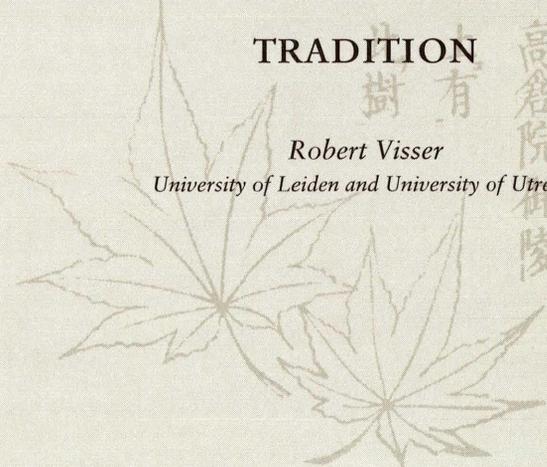


DODONÆUS AND THE HERBAL TRADITION

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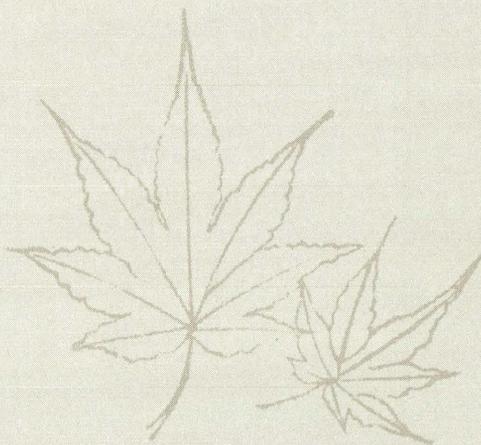


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The Greek scientist Theophrastus of Eresus, a pupil of Aristotle and his successor as head of the Peripatetic school at the Lyceum, is generally regarded as the father of European botany. The authoritative *Dictionary of Scientific Biography* was very specific when it stated that he laid "the groundwork for modern botany."¹ One cannot deny that the Greek natural philosopher has rather good credentials for this position. Theophrastus was, first of all, the author of the oldest distinctly botanical writings that are still extant.² More substantial claims for historical recognition must of course be founded on the actual contents of these writings. His methods and aims look indeed surprisingly modern. Theophrastus attached great importance to a critical and empirical approach. Undoubtedly inspired by his teacher, he recognised the diversity of plant forms as the central problem of botany. He used morphological and physiological data as the principal means to solve it. Besides, we find in his work the first signs of some kind of natural classification. Such traits link Theophrastus closely to the new botany that started to emerge at the beginning of the early modern period. Theophrastus' parenthood is remarkable in the sense that its first recognisable offspring was only born in the first half of the sixteenth century, more than eighteen centuries after his death. During that long interval, the majority of botanists, instead of following his example of a truly scientific study of plants, concentrated their attention on the practical aspects of their science. During the Middle Ages Western botany derived its *raison d'être* first and foremost from the services it rendered or was supposed to render to agriculture and especially to medicine. The medieval botanists drew their inspiration and guidance not from Theophrastus but from the Greek physician Dioscorides.

About the middle of the first century A.D. Dioscorides had written a comprehensive book that became widely known as *De materia medica*,

the Latin translation of its title. The book was for the greatest part devoted to plants. Dioscorides manifested himself as an experienced and knowledgeable phytopographer. It is quite clear however that he was not primarily interested in plants *per se*. Dioscorides' subject was medical botany and his chief concern was the remedial use of plants and other natural products. His book was written in Greek and therefore inaccessible to most of the European botanists. This did not prevent its author from being the most popular, influential and the most highly esteemed botanist for a very long time.

It is an often-told story how in the Renaissance Dioscorides' work became one of the factors that induced a drastic change in botanical practice. When European botanists tried to correlate his plant descriptions to the species of their native floras, they inevitably discovered considerable discrepancies. The ensuing doubts about the universal applicability of Dioscorides' descriptions were an important stimulus for botanists of the early sixteenth century to reconsider their ways of obtaining scientific knowledge. They soon became convinced that the classical texts and the one produced by Dioscorides in particular should be rejected as the main source of factual information. It was argued that instead of relying on what botanists from preceding ages had written, which until then had been a fairly widespread procedure for collecting scientific data, the botanists should consider it their primary duty to consult nature directly.

It is amazing to observe how easily a practice was abandoned that had reigned supreme for many centuries. In just a few decades there grew a consensus in the European botanical community that only the empirical approach could result in meaningful scientific knowledge. From now on this method would never be regarded as anything less than the guiding principle for all investigations in the field of botany. German botanists are considered, with good reason, to have been the pioneers of this fruitful methodological innovation. The notable names are those of Otto Brunfels (ca 1489-1534), Jerome Bock (Tragus) (1498-1554), Leonhard Fuchs(ius) (1501-1566) and Valerius Cordus (1515-1544). Not without some nationalistic bias the German historian of botany Kurt Sprengel introduced Brunfels, Bock and Fuchs as the "German fathers of botany"³ and considered their herbals, published between 1530 and 1542, as inaugurating a completely new era in the development of the plant sciences.⁴

The authors glorified by Sprengel wrote books that are clearly not of equal merit. Brunfels's herbal broke new ground with the life-like illustrations made by the artist Hans Weiditz. His text on the other hand was entirely conventional. Brunfels himself indicated that he had extracted it from what he called "ancient and trustworthy authors".⁵ Bock and especially Cordus⁶ were the full-blooded empiricists among the German botanists. They based their descriptions on a logical and systematic application of the empirical doctrine. By studying the plants with their own eyes they enriched botanical science with quite a number of original observations. In view of the often rather exaggerated views on the revolutionary merits of the German fathers of botany – views expressed by Sprengel and many later historians of botany⁷ – it is good to keep in mind that the changes brought about by these botanists, did certainly not constitute a complete break with the past. Their important innovations were primarily of a methodological nature. Most of the German fathers were rather traditional however in regard of the ultimate aims of their research.

Brunfels, Fuchs and to a lesser degree Cordus were also basically medical botanists. They regarded plants first of all as raw material for medicines. For them the new methodological practice was a means to assist the physician in better identifying the plants and thus improving the range and quality of his herbal drugs. Bock on the other hand was more instilled with the philosophical spirit of Aristotle and Theophrastus than with the practical spirit of Dioscorides. He was the only German father of botany who deserves to be called a scientist. Bock's investigations were not guided by the needs of the medical profession. He focused on the plants for their own sake. His botanical studies were driven by a sincere wish to analyse as many biological aspects of his objects as possible.

The developments that were started in Germany were assured a fruitful continuation in the Low Countries, where a flourishing botanical culture originated in the second half of the sixteenth century. One of the most formative influences on this process was the central figure in this collection of essays. Rembert Dodoens (1517-1585) was the first in this part of the world to follow in the footsteps of the German fathers of botany – for Sprengel apparently a reason to honour him with the title of "one of the oldest and most important fathers of botany".⁸ Dodoens did not remain the only one for long. Within a few years he received the company of Carolus Clusius (Charles de l'Escluse,

1526-1609) and Matthias de Lobel (1538-1616), who investigated the vegetable kingdom in a similar way as their countryman.

Dodoens had started his career as a physician.⁹ He extended his sphere of activities when the Antwerp publisher Jan van der Loe asked him to write a herbal that was apparently intended for a broad readership, since it had to be in the vernacular. Dodoens complied with this request. Preceded by some smaller botanical writings, his voluminous *Cruijdeboeck* was published in 1554. With this substantial contribution to botanical literature, the study of plants became a major object of Dodoens's scientific interests for the rest of his life.¹⁰ His final literary achievement as a botanist was a considerably enlarged (the number of plants was almost doubled) and thoroughly rewritten and rearranged version of the *Cruijdeboeck*. It appeared in 1583 as the *Stirpium historiae pemptades sex* and was published in Antwerp by the famous printing office of Christophe Plantin. Dodoens's herbal met with considerable success. The original version was translated into French (1557), English (1578 and subsequent editions) and Japanese (1790s) and was reissued several times. In 1608 the *Stirpium historiae* version appeared in a Dutch translation that had been prepared by Dodoens himself. A new edition of the *Cruijdeboeck* was issued even as late as 1644. Dodoens's book has been rightly qualified as one of the most popular herbals of the sixteenth and early seventeenth century. It seems that in his native country Dodoens's popularity even lasted well into the nineteenth century. In 1850 one of the members of the Belgian medical community stated that "there is not a pharmacist in the Flemish part of Belgium who does not possess a Dodoens and does not use its pictures everyday for identifying the wild species of medicinal value".¹¹

The *Cruijdeboeck* was conceived by the publisher as a kind of encyclopaedia on plants, with special attention to their medical virtues. Van der Loe had urged Dodoens to use Fuchs's herbal as a model and Dodoens had agreed to this suggestion. Hence the fact that Dodoens's book relies heavily on the illustrations, the phytography and the pharmaceutical instructions of his German colleague. However, this certainly does not mean that Dodoens was a mere translator or a slavish copier and that his *Cruijdeboeck* lacks in originality. It is true that most of the illustrations of the *Cruijdeboeck* were borrowed directly from Fuchs, but that was primarily a decision of the publisher, based on commercial considerations. In the medical part Dodoens adheres closely to the original. In the botanical texts we meet with a somewhat

different Dodoens. There he clearly shows that he did not lack critical sense. He demonstrated moreover an independent mind whenever he added novel and original observations to Fuchs's descriptions and that is something he did regularly. Dodoens dealt with substantially more species than Fuchs had done, included a lot more details in his descriptions and provided his readers with better information on the places where the plants grow.

All taken together we have to ascertain that, although the first edition of the *Cruijdeboeck* showed numerous and often very promising signs of Dodoens's empirical leanings, the new method played as yet a rather modest role in his fact-finding activities. Therefore, I think that we give Dodoens too much credit when we subscribe to the opinion, advanced first by historians of science of an older generation,¹² but also shared by contemporary ones, that this first version of his herbal is a major example of the fundamental methodological shift that was taking place in the botany of that time.

It was only after the publication of the first edition of the *Cruijdeboeck* that empirical research developed into an essential element of Dodoens's investigative practice in botany. It really became a prominent activity from the early sixties onwards, when he was preparing what would become his *magnum opus*, i.e. the *Stirpium historiae pemptades sex*. Dodoens's activities in this period make it quite clear that he now rated the investigation of the plants themselves as the principal source of phytographical data. His methodological position had changed considerably and when his life's work was published, Dodoens had become one of the leading empiricists in botany. It is interesting to note that while until then the methodological innovation of the sixteenth-century herbals had been mainly embodied in their illustrations drawn from nature, with Dodoens it shaped the verbal descriptions as well.

Several resources were used by Dodoens to give his botany the necessary empirical foundation. There are strong indications that he studied material in herbaria. It seems however that these collections of dried plants were only of minor importance. He was much more interested in investigating living plants. The numerous ornamental gardens in the Low Countries were an ideal place for pursuing this line of research. Dodoens was a frequent visitor of such gardens and amply availed himself of the opportunities they offered the botanist. The majority of the more than hundred new species he described were garden plants. Field

trips near the places where he lived were another important means of gathering information. Dodoens was a pioneer in exploring the local floras of the Low Countries. Even in his old age he was still taking time off to herborize and study plants in their natural habitat.¹³ These activities provided him with a rather extensive knowledge not only of floristics but also of the ecology and especially the sociology of plants. His varied experiences found their way into the *Stirpium historiae*, where he referred time and again to his own observations of these topics.

Dodoens was indeed a keen observer. The descriptions in the *Stirpium historiae* are a testimony to his abilities in this respect. They capture the characteristic morphological properties of the plants, which are often emphasised by comparing them to those of related species, and give a clear and minute, although not too detailed, picture of their appearance. Dodoens made it easy for his readers to form an idea of the habitus of the plants. The verbal descriptions in the *Stirpium historiae* are almost unparalleled as an aid in identifying plants. If we compare Dodoens with his colleagues we have to conclude that he was among the best and perhaps even the best phytographer of his time. The popularity of his writings made Dodoens an influential propagandist of the empirical practice in botanical science. There is no doubt that its rapid spread in the Low Countries owed much to him.

The methodological changes sketched above were one of the major developments that left their mark on sixteenth-century botany. The growing attention to taxonomical matters was another determinant of great importance. Here too, Dodoens made an important contribution. Before dealing with it, let us have a closer look at what his predecessors and contemporaries had achieved in botanical classification. Theophrastus had already studied the possibilities of arranging plants in groups. He distinguished four primary *divisions*: trees, shrubs, half-shrubs and herbaceous plants. At a lower level he ranged the species, especially those of the fourth division, in subgroups, which coincide more or less with some of our natural families, like grasses and *umbelliferae*. This rather sophisticated arrangement remained unsurpassed for many centuries. Between Theophrastus and the Renaissance, attempts at botanical systematisation usually resulted in classifications of a rather pragmatic nature. They displayed a striking lack of consistency and of naturalness in the criteria for establishing the relationships between plants. Plants could be ordered by means of utilitarian principles, with the consequence that we find in one and the same system dis-

parate groups like “ornamental plants”, “aromatic plants”, “medicinal herbs” etc. A favourite method was to range the plants alphabetically, according to whatever name in whatever language the author chose to give them. It will be clear that in neither case much light was thrown on the morphological affinities between plants.

On the other hand we find several botanists in the sixteenth century who showed an awareness of the existence of a natural order in the plant world and who seemed to have been convinced that it was their duty to try to reveal it. Of course a full-blown classificatory science did not develop overnight. Explicit and elaborate views on the discipline’s aims, principles and diagnostic procedures were still lacking. Moreover, the concrete attempts at classification were generally restricted to the *species* and *genus* level. Nevertheless, classification was again on the botanical agenda and this time it was there to stay. The revived interest in a more natural classification was undoubtedly tributary to Theophrastus, whose botanical writings had become better known in the West towards the end of the fifteenth century, when the first Latin translation was published (1483). Among the German fathers of botany Jerome Bock was an outspoken supporter of the new systematics. He emphatically rejected the utilitarian and alphabetical classifications as unscientific and emphasised the need to try and find a natural system of plants. Bock practised what he preached. His classification was primarily concerned with the *genera*. Seen against the backdrop of his time, his classificatory attempts were meritorious in every way. His colleague Valerius Cordus worked in the same spirit and went one step further. He was the first who made substantial efforts to unite related *genera* in the same family.

In view of the fact that Leonhard Fuchs provided the model for the first edition of Dodoens’s herbal, it is useful to see what he achieved in the field of systematics. In the historical literature on Dodoens, Fuchs is usually pictured as an old-fashioned scientist without any notable interest in the new trends of botanical systematics. This judgement is not entirely fair and perhaps inspired by too great an admiration for the pioneering qualities of Dodoens. It is indeed true that Fuchs arranged his plants alphabetically. But it is essential to keep in mind – and that was missed by the majority of the historians referred to above – that it was an arrangement of *genera* and not of *species*, and that in quite a lot of these genera Fuchs brought together plants that according to the then accepted criteria resembled each other. It is undeniable that

Fuchs was much less concerned with classification than for instance Bock, Cordus and later Dodoens, but this does not mean that he had no part in the quest for a natural order among plants, albeit in a modest way. This leads us to the conclusion that as for botanical classification he may have been of greater importance to Dodoens than is commonly suggested.

Dodoens demonstrated right from the start an involvement with classificatory matters. The more than 1000 plants in the first edition of the *Cruijdeboek* were split up in five main divisions. The creation of these divisions was an aid to structuring his book in a way no printed European herbal had been before. Dodoens was however rather traditional in his choice of characteristics to differentiate these divisions. He based his classification on the useful properties of the plants. Contrary perhaps to what one might expect after such an orderly beginning, the arrangement within the divisions was for the greater part chaotic and without apparent order. It was only in a few occasions that he grouped together those plants that showed morphological similarities. Although we can ascertain in Dodoens an actual interest in plant systematics, it is obvious that his first results, as published in the *Cruijdeboek* in 1554, were in no way ahead of his time.

However, during the following decades Dodoens developed his systematics considerably, as appears from the *Stirpium historiae*. The book presented a classification that was much more elaborated than what any of his predecessors had produced. It contributed to its recognition as a pioneering work. There is a kind of consensus that it is one of the landmarks in the history of the plant sciences. According to the nineteenth-century historian of botany Ernst Meyer it was "a first crude attempt at a scientific arrangement of plants".¹⁴ In the *Stirpium historiae* Dodoens started by dividing the plants in the same five major groups he had used 30 years earlier in his *Cruijdeboek*. Not insignificantly, he now called them *pemptades* and equated them with *classes*. Entirely new was their further subdivision into a total of 25 subgroups. In doing so Dodoens gave an original extension to the hierarchical structure of the botanist's classificatory schemes. The definition of these groups was less innovative. Dodoens had again recourse to utilitarian characteristics. Only in a few cases did he employ more natural criteria. As a consequence the composition of these groups was on the whole rather heterogeneous, at least from our point of view.

Dodoens's real merits as a systematist are to be found in the way in

54 which he handled groups at the level of *genera* and *families*. Here he showed an acute insight into the purpose of botanical classification. By these groups Dodoens put into practice what he had announced in the short introduction to the *Stirpium historiae*, namely that he would bring together those plants that resemble each other and separate the ones that did not, and that he would do this on the basis of their "forma et figura" (= morphology and habitus). This procedure enabled him to recognise many of the larger genera and families and even to establish relationships between plants that do not show much resemblance at first sight. While most of his predecessors had regarded genera as elementary taxa, Dodoens was one of the first to treat them as a composition of species and that gave his systematics a distinctly modern touch. The same holds for his nomenclature. Another result of his focusing on genera was Dodoens's almost strict adherence to a binary generic nomenclature, a type of nomenclature that the eighteenth-century Swedish botanist Carolus Linnaeus would make into a cornerstone of biological taxonomy, which it still is today.

The views expressed in the preceding paragraphs are based on a reading of the *Stirpium historia* as a botanical text. It is good to realise that in this way we only get a part of the story that can be told about this important and influential book. To do full justice to Dodoens's intentions, our story should also pay attention to its medical and pharmaceutical aspects. There is, or at least there was in the past, some debate about the relative importance of the botanical and the medical parts of the *Stirpium historiae*. During the Dodoens celebrations of 1917, Hunger, who later became known as the author of an impressive monograph on Clusius, defended the thesis that in writing his herbals Dodoens had turned from a physician into a botanist.¹⁵ Louis, another specialist on sixteenth-century botany and writing much later, was not quite sure if such transformation had taken place. He was ultimately inclined to the opinion that Dodoens had always remained a physician and that his herbals were intended for medical purposes.¹⁶

If we consider the contents of the *Stirpium historiae* quantitatively, we have no reason to doubt that we are dealing with a book that is primarily botanical. The descriptions of a purely botanical nature, including the classificatory discussions, take up by far the greater part of the book. Here Dodoens went to far greater lengths than any other author of a herbal had done before. The assumption that he may have had some kind of botanical agenda and that his plant descriptions were

no means to medical ends but an end in itself seems moreover to be vindicated by his statements about classification in the introduction of the *Stirpium historiae* to which I referred above. We cannot but regret that Dodoens never presented unambiguously his own viewpoint on the aims he had in writing this book. Whatever Dodoens's intentions, his *Stirpium historiae* undoubtedly has a place in the history of botany. He is one of the exceptions that Frank Egerton may have had in mind when he wrote in the introduction to Edward Greene's *Landmarks of Botanical History* that "most of the history of botany before 1700 was really the history of pharmacy".¹⁷ Before making a few final comments on Dodoens's place in the botany of his century, I would like to stress that any serious attempt at assessment is hampered by a lack of really thorough and up-to-date historical analyses of his voluminous botanical production. We are even less well informed about its influence, especially in Western Europe. Most of what has been written about Dodoens is fragmentary and dates from many years back. Besides, not a few of these studies are coloured by strong hagiographic tendencies. In view of this situation my concluding remarks on his place in the history of sixteenth-century botany are necessarily of a tentative nature.

In the broad perspective of European botany Dodoens attracts first and foremost the attention because of his systematics. He certainly was one of the pioneers in this field. Dodoens's historical significance is not merely determined by the actual results and the scale of his classificatory activities. Classification was at that time more than just a new botanical specialty. It was also being propagated as a means to sever botany's ties with medicine and give it the status of an independent scientific discipline. In the same year that the *Stirpium historiae* appeared, the Italian physician and botanist Andrea Cesalpino published an important and influential theoretical study entitled *De plantis libri XVI*. In this book Cesalpino voiced his regrets that botany had fallen in the clutches of medicine. He proved himself to be a zealous advocate of an autonomous botany. He was convinced that botany could win a position of its own if and when its practitioners concentrated on taxonomy. This branch of botany was in his view pure science and was supposed to be of no relevance to medicine or any other utilitarian pursuit. Already in the sixteenth century the movement started by Cesalpino gained considerable momentum. It led to lasting results in the following centuries, when scholars like Tournefort and Linnaeus completed the process and gave botany definitely a place of its own among the life sciences.

If Dodoens had any ideas similar to those of Cesalpino, he expressed them neither explicitly nor implicitly. Therefore we cannot simply connect his attempts at systematics with the pursuance of botany for botany's sake. On the other hand it is hardly conceivable that there was not any interaction between the theoretical and the practical dealings with taxonomy. This certainly applies where Dodoens is concerned. He was one of the most seminal practitioners of plant systematics of the late sixteenth century. In particular, he demonstrated how to do classificatory research and also that it actually worked. The *Stirpium historiae* showed that comparative research can reveal meaningful patterns in the plant world. Dodoens's text could easily be interpreted as proof that classification yielded results that could be accepted as science, thus giving concrete foundation to the claims of Cesalpino and his allies with regard to the emancipatory function of taxonomy. We can at least credit Dodoens with an indirect and supportive role in the movement towards an independent science. Besides empiricism and classification, to which he also contributed, this was another characteristic of the modernisation process that European botany underwent during the sixteenth century.

NOTES

- 1 See J.B. McDiarmid, *Dictionary of Scientific Biography*, vol. 13 (1976). s.v. "Theophrastus."
- 2 I.e. *Historia plantarum* and *De causis plantarum*.
- 3 Kurt Sprengel, *Geschichte der Botanik* (Altenburg/Leipzig, 1817), vol. 1, 258.
- 4 The books concerned were: Brunnfels, *Herbarum vivae icones ...* (1530); Bock, *New Kreütter Buch ...* (1539); Fuchs, *De Historia stirpium ...* (1542).
- 5 Brunnfels, *Herbarum*, dedicatory epistle.
- 6 His botanical writings were published posthumously by Conrad Gesner in 1561.
- 7 E.g. K.F.W. Jessen, *Botanik der Gegenwart und Vorzeit in culturhistorischer Entwicklung. Ein Beitrag zur Geschichte der abendländischer Völker* (Leipzig, 1864), 176 seq.
- 8 Sprengel, op. cit. (see note 3), 307.
- 9 The only book-length biography of Dodoens is the rather obsolete study by P.J. Van Meerbeeck, *Recherches historiques et critiques sur la vie et les ouvrages de Rembert Dodoens (Dodonæus)* (Malines, 1841).
- 10 The best analysis of Dodoens's botany is to be found in Edward Lee Greene and Frank N. Egerton, ed., *Landmarks of Botanical History* (Stanford: Stanford University Press, 1983), vol. 2, 847-876.
- 11 P.-J. D'Avoine, *Eloge de Rembert Dodoëns, médecin et botaniste Malinois du XVIe siècle ...* (Malines/Bruxelles, 1850), 53-54.
- 12 As e.g. A. Louis, "Over het leven en het botanisch werk van Rembert Dodoens (1517-1585) ...", *Biologisch Jaarboek* 21 (1954): 262-264 and passim.
- 13 See A. Louis, "Critische beschouwingen bij de Dodoens-brief van 26 november 1583," *Mededelingen van de Koninklijke Vlaamsche Academie voor Wetenschappen, Letteren en Schone Kunsten van België* 16 (1954), no. 13.
- 14 E.H.F. Meyer, *Geschichte der Botanik* (Königsberg, 1857), vol. 4, 348.
- 15 F.W.T. Hunger, "Dodonée comme botaniste," *Janus. Archives internationales pour l'Histoire de la médecine et la géographie médicale* 22 (1917): 156.
- 16 Louis, op. cit. (see note 12), 244.
- 17 Greene, op. cit. (see note 10), 5.