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The Rise of Botanical Terminology in the Sixteenth and Seventeenth Centuries

Abstract: Early modern scientific literature was to a big part written in Latin and until today many technical terms are derived from a Greek or Latin root. Botany, in particular, has maintained this tradition of describing and naming new plant species in Latin to this day. The sixteenth and seventeenth centuries saw a sudden and unprecedented increase in knowledge of plants not only due to the Europeans' encounter with other parts of the world but also due to a more thorough study of the indigenous flora and the new possibilities that inventions like the microscope offered. This new knowledge sparked the development of more comprehensive and specialized terminologies. The following chapter aims at giving an overview of this development and tries to answer the questions why new terms were introduced, how they were formed, and what contributed to their acceptance and success. The study is based on several important texts from the sixteenth and seventeenth centuries and the findings are exemplified by a close reading of passages on the development of fruits.

While Latin has been the main language in many scholarly disciplines in Western Europe from late antiquity, the predominant position of Latin gradually declined to give way to vernacular languages beginning in the seventeenth century. This process did not develop everywhere at an equal pace as, for example, emerging academies of science in England, France, and Italy actively fostered the publication of scientific results in the respective vernacular, while scholars from the European periphery, in Eastern or Northern Europe, for instance, stuck to Latin much longer. Moreover, there were differences between the scientific disciplines. Botany, systematic botany in particular, was without doubt the discipline that remained true to Latin the longest. Until 2012, the first description of every newly found plant, alga, or mushroom had to be in Latin. Since then, English and Latin are allowed.[1]

1 Turland et al. 2018, Article 39.

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However, even though Latin was the main language of the scholarly discourse for centuries, it has some linguistic disadvantages for this purpose because it lacks a direct article and the possibility to easily nominalize expressions. Moreover, Latin composites were regarded as poor style.[2] Despite these linguistic deficiencies, Latin could maintain its dominance as the language of science for such a long time because it had developed some kind of internationally recognized scientific terminology that moreover remained comparably stable over centuries. Latin has changed little with respect to morphology and syntax since the first-century BCE so that someone who can read Pliny can probably also read Leonhart Fuchs, although they lived about one and a half millennia apart.[3]

However, in the wake of the growing knowledge on plants in general and plant species in particular in the sixteenth and seventeenth centuries this was soon going to change. With an increase in knowledge and a decreasing influence of the stylistic models from antiquity, more fine-grained and comprehensive terminologies developed. Our contemporary botanical Latin is hardly recognizable and understandable for those trained in ancient Latin.[4] Especially in the eighteenth and nineteenth centuries, influenced not least by Carl Linnaeus (1707–1778), Latin was adapted to the needs of a technical language. Not only were further specialized terms introduced and meanings of words changed, but there also came to be differences in the preferred spelling of words and in grammar.[5] At this stage, botanical Latin ceased to be a language of general communication and developed into a purely technical language for specialist discourse.

In the following chapter, I will focus on the sixteenth and seventeenth centuries when Latin had to adapt to new knowledge and advanced techniques of observation and description, but still remained firmly rooted in its ancient origin even though scholars felt decreasingly obliged to write in Ciceronian Latin. Since this would still cover a vast number of texts, I will discuss select texts from different periods that proved to be influential. Moreover, I will deal with general botanical terminology and not with specific names for certain plant species.

1 Ancient Texts and Early Modern Observations

Early modern authors were fierce opponents of the scholastic Latin that had been developed at medieval universities. Orienting themselves toward a new stylistic ideal, the Neo-Latin literature saw a return to classical, that is, mostly Ciceronian Latin.

2 See Roelli 2018, 2021 on Latin as scientific language.
3 Roelli 2018, 390–392; see also Stearn 2004, 15.
4 Stearn 2004, 15.
5 Ibid. 11, 15 f.

How far this imitation of Cicero should go was hotly debated at the end of the fifteenth and the beginning of the sixteenth centuries, but there was a general consensus to follow this model as much as possible.[6] In this first phase of the rediscovery of ancient Latin and increasingly also Greek texts, many scholars had the impression that their ancient scientific heroes such as Hippocrates, Aristotle, Theophrastus, Pliny, Dioscorides, or Galen already knew basically everything. Hence, a philologically sound edition and Latin translation of their writings, the identification of *materia medica* mentioned in them, and moreover the abolition of Medieval Latin or Arabic terms that had become common in late medieval medicine would ultimately lead to the restoration of the ancient knowledge.[7] Due to this intellectual current – the ideal of Ciceronian Latin and the idea of intellectual superiority of ancient scholars – we can hardly expect any new botanical terminology in this phase although Latin translations of Greek texts, which had a much more specialized and established philosophical and scientific terminology, proved to be challenging in this respect.

A main task for naturalists at the end of the fifteenth and the beginning of the sixteenth centuries was to identify plants that were mentioned in ancient texts; general and theoretical aspects of botany, by contrast, were less important.[8] Hence, Dioscorides' collection of plants in his *Materia medica* was a much more popular, studied, commented upon, and imitated work than Theophrastus' philosophical botanical works. However, the latter were available in a Latin translation by Theodorus Gaza (1410–1475) from 1454 that appeared in print in 1483.[9] The volume comprised both the *Historia plantarum* and *De causis plantarum*. Gaza struggled with Theophrastus' text, not only because his Greek was rather terse and dry, at times even obscure, but also because the translator had to be educated in *philosophia*, that is, have a sound understanding of the content. An additional difficulty arose from the lack of suitable Latin authors on this topic and the resulting lack of an adequate Latin terminology as Gaza lamented in the preface (1483, fol. Aiii^{r}-Aiii^{v}). In a letter included in the volume between the *Historia plantarum* and *De causis plantarum* (1483, fol. Kvi^{v}), the humanist Giorgio Merula (1430–1494), who saw the work through press, praised Gaza's translation and defended his use of rare words as inevitable. Theodorus Gaza thoroughly searched Latin authors, Pliny, in particular, for suitable terminology.[10] The passage on the development of fruits will provide an idea of Gaza's translation. In the following discussions of later works, the treatment of this process will also serve as an example in order to make the individual differences as well as general trends in terminology and style easier to compare. This topic was chosen because

6 See, e.g., Helander 2014, 39 f.; Fantazzi 2014; Korenjak 2016, 35–37.

7 See also, e.g., Dilg 1980, 115–121; Morton 1981, 115–118; Ogilvie 2006, 30–34.

8 Dilg 1980, 116 f.; Morton 1981, 122; Ogilvie 2006, 138.

9 Dilg 1975, 230; Morton 1981, 122; Ogilvie 2006, 138.

10 *Hic quotiens nobilium philosophorum libros in Latinum convertit, diligenter nostros scriptores rimatus et imprimis a Plinio non discedens adeo omnia facunde et Latine explicuit*, [. . .] (1483, fol. Kvi^{v}).

it is discussed in many texts and most descriptions are comparably easy to follow without much additional information. Theophrastus treated the development of fruits in his *De causis plantarum* 1.16.1 with the following words:

> Ἡ δὲ πέψις ἐστὶν ἐν τῷ περικαρπίῳ· τοῦτο δὲ δεῖ γίνεσθαι καὶ λαβεῖν χυλὸν ἁρμόττοντα πρὸς τὴν ἡμετέραν φύσιν. Ἴσως δὲ αὐτὸ τοῦτο πρότερον εὖ ἔχει διελεῖν, ὅτι πέψις ἐστὶν ἡ μὲν οὖν τῶν περικαρπίων, ἡ δ' αὐτῶν τῶν καρπῶν, καὶ ἡ μὲν πρὸς τὰς ἡμετέρας τροφάς, ἡ δὲ πρὸς γέννησιν καὶ διαμονὴν τῶν δένδρων· οἱ γὰρ καρποὶ καὶ τὰ σπέρματα τούτων χάριν. Ἑκατέρα δέ πως ἐναντιοῦται πρὸς τὴν ἑτέραν. Ἅμα γὰρ τὸ περικάρπιον ὑγρότερον καὶ πλεῖον καὶ ὁ καρπὸς ἐλάττων, καὶ ἅμα μείζων οὗτος καὶ τὸ περικάρπιον ἔλαττον καὶ σκληρότερον καὶ δυσχυλότερον.[11]
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> But concoction is in the pericarpion; and this must be produced and must acquire a savour that agrees with our human nature. Perhaps it is well to make a distinction about this last point. There is to be sure a concoction of the pericarpion, but there is another of the fruit proper; and the former concoction serves to provide man with food, the latter serves the generation and perpetuation of the tree, this being what fruit and seed are for. Each of the two concoctions interferes in a way with the other: with greater fluidity and size in the pericarpion goes smaller fruit, and with larger fruit goes a smaller, harder and more ill-flavoured pericarpion.[12]

Theodorus Gaza translated the passage like this (1483, fol. bii^{r}):[13]

> [. . .] *concoctio in pulpa fieri solet: quam scilicet confici et succum saporemque capessere nostrae naturae congruum necesse est. Sed forte hoc ipsum prius distinxisse oportet: coctionem aliam pulparum, aliam seminum esse et earum alteram ad cibum hominis accomodatam, alteram ad generationem perpetuitatemque arborum pertinere. Fructus enim et semina earum rerum causa natura produxit. Utrumque vero coquendi genus alteri quodammodo opponi videtur. Cum enim pulpa humidior et plenior est, fructus minor includitur. Cumque is maior est, pulpa minor, durior saporeque deterior ambit.*

Gaza tries to make sense out of some rather obscure passages in Theophrastus by adding, for example, *natura produxit* or *coquendi genus*. Otherwise, he remains quite close to the Greek text. For the technical term πέψις (*pepsis*), meaning a softening or ripening through heat, that has already been introduced by Theophrastus' teacher Aristotle for such physiological processes,[14] Gaza chose the Latin equivalents *concoctio* or *coctio*, a suitable choice since both nouns denote the process of cooking (πέσσω (*pessō*)/*coquere*[15]). In the sense of 'digestion' – expressing in this case almost the same concept – the Latin words *concoctio* and *coctio* have already been used by ancient

11 Text: Amigues 2012, 39.

12 Translation: Einarson & Link 1976, 127–129.

13 I have normalized Latin spelling according to modern conventions throughout the article. All translations are mine if not otherwise indicated.

14 E.g., Aristoteles, *Meteorologica* IV 3, 380 a 11 (ripening of fruits); 381 b 7 (digestion); *De generatione animalium* I 2, 719 b 2 ('concoction' of semen). See also Liddell et al. 1996 s.v. πέψις. For Aristotle's concept of πέψις see, e.g., Lloyd 1996, 83–103. Amigues 2012, 139 states that πέψις is specifically used for the ripening of fruits by Theophrastus and has in most instances the same meaning as 'maturation'.

15 These verbs are actually derived from the same Indoeuropean root. See, e.g., Frisk 1960, s.v. πέσσω; Beekes 2010, s.v. πέσσω.

Latin authors, most notably by Pliny.[16] Considering it was explicitly highlighted by Merula that Gaza looked for suitable terms in good Latin authors, especially in Pliny, it is reasonable to assume that he found this word in the respective writings. The term περικάρπιον (*perikarpion*) literally just means anything around the fruit and was already employed by Aristotle in the sense of the often fleshy covering around the seed of which many fruits consist.[17] This term is still in use (although there is further subdivision into endo-, meso-, and exocarp). Gaza chose to translate it with the Latin word *pulpa* that basically means 'flesh' but could sometimes refer to softer tissue in plants and fruits in antiquity.[18]

However, although Gaza tried to pave the way for Western European scholars interested in plants, his translation did not render Theophrastus' complicated text much easier to comprehend. Commentaries were not available before the second half of the sixteenth century.[19] This might be a reason why Theophrastus' rather philosophical works on plants were less studied at the beginning of the sixteenth century.[20]

The first early modern author likely to have been inspired by Theophrastus' ideas was Jean Ruel (1479–1537). Apart from publishing *inter alia* a Latin translation of Dioscorides' *De materia medica* in 1516,[21] Ruel wrote *De natura stirpium* (1536). This work consists of three books and contains descriptions of some 600 plants, almost all of which were already mentioned by Theophrastus and Pliny.[22] Book one starts with 22 chapters (over 128 pages) dealing with general topics such as habitus, organs of plants and their functions, colors, odors, fruits and seeds, and medical use of plants. There is also a large chapter on botanical nomenclature (Chapter 20, pp. 90–117) where Ruel explains the etymology of some plant names. This part seems to be inspired by Theophrastus, but Ruel hardly went beyond the Greek philosopher as already noted by Theophrastus' true early modern successor Andrea Cesalpino (1519–1603).[23] Ruel's sentences in these introductory chapters are rather short and often contain definitions of technical terms, though they are largely based on ancient texts. The Chapter (11) on fruits and seeds starts as follows (1536, 44):

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16 For example, Pliny, *Naturalis historia* 20.37, 101 (*concoctio*). See also *Thesaurus linguae Latinae* s.v. *concoctio* and *coctio*.

17 Aristoteles, *Meteorologica* IV 3, 380 a 11; *De generatione animalium* I 18, 722 a 15. See also Liddell et al. 1996 s.v. περικάρπιον.

18 For example, Pliny, *Naturalis historia* 16.185 f. (soft tissue in wood, especially of fruit trees); Palladius, *Opus agriculturae* 4.10.35 (pulp of figs). See also *Thesaurus linguae Latinae* s.v. *pulpa.*

19 Dilg 1975, 230 f.

20 Another reason might be that Theophrastus was virtually unknown in Western Europe during the Middle Ages as Dilg 1975, 230 pointed out.

21 Ogilvie 2006, 32.

22 Morton 1981, 122; Valderas 1988, 277 f.

23 *Apud nostros autem Ruellius tentavit quidem, sed praeter ea, quae a Theophrasto excerpsit circa rationem commune, ulterius nequaquam est progressus* (Cesalpino 1583, fol. a3^{v}). Cf. also Morton 1981, 122; Valderas 1988; Ogilvie 2006, 223.

> *Fertilium pars maior fructum in medio flore concipit, alit fovetque tantisper in amplectentis utriculi sinu, dum flavescens emarcescat aut pereat caducus. Fructus flore exutus sensim increscens ad maturitatem perducitur. Fructus alii carne et nervo constant, alii carne tantum concreti. Nonnulli cute teguntur, sed humore omnes imbuti. Carne nervoque pruna cucumeresque coguntur, humore et cute mora punicaque coaluerunt. Sed publica haec distinctio, ut pars exterior cortex, interior caro intelligatur. Quibusdam quoque nucleus sequitur. Postremum in omnibus semen interne decumbit.*
>
> The largest group of fertile (plants) conceives the fruit in the middle of the flower, nourishes and fosters it in the bosom of its surrounding uterus until the falling flower becomes yellowish and withers away or vanishes. After it has been stripped off the flower, the fruit slowly grows into maturity. Some fruits consist of flesh and 'nerves', some just of flesh. Some are covered by a skin, but all are filled with liquid. Plums and cucumbers are held together by flesh and 'nerves', mulberries and pomegranates by liquid and skin. But this is a general distinction that the outer part is the rind, the interior the flesh. In certain fruits there is also a kernel. Finally, there is a seed inside all fruits.

Ruel not only used terms that are closely associated with plants but also terms taken from animals such as *utriculus* (here diminutive of *uterus*), *caro*, or *nervus*. The two latter words denote different qualities of rather unspecified tissue that Ruel discussed in Chapter 4 (*De carne, nervis, venis*; pp. 14–16). *Caro* is a soft tissue, *venae* are what we would call vascular tissues in which saps and water are transported. *Nervi* are some kind of fibers, smaller than the *venae*.[24] Also other terms deriving from structures in animals are used in this chapter such as *medulla* ('marrow', here used like *caro*, but also in the sense of the heartwood),[25] *pulpa* (in contrast to Gaza's translation, here likely referring to the softer parts of wood), or *ossa* ('bones', here in the sense of harder structure into which the *caro* develops). Plants are thus partly described as animals, a quite common metaphor or analogy[26] that we can already find in Aristotle and Theophrastus, and that will remain an important conceptual tool in naming and describing plant anatomy, as we will see.[27]

A much shorter but very influential glossary of terms can be found in Leonhart Fuchs's (1501–1566) *De historia stirpium* (1542).[28] After a long introductory letter,

24 Valderas 1988, 281.

25 Ibid. 281 f.

26 I follow Hentschel 2010, 19–24, who maintains that metaphors show similarities in just one point, but analogies in several relations between source and target system. It is not always easy to decide whether zoological terms in descriptions of plants are just metaphors or are meant to imply an analogy.

27 See, e.g., Atran 1990, 224–230; Humar 2019; Bigotti 2021. Anthropomorphization of plants is, of course, not restricted to scientific texts; think, for example, of plant similes in epic or metamorphoses of humans into plants.

28 On this work, see, e.g., Morton 1981, 124; Pavord 2005, 175–191; Ogilvie 2006, 194–197 and *passim*; Kusukawa 2012, 107–123. There is a commentary and facsimile edition by Meyer et al. 1999 in two volumes. Choate 1917 and Heller in Meyer et al. 1999 I, 220–259 offer an English translation of the glossary.

Fuchs added a *vocum difficilium explicatio* (fol. $\beta 3^{r}$–$\beta 4^{v}$) in which he explained around 130 technical terms in alphabetical order, most of them referring to parts of plants, but 18 were not used as botanical terms by Fuchs, for example, *amuletum* or *cubitus*.[29] Some of these words – Stearn mentions 49[30] – have retained their meaning, the rest have become obsolete or acquired a different meaning. The explanations of the terms are just short definitions. The word *fructus* is explained like this (fol. $\beta 3^{v}$): *Fructus, quod carne et semine compactum est. Frequenter tamen pro eo, quod involucro perinde quasi carne et semine coactum est, accipi solet.* – "The fruit is, what consists of flesh and seed. Yet frequently in place of that, is understood whatever is collected in a wrapper in the same way as seed and flesh."[31] Like Ruel, but unlike Theodorus Gaza, Fuchs did not use *pulpa* for the fleshy part of the fruit but *caro*, the common word for flesh. *Pulpa* is also defined by Fuchs (1542, fol. $\beta 4^{r}$) in the same sense as in Ruel's text: *Pulpa in arboribus est, quod nos in animalium corporibus musculum appellamus*. – "*Pulpa* in trees is what we call muscle in animal bodies."

It is important to note that none of these terms in Fuchs's glossary is newly coined but all are inherited from antiquity[32] or maybe also from his predecessor Ruel.[33] Fuchs did, however, create some new denominations for plants that had not been described in antiquity, most notably for the foxglove that he baptized *digitalis*, a loan-translation from its German name *Fingerhut* (Fuchs 1542, 892).[34] Fuchs only described some 550 plant species, most of them already known in antiquity,[35] so a detailed taxonomy and systematic description was not yet important. This would soon change, since early modern botanists were becoming increasingly aware that there were much more plant species than the ancients mentioned, not only from the Americas but also from Europe. This insight was already expressed by Antonio Musa Brasavola (1500–1550) in his *Examen omnium simplicium medicamentorum* (1536, 103):

> [. . .] *certum vero est centesimam partem herbarum in universo orbe constantium non esse descriptam a Dioscoride, nec plantarum a Theophrasto aut Plinio, sed in dies addiscimus et crescit ars medica.*
>
> But surely not a hundredth part of the herbs in the whole world was described by Dioscorides, not a hundredth part of the plants by Theophrastus and Pliny, but every day we learn more and the art of medicine grows.[36]

29 Stearn 2004, 28. Stearn also remarks that three of the initially unbotanical words have meanwhile acquired a botanical meaning: *alabastra*, *amphora,* and *ligula*. Heller in Meyer et al. 1999 I, 224 identifies 29 'nonbotanical' terms.

30 Stearn 2004, 28.

31 Translation: Choate 1917, 193 with modifications. Cf. also Heller in in Meyer et al. 1999 I, 239.

32 Pavord 2005, 189.

33 Morton 1981, 124.

34 See Meyer et al. 1999 I, 100 f. for further examples.

35 Morton 1981, 124; Meyer et al. 1999 I, 65.

36 Translation: Morton 1981, 118 with modifications.

Caspar Bauhin (1560–1624), for example, could already describe more than 6000 forms of plants in his *Pinax theatri botanici* (1623). This increasing mass of known plant species and the wealth of additional information required a whole new system of categorization and description in a more standardized way.[37] The study of plants within so-called natural history developed into the 'science of describing' with its own and specific ways of identifying, naming, describing, and categorizing natural items as Brian Ogilvie has demonstrated.[38] This in turn fostered the development of new and more specific terms in botany.

2 The Expansion of Botanical Knowledge

The introduction of a new botanical terminology was a largely gradual process to which different authors contributed. We must not assume that there was a single scholar who crafted a newly coined terminology from scratch that was subsequently accepted by his peers. Instead of the coining of wholly new terms in the sense of a neologism of form, we rather see that already existing terms were given a new meaning in a certain context (neologism of sense), for example, by analogy or metaphor, or that some terms acquired a more specific meaning and developed from rather general words into real technical terms. Instead of a full set of new terms, early modern botanists could come up with just one or a few expressions that were subsequently taken over by others if they proved to be helpful. A good example is Fabio Colonna's (1567–1640) linguistic distinction between leaves of flowers and foliage leaves. Interestingly, the two sorts of leaves were not distinguished on a linguistic level until the end of the sixteenth century since both kinds of leaves were mostly referred to as *folium* in Latin and φύλλον (*phullon*) in Greek. Fabio Colonna graduated in laws but became interested in botany and pharmacology through his suffering from epilepsy and other illnesses. These led him to the study of ancient medical texts and resulted in the publication of the ΦΥΤΟΒΑΣΑΝΟΣ *sive Plantarum aliquot historia* (1592) as he highlights in the preface of this work.[39] As the Greek title Φυτοβάσανος (*phutobasanos*) – 'the touchstone of plants' – indicates, Colonna discussed ancient descriptions of plants including their alleged medical properties and assessed them in light of modern findings and observations – among them many of his own. Hereby, Colonna corrected quite a few errors of ancient medical writers. Besides, Colonna used πέταλον (*petalon*) to refer specifically to the leaves of the flower, the petals as they are still called

37 For example, Morton 1981, 145; Atran 1990, 135; Ogilvie 2006, 222. The inclusion of detailed and realistic pictures constituted another important means for the identification of plants. See Dilg 1980, 122 f.; Kusukawa 2012.

38 Ogilvie 2006, especially 139–208.

39 See also Freedberg 2002, 114.

today.[40] The Greek word πέταλον basically also means 'leaf', though it is mostly used in poetry, not in prose.[41] Thus, *petalon* acquired a new, more specific meaning. Colonna became a member of the so-called Accademia dei Lincei and participated in many of their scientific activities including the publication of the so-called *Rerum medicarum Novae Hispaniae thesaurus*. This work on the natural history of the Spanish colonies in America was originally written by Francisco Hernández de Toledo (1517–1587) in the 1570s but remained in manuscript form and was kept in the library of the Escorial in Spain. This manuscript was later lost in a fire, but an epitome by an Italian physician named Nardo Antonio Recchi (1540–1595) had been produced that came into the hands of the members of the Accademia dei Lincei who published it in 1651 together with supplementary material, including glosses on plants by Colonna.[42] In this part, Colonna explicitly stated (p. 853) that he preferred the term πέταλον for the leaves of the flower to distinguish them from foliage leaves.[43] Colonna's new term helped botanists to specifically refer to a characteristic of plants that can be used to distinguish species from one another.

Some terms were closely linked to a specific concept and therefore did not survive when this concept was abandoned. A good example for this phenomenon is Andrea Cesalpino's reinterpretation of the term *cor* in his work *De plantis* (1583). The word *cor* was used by Ruel (1536, 3, 16) and Fuchs (1542, fol. β3^{v}) in the sense of heartwood just like Theophrastus (*Historia plantarum* 3.14.1) had already employed the respective Greek word καρδία (*kardia*). The idea that the innermost part of the wood is so-to-say the 'heart' is still contained in the English expression 'heartwood'. Cesalpino introduced a whole new meaning for *cor* in plants in analogy to the heart of animals. He identified the *cor* with the region, especially in the seed, where shoot and root come together and where he localized the seat of the soul just as he assumed it in the case of animals.[44] This meaning of *cor* is no longer in use because the concept of a vegetative soul localized in some kind of heart is, of course, outdated. The respective region in the seed where the embryonic root of the plant embryo in the seed goes over into the axis is nowadays called hypocotyl, referring just to its location below the primordial leaf or leaves, the cotyledon(s).

Cesalpino's work *De plantis* is surely a milestone in the history of botany. It consists of 16 books and discusses about 1,500 plants in ca 1,000 chapters.[45] The first book

40 Morton 1981, 163 f.; Findlen 2006, 461. Stearn 2004, 31 is, however, not correct in stating that Colonna never used the word πέταλον/*petalum* himself and seems to be unaware of its introduction in the *Phutobasanos* where it appears already in the very first description on page 1.

41 Liddell et al. 1996 s.v. πέταλον.

42 See, e.g., Freedberg 2002, 245–274; de Asúa & French 2005, 93–104; Baldriga 2007, 258–262; Mason 2009, 152–154; Capanna 2009 on the *Thesaurus* and its history.

43 See also Morton 1981, 133; Stearn 2004, 31.

44 For example, Cesalpino 1583, 2, 8. See also Morton 1981, 133; Atran 1990, 225–227.

45 Morton 1981, 129; Pavord 2005, 237.

is special because it is one of the few original philosophical treatises of botany from the sixteenth century, arguably the first since the works of Theophrastus.[46] As we have seen, Cesalpino was influenced by the peripatetic notion of the vegetative soul and used the respective vocabulary. The 15 remaining books are on the macrolevel arranged in the traditional order according to the habitus (trees and bushes in books 2–3, *humilior materia*, i.e., subshrubs and herbs in books 4–16). On the microlevel, Cesalpino grouped together plants with similar fruits and forms of seeds. Thereby, he created the first system of plants based on organs of reproduction; a system based on *differentiae* of the *substantia* of plants, not on *accidentia*, as Cesalpino (1583, 26) stated in an Aristotelian manner.[47] However, apart from his peripatetic influences, Cesalpino's text contains comparatively little technical vocabulary of botany. Most of the terms are, moreover, explained and defined. In this respect, his text is quite accessible. His description of the development of fruits begins like this (1583, 16):

> *Fructum vocamus, quod ex semine et semen continentibus corporibus constat, quamvis proprie secundum nominis appellationem ea pars significetur, qua fruimur in cibis expetentes. Expetimus autem inter cibos aliquando nuda ipsa semina, ut pini, nucis, castaneae et omnium frugum et leguminum, aliquando carnem seminibus circumpositam, quam proprie pericarpium vocant, ut mali, piri, melopeponis. Cum igitur de semine superius dictum sit, relinquitur, ut de circumpositis corporibus dicamus: hinc sumpto initio. Seminibus omnibus inest humor quidam fecundus, quo evanescente, aut per aetatem aut ab externa iniuria, redduntur infecunda. Huius igitur custodiendi gratia natura omnibus corticem quendam circumduxit, qui perpetue haeret, donec germinare coeperint.*
>
> We call fruit what consists of the seed and the bodies that contain the seed, although in the proper sense of the word it denotes the part that we enjoy when we reach out for it in meals. During meals, however, we sometimes reach out for the seed per se, like of pine tree, nut tree, chestnut tree, and all grains and legumes, sometimes we reach out for the flesh that surrounds the seed, that is properly called pericarp, like of apple trees, pear trees, and melons. As we have already talked about the seed above, we leave it aside so that we can speak about the surrounding bodies and start from here. In all seeds is a fertile sap. If this is lost either through age or an external damage, they become infertile. Thus, in order to protect them, nature has surrounded all of them with some kind of shell that remains there permanently until they start to germinate.

Cesalpino begins his chapter on fruits with a definition of it that resembles the one in Fuchs's glossary. Other technical terms are also explained, most notably *pericarpium*. While Theodorus Gaza, Ruel, and Fuchs found a Latin equivalent, *pulpa* or *caro*, Cesalpino chose to basically transliterate the Greek word (with a Latin ending) and give a short explanation. Otherwise, his text is written in elegant, almost classical Latin without too many technical terms, except for those that cannot be avoided such as the names of fruits. For instance, Cesalpino neither mentioned nor created a technical term for the seed coat, nowadays known as testa, which he just called *cortex quidam*.

46 For example, Morton 1981, 128–144; Pavord 2005, 228–241; Ogilvie 2006, 54, 223–226 and *passim.*

47 See also Morton 1981, 135 f.; Pavord 2005, 234 f.

Joachim Jungius's (1578–1657) *Isagoge phytoscopica* constitutes an important step toward our modern terminology. This small work was edited and printed posthumously in 1678 or 1679[48] but had already circulated earlier in manuscript form.[49] The content of this introduction to botany stems from Jungius's teachings in private *collegia*, emended and extended by the author himself, and subsequently revised and edited by Johannes Vagetius (1633–1691) after Jungius's death. Inspired by Theophrastus' and Cesalpino's philosophical approach, Jungius offered an analytical assessment of plant morphology based on essential organs and structures.[50] Jungius is better known as a mathematician and in fact his *Isagoge* introduces the reader to the study of plants with short, non-redundant definitions of terms as we would expect it in a mathematical work.[51] There are 28 chapters on parts of plants ordered from general to special, subdivided into parts that serve growth (*augmentatio*) and parts that serve reproduction (*generatio*). Chapter 26 on fruits starts as follows ([1678], fol. $F2^{v}$-$F3^{r}$):

1. Fructus *dicitur pars plantae annua flori cohaerens et succedens, qui ubi maturuerit, id est ad perfectionem suam pervenerit, sponte a planta abscedit et terra aliave commoda nutrice excepta novae plantae fit initium.*
2. Succedere *dicitur* flori fructus*, quod floris inchoatio, perfectio, defluxio, fructus inchoationem, perfectionem, defluxionem antecedat.*

   Fructus igitur a reliquis plantae annuis[52] *partibus differt, quod cum primum absolutus est sive ad perfectionem devenit, pars esse desinit, cum reliquae (uti folia, flores et in nonnullis surculi vel etiam integri stipites), tum demum ubi marcescere, putrescere aliterve corrumpi incipient a planta sua separentur.*[53]
3. *Fructus vel semen est vel seminis conceptaculum, vasculum, folliculus, capsula, theca, involucrum seminis.*

1. A *fruit* is an annual part of a plant that is connected to the flower and follows it. As soon as it has ripened, that is, reached its perfection, it falls from the plant by itself and becomes the origin of a new plant after it has been received in the ground or another suitable 'nurse'.
2. *That the fruit follows the flower* means that the beginning, perfection, and discharge of the flower precede the beginning, perfection and discharge of the fruit.

   The fruit is therefore different from the other annual parts of the plant because it stops being a part as soon as it became complete or reached perfection while the other parts (like leaves, flowers, and in some plants twigs or even the whole trunks) are finally separated from their plant when they start to whither, rot, or are otherwise damaged.
3. A fruit is either the seed or the receptacle of the seed, the vessel, pod, capsule, hull, or covering of a seed.

48 Morton 1981, 168; Stearn 2004, 30.
49 There is no date on the print, but Vagetius's dedicatory letter is dated 28 August 1678.
50 Morton 1981, 168; Stearn 2004, 30.
51 Morton 1981, 168; Stearn 2004, 30.
52 The print reads *annuae*, but the adjective should rather refer to *partibus*.
53 This discussion of fruits, leaves, flowers, etc. as *partes* or μέρη of plants goes back to Theophrastus, *Historia plantarum* 1.1.2 f.

Jungius's language is already very technical and contains hardly any unnecessary words or information. Moreover, we see nominal expressions such as *inchoatio*, *perfectio*, and *defluxio*. While many early modern scholars at the beginning of the sixteenth century tried to avoid such unclassical expressions that were regarded as scholastic and hence shunned, these reservations gradually declined in the course of the sixteenth and seventeenth centuries because – as in scholastic texts – an exact terminology consisting mostly of nouns became not only necessary but also proved to be handy.[54] Although Jungius is in general thorough in his definitions, he neither defined the forms of seed vessels nor distinguished between fruits containing only one seed and those containing several seeds.[55]

The editor Vagetius stated in the letter of dedication that Jungius's work provided not only a good guide to the characteristics (*differentiae*) of plants but also a sound set of terms for these characteristics. Jungius's terminology thus enabled scholars to write down their observations so that an unambiguous identification of plants would still be possible after some centuries.[56] In fact, Jungius introduced a number of new terms that are to a substantial part still valid today and gave already existing terms a very specific, technical meaning.[57] In contrast to earlier authors like Ruel, Jungius used *nervus* together with *costa* ('rib') to denote the veins of the leaf.[58] Jungius's definition prevailed in a certain sense,[59] and this example shows that technical terms did not remain stable and could change meaning.

One reason for Jungius's success is surely his sound and useful approach to describing and naming parts of plants, but the fact that his work was much valued by John Ray (1627–1705) and Carl Linnaeus also played a role. The latter mentioned Jungius and his *Isagoge* as the first example of *institutores* – that is, philosophers of botany who teach how to correctly establish systematics of plants[60] – in his *Bibliotheca botanica* (1736, 123), which contains what he considers the most important works of botanists; the last *institutor* is, of course, no other than Linnaeus himself.

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54 Helander 2014, 43–45. Cf. also Roelli 2021, 439–454 for a general assessment of scientific texts in Latin.

55 Morton 1981, 172 f.

56 [. . .] *inventis apta imposuit nomina, id denique effecit, ut describi observationum istarum ductu planta quaelibet ita possit, ut post quotcumque saecula ex descriptione ista sine errore agnoscere eam liceat* (fol.)o(3^{v}).

57 Morton 1981, 173; Stearn 2004, 31.

58 *Id, quod inter folia est,* nervus *saepius aut* costa *dicitur* (Jungius [1678], fol. $A2^{v}$) – "The same, which is the middle of the leaves, is called most often the nerve or the rib." (transl. Stearn 2004, 30).

59 In English, 'nerve' or more often 'vein' is used for all vascular bundles of the leaves; *costa* ("rib") denotes the midrib, the main vascular bundle of the leaf. See also Stearn 2004, 31 for this and further examples.

60 *Institutores botanici philosophi sunt, qui regulas rite constituendi systemata tradiderunt* (Linnaeus 1736, 123).

John Ray must have already received Jungius's *Isagoge* in manuscript form shortly after his death because Ray frequently cites it in his own works from 1660 onward.[61] Ray was an important predecessor of Linnaeus and developed a system of plants based on shared morphological characteristics (mostly flowers, seed, and seed vessels) and also tried to define 'species' in chapter 20 of the first volume of his *Historia plantarum* (1686, 40–42).[62] The *Historia plantarum* is an *opus magnum* published in three volumes (1686, 1688, and 1704). It not only contains thousands of plant species from all parts of the world, many of them described for the first time, but also a substantial theoretical introduction in the first book.[63] Like in Fuchs's *De historia stirpium* (1542), Ray included an alphabetical glossary of technical terms at the beginning of the first volume (1686, fol. $a2^{r}$-$a4^{v}$). In Ray's glossary, we find not only the Latin terms and definitions but also English translations.[64] Ray included basically all of Jungius's terms and added some more. Among Ray's additions is *petala* (1686, fol. $a3^{v}$) for the petals for which he rightly refers to Colonna; Jungius did not linguistically differentiate between the two kinds of leaves.[65] This inclusion is in line with Ray's focus on the flower for his taxonomy of plants that required a specialized terminology. Cesalpino was another important source for Ray and he also took over Cesalpino's concept of *cor* that can be found in the glossary (1686, fol. $a2^{v}$).[66] Ray's Chapter 12 on fruits starts with these words (1686, 22):

> *Fructus a fruendo dicitur estque pars ea plantae qua in cibis fruimur, sive pericarpium sit sive semen. Nomen autem fructus per analogiam ad omnium plantarum partes similes, quamvis nullum nobis usum praestent, nec in cibis neque in medicina, extendi potest.*
>
> Fruit is derived from *frui* ('enjoy') and it is the part of a plant that we enjoy in meals, be it the pericarp or the seed. The term 'fruit' is by analogy applied to similar parts of all plants, even if they are not useful for us and are neither sought after in meals nor in medicine.

This introduction is clearly inspired by Cesalpino's similar words, although Ray's version is much shorter and lacks, for example, the explanation of *pericarpium*. Immediately following these two sentences are Jungius's definitions to which there is a correct reference. Ray went well beyond Jungius and Cesalpino in the following account on the fruits and distinguished different sorts of fruits according to structure, number of seeds, etc. Moreover, Ray considered the latest microscopic studies by Marcello Malpighi (1628–1694), which will serve as a final example.

61 Stearn 2004, 31.

62 See, e.g., Morton 1981, 197–212; Pavord 2005, 372–395.

63 See, e.g., Morton 1981, 198.

64 Stearn 2004, 31 states that some of the English terms no longer exist nowadays as they have been replaced by the Latin equivalent they should explain. This demonstrates the importance of Ray's work and the role of Latin in botany.

65 Morton 1981, 207; Stearn 2004, 31.

66 *Cor sive corculum seminis est portiuncula seminis unde tum radix, tum germen enascitur.* – "The heart or little heart of the seed is the part of the seed from where root and shoot grow out."

3 Microscopic Studies

Marcello Malpighi's *Anatome plantarum* (1675–1679) marks another important step in the history of botany. Together with Nehemiah Grew (1641–1712), Malpighi established the field of plant anatomy.[67] With the help of the microscope, Malpighi could describe the microstructure of plant tissues on a cellular level for the first time, although he was not yet aware of the real nature of cells and referred to them metaphorically as *utriculi*, 'small skins (for a liquid)', because of their form.[68] We should note that *utriculus* as diminutive of *uterus* has already been used by Jean Ruel in the quotation above to denote the ovary of plants. Hence, these two *utriculi* are homonyms. Our modern term 'cell' goes back to Robert Hooke's description of pores in cork that reminded him of the cells in a honeycomb as he explains in his *Micrographia* (1665, 113).[69] Although Malpighi's observations of what we can nowadays identify as plant cells are much more accurate than Hooke's, Malpighi's name did not prevail. Apart from this, Malpighi made many more important new findings that needed to be described and named accordingly. But, as Stearn rightly states, also in these cases "few of the words used by Malpighi have survived into modern botanical terminology."[70] This might partly be due to the conceptual framework in which Malpighi conducted his observations on plants that is reflected in his choice of names. Already in the so-called *Anatomes plantarum idea*, a short sketch of plant anatomical studies written in the form of a letter dated 1671 that was also prefixed to his *Anatome plantarum*, Malpighi stated (1675 [1671], 1):

> *Etenim fervente aetatis calore anatomica aggressus licet circa peculiaria fuerim sollicitus, in perfectioribus tamen haec rimari sum ausus. Verum, cum haec propriis involuta tenebris obscura iaceant, simplicium analogismo egent; unde insectorum indigo illico arrisit. Quae cum et ipsa suas habet difficultates, ad plantarum perquisitionem animum postremo adieci, ut diu hoc lustrato mundo gresso retroacto vegetantis naturae gradu ad prima studia iter mihi aperirem. Sed nec forte hoc ipsum sufficiet, cum simplicior mineralium elementorumque mundus praeire debeat.*
>
> And though when I turned to anatomical studies in the fiery heat of youth, I was eager about peculiarities, I nevertheless dared to examine these in higher animals. But since they lay hidden and covered in their own darkness, they required analogous studies of simpler animals; whence the study of insects seemed immediately pleasing to me in need. When these had their own difficulties, I have finally turned to the study of plants so that after I will have wandered this world for a long time, I might turn my step back and open a path from the stage of vegetal nature to my initial studies. But maybe not even this might be sufficient, because the simpler world of minerals and elements must precede.

67 See, e.g., Adelmann 1966 I, 384–417; Morton 1981, 178–195; Fournier 1996, 55–62, 118–121 and *passim*; Bäumer 1996 III, 28–31; Rebohm 2017, 72–77.
68 Möbius 1901, 159 note 4; Morton 1981, 187; Toepfer 2011 III, 764.
69 *Oxford English Dictionary* s.v. cell.
70 Stearn 2004, 29.

We can see that Malpighi's main motivation for the study of plant anatomy was ultimately to understand the anatomy of humans. As the latter proved to be complex, he went down the *scala naturae* so to say and finally arrived at plants, which were perceived as the less complex living beings. Thus, we find many terms from the anatomy of animals transferred to plant structures in analogy.[71] We have already seen that the metaphor or analogy of plants as animals was widespread in pre-modern – and partly also in modern[72] – biology, but Malpighi has taken the analogy much further than his predecessors had. In fact, his approach yielded some good results in comparative anatomy of animals by drawing analogy to the function of similar structures in smaller or more difficult to observe animals from the study of larger and more easily observed animals.[73] However, plants proved too different from animals for his widespread and consequent application of animal terminology to prevail to a significant extent. A notable exception is vascular tissues that are called *trachea* because their structure resembles the trachea[74] of humans and especially the spiracles[75] of insects.[76] Trachea in plants are specialized cells or rather dead cells of the vascular tissue, in the so-called xylem, that serve the transport of water and minerals.[77] By contrast, Malpighi's choice of terminology in his chapter on the plant seed (1675, 57–63) that he described as if it were a chick embryo was less successful.[78] It is difficult to decide whether these analogies were intended to refer to a factual correspondence or Malpighi just used them metaphorically in order to indicate a certain similarity. Still, the quotation above gives the impression that Malpighi really had the idea that the anatomy of plants and animals is comparable so that he could gain knowledge on the one by studying the other.

Apart from this feature, Malpighi's text and the style of his writing show further peculiarities that can be demonstrated with his description of the development of the fruit (Malpighi 1675, 64):

> *De uterorum augmento et ipsorum succedente forma*
>
> *Expositis incrementis contentum semen in stylo ceu utero debitas subit mutationes, donec perfecta et completa organizatione veluti filius emancipetur. Nec soli semini contingit augmentum, sed Natura in pluribus uterum successive auget pluraque circum-turgere iubet foetus gratia. Ita in piro, pomis, cerasis et similibus contingit inducto pericarpio ut plurimum vel osseo cortice vel alio analogo tegumento. Varia est Naturae methodus in producendis huiusmodi uteri appendicibus et integ-*

71 For example, Atran 1990, 227; Fournier 1996, 59 f., 120; Rebohm 2017, 61, 76.

72 Humar 2019, 90–92.

73 Micheli 2007.

74 This word is derived from the female form τραχεῖα of the Greek adjective τραχύς ('rugged', 'rough') that is used together with ἀρτηρία to denote the trachea.

75 Their scientific (and also German) name is *trachea* as well.

76 Malpighi 1675, 10, 14, and *passim.* See, e.g., Fournier 1996, 60.

77 See also Humar 2019, 92.

78 See, e.g., Morton 1981, 185; Fournier 1996, 120. A translation of some parts of the chapter together with notes can be found in Möbius 1901, 60–63 (German) and Adelmann 1966 II, 849–855 (English).

umentis. Primo itaque, ubi calyx humilis est et exiguus uterus, in longum producitur styli elongata tuba. Hoc apprime experimur in citris et malis limoniis (Tabula 43, 247), quarum uterina extuberans tuba A sensim contabescere incipit, utriculi autem corticis B, turgidiores redditi, pericarpium exterius augent et circa seminum capsulas C vesiculae avido succo turgidae D emergere incipiunt.

On the growth of the uterus and its subsequent form

When growth became visible, the seed contained in the ovary or the uterus undergoes the necessary changes until it is released into independence like a son after all the structures have formed completely. Not only the seed grows, but nature lets the uterus gradually grow in many species and makes many swell all around because of the fetus. This happens in pears, apples, cherries, and similar fruits as soon as it is covered by the pericarp or a 'bony' hull or another analogous cover. Nature has various ways in producing accessions and coverings of such a uterus. First, thus, where the calyx is low and the uterus small, the elongated style of the ovary is extended. We find this mostly in lemon and lime (table 43, 247, here Fig. 1) whose upswelling style of the uterus A gradually begins to wane, the cells in the hull B, that become more swollen, let the pericarp grow from outside and vesicles swollen with avid juice D begin to emerge around the shell of the seeds C.

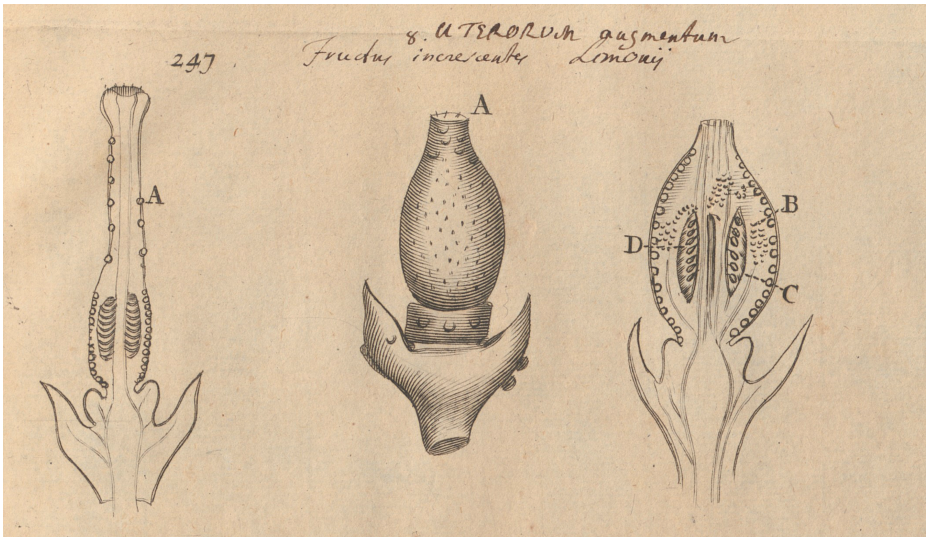

Fig. 1: Table 43, illustration 247 from Marcello Malpighi's *Anatome plantarum* (1675). Zentralbibliothek Zürich, NB 175, https://doi.org/10.3931/e-rara-62547 / Public Domain Mark.

Several points have to be addressed in this short passage with regard to the use of terminology. As has been said, Malpighi tried to describe plants as analogous to animals. Therefore, it comes as no surprise that he preferred the term *uterus* over *stylus* for the ovary. That he regarded these terms as synonyms is clear through the expres-

sion *in stylo ceu utero* in the first line.[79] In the chapter title and in most instances in the text, Malpighi rather uses the zoological term than the botanical. *Stylus* is not equivalent to our modern 'style', that is, the oblong, upward extension of the ovary. This structure is here called *tuba*, a metaphorical term referring to the musical instrument it resembles. Similarly, the seed is not only referred to as *semen* but also as *foetus* and is even compared to a son who is released from parental care (*veluti filius emancipetur*).

Malpighi's text features some subtle semantic changes compared to the earlier usage of a word. The word *calyx* (not to be confused with *calix*) or Greek κάλυξ (*kalux*) has been used since antiquity for basically any covering of flowers and fruits, but in Malpighi's text the term acquired the more specific meaning it still has today, that is, the usually green cover around the flower collectively formed by the so-called sepals.[80] An unclassical word in Malpighi's text is *organizatio.* The verb *organizare* was already used in Medieval Latin for 'playing the organ' or 'to pattern/form'.[81] The latter surely provides the meaning of the noun *organizatio* in this and in other medical or biological texts where it means something like 'the development of organs/structures' or, even closer to its modern meaning, just 'structure', 'arrangement'.[82] Malpighi was obviously not afraid to employ words from Medieval Latin. Moreover, Malpighi used descriptive, but unclassical verbs such as *circum-turgere*.

Besides, Malpighi's text is written in a nominal style that we have already encountered in Jungius's *Isagoge*. We find, therefore, expressions such as *mutationes subit* instead of *mutat* or *semini contingit augmentum* instead of *semen augetur.* Given the fact that Jungius's *Isagoge* was a different kind of text in which the use of nominal style might be less surprising, Malpighi's choice of nominal expressions is even more remarkable, especially as they do not seem to provide any additional or more specific meaning compared to expressions that are more classical.

4 Conclusion and Outlook

Having assessed different texts concerned with botanical terminology, I will now try to draw some general conclusions and to relate them to the overall questions of this volume. In the earliest examples from the end of the fifteenth and the first half of the

79 Stearn 2004, 29, however, thinks that *stylus* denotes the gynoecium as a whole while *uterus* only covers the ovary.

80 Stearn 2004, 29.

81 For example, Du Cange s.v. *organizare*. It can also be found in Kirsch 1774, 1986: "organīzo, are, *die Orgel schlagen*".

82 The word can also be found in other passages of this work: Malpighi 1671 [1675], 1; Malpighi 1675, 27. There are also earlier instances of this use in English texts. See, e.g., *Oxford English Dictionary* s.v. organization.

sixteenth centuries, we hardly encounter unclassical words. As has been said, this is on purpose because scholars strived to imitate ancient models – in the case of science mostly Pliny – and resorted to neologisms only if they had no other choice. Since ancient scientific texts, particularly pharmacological and medical ones, were to a big part written in Greek, the first Latin translations of these texts in the early modern period proved to be very challenging because Greek had a more developed and extensive technical vocabulary. To find a suitable Latin terminology was not only a question of style and aesthetic but also of authority because early modern scholars aimed at restoring ancient knowledge by carefully editing, interpreting, and commenting authoritative texts from antiquity. The correct understanding and use of terminology were crucial to this end.

By the second half of the sixteenth century at the latest, scholars became aware that ancient authors were missing out on many aspects of scientific knowledge and subsequently emancipated themselves from them. The exponential increase in knowledge on plants and especially of known species from several hundred to several thousand in the sixteenth and seventeenth centuries led to the development of more detailed and standardized descriptions as well as systems of categorization. This fostered in turn the creation of new terms not only for individual plant species but also for general concepts or structures of plants. Since it was no longer feasible to write in a Ciceronian style, these stylistic questions took a backseat and a more technical style developed. The increase in both detailed knowledge and specialized jargon surely also led to a further differentiation of the scientific disciplines that – like in a feedback loop – might have fostered further specialized jargon: If the interested layperson could no longer understand the latest findings and theories anyway, there was no need for a more accessible treatment of one's topic. This is, of course, a gradual process and there are individual differences, but in general, a scientific Latin text from the beginning of the sixteenth century is much closer to classical Latin – and hence, easier to understand for the non-specialist – than a specialized treatise from the end of the seventeenth century. It is also worth noting that the seventeenth century saw an increase in botanical literature written in the vernaculars that could provide information for the interested layperson.

With regard to the creation of new terms we encountered different strategies although most words remain firmly rooted in the classical languages. As can be expected, technical texts tend to be written in a nominalized style and this increased over time as the Ciceronian ideal became less important. Malpighi's text is a particularly good example in this respect.

In many cases, there is no real coinage of new terms, but already existing, rather general words get a more specific meaning as we have seen, for example, in the case of *calyx*. Thereby, expressions that used to be synonyms or at least have a very similar meaning such as *pulpa* and *caro* or φύλλον/*folium* and πέταλον/*petalum* could develop into technical terms with different meanings. Another strategy consists in the transfer of already existing terms from zoology and anatomy to structures in plants. As has been said, this metaphorical or analogical use of zoological vocabulary was already es-

tablished in antiquity, but authors like Cesalpino and especially Malpighi explicitly chose these terms for conceptual reasons, that is, because they perceived structures in plants to be analogous to those in animals. Many of these terms are therefore no longer valid because neither are the concepts behind them. Another danger of this strategy lies in the misinterpretation of certain structures in animals as similar or equivalent to different structures in plants. Hence, such terms taken from zoology are particularly prone to be unstable. Words like *pulpa*, *nervus*, or *cor* were used differently by different authors. The most stable terms are probably those that proved to be easily comprehensible (i.e., deducible from classical languages), descriptive, handy, not too closely connected to specific concepts, and moreover valued by later authorities.

The creation of scientific terminologies in the sixteenth and seventeenth centuries was not done in a single act but it was a gradual process with different – even conflicting – systems side by side. This was surely due to the lack of a single towering authority, be it an institution such as the modern International Botanical Congress or the International Union of Pure and Applied Chemistry (IUPAC) or a single person. Botany actually had such a towering figure in the eighteenth century, Carl Linnaeus. Although he neither created a new terminology from scratch but was influenced by – among others – John Ray, nor was his system undisputed during his lifetime, Linnaeus's reforms had a huge impact and (continue to) shape botanical terminology to this day. With Linnaeus botanical Latin finally developed from an ordinary language to a purely technical means of communication.[83]

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