

realized and also, by the use of dyes and other materials, that their direction downwards through the gravel is approximately at right angles to its surface, irrespective of the gradient of the gravel bank.

The influence of these currents on the distribution of the bottom fauna and flora is being investigated, but it is evident that incubating ova and developing larvæ of salmon, trout and minnows are thus provided with the maximum aeration possible.

Further indication of the biological significance of these currents has been obtained incidentally by the successful spawning of minnows (*Phoxinus phoxinus*, L.) in the experimental tank, no previous record of which is known to me. The ova deposited at the surface of the gravel became lodged in the gravel bank, presumably by the action of the downward currents, and some thousand fry have since been reared in this tank. A full account of this work will be published elsewhere.

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¹ Stuart, T. A., *Sci. Invest. Freshwat. Fish. Scot.*, 5 (in the press).

Frequency of Moulting in Anura

THERE appears to be no accurate information available on the frequency with which the Anura moult. In his recent monograph on the British Amphibia, Smith¹, discussing the habits of *Bufo bufo* (L.), writes: "Periodically the skin is shed, certainly several times in the course of a summer. Gadow states that they shed it every few weeks, but this surely is an overstatement".

We have investigated the frequency of moulting in two species of *Bufo* and one species of *Breviceps*. The method employed was simple. The animals were kept in isolation in boxes with a dish of water. A small area of the back was painted with Gestetner correcting fluid. This mark comes away with the cast at the time of moulting, which can thus be accurately determined. There is no evidence that the fluid has any adverse effect upon the animals. Observations were made every twelve hours and the animals were maintained at a constant temperature of 20° C. The results obtained are summarized in the accompanying table.

	<i>Bufo regularis</i> Reuss	<i>Bufo carens</i> Smith	<i>Breviceps</i> <i>mossambicus</i> Peters
Mean duration of intermoult (days)	5.8 ± 0.1	4.3 ± 0.1	5.7 ± 0.2
Maximum and minimum values (days)	3.5-9.5	3.0-6.5	4.0-6.5
No. of animals	80	16	4
No. of observations on each animal	6	5	5

It will be seen that the moulting of these three species is a much more frequent event than had hitherto been suspected. Preliminary observations on *Rana oxyrhyncha* Smith, *Rana umbraculata* Bush and *Xenopus laevis* Dandin indicate that these largely aquatic species moult about once a week; but no satisfactory method of marking has yet been de-

veloped which allows accurate quantitative statements to be made.

A fuller account of these results, together with observations on the influence of environmental and other factors on moulting, will be published elsewhere.

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¹ Smith, M., "The British Amphibia and Reptiles" (Collins, London, 1951).

Use of X-Ray Stereoscopy for examining Shipworm Infestation *in vivo*

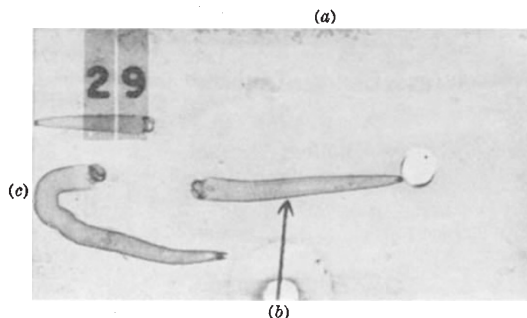
THE ravages of the shipworm, *Teredo* sp., particularly in warmer seas, are notorious. In order to combat these attacks several methods of control are in use. The pretreatment of timber by creosote, preferably under pressure, is normally recommended, though other compounds have also been employed.

Prerequisites to the development of improved treatments are: (a) a knowledge of the habits of the larval *Teredo*, its method of entry and selection of points of attack; (b) the growth and behaviour of the adult; (c) a reliable method of assessing attack by *Teredo* on experimentally treated wood blocks.

Since the *Teredo* enter the wood as minute larvæ, and remain inside, they are scarcely noticed until the block falls to pieces as a result of their activity. Assessment or examination of the extent of attack before this occurs normally involves opening up the wood, as, for example, by planing off the surface¹. This inevitably terminates the experiment.

Although as early as 1924 a photograph of heavily infested wood taken by means of X-rays was published by the National Research Council, Washington², the idea does not appear to have been put to practical use. It is therefore hoped that the details given below will be of assistance to workers investigating measures of control.

In the course of work carried out during the past three years on the efficacy of various methods of treatment of experimental wood blocks we have used X-rays for *in vivo* examination of *Teredo* without causing them or the blocks any injury. This has allowed us to follow the growth and boring habits of individual shipworms from the time of their initial settlement in the wood.



Radiograph of one half of a pine block showing (a) newly settled *Teredo* larva, (b) typical individual about one month old growing along the grain, and (c) burrow turning at the block edge. Two-thirds natural size