VENOM EXISTS ONLY IN THE IMAGINATION OF THE ADDER

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INTRODUCTION

In ancient times, man believed that frogs came from drops of rain, that fell down during a shower. This fact was accepted for centuries as the truth, then in 1664, along came someone with the idea to catch one of these frogs and dissect it. The remains that he found in the stomach and intestines, made it obvious that the frog had lived for some time and therefore made it impossible to have originated during the rain shower.

In ancient times man believed that a she-bear brought her young into the world, as shapeless blobs of flesh. The mother then licked these blobs, until she had formed the shape of a bear. An 'unlicked cub' these days is someone whose mother had not sufficiently licked him into shape and therefore lacks all sense of decency but in the past man took this expression literally.

In olden days, until not so long ago, man took the most bizarre interpretation from nature to be the truth. Classically taught scholars, whose names were only spoken in awe, had particular conceptions about acts of nature and were taken to be true. These 'true facts' ended up in books, just because they were true. Because the only way to copy a book, long ago, was to write it down, it made it possible with a slip of the pen, to create the strangest creatures or creatures with the strangest idiosyncrasies.

No one came up with the idea to 'question' these warped facts, by putting them to the test. One important quality from the sciences in general, was, for example emphasised by Aristotle (384-322 BC) until the middle of the 17th century, in that people normally accepted somebody's word and did not carry out their own observations.

'UNENLIGHTENED' VIEWS ABOUT SNAKES

In the field of herpetology, there existed views that the word of the eminent scholars were to be accepted as true and passed on, right up until the middle of the seventeenth century, until researchers came forward and reached their own conclusions – inspired by the ideals from the *enlightenment* – by conducting research into the accuracy of these conceptions. Anyone who reads a random interpretation about snakes from that time, will find it difficult not to smile.
Here I give an anthology - and do not be surprised that there are several contradictions shown in these observations:

* the sound of a whip, made from the intestines of an adder, caused a pregnant woman to miscarry;
* an adders eyes will melt and gush from its forehead if it catches a glimpse of a real emerald;
* the fresh saliva from a man will kill an adder instantly;
* scorpions and adders die when they come into contact with olive oil;
* those who eat adder flesh will suffer a quenchless thirst;

* an animal that is killed by an adder is no longer edible;
* if somebody dies as the result of an adder bite and has to be washed, this can lead to nasty side effects to the person who carries this out;
* the teeth from an adder is the only poison;
* the gall from an adder is the most deadly venom in the world;
* the venom is nowhere else than in the tail;
* the wine in which an adder has drowned, even if it has only drunk from, is a terrible and fatal poison;
* you can catch adders with wine;
* the flesh of an adder is so hot, that the flagon in which it is caught bursts;
* the best remedy for an adder bite is to bind the chopped off head against the wound;
* a good remedy for an adder bite is lemon;
* he who wears the head of an adder that has been first choked with a silk thread will be in this way relieved from angina;
* music is an effective method to cure someone who has been bitten by an adder;
* when a snake crawls over somebody's clothes that are lying out to dry, there develops in the kidneys of the person who wears those clothes, snakes that have bits and pieces growing out of their bodies that can wrap around the whole body; when the head meets the tail then death is inevitable;
* venom exists only in the imagination of the adder; when thoughts of rage and revenge develop within it, these thoughts are passed on to the teeth and only then can a bite infect the blood. If it does not think these negative thoughts then her bite is not poisonous; etcetera.

For those who are interested in more of these interpretations you can find them, among other things, in the medieval author, Jacob van Maerlant's natural history encyclopaedia *Der Naturen Bloeme* (± 1270) which has a snake section (Van der Voort, 1993).

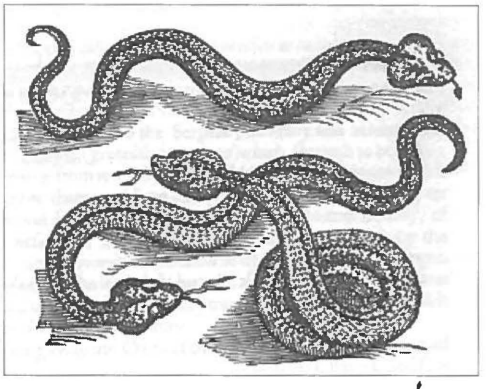
However if you take any indiscriminate ancient or medieval scientist that has written a piece about snakes – and there are quite a few – you can be caught out with their above mentioned 'facts'.

Those who have leafed through a number of bestiaries (in which you can read about not only snakes but facts about other animals) will come across the same information, with a few interesting nuances.

EMPIRICAL RESEARCH

Since herpetologists nowadays 'know better', there would have been a time in history when the revolt began against the facts that had been applied for centuries. This revolt finally lead to the changes that we nowadays have become used to and happily accept as true. This beginning was somewhat abrupt. Topsell still proclaimed in 1608 in his *Historie of Serpents,* (that is well worth reading), the most priceless 'nonsense' about snakes (wherein he reviewed numerous interpretations from nominated Ancient and Medieval scholars). Almost a half century later, Francesco Redi, decided to declare war against the prevailing gullibility that was overall and made it clear to his contemporaries the principles of empiricism, research by experimenting.

Francesco Redi (1626-1696?) was an Italian scholar at the royal household of the Dukes of Medici. He had studied medicine and philosophy at the university of Pisa and in 1666 became the personal physician to the grand duke in Florence. It is most probable that he had

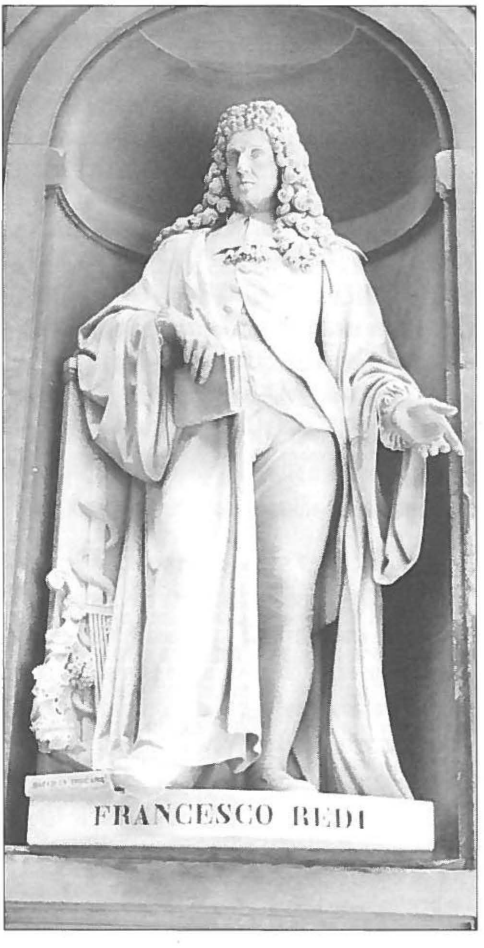


'Of the viper' (from: Topsell, The History of Serpents, pag 290)

influenced the field of taxonomy. In the Latin dissertation from Josephus Laurenti in 1768, is the *Vipera* in Genus XXXI explicitly called *Vipera Francisci Redi,* just like Redi's opponent Moise Charas (see below) saw a snake named after him: *Vipera Mosis Charas* (Laurenti, 1768, page 99-100). It seemed plausible that the first mentioned animal, is the present day *Vipera aspis franciscirediI* but this is only my interpretation. I am definitely no taxonomist and have very little insight in the changes that have occurred during the course of time within the herpetological designations.

Now Redi had meticulously recorded experiments, in which he had shown that the conclusions from his illustrious predecessors (and contemporaries) were unjust. For example, in three letters (1664, 1670 and 1684) he had written to Italian dignitaries, that were apparently interested in his experiments. You can follow him step for step through his sometimes simple and yet incredibly cruel experiments, that had cost a number of adders and other laboratory animals their lives.

It would be going too far to elaborate over all the bizarre conclusions mentioned above; I'll pick out a couple from these and show how Redi worked to prove that the classical conclusions were unjust and to justify his own findings. For the reader that has become more curious, I would refer to the book by Knoefel.



Statue of Francesco Redi in het Piazzale of the Uffizi museum, Firenza
Photo: Marcel van der Voort

REDI AT WORK

- **Gall**

The gall from an adder is a strong poison, this you'll come across continually in the old literature. Redi had his own ideas about this. He was once in the company of a well known adder catcher, when this wisdom was yet again rebuked. This adder catcher, Jacopo Sozzi, who supplied the animals to the pharmacies that made theriac – a 'miracle drug' (see Van der Voort, 1993, page 110 ff.; supplement E), just happened to have adders gall in his pocket, put this in a glass half full of water and drank this without flinching. He did not die from this.

Redi was not content with this proof, that the old conceptions about the adder gall were unjust. The man could have already taken theriac and was therefore immune. With the help from two doves, a dog, two hens, a peacock and a turkey, that he let eat adder gall, he showed – when the animals appeared to survive the experiment – that the toxicity was not so bad.

Adder gall did not seem to be harmful when swallowed but it is possible that there are symptoms of poisoning when this fluid is dripped in a wound. So Redi wounded, or let be wounded (sometimes as he carried out the experiment he mentioned this explicitly), numerous chickens, doves, rabbits, a lamb and a deer, then dripped adder gall in the wounds and came to the conclusion that adder gall is totally harmless.

- **Saliva**

From way back it was claimed, that fresh saliva from humans is deadly to snakes (Van der Voort, 1993, supplement A). Redi first gave an impressive list of his predecessors and contemporaries who had came up with this thesis and then, continued to show how unjust these were. He did this in the following way: he put six adders in a box and arranged that the same number of men made these snakes 'happy' by giving them their fresh saliva for fifteen mornings. He forced the animals to swallow this and noticed that after this they were more friendly and livelier because of their beneficial new food and certainly did not die.

With the second experiment, Redi showed that animals bitten by adders that had first been smeared with human saliva, had no chance of surviving at all. The venom had become by no means weaker from the saliva and all the laboratory animals died. One less misconception.

For the rest it appeared that saliva contained a few ingredients, from which the healing and antibacterial effects should not be underestimated (Root-Bernstein, 113ff.).

- **The eating of a poisoned prey is deadly**

To disprove this theory Redi allowed a number of chickens and doves to be bitten by adders and then he fed their corpses to a dog and several kestrels. He came to the conclusion that there was nothing bad at all with such food.

- **Snakes are crazy about wine**

Snakes should be crazy about wine. If they get the chance to crawl into a bottle or vat, they then can poison the wine. This drink then became deadly for

people (Topsell noted in 1608 a supposedly true incident involving 'adder wine', see Van der Voort, 1993, page 22).

Redi knew how he could easily dismiss this theory, at a location where it was known that there lived lots of adders (in Toscane it must have swarmed with the animals back then) he placed containers full of wine between the shrubs. At no time had he caught an adder drinking from these and not one container showed signs of a change in level.

To show that the old scholars were wrong in stating that adders drowned in vats or bottles, he performed some cruel experiments. If an adder could climb into a bottle, then he could climb back out. He repeatedly put a snake into the bottle so that the snake could climb out, again and again.

Only by holding the snake in the wine for an hour and a half, could he make the snake drown. To show that a snake would keep attempting to escape for a long period before he gave up he put the snake in a bottle of olive oil. The unlucky snake tried for a period of sixty hours to escape. Redi described in detail how the snake, exhausted, finally sunk to the bottom and suffocated and with this, proving yet another theory for science.

- **Venom exists only in the imagination of the adder**

The most peculiar view regarding the ability of the venom from an adder, is the view that was expressed by Moise Charas, a French researcher who was aware of Redi's findings in 1664 and was not entirely in agreement with his counterpart. After thorough research he came to the conclusion that not a single body-part, organ or fluid from an adder could explain where the ability to poison came from, the venom could only exists in the adders imagination. Briefly the experiments from Charas were that he inflicted an injury on his animal subjects, dripped venom in the wound and then closed the wound to stop the venom running out. The venom seemed to have no negative effects for the doves and cats. The dog who had a wound behind the ear, a place where he could not lick it clean (saliva!), had also no negative side-effects from this so produced poisoning.

In an other experiment Charas let an adder repeatedly bite into bread. He then 'irritated' the animal, making it bite a dove. The dove died shortly after. This was the proof for Charas that the yellowish fluid that once dripped from the adders teeth, had nothing to do with this because the liquid was exhausted by repeatedly biting into the bread, meaning that the dove had died from the adder's sense of revenge.

Even though Redi in 1664 had exhaustively carried out, for adders and other animals, many deadly experiments with great accuracy, he began to doubt his own research because of the criticism. So he began once again letting adders bite a dove, a hen, a turkey, a squirrel, a dormouse and many other small mammals.

Of course all of these animals died as a result of the bite but Redi ascertained nuances. The length of time to die depended on the size of the lab animal, the place where it was bitten. The bite had more effect in

a place where there were lots of veins, than a place with less veins. He also noticed that sometimes an animal survived if the bite bled heavily. It also seemed that the bite was more effective when the adder bit out itself than when the bite was made with the help from man. Incidentally: Redi had the heads from many adders cut off and inflicted injury on all-sorts of animals with the cut off heads, in the course of time. It became clear that the chopped off heads could be used to poison, even though the effect wore off with time (by the way: in Keimer it is written, that there was an attempt to do research on mummies of snakes, to isolate and test their venom that appeared to have a long storage life – Keimer, 1947, page 37 note 2).

Finally Redi came up with an ironic conclusion. The adders in Italy must have been more venomous than those in France because it was obvious that Charas's theory was untenable. Apart from that, during the experiments the animals were referred to as 'adders' and nothing more. It is not clear to me if both researchers used the same type of adder.

Although Redi seemed to be right, not every scholar was overly convinced. More than a century later, in 1781, the words of Mr. J. van Lier show that there was still uncertainty about the way that you become poisoned from an adder bite. 'It is as equally well known for the practitioner of medical science as the nature researcher, that for the last century man has disputed whether adder venom is something physical or in the mind. That is, they must determine whether the fluid that is released from the fangs of the adder is on its own harmful and actually contains venom or it was by chance that the fluid only became harmful when the animal was provoked and made angry' (Van Lier, 1781, 137-138).

It is of course so, that an adder will strike harder with her fangs, her bite will last longer and she will inject more venom in the wound, the angrier she is but all this does not change the correctness of Redi's and the incorrectness of Charas basic assumptions.

CONCLUSION

It is characteristic of the 'obedient' ancient and medieval scholars, that the possibility that the views about adders, a few from which are quoted in the third part of this article, could have been held onto for thousands of years as correct. It is possible to see today how much courage Redi must have had, to go against what had applied for centuries, in for example the field of snakes, with his research and somewhat different views.

It is – or at least I think so – interesting to see how laborious it was to refute the bizarre views and ideas during the course of time. Much more interesting is to walk the path in reverse. The honest and upright researchers that had centuries before Christ, most probably observed, lone animals in nature and had came up with the most absurd and generally accepted 'truths' ?

Oh, by the way, an 'unlicked cub', a she-bear gives birth during her hibernation. She spends her hibernation withdrawn deep into her cave. It must have been

no easy task for those earlier researchers to have observed a birth under the right circumstances. Young bears, as we now know, enter the world in a membrane. After the birth the mother bites through the sack and then licks her cub clean. Consequently it seems like the mother is licking a shapeless blob of flesh into the form of a bear.

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