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Herpetology Extracts

torpidity. This activity will produce extra demands on fat reserves. A little careful feeding will be beneficial at such times but it should be stopped immediately should severe conditions return or if the temperature drops enough to stop activity among the fish. Experience, extended over several years, has convinced me that February can be the best trying part of the Winter for the fish. This is particularly true when alternating mild and cold weather occurs. It is then that the fish are more prone to attack by Fungus than when low temperatures persist through the greater part of the month keeping the fish in a state of torpidity until nearer the approach of Spring. If the fish were well fed on fat-producing foods during Autumn, to enable them to build up plenty of reserves, they are capable of withstanding a long run of low temperatures through the Winter in a state of torpidity. If, however, the dormant period is disturbed by intermittent spells of cold weather the activity induced causes a considerable drain on the remaining fat reserves towards the end of the Winter. The result is that the fish's resistance is suddenly lowered. The greatest trouble in this direction is when the temperature is sufficient to induce sluggish activity but not enough to bring the fish on to feeding. Careful observation, therefore, during the month of February is all worth while.

**Progress of a Gentian**

In one of my articles last year I mentioned that I was going to try one of the Autumn-flowering Gentians in the rock pond. This has done quite well. The species is *Gentiana sino-ornata* and I propose to introduce one or two more of the Autumn-flowering species. March is a good time to plant them. I used a compost consisting of equal quantities of sharp, gritty, lime-free soil and peat with a top dressing of lime-free gravel. There are several species, and hybrids, to be obtained and one species I intend to try is *G. veitchiana* which is a darker blue than *G. sino-ornata* and a vigorous grower when it finds conditions to its liking. One of the hybrids appeals to me very much and it is one which I understand is a cross between *G. veitchiana* and *G. farreri*. The flowers are large and an extremely attractive shade of azure blue. March is also a good time to propagate the Autumn Gentian by division. This will give the divided portions ample time to get established. Although the Gentians object to poor drainage and waterlogged conditions they do require plenty of moisture during the Summer months. It may be necessary during a warm, dry spell to provide them with regular watering to ensure that they have a cool, moist root run.



[L. E. Perkins]   
 "The lovely white Water-lily, *Nymphaea alba*, is another aquatic plant useful for the relief of pain, notably "agues and sunburn."

Herpetologist's Notebook

# Should Creatures Hibernate ?

By Alfred Leutscher, B.Sc.

**A**T this time of year the herpetologist who keeps and makes a study of living specimens, has faced an important yearly problem. As a vivarium owner will he have hibernated his collection, or has he decided to continue to provide the creatures with warm surroundings throughout the long Winter months? Having tried both methods I find that there are advantages and disadvantages in both. Where a reptile or amphibian normally hibernates, there is a lot to be said for letting it follow Nature's course.

In the wild this is done by seeking out some retreat which is safe from two great hazards in life, that is, death from freezing and death from drying up. Sub-zero temperatures probably cause some sort of crystallisation of the moisture tissues, which then leads to a breakdown of the cells. There may also be a form of paralysis of the brain. In the absence of a water supply, body tissues soon dry out. Amphibians are particularly vulnerable in this latter respect and indoor vivariums containing them should be escape-proof so that they are prevented from experiencing unfavourable external conditions.

It is quite remarkable what some species can withstand in the way of freezing. Many frogs and newts, as well as hardy creatures like the European Terrapin, can become frozen in ice for many days, and will survive. The same can be said of frog spawn. I have also known the Axolotl to winter safely in an ice-bound garden pond. The most remarkable case was a friend's African Clawed Frog (*Xenopus*) which was actually frozen in solid ice for two days, yet survived.

**Wide Temperature Range**

It is not generally realized that vivarium animals are tougher than we imagine. For instance, the Indian Rock Python, in the northern part of its range along the Himalayan foothills, hibernates for part of the year. In many other parts of the tropics, mountainous species will rest during severe weather.

Hibernation must not be confused with what we normally mean by sleep. Hibernation is the result of a gradual process leading up to what amounts to a state of suspended animation. The body temperature falls, breathing almost ceases, and the heart-beat slows down. It follows that the return to activity in Spring is gradual. A sudden awakening can be dangerous, and hibernating pets are best left strictly alone.

I usually put my reptiles into perforated tins or boxes, loosely packed away in slightly dampened moss and leaves, and stored in a sheltered place, like a garden shed, greenhouse, garage, or some other cold outhouse. The amphibians, which normally live in converted aquariums, are moved, their containers included, to these Winter quarters. With the glass lids still on, it is possible to maintain the damp surroundings in which they live best.

Wherever it occurs, I permit my charges to hibernate under water. Newts, frogs, crocodylians and terrapins will do this. Paradoxically, they are much safer under ice than out on land. The owner then knows that the temperature cannot fall below 4 deg.C., the figure below which water begins to expand and turn to ice.

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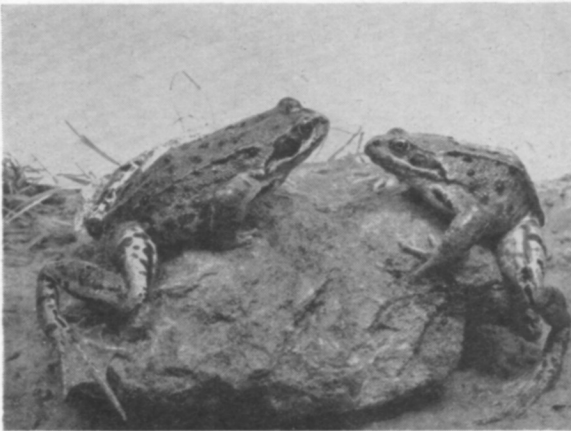
## EASY REFERENCE

A complete cross-index to all articles and special features appearing in 1955 issues of *WATER LIFE* is included in this issue. It forms a four-page supplement and, after being unstapled, can be placed with a complete set of 1955 *WATER LIFE* copies when a speedy and accurate reference to all information contained in them will be available. Also incorporated is an index to contributors.

On the other hand, air temperatures go on falling with the increased cold, so that extra precautions must be taken. In very severe Winters, frost can penetrate deeply into the hibernation quarters. I keep a small paraffin lamp in readiness in the greenhouse, and light it at the first signs of frost. It takes off the chill of the air but does not warm it sufficiently to awaken the specimens.

Owners who keep their animals awake and active all the year round are sometimes faced with the problem of feeding.

In Winter the insects are lacking, and the ground is sometimes too hard to dig for worms. Fertility may also be upset.



Photograph]

[H. V. Lacey

The author found a Common Frog croaking in his pond as late as December 11. It was a male and seemed in breeding condition but no females were available at that time.

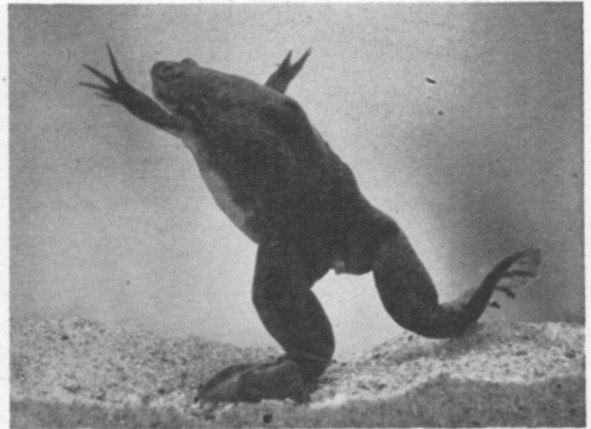
I find that newts, for instance, when deprived of their Winter sleep, will show no signs of wanting to breed the following Spring. It appears that they need a rest period at low temperatures before they come into breeding condition. Something similar applies to seeds which require a dormant interval before germinating.

To hibernate, or not to hibernate—whichever course is taken, the choice should be a firm one. On no account must borderline conditions be provided during the Winter, where the temperatures are not low enough to induce hibernation, yet not high enough to stimulate activity.

## Experiences Recorded

The notes which follow are extracted from my diary and illustrate some of the unusual experiences which come the way of all herpetologists, and only go to show how, as a vivarium keeper, much of his knowledge is gained from experience.

OCTOBER 10. A rainy day. All the salamanders are out of hiding, although they are indoors with the window shut. It is surprising how they react to a drop in atmospheric pressure, and seem to sense the moisture in the air. They would make excellent barometers.



Photograph]

[G. J. M. Timmerman

Mr. Leutscher records that a Clawed Frog (*Xenopus*) survived after being frozen in solid ice for two days during the winter.

NOVEMBER 5. I have heard it at last! The little Midwife Toads were calling to each other, giving a rather pleasing little call. No wonder they are also named Bell Toads. I have only heard them in the wild before, in some German woods. So far, I have not bred this species, *Alytes obstetricans*. It is not easy, and sexing is difficult.

DECEMBER 1. A salamander is having a family. So far, ten youngsters are swimming about in the water. Note: I shall have to find out exactly when *Salamandra salamandra* breeds in Nature. A friend once had a family of these salamanders presented on Christmas Day. Another had a female salamander which produced a family two years after he got it, and it lived entirely by itself during that period. Here is a mystery . . . when was she fertilized? Virgin births among animals are in the news lately. Was this an example?

DECEMBER 11. Working in the garden. Weather cold but sunny. I heard a Common Frog croaking in the pond and managed to catch it. Its thumb pads were fully developed but there was no clasping reaction. It appeared to be in breeding condition, but not ready to mate. A pity there is no female frog available. There are cases reported of frogs breeding in late Autumn.

DECEMBER 12. The young Indian Python is feeding well, on dead mice etc. It is still very snappy (a good sign indicating physical fitness) and sloughing cleanly. There is plenty of time yet to tame it when it grows a little.



Photograph]

[E. E. Dennis

Male Midwife Toad with eggs. Sometimes the species is referred to as Bell Toad because of the charming noise it makes.



*American Bull Frog, a species which requires warm, humid conditions in the vivarium.*

Photograph]  
[L. E. Perkins

## Herpetologist's Notebook

# Methods of Heating Vivariums

By Alfred Leutscher, B.Sc.

that helps to adjust the cage temperature to the required level. This simple device is cheap and efficient, provided that the current does not fail, as happened recently during a power cut.

In the rush of finding candles and paraffin stoves, the vivarium was overlooked. By the time it was remembered, the cage temperature had fallen to 38 deg.F. The python was hastily removed, wrapped in a blanket, and placed inside a box in the airing cupboard next to the hot water tank. Fortunately it was saved in time, but the effect could have been more serious had the electricity failed during the night.

A more dependable source of heat is from a fire or stove which heats up a room in the usual way, and the cages are simply kept in this atmosphere. A regular supply of coal, coke or paraffin may become expensive, and this method is usually employed in zoos and fishhouses, where specimens are kept on a large scale. The more modest collection of the average aquarist or vivarium keeper does not normally justify the expenditure and individual heating to each cage or tank is relied upon.

The electricity risk has already been mentioned. I have tried out two alternative methods, which never seem to break down even though the house is plunged into darkness or the room goes cold.

### Using an Oil Lamp

The first is to use a small paraffin lamp. One of my cages so heated is raised on short legs, and has the entire under-surface covered with a sheet of metal. Tin is used as it is a rapid heat conductor. The tiny spirit flame plays on to the metal, and the heated tin sheet in turn warms the entire cage floor, from which hot air rises to give an overall temperature. By covering the cage floor with a layer of clean sand much of the warmth is stored up, and gives the occupants a pleasantly warm surface on which to rest.

It is important to mention that the contents of a cage of this type become very dry, and that these conditions are only really suited to animals which normally live in dry, desert country. This would include Skinks, Zonures, certain Agamids like the Mastigures (*Uromastix*), and sand snakes. It is also ideal for desert insects, scorpions and locusts.

Other tropical species such as pythons, chameleons and

**T**HE return to more normal weather conditions after the Winter's bitterly cold spell has come as a relief to many. Shortage of coal, power cuts and burst pipes have been much too common, and to all these WATER LIFE readers can add the worries of maintaining the heat supply to their fish-houses, tropical tanks and vivariums.

It is during these emergencies that the merits of different fuels for maintaining tropical conditions can be assessed and put to the test. Electricity is a clean and tidy way of heating, but the current can fail at times, which is particularly serious at night when the surrounding air is cold, as in an unheated room, conservatory, greenhouse or shed.

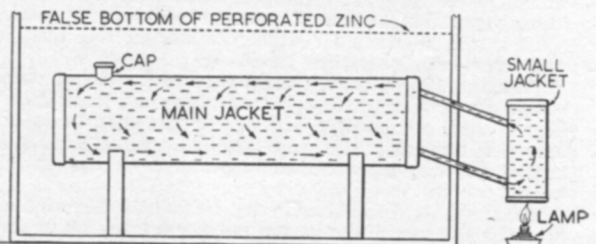
A vivarium in which I keep a young python is heated in this way. It has a false bottom inside which is fitted a lamp socket to take a 60-watt bulb. This bulb is covered by a tin which becomes surprisingly hot. The warmed air rises into the cage to give a temperature which can be as high as 85 deg.F. The perforated zinc cage roof has a sliding cover

### Flying Foxes

(Continued from previous page.)

behaviour states that the reason for the change is due to the contracting by the fish of some form of irritational disease. This opinion has been found true in the study of mammals. For instance, many rogue elephants on being shot and examined have shown that the inner cavities of their tusks were completely decayed. It is not hard to realise that the persistent irritation from such deterioration could have sent the animals berserk. To sum up from the fish angle, disease irritation may be the answer, or is it a problem for a fish psycho-analyst!

An additional note regarding *E. kollopterus* concerns their ability to, and obvious natural habit of, swimming or resting when desired in an inverted position, after the fashion of the Upside-down Catfish (*Synodontis*). This unusual position has apparently been partly evolved in the *Kallopterus* to enable them to take food from the water surface. I have observed these fish maintaining the inverted position for quite long periods of surface foraging. But this inversion appears also to be a favoured position when resting close up to the roof of a cave, the fish invariably having its head pointing outwards so that the inquisitive eyes may observe all that may happen in the vicinity.



An effective and economical way of heating a vivarium by employing a small paraffin lamp to warm the water in a closed circulatory system. The main jacket is below a false floor.

many amphibians prefer the shade of trees and undergrowth, where the air is humid. If these are to be kept in the above cage then, at the very least, a permanent bowl of water must be present. It is quite remarkable how quickly this evaporates, indicating just how large a quantity of water can be taken up by warm air. The bowl should never be empty. Apart from drinking the water, pythons and boas will sometimes lie and soak in it for hours.

The other method of heating is by the use of heated water. I came across this idea many years ago, in a book by the Rev. G. C. Bateman, called "The Vivarium." Although long out of print, it is still one of the finest books ever written for the vivarium hobby.

Inside a false bottom of the vivarium is fitted a sealed water jacket, shaped like a cylinder. Out of one end lead off two pipes, one above the other, at a downward angle. These connect with a much smaller cylinder which is fixed in the vertical position. The whole system is filled with water through a screw-cap opening at the other end of the main cylinder. The flame of the spirit lamp then plays on to the small cylinder (which projects out of the cage).

As the water heats up, convection currents set it in motion, so that the entire system remains warm, and resembles a hot-water bottle permanently filled with hot water. This in turn heats the air which then rises into the cage. The idea is economical and very reliable, provided that the flame is never allowed to go out.

#### Tropical Amphibians

Amphibians from the Tropics do quite well in these surroundings, when a high humidity is maintained. This can be done by cutting down the ventilation, and always having a water dish installed. If plants are grown, these will moisten the atmosphere to some extent through transpiration.

The converted aquarium with a glass cover just raised clear of the top (a fraction of an inch is enough) is perhaps the best home for amphibians, being watertight and easy to handle. People with radiators have an excellent source of heat, and can place the aquarium or vivarium over it on a suitable shelf support. Tropical house plants are often kept in this way, on shelves or in trays fitted over radiators.

So much for the Winter hazards. Spring is now here and any time during March the hibernating stock will have awakened. This must never be hurried. Our tortoise, lizard or snake takes just as much time to wake up as it did to settle down to rest last Autumn. Many weeks may elapse before it recommences feeding.

During the waiting period plenty of water should be handy and, if possible, access to all the sunshine available. People with greenhouses are lucky in this respect. Glass lets in all the sun during the Spring days, and retains much of the heat. Raw and windy weather, and also damp, is kept out.

#### Diary Notes

DECEMBER 31. I wished farewell to a friend returning to his home in South Africa and was able to supply him with some Crested Newts and European Salamanders. They will cause a sensation, he said. The reason? No tailed *Amphibia* exist in the Southern Hemisphere and even zoologists in those parts rarely see them alive.

JANUARY 19. I started an argument with an experienced snake keeper on whether humans have an "instinctive" fear of these reptiles. We both agreed that this was not so, and that the fear is learnt or acquired. Proper education and the correct approach would do much to explode this myth.

FEBRUARY 4. I found a Crested Newt frozen in solid ice in a shallow part of the garden pond and managed to save it by careful thawing out in a bowl of water. At one stage the body was still encased, but the freed legs and tail were actually moving—a strange sight!

FEBRUARY 6. I mentioned the experience to a medical

friend and asked him the cause of death from freezing. He suggested some brain injury or, possibly, the crystallisation of the body fluids causing fatal damage to the tissues. The results of deep-freezing are still not understood, and more research into hibernation below zero might assist the medical world in the latest methods of operations at low temperatures.

## Popular Goldfish

# Orandas and Lionheads

By Capt. L. C. Betts

IN previous articles it has been stressed that the Goldfish is essentially a man-made fish. Few other animals have received such detailed and consistent study and it stands or falls as a monument to man's enquiring mind. As a study in genetics, it preceded Mendel by several centuries and in general interest has aroused the attention of more people than can be envisaged.

So far the discussion has been confined to varieties with a wide æsthetic attraction but it is now the turn of those with a more limited appeal. Under this heading can be considered the Lionhead and Oranda, characterised by the bramble-like growth which envelops the head. To some this makes a great appeal, but to others it is considered incongruous.

#### Growth Over the Head

But first the growth itself. In prize specimens the development takes the form of knotted flesh which completely envelops the head, mouth and gill plates, very much like a wild blackberry in contour and standing out well from the general outline of the fish.

At one time it was thought that the growth was a series of tumours and certain research workers in the medical profession had hopes that investigation might give valuable information on the development of malignant tumours in animals and humans. However, I am inclined to the view that the growth could be a tumour but not a malignant one.

From experience, it is found that male Twintails (Veiltails) develop this hood on the top of the head as they get older, which suggests that the development is associated with a build up or breakdown during metabolism.

Goldfish with a growth on the top of the head only are known as Gooseheads and are produced in China as a separate variety. Usually the bramble effect is preceded by a thickening of the tissue, after which the characteristic indentations appear. Many fishes never pass the thickened tissue stage and these are usually useless for breeding purposes. It is very necessary for breeding stock to have the pronounced indentations so that a high percentage of young developing this characteristic are produced. Again, as with all the physical modifications of Goldfish, an early transformation is essential to maintain the continuance of the feature in future generations.

Apart from the Goosehead form, which has not a very large following in this country, the Oranda can be considered a more beautiful and popular fish than the Lionhead. The long flowing tail and high billowing dorsal fin of the Oranda seem to balance the fish nicely, and the head growth, far from detracting, appears to add dignity.

(Continued next page.)

## Herpetologist's Notebook

## European Fire Salamander

Alfred Leutscher, B.Sc., Describes this Long-lived Species as his Favourite Vivarium Animal



*Photograph by L. E. Day of the European Fire Salamander. The light markings are yellow on a black body colour. The species has thrived a considerable time under vivarium conditions.*

AT this time of year the vivarium hobby is in full swing, and during the Summer months newcomers are attracted by fresh displays of reptiles and amphibians in the pet-shops, or maybe find a specimen during an excursion into the countryside. The newly-acquired pet is taken home, and so another vivarium keeper is made.

A real enthusiast is, of course, an all-the-year-round, and he can find plenty to do in the colder months. There are cages to overhaul, reptiliaries to check over and replant, ideas to plan for the coming year and books and articles to read. There will also be a little reflection, a looking back over the past successes and failures, and a resolution to do better in the future.

As in so many hobbies which deal with living things—and vivarium keeping is no exception—the beginner starts with a creature which is easy to feed and look after. Then comes a phase of enthusiasm, in which breeding takes a high priority, or the specimens chosen are rare or spectacular. Finally, with time and experience, there is a tendency to go back to the “old faithfuls” of earlier days.

Commonplace though they may be, they never seem to let us down. Time and again I have come to the realisation that there is always a small nucleus of hardy favourites which seem to keep my collection going. The rest come and go, but these old-timers apparently live on for ever. A period of vivarium life of twenty years or more is by no means unusual with them.

#### Brightly Coloured

Among the *Amphibia* there is one species which stands out as a particular favourite of mine. This is the European Salamander (*Salamandra atra*), a small, highly coloured black and yellow creature which looks more like a painted ornament than a living thing. Throughout Western Europe its fame has spread since early times, for this is the notorious Fire Salamander which is said to live through fire. Many still believe it to be deadly poisonous.

Both ideas are nonsense, and it can no more withstand fire than you or I. Its poison is confined to the skin, and is intended to discourage any enemy which attacks it, since it has a bitter taste. The bright colours are said to warn off an aggressor.

Handling this slow-moving, gentle creature does no harm to the owner, but is not recommended because hot, dry fingers can easily harm the salamander's delicate skin. If our pet must be touched, the fingers should first be dipped in water.

The requirements of this quiet little animal are modest. It will live quite happily by itself, or with a mate, in a small

cage or aquarium placed in a shady corner. In it we must plant a miniature garden of small ferns and mosses, and other plants which do not mind damp and darkish surroundings. A suitable hiding place, made out of stones, bark, or a broken flower-pot, is placed in one corner, and a shallow dish sunk into the soil in another. This little “pond” is all that our pet requires, since it rarely enters water and is a poor swimmer.

Sexes look very much alike, but may be recognised by the more swollen appearance of the cloacal region below the tail in the male. A newly-purchased female, especially if she looks plump, may produce a family. In this species the fertile eggs are retained by the mother until the young are about to hatch. She then produces them “alive” by sitting quietly in some shallow water. As many as 50-60 young may occur, and their birth is a protracted affair, spread over a number of days with two or three born at intervals.

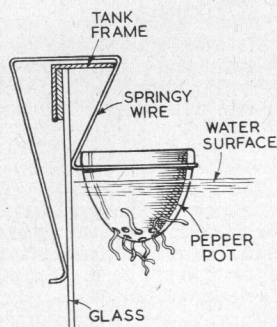
#### Delayed Production of Young

In the vivarium there seems to be no particular season for this although, in the wild, the young are mostly found in early Summer. It is known that salamanders have remarkable powers of withholding the young. A case was mentioned in my diary note in the February issue of *WATER LIFE*.

Many zoological students have had the somewhat disconcerting experience of dissecting a dead specimen, only to find the oviducts full of young. It is possible to free them from the mother, and let them grow up in normal fashion. For about two to three months, these gilled tadpoles live in

#### Readers' Hints and Tips

##### Improved Worm Feeder



When the wire is hooked on to the tank frame the pot should be half submerged and is then ready to receive the *Tubifex* worms.—(N. McCready, Liverpool, 11).

(10s. 6d. is paid for all published hints and tips)

water, and feed quite well on small living animals, such as *Daphnia*, *Tubifex* and White Worms.

At the time of metamorphosis the lungs are developed and the adult colours have appeared. Then the pretty little babies, a little more than an inch long, leave the water. They can be reared on tiny Earthworms, small slugs, greenfly and various small grubs.

#### Breeding in the Vivarium

Salamanders will occasionally mate in captivity. I have only seen the full procedure once. The male made clumsy attempts to clamber on to the female's back and clasp her body with his fore-limbs. In her struggles to escape she repeatedly threw him off. There seems little purpose in these antics, since no actual union takes place in these animals. Instead, the male emits a curious, small object, called a spermatophore. It is cone shaped and gelatinous in appearance. Under a microscope a great number of male reproductive cells can be seen, each struggling to escape from the sticky mass. Later, the female found this, and pressed it against her cloaca with her hind-feet.

In this way the escaping sperm-cells enter her body, and are there stored in a special chamber called the spermatheca, until required to fertilise the ripening eggs. Incidentally, a very similar breeding pattern occurs among our native newts, but takes place in water.

One or two of my adults are now in their tenth year, and live in an indoor vivarium, actually a converted aquarium which has a glass roof slightly raised on rubber corner pads. In this time three families have appeared. Each in turn was removed to a tank of matured water, where they lived and grew until ready to come on to land.

#### "Salamander Disease"

We all have our particular choice of favourite in each animal hobby, and the European Salamander would be mine as far as a vivarium creature is concerned. Apart from accident or injury, I have known it to suffer from only one serious ailment. This is the so-called "salamander disease," caused by a parasitic fungus which attacks the skin. It begins as tiny round sores which may widen and show traces of blood. It can be checked if taken in time, and given the mercurochrome treatment as recommended for tropical fish suffering from the White Spot disease. Ordinary antiseptics are best avoided, as they are liable to damage the skin. I have also tried one of the dyes, gentian violet, with good results. In its later stages this fungus penetrates into some vital organ, and death is certain to follow should this happen.

The colour of the European Salamander makes an effective contrast to the greens of a well-planted vivarium, and such a home can be a pleasing ornament in the drawing room. To enhance the colours I have tried bathing the contents with the glow of a green-coloured light from above. With the rest of the room in darkness, the effect is sufficient to place it in as attractive a class as any well-decorated tank of tropical fish.

#### Diary Notes

MARCH 29. The first frog's spawn was in the garden pond, well on time in spite of the recent severe weather. Nature seems to be remarkably punctual in this important business of breeding.

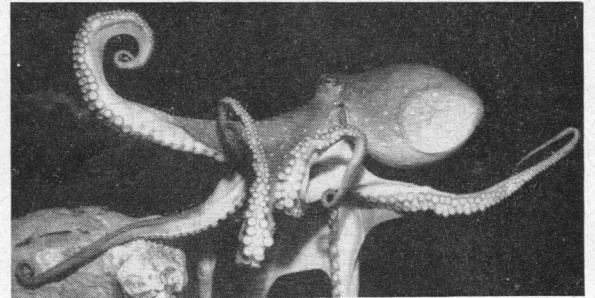
APRIL 18. Toad's spawn was laid in the pond. I reminded myself to remove it before hatching, as the tadpoles can be poisonous to the fish. I have already found a number of dead toads in the roadway. This is a yearly tragedy, as many toads on migration just now get run over by cars.

MAY 6. My little white newt has died at last, still wearing external gills, and only 2½ in. long. It was given to me in March, 1949, over seven years ago!

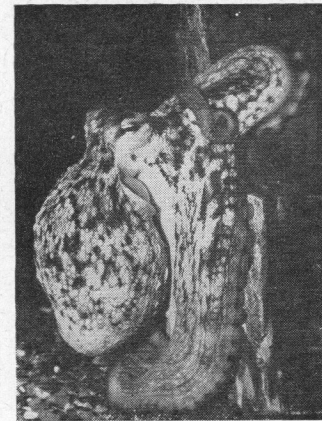
## The Moods of a Very Common Octopus



"BEST FOOT FORWARD—BUT, LET ME SEE, WHICH ONE SHALL IT BE?"



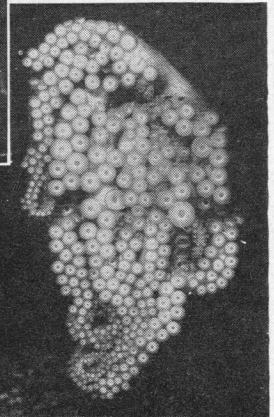
"PLEASE—NO COMMENTS ABOUT MY HAVING A BIG HEAD—EVEN IF IT HAS TOUCHED THE GLASS."



"CAN'T A FELLOW HAVE A SNOOZE IN PEACE?"

"YOU MAY THINK I'M MORE OF A SUCKER THAN MOST, BUT YOU SHOULDN'T BE LOOKING UNDERNEATH ANYWAY!"

*Common Octopus (O. vulgaris) photographed in the Aquarium London, South Bank, Waterloo, by Laurence E. Perkins.*



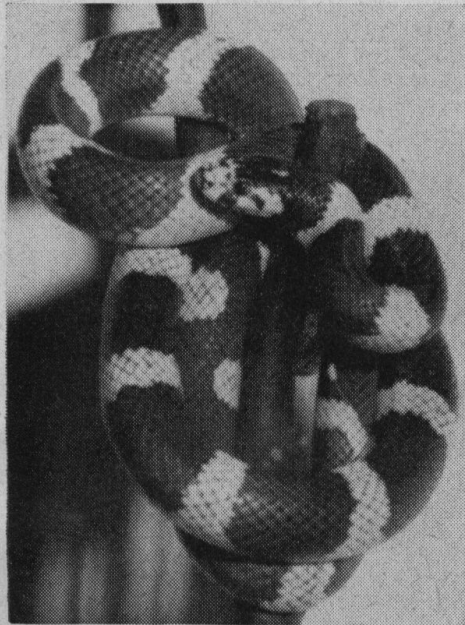
## Herpetologist's Notebook

## Let Snakes Be their Own Ambassadors

Suggests Alfred Leutsch, B.Sc.

PEOPLE who care for animals in captivity do so for a number of reasons. Some keep them as pets and others have them for research. I am concerned here with a third reason—perhaps the most important of all—their value in education. Anyone who teaches or lectures knows that he or she can always face a class or audience with confidence if the lesson or talk includes a show of living animals. More can be learnt in a few seconds, by looking at or handling a live creature, than by listening for an hour to the most carefully worded explanation.

Although we are now in the twentieth century, it is remarkable that certain well known animals are still greatly



## VIVIDLY-SHADED SPECIES

*A three-foot specimen of the Californian Banded King Snake which recently came into the possession of the author. Its colouring is chocolate and white and it settled down very quickly to vivarium life.*

[Photographs]

[Neave Parker]

misunderstood. The ignorance and fear in which they are held should rightly belong, one would think, to the Dark Ages. Of the different groups which come the way of a herpetologist the snakes belong to this category.

Any animal lover is quick to jump to the defence of his animal favourites, and any sympathetic reader who, like me, can look upon a snake as a beautiful and interesting creature will agree that it is high time to expose the snake bogey. First of all—some facts. Of the 2,300 or so living species in the world, only about 150 are venomous. Of this total those which are fatal to mankind number about 20, that is, less than one per cent of the total. Consequently, actual death from snake bite, even in danger areas, is hardly noticeable compared with the appalling figures from epidemics, wars and road accidents. For example, the deaths from Adder bite in Great Britain over the last fifty years is given as less than twelve. Indeed, the shy and timid little Adder is something to be admired rather than feared.

Do snakes sting with their tongues? They certainly do not. This sensitive organ is used to test the air for particles of scent coming off an object, which lets the snake know whether it is friend or foe, or something to be eaten. Watch the slow-moving tongue of a tame or placid snake, and the speedy tongue of an excited, nervous or hungry one.

The slimy serpent is another myth. Unless freshly out of the water a snake's skin is perfectly dry and often silky

to the touch. In fact, it can be said that a snake makes one of the cleanest of pets. There is no feather or fur to hide any parasite or dirt and, provided that proper care is given, a snake need never suffer from skin troubles. The glossy surface of a healthy specimen is a pleasure to see. Mixed with the true colours is a hidden bloom which reminds one of a bird's feather or butterfly's wing.

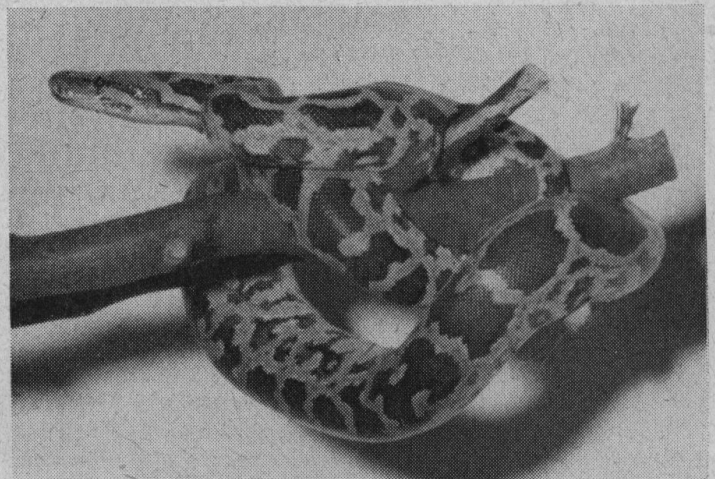
## Movement of the Animals

A snake's skeleton is one of Nature's mechanical marvels. Watch the body glide over an arm and notice the ripple of movement flowing over the snake's skin. There is a rhythmic flow of muscle under the skin, which pulls it to and fro in a kind of caterpillar action, so that the overlapping scales slip forward without catching, but grip the surface on the "return stroke", and the body is rowed forward along its gliding path. One can learn about these things, and others besides, from the snake itself. How much more permanent and real this becomes can be judged by having such an animal as a pet.

Keeping a snake is not all that difficult, provided that one chooses a species which readily tames and whose feeding can be assured. In Britain and Europe generally, the Grass-snake (*Natrix natrix*) has always been a favourite. It is perfectly harmless, and will bite only on very rare occasions. I have never had this happen to me. The aggressive behaviour when first caught is an act of bluff, and the disagreeable smell produced does not persist when the creature becomes tame. With gentleness and careful handling a Grass-snake will become docile within a few days, and may even feed out of one's hand in a week. Frogs, newts and fish are its main diet, and some specimens will also take toads.

## King Snakes Make Perfect Pets

In America, where the number of snakes is far greater, the so-called King Snakes are usually recommended as the perfect pets. Here again, although aggressive at first and even inclined to bite, a King Snake will soon settle down. A very beautiful form of the well-known species called *Lampropeltis getulus* has recently been received from a friend in California. Its body is a rich, chocolate brown,



Young, two-foot specimen of the Indian Rock Python.



marked with pure white bands in the form of loose circles around the body. Within minutes of leaving the air-mail parcel it was drinking water from the bowl in its new home, and next morning ate its first meal, a freshly-killed mouse. This species is a constrictor and an expert climber.

### Rock Pythons

A third favourite for those who like their pets on the large side is the Indian Rock Python (*Python molurus*). This species is well-known for its docility, especially the pale-coloured variety, and is usually the snake which claims attention at the side-show in a circus, or on the music hall. Reptile houses often keep one or two tame specimens for visitors to handle.

An experienced herpetologist will sometimes let children handle snakes, and to anyone unfamiliar with these reptiles it can be alarming to see a small child holding a large Python of twelve feet or more. Is there no danger, it might be asked? Well, firstly, the experienced snake owner would not allow an untamed snake near a young person, and in the second instance the owner would be watching. He knows the danger signs, such as the restless movement, the increased speed of the tongue, and an inclination to hiss. This means that the snake is beginning to warm up with too much handling, or that it is being held wrongly.

Handling a snake takes a little understanding. One does not actually grip the body, like holding a rabbit or cat, but merely supports it. The snake can then treat the arm or shoulder as a kind of tree to grip and rest on. So as not to fall off some snakes will use their coils to secure a "foothold", and the first time one feels the steady pressure of a Python as it grips the arm or neck the

sensation can be rather alarming. A snake can be supported and stroked anywhere along its body except the head. The snout, in particular, should not be touched, and most snakes will resent this.

Is the fear of serpents instinctive—in other words, are some of us born with it? Personally, I doubt it. A tiny child will gurgle over a snake and play with it, as if it were a puppy or kitten. If the snake should happen to bite the child it may then grow up to mistrust snakes, but surely a similar situation could arise if the puppy were to bite or the kitten scratch. It is here that the wise parent or teacher will intervene, and explain that the bite was only an accident because it was not handled correctly. This may be a white lie, but it is much better to put the blame on the child than on the pet. This teaches gentleness and understanding.

### Show No Fear

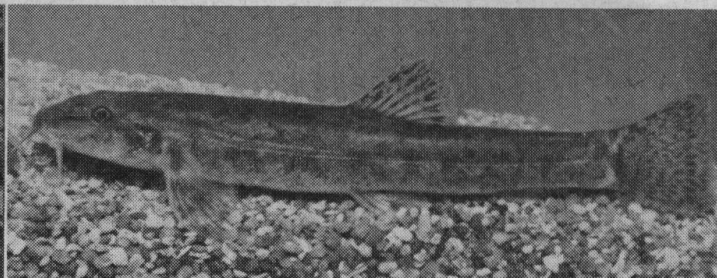
Above all, the parents should show no fear themselves. This can be very infectious, and will have a lasting impression, especially if backed up with some such remark as "Leave the nasty, horrid thing alone or it will sting you." The point of all this is to show how valuable the keeping of live animals is in education, especially where so much ignorance still exists, as in the case of snakes. The writer has no intention of beginning a crusade to convert everyone into snake lovers, but would be happy to see a little more tolerance towards these misjudged animals.

Let the snake become its own ambassador. It is up to those who keep them for educational work, to expose the many popular fallacies, and above all, to encourage the younger generation to admire and respect them for the graceful and beautiful creatures they are.

## Coldwater Fishes

By R. J. Affleck, M.Sc.

# Stone Loach and Miller's Thumb



[Photographs]

[H. V. Lacey and L. E. Perkins]

Two bottom-living, native fishes. Left, Miller's Thumb (*Cottus gobio*) and, right, Stone Loach (*Nemachilus barbatulus*).

**T**HE Stone Loach (*Nemachilus barbatulus*) is very like a Gudgeon in appearance as it lives on the bottom of rivers and lakes and has barbels around its mouth. However, it may be readily distinguished from a Gudgeon by the small eyes, six barbels (two long, four short), the tail fin which is not forked, and the small scales.

The Spined Loach (*Cobitis tenia*), which bears a spine on the operculum, is a smaller fish with a relatively smaller head. It has six barbels of equal length and a well-rounded tail fin. Both Loaches may be kept in aquaria.

The Miller's Thumb (*Cottus gobio*) is the only British freshwater Bullhead—its other British relation being marine. The head of this fish, which is broad but flattened dorso-ventrally, is responsible for the popular name and is

noticeably wider than the rest of the body. The fish is very rough to the touch, due to spines on the operculum, pelvic, and dorsal fins.

Miller's Thumbs are found under stones or rocks in the headwaters of rivers where the water is clear. Under these conditions it is not surprising to find that they are solitary and carnivorous.

### Species from Running Water

Most fish which normally live in clear, running water are difficult to keep under aquarium conditions unless the water is circulated. Aquarists who like to keep and breed unusual species might attempt to breed those found in such locations. Miller's Thumbs pair off in early Spring and about April eggs are laid in a rough nest under a stone. The male guards the eggs until they hatch.

## Herpetologist's Notebook

## Careful Observations Can Aid Science

Says Alfred Leutscher, B.Sc.

**A**NYTHING curious or out of the ordinary always forms an attraction, and this can be said for animals, as well as people and events. Among the animals, reptiles and amphibians excite curiosity, mainly because they are not well known. This is what makes them so fascinating to many pet keepers.

Pets can always teach us something, and apart from the pleasure they give us in their companionship, or in breeding them and winning awards at shows, the knowledge we gain can sometimes be of value to science. This more serious side to a pet hobby is sometimes overlooked. Simple experimental work in an aquarium or vivarium quite often demands only a little patience and careful observation to prove a theory or uncover a problem which might take months to sort out in the open.

In herpetology the vivarium keeper has many opportunities for this, and can assist the scientist in numerous ways. For example, what exactly happens when two frogs or toads pair in order to spawn? One would think that we knew all about this familiar yearly act, yet it was only a few years ago that the full process of mating and spawning was seen in close-up and it took place in the aquarium.

**Pairing of Amphibians**

It is well known that when these amphibians pair up, the female's eggs are fertilized by the male after they leave her body, that is, in the water. How does he know exactly when to fertilize them? The aquarium has given the answer.\* It is the behaviour of the female which warns the male. In the case of a frog, the female contracts her body in spasms as she lays. With the toad, the male feels the egg strings sliding across his hind legs as they emerge. In the absence of these two movements the males do not emit their sperm.

Sometimes a male frog or toad will grasp a spent female. It is then that her struggles tell him that he has made a wrong choice, so he lets go. A male gripped by another male will also struggle, and often croak in protest, with the same result. Normally, a female ready to spawn will remain passive.

The curious courtship of newts, in which the male performs a display, has also been observed in minute detail in the aquarium. An Italian naturalist thought up the idea of suspending glass tanks from the ceiling, so that he could watch the newts from all angles. All this can be observed each year by anyone who cares to keep some newts in a tank,

**Photographing Fish***(Continued from previous page.)*

on the bubble-nest, then with a panchromatic plate in position and a piece of black card held in front of the open lens, wait until the fish is seen to come near the point in focus. Now quickly uncover the lens, and fire a flash bulb directly over the tank as near as possible to the water. Immediately re-cover the lens, and the plate is ready for processing. It should be pointed out that as a small stop is used, the time elapsing from uncovering the lens to firing the flash is so short that there is no chance of an image being recorded on the plate.

The speed of the flash is approximately 1/75th of a second and is quick enough to catch the characteristics of your favourite fish. So just unearth that old fashioned camera, give it a thorough dusting, and get busy.

and can spare a few hours to watch their behaviour. Observations like these would be tedious, if not impossible, from the pondside.

A classical case of an accidental discovery was that of the famous Axolotls which "grew up" in their tanks in the Jardin des Plantes, in Paris, where they had been sent from Mexico in 1864. It was here, through an oversight, that the water was allowed to evaporate from their home, with the result that some of them transformed into land salamanders with lungs. Since then, innumerable experiments have been tried out on axolotls, to try and solve the mystery why they never grow up in Nature. Readers may be familiar with the giving of thyroid extract to these "Peter Pans", in order to make them metamorphose.

At any moment a vivarium keeper can make a new discovery. I remember on one occasion keeping a very tame



Photograph]

[S. Crook

*The Adder, a native snake which the author observed in an outdoor Vivarium. He saw the dance of male Adders, which is a display of rivalry, as they establish claim on territory.*

toad and frog. The toad would allow itself to be placed on the hand, and would even catch flies if held up in the wall or window. The frog would attempt to "swallow" a finger if this was waved in front of it. One morning a large Slow-worm came near the frog. The frog made attempts to catch and swallow it, but could not obtain a grip on the smooth scales. Suddenly, it began leaping madly around the cage and ended up in one corner with its mouth open and emitting a noise. This is a frog's normal fear-reaction to a snake. It seemed as if the frog mistook the Slow-worm for a meal one minute, and a snake the next.

**Reaction of a Toad**

The "meal" was then offered to the toad. First it tried to catch it, then suddenly stopped, and instead reared itself on to its toes, swelling the body to twice normal size. Here again, this is exactly what happens when a toad faces a snake. The deduction one draws from this, is that frogs

\* A full account of this is given by the observer, Maxwell Savage, in his paper in the Proceedings of the Zoological Society, London, 1934.

and toads probably judge a meal by its movements and size. Large moving objects are to be avoided. It is possible that these two pets had largely overcome their fear-reaction in the presence of humans, and may have forgotten what a snake looked like.

The Slow-worm also taught me something; that these reptiles can eat snails. The much larger Slow-worm of South Europe, the Glass Snake or Scheltopusik, does it with ease, simply by crushing the snail in its powerful jaws, and swallowing the lot. A British Slow-worm with its small mouth cannot do this. My specimen solved the problem in this way. It approached the moving snail, a small example of the garden species, *Helix aspersa*, in the deliberate way that Slow-worms stalk their prey, and grasped the soft body before it could withdraw. In about five minutes it had worried and chewed the delicate morsel out of its home, leaving the shell behind.

### Defence in the Grass-snake

Grass-snakes make splendid pets as soon as they become tame, but they can be objectionable at first. The unpleasant fluid which they emit is part of their defence mechanism, but this usually disappears once a Grass-snake is used to being handled. On the other hand, if we leave our snake entirely alone for a few days and do not go near it, it will revert to the wild behaviour, and the defence mechanism will return. This suggests that snakes have short memories.

Many interesting memory tests can be performed on pet reptiles and amphibians, such as experiments with different foods. Certain brightly coloured animals are avoided as food because they have an unpleasant taste. The yellow and black caterpillar of the Cinnabar Moth is a good instance. It is found in colonies on the ragwort, a common wayside plant. Hardly any bird will touch it.

I tried out some of these caterpillars on a salamander. It immediately took one, then spat it out. After about five goes it refused any more. An hour later the same thing happened, but this time with less mistakes. Only after the fifth experiment (they were done at hourly intervals) did the salamander ignore all the caterpillars. The whole experiment was repeated the following day, with slightly better results.

Only after the fifth day was the salamander fully aware of the caterpillar as something not to eat. A month later the experiments were repeated with similar results. The tables were really turned on the salamander, since this amphibian uses the same warning pattern of bright yellow and black, and is avoided by enemies because of the poisonous skin it has.

### "Dance of the Adders"

Perhaps my most exciting personal observation was to see the strange "dance of the adders", in which these snakes rear up against one another and appear to sway in a curious fashion. Because this snake is a nervous captive, and usually refuses to eat, I kept my specimens for a while in a small garden reptiliary, and watched them at intervals unobserved from a hiding place.

At the time I made the popular mistake of thinking that I was watching a mating dance of adders. It has since been shown that only the males take part, and that this is a display of rivalry in order to establish a territory. The moral here, is that one should always be honest about what one sees, and resist the temptation to invent something, or fill in a gap from one's imagination.

Scientists are trained in accurate observation, but are always willing to encourage the amateur and enlist his help. The vivarium and the aquarium have a great deal to offer to science, and the hobbyist can play his part. The most important thing is to get it all down on paper before the memory fades. I wonder how many readers keep a notebook and pencil handy beside their tank or vivarium at home?

## READERS' HINTS AND TIPS

### REMOVING SURFACE SCUM

**I** FOUND the "newspaper method" of removing surface scum rather frustrating so I devised the following plan.

Submerge an empty jar until it is just below the surface of the water. Only the surface water will run into it carrying in the scum. If the jarful of water is poured back into the tank through a cloth (I use a small cotton net) the scum remains in the cloth and no water is wasted.

This method is particularly useful if there are floating plants in the tank as the majority of them are unaffected and those that are "caught" can be easily rinsed and replaced.—(E. W. QUICK, London, S.E.6.)

### CONTAINER FOR LIVEBEARER FRY

**A**NY transparent sandwich box of the approximate dimensions 8 in. long, 4 in. wide and 2½ in. deep, will suffice for the first home of newly-hatched livebearers. The container may be floated in the community tank without being unsightly or interfering with the glass cover over the tank.

The advantages over the ordinary glass jar type of container are as follows:—

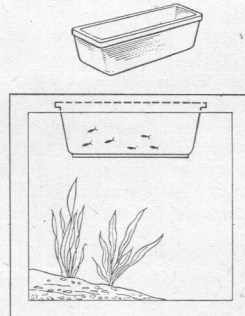
(1) It is very light in weight and displaces very little water, thus it may be filled almost to the top. The water level in the container is almost the same as that of the tank.

(2) The surface area is comparatively large and the water is ideally shallow for fry.

(3) All food will be easily found by the fry and uneaten food, etc., may be siphoned off quite simply.

(4) The fry can be readily observed.

This container can also be tried for breeding *Daphnia*.—(R. N. BURGESS, London, S.W.19.)



### TRANSPORTING TROPICALS

**I** HAVE made an effective tropical fish carrier using a national milk tin which, when lined with felt and glass wool, just accommodates a 2 lb. jam jar.

To adapt the tin, first soft solder two wire lugs to the top of it. These are intended to take the handle which is made from a length of soft iron wire bent to shape. Before shaping the handle thread it through a piece of ⅜ or ½ in. dowel which has been drilled through the centre. This will give a comfortable hand grip.

The tin is lined with felt and glass wool on the inside and the jar is placed in the centre. These materials have proved effective against excessive heat loss. The tin and handle can be painted any shade required.—(F. L. HOYLE, Farnworth, Lancs.)

Readers are invited to send details of hints and tips they have found helpful in their fish-keeping. 10s. 6d. is paid for each one published.

## Herpetologist's Notebook

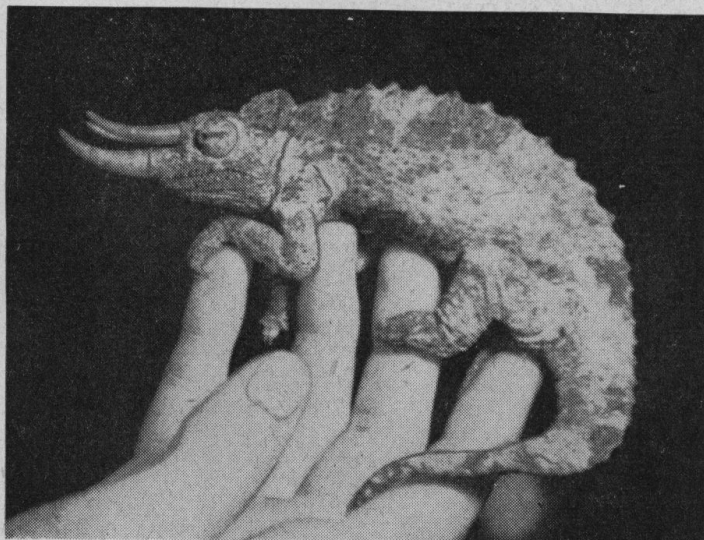
## Chameleons—Curiosities among Lizards

By Alfred Leutscher, B.Sc.

**T**O most people the name chameleon is far more familiar than the animal itself. This animal curiosity is really a lizard whose anatomy is unique in the reptile world. The Family of about 80 known species, called the *Chameleontidae*, is put into a special division of lizards—the *Rhoptoglossa*. This name means “a throwing tongue” from the chameleon’s way of catching its food, mainly insects.

The ancient Greeks first named this harmless little animal, and compared it to a “miniature lion” (Greek: *camia*—ground, and *leon*—lion). They believed that it lived on air alone which idea probably comes from the chameleon’s habit of swelling up its body when angered or alarmed. Needless to say, it requires both food and water to live.

Well over three-quarters of the species belong to the Genus *Chameleo*. A feature is the narrowness of the head, large size in many species, and the adornments of curious hoods, shields and horns found especially in the males. One can roughly divide them into Eared Chameleons, Helmeted Chameleons and Horned Chameleons, as they are popularly named. The Eared Chameleons possess a



Photograph] [Fox  
The three-horned Jackson's Chameleon (*Chameleo jacksoni*) from Africa, one of the most grotesque Chameleon species.

kind of hood of horny plates, called a casque, which covers the top of the head and may extend down the sides to resemble superficially a pair of ears. The Common Chameleon (*Chameleo chameleon*) shows this characteristic. It is about four inches long, and lives in North Africa, countries of the Middle East and South Spain. In cultivated areas, it frequently turns up in orange and olive groves. This little animal mates towards the end of Summer, and lays up to 20 eggs in the soil in Autumn about six weeks later. Incubation may take from 4-18 months.

A much larger species is the Eared or Flap-necked Chameleon (*C. dilepis*) of Tropical Africa. It grows to about six inches and has a well developed casque extending alongside the back of the head as two flaps or “ears”. It is a handsome species and colours up to a bright green in suitable surroundings. It is an egglayer, and may produce up to 50 eggs.

The most striking species are those with horns. Meller's Chameleon (*C. melleri*) is a large, impressive species from East Central Africa, but of all chameleons it is possibly Jackson's Chameleon (*C. jacksoni*) of Kenya and neighbourhood which has the most fearsome appearance. It has three horns, one on the end of the snout and one near each eye. To look at it one can well understand how some people fear chameleons, saying that they are poisonous.

The so-called Pygmy or Dwarf Chameleons belong to separate Genera. A well-known example is the three-inch midget, *Microsauria pumila*. There are good reports of its thriving in vivariums. It is a livebearer, and gestation of about six months is followed by a family of up to 12 young. The colouring of *M. pumila* is green with a brick red lateral band interrupted by patches of blue.

The short life of a chameleon, even in the wild, coupled with its slow movements and harmless nature are to some extent compensated by its remarkable camouflage properties. Not only does it look like a leaf, both in shape and colour, but “acts” like one. As each grasping foot is carefully placed in front of the other to take the next step, there is a pause, and the body rocks to and fro like a leaf swinging in the wind.

The colour range is due to the ebb and flow of pigment within the special chromatophores, or skin-cells. This

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for the Fishkeeping Enthusiast

works through the nervous system, but the stimuli can be most varied. Light probably plays the most important role, followed by changes in temperature and humidity, but emotional disturbances will also cause a change. Without being too unscientific, it can be said that a chameleon will turn pale with fright and black with anger.

A chameleon's tongue is another unique feature. It can extend to the length of the body, and rarely misses its aim. The club-shaped, sticky tip adheres to anything which it strikes. Those most extraordinary objects, the eyes, focus on to the prey, but at other times may wander about in all directions. Each is set into a conical pouch with a slit-like tip through which the eye-ball peeps. When the creature is asleep the slit is closed.

Sometimes a Chameleon will deliberately try to hide, by placing its body behind a branch, rather like a squirrel does when disturbed. The tail helps to give it extra support, but it will be curled up when not in use, unless the chameleon is unwell, when it tends to hang loose.

Chameleons in vivariums should be given a feeling of freedom; even though they do not move about much. Also, since they quarrel a lot, they are best kept singly. A four-to six-inch specimen should be given a cage no less than 2 ft. high with 18 in. of floor space. The cage should be made of window glass set into a frame of wood or angle iron. The kind of display cabinet seen in shop windows or on counters would make an excellent substitute.

One glass side should be fitted into a separate frame to act as a doorway. Ventilation is through the roof, made of wire netting or perforated zinc. A sliding roof placed over this will help to control the heating. Heating comes from below, and should be maintained at about 75 deg.F. The glass case, which has an open base, is placed on a shallow wooden tray which is waterproofed in some way. Part of it is sectioned off with a screen of perforated zinc. Inside, a light socket is fixed to the side with a flex leading off to the nearest point. The socket takes an ordinary domestic light bulb of 60 or 75 watts. When switched on the heat from it will rise into the cage, and it is surprising how much warmth is generated.

### Plant Decorations

The rest of the tray is filled with small stones into which are sunk some pots containing plants that enjoy warmth and humidity. A local florist could supply these. The purpose of live plants is to give the chameleon some cover and to overcome the bare look of the cage. A few dead branches fitted among the plants will give the pet something on which to cling.

It is a good idea to add a dish of fresh water to the cage, which must be topped up daily. The evaporation will provide an air humidity which is natural to the closed-in surroundings of bushes and trees where chameleons normally live. The chameleon does not drink in the usual way from the ground, but licks off moisture from leaves, such as rain or dew drops. This may be provided by spraying the leaves occasionally with fresh water.

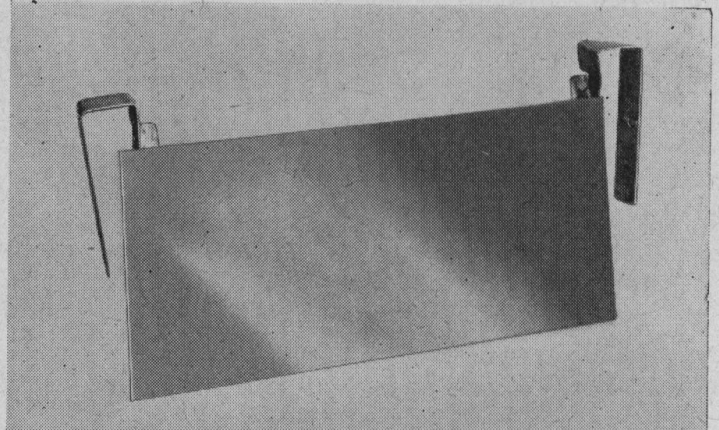
Chameleons sometimes lay eggs in vivariums. In Nature they descend to the ground, excavate a burrow to lay their eggs, then cover it up. A tin box containing some slightly moistened, loamy soil should be placed in the cage. If eggs are laid in this, the box can be removed without upsetting them, and placed in a warm place until they hatch.

In attempting to hatch out chameleon eggs, the reader is reminded that they can take quite a while to develop, and that some patience is necessary. Up to 18 months is not uncommon. A tropical aquarium makes an ideal incubator. The chameleon eggs are left in moss inside a glass jar which is simply floated in the aquarium.

Artificial heating is not always necessary during the Summer, should the outside temperature be high enough. In Winter some other source of heating, such as a fire or radiator can be brought into use.

Finally, a certain amount of natural sunlight is beneficial.

## Gadget to Prevent Bubble-nest Damage

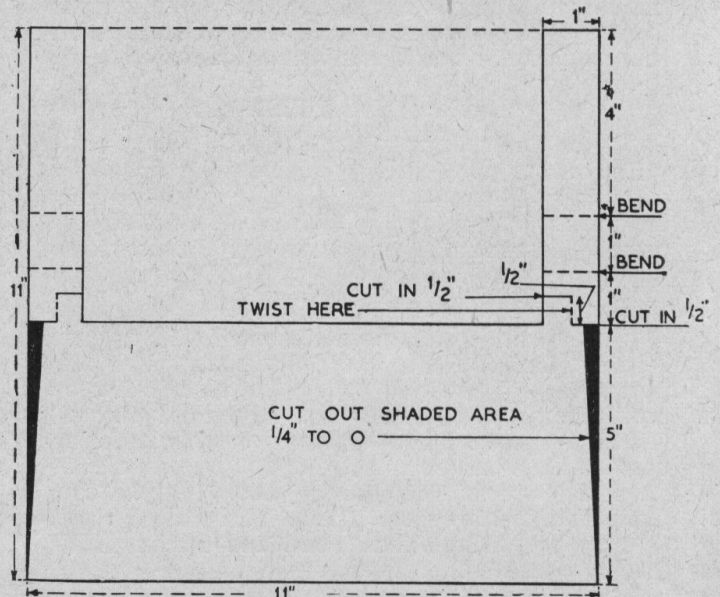


Divider to go across the breeding tank. Sketch below shows construction.

**I**N an attempt to breed Siamese Fighters (*Betta splendens*) I found that it was a tricky operation removing the female after the spawning, without breaking or disturbing the bubble-nest. I therefore designed from an 11 in. square sheet of 1/32 in. gauge aluminium the divider illustrated.

A 24×12×12 in. tank was prepared for the spawning attempt. Once the male started making his nest of bubbles the divider was placed just over half-way along the length of the tank, leaving ample room for the nest. The two hooks clip over the top angle of the tank. The water at 75-80 deg.F. was dropped to ¼ in. above the bottom of the divider. The male ducked under the partition quite happily when it wished to do so.

While nest building was in progress I inserted a sheet of glass under the metal so that a complete partition was formed. The female was placed in the side away from the bubble-nest. After the fifth day the glass was removed and



the pair spawned. When this was completed I removed the female without disturbing the nest, while she was in the end away from the bubble-nest. The metal sheet projecting just below the water surface prevented surface movement of the water breaking up the nest. The result was a successful spawning of Fighters.—W. HOUSE (Tonypany A.S.).