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Scientific Nomenclature of Species and Naming Practices in (Ancient) Biology

Abstract: The history of biology and its nomenclature of species are full of allusions to mythology, borrowings from literature, appreciation of authorities, and curious puns. The chapter offers an account of the different naming practices employed by naturalists from antiquity to the modern era. The various practices, which allude to mythology, draw comparisons, honor authorities, or coin playful names, are systematized using specific concepts and revealed as ‘strategies of displaying competence’. Thus, scientific nomenclature can serve as a tool for self-representation, it can raise public awareness, or even insult competitors. Naturalist, especially in the Renaissance and modern era, also used ancient authors to increase their authority and create the image of an educated and well-studied scientist.

To Noah Yaro who wasn't that difficult to name.

1 Introduction: Systematic Classification and Naming Practices in (Ancient) Biology

Since humankind discovered nature, a deep urge has persisted to order and systemize the living world. In the Western world, Aristotle is regarded as the founder of zoology and biological classification.¹ His immense influence in the emergence of systematic classification is undisputed, although he may have had predecessors such as Speusippus.² Aristotle's zoological works, especially his major work *Historia animalium* (*History of Animals*), were recently examined by modern biologists regarding the accuracy of his organization of the living world.³ The process of classification involves the invention of higher and lower groups and (although not unanimously agreed upon)⁴ the assign-

¹ See Pellegrin 1982.

² The extant fragments of Speusippus suggest that he was inclined to systematic classification as well; on this, see Lloyd 1983, 15. There are similarities between his terminology and the Aristotelian terms. See, for example, the name of the modern *crustaceans* (μαλακόστρακα, literally referring to ‘soft-shelled’ animals) in fr. 8 Athenaeus *Deipn.* 105b which is also used by Aristotle several times (e.g., in *HA* IV 8, 534b14 and IV 9, 537a1; *GA* I 3, 717a3 and I 21, 729b9).

³ For taxonomical studies, see Tipton 2006; Voultsiadou & Vafidis 2007; Fürst von Lieven & Humar 2008; Laurin & Humar 2022.

⁴ On the discussion of the use of rank-based (Linnaean) nomenclature and the claim for an end of the use of species and rank-based systematics, see Ereshefsky 2002; Laurin 2005 who stresses that rank-based codes are no longer considered sufficient to a growing number of systematists in modern biology.

ment of a species-concept.⁵ Thus, the development of a system, by Aristotle and later authors, requires the naming and description of single groups, families, and finally species.⁶ In biology, most notably, where the number of living beings to be ordered is vast, the scientist is highly challenged because he or she has to find names for each single species;⁷ scientific denominations for species (and sometimes higher groups) must be invented. To classify an animal or plant in antiquity, in the Renaissance, and later in the time of the Swedish taxonomist Carl Linnaeus, was to describe a certain species (or *taxa* in general) in an appropriate way. Above all, the naming of animals or plants in these times eminently reflects the scientist's education, linguistic competence, and, not least, his or her fantasy and creativity.⁸

As already mentioned, the taxonomist who wants to record all creatures is confronted with an enormous number of living beings to describe.⁹ As the British biologist Theodore H. Savory put it:

The zoologist has had a much harder task than the chemist. He has had to name the animals he has found, and in contrast to ninety-two elements he has well over a million different kinds waiting for christening.¹⁰

What Savory states can be applied to every taxonomist or naturalist, ancient as well as modern. Therefore, the following questions arise: What naming practices can be found in the scientific literature from antiquity to the modern age dealing with the naming and classification of organisms? Do certain naming practices have a deeper function than simply 'naming' species? Naming practices can be defined as the way cultures or single scientists refer to objects – whether animate or inanimate¹¹ – and, hence, give some insight about cultural aspects of biological nomenclature.

This article presents some case studies within the history of animal and plant nomenclature and provides a review of the different naming practices in biological texts from antiquity to modern times, followed by a brief discussion of the purpose of several naming practices and the backgrounds of certain names of organisms. Since I am

5 On the concept of species, see Mayr 1982, 273 and the discussion in Atran 1987. On the development of the concept in the history of biology, see Toepfer 2011, Vol. 1, 61–131.

6 This point is also stressed by Hardy & Totelin 2016, 97: "Naming always involves a form of classification." But see note 4 above.

7 A singular instance might be the Scythian plant which was named *Anonymous* because no one found a suitable name. Hence, the plant "found a name by not finding one," as Pliny (*Hist. nat.* 27, 31: *Anonymos non inveniundo nomen invenit*) states. See Hardy & Totelin 2016, 96.

8 Today with the definition of codes of biological nomenclature, there are rules to follow which make the naming of species a little bit more controlled and less free concerning the creativity of the suggested names.

9 Cf. Vergil *Georg.* II, 103–104: *sed neque quam multae species, nec nomina quae sint, | est numerus: neque enim numero comprehendere refert.*

10 Savory 1967, 99.

11 Cf. Schiebinger 2007, 91 who describes the naming of objects as 'a deeply social process'.

interested in the relationship between names and their function besides their referring to a species, this paper focusses on naming practices with a (supposedly) deeper function than only ‘naming’ a species.¹²

Preliminarily, I will give a short remark on biological nomenclature of today, which is used throughout this paper. When a species – a plant, an animal, a fungus, or a bacterium – is discovered, it receives its official name followed by a detailed description and a publication of the results.¹³ At the most simple level of scientific nomenclature, each species has a scientific name made up of two components: a generic (or genus) name and a specific name or epithet. Together, these two names are referred to as a binomial or binary name.¹⁴ Binominal names are always given with the generic name¹⁵ first starting with a capital letter; the specific epithet follows with a lower-case letter. Both names are customarily italicized, and it takes at least two parts to name a species. The generic name can be understood as a ‘collective name’¹⁶ for a class¹⁷ and indicates a grouping of organisms that all share a suite of similar characters, for example, the generic name *Panthera* (coined by Oken 1816) referring to the family of large cats (*Pantherinae*), including lion, tiger, leopard, and other species. The specific name allows for a distinction between different organisms within a single genus, for example, the *Panthera leo* as the binominal nomenclature for the lion, and *Panthera tigris* for the tiger, and the *Panthera pardus* for the leopard. If the organism described cannot be reliably assigned to a certain species, modern taxonomists use the abbreviation *sp. (species)*¹⁸ instead of the epithet to mark this circumstance. This binary name is often (but not compulsorily) supplemented with the name-giver (often

12 The case studies are limited to species names, but also higher rank names could be taken into account.

13 The description of a newly discovered species commonly contains four basic components: 1. The new binomial name; 2. A detailed description of the species’ morphology; 3. Etymology of the given name; 4. Geographic distribution of the organism (extant taxa; for extinct taxa the stratigraphic range is documented). In botany, the deposition of specimens is also given in the publication. On these components, see Bernhardt 2008, 9–10.

14 The term ‘binominal’ or ‘binary’ nomenclature arises in the late eighteenth and early nineteenth centuries; it is used, for example, by Duchesne 1796, 148–149 (‘nomenclature binaire’) and Cuvier 1807, 374. On the development of the nomenclature, see Toepfer 2011, Vol. 1, 97–98. Essentially, the binominal naming started with two important works of Linnaeus: the *Systema naturae* (1735 and several editions; on this, see below) and his *Species plantarum* (Stockholm 1753).

15 This generic name has to be in the form of a noun or a substantivized adjective treated as a noun and must be unique in the zoological world.

16 But see note 4 above.

17 Nevertheless, taxa are no longer considered to be natural kinds by many scientists; instead, they view them as individuals. About this, see Baum 1998; Ghiselin 2002. I thank Michel Laurin for several comments on this topic.

18 This is also possible for higher ranks; so, one could name an animal as *Mammalia indet.* if the identification is not more precise.

abbreviated) and the year of the original description of that species under the given name, e.g., *Panthera tigris* (Linnaeus 1758). Hence, the basic scientific name of a species consists of (at most) four parts.

2 Examples of Naming Practices in Antiquity

Neither the ancient Greeks nor the Romans developed a scientific zoological or botanical nomenclature which differs from commonly spoken language.¹⁹ However, an interest in the naming of species and a discussion of the aptness of their names as well as different naming practices are found in several texts from antiquity. A popular naming practice was the naming after the species' morphology, its typical forms of behavior, or its peculiar qualities and activities. Another inspiration for animal names is to be found in certain peculiarities regarding their lifecycle (so-called *morphonyms*).²⁰ One example for the first practice is the naming of the woodpecker, the *druokolaptēs* (δρυοκολάπτης). The Roman writer Aelianus describes the etymology of this species' name in *De natura animalium*:

τὸ ζῷον ὁ δρυοκολάπτης ἐξ οὗ δρᾷ καὶ κέκληται. ἔχει μὲν γὰρ ῥάμφος ἐπίκυρτον, κολάπτει δὲ ἄρα τούτῳ τὰς δρῦς, καὶ ἐνταυθοῖ ὡς ἐς καλιὰν τοὺς νεοττοὺς ἐντίθησιν [. . .].

The bird 'Woodpecker' derives its name from what it does. For it has a curved beak with which it pecks (*kolaptei*) oak-trees (*drus*) and deposits its young in them as in a nest [. . .].²¹ (Translation after Scholfield 1958)

Another example from zoology is the teleost called *ouranoskopos* (οὐρανοσκόπος). This fish was known under several names in antiquity²² which demonstrates the problem evolving from a nomenclature not being consistent in Greece and Rome.²³ Pliny the Elder, recognizing the peculiar position of the eyes of this species which causes the effect that it always looks upwards, provides an explanation for giving the name *ouranoskopos*:²⁴ *Idem piscis et uranoscopus vocatur ab oculo, quem in capite habet*. – The same fish is also called *uranoscopus* from the eye it has in its head.²⁵

¹⁹ An exception are, of course, loanwords from Eastern languages. On this, see below p. 189, note 43.

²⁰ See Jobling 2010, 11–12.

²¹ *De nat. an.* 1, 45.

²² Other synonyms include καλλιώνυμος and νυκτερίς. The fish can be identified as belonging to the genus *Uranoscopus* (stargazer-fish); on the identification, see Thompson 1947, s.v. καλλιώνυμος. Discussions of that species can be found in Oppian, *Hal.* 2, 199–205 and Athenaeus, *Deipn.* 282c–e. A detailed analysis and discussion of the several synonyms of the *Ouranoskopos* is missing.

²³ Especially Pliny the Elder discusses several times the problem of multiple names of species; see Doody 2010, 28. See also Pliny's comment below, p. 189, note 41.

²⁴ The name can be traced back to Galen who discusses the fish in *De usu part.* 3, 182–183 Kühn. Pliny's explanation given above is echoed in Isidor. *etym.* 12, 6, 35.

²⁵ *Hist. nat.* 32, 69–70.

This naming practice can also be observed in ancient botany: Several plants are named after one of its characteristics, such as smell and color, physical properties or morphological aspects.²⁶ One example might be the plant called *aeizōon* (ἀειζῶον),²⁷ which means ‘ever-living’, because of its evergreen leaves.²⁸

The passages quoted above, and several others in the works of Aristotle and Aelianus, prove that animals in antiquity were named after their behavioral or morphological features.²⁹ Aelianus frequently discusses the suitability of a given term for a certain animal: In *De nat. an.* 7, 24, the author emphasizes that the name *dromias* (δρομίας, designating the runner-crab or horseman crab) mirrors the animal’s principal activity “most properly” (*prepōdestaton*, πρεπωδέστατον). The aptness of particular designations is commented on in numerous other passages.³⁰ This short extract shows that there is an interest in the problem of whether naming practices describe species aptly and that this question is also discussed in the texts dealing with the nomenclature of organisms.³¹

However, it is not only the observation of a specific trait or peculiarity that determines the name; in biological texts, we find the allusion to everyday life or traditional association very often. The most common example might be the term denoting the butterfly: the *psukhē* (ψυχή). By examining the detailed description of their metamorphoses, it becomes obvious why the Greek chose this name:

γίνονται δ’ αἱ μὲν καλούμεναι ψυχαὶ ἐκ τῶν καμπῶν, αἱ δὲ γίνονται ἐπὶ τῶν φύλλων τῶν χλωρῶν, καὶ μάλιστα ἐπὶ τῆς ραφάνου, ἣν καλοῦσιν τινες κράμβην, πρῶτον μὲν ἔλαττον κέγχρου, εἴτα μικροὶ σκώληκες καὶ αὐξανόμενοι, ἔπειτα ἐν τρισὶν ἡμέραις κάμποι μικραὶ· μετὰ δὲ ταῦτα αὐξηθεῖσαι ἀκινήτιζουσι, καὶ μεταβάλλουσι τὴν μορφήν, καὶ καλοῦνται χρυσαλλίδες, καὶ σκληρὸν ἔχουσι τὸ κέλυφος, ἅπτομένου δὲ κινεῖνται. Περιέχονται δὲ πόροις ἀραχνιώδεσιν οἱ οὔτε στόμα ἔχουσαι οὔτε ἄλλο τῶν μορίων οὐθὲν διάδηλον. Χρόνου δὲ πολλοῦ διελθόντος περιρρήγνυνται τὸ κέλυφος, καὶ ἐκπέτεται ἐξ αὐτῶν πτερωτὰ ζῶα, ἃς καλοῦμεν ψυχάς.

The so-called psyche or butterfly is generated from caterpillars which grow on green leaves, chiefly leaves of the raphanus, which some call *krambē* or cabbage. At first it is less than a grain of millet; it then grows into a small grub; and in three days it is a tiny caterpillar. After this it grows on and on, and becomes quiescent and changes its shape, and is now called a chrysalis. The outer shell is hard, and the chrysalis moves if you touch it. It attaches itself by cobweb-like filaments, and is unfurnished with mouth or any other apparent organ. After a little while the

26 See Amigues 1984.

27 E.g. in Theophrastus, *HP* 1, 10, 4 and Dioscurides 4, 88.

28 For further examples, see Hardy & Totelin 2016, 98.

29 See Aelianus, *De nat. an.* 4, 21; 8, 24; 9, 24. On this, see Fögen 2009, 51–52. For some naming practices in Aristotle’s works, see Fürst von Lieven & Humar 2017, 21–24.

30 See Fögen 2009, 52.

31 We find also discussions on the names of animals outside of scientific or technical literature; see, for instance, the discussion of the ostrich’s name (στρουθοκάμηλος) in Diodorus Siculus 2, 50, 3–4.

outer covering bursts asunder, and out flies the winged creature that we call the *psukhē* or butterfly.³² (Transl. by Thompson 1910)³³

This meaning of *psukhē* as a butterfly was not used before Aristotle.³⁴ The reason why the butterfly is synonymous with the soul is obvious from the extract;³⁵ this passage describes, in detail, the holometabolic development of the butterfly. The term ‘holometabolic’ describes a development (especially of certain insects) that is characterized by a complete change in physical form or substance. Therefore, insects with a holometabolic lifecycle undergo complete metamorphoses with four developmental stages: out of the egg, the larva develops, (which is a stage of active feeding and growth), the insect turns into the pupa, and a period of reconstruction begins (larval tissues are dismantled and rebuilt following the adult body plan), followed by the rising of the adult animal. As a pupa, the insect often has a sclerosed exoskeleton, which remains behind as a dead shell. The analogy to the imagination of the soul is evident: the adult animal leaves the hard, dead body behind. Therefore, the beliefs concerning the soul were the reason for the naming of this group of insects.

The naming of species after parallels in mythology was also a very popular practice. Further, we find more examples of mythological naming practices, e.g., in Aelianus. In a chapter on the species of mullets (*De nat. an.* 9, 36), he describes the Adonis-fish as a creature living in both land and water.³⁶ The name-givers probably intended to hint at Adonis, the god of beauty and desire who was desired by Aphrodite, representing the upper world, and Persephone, standing for the underworld.³⁷

There are also examples of species named after a character of classical mythology or of one of their attributes in botany. The *Nymphaeae*, a genus of aquatic plants commonly known as water-lilies, bear a name inspired by the Nymphs (νύμφαι). A special plant of that genus, probably the so-called yellow water-lily (*Nymphae lutea*), is described by Theophrastus in his *Historia plantarum* (*HP*) 9, 13, 1. Later, Pliny the Elder gives the following explanation for the naming of that plant: *Nymphaea nata traditur nympa zelotypia erga herculem mortua – quare heracleon vocant aliqui, alii rhopalon*

³² *Hist. an.* V 19, 551a13–24. Text after Balme 2002.

³³ In Thompson’s translation the addition “or butterflies” is not contained in the text. On the *psukhē*, see also Theophrastus, *HP* 2, 4, 4 and Plutarchus, *Moralia* 636 c. The lifecycles of holometabolic insects are described in Pliny, *Hist. nat.* 11, 112: *Multa autem insecta et aliter nascuntur, atque in primis e rore. Insidet hic raphani folio primo vere et spissatus sole in magnitudinem milii cogitur. Inde porrigitur vermiculus parvus et triduo mox uruca, quae adiectis diebus accrescit, immobilis, duro cortice. Ad tactum tantum movetur, araneo accreta, quam chrysallidem appellant. Rupto deinde cortice volat papilio.*

³⁴ See LSJ, s.v. ψυχή.

³⁵ On this passage in detail, see Humar 2021, 18–19.

³⁶ The Adonis-fish or *Exocoetus* (literally ‘sleeper-out’) is hard to identify; beside Aelianus, the sources for its description include Athenaeus, *Deipn.* 8, 5 33b–e (Clearchus fr. 101) and Oppian (*Hal.* 1, 155–160).

³⁷ On this, see Fögen 2009, 54. We find a similar case in modern nomenclature: *Betta persephone* (Schaller 1986), a species of fish living in the waters around Malaysia, derives its name from the goddess of the underworld because of its blackish color arousing an association to the underworld.

a radice clavae simili [. . .]³⁸ – It is said that Nymphaea was born of a nymph who died because of jealousy toward Hercules – for this reason some call it *heracleon*, others *rhopalon*³⁹ because its root looks like a cub.

Pliny, briefly discussing the etymology of this genus, gives two explanations. Some people say that the plant is alluding to the mythological story of a nymph being so jealous of Heracles that she died and turned into a water-lily. On the other hand, the root of that plant highly resembles the mighty cub of Heracles and might be the reason for its name.⁴⁰ These names could be described as (mythological) *eponyms*.⁴¹

Besides these naming practices we find, of course, other names which are determined by the geographic origin (hence called *toponyms*)⁴² of the species, mainly plants, or simply the names are borrowed from other languages (which could be called *autochtonym*).⁴³ Since this paper focuses on nomenclature and naming practices as a display of competence, these practices are omitted here.

Considering the naming practices found in works by Aristotle, Aelianus, and Pliny the Elder, it becomes obvious that the two prominent naming practices involved naming after a character in mythology or naming after certain peculiarities in the behavior or lifecycle (*eponyms* and *morphonyms*). Regarding the function of those naming practices one could say that they serve a simple purpose: Names which are well-fitting because they refer to observable peculiarities (*morphonyms*) or draw comparisons to known figures (e.g., figures of mythology) or concepts (*eponyms*) are easy to remember; they serve as ‘mnemonic tools’. They do not have to be rehearsed or continually repeated to stay in mind. Therefore, those names were coined by ancient naturalists or even by lay-men because they are easily learned (in contrast to *toponyms*);

38 *Hist. nat.* 25, 75.

39 The Greek word for the cub.

40 See Carnoy 1959, 142–143.

41 On *eponyms*, see Jobling 2010, 12–13. Another example is the plant named *Paeonia* which refers to the god Paeon (Παῖων). Pliny writes: *Vetustissima inventu paeonia est nomenque auctoris retinet, quam quidam pentorobon appellant, alii glycysside. Nam haec quoque difficultas est, quod eadem aliter alibi nuncupatur.* (*Hist. nat.* 25, 10); cf. Lloyd 1983, 146 n. 97.

42 See Jobling 2010, 14. Primarily in botany, we find the description of species with geographic epithets. In Theophrastus’ works, numerous plants are given a geographic epithet denoting the origin of the particular species usually in comparison with other, more or less similar genera; for example, the Persian nut-tree (i.e., the walnut, *Juglans regia*) in *HP* 3, 6, 2; the Euboean nut-tree (probably the sweet chestnut, *Castanea sativa*) in *HP* 4, 5, 5; the Heracleotic nut-tree (i.e., the hazelnut, *Corylus avellana*) in *HP* 3, 14, 1–2. Another example is the Persian (or Medic) ‘apple-tree’ (*Citrus medica*) in *HP* 4, 4, 2. Similar to this practice is the naming of a plant after its habitat, for example, with the stem *petr-* designating a growth on stones or rocks as in *πετροσέλινον* (common parsley, *Petroselinum crispum*). On this point, see Hardy & Totelin 2016, 99.

43 On *autochtonyms* see Jobling 2010, 13–14. For examples, see, e.g., Bodson 2005, 455–456. For plant names borrowed from foreign languages, see Hardy & Totelin 2016, 97–98 with further literature. For example, the Greek names for exotic animals like the lion (*leōn*) or the elephant (*elephas*) are borrowed from Eastern languages; on this, see Bodson 2005, 453–454.

thus, these naming practices reflect in a certain way the competence of the naturalists since they had to observe conspicuous features to coin names aptly. However, since we do not have a scientific nomenclature in antiquity, assumptions concerning the purpose of naming practices in antiquity should be treated with reservation.

Because mythology seems to have been a rich vault of inspiration regarding the invention of names as can be seen from the examples given above, I want to ask if the important role of mythology or folklore as a source for scientific nomenclature persists today and, further, how naturalists dealt with the possibility of naming species after the personage of myth. In the next chapter I will first present some naming practices of the Renaissance referring to ancient authors generally and, second, discuss the role of mythology in that era of biological nomenclature on the basis of several case studies.

3 Naming Practices in the Biology of the Renaissance and the Works of Linnaeus

The reason why most scientific names of species today are directly derived from their Latin or Greek sources is simple: During the Renaissance, the writers bestowed an immense labor on determining the names by which species were known to the ancients. Almost every naturalist starts his own remarks to certain species with a discussion of the ancient texts.⁴⁴ Aristotle, Pliny the Elder, and Theophrastus are among the most important sources and references for most of the naturalists dealing with the kingdoms of animals and plants with regard to the description of animals as well as to their generic as well as eponymous names; often, the Greek name was later translated into Latin.⁴⁵

At times, if the ancient sources provided a detailed description of a certain species, the names were borrowed and immediately transformed into a binary name;⁴⁶ they are *autochtonyms* from Greek and Latin. For example, the description of the common catfish in Greek sources (Aristotle, *Hist. an.* IX 37, 621a21 ff.) and in Latin texts (Pliny, *Hist. nat.* 9, 44 and 165) is so rich in detail that Linnaeus combined the

⁴⁴ See, for example, Pierre Belons *L'histoire de la Nature des Oyseaux* (Paris 1555) or Guillaume Rondelets *Libri de piscibus marinis* (Lyon 1554–1555).

⁴⁵ An example is the group of insects. In the 10th edition of *Systema naturae*, Carl Linnaeus classified the arthropods, including insects, arachnids, and crustaceans, among his class *Insecta*, which is the translation of Aristotle's *Entoma* (ἐντομα): both meaning 'incised'. In addition, the German term *Kerbtiere*, coined by P. von Zesen (1619–1689), alludes to the peculiar form of the insect's body.

⁴⁶ This practice has been criticized by Gill 1896, esp. 587–589.

Greek (*glanis*, γλάνις) and the Latin (*silurus*)⁴⁷ terms and coined the binary name *Silurus glanis* (Linné 1758).⁴⁸ The same is true of the naming of the common ivy *Hedera helix* (Linné 1758); this name combines in the same manner both ancient roots (*helix*, ἑλιξ in Greek, *hedera* in Latin).⁴⁹ Sometimes, a name is adopted with a certain amount of creativity: For example, the genus of *Delichon*, a small genus of passerine birds that swallows belong to, was coined by Horsfield & Moore (1854, p. 384). The name is an anagram of the Greek term designating the swallow (*khelidōn*, χελιδών).⁵⁰

However, modern nomenclature sometimes contains names that referred to another species in antiquity under the same name because the authority of the ancient was not questioned and no further research to confirm the correctness of the denomination was undertaken. One example is the bird named χαραδριός (*kharadrios*). In recent nomenclature, we find the Kentish plover (*Charadrius alexandrinus*), a small wader, which is sometimes identified with the Greek *kharadrios*. A recent study shows, however, that the identification of the ancient *kharadrios* with its modern equivalent is doubtful.⁵¹

Another example might be the *ekhenēis* (ἡ ἐχενήϊς) or remora, commonly identified with the ship-holder (*Echeneis remora* L. 1758). In addition, in this case, the adoption of a name coined in antiquity and its unquestioned application to a species seems debatable because all the ancient sources referring to the *ekhenēis* contain descriptions of characteristics matching the morphology of the *lamprey*.⁵²

The same phenomenon can be observed concerning plant names: Various ancient plant names have been adopted by Linnaeus and correspond exactly with their ancient equivalent.⁵³ In other cases, Linnaeus borrowed ancient names and applied them to completely unrelated plants; e.g., the modern *cactus* (a member of the plant family *Cactaceae*) is not the same plant as the Greek κάκτος (*kaktos*), which probably describes the cardoon or artichoke thistle (*Cynara cardunculus* L.).⁵⁴

47 The Latin version of Greek σίλουρος, another sheatfish (Aelianus, *De nat. an.* 14, 25; Galen *De simp. med. temp. ac fac.* 12, 377 Kühn).

48 See Cuvier's comment on this species in his commentary on Pliny's *Hist. nat.* (1828). For details concerning the γλάνις and the σίλουρος, see Thompson 1947, 42–48 resp. 233–237.

49 On the ivy in Theophrastus, see *HP* 3, 18, 6; 7, 8, 1. On the *hedera*, see Vergil, *Georg.* IV, 47; Pliny, *Hist. nat.* 16, 144–152.

50 According to Joblin 2010, 14–15, names of species which are constructed by resemblance or any relationship to other names referring to species can be called *taxonyms*. The genus *Delichon* is listed under this category; further examples of this naming practice are diminutives and generic combinations.

51 See Lunczer 2011. Lunczer suggests the *charadrios* being either the Scopoli's Shearwater (*Calonectris d. diomedea* Scopoli 1769) or the Yelkouan Shearwater (*Puffinus yelkouan* Acerbi 1827); see esp. the detailed analysis in Lunczer 2011, 55–63.

52 On this particular case, see Humar 2015. For another case, see Tipton 2006. See also Lytle 2016 for a reconsideration of the species ἀμία and γομφάριον.

53 For instance, the binary name of the myrtle (Greek μύρτος) is *Myrtus communis* L.; on this case see Hardy & Totelin 2016, 94.

54 See Hardy & Totelin 2016, 94.

3.1 Mythological Naming Practices in the Works of Carl Linnaeus

A turning point in the history of classification is marked by the *Systema Naturae* (Stockholm 1735),⁵⁵ published by Carl Linnaeus.⁵⁶ Before Linnaeus it was common to name species using long Latin phrases describing the features of the species.⁵⁷ Linnaeus chose a binominal naming-scheme using only the genus name and the specific name.⁵⁸ While arranging his genus and species names, he consulted and compared the names given to species by ancient as well as Renaissance writers. Facing the huge number of new species to be described, or re-described, Linnaeus used the same naming practice as his ancient antecedents. Most of his descriptions and denominations derive from mythology (drawn from classical literature), which functioned as a welcome inspiration for his scientific nomenclature.⁵⁹

The archetypal example of mythological naming practices in the work of Linnaeus with an explanation of the origin of the name is probably the story of the bog-rosemary (*Andromeda polifolia* L.), a species of flowering plant native to the Northern hemisphere.⁶⁰ During his 1732 expedition to Lapland,⁶¹ Linnaeus observed this small shrub and named it after Andromeda, a prominent figure in Greek mythology. With excitement, he describes the beauty of the plant “decorating the marshy grounds in a most agreeable manner.”⁶² After a moment of contemplation, he “could not help thinking of Andromeda as described by the poets”⁶³ and decided to name it after her. Immediately, he gives a detailed explanation of his inspiration to that name, of course, with a close connection to the ancient poets:

55 The important tenth edition of the *Systema* (Stockholm 1758) is understood as the beginning of biological nomenclature as definition and separation of groups of biological species based on morphological peculiarities arranged in a hierarchical classification. His *Species plantarum* (1753) plays a similar role in botanical nomenclature.

56 On the history of biological nomenclature and the role of Linnaeus, see Schiebinger 2007.

57 These ‘polynomial’ names can be found in every botanical work before Linnaeus’ *Systema*. See, e.g., the plants listed in Joachim Camerarius’ *Hortus medicus et philosophicus*, Frankfurt 1588 and in his *De plantis epitome utilissima*, Frankfurt 1586. Another quite illustrating example is the *The Herball or Generall Historie of Plantes* by John Gerard (1597) where almost every common name of a plant is listed; cf. also Schiebinger 2007, 95 shortly discussing the second edition of the *Herball* (1633).

58 See above pp. 185 f.

59 On the naming practices in Linnaeus’ work, see Kranz 2019 who shows that the Swedish botanist already took the poetic dimensions of plant names into account.

60 The *Andromeda* is a small shrub with slender stems; the leaves are evergreen, the flowers are bell-shaped with a white or slightly pink color, and the fruit is a small capsule containing numerous seeds.

61 C. Linnaeus, *Iter lapponicum*, Stockholm 1732.

62 *Iter lapponicum*, 188.

63 *Ibid.*

Andromeda is represented by them [sc. the poets] as a virgin of most exquisite and unrivalled charms; but these charms remain in perfection only so long as she retains her virgin purity, which is also applicable to the plant, now preparing to celebrate its nuptials. This plant is always fixed on some little turfy hillock in the midst of the swamps, as Andromeda herself was chained to a rock in the sea, which bathed her feet, as the fresh water does the roots of the plant. Dragons and venomous serpents surrounded her, as toads and other reptiles frequent the abode of her vegetable prototype, and, when they pair in the spring, throw mud and water over its leaves and branches. Hence, as this plant forms a new genus, I have chosen for it the name of Andromeda.⁶⁴

In this passage, Linnaeus demonstrates a deep familiarity with ancient literature and artistically intertwines the origin of this binary name with the mythological background embellished with a drawing (see Fig. 1). In this way, he displays his education and competence.⁶⁵ Hence, Kranz speaks of the *nomenclator botanicus* as *poeta doctus*.⁶⁶



Fig. 1: Illustration from Linnaeus' *Iter Lapponicum* (1732).

However, the mythological explanations of binary names can also be misleading. In his *Species plantarum* (1753), Linnaeus describes the Herb Paris, or True Lovers' Knot: a perennial herb with four filiform petals and only one blueberry-like fruit, which is poisonous. The symmetric arrangement of the leaves and the exposed flower in the middle give the one berry an ornamental shape. The scientific name of this plant, *Paris quadrifolia*, is, at first glance, mythological; the plant illustrates the famous judgment of Paris, which is

⁶⁴ *Iter lapponicum*, 188–189 (Translation James Edward Smith 1811). On this, see also Kranz 2019, 104–105.

⁶⁵ In numerous passages, Linnaeus is quoting from Vergil, Propertius, and other Roman poets to decorate his texts, which reflects, again, his familiarity with classical texts. On Linnaeus literary education, see Lindroth 1983.

⁶⁶ See Kranz 2019, 106.

preserved in several ancient sources.⁶⁷ The four petals represent the three goddesses, Hera, Aphrodite, and Athena, together with Helen, while the single fruit in the center is the Trojan prince Paris.⁶⁸ This interpretation is found in the plant's English trivial name Herb Paris (in Italy, L'Herba Paris). In fact, the generic name *Paris* derives from the Latin root *par* (equal, similar) and refers to the similarity of the four petals.⁶⁹

Even the re-naming of certain species can show the scientist's familiarity with Greek mythology. For example, the German entomologist Jakob Hübner (1761–1826) renamed Linnaeus' butterflies. In his *Systema Naturae*, Linnaeus originally placed all butterflies and moths under the genus *Papilio*;⁷⁰ within this group, he described the *Papilio io*, the Io butterfly (European peacock or peacock butterfly). The most eye-catching structures on this butterfly are its two spots on each wing, which highly resemble eyes. Linnaeus' choice for the epithet name *io* is clearly motivated by the mythological story about Io, the daughter of Inachus.⁷¹ Io, in Greek mythology, was a priestess of Hera in Argos; Zeus, inflamed with passion, seduced her. To escape Hera's detection, he turned Io into a heifer. This metamorphosis into a heifer, known for having big round eyes, probably was the model for naming this butterfly after Io in the *Systema Naturae*. Later, Jacob Hübner erected a new genus (*coitus*, in German: 'Verein') for *Papilio io* within the family of Angulatae (Anglewings). The ranking of the *Papilio io* as a single genus was accompanied by a re-naming. Moreover, within this task Hübner shows his familiarity with Greek mythology as well; he named this species *Inachis io*, which is: Inachus' daughter, Io.⁷² This re-naming is in two ways impor-

67 See, for example, Ovid (*Heroides* 16, 71 ff., 149–152 and 5, 35f.), Lucian (*Dialogues of the Gods* 20), and Hyginus (*Fabulae* 92).

68 Another possible interpretation is to see the single fruit as the apple thrown by Eris to induce the quarrel of the three goddesses.

69 This insecure etymology is already remarked upon, for example, by Strohecker 1869, 65; for further details, see Genaust 1996, s.v. Paris. In order to prevent misunderstandings regarding the sources of names it is now an established practice to specify as an author what inspired the name; see the most modern examples of nomenclature below on pp. 199 f.

70 The documentation of the nearly 200 species of butterflies known to Linnaeus is full of names from classical mythology as specific names. These were thematically arranged into six groups. The first such group is named *Equites*, which was divided into the *Equites Trojani* (Trojan army) and *Equites Achivi* (Achaean army), alluding to the Trojan War. Between the two groups, most of the figures involved in the war were named. The second group was the *Heliconii* comprising Apollo and the Muses. The third group was the *Danai*, which was divided into the *Danai Candidi* and the *Danai Festivi*, representing the Danaids and their husbands. The fourth group was the *Nymphales*, or nymphs, divided into the *Nymphales gemmati* and the *Nymphales phalerati*. The fifth group, the *Plebeji*, was divided into *Plebeji Rurales* and *Plebeji Urbicolae*. The final group was the *Barbari*, or Argonauts. For Linnaeus' catalog of Trojan heroes and Nymphs or Muses, see Heller 1945.

71 Other fathers are named in Apollodorus, *Bibl.* 2, 5. See also 2, 1, 3 and Hesiod's *Catalogue of Women* fr. 124.

72 See Hübner 1816, 37. The taxon *Inachis* (Hübner 1816) has been synonymized with the taxon *Aglais* (Dalman 1816) relying on a DNA-based study conducted by Wahlberg & Nylin 2003. The binominal of the European peacock is *Aglais io*. This renaming is not entirely accepted; see, e.g., Tshikolovets 2011.

tant. On one hand, it is anatomically justified because of the degree of difference from other *taxa*. On the other hand, it is a precision concerning the aptness of the name regarding the mythological background. Thus, Hübner by coining this name ‘outperforms’ Linnaeus twice: systematically and concerning mythological accuracy.

However, what is the reason for such a vast usage of mythology in the naming of species? The purpose of mythological naming practices can be described as a demonstration of competence.⁷³ In other words: Naturalists, like Linnaeus (and other authors before and after him), demonstrate their education and knowledge by choosing terms or names that are very rich in allusions to ancient mythology. The author of a species presents himself or herself as adept to the ancient source and literature. Hence, the naming of species after figures in mythology exceeds purely ornamental intentions.⁷⁴ Further, the naming after figures known to society raises public awareness of the naturalist’s discoveries or of biodiversity, in general. These strategies can be observed even in modern naming practices of species as will be shown below.

3.2 Naming Practices as Competence Strategies

All zoological and botanical works dealing with the naming and description of animals or plants show a high level of familiarity with ancient sources (poetry as well as prose). Often, the naturalists paid more attention to the naming of authorities than to investigating the accuracy of their descriptions. Guillaume Rondelet (1507–1566), for example, in his *Libri de piscibus marinis* (1544–1545), mentions the Roman poet Ovid and the Greek poet Oppian several times. Because these poets focused on poetic description and literary devices, they did not offer detailed descriptions of the species named in their works. Rondelet pays high attention to their actions and often comments on their descriptions of fish with phrases like ‘ut Ovidius eleganter dixit’ or ‘bene dixit’. However, the works seldom exceed the accuracy of the ancient descriptions and do not provide a detailed analysis or re-evaluation of the ancient sources. It seems, rather, that ample lists of ancient works studied and recited in the works of Rondelet serve as a way of ‘name-dropping’ to increase his own reputation as a highly educated and diligent naturalist. Rondelet even supports allegations of the ancient writers that can hardly be true. For example, concerning the Adonis-fish

⁷³ On the display or representation of competence and knowledge in antiquity, see Fuhrer & Renger 2012.

⁷⁴ Heller, for example, explains the usage of mythological figures in the works of Linnaeus only by decorating purposes: “It needs no demonstration that in this age references to classical mythology were sought after as an embellishment not merely in poetry, but in technical and scientific writing as well” Heller 1945, 335.

mentioned above, he asserts that he observed several species of that fish sleeping on land many times.⁷⁵

Nevertheless, Rondelet also contributes to the variety of zoological nomenclature: For a long time, it was uncertain where the genus of dragonflies (*Libellula*)⁷⁶ got its name. Two independent papers⁷⁷ revealed that Rondelet coined this term. In the context of the discussion of the dragonflies, he reports that

Insectum hoc libellam fluviatilem libuit appellare, a similitudine quae illi est cum fabрили instrumento, et cum Libella marina. Haec bestiola parva est admodum T, litterae figuram referens, pedes ternos utrinque habet, cauda in tres appendices definit, quae viridi sunt colore, iisdem et pedibus natat.⁷⁸

it was much-loved to call that insect river-libella, because of the similarity it has to the craftsmen's instrument and to the marine *Libella*. This little animal resembles pretty much a T, referring to the shape of that letter; it has three legs on each side, the tail ends into three appendages, which are of green color; it swims by these and by the feet. (my translation)

Rondelet observed little dragonflies, or, more precisely, their larval stage, resembling the letter T because of their head with protruding lateral eyes. Rondelet connects the shape of the dragonfly to the level, or bubble level, of a scale and to the marine *Libella*, which might be the hammerhead shark (Greek: ζύγαινα).⁷⁹ In his chapter on the hammer-head (*Zygaena*) he reports that Theodorus of Gaza translated the Greek term ζύγαινα with *libella*, alluding to the similarity to the craftsmen's instrument. Since this shark with its lateral extended eyes indeed highly resembled the larvae of the dragonflies, Rondelet then coined the name *Libella* for the dragonflies.

These examples show how names can indirectly impart the education of its name-giver. Another strategy, also found in scientific names, is to honor the education of another scientist. This is briefly outlined in the following section.

⁷⁵ See Rondelet, *De piscibus marinis*, s.v. *Exocoetus*. It seems that already Theophrastus doubted the plausibility of the *Exocoetus* coming on land when he tells the story as follows: "The most wondrous case is, if it is true, the case of the so called 'sleeping outside': This fish, they say, makes its bed every day on land, which is the reason why it has got its name." Theophrastus fr. 171, 1 (my translation).

⁷⁶ Often misinterpreted as derivation from the Latin word for book (*librum*, *libellum*).

⁷⁷ See Kemner 1942; Jarry 1962.

⁷⁸ *Universae aquatiliū Historiae pars altera, cum veris eorum imaginibus* (1555), cap. 39.

⁷⁹ The name for the hammerhead-shark itself is quite metaphorical since the word ζυγός literally describes a yoke of a plough. The particular structure of the shark's head definitely deserves such a metaphorical expression.

3.3 Authorities as Eponyms

Another common naming practice, especially in the Renaissance and following eras, was the naming of species after authorities⁸⁰ (*eponyms*) meritorious in certain fields of research. Especially in botany, there are many species or families bearing a scientist's name. For example, the French botanist Charles Plumier (1646–1704) honored the German naturalist Conrad Gesner (1516–1565) with a family named *Gesnera*.⁸¹ Further, Plumier was honored by Joseph Pitton de Tournefort (1656–1708) by his family *Plumeria* (Apocynaceae); in return, Plumier named the family *Pittonia*.⁸² This name was later revised and renamed by Linnaeus. He turned the *Pittonia* into the *Tournefortia*⁸³ because this name was more popular.⁸⁴ Often, these eponyms have no connection to the authorities they are named after. In some cases, however, there is a relation between the names of the genus and the name-giver; e.g., the family *Bauhinia* was named by Charles Plumier⁸⁵ after two Swiss-French brothers, Caspar (1560–1624) and Johann Bauhin (1541–1613), who were both meritorious in botany. This genus within the family of *Fabaceae* is characterized by leaves that seem to consist of two leaves that have grown together and, thus, resemble two inseparable brothers.⁸⁶

It is possible that affiliated naturalists named different generic groups or species after each other, not only out of a genuine appreciation for these scientists' works, but also to increase their renown. Another intention might have been that young naturalists were motivated to partake in intensive research because there were higher chances of success and honor and, hence, their diligence was enhanced.⁸⁷

However, the naming after 'persons' was also used to brand competitors or critics, as can be already seen in Linnaeus' binary names.⁸⁸ Daniel Rolander, a student of Linnaeus who collected thousands of specimens, once refused to turn them over to his master, intending to describe and publish them by himself and establish his repu-

⁸⁰ We find a few cases of this naming practice in ancient texts. For instance, according to Pliny (*Hist. nat.* 25, 77) the plant *euphorbia* (εὐφορβία in Dioscurides 3, 82) was named after the physician Euphorbus, a brother of a famous doctor. The plant *Mithridateia* was named after Mithridates VI by the ancient botanist Crateuas (*Hist. nat.* 25, 62). See Hardy & Totelin 2016, 100–101 for further examples.

⁸¹ Adapted by Linnaeus under the genus *Gesneria*.

⁸² Charles Plumier, *Nova plantarum americanarum genera*, Leiden 1703, 5.

⁸³ Carl Linnaeus, *Genera plantarum*, Leiden 1742, 62.

⁸⁴ Interestingly, there are several reflections on the rules concerning the naming after authorities, for example, the remarks of the Swiss Alphonse de Candolle (1806–1893), holder of the Linnaean Medal (1889), and member of the Leopoldina since 1836. In his *Introduction à L'Etude de La Botanique* (Paris 1835), he emphasizes that, if a man has two names, like in the case of Pitton de Tournefort, the name of the genus named after him should bear the more prominent name; see de Candolle 1835.

⁸⁵ Charles Plumier, *Nova plantarum americanarum genera*, Leiden 1703, 26.

⁸⁶ Another example might be genus *Trembleya*, named after three brothers who were all active in botanical studies. On this, see de Candolle 1835, 8.

⁸⁷ See de Candolle 1835, 8.

⁸⁸ On the practice of insult naming, see Heard 2020, 104–114 with several examples.

tation. Linnaeus answered this behavior by naming a bug after his disobedient pupil: *Aphanus rolandri* (Linné 1758). The Greek word *Aphanus* stands for ignoble and obscure. In addition, Linnaeus coined another name with insulting intentions:⁸⁹ the genus *Siegesbeckia*,⁹⁰ a small creeping sometimes foul-smelling herb that grows in mud, was named for Linnaeus' main critic, the Prussian physician and botanist Johann Siegesbeck (1686–1755), with whom Linnaeus quarreled.⁹¹ Linnaeus was honored by the Twinflower named after him (*Linnaea borealis*) by Jan F. Gronovius (1611–1671).⁹²

4 Naming Practices in Modern Biology

At first glance, the described naming practices we find in texts from antiquity to the Renaissance seem to hardly be applicable to modern nomenclature; the majority of modern scientists perhaps lack a profound knowledge or deep interest in ancient mythology.⁹³ However, we find many names alluding to fables of modern times, often, though, without any connection to the character concerned. For example, the Cinderella fat-tailed mouse opossum (*Thylamys cinderella*, Thomas 1902) is a species of opossum in the family Didelphidae or, *Crociodura cinderella* (Thomas 1911), a species of mammal in the Soricidae family. The Jurassic genus of ichthyosaurs named *Excalibosaurus* sp. (McGowan 1986) was denominated after the famous sword in the Arthurian legend because of its jaw resembling a sword.

Probably, the fantasy novel *Lord of the Rings*, published by J. R. R. Tolkien (1954–1955) had one of the most pronounced influences on modern taxonomists. We find the main characters of this novel in many species, such as the snout beetles *Macrostyphlus frodo* (Morrone 1994), *Macrostyphlus gandalf* (Morrone 1994), or the cicada *Macropsis sauroni* (Hamilton 1972).⁹⁴ But, likewise, *Harry Potter* is catching up.⁹⁵ This proves that also modern biologists show their penchant for their favorite literature

⁸⁹ This insulting naming practice is now forbidden by the codes of nomenclature, see below.

⁹⁰ Description in *Hortus cliffortianus*, Leiden 1737.

⁹¹ On the controversy between Linnaeus and Siegesbeck, see Jönsson 2000.

⁹² Gronovius coined the name this way because it was Linnaeus's favorite plant. Linnaeus had helped Gronovius to complete his *Flora virginica* (two parts, published 1739 and 1743).

⁹³ However, some names in modern taxonomy contain references to antiquity, albeit in a humorous way: *Vini vidivici* (a parrot, named by Steadman & Zarriello 1987) and *Ytu brutus* (coined by Spangler 1980), a water beetle.

⁹⁴ The Finnish taxonomist Lauri Kaila provides a large catalogue of elves in the description of several species belonging to the *Elachistidae*, a genus of moths. We find *Elachista amrodella* (Kaila 1999), *Elachista aredhella* (Kaila 1999), *Elachista gildorella* (Kaila 1999), and many more.

⁹⁵ See Heard 2020, 152–161.

via naming practices. These practices resemble the naming after (mythological) *eponyms* in antiquity.

Another prominent naming practice in modern nomenclature is still the naming after authorities. For example, the alfalfa gall midge (*Asphondylia websteri*, Felt 1917) is named after the entomologist Francis M. Webster who encouraged the examination of the species. In some cases, we even find a ‘double naming’ after authorities, as in a roundworm (nematode) of the genus *Koerneria* (Meyl 1960), named after the nematologist Hermann Koerner; the epithet in turn is named after another modern German specialist in nematology, Walter Sudhaus (*Koerneria sudhausi*). In contrast to the naming of species after authorities in the Renaissance without a (necessary) connection to the species or the field of research it falls under, today it is a common practice to name species after researchers meritorious in the field in which the species description was published.

The examples given above show that, even in modern nomenclature, we find names alluding to (fictitious) traditional narrative. Further, we can observe a naming practice similar to the allusion to mythology of today’s naming of species: As ancient mythology and its heroes were to the naturalists in antiquity, and the ancient authorities to the Renaissance writers, so are figures of popular culture to the modern scientists. Thus, nowadays famous persons, such as athletes, actors, singers, or ensembles, inspire numerous names of organisms. One finds examples of these eponymous taxa that were simply chosen to honor the respective celebrity by devoting a denomination of a newly discovered organism, often without any connection to the name-giver. For example, the worm species *Neanthes roosevelti*, the beetle *Maxillaria gorbatchesii*, or the trapdoor spider *Aptostichus barackobamai*.⁹⁶ In singular cases, one finds reflections on the naming of species: Recently a newly discovered moth occurring in Southern California and Northern Mexico with a remarkable yellowish-white color of the scales on the head was named after the current president of the United States: *Neopalpa donaldtrumpi* (Nazari 2017). Nazari explains explicitly that the scales with its color reminded him of the hair-style of the name-giver and connects this explanation with an important remark concerning the protection of biodiversity:

The new species is named in honor of Donald J. Trump, to be installed as the 45th President of the United States on January 20, 2017. The reason for this choice of name is to bring wider public attention to the need to continue protecting fragile habitats in the US that still contain many undescribed species. The specific epithet is selected because of the resemblance of the scales on the frons (head) of the moth to Mr. Trump’s hairstyle.⁹⁷

To raise attention to environmental problems is a very modern motivation of naming practices, and quite necessary and (maybe) beneficial as another example might prove: Recently, a deep-sea amphipod has been found in depths of more than 6000 m.

⁹⁶ For more examples for species named after celebrities, see Heard 2020, 49–56.

⁹⁷ See Nazari 2017, 89.

However, the species contained a lot of PET plastic in its stomach which is a result of the rising plastic pollution of the oceans. Alan Jamieson, one of the authors of the publication on the newly discovered species, stated:

We decided on the name *Eurythenes plasticus* as we wanted to highlight the fact that we need to take immediate action to stop the deluge of plastic waste into our oceans.⁹⁸

Other names refer to specific characteristics observed in the organism that parallel those of the eponym. For instance, the male species of a carabid beetle, holding markedly developed, almost 'biceps-like' middle femora, was named *Agra schwarzeneggeri* (Erwin 2002) in reference to the imposing physique of the famous Austrian actor and former governor. A certain species of wasps discovered in Ecuador was named *Aleiodes shakirae* (Shimbori & Shaw 2014) since parasitism by this species causes the host, a particular type of caterpillar, to characteristically bend and twist its abdomen in ways that reminded the scientists of a Colombian singer who is famous for her belly-dancing moves. Marilyn Monroe likewise inspired scientists to name a species of trilobites, *Norasaphus monroeeae* (Fortey & Shergold 1984), after her for its hourglass-like shape. These naming practices do not seem very traditional, but are witty and creative.⁹⁹ Moreover, these strategies serve the purpose of creating an image, which, on the contrary to the strategies of the Renaissance-naturalists,¹⁰⁰ does not focus on the demonstration of education and knowledge, but on the self-representation of scientists as humorous and widely interested people, instead of nerdy specialists.

Facing the high increase of newly discovered species and the availability of names or prominent figures, it seems reasonable that some scientists focus on their imaginative humor to define and name new species; a strategy unfamiliar to antiquity or the Renaissance. For example, a species of braconid wasps with conspicuous huge eyes named *Heerz lukenatcha*¹⁰¹ (Marsh 1993), a species of the scarab beetle *Cyclocephala nodanotherwon* (Ratcliffe 1992), the pyralid moth *La cucaracha* (Blesynski 1966), or the snail *Ba humbugi* (Solem 1983). The historical archetype of the invention of 'humoristic' names might be the insulting naming of the species *Anisonchus cophater*

⁹⁸ Weston et al. 2020. Another example can be added here: A new genus of huntsman spiders (*Thunberga*) found in Madagascar has been described recently by the German arachnologist Peter Jäger and was named after Greta Thunberg because of her commitment to stopping the climate change. On the original description, see Jäger 2020.

⁹⁹ The entomologist Spencer Less showed little creativity and humor when he had to face the task of inventing names for his newly discovered species of flies; he chose perhaps the most uncreative way of sequential naming: *Ophiomyia prima*, *O. secunda*, *O. tertia*, and so on. The same concept can be observed in chemical elements: While several elements are named after the place of discovery (e.g., *Hassium* and *Darmstadtium*) or famous scientists (e.g., *Einsteinium*, *Curium*, and *Roentgenium*), some elements are simply named after their number within the periodic table (*Ununtrium*, *Ununquadium*, *Ununpentium*).

¹⁰⁰ However, Linnaeus had his own sense of humor; see Jönsson 2002.

¹⁰¹ Read out loud: Here's looking at you.

(Cope 1884). The comparative anatomist Edward D. Cope (1840–1897) comments with this species of a Miocene mammal on the diverse hostilities of, especially, Othniel Charles Marsh. In a letter to Henry F. Osborn he wrote:

Osborn, it's no use looking up the Greek derivation of *cophater*, [. . .] for I have named it in honour of the numbers of Cope-haters who surround me [. . .].¹⁰²

These names could be described as *poetonyms* since they do not bear any relation to a (real) person (like *eponyms*), to morphological or behavioral features, (like *morphonyms*), and they do not borrow elements from a foreign language (like *autochtonyms*) or refer to a special place (like *toponyms*). Therefore, they must be seen as inventions originating from the authors' fantasy or creativity.

In consideration of these new naming practices, it seemed necessary that the International Commission on Zoological Nomenclature (ICZN)¹⁰³ emphasized that no zoologist should propose a name that, to his knowledge, gives offense on any grounds or is insulting in any way; however, we have evidence that this rule was previously neglected.¹⁰⁴

5 Conclusion

This overview of the different naming practices demonstrates that, from ancient times to today, naturalists and systematists showed a high level of creativity in inventing names for species. The sources of their names are particularly mythology and lit-

¹⁰² On this, see Davidson 1997, 69.

¹⁰³ The ICZN was founded in 1895 after the First International Congress of Zoology in Paris. Its main task is to publish and periodically revise the International Code of Zoological Nomenclature. The rules concerning the Zoological Nomenclature are regularly revised by the ICZN. The equivalent in botany is the International Commission on Botanical Nomenclature (ICBN). The rules of nomenclature are manifold and the ICZN has the agenda to minimize synonyms of the same species to avoid confusion. Thus, also linguistic lapses are preserved, if they belong to the original description of a certain species and therefore are valid. For example, the genus of burying beetles, first named *Nicrophorus* by Fabricius (1775), was emended by Carl Peter Thunberg (1789) in *Necrophorus*, which is linguistically correct. However, the first description was made by Fabricius in 1775; hence, Thunberg's emendation is not valid. In other disciplines of biology, we have similar committees serving the establishment of rules of nomenclature: The ICSP (International Committee on Systematics of Prokaryotes), for instance, and the IBC (International Botanical Congress). On the ICZN and its nomenclature, see Laurin 2005.

¹⁰⁴ See the example in Linnaeus' work and the case of the *Anisonchus cophater*. Another example might be the English entomologist George W. Kirkaldy (1873–1910), a specialist in *Hemiptera*, who coined many generic names ending with *-chisme* (e.g., *Polychisme*, *Peggichisme*, and *Florichisme*). The Greek suffix *-chisme* is pronounced similar to “kiss me,” while the prefixes of Kirkaldy's generic groups belong to various women from alleged affairs. On Kirkaldy and his nomenclature, see Fletcher 1934.

erature, certain peculiarities of the species, and, especially in later periods, prominent authorities. Hence, the naming practices can be described as highly ‘cultural’.

In the process of inventing names, creativity, education, and knowledge were, and still are, displayed by giving names rich in allusion and referring to external sources. Therefore, naming practices fulfill a further function beyond simply naming species: They can be used to reinforce the appreciation of the naturalist’s education and awareness of details.

The naming practices of modern times in particular prove that, within the task of describing new species and inventing names, a parallel competition emerges; scientists seem to attempt to outperform each other with the naming of their species. Thus, scientific nomenclature serves as a tool for self-representation and demonstration of one’s own education and creativity. In modern times, also the wish to raise attention for questions regarding environmental issues can be connected to the invention of names. Therefore, all those different practices of naming species should be treated with view to their cultural (and temporal) context.

But, as the amateur entomologist Lieutenant Colonel Arthur Maitland Emmet (1908–2001) puts it, sometimes the names given to species simply amuse their inventors:

Scientific names have much in common with crossword puzzles. The nomenclator is the setter; he searches for a name that is neat and appropriate and if he can mystify his fellow entomologists, he will derive sadistic pleasure in so doing.¹⁰⁵

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¹⁰⁵ Emmet 1991, 13. Such a case of riddles in nomenclature might be the genus of orchids called *Empusa* by John Lindley (1799–1865). *Empusa* refers to a frightening demigoddess in Greek and Roman mythology. Bernhardt 2008, 85 was puzzled why John Lindley “cursed” this species of orchids “with the name of the filthiest she-demons in Greek mythology” and provides some ideas about the origin of the name. For another case, see Bernhardt 2008, 136.

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