

A Snail Farm in the Netherlands

by

W. S. S. VAN BENTHEM JUTTING

(Zoological Museum, Amsterdam)

In the Netherlands the Roman Snail, *Helix pomatia* L., occurs in the wild state only in the extreme S. E. part of the country, the province of Limburg, S. of the bottleneck of Sittard. This region is formed by the last spurs of the German and Belgian mountains and consists of limestone hills, carved by the rivers into table-lands with precipitous cliffs. In structure, scenery, and vegetation it is quite unlike any other part of the Netherlands, and the fauna, especially the snail-fauna, is likewise very different. Here the Roman Snail is a common inhabitant of waysides and woodland. By the local population it is called caracol or karkol.

For many years it has been the custom among the residents of the region to eat the Roman Snail now and then. Local collectors went out to collect them, if anyone ordered them. Export on a small scale went to Belgium, but the Dutch people who have always been very particular in eating anything apart from their traditional food, detested these gruesome beasts. Of late years, however, a distinct change in the public opinion has taken place, and certain Dutch epicures have developed a taste for Roman Snails.

This encouraged one of the local collectors, Mr. P. FLORACK, waiter of one of the restaurants at the town of Valkenburg, to enlarge his business by founding a nursery garden for caracols.

To that end he hired a plot of meadow-land, surrounded by hedges of elder and alder. It occupies 33 x 12 m square and is divided into two rectangular beds, with vegetation of grass, bur (*Lappa major*), greater Plantain (*Plantago major*) and other meadow-plants and one small tree. Between the beds and around the entire plot are narrow foot-paths; at the entrance there is a somewhat larger free strip where about a dozen small cages for special cultures and a modest shack have found a place. Before Mr. FLORACK rented it the plot used to be a dung-heap and a system of drain-pipes had been constructed below the centre of the garden, so that this part is somewhat higher, sloping gently to the sides.

This technical detail proved to be of great value for the snail culture because at heavy rains the higher part forms a refuge for the snails which like moisture but are afraid of water.

Each bed is surrounded by a border of double chicken-wire about

20 cm high. The meshes are too small to let the adult snails escape and moreover the wire is sloped somewhat toward the interior of the beds. Along the wire border a narrow strip of fine marlstone has been strewn to provide for the animals' lime hunger. On each bed a few dead logs and a number of little bridges or racks have been driven into the ground to offer the snails opportunities to climb.

Apart from the snailgarden Mr. FLORACK has rented about a dozen parcels of woodland and meadows where he can collect his future inmates. His experience has told him that meadows where sheep or horses graze or ivy-covered plots are bad collecting grounds whereas cow-meadows and shrubs of alder are especially favourable. Without further investigation it is not possible to give an explanation how these factors work.

In spring Mr. FLORACK starts collecting on the plots in the country; he always takes adult animals which are — according to him — 12 to 19 years old. Young and semi-adult snails are not taken.

The full-grown caracols are brought to the beds in the snailery. They are fed on lettuce-heads, surplus of a kitchen-garden, which they prefer above all other vegetables, even if the lettuce is no longer quite fresh but slightly decaying. In addition, powdered marlstone mentioned above is indispensable.

The snails not only supply their need of lime indirectly by consuming lime-containing plants but also directly by rasping off the raw material.

Watering of the snails or of the cultivation-beds is not practised. Generally the Dutch climate provides enough precipitation to keep up the required degree of moisture. During a very dry spell the animals move only at night when some dew is formed.

During strong insolation the snails hide under the vegetation of the soil or under the little log-bridges. For fixing their shell in this upside-down position the snails secrete a transparent circular membrane between the aperture of the shell and the substratum. The foot is then retracted. In zoological textbooks this membrane is generally regarded as a protection against desiccation. Mr. FLORACK, however, supposes that it also keeps away flea-beetles (small beetles, or perhaps also other organisms?) which try to enter the pulmonary cavity of the snails.

If, later, the snails want to return to the ground they simply let themselves drop, for they are not capable of retreating backwards, nor of creeping with the head downwards.

During the months June to August the Roman Snails mate. This procedure can take place at any time of the day or night and takes $3\frac{1}{2}$ hours, the prelude included. One pair unites only once in a

season. The animals are at least 6 years old before they start mating for the first time.

Although *Helix pomatia* is hermaphroditic, so that potentially any one individual would be sufficient to propagate by selffertilization or any two individuals could mate reciprocally, Mr. FLORACK has observed that for each fertile copulation the two partners are morphologically different. The functional male has a darker footsole than the functional female, and moreover its skinwarts are more „en relief” with darker veins between them. According to Mr. FLORACK only the last-named matings are fertile. Although the mating (mock-mating!) of two „males” or two „females” is followed by egg-production, such eggs are always sterile. Reciprocal mating has never been observed.

For a final opinion the assertions of Mr. FLORACK ought to be checked by section and experiment. Answers to the following questions should be sought: Do the functional males remain in the male phase during their whole life or does the sex change with increasing age or from year to year? How is this evident from the generative organs?

Eggs are laid in clusters of 22 to 25. If the soil is loose and rough, the snail digs a funnel-shaped hole of 2 to 5 cm depth *in* the soil and deposits the eggs in it. Is the soil too hard for digging she spawns *on* the soil under a leaf or a stone. After about 22 days the young snails hatch. These do not further concern Mr. FLORACK because they are liable to run away through the meshes of the wire and because the somewhat artificial circumstances in the snailery cannot compete with the snails demands in nature.

In malacological literature *Helix pomatia* is usually stated to attain an age of 2—3 years, in exceptional cases up to eleven years. Therefore I was much surprised at Mr. FLORACK's presumption that the adult animals in his snailfarm are between 12 and 19 years old.

If we take each distinct modification of colour and structure in a *Helix pomatia* shell as the transition to a succeeding year we can, indeed, arrive at a number of 12 years and more for a well developed caracol.

I will not combat the opinion of a man with such a long experience in snail cultivation without bringing forward the result of reliable tests and culture experiments. The first thing to be done is to start breeding series of marked snails from the egg to the adult stage.

A Roman Snail of about 12 years weighs about 25 gram, another of 19 years about 35 grams (inclusive of the shell). Mr. FLORACK determines the approximative weight by the touch, just as a postman

knows by lifelong experience the weight of a letter by testing it in the hand.

Towards autumn the Roman Snails become slower in their movements and take less food; they are preparing for hibernation. Towards the end of October or early in November they hide in the ground, retract in their shell and close it by means of a temporary calcareous lid (epiphragma) of 2 to 3 mm thickness. The epiphragm is formed by the mantle, from the margin to the centre. The central part which is closed last is thinnest.

The hibernation of the Roman Snails and their presumptive instinct to „know“ in anticipation if the winter will come early or late and will be mild or severe has not failed to provoke a flood of doubt and criticism.

According to Mr. FLORACK the snails prepare for the dormant stage early, end of October or beginning of November, if freezing is starting early. If on the other hand the frost is late, then the snails do not retire before the end of November.

Moreover he has observed that before a severe winter of many weeks below zero the snails burrow deep (16—20 cm deep), but before an open winter they remain closer to the surface (8—9 cm deep).

Although these presentiments of the snails seem somewhat fantastic, and although many persons are inclined to regard them as sheer nonsense I may perhaps remind the sceptics that there are many animal instincts generally acknowledged but not understood by man (e. g. migration of birds, of eels, etc.)

Before December 6th all Caracols have disappeared from the surface and lie hidden in the ground. In nature the animals would remain in this dormant condition, living secretly on their reserves till the spring awakes them.

But in his snailery Mr. FLORACK digs up by the end of November or the beginning of December all the hibernating animals and transports them to the garden of his house. Here he enters them into the earth at similar depth and in this way they are ready at hand for the market.

Hence the snail-farm is only a temporary residence of 6—7 months for 12 to 19-year-old animals where they are fattened. During the other months of the year they are kept in store, like the farmers ensilage potatoes, or beets.

The purpose of both depositories is to have in store living animals for the two categories of customers: the epicures who appreciate a savoury dish, and the zoological institutes which use the

Roman Snail for various scientific experiments and for class-room courses for students.

For the table almost any adult snail can be used, but according to Mr. FLORACK the hibernating specimens are most delicious. By throwing them in boiling water the epiphragm springs loose, the columellar muscle releases and the soft parts can be extracted from the shell.

The zoological laboratories demand the largest possible specimens of about 35 grams.

For consumption the snails can be delivered alive (at 10 cents apiece) or prepared according to Mr. FLORACK's special recipe (at 30 cents apiece). The method of letting the snails clean their gut by feeding them some time on bran, flour or oats before boiling is not in use here. Neither is it practised in this country to feed them on aromatic herbs (balm-mint, sage, hyssop, fennel) which cause the tissues to take on these special flavours.

Transport is done in wooden boxes, by express mail. Especially for living snails cardboard boxes or osier-baskets are totally inadequate because the animals gnaw through this packing and escape.

Diseases or abnormal mortality do not occur with proper feeding and good treatment. Sinistral shells have never occurred in Mr. FLORACK's snail nursery, and only once (1951) a scalariform specimen came into his hands. In this case the abnormal growth was obviously caused by damage at an early stage.

If by some accident a snail's shell is broken the animal is able to repair the damage in a few days. For that purpose new lime is secreted by the underlying part of the mantle but as this repair is never so neatly executed as the shell structure formed by the mantle margin, the wound remains always visible as an irregular spot on the shell.

Mr. FLORACK has observed that snails are completely doomed to death if the initial part of the shell, the apex and a few following whorls are destroyed. Even if the remaining part of the shell and the snail itself are not damaged, the animal has to give up life because it is not capable of repairing this early part of the shell.

Further investigations are necessary to demonstrate why regeneration is not possible in the top of the shell and where in the spiral this power sets in. Special care is here recommended because lesions can be so manifold and of such diverse intensity that it is difficult to compare them.

SAMENVATTING

Schr. beschrijft de kwekerij van Wijngaardslakken te Valkenburg (L). Op twee stroken grasland met wat struikgewas (oppervlakte 33 x 12 m), omgeven door kippengaas, leven daar enige duizenden *Helix pomatia*. Zij worden gevoerd met sla en fijne mergel. Nadat zij goed vetgemest zijn, kruipen zij in het najaar (October-November) in de grond voor hun winterslaap en sluiten hun huis met een kalkdeksel of epiphragma af. De eigenaar van de kwekerij graaft de slakken dan op en kuilt ze in zijn privé-tuin weer in, om steeds voorraad te hebben voor de verkoop. Besproken worden voorts geslachtsverschillen in deze potentieel hermaphrodiete dieren, de leeftijd, de regeneratie en het veel-betwifelde vermogen van de slakken om de meer of mindere strengheid van de winter te doorstaan.