behind in some fray or through some untoward accident; whilst a large proportion of the tail may be shorn away in the sure hope of a perfect reproduction of the lost member. The Abbé Spallanzani, a famous naturalist of the last century, experimented upon the Smooth Newt (*Lissotriton punctatus*), with the result of discovering that the legs and tail might be cut off several times in succession and would be invariably reproduced. If we inquire as to the probable explanation of these marvellous powers of reproduction, we may find parallel illustrations in the case of the lobsters and crabs, to which the loss of a claw is a matter of small moment, and which also reproduce lost parts with a facility which is nothing short of wonderful.

It is notable that in both lobsters and newts the skin is cast periodically. In the newts the skin may be moulted in shreds and patches; but in the Smooth Newt the entire skin may occasionally be cast off in one piece, the slough presenting us with a mould of its body as a glove presents us with a mould of the hand.

The explanation of the reproduction of lost limbs and tails, may be said in a sense to relate itself to the power of reproducing the skin-surface—the latter act being a perfectly natural part of the newt's existence. The cold-blooded nature of these animals may be held to predispose towards the deadening of sensation; and "pain," as known to the higher animals, may practically be said to be unrepresented in newt-existence. Were pain and shock after such an apparently serious injury as the removal of the tail or of a limb present in the newt as in higher life, the effects of the injury would be apparent in the death of the animal, or at least in the non-repair of the tissues. But absence of shock, and a power of accommodation to exigencies in virtue of the want of acute sensation, present us with the first conditions for the successful repair of injuries, and lead us to understand how the vitality of the animal, unimpaired by pain, is sufficient to reproduce lost or severed members.

The newts common in Britain are the Great Water-Newt, or Common Warty Newt (*Triton cristatus*), the Smooth Newt (*Lissotriton punctatus*), and the Palmated Smooth Newt (*Lissotriton palmipes*). The first may readily be recognised by the fact that the prominent

back-crest of the male—specially developed during the breeding-season—is separated by an interval from the tail-fin. The body is covered with little warty processes, hence the term "Warty Newt," and its colour is a blackish-brown variegated with dark round spots on the upper parts, and orange-yellow below with black spots.

In the Smooth Newt, on the other hand, the skin is quite smooth, and the tail terminates in a sharp point. The back-crest and tail-fin of the male are continuous in this species, the male being coloured of a brownish-grey above, and yellow below; whilst his mate is of a lighter tint, with brown markings, and the under parts unspotted. But the colour of the Smooth Newt varies greatly. The Palmated Newt resembles the Smooth Newt, the characters of this newt—by no means of common occurrence—being found in its smaller size as compared with the Smooth Newt, in the crest of the male being placed further back, and in the hind-feet of the male being webbed, and especially in the summer. Whether or not this last species is merely a variety of the Smooth Newt remains an open question.

Allied to the newts are the famous "Salamanders," whose supposititious powers of resisting fire have formed the wonder of the ignorant in past generations, as indeed they are still remarked at the present day. The salamanders are simply "land-newts," which begin life as water-living and gilled animals, but which also cast off their gills, as do the water-newts, and become wholly terrestrial in habits as adults. The salamanders do not inhabit Britain, and they are, if anything, more lizard-like than our own newts. The land-newts, for instance, have tails of rounded shape, and instead of simply depositing their eggs, as is the case with the common newts, the salamanders retain the eggs within the body until the young are hatched.

The skin of these animals is of a warty and glandular nature. This observation is by no means uninteresting, in view of the probability that the watery fluid discharged from the skin-glands under pain or irritation, may have given rise to the belief that the salamanders could drown out the fiercest fire amidst which they could be placed. A chance observation may thus have given rise to an exaggerated fable of fire-extinguishing powers. The salamanders are common on the Continent. The best-known species is the Spotted Salamander of Southern Europe, the *Salamandra maculosa* of naturalists. A curious species, named the Alpine Salamander (*S. Alpina*), inhabits the higher parts of the Alps, in situations where no water-pools exist. The young of this form, possessing gills, would be naturally regarded as placed in an invidious position, seeing that in the absence of water their breathing powers could not be exercised. But nature has been equal to the task of modifying the life of the animal to its untoward surroundings. The young cast their gills before they are born, and thus appear in the world as lung-possessing and air-breathing forms. The lesson taught us by the case of the Alpine Salamander is clearly that of modification and adaptation to surrounding circumstances. The young were formerly born with gills and lived in water at

first as nature intended. But, as geology teaches, the Alps have been elevated within—geologically speaking—"recent" times, and as the Alpine Salamander was carried upwards and out of reach of water for its young, it must gradually have acquired the peculiar adaptation fitting it for its changed existence. Another proof that the present condition of the Alpine Salamander has been acquired, and not original, is found in the fact that out of some forty or fifty eggs produced, only two young are born; the two developing animals eating the remainder of the eggs as nutriment. Here again we perceive the wondrous adaptation of the animal to its habitat and conditions of life. For-

merly the Alpine Salamander produced, as do the other species, numerous young. Now it produces but two; this limitation in the number being the result of the unfavourable circumstances of the surroundings; whilst the store of eggs becomes utilised under the changed conditions to serve as a store of food for the favoured young. We are taught thus that the living part of nature, equally with the inorganic universe around us, is subject to changes and vicissitudes, often of startling character; and we also see in such changes that marvellous power of adaptation to unwonted circumstances which characterises the world of life at large.

HIS STRANGE INFATUATION.



AR back, in the days when good-natured Queen Anne lolled comfortably upon her throne, and a generation of wits and geniuses strutted about under huge periwigs—adornments mightily out of place with the wisdom they muffled—a certain doctor of antique mould was living in London, and waiting philosophically for the fame and reputation which had looked at him through future's vista fifty years ago. Now, in truth, Doctor Bone, as he was called, was no quack; but his nature refused to conform itself to the dictates of fashion and patronage, and consequently the general public had always regarded him through the wrong end of life's telescope, whereby his person and skill had appeared of indifferent make.

Thus for thirty years or more he had trudged his weary journey, proving himself of infinite value to the needy, and acknowledging uncomplainingly the propriety of his fate, but with a pride that showed his indifference to fashionable approbation. He met disdain with contempt; and, although he was loser thereby, had the conscious self-satisfaction of an independent spirit. Perhaps, morally speaking, he was in the right; but in those days of fawning and flattery, the renown he sought was as unattainable to him as the Lord-Mayorship would have been.

As for his person, he was tall and lank, with a somewhat ponderous Roman nose, lips that fell, by long practice, at the corners, and pent-house brows which thatched his eyes but poorly, for the water would often gleam under them at a tale of pity. Upon his head he wore, within doors, a rusty old skull-cap, from which his natural locks fell downwards in a thin avalanche of silk, and upon his shoulders habitually a cloak, unlike Whittington, turned little to its advantage. His knee-breeches, witless of ornament, bore some resemblance to iron stove-pipes which have

known many a downpour of rain; and his heelless shoes, long unenthralled by buckles, but too often succumbed to the pressure of circumstances, and brought portions of his bare feet into contact with their mother earth.

When the world was greener to the poor Bone, he had married a merry-hearted lass from his native village, who for many a year had faithfully and ungrudgingly borne the trials of poverty by his side, and lightened the gloom of his existence with unflagging spirit; but one blank night the flame of her little life shot up brilliantly for a moment and then guttered into darkness, though the poor child was sorely stricken for the tired traveller she was leaving behind. And he, simple practitioner, bowed his fading head to fate, and toiled onwards childless, alone and sorrowful.

But one day, when he had passed his sixtieth year, a patient of his, an old woman, died, and in the bounty of his ancient heart he took a forlorn little grandson of hers to his own home, and swore solemnly to foster this stripling of three years old and bring him up as his own son.

And he kept to his word, and for three more years now had reared the minute adoption with a zeal and tenderness befitting his noble nature. For hours would he sit in his mouldy old study, feigning to be absorbed in some moth-eaten volume, but in reality watching and enjoying the gambols of his little Geoffrey, as he tumbled about the floor with a hundred infantine whims which went direct to the sunny heart of the observer. With his own hands would he direct the baby's meals, and when his old housekeeper, Betsy, had put him to bed he would creep up-stairs for a good-night kiss, or a playful wrestle, in which the little arms always came off victorious. Then would he return to his gloomy den and exercise his wits in the resolving of some intricate problem, which last habit had happily absorbed many an hour of his tedious life.

What a dear gift is the power of deep inward contemplation to a man, the power which enables him—as in the stories told of some ancient Christian martyrs—to wrap his mind in that dense mist of thought