The pump is directly geared to the tractor on which the machine is mounted, and therefore the concentration taken into the pump is an exponential function of distance along the plot. Since it is necessary for air to be expelled from the spray system before the plot is reached, the simple principle above described is modified by providing also a direct tube from the water tank to a three-branch cock immediately above the pump. The tractor is driven towards the plot spraying water only, pumped through this line. The cock is then quickly thrown over and spraying of chemical commences. Owing to residual water in the pump and manifold, the concentration at the spray nozzles, after clearance of the tubes to the nozzles, rises steeply to a concentration somewhat less than that initially charged, before decreasing along the remaining length of the plot in an approximately exponential manner. The concentration is uniform across the plot. The form of the curve can be worked out theoretically from the volumes; but results are based on experimental calibration. The experimental curve is very accurately constant over the range of speed of a tractor working in one gear. Since the machine is effectively self-washing, repeated sprayings with the same or different chemicals can be made very rapidly.

The machine has enabled the expected advantages of speed and continuity to be obtained, and in addition provides a means of obtaining a rapid estimation of selectivity, and the dosage ratio for limiting crop-damage and limiting weed-kill. Changes in apparent effect with time are also easily observed. By filling throughout with the same spray liquid, the machine can be used for normal spraying. It is also possible to use the machine for examining the effect of admixture of herbicides or of a herbicide and an ancillary (for example, wetting) agent in continuously varying ratio. The exponential form for one concentration or ratio is not, however, the most satisfactory for this application, and a modified machine, using two mixing tanks in series, which gives a sigmoid concentration–distance curve, is to be preferred.

Our thanks are due to Mr. A. Ross for construction of the machine and to the directors of Fisons Pest Control Ltd. for permission to publish this account.

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Live Coelacanths

From the discovery of the first Coelacanth at East London in 1938, it was my aim not only to discover their true home, but also I hoped to live to see a living Coelacanth, and for mankind generally to be able to see this living link with the incredibly remote past. When *Malania* was found at the Comores, I planned to catch Coelacanths alive and to keep them alive. It is therefore gratifying that the French are plainly making every endeavour to achieve this. The article by Prof. J. Millot in *Nature* of February 26, 1955, on the experience of the first living Coelacanth at the Comores is of special interest.

The failure of the French to keep their fish alive for more than a few hours is attributed by them to decompression combined with rise in temperature of the water, while a high degree of photophobia on the part of the fish is alleged. While there may be something in this, in my view the cause is probably quite different. Prof. Millot and his collaborators are possibly not aware of the experience that large fishes taken alive after a struggle on a line even with no visible laceration rarely live long after, certainly not in aquaria, and even when liberated many die very shortly. Curiously enough, fishes taken by harpooning, even when extensively gashed, show a greater survival-rate than those taken on hooks. Coelacanths caught by net or trap and kept in a closed vessel will almost certainly have a greater chance of survival even at normal pressure.

It is doubtful whether the view about decompression or small variation in temperature is tenable, since after being hauled to the surface in a trawl-net near East London, the first Coelacanth lived for more than three hours, out of the water, on the deck of a trawler on an unusually warm day.

It is interesting to note that the French used a boat as an improvised aquarium. At a meeting in Nairobi in October 1953 I suggested a decked boat, since it seemed likely that an important factor in survival would be to shield the fish from shocks until such time as it could become accustomed to a new environment. An open whaler, however, was used at Matsumudu, so that the fish had a clear view. We are told that "Throughout the night, which the delighted population of Matsumudu passed in singing and dancing to celebrate the capture, the Coelacanth was watched over with admirable care", by officials, doubtless with constantly flashing torches, and only those who have experienced a night such as is indicated here can have any idea of the noise and lights: the Coelacanth at Matsumudu must have passed the night in a state of high nervous tension.

What the French considered 'photophobia' on the part of the Coelacanth is, in my view, no more than the natural uneasiness that any large and intelligent fish would experience as unfamiliar surroundings and objects become increasingly obvious from dawn.

The 'luminescence' of the eyes of the live Coelacanth is interesting. This phenomenon is, however, quite common in sharks and other large fishes of shallow waters, and on this night there was bright moonlight.

It is a notable feature of the reports that the depth to a metre at which each Coelacanth was caught has been stated. As all these were apparently taken by natives fishing from drifting canoes at night, and the slope of the bottom offshore at the Comores is stated to be at least 50°, it would be of general interest to know how this high order of accuracy is achieved.

In the matter of the first egg-bearing female Coelacanth, it is a strange coincidence that this was captured by one of the crew of Captain Hunt's vessel, only a short distance from where this was anchored. (It was Captain Hunt who took our Coelacanth leaflets to the Comores, which resulted in the discovery of *Malania* there.) The fish was apparently cut open and seen to contain a cluster of eggs at all stages of development "such as is observed in a fowl", or in oviparous sharks. We may therefore expect Coelacanths to have egg-cases like those of Elasmobranchs.

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June 17.