Skepticism and Gullibility in Linnaeus' Herpetological Contributions

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ABSTRACT

The herpetological contributions of Carolus Linnaeus show (1) an explicit abomination for amphibians and reptiles, probably due to his strong religiosity, (2) enlightened criticisms of some ancient beliefs, especially those that referred to the existence of dragons, hydras, sirens and other improbable beings, and (3) an almost scholastic, blind respect for the authority of the Classics, taking as true some legendary behaviors attributed to frogs and toads (*e.g.,* insects are attracted to the toad mouth by enchantments, the penis of anurans is located in the callosities of the thumbs), salamanders (*e.g.,* skin secretions have depilatory properties), turtles (*e.g.,* turtles sleep on their backs while swimming, the shell was used to make shields and bows, a beheaded turtle can live for two weeks, intercourse can last a month), crocodiles (*e.g.,* male and female eat the young that fall into the water), lizards (*e.g.,* geckos exude poison from their feet or urine, skink meat is aphrodisiac, iguana meat, although tasteful, is dangerous for syphylitics) and snakes (*e.g.,* rattlesnakes charm their prey). This, together with the acceptance of some myths from rural XVIII Century Sweden, show the convictions and contradictions of Carolus Linnaeus, an academic in a century of changes who never lost his peasant roots.

INTRODUCTION

Among herpetologists, Carolus Linnaeus (1707-1778) is mainly remembered for the tenth edition of *Systema Naturae* (1758), a publication that marks the beginning of zoological nomenclature. However, in the period between the 1st and 12th editions of this compilation of minerals, plants and animals (1735-1767), Linnaeus produced an interesting body of work that dealt with what we know today as amphibians and reptiles, grouped in his *Classis III. Amphibia.* The *Amphibia Nantes,* included in the tenth edition of Systema Naturae to contain a diverse group of Petromizontiformes, Chondrichthyes and Actinopterygii, are ignored in this analysis for obvious reasons.

Linnaeus has the privilege of being one of the most cited authors in zoological publications during the last 250 years but, as often happens with the classics, today is one of the least read. It happens that his works were written in Latin (a language less and less studied) or in a Swedish full of archaisms and printed in *fraktur* characters, which make reading even more complicated for the average contemporary biologist. For most of these works there are no transcriptions to modern Swedish or translations to other modern languages. For other publications, such as the Journey to Öland and Gotland, originally published in 1745 (Linnaeus, 1745) and the chapter on Amphibia in the tenth edition of Systema Naturae (Linnaeus, 1758), we had to wait until the mid- or late 20th century to have an English translation (Åsberg *et al.,* 1973; Linnaeus, 1973a, b; Kitchell and Dundee, 1994). An exception is the narrative of his journey to Lapland that, although started in May 12, 1732, was first published in 1811 in an English translation by James Edward Smith, at that time President of the Linnaean Society of London (Linnaeus, 1811).

These statements may be considered reckless, and some may say that the list of Soulsby (1933) suggests otherwise, showing many titles attributed to Linnaeus in German, French and English published in the late 18th and in the 19th century. However, the comparison of texts shows that more than translations, these are truly new works, annotated, augmented and to some extent distorted by the respective publishers. This has led to situations in which some of the statements attributed to Linnaeus are actually creations of others, and in some cases do not adequately reflect his thinking [this happens, for example, with the so called Edition 13 of the Systema Naturae by Gmelin (1789 "1788") which, as already indicated by Vanzolini (1977), is a different work.]

Linnaeus felt an almost religious abomination for amphibians and reptiles, an evident fact in all his herpetological contributions. There, along with the results of direct observation, typical of the Enlightenment, are references that show a blind respect for the authority of classical authors, characteristic of older times that refused to disappear.

This contribution focuses on three aspects of Linnaeus publications on amphibians and reptiles, viz., his horror at these animals, his criticism of some old beliefs and, finally, the amazing belief in others. In each case I analyzed the primary sources read by Linnaeus and, when necessary, the secondary sources contained therein, to place in context the origin of those curious statements.

AMPHIBIANS, THESE FRIGHTENING ANIMALS

Although the analysis of Linnaeus' religious beliefs is not the goal of this article, let us say that, as shown in his writings, he was not only a fervent believer, but was proud to give testimony of this condition as well. All editions of the *Systema Naturae* begin with Psalm 104: 24 (1), with which he thanked God for the glory of creation, but starting from the tenth edition these expand the limits of reasonableness. In the tenth edition (Linnaeus, 1758), to the aforementioned Psalm, printed in the back of the title-page, he added a praise on the back of the dedication (2), one at the end of *Ratio Editions* (3), one at the end of the Introduction (4), another at the end of the chapter on *Imperium Naturae* (5), one more at the end of the introduction of *Regnum Animale* (6) and a last one in the page before the Appendix (7). In addition, in the introduction (*Introitus*), besides being full of praise to the Creator, he explicitly specifies the sense of humankind: Man is on earth to glorify creation (8). The climax was achieved when he included God (*Deum*) (9) in the highest category of his *Imperium Naturae,* followed, in descending order, by the universe (*Mundus*), heavenly bodies (*Astra*), matter (*Elementa*), earth (*Tellus*), nature (*Naturalia*), man (*Homo*), reason (*Sapientia*), method (*Methodus*), names (*Nomina*) and knowledge (*Scientia*).

It is probably in his religiosity where lies the source of the disgust that Linnaeus had for amphibians and reptiles, animals calumniated since the origins of Judeo-Christian culture. According to these traditions, the devil took the form of a serpent to tempt Eve, and the human species lost paradise (Genesis, 3: 1-24); crowds of frogs were one of the seven plagues that struck Egypt (Exodus, 8: 1-15); lizards are unclean according to Leviticus (11: 29-31), plus numerous other examples in which all these animals are discredited. Linnaeus does not discuss these concepts, although he may have felt some conflicts when the falsity of the *Hydra* of Hamburg was proved, up to then shown as the tangible representation of the monster mentioned in St. John's Apocalypse.

The referred distaste is explicit in two moments of the *Systema Naturae*. In the first five editions, Linnaeus (1735, 1740a,b, 1744, 1747) included a comment in which, with some differences among the various issues (10), he expresses his gratitude for the benevolence of the Creator for not allowing the proliferation of *Amphibia,* because the abundance of hydras, dragons, basilisks and other beings of that kind would have made life for the human race on Earth impossible. Starting in the tenth edition, Linnaeus (1758, 1766, 1767) expressed his displeasure for this group, defining the Amphibia as frightening animals, with cold bodies, sallow (or pale, cadaverous) color, cartilaginous skeleton, nasty skin, grim face, brooding eyes, offensive smell, hoarse voice, miserable posture and terrible venom (11).

Finally, Linnaeus closed the above quote stating that, being consistent with these characteristics, the Maker did not care to create them in large numbers, an assertion related to the next: Of all animal groups, Amphibians are the least abundant (12), despite Seba's (1734) attempt to increase them.

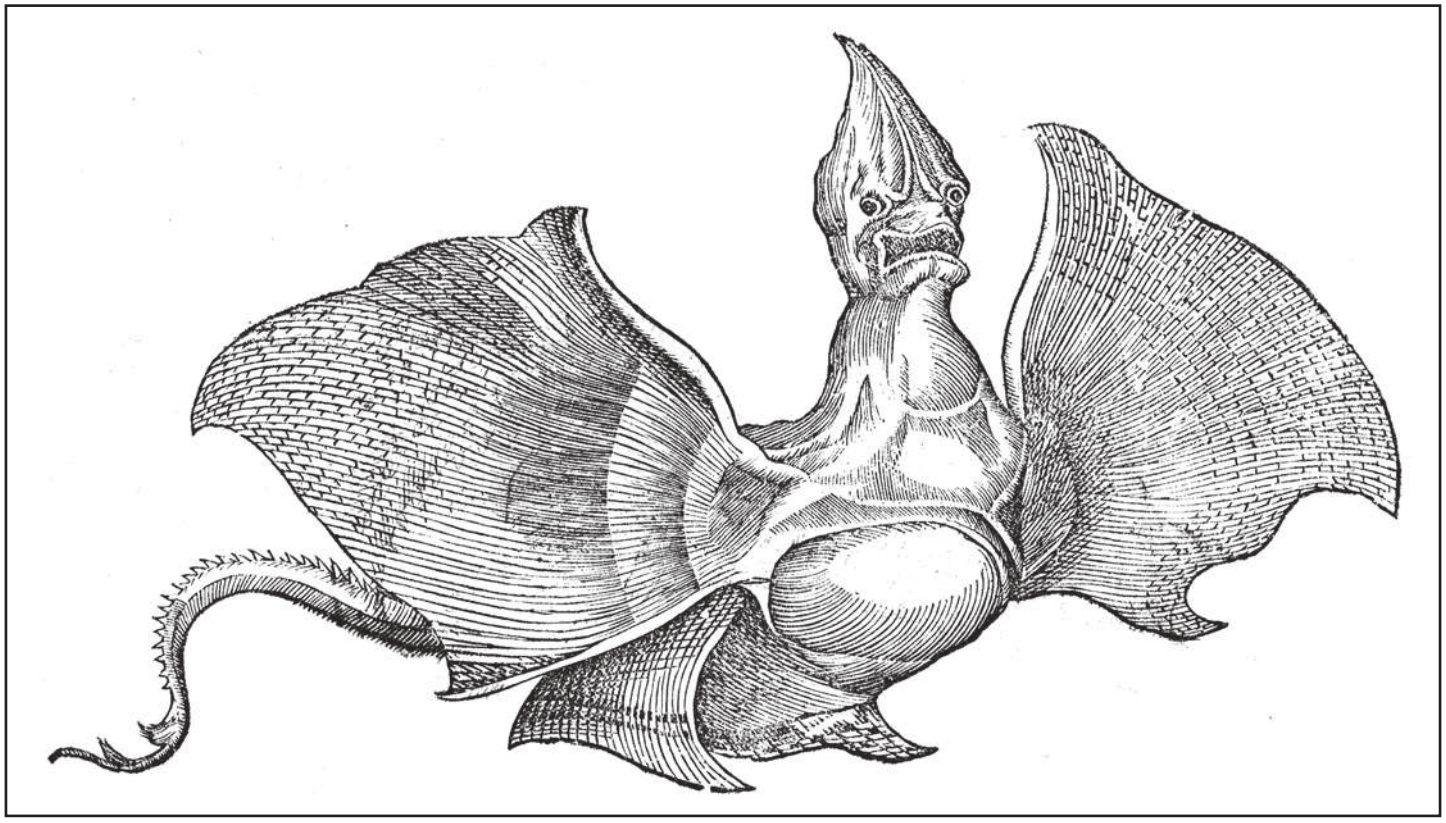


Figure 1: *Draco alter ex Raia exsiccata concinatus* [Another dragon, made with a ray]. (Aldrovandi, 1640: 316).

ALL DRAGONS ARE MYTHICAL

Although Descartes was never explicitly mentioned, Linnaeus' work clearly reflects the four basic principles established in the second book of *Le Discours de la Méthode* (13) [Anonymous (Descartes), 1637]. Thus, under the Cartesian first precept, he criticized some deeply rooted beliefs in the first five editions of the *Systema Naturae* (Linnaeus, 1735, 1740a,b, 1744, 1747). There, and under the category *Paradoxa* or *Animalia Paradoxa,* Linnaeus included a varied set of improbable beings (ten in the first edition and 14 in second to fifth): *Hydra, Rana-Piscis, Monoceros, Pelecanus, Satyrus, Borometz, Phoenix, Bernicla s. Anser Scoticus & Concha Anatifera, Draco corpore anguino, Automa Mortis Horologii, Manticora, Antilope, Lamia* and *Siren*). From this, *Draco corpore anguino, Siren, Hydra* and *Rana-Piscis,* have herpetological connotations. These, and the *Leviathan* and horned snakes mentioned in the tenth edition of the *Systema Naturae,* are analyzed below.

Draco corpore anguino

Dragons were frequent in the Bible, in myths and legends of medieval Europe, and were represented in several pre-Linnaean texts (*i.a.,* Aldrovandi, 1640; Topsell, 1658; Kircher, 1664). Dragons, in Europaean culture, represented evil and sin, and were the image of the devil (Topsell noted that St. Agustin wrote that the devil is called dragon because of his treachery) (14). Linnaeus demonstrated that these beings, with a snake-like body, two wings (like bats) and two feet, were dried *Raja,* transformed into monsters by the ability of some artisans (15) (Figure 1). The only accepted Dragon was the winged lizard, a precious piece in the Cabinets of Curiosities, mentioned in Bontius (1658), Bradley (1721), Seba (1734), Balk (1746), Hast (1745) and Gronovius (1756). These real Dragons were later described as *Draco volans* Linnaeus, 1758 (Figure 2).

Siren

Sirens were another common belief since Classical times (Figure 3), and even Columbus noted their presence in the American seas, although he was disappointed because they were not as beautiful as those from Europe, as noted in his diary on January 9, 1493. Added in the second edition of *Systema Naturae* (Linnaeus, 1740) (16), their existence was questioned because there were no records of individuals, neither alive nor dead, and they were also insufficiently described. It is interesting to note that after Petri Artedi's death in 1735, his close friend Linnaeus published his papers on fish (Artedi, 1738: 81) including *Siren* among the Plagiuri, based on the description of Thomasus Bartholini (1654: 169). Artedi's description was skeptical, and wondered if it was a story or a true fish (17), concluding that about a matter not seen, it is better not to judge. But Bartholini's logic to justify the existence of these sirens or *Marini Homines* was simple: If some fish in the ocean resemble terrestrial animals (there were sea-horses, sea-caws, etc.), why can't there be marine monsters with

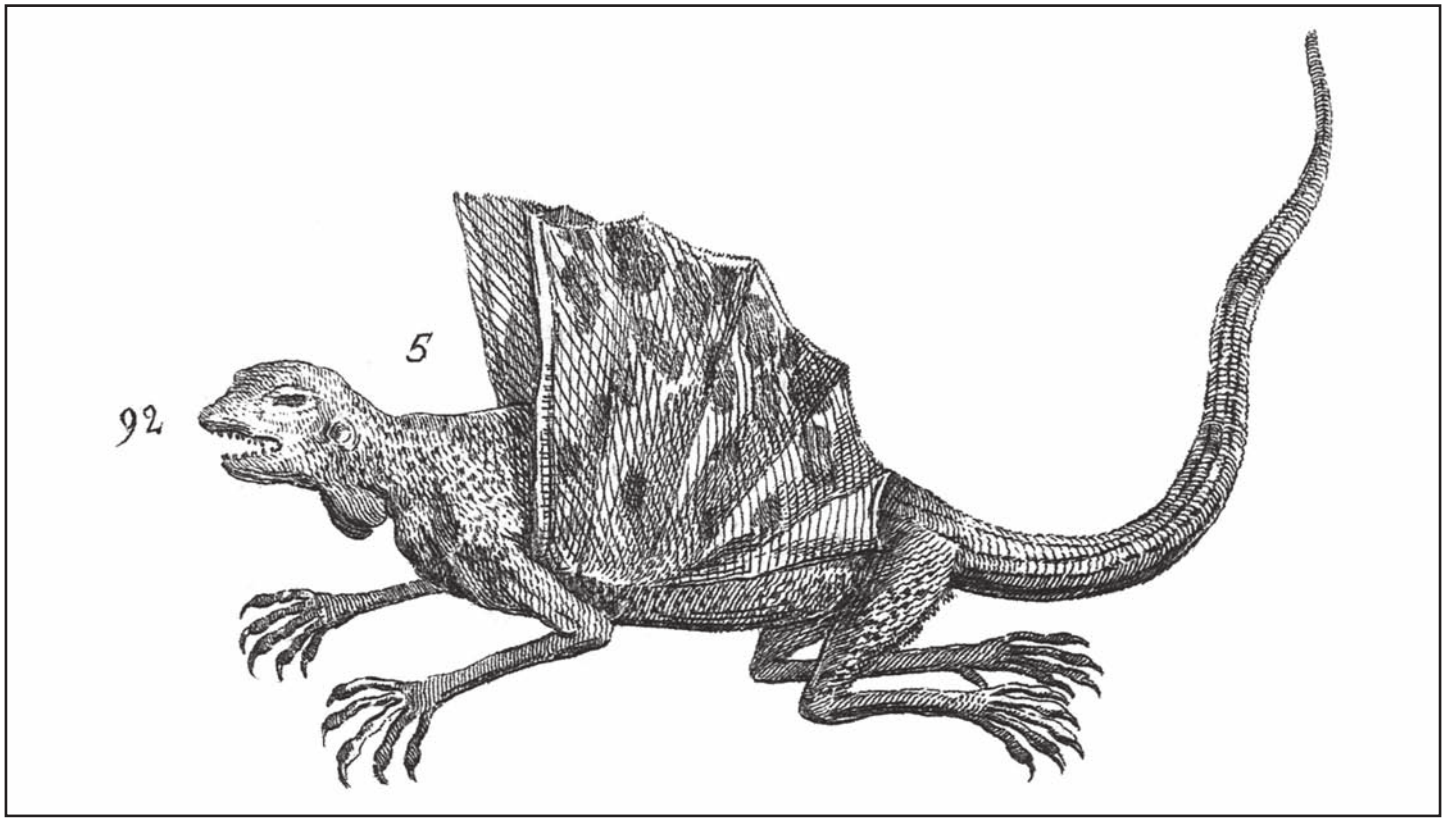


Figure 2: *Lacerta volans.* (Linnaeus, 1748: Plate III).

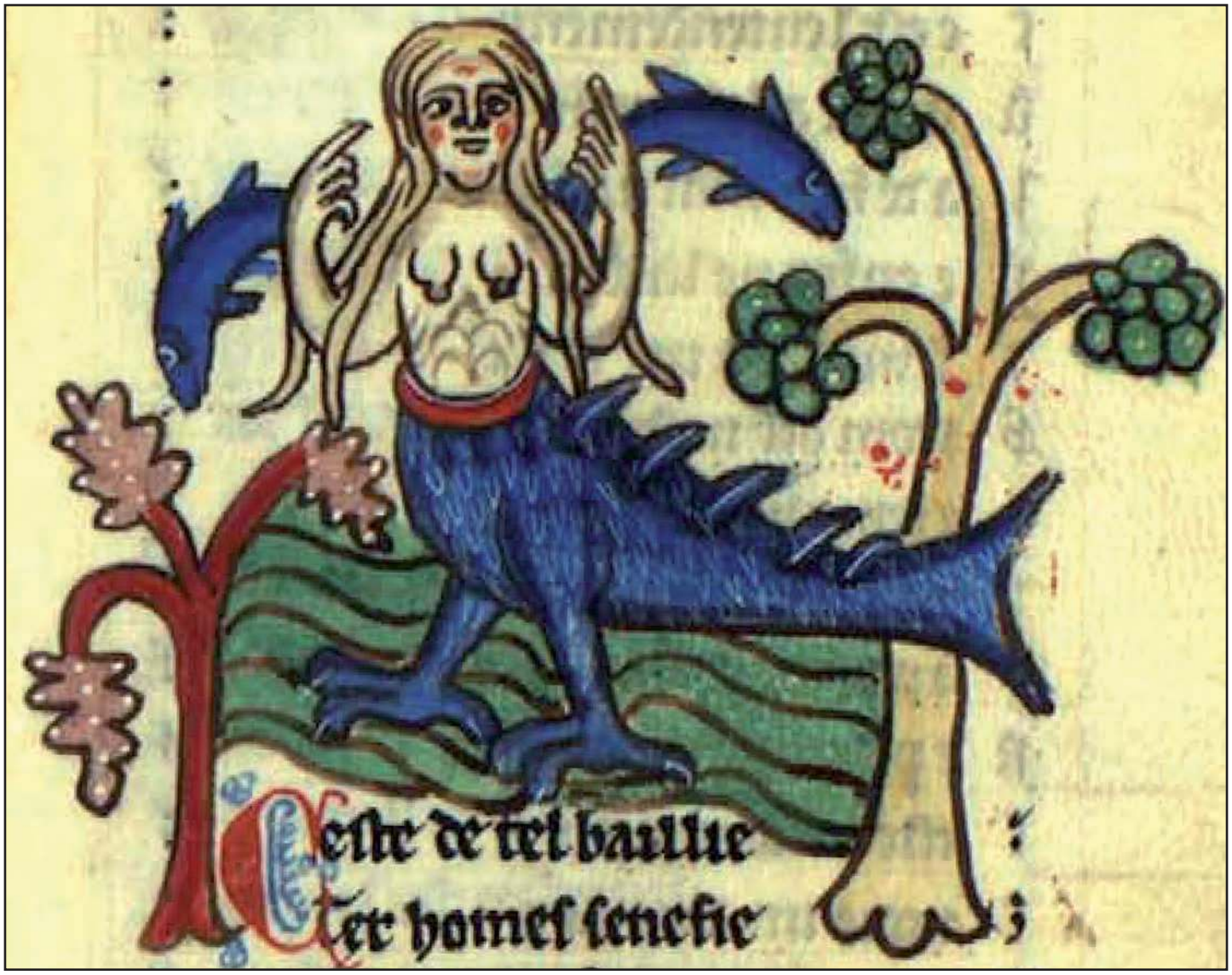


Figure 3: Siren. (Walshe, circa 1400: folio 36 Recto).

a human effigy, as on earth there are monkeys? (18). It was necessary to wait until the defense of Abraham Österdam's thesis, in 1766, to tie the name *Siren* (in *Siren lacertina*), to a real organism.

Rana-Piscis

The heirs of Maria Sibylla Merian included, from the second edition of her book about the metamorphosis of insects of Surinam (Meriaen, 1719; Merian, 1719), a peculiar species of frog who turned into fish (Figure 4). The specimens were housed in the collection of Albertus Seba in Amsterdam, and that curious ontogeny was illustrated in five figures of plate LXXI. In turn, Seba (1734) did the same in figures 15 to 22 of his plate LXXVIII, giving a detailed description of the process (Figure 5).

Linnaeus was particularly skeptical and critical of this point, remarking that mutations between the different classes are not accepted in nature (19). This fish-frog was included under the genus *Lacerta* (as *Lacerta cauda ancipiti, palmis tetradactylis fissis, plantis pentadactylis palmatis, abdomine ventricoso*) in the sixth edition of the *Systema Naturae* (Linnaeus, 1748), and as *Rana paradoxa* in subsequent contributions (Linnaeus, 1754, 1758, 1766, 1767).

Hydra

In 1734 Seba described and illustrated a seven-headed *Hydra* on display in Hamburg. The specimen (obtained as a war trophy in 1648, after the Battle of Prague) originally belonged to the Earl of Konigsmark, then was inherited by the Earl of Leeuwenhaup, and ended up in the hands of the merchants Dreyern and Handel (according to Seba, 1734), or was in the possession of Hamburg's mayor, the Burgomaster Johann Andersen (according to Brightwell, 1858), or belonged to Johann Heinrich von Spreckelsen, secretary of the Hamburg's Council

(according to Carr, 1837). Seba's description and illustration were done on the basis of a life-size, colored drawing sent by Johann Friederich Netorp (Figure 6), and as favorable arguments for its authenticity, Seba regarded the seven-headed *Hydra* illustrated and described in page 459 of Gesner (1604) and the diverse monsters with a variable number of heads included in Aldrovandi (1640).

When Linnaeus visited Hamburg in 1735, the *Hydra* was on sale for an exorbitant amount of money (they had rejected an offer from the King of Denmark for 30,000 ducats, *fide* Blunt, 2001). After its analysis, Linnaeus realized that it was a forgery, finely crafted with *Mustela* bones and snakeskin, and made this information public (apparently in Kohl's *Hamburgerische Berichte,* June 10th 1735; not seen). This was the last activity carried out in Hamburg, a city that he had to flee for obvious reasons (Brightwell, 1858; Broberg, 2008).

In the first edition of *Systema Naturae,* Linnaeus (1735) described the specimen (20) as an animal with snake-like body, seven necks, each one with a head and no wings, pointing out its similarities with the monster described in the Apocalypse of St. John and noting that the birth of beings with many heads in one body never occur naturally, a consideration repeated in a footnote on page 199 (21) of the tenth edition (Linnaeus, 1758). From a seven-headed dragon, the name *Hydra* shifted to a coelenterate with many tentacles in the tenth edition of *Systema Naturae.*

Salamandra

The idea of the salamander living among flames (or its ability to extinguish fire) has ancient roots (Figure 7). Just a few of many dozens of possible examples:

In Hagiga 27a of the Talmud (22), salamanders emerge from fire, and any part of the body smeared with its blood becomes fire-proof. Aristotle (23) notes that the bodies of some creatures, like salamanders, are not consumed by fire, and even they are able to extinguish it (Aristoteles, 1534; Lib. V; Cap. XIX). Pliny has contradictory views; in Lib. X: lxxxvi he states that salamanders are so intensely cold as to extinguish fire by contact (24), in the same way as ice does, while in Lib. XXIX: xxiii he is suspicious of this belief, complaining about the lack of experiments (25) (Plinii, 1554). St. Augustin (1555; Lib. XXI: iv) compares salamanders to a sinful soul: both, although burn, are not consumed by the flames (26). Isidoro [1911 (1472).

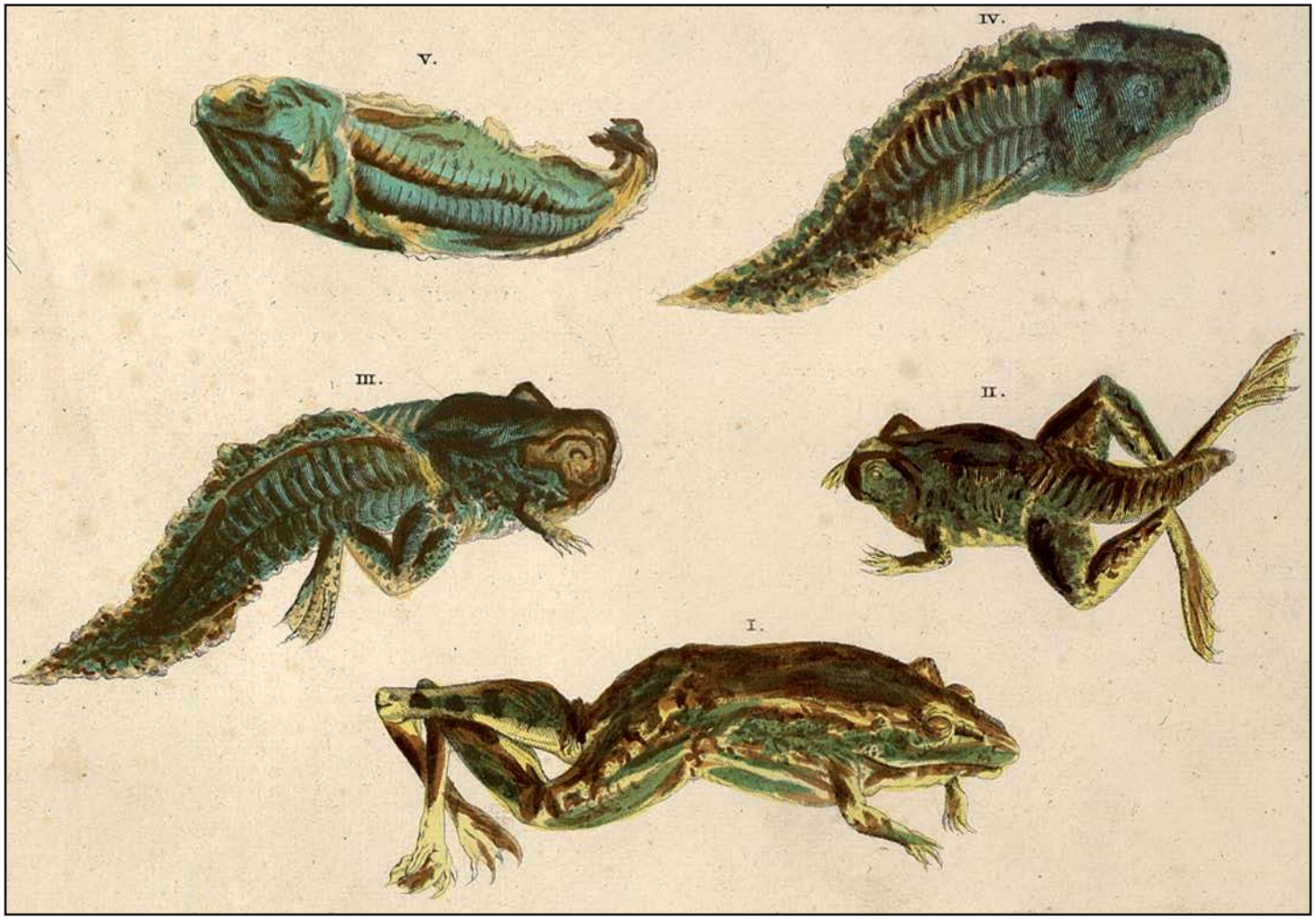


Figure 4: *Die uyt visschen, en di uyt vorschen visschen vorden* [The transformation of a fish in frog and a frog in fish] (Meriaen, 1719: Plate LXXI).

Lib. XII: iv: 36] tells that salamanders not only put out fires, but also can live there without pain (27).

This consideration was refuted by Linnaeus (28), based on Bartholinus' authority. This refers to Bartholini (1654) who, in *Centuria* II, *Historia* L, showed that in his experiments salamanders attempted to escape from the heat of the fire (29).

Horned snakes

In 1751 Hasselquist described a snake from Egypt, very similar to the frequent *Vipera Ægyptiaca* (although noticeably longer), characterized by the presence of two horns, one at each side, in the latero-superior margin of the eye (30). The species, named *Coluber cornutus,* was also included in the narrative of Hasselquist's journey to the Levant, edited by Linnaeus five years after the death of his student (Hasselquist, 1757), although the characterization was slightly different. In the tenth edition of the *Systema Naturae,* and in a rather politically incorrect footnote in p. 216, Linnaeus (1758) describes the forgery: The alluded horns were bird's nails inserted in the head "by the cunning of the Arabians" (31) (Figure 8).

Leviathan

The Bible is replete with fabulous animals, including dragons, flying serpents, seven headed beasts and several more. Among these, the *Leviathan* (Figure 9) was interpreted as a giant sea snake, a whale or a crocodile.

In the tenth edition of the *Systema Naturae* Linnaeus considered that the *Leviathan* described in the Book of Job was a crocodile (32), ascribing to the identification in Bochart's *Hierozoicon* (first published in 1663; here analyzed the fourth edition of 1712) and cited by his student Hast in 1745. Koch (1841) overlooked this explicit synonymy, and used the name

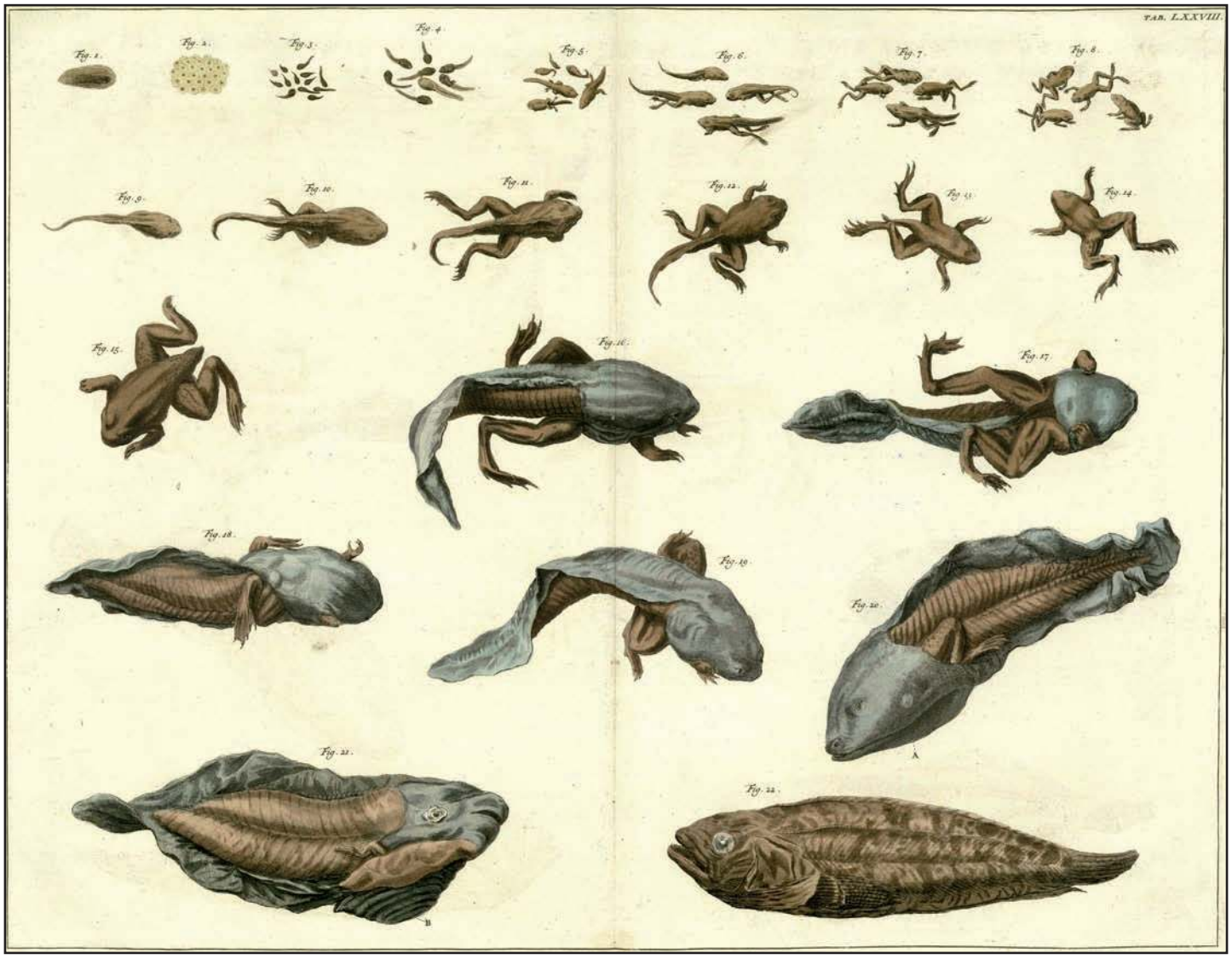


Figure 5: *Transmutatio Ranarum Americanum in Pisces.* [The transformation of an American frog in fish] (Seba, 1734: Plate LXXVIII).

Leviathan missourii for a Mastodon. Recently, Lambert *et al.* (2010a), named as *Leviathan melvillei* a fossil whale from Peru. Because the generic name was preoccupied, it was changed to *Livyatan* (Lambert *et al.*, 2010b).

OLD BELIEFS REFUSE TO DIE

At the same time, in Linnaeus' thought do persist several beliefs that contradict the Cartesian principles, and his contributions on Amphibia also contain numerous assertions of astonishing credulity, showing that old beliefs refused to die. In one of his first writings, the narrative of his trip to Lapland (started on May 12, 1732, but first published in 1811), Linnaeus (1811) comments on the encounter, at the town of Lycksele, with a woman who had the misfortune of raising three frogs in her stomach, that she and those nearby heard croaking. In Linnaeus words, apparently this was the result of drinking, during the previous spring, water with the "seeds" of these animals. The problem persisted despite the diversity of attempted remedies, including Linnaeus' recommendation of tar to solve the problem (33). The Amphibia in the tenth edition of the *Systema Naturae* also contains numerous assertions of this kind, which will be briefly discussed.

Turtles

1. Turtles sleep on their backs while they swim [Linnaeus, 1758: 197. *Testudo mydas*. "*...resupinata in mare dormiens natat...*"].

The origin of this comment is in Pliny (Plinii, 1554; Lib. IX. Cap. X) (34). As Linnaeus (1758) never cited Pliny in relation to his *Amphibia,* the assertion was probably taken from some of his primary sources, including Gesner [1586 (35); 1604 (36)] or Jonston (1650) (37), who mentions that marine turtles, once satiated after feeding greedily on land (38), and feeling weary, sleep on their backs floating in the sea.

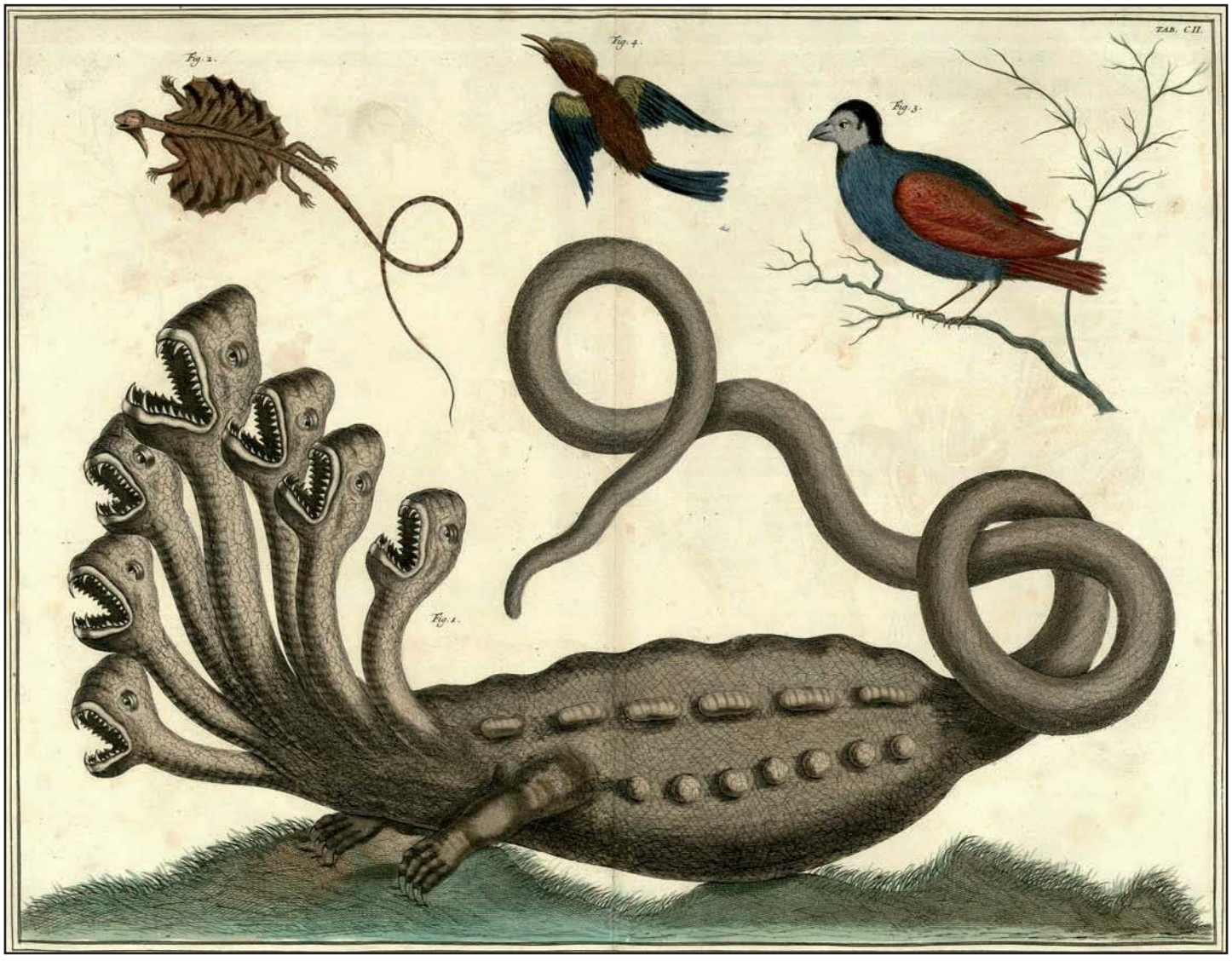


Figure 6: *Hydra, Serpens.* (Seba, 1734: Plate CII).



Figure 7: *Ut Salamandra vivit igne sic lapis* [Salamander lives in fire, as the stone]. (Maier, 1618: 125).

2. The shell was used to make shields and bows [Linnaeus, 1758: 197. *Testudo mydas*. *"...Testa olim pro scutis, fornicibus..."*].

Again, the source is Jonston (1650), who comments that the people of the River Gambra (= Gambia?) made shields with the shells, adding other applications, that runs from roofs of houses to baby cribs (39).

3. A beheaded turtle can live for two weeks [Linnaeus, 1758: 198, footnote. *"...Testudines abcisso capite sape 14 dies vivunt..."*].

The news that a turtle can survive for several days after decapitated has multiple sources. Just to cite a few, Emanuel Swedenborg, a Swedish contemporary of Linnaeus, made that observation in 1740 (40) on marine turtles, noting that Caldesi made the same observation on terrestrials. Caldesi, in turn, in a *"lettera"* to Francesco Redi published in 1687, not only mentioned that terrestrial turtles can live up to six months without a head, but are also able to walk around (41), and Francesco Redi (Caldesi's correspondent and an author cited twice by Linnaeus), in a letter full of irony, wrote to Francesco María (later Cardinal of Medici) on December 11, 1683 about his experiments with beheaded tortoises and others that they had removed their brains, expecting its regeneration (Redi, 1778) (42). Complementarily, Gesner (1586), citing Aelian, accounts that the turtle's head severed from his body does not die immediately and that it can bite the hands of those that are nearby (43).

4. Turtle intercourse can last for one month [Linnaeus, 1758: 198, footnote. *"...copula cohaerent saepe per mensem..."*].

The source was the comment of Ray (1693) (44) who, quoting Trapham (1679), noted the fact that male and female can be joined in the venereal act for a whole lunar month.



Figure 8: *De Ceraste* (Cuba, 1511: Chapter XXXVII).

Crocodiles

5. Male and female eat the young that fall in the water [Linnaeus, 1758: 200. *"...exclusos pullos Mater in tergum provocat, ad aquas ducit, deciduos Mas Feminaque ingurgitant..."*].

Based on partial observations on the peculiar mode of transport of the offspring, several chroniclers reported that crocodiles eat their young. This thought was mentioned both for American forms (*i.a.,* Juan and Ulloa, 1748), as African (*i.a.,* Hill, 1752; Murillo, 1752) or Asian (*i.a.,* Salmon, 1744), and the concept was echoed by Linnaeus. This putative infanticide was explained as a way to limit the number of individuals, since, as noted by Salmon (1744), *"...the females are extraordinary fruitful so as to bring fifty crocodiles at a time; and the rivers and lakes would be full of them in a very short time, to the great damage of mankind, if they did not devour their own brood..."*.

Salamanders

6. The secretions of the skin have depilatory properties [Linnaeus, 1758: 205. *"...oleum e poris exudans pro psilotro habetur..."*].

The belief that the secretions of the salamander were depilatory has deep roots in Classical culture, but referring to its saliva, not to skin glands products. Among others, Plinii (1554) (45) noted that the body hair falls out if the saliva touches any part of the body, even the soles of the feet [from an extensive list of Classical authors, see also Martial *Epigrams* (written in Rome between the years 86 and 103) (46) (Martialais, 1680) and Serenus' *De re medica* (written at the end of



Figure 9: *Leviathan & Ludolachra.* (Cuba, 1511: Chapter L).

the Second or the beginning of the Third Century) (Serenus, 1581) (47)]. Among Linnaeus sources, the concept is in Gesner (1586) and Aldrovandi (1637) (48).

Lizards

7. Geckos exude poison from their feet (or urine?) [Linnaeus, 1758: 205. *"...Pedibus exhalant venenum in esculentis (an urina?) Hasselq..."*].

The reference is based on Hasselquist (1757), who noted that the venom flows from the digits lamellae, and pervades the places through which it passes, especially those containing marine salt (49). The suggestion that the poison was in the urine is Linnaean.

8. The meat of the skink is aphrodisiac [Linnaeus, 1758: 205. *"...Corpus officinales pro aphrodisiaco..."*].

Again, a reference taken from Hasselquist (1757). The meat, fresh or dried and reduced to powder, was widely used in the Middle East (but not in Europe) as an aphrodisiac. It was common in European pharmacies and was often believed to be a fish (50).

9. The meat of the iguana, although tasteful, is dangerous for syphylitics [Linnaeus, 1758: 207. *"...Caro omnium sapidissima, Siphiliticis noxia..."*].

The first to call attention to the belief that iguana meat was dangerous for sufferers of syphilis was Oviedo (1535). According to him, the meat has the property to bring up again the symptoms of syphilis in those who have had the illness, although they were cured. The statement of this belief is particularly interesting considering that Linnaeus, early in his career, was a physician specialized in venereal diseases (*i.a.,* Blunt, 2001).

Frogs and Toads

10. Insects are attracted to the toad mouth by enchantments [Linnaeus, 1758: 210. *"...Insecta in fauces fascino revocat..."*. p. 213: *"...Muscas in fauces revocans..."*].

In the characterization of the *Classis III. Amphibia,* in the comments on *Rana bufo* and in the notes on *Rana arborea,* Linnaeus noted that insects are attracted to the anuran's mouth by means of enchantments. As it was not possible yet to find an early source of these statements, and following Pennant (1769: 324), it is tentatively considered to originate with Linnaeus, probably based on local stories. This comment is striking, especially when one of the oldest texts consulted by Linnaeus (*Bellon. Aquat.* – Belloni, 1553) says that frogs mimic the chameleon in the way of capturing food, trapping them with a tongue three fingers long, with a sponge and adhesive tip. In addition to citing a list of prey, he refers to the hyoid as a couple bones at the base of the tongue, which is what allows the tongue to project (51).

11. Is the penis of anurans located in the callosities of the thumbs? [Linnaeus, 1758: 211. *"...Penes Ranarum an verrucae pollicis palmarum?..."*].

The most immediate antecedents to the idea that fertilization in anurans would be made through male nuptial callosities are in the dissertations defended by two of his disciples, Bosio (1724) (52) and Hast (1745) (53). It is noteworthy that Linnaeus continued with this question after having consulted the work of Bradley (1721), which correctly describes the fecundation process in anurans (54).

Snakes

12. Rattlesnakes charm their prey [Linnaeus, 1758: 214. *"... Aves Sciurosque ex arboribus in fauces revocat..."*].

Linnaeus' (1758) comment is similar to that of Rev. Hugh Jones who, in a letter from Maryland dated January 23, 1698, noted this peculiarity of rattlesnakes (55) (Jones, 1700). In 1735, Sloane discussed a similar observations made by Col. Beverly in Virginia (Beverly, 1705) and considered that prey-charming was not involved (56). Unfortunately, the editor of Sloane's comment (Sloan, 1735) left the question open, allowing the survival of the belief (57).

13. On the fragility of glass-snakes [Linnaeus, 1758: 229. *"...Hujus maxima fragilitas lepide explicata a Lemery in dictionario..."*].

Linnaeus's comment on the frailness of *Anguis fragilis* relies on Lemery's authority. At a time in which autotomy had not yet been explained, the *Dictionnaire universel des drogues simples* (first published in 1698; here analyzed the third edition), Lemery (1716) stated that the fragility of these animals was due to their diet, based on juice or other foods that are extremely condensed and hardened, especially on the outer parts of the body (58).

FINAL COMMENTS

The eighteenth century was a period of intense social, cultural, political and religious upheaval of such magnitude that it culminated in the American and French revolutions and, in the first decades of the next century, in the independence processes in Central and South America. Although these changes had complex origins, they were deeply influenced by the Newtonian scientific revolution, Descartes' rationalism, the discussions of Baruch Spinoza, the contributions of John Locke on the knowledge of man and the rational metaphysics of Leibniz and Christian Wolff, only to mention some remarkable facts. The period was known as the Age of Reason or Enlightenment, and Enlightenment was defined by Immanuel Kant (1784) as man's emergence from his self-incurred immaturity (59).

In that context, Linnaeus' contributions are contradictory. I already mentioned that his work had a strong Cartesian influence, and to illustrate the point, let us do an analysis of the herpetological writings.

The first Cartesian principle indicates *never to accept anything as true* (...). Linnaeus' statements on dragons, sirens, salamanders, hydra, rana-pisces, horned snakes and Leviathan

point in this direction. Furthermore, the descriptions of the material housed in the collections of Caroli Gyllenborg (Hast, 1745, 1749), King Adolf-Friederik (Balk, 1746, 1749; Linnaeus, 1754), and Claudius Grill (Sundius, 1748, 1749) reflect the study of concrete specimens through direct observation.

The second principle, *to divide each of the difficulties under examination into as many parts as possible, and as might be necessary for its adequate solution* (...), has the best representation in Linnaeus' *Methodus* (1736), and is also reflected in the development of a method for recording separately the body and caudal ventral scales, which was a revolution for the identification of snakes (Linnaeus, 1752).

The third principle, *to conduct thoughts in such order that, by commencing with objects the simplest and easiest to know, I might ascend by little and little, and, as it were, step by step, to the knowledge of the more complex* (...), is the cornerstone of the hierarchical ordering of the *Systema Naturae*.

Finally, the constant update of the *Systema Naturae* (twelve editions from 1735 to 1766) reflects the fourth Cartesian principle: *in every case, to make enumerations so complete, and reviews so general, to be sure that nothing was omitted*.

At the same time, rationalism was left out to accept, without discussion, assertions bordering on the ridiculous. These belief were, in some cases, traceable back to Aristotle and Pliny (via renowned authors, like Aldrovandi, Gesner and Jonston), and this submission to the principle of authority led Linnaeus to allow the prevalence of an almost scholastic way of thinking that allowed the survival of ancient mistakes. Other stories were part of the folk traditions of rural Sweden, portraying Linnaeus as an academic who had not lost his roots

Finally, and as surprising as it may seem almost three centuries later, the multiple references to divinity, and the assertion that the mission of humanity on earth was to glorify the Creation, were still subject of discussion during the Enlightenment. Even Descartes (Anonymous, 1637) used reason to demonstrate the existence of God, and this idea was followed by Linnaeus. Shapin (2008) recalls that the "pious naturalists" were frequent and accepted, especially in Protestan culture, mainly because since the Renaissance it was argued that God had written two books by which His existence, attributes, and intentions might be known – Scripture and the Book of Nature. John Ray (1717; first published in 1691), Derham (1720; first published in 1713), Pluche (1732-1742, 1739) and several others endorsed these principles, in a time when Spinoza (1677), Locke (1690), Pope (1733), Hume (1739-1740, 1748) and La Metrie (1748), just to cite a few, challenged the existence of a Supreme Being.

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NOTES

1. Linnaeus (1758). Title page, verso.
   O Jehova
   Quam ampla sunt Tua Opera!
   Quam sapienter Ea secisti!
   Quam plena est Terra possessione Tua!

2. Linnaeus (1758). Dedication.
   Magnus est DEUS noster,
   & magna est potentia Ejus,
   & potentia Ejus non est numerus.

3. Linnaeus (1758). *Ratio Editiones.*
   Docuisti me DEUS a juventute mea,
   & usque nunc pronunciabo Mirabilia Tua.

4. Linnaeus (1758). Introduction.
   O JEHOVA!
   Quam magnifica sunt Tua Opera!
   Vir insipiens non cognoscit ea
   & stultus non animadverit ea.
   David.

5. Linnaeus (1758). *Imperium Naturae*
   Narrabo mirabilia Tua DOMINE,
   & virtutem Terribilium Tuorum dicant generationes.
   David.

6. Linnaeus (1758). Introduction to Regnum Animale:
   Terribilia sunt opera Tua DOMINE.
   In multitude virtutes Tuae, Te metientus inimici Tui.

7. Linnaeus (1758). Page 821:
   Pauca haec vidimus operum DEI,
   Multa abscondita sunt majora his.
   Syrac. XLIII: 3.

8. Linnaeus (1758). *Introitus. "...Finis Creationis telluris est gloria Dei ex opera Naturae per hominem solum...".*

9. Linnaeus (1758). *Imperium Naturae:* "...DEUM *sempiternum, omniscium, omnipotentem* a tergo transeuntem vidi & obstupui! legi aliquot Ejus vestigia per creata rerum, in quibus omnibus, etiam minimis, ut fere nullis, quae Vis! quanta Sapientia! quam inextricabilis Perfectio! Observavi *Animalia* inniti vegetabilibus, *Vegetabilia* terrestribus, *Terrestria* telluri; *Tellurem* dein ordine inconcusso volvi circa solem, a quo vitam mutuatur; *Solem* demum circa axin gyrari cum reliquis *Astris,* systemaque *Siderum,* spatio & numero vix definiendum, mediante motu in vacuo nihilo suspensum teneri ab incomprehensibili *Movente primo,* Ente Entium (a), *Caussa caussarum, Custode Rectoreque universi, mundani hujus operis Domino & Artifice. Vis illud* Fatum *vocare, non errabis, est ex quo suspensa sunt omnia. Vis illud* Naturam *vocare, non errabis, est ex quo nata sunt omnia. Vis illud* Providentiam *vocare, recte dices, est cujus consilio mundus actus suos explicat* (b); *totus est* Sensus, *totus* Visus, *totus* Auditus, *totus* Animae, *totus* Animi, *totus* Sui; *hujus* Extera *indagare non capit humanae conjectura mentis* (c); Numen *esse credi par est, aeternum, immensum, neque genitum neque creatum* (d). *Hoc sine quo nihil est, quod totum hoc fundavit & condidit, quodque oculos nostros & implet & effugit, cogitatione tantum visendum est; in sanctiore enim secessu Majestas tanta delituit, nec ulli dat aditum nisi animo* (e).
   References are: (a) *Aristoteli.* (b) *Senec. quaest. II: 45. hoc respectu, sed caute, ne effectus summatur pro caussa.* (c) *Exod. XX: 4.* (d) *Plin. Nat. II: 17.* (e) *Senec. VII: 31.*

10. Linnaeus (1735, 1740b). *"...Amphibiorum classem ulterius continuare noluit benignitas Creatoris; Ea enim si tot Generibus, quot reliquæ Animalium Classes comprehendunt, gauderet, vel si vera essent quæ de Draconibus, Basiliscis, ac ejusmodi monstris οί τεγραλόγοι fabulantur, certe humanum genus terram inhabitare vix posset...".*
    Linnaeus (1740a, 1747). *"...Amphibiorum classem ulterius continuare noluit Optimus Creator; Hæc enim classem tam late patentem, quam cæteras, si reddidisset Creator, & singula genera veneficio & malignitate in tantum perrexissent, in quantum cœperunt, uti omnibus mortalium exitio fuissent, & Basilisci, & Dracones, & Hydræ & sexenta pejora prodiissent...".*
    Linnaeus (1744). *"...Amphibiorum classem ulterius continuare noluit Optimus Creator; Hæc enim si adeo late ac cæteræ pateret, singulaque genera veneficio & malignitate crescerent, ut cœperunt, tandem & Basilisci, & Dracones, & Hydræ sexentaque pejora prodiissent...".*

11. Linnaeus (1758a, p. 194). "...AMPHIBIA *pleraque horrent Corpore frigido, Colore lurido, Sceleto cartilagineo, Cute foeda, Facie torva, Obtutu meditabundo, Odore tetro, Sono rauco, Loco squalido, Veneno horrendo; non itaque in horum numerum sese jactavit eorum Auctor...".*

12. Linnaeus (1758a, p. 195). "...AMPHIBIOLOGI *omnium paucissimi sunt, nullique veri.* Seba *numero stupendo sibi ignota pulchre collegit & delineavit, sed multiplicavit, minimeque*

descripsit. Catesbaeus nec paucos Serpentes pulchrius delineavit, quam notavit…".

13. Anonymous (Descartes), 1637:
Le premier était de ne recevoir jamais aucune chose pour vraie que je ne la connusse évidemment être telle, c'est-à-dire d'éviter soigneusement la précipitation et la prévention, et de ne comprendre rien de plus en mes jugements que ce qui se présenterait si clairement et si distinctement à mon esprit que je n'eusse aucune occasion de le mettre en doute.
Le second, de diviser chacune des difficultés que j'examinerais en autant de parcelles qu'il se pourrait et qu'il serait requis pour les mieux résoudre.
Le troisième, de conduire par ordre mes pensées, en commençant par les objets les plus simples et les plus aisés à connaître, pour monter peu à peu comme par degrés jusques à la connaissance des plus composés, et supposant même de l'ordre entre ceux qui ne se précèdent point naturellement les uns les autres.
Et, le dernier, de faire partout des dénombrements si entiers et des revues si générales que je fusse assuré de ne rien omettre.

14. Topsell (1658). *"…Diabolus Draco dicitur propter insidias, quia occulte insidiatur…".*

15. Linnaeus (1735): *"…Draco corpore anguino, duobus pedibus, duabus alis, Vespertiliones instar, est Lacerta alata, vel Raja per artem monstrose ficta, & siccata…".*

16. Linnaeus (1740): *"…Siren* Art. gen. 81. *Syrene* Bart. *quamdiu nec vivus, nec mortuus visus, nec fidè & perfecte satis descriptus, in dubium vocatur…".*

17. Artedi (1738). *Siren nostra seu Bartholini prope Massiliam in America a Mercatoribus inventa & capta suit in mari.*
Ab umbilico, ad extremum corporis, informis erat caro, sine caudae signo.
Pinnae Pectorales duae in thorace, quinque ossîbus ceu digitis, membrana conjunctis, constantes, quibus natat. Radius in cubitu vix 4 digitorum transversorum longus. Utinam existeret verus Ichthyologus, hoc qui examinaret animal, fabula utrum sit, an verus piscis? De re non visa potius est non judicare, quam audacter quid pronuntiare.

18. Bartholini (1654). Centuria II. Historia XI. *"…Pisces in Oceano inveniri animalia terrestria quadam specie referentes, certum est. Adest vulpes marinus, lupus, vitulus, canis, equus, &c. Cur effigiem humanam marinis monstris denegabimus? Certe & in terra simiae sunt, quae rationis expertes & formam externam hominis & gestus exprimunt. Omnia hujusmodi marina monstra ad Phocarum genus referimus…".*

19. Linnaeus (1735): *"RANA-Piscis S. RANAE IN PISCEM METAMORPHOSIS valdè paradoxa est, quum Natura mutationem Generis unius; in aliam diversae Classis non admittat. Rane, ut Amphibia omnia, pulmonibus gaudent & ossibus spinosis. Pisces spinosi, loco pulmonum, branchiis instruuntur. Ergo legi Naturae contraria foret haec mutatio. Si enim piscis hic instructus est branchiis, erit diversus à Rana & Amphibiis. Si verò pulmones, erit Lacerta: nam toto coelo à Chondropterygiis & Plagiuris differt".*

20. Linnaeus (1735): *"…Hydra corpore anguino, pedibus duobus, collis septem, & totides capitubus, alarum expers, asservatur Hamburgi, similitudinem referens Hydrae Apocalypticae à S. Joanne Cap. xii. & xiii. descriptae. Eaque tanquam veri animalis speciem plurimis praebuit, sed falso. Natura sibi semper similis plura capita in uno corpore nunquam produxit naturaliter. Fraudem & artificium, cum ipsi vidimus, dentes Ferino-mustelini, ab amphibiorum dentibus diversi, facillime detexerunt…".*

21. Linnaeus (1758): *"…Dracones omnes reliqui authorum fabulosum sunt, ut HYDRA, Seb. mus. I. t. 102. f. 1. Hamburgi a nobis visa, sed artis opus eximium…".*

22. Talmud Hagiga 27a: "והב תטלוש מנהיג לש רוא וא מימכח ידימלת, וא המדמ דסה – איה שא תדלותש ארדנמלס המו ;ארדנמלסמ רמוחו לק שאכ ירבד הכ אולה' ביתכד ,שא ופוג לכש ,מימכח ידימלת ,וב תטלוש רוא המכו המכ תחא לע – 'ה מאנ".

23. Aristoteles (1534), Lib. V. Cap. XIX. *"…Nonulla corpora esse animalium, quae igne non absumantur, salamandra claro documento est: quae, ut aiunt, ignem, inambulans per eum, extinguit…".*

24. Plinii (1554) Lib. X. Cap. lxxxvi. *"…salamandrae, animal lacertae figura, stellatum, numquam nisi magnis imbribus proveniens et serenitate desinens. huic tantus rigor, ut ignem tactu restinguat non alio modo quam glacies…".*

25. Plinii (1554) Lib. XIX. Cap. xxiii. *"…Ex ipsa quae Magi tradunt contra incendia, quoniam ignes sola animalium extingaut, si forent vera, iam esset experta Roma…".*

26. Agustin (1555) Lib. XXI: iv. *"…Quapropter si, ut scripserunt qui naturas animalium curiosius indagarunt, salamandra in ignibus uiuit et quidam notissimi Siciliae montes, qui tanta temporis diuturnitate ac uetustate usque nunc ac deinceps flammis aestuant atque integri perseuerant, satis idonei testes sunt non omne, quod ardet, absumi et anima indicat non omne, quod dolere potest, posse etiam mori: quid adhuc a nobis rerum poscuntur exempla, quibus doceamus non esse incredibile, ut hominum corpora sempiterno supplicio punitorum et igne animam non amittant et sine detrimento ardeant et sine interitu doleant?…".*

27. Isidoro (1911). Lib. XII: iv: 36. *"…Ista contra incendia repugnans, ignes sola animalium extinguit; vivit enim in mediis flammis sine dolore et consummatione, et non solum quia non uritur, sed extinguit incendium…".*

28. Linnaeus (1758): Comment under *Lacerta salamandra: "… Ferebatur antiquitus in igne vivere, sed expertus Bartholinus…".*

29. Bartholinus (1654). Centuria II. Historia L. *"...Salamandra quo modo ignem perferat: Salamandram vivam Romae alebat Fr. Cervinus, amicus meus, nigro colore, maculis flavis, stellionis instar, distinctam, quae moram duarum horarum in igne perferebat, sed non ita vehemente. Singulari autem artificio, natura dictante, ignis calorem elusit. Evomuit enim guttam liquoris, qua ignis fervorem temperabat. Alias velut canis ad Nilum, fugiendo ignis flammam humido corpore transeunt. Novem hic mensibus in vitro sine cibo vixit, terra tamen cum qua advenerat, alimenti loco utebatur. Ex hac humidum omne exsugebat, qua exsiccata, sequenti hebdomade eundem liquorem rejecit, ite ratisque vicibus & suxit & evomuit. Demum in aliam terram coeli nostri imposita, cito mortua est. Venenatum esse animal, Pater Henricus Corvinus Botanicus & Pharmacopaeus clarissimus expertus est, quotiescunque enim aperto vase vitreo propius Salamandram inspexit, toties capitis dolore superveniente recessit..."*.

30. Hasselquist (1750). "...Aculei *duo utrinque unus, ad latera verticis, in margine superiore orbitae oculi, erecti, subteretes, apice acuminati, pone parum arcuati, parum canaliculati, subduri, cute communi tecti, basi squamis minimis erectis una serie dispositis, breves, (orbitae oculorum dimidia longitudine.)...*".

31. Linnaeus (1758). Foortnote p. 216: "...*Vipera cornuta* Hasselqv. *Act. Ups.* 1750. *p.* 27. *est fictitius Coluber astu Arabum, qui unguibus aviculae pertuserunt caput eidemque inserverunt...*".

32. Linnaeus (1758). Comment on *Lacerta crocodilus*. "...Leviathan Jobi, 40: 20; 41: 24...".

33. Linnaeus (1811). "...Here was a woman supposed to labour under the misfortune of a brood of frogs in her stomach, owing to her having, in the course of the preceding spring, drunk water which contained the spawn of these animals. She thought she could feel three of them, and that herself, as well as persons who sat near her, could hear them croak. Her uneasiness was in some degree alleviated by drinking brandy. Salt had no effect in destroying the frogs. Another person, who for some years had had the same complaint, took doses of *Nux Vomica,* and was cured; but even this powerful remedy had been tried on this woman in vain. I advised her to try tar, but that she had already taken without success, having been obliged to throw it up again...".

34. Plinii (1554). Lib. IX. Cap. X. *"...Capiuntur multis quidē modis, sed maxime euectae in summa pelagi antemeridiano tempore blandito, eminente toto dorso per tranquilla fluitantes: quę uoluptas libere spirandi, in tantum fallit oblitas sui, ut solis uapore siccato cortice, non queant mergi, inuita que fluitent opportunae uenantium praedae..."*.

35. Gesner (1586). *"...Capiuntur* [testudines marinae] *multis quidem modis, sed maxime euectae in summa pelagi ante meridiano eminēte toto dorso per trāquilla fluitātes..."*.

36. Gesner (1586). *"...Capiuntur testudines marinae multis quidem modis, ut tradit Plinius, sed maxime euectae in summa pelagi, aut meridiano tempore blandito, eminēte toto dorso per trāquilla fluitātes..."*.

37. Jonston (1678): *"...Ad naturam pertinet, quod extra aquam diu vivere non possint: quamvis vitulorum marinorum instar, in terra somnum quandoque capiat: quod, post que pastum noctue ressae, avide que saturatae, lassantur, dum in superficie maris resupinatae dormiunt, sonum quendam edunt: quod denique, quotiescunque solis radiis mari innatantes siccantur, ita ut in gurgitem deferri nequeant, intereunt..."*.

38. Curious comment, based on Pausanias, who wrote that sea turtles feed on *"...pisciculis, cochleis, & ad terram delatae, gramina depascuntur..."*.

39. Jonston (1678): *"...Nam olim postes teguminibus exornabantur: Taprobanae insulae incolae, iisdem culmina demorum tegebant: Chelonophagi vero, pro navigiis, vasis aquaticis, & tentoriis utebantur. Infantes receter nati in eis lavabantur: Barbaris ad fluvium Gambrae scutorum loco inserviunt. Turcae denique ex testis pellucidis gladiorum manubria fabricant..."*.

40. Swedenborg (1749): *"...quod tale Animal abscisso capite, diu & quidem per integras Septimanas vitam mere corpoream possit tranere. Nam testudo secundum Caldesium, Capite abscisso, toto semestri Chelonium suus circumgestat..."*.

41. Caldesi (1683): *"...le Tartarughe, ed imparticolare le terrestri vivano molti giorni senza testa, e campino lungo, e lungo tempo senza cervello, e si muovano, e alcune camminino francamente, e sien campate sei mesi interi non perdendo mai la forza del camminare liberamente a lor veglia..."*.

42. Redi (1778): *"...Ad una di esse* [tartaruga] *per alcuni suöi misfatti fu tagliata la testa la sera del 20. Novembre, all altra fu pur tagliata la testa la sera del 28. pur Novembre; e sono tutte e due per ancor vive, ancorchè con poca speranza: e veramente il medico ne fa cattivo pronostico. Alla terza che non avea commessi delitti tanto enormi e brutti quanto le due prime, ma era solamente un poco capricciosetta, bizzarra, e cervellina, le fu dal carnefice cavato tutto il cervello, per vedere se le ne rinascesse un nuovo, e questo si è fatto a petizione di certi mariti, che bramerebbono aver le loro mogli più cervellute, e manco cervelline. È veramente son tutti entrati in grande speranza di ottenere il loro intento col far questo suddetto bel giuoco alle loro mogli; perchè questa Tartaruga si può dire totalmente guarita..."*.

43. Gesner (1586): *"...Caput marinae testudini abscissum non continuo moritur, sed & videt, & siante oculos ei manus obversetur, illos claudit: & paulom etiam propius si manum admoveas, mordet, Aelianus..."*.

44. Ray (1693). *"...Mas & fœmina per integrum mensem Lunarem in complexu Venereo perseverant..."*.

45. Plinii, Lib. XXIX. Cap. xxiiii: *"...Quippe cum saliva salamandrae quacumque parte corporis, vel in pede imo respersa, omnis on toto corpore defluat pilus..."*.

46. Martialis (1680), Lib. II, Ep. lxvi: *"...Desine iam Lalage tristeis ornare capillos, || Tangat et insanum nulla puella caput. || Hoc salamandra notet, vel saeva novacula nudet, || Ut digno speculo fiat imago tuo..."*.

47. Serenus (1589), *De fluore capillorum, & maculis capitis tollendis* (Cap. VIII): *"...Defluit expulsus morbo latitante capillus, || Si raro e lavitur, seu vis epota veneni, || Seu salamandra potens, nullisque obnoxia flammis, || Eximium capitis tactu dejecit honorem..."*.

48. Aldrovandi (1637). *"...Et quia saliva huius animantis, si cadat super aliquam partem pilosam, illam depilat..."*.

49. Hasselquist (1757). "...Maxime singulare est animalis hujus venenum, quod ex lobulis digitorum exhalat; quaerit animalculum loca & quascunque res sale marino imbutas vel tinctas, hoc dum invenit aliquoties supercurrit & currendo venenum post se relinquit maxime noxiorum...".

50. Hasselquist (1754). "...Aphrodisiacum *est insigne Orientalibus in multo usu, ab Europaeis vero derelictum. Datur animalis Caro in pulveram redacta, cum excipiente quodam stimulante, etiam jusculum ex recenti idecoctum adhibetur ab Arabibus. Ex aegypto superiore & Arabia Alexandriam & inde Venetias & Massiliam transfertur, unde Pharmacopoei Europae illud habent...*".

51. Belloni (1553) *"...Rana palustris paucis antehac annis in cibis apud nos expertitia, ore est praegrandi, nullis dentibus praedito, quod foras ex aqua, testudinis modo, emittit, ut aurum exipiat: chamaeleone in cibo capiendo imitatur, vesciturque muscis, locustis, millepedibus, erucis, culicibus: quibus dum insidiatur, linguam ternum digitorum longitudinis foras exerit ac vibrat, in cuius extremo spongiosus quidam veluti mucus, visci modo, quicquid contingit, agglutinat, ut integrum scarabeu pleruque in aluum demittere conspiciatur. Ad quod munus ossicula utrinque duo in radice linguae (ut & serpentes) habet, quibus ipsa miro naturae artificio confirmatur...".*

52. Bosio (1724): *"...Insilit a tergo masculus, arctissmoque amplexu involvit foemellam, lunatis ulnis, pectore armis incumbens, anterioresque pedes inflectens subalis, consertis digitorum, vel unguium, intercapedinibus, qui ideo membrana, qua posteriorum pedum digiti connectuntur, ut natationi usum praestent, sunt liberi; sed ita conseruntur in manibus digiti, quos ita nominare liceat, ut pollex ea parte, qua est tuberculum papillare, pressius applicetur cuti thoracis, eo loco, quo fistula, utero emissa, inferitur, ubi eo in primis tempore, quo genitale virus sitit palustris nympha, cutis rara et transparens est; et sic in amplexu haerentem sustollit amata taurum, quem vel in stagno natans, sive in gramine, soloque duro saltans, subando circumfert, imo sublatum gestat, et ita firmiter incumbit admissarius, ut nec virga caesus, nec ferro sectus amatam dimittat...".*

53. Hast (1745) *"...Singularem ranarum concipiendi modum, varie explicarunt recentiores; maxime tamen haec inter illos celebrata est hypothesis; quod maris pollici in utraque manu, parva, tempore veris, adcrescat verruca, quam penis instar, foeminae foramini cuidam subaxillari adaptet mas; hincque conceptionem peragi contendunt...".*

54. Bradley, 1721. "...after they have been sometime in the Uterus they [the oocytes] are discharged, statis temporibus per Annum; the Male being ready, at that very instant, to besprinkle them with its Semen, in order to impregnate and render them fruitful...".

55. Jones (1700). "...Of all our Reptiles, the Rattle-Snake is the most noted; and what is commonly reported of its charming Birds, and Squirrels, &c. is not groundless, for it hath been affirmed to me by several Eye Witnesses...".

56. Sloan (1735). "...when such Animals as are their proper Prey, namely, small Quadrupeds, Birds, &c. are surpriz'd by them, they bite them; and the Poison they emit and infect them with, allows them time to run a small way, or if it be a Bird, to fly up into the next Tree, where the Snakes watch them with great Earnestness, till they fall down, or are perfectly dead, when having lick'd them over with their Spawl or Spittle, they swallow them down...".

57. Sloan (1735). "...It is yet I think a dubious Point whether Snakes have its supposed Power of Incantation or not; nor is it certain whether the Transaction related by Col. Beverly were in truth the excersice of such a Faculty, or merely such a Process as is suggested by Sir Hans, or affirm'd by Father Labat. It were to be wish'd that some further and more nice Observations and Experiments might be made in order to determine it...".

58. Lemery (1716): "...A la Montagne de Cupferberg, c'est-à-dire en Allemand, Montagne de Mine de Cuivre, à 24. lieuës de Stokolm en Suéde, on trouve des Serpens de couleur de Cuivre rouge, longs chacun d'environ un pied, gros d'un ou de deux pouces, révetus d'une peau ecailleuse, fragile, peu venimeux: ce qu'il y a de particulier en cette espece de Serpens, c'est que si l'on les frape avec une baguette ou autre corps dur, ils se cassent come du verre; ils remuet encore longtemps étant cassez de même que les autres Serpens qu'on a coupez par morceaux; s'ils meurent sans avoir été frapez, ils demeurent casiants jusqu'à ce qu'ils pourrissent; je crois que la raison de leur fragilité vient de ce qu'ils se sont nourris de sucs, ou autres aliments aerugineux qui ont condensé & endurci extraordinairemente leur substance, & principalement à leur exterieur...".

59. Kant (1784). "...Aufklärung ist der Ausgang des Menschen aus seiner selbstverschuldeten Unmündigkeit...".