Seven Years in Greece – Carl Fraas (1810–1875) and His Identifications of Dioscuridean Plant Names*

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/ Abstract

Between 1835 and 1842 the Bavarian Botanist Carl Fraas lived in Athens and was appointed professor of botany at the newly founded university. He used this time for botanical excursions, which also had the purpose of identifying ancient plant names. The results of his research were published as *Synopsis plantarum florae classicae* (München 1845) – a work that Sir Arthur Hort dismissed as "ambitious but uncritical". Nevertheless, some of Fraas' suggestions have prevailed over the identifications of John Sibthorp (1758–1796) and Kurt Sprengel (1766–1833) and have found their way, among others, into Hort's Theophrastus Loeb edition (1926) and the Liddell-Scott-Jones Lexicon. In my paper I will analyze some of his merits and demerits and place him in the ongoing debate on Dioscuridean plant names.

Tra il 1835 e il 1842 il botanico bavarese Carl Fraas visse ad Atene e fu nominato professore di botanica presso la neonata università. Utilizzò questo periodo per fare delle escursioni botaniche, che avevano anche lo scopo di identificare antichi nomi di piante. I risultati delle sue ricerche furono pubblicati col titolo di Synopsis plantarum florae classicae *(Monaco di Baviera, 1845), opera che Sir Arthur Hort liquidò come "ambiziosa ma acritica". Tuttavia, alcuni dei suggerimenti di Fraas hanno prevalso sulle identificazioni di John Sibthorp (1758–1796) e Kurt Sprengel (1766–1833) e hanno trovato posto, tra gli altri, nell'edizione Loeb di Teofrasto curata da Hort (1926) e nel Liddell-Scott-Jones. Nel mio articolo analizzerò alcuni dei suoi meriti e demeriti e lo collocherò nel dibattito in corso sui nomi delle piante dioscoridee.*

/ Keywords

Ancient flora; Identification of plants; Dioscorides; Theophrastus.

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1. Introduction

In studying the meaning of ancient Greek plant names, sooner or later one ends up with 19th century scholarship. The majority of modern translations in the Liddle-Scott-Jones Lexicon and in Jacque André's *Les noms de plantes dans la Rome antique*, and also many in Suzanne Amigues,[1] have a long tradition going back to the 18th/19th, often to the 16th century.

Unfortunately, unlike Severino in Umberto Eco's *Il nome della rosa*, pre- and early modern botanists did not use Linnean binomial nomenclature. If one does not want to get lost in botanical-historical investigations, it is pragmatic to start with the literature of the 18th/19th century. For here we have for the first time a halfway fixed point of reference, namely the Linnean nomenclature. Moreover, it was only in this period that floristic research of the area relevant to Theophrastus and Dioscorides began.

I will first briefly outline the state of botanical research in the 19th century concerning Dioscorides. On this basis and in the context of philhellenism, it is possible to shed light on Fraas' approach, whereby his biography also plays a major role. After this, I will give four examples of Fraas' contributions to plant identification and finally try to draw some conclusions.

2. State of research in Fraas' days

It is well known that the important botanists John Sibthorp (1758–1796) and James Edward Smith (1759–1828) were also interested in ancient plant names – without, as one might think, regarding Dioscorides as a saint.[2] On their journey to Greece and the Levant, they also had in their luggage copperplate reproductions of the figures in the Vienna[3] and Neapolitan[4] Dioscorides manuscripts. Only five copies of this series (consisting of 410 plates) are known

[1] Henry George Liddell, Robert Scott and Henry Stuart Jones, *A Greek-English Lexicon*. 9. ed. with a revised supplement (Oxford: Clarendon Press, 1968); Jacques André, *Les noms de plantes dans la Rome antique* (Paris: Les Belles Lettres, 1985); Suzanne Amigues, *Théophraste. Recherches sur les plantes*, 5 vol. (Paris: Les Belles Lettres, 1988–2006) and Ead., *Études de botanique antique* (Paris: Académie des Inscriptions et Belles-Lettres, 2002).

[2] Sibthorp in a letter to John Hawkins (1761–1841): "The Grecian Flora has been little examined, I think I shall be able to throw some Light on the Absurdity of Dioscorides. I have by the Friendship of Jacquin procured a Copy of the Drawings of the oldest Manuscript which is extant which will facilitate my Enquiries", quoted in Hans Walter Lack, "Die Kupferstiche von frühbyzantinischen Pflanzenabbildungen im Besitz von Linné, Sibthorp und Kollár", *Annalen des Naturhistorischen Museums in Wien. Serie B für Botanik und Zoologie* 100 (1998): 634.

[3] Österreichische Nationalbibliothek Wien, Cod. Vindob. med. gr. 1. As facsimile: Otto Mazal (ed.), *Der Wiener Dioskurides [...]*, 2 vol. (Graz: Akademische Druck- und Verlagsanstalt, 1998) and in the monumental edition by Joseph von Karabacek, *Codex Aniciae Iulianae picturis illustratus* (Lugduni Batavorum: Sijthof, 1906).

[4] Biblioteca Nazionale di Napoli, Neapol. ex-Vindob. med. gr. 1, online available in the World Digital Library, https://www.loc.gov/item/2021667873/ (accessed December 12, 2023).

to have existed – kept now in Vienna, Oxford and London. One series went 1786 to Sibthorp, another, but not as extensive, was given 1763 to Carl von Linné (1707–1778).[5]

However, Sibthorp has not only identified the illustrated plants, but also the described ones. Most of the interpretations are due to Sibthorp, but Smith, too, contributed some identifications.

After Sibthorp's early death, Smith published the material first as *Prodromus* (1806–1813) and later in the magnificently illustrated *Flora Graeca* (1806–1840).[6] According to Smith himself, he compared Sibthorp's identifications "with the best Dioscorides editions".[7] A reprint of the *Flora graeca* with modern commentary and up-to-date distribution maps has been published by Arne Strid (2009–2013), who can probably be described as the best living expert on the eastern Mediterranean flora.

These new identifications by Sibthorp were then used by the German botanist and medical historian Kurt Sprengel (1766–1833) in his commentaries on Theophrastus and Dioscorides.[8] Unlike Sibthorp, Sprengel had no autoptic knowledge of the flora, but he did have a large library. He was one of the few of his time who could survey the entire commentary literature on Dioscorides. For this reason, his commentary is still valuable today. For example, he draws not only on the well-known authors such as Leonhart Fuchs (1501–1566) and Pietro Andrea Mattioli (1501–1578), but also on lesser known but important ones such as Luigi Anguillara (ca. 1512–1570), Fabio Colonna (1567–1640) or Prospero Alpini (1553–1617).[9] Unfortunately, Sprengel has not analysed the listed editions exhaustively. It is therefore advisable to do own research if there is any doubt.

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[5] Lack, "Die Kupferstiche", 629–630.

[6] John Sibthorp and James Smith, *Florae Graecae prodromus [...]*, 2 vol. (Londini: Taylor et Socii, 1806–1813); Hans Walter Lack and David J. Mabberley, *The Flora Graeca Story [...]* (Oxford: Oxford University Press, 1999), 191–225 and Arne Strid and Barbro Strid, *Flora Graeca Sibthorpiana. An Annotated Reissue*, 2 vol. (Rugell: Koeltz, 2009), v–xiv.

[7] *Omnia haec synonyma cum optimis editionibus Dioscoridis comparavi*, Sibthorp and Smith, *Prodromus*, xiv. Two of Sibthorp's identifications were particularly noteworthy for Smith, cf. Lack and Mabberley, *Flora Graeca Story*, 200: the identification of φοῦ as *Valeriana dioscoridis* Sm. in Sibthorp and Smith and that of the black ἐλλέβορος as *Helleborus orientalis* Lam. (syn. *H. officinalis* Sm. in Sibthorp and Smith). These interpretations are still being discussed today, cf. Maximilian Haars, *Die allgemeinen Wirkungspotenziale der einfachen Arzneimittel bei Galen. Oreibasios, Collectiones medicae XV. Einleitung, Übersetzung und pharmazeutischer Kommentar*, (Stuttgart: WVG, 2018), 410–411 and 223–224.

[8] Kurt Sprengel, *Pedanii Dioscoridis Anazarbei De Materia medica [...]*, 2 vol. (Lipsiae: Knobloch, 1829–1830).

[9] Since Sprengel himself does not provide a bibliography I list the most important botanical authors here: Otto Brunfels, *Herbarum vivae eicones [...]* (Argentorati: Schott, 1532); Otto Brunfels, *Novi Herbarii Tomus II* (Argentorati: Schott, 1536); Leonhart Fuchs, *De historia stirpium commentarii insignes [...]* (Basileae: Isengrin, 1542); Pietro Andrea Mattioli: *Opera... omnia... Comment. in Dsc. de Medica materia. ed. Casparo Bauhino [...]* (Basileae: König, 1674); Hieronymus Bock, *New Kreuterbuch [...]* (Argentorati: Rihel, 1546); Valerius Cordus, *Annotationes in Dsc. De Medica materia libros V [...]* (Argentorati: Rihel, 1561); Luigi M. Anguillara, *Semplici [...]* (Vinegia: Valgrisius, 1561); Matthias Lobelius, *Stirpium Adversaria Nova [...]* (Londini: Purfoetius,

3. Fraas – Life, Work and Influence

A third important person in the 19th century Dioscorides research is the Bavarian botanist Carl Fraas, who is the subject of this paper. Of course, there are other authors before and at the same time as Fraas, but these are the most important ones to present an overall concept to the plant names in Dioscorides.[10]

The biography of Fraas, who later emerged primarily as an agronomist, has been well researched by historians of botany and I am basing the following on their findings.[11]

Fraas was born 1810 near Bamberg, Bavaria. After studies in Philosophy, Botany and Medicine in Munich (with flying colors), he took part in the philhellenism characteristic of his time and accompanied 1836 Graf Saporta (1794–1853) as court master to Athens. Saporta was major-domo of King Otho of Greece (1815–1867), who, together with his wife, also had a passion for natural history and botanical gardens.

Already in 1837 Fraas was appointed professor of botany at the newly founded 'Ottonische Universität' in Athens (later National and Kapodistrian University) and director of the Botanical Garden. It is said that Theophrastus already had a garden on these grounds.[12]

1570–1571); Fabio Colonna, *ΦΥΤΟΒΑΣΑΝΟΣ [...]* (Florentiae: Io. Iacobus Carlinus, 1744); Carolus Clusius, *Rariorum plantarum historia [...]* (Antverpiae: Moretus, 1601); Carolus Clusius, *Exoticorum libri decem [...]* (Antverpiae: Officina Plantiniana, 1605); Prosper Alpini, *De plantis exoticis libri duo [...]* (Venetiis: Guerilius, 1629). Sprengel's plant identifications are not essentially based on the commentary by Janus Saracenus, *Pedacii Dioscorides Anazarbaei Opera* ([Francofurti]: Marnius & Aubrius, 1598), as Riddle believes, since Saracenus does not offer any identifications (but primarily scholia), but cf. John Riddle, *Dioscorides on Pharmacy and Medicine* (Austin: University of Texas Press, 1985), xxv; John Riddle, "Dioscorides", in *Catalogus translationum et commentariorum*, ed. F. Edward Cranz and Paul Oscar Kristeller, vol. 4 (Washington: Catholic University of America Press, 1980), 41–44.

[10] Joseph Pitton de Tournefort (1656–1708) who was the first, so to speak modern, botanist to undertake a journey to the Levant, rarely refers to plant names in Dsc., Plin. or Thphr., cf. Joseph Pitton de Tournefort, *Relation d'un voyage du Levant [...]* (Lyon: Imprimerie Royale, 1717), vol. 1, 39–40 (*diktamnon*, δίκταμνον), 41 (*chamaileōn leukos*, χαμαιλέων λευκός), 90 (*kisthos/ladanon*, κίσθος/λάδανον), 190 (*stoibē*, στοιβή); vol. 2, 30–31 (*helenion*, ἑλένιον), 110 (*skammōnia*, σκαμμωνία); 246–247 (*kissos* / κισσός). Nor was the purpose of his trip to deal with these names. Before Fraas, Julius Billerbeck had already compiled important sources, which still represent a helpful synopsis, see Julius Billerbeck, *Flora classica* (Leipzig: J. C. Hinrichs, 1824). For further contributions see n. 28.

[11] Heinz Kalheber, "Bavarian Plant Collectors in Greece: 1. Franz Xaver Berger, Franz Zuccarini and Carl Nikolaus Fraas", *Willdenowia* 36, no. 1 (2006): 565–578 and Fritz Andreas Zehetmeier, *Carl Nikolaus Fraas (1810–1875). Ein bayerischer Agrarwissenschaftler und Reformer der intensiven Landwirtschaft* (München: Utz, 1995), 151.

[12] "It is said that he (sc. Thphr.) even came into possession of his own garden after the death of Aristotle, since Demetrius of Phalerum, who was also his friend, helped him to obtain it" and in his testament: "The garden and the walk and all the dwellings next to the garden I give to those of (my) friends... who wish... to philosophize together in them", translation by William W. Fortenbaugh et al., *Theophrastus of Eresus. Sources for his Life, Writings, Thought and Influence*, 2 vol. (Leiden: Brill, 1992–1995), 25.1–3 and 43 (= D.L., V, 39 and 51 respectively). It is not clear from Diogenes where this garden was located, nor whether it was a kind of "botanical garden". The property was probably near the Lyceum, at a sanctuary called "Museion", which was located after a boundary

Fig. 1. The National Garden behind Syntagma Square in Athens. Theophrastus (around 371–287 BC) acquired a garden plot here with the help of his pupil and friend Demetrios of Phaleron (ca. 360–280 BC). Much later, it was transformed into a botanical garden, in which Carl Fraas played a major role. Photo © M. Haars.

Under Fraas' administration, many commercial plants were imported, especially date palms (*Phoenix dactylifera* L.).[13] Today this is the National Garden of Athens (*Ethnikos Kēpos*, Εθνικός Κήπος), which most visitors will remember for its characteristic avenue of date palms (Fig. 1).

Fraas' first botanical excursion in March 1837 took him to the Peloponnese (Killini, Taygetos Mountains, Nauplia, Corinth), another, in 1840, to Thebes, Orchomenos and finally to Mt. Parnassos reaching the *Abies* region. On his return he botanized at Mt. Helikon and on Mt. Dirfys and went back to Athens via Steni, Chalkida and Aulis.

Fraas used these seven years, among others, for identifying the plant names in classical authors, especially Dioscurides. He did not have a large library, but he did have Sprengel's edition and plenty of time to botanise at the *locus classicus*. His autoptic knowledge of the Greek flora still makes his statements interesting today – especially as he found vegetation from pre-industrial times.

After his return to Bavaria, he published his results in a monograph as a synopsis (Fig. 2) arranged by Linnean Synonyms in systematic order.[14] This survey of the ancient plant names draws especially on the Greek authors Theophrastus and Dioscorides, and to a lesser extent on Pliny and other Greek and Latin sources. The arrangement is systematic, that means related species are placed next to each other. In addition, Fraas has collected the contemporary Greek names – which, as it turned out, did not contribute to the identification of the old names. In this context he criticises Sibthorp, who apparently put many old classical names into the mouths of the new Greeks.[15]

The reception of his work was divided. On the one hand, botanists welcomed Fraas' field research and his contributions to the Greek flora. A plant was named in his honor (*Crepis fraasii* Sch. Bip.).[16] However, opinions differ on the historical contributions.

The historian of botany E.H.F. Meyer remarked on Fraas: "These writings suffer from the basic error of most works of a similar kind, namely, to take the completely uncertain for probable, the only probable for certain; they are therefore to be used with caution, but until we have a better and more complete flora of Greece from a botanist who is also a scholar of antiquity, they are by no means to be neglected".[17]

Sir Arthur Hort in his Theophrastus Loeb edition (1926) dismissed the *Synopsis* as "am-

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stone in today's National Garden, cf. Hans Rupprecht Goette and Jürgen Hammerstaedt, *Das antike Athen. Ein literarischer Stadtführer* (München: C.H. Beck, 2004), 214–215.

[13] Kalheber, *Bavarian Plant Collectors*, 573.

[14] Carl Fraas, *Synopsis plantarum florae classicae [...]* (München: Verlag von E.A. Fleischmann, 1845).

[15] This has already been noted by Kurt Sprengel, *Theophrasts Naturgeschichte der Gewächse*, 2 vol. (Altona: J. F. Hammerich, 1822); here vol. 2, 6. For this, he criticizes Sibthorp and even more Tournefort (especially the statement in his *Relation d'un voyage du Levant*, vol. 1, 34).

[16] Kalheber, *Bavarian Plant Collectors*, 565.

[17] Ernst H. F. Meyer, *Geschichte der Botanik*, vol. 1 (Königsberg: Bornträger, 1854), 188.

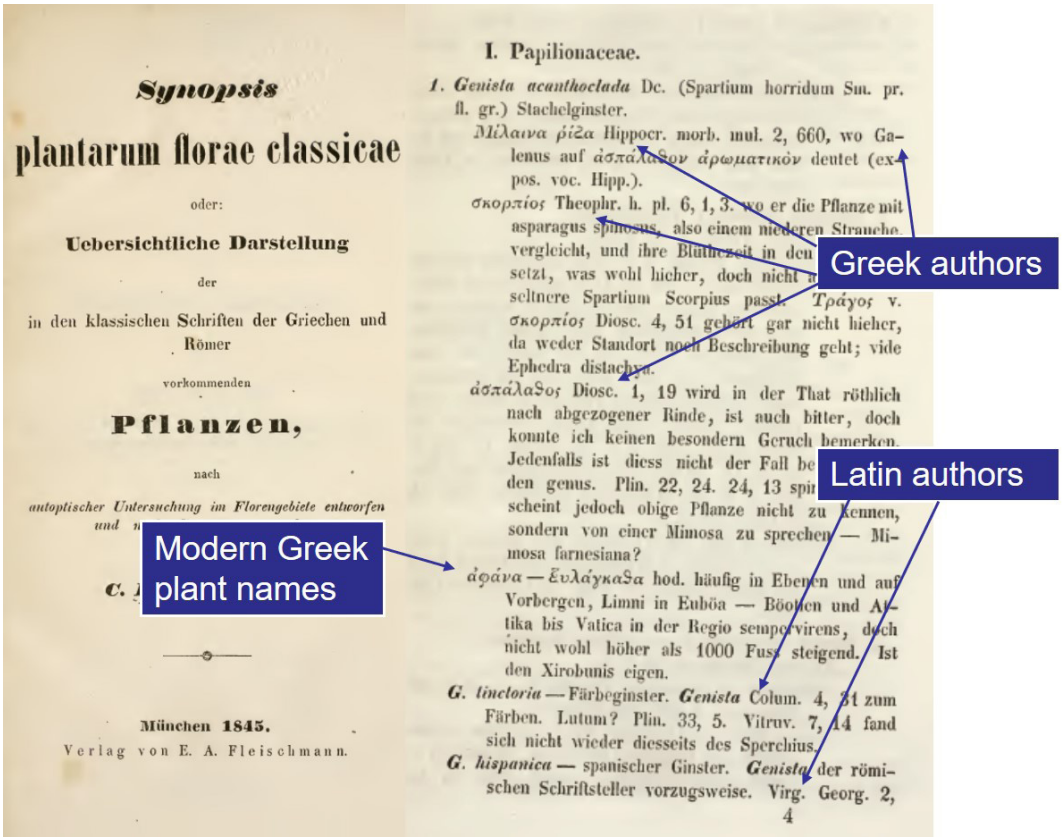

Fig. 2. Fraas' *Synopsis* (1845): included ancient authors.

bitious but uncritical".[18] Certainly, on the one hand, Hort is right: there are many comments in Fraas that are unfounded, not only from today's perspective. However, directly following his criticism, Hort himself provides a list of plant names, which benefits from Fraas' suggestions. These identifications, collected and improved by the Kew-Gardens botanist Sir William Turner Thiselton-Dyer (1843–1928), then also passed into the LSJ. And in the case of Jacques André, Fraas eventually became even more prevalent. So, we have to deal with him if we want to translate these plant names. My aim here is not to show what Fraas did not know, but to discuss some of his proposals that still appear today in the reference works mentioned.

I have therefore looked for identifications that were first suggested by Fraas, in other words that do not yet appear in Sprengel or Sibthorp, and which are still being discussed today. There are, of course, many others[19] and my selection of four examples was rather random.

[18] Arthur Hort (ed.), *Theophrastus. Enquiry into Plants [...]*, vol. 2 (London: Heinemann, 1926), 436.

[19] Other relevant examples are Dsc., *MM* IV, 61 (*astragalos*, ἀστράγαλος), II, 158 (*erysimon*, ἐρύσιμον), IV, 16 (*leimōnion*, λειμώνιον), II, 114 (*oxylapathon*, ὀξυλάπαθον), IV, 14 (*periklymenon*, περικλύμενον); IV, 59 (*per-*

4. *Myos ōta* (μυὸς ὦτα), Dsc., *MM* II 183 (I, 253 W.)

The first example is the eponymous plant for the genus *Myosotis* in Linné. Sprengel's text (i.e. Fraas' basis) differs from Wellmann's[20] in the description of the plant in only one word (see below).

In my translation of Wellmann's text the description runs as follows:

> *Myos* ōta; some call it *Myos* ōtis. It sprouts many stalks from a single root, reddish (*hyperythrous*, ὑπερύθρους) and hollow at the base (*katōthen koilous*, κάτωθεν κοίλους), the leaves are narrow and elongated (*stena kai epimēkē*, στενὰ καὶ ἐπιμήκη), with a raised vein (*rhachin epērmenēn*, ῥάχιν ἐπηρμένην), darkish (*melanizonta*, μελανίζοντα), growing in pairs at intervals (*ana dyo pephykota ek diastēmatōn*, ἀνὰ δύο πεφυκότα ἐκ διαστημάτων), ending in a sharp point (*eis oxy*, εἰς ὀξύ). Delicate little stalks grow from the (leaf-)axils (*lepta kaulia ek tōn maschalōn*, λεπτὰ καυλία ἐκ τῶν μασχαλῶν), on which there are small dark-bluish flowers (*eph' hōn anthyllia kyanizonta*, ἐφ' ὧν ἀνθύλλια κυανίζοντα), like those of the pimpernel (*anagallis*, ἀναγαλλίς).

The plant *anagallis* has been identified with certainty, Caterina Manco even placed the figure in its red form on the conference poster. The Vienna and the Neapolitan codex offer both illustrations with the blue and the red form.[21] However, the more common one is the dark blue. Dioscorides continues:

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istereōn, περιστερεών); III, 66 (*petroselinon*, πετροσέλινον); IV, 139 (*polygalon*, πολύγαλον); IV, 163 (*sēsamoeides to leukon*, σησαμοειδὲς τὸ λευκόν); IV, 179 (*empetron*, ἔμπετρον); IV, 97 (*thaliētron*, θαλίητρον); IV, 123 (*bounion*, βούνιον); III, 34 (*hēdyosmon agrion*, ἡδύοσμον ἄγριον); II, 121 (*krambē agria*, κράμβη ἀγρία); IV, 58 (*agēraton*, ἀγήρατον); IV, 31 (*agrōstis hē en tō Parnassō*, ἄγρωστις ἡ ἐν τῷ Παρνασσῷ); III, 62 (*ammi*, ἄμμι); IV, 130 (*antirrhinon*, ἀντίρρινον); II, 177(*argemone*, ἀργεμώνη); IV, 105 (*arktion*, ἄρκτιον); III, 92 (asklēpias, ἀσκληπιάς); II, 155 (*kardamon*, κάρδαμον); II, 130 (*korōnopous*, κορωνόπους); II, 174 (*lepidion*, λεπίδιον); III, 76 (*sphondylion*, σφονδύλιον) and IV, 125 (*chamaikissos*, χαμαίκισσος).

[20] Max Wellmann (ed.), *Pedanii Dioscuridis Anazarbei De materia medica Libri quinque*, 3 vol. (Berlin: Weidmann, 1906–1914), here vol. 1, 253.

[21] Vindob. med. gr. 1, f. 39v/40v and Cod. Neap. ex-Vindob. med. gr. 1, f. 15r. In interpreting ancient plant illustrations, sensitivity is required to understand which details were important to ancient illustrators and which were not. What role chance may ultimately have played etc. In the case of *anagallis*, we notice that C shows four petals, while N shows five. Who has miscounted here? For the modern botanist, this is one of the most important features for using a dichotomous identification key. But was it the same for ancient physicians? Although the figures in C are generally considered to be more natural, the reverse is true here. Furthermore, the illustrations of the blue *anagallis* make it impossible to distinguish *A. arvensis* L. f. *azurea* from *A. foemina* Mill., which also has blue flowers – but this is unlikely to have made any difference to the effectiveness of this medicinal plant. Although it has often been argued that the illustrations of the 'luxury manuscripts' are of little value for the identification of Greek plants, we must not ignore the fact that they were not exclusively ornamental, but originally also served a practical purpose: the retrieval of the medicinal plant. See in more detail, Maximilian Haars, "A Botanical Perspective on the Illustrated Dioscorides", *History of Pharmacy and Pharmaceuticals* 66 (2024), 26–33.

> The root is as thick as a finger and has many secondary roots (*rhiza de daktylou to pachos, echousa pollas apoblastēseis*, ῥίζα δὲ δακτύλου τὸ πάχος, ἔχουσα πολλὰς ἀποβλαστήσεις). The overall habit of the herb is similar to *skolopendrion*, but smoother and smaller (*leiotera de kai elassōn*, λειοτέρα δὲ καὶ ἐλάσσων). Its root applied as a poultice cures lacrimal fistula. Some call *helxinē*, too, *myos* ōtis.

In Sprengel's text the habit is "smaller" (*leptotera*, λεπτοτέρα), which, according to Marie Cronier's studies,[22] would be the preferred reading, since witnessed in the *Escorialensis* manuscript (E) and Oribasius (Orib.). However, Wellmann prefered *leiotera* (λειοτέρα), the reading of the other mss., probably because Pliny (*HN* XXVII, 23 = IV, 237.5–6 Mayhoff)[23] speaks of *minusque hirsuta* and in § 105 (p. 261.20 Mayh.) of *levis herba*. Yet Wellmann does not seem to note that in § 23 only the synonymous *alsine* (*quam quidam myosoton appellant*) is being referred to. Although all interpreters of our passage (§ 105)[24] translate *lēvis* as "smooth", it would also be possible to read a short "e", then in the sense of "tender". The confusion of *levis* and *lēvis* is very common.[25] There are also content-related reasons in favor of *leptotera* (λεπτοτέρα): regardless of which of the two ferns *skolopendrion* (σκολοπένδριον) refers to,[26] these are not hairy at all, but smooth, which is why the comparison is more likely to refer to their habitus.

The figures in the most important illustrated Dioscorides manuscripts from Vienna,[27] Naples,[28]

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[22] Marie Cronier, "L'Herbier alphabétique grec de Dioscoride: : quelques remarques sur sa genèse et ses sources textuelles", in *Fito-zooterapia antigua y altomedieval: textos y doctrinas*, ed. Arsenio Ferraces Rodríguez (A Coruna: Universidade da Coruña, 2009), 33–59.

[23] Carolus Mayhoff (ed.), *C. Plini Secundi Naturalis historiae*, vol. 4: libri 23–30 (Stuttgart: Teubner, 1967).

[24] So also Alfred Ernout (ed.), *Pline l'Ancien, Histoire naturelle XXVII* (Paris: Les Belles Lettres 1959), 55 and 103 (commentary). Ernout confirms André's criticism of the identification. However, his remark that we are dealing here with an Egyptian plant is probably a confusion with the preceding chapter (Dsc., *MM* II, 182).

[25] I thank K. D. Fischer for the hint. See also Mayhoff's apparatus to line 20: "*an tenuis*?". The late antique Latin translation of Dioscorides has *lenis*, cf. Konrad Hofmann, Theodor Auracher and Hermann Stadler (ed.), "Dioscorides Longobardus", *Romanische Forschungen* 10 (1897), 246 line 15.

[26] *Skolopendrion* (Σκολοπένδριον) is a synonym of two ferns in Dioscorides: firstly of *asplēnon* (ἄσπληνον: Dsc., *MM* III, 134 – certainly *Ceterach officinarum* Willd.) and secondly of *polypodion* (πολυπόδιον: IV, 186 – probably *Polypodium vulgare* L.). Moreover, according to Ps.-Dsc. IV, 16 RV the plant *saxiphragon* (σαξίφραγον), which is to be neglected here. The actual *skolopendrion* is the spleen fern, *asplēnon* (ἄσπληνον). This is also a very well-known and frequently encountered plant. For ancient illustrations and a photo taken by me in Priene, West-Turkey see Maximilian Haars, "Identifikation der Pflanzen bei Dioskurides – Forschungsstand, Desiderate und Perspektiven", in Jochen Althoff, Diego de Brasi, Sabine Föllinger, Georg Wöhrle (ed.): *Antike Naturwissenschaft und ihre Rezeption. Vol. XXXIV* (Trier: Wissenschaftlicher Verlag Trier 2024, 87–114).

[27] Vindob. med. gr. 1, f. 230v, Daubeny gives the identification of Sibthorp, but strangely does not evaluate the illustration in Vindob., cf. Charles Daubeny, *Lectures on Roman husbandry* (Oxford: J. Wright, 1857), 312. Emmanuel puts several question marks after the same proposal and suggests – with justification – *Ruscus aculeatus* instead, cf. E. Emmanuel, "Étude comparative sur les plantes, dessinées dans le Codex constatinopolitanus de Dioscoride", *Schweizerische Wochenschrift für Chemie und Pharmacie* 50 (1912), 68.

[28] Neapol. ex-Vindob. med. gr. 1, f. 91r.

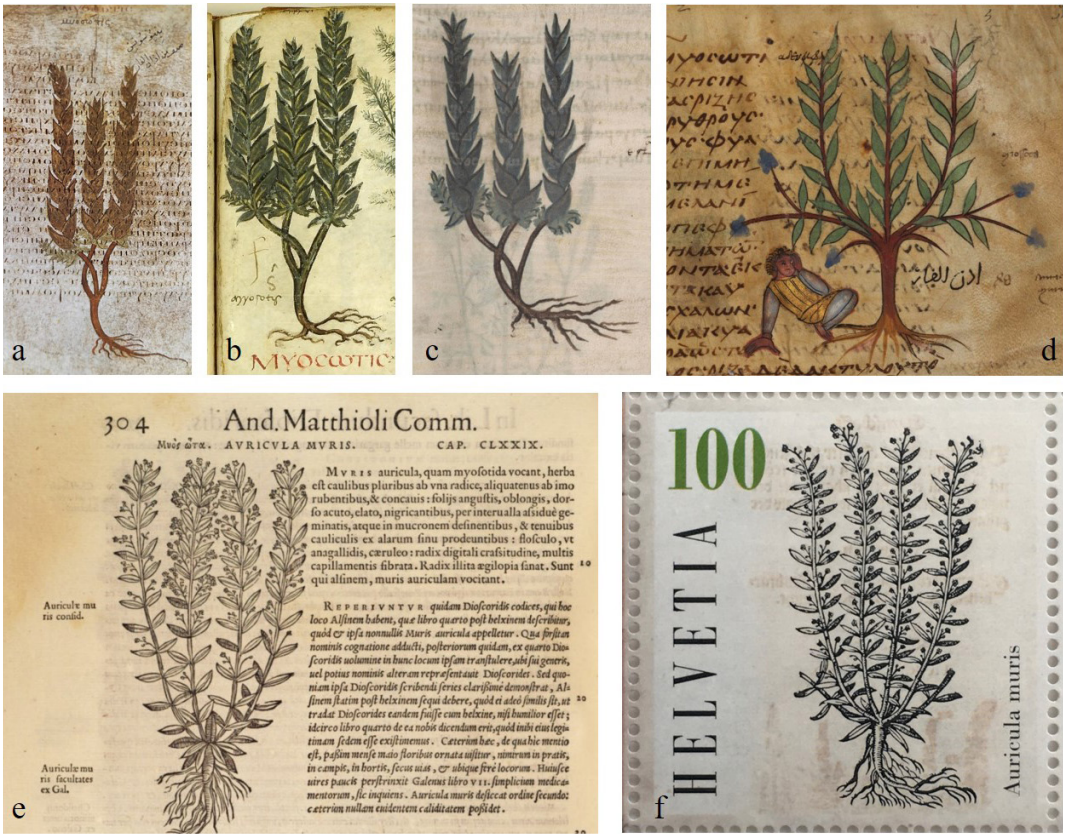

Fig. 3. a) Vindob. med. gr. 1, f. 230v; b) Neap. ex-Vindob. 1, f. 91r; c) Pierpont Morgan Library MS M.652, f. 106r; d) Par. gr. 2179, f. 5r; e) Mattioli, Dsc.-Comm. II 179: Venetiis 1554, p. 304 s. v. *auricula muris* (Public Domain); f) Swiss stamp showing Mattioli's *Auricula muris*. Owned by the Author.

Paris[29] and New York[30] do not help us any further (Fig. 3a–d). Presumably this is a fictitious plant conceived according to some of Dioscorides's indications, at any rate not *Myosotis* sp.

Based on the description in Dioscorides all authorities assume a species from the Boraginaceae family. Mattioli[31] shows a drawing (Fig. 3e), that has even made it onto a Swiss

[29] Paris, Bibliothèque nationale de France, Par. gr. 2179, f. 5r, on this Bonnet: "*Myosotis* sect. *Eumyosotis* DC.", cf. Edmond Bonnet, "Essai d'identification des plantes médicinales mentionnées par Dioscoride, d'après [...] Ms. Grec. No. 2179", *Janus* 8 (1903): 177. Griebeler rightly remarks: "The now unidentified *myos ōta* plant", Andrew Griebeler, "The Critical Tradition of Byzantine Botanical Illustration in the Alphabetical Dioscorides" (PhD diss., Berkely, 2019), 51 (I thank the author for a preprint version).

[30] New York, Pierpont Morgan Library MS M.652, f. 106r, Morgan Lib. note: "A. procumbens" – the notes on the website do not refer to the plants illustrated, but to the plants described by Dioscorides.

[31] Pietro Andrea Mattioli, *Commentarii in libros sex Pedacii Dioscoridis Anazarbei de medica materia [...]* (Venetiis: Valgrisius, 1554), 304 s.v. *auricula muris* (Fig. 3e).

stamp (Fig. 3f). Today it bears the name *Lappula squarrosa* (Retz.) Dumort.,[32] but was first described by Linné as *Myosotis* (this is also the presumed etymology of the modern genus name).[33] Sibthorp[34] then suggested *Aegonychon purpurocaeruleum* (L.) Holub (syn. *Lithospermum purpurocaeruleum* L.) as a more widespread species. The flowers are similar to those of *Anagallis*.[35] However, Sprengel[36] objected that the plant did not resemble the fern *skolopendrion* (*Ceterach officinarum* Willd.). He himself stuck with *Myosotis* L. and identified it as *M. scorpioides* L. (syn. *M. palustris* (L.) L.). From today's perspective, though, this species would be ruled out for not being native to Greece and Turkey, as it later turned out.[37] Finally, Fraas[38] suggested the related *Asperugo procumbens* L. This translation has been adopted by more recent authors.[39] In fact, there is much to support this species:[40] the shape of the leaves with the pronounced leaf vein, the hollow stem, the flowers. The drug *Herba Asperuginis* was later also used medicinally.[41] The distribution today is somewhat scattered (which of course does not necessarily mean anything with regard to the ancient flora): not everywhere in Greece, but well documented in Turkey. It only seems incongruous to be significantly larger than the Skolopendrion (*Ceterach officinarum* Willd.).

If we now compare the characteristics of all proposals (see the following table, see Fig. 4), we find the Fraas' species still fits best. Can Dioscorides' *myos ōtis* (μυὸς ὠτίς) therefore be identified? There are some arguments against this (shaded red in the table), so that final doubts remain. Is the initially seemingly detailed description even sufficient for a reasonably reliable identification?

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[32] For botanical details see Gustav Hegi, *Illustrierte Flora von Mitteleuropa* (= HEGI), 6 Bde. in 23 Teilbdn (in publication since 1909 by various publishers), here vol. 5 (1927), 2139 and Sandro Pignatti et al. (ed.), *Flora d'Italia* (= Fl. Ital.), 4 vol. (Milano: Edagricole, 2017–2019), here vol. 3 (2018), 189.

[33] Cf. also the explanation in Hellmut Genaust, *Etymologisches Wörterbuch der botanischen Pflanzennamen* (Hamburg: Nikol, 2005), 403–404, who, however, should have mentioned Mattioli.

[34] Sibthorp and Smith, *Prodromus*, 114.

[35] For botanical details on this sp. see HEGI vol. 5 (1927), 2154; Peter H. Davis et al. (ed.), *Flora of Turkey and the East Aegean Islands* (= Fl. Turk.), 11 vol. (Edinburgh: Edinburgh University Press, 1965–2000), here vol. 6 (1978), 314 and Fl. Ital. vol. 3 (2018), 142.

[36] Sprengel, *Dioscordis*, vol. 2, 488.

[37] Even today, it is still incorrectly listed for Greece in the Euro+Med Checklist, https://europlusmed.org (accessed December 12, 2023). There is no evidence that this species was native to the eastern Mediterranean in ancient times. When a plant is described as native or indigenous in a scientific flora, this means that it has been naturally occurring there for a very long time (beyond historical times). Human influences and climatic fluctuations can lead to changes in plant cover, which must be taken into account especially where the indigenous status is not verified. For botanical details see HEGI 5 (1927), 2161 and Fl. Ital. 3 (2018), 185.

[38] Fraas, *Synopsis*, 161.

[39] E.g., André, *Noms de plantes*, 166 and LSJ s. v. *myosōtis* (μυοσωτίς).

[40] The botanical data is taken from HEGI vol. 5 (1927), 2136; Fl. Ital. 3 (2018), 177 and Fl. Turk. 6 (1978), 264.

[41] Wolfgang Schneider, *Lexikon zur Arzneimittelgeschichte [...]*, 7 vols. (Frankfurt am Main: Govi-Verlag, 1968–1975), here vol. 5/1 (1974), 149.

Dsc. II 183	Distribution in Greece & Turkey	smaller than Asplenium ceterach (< 20 cm)	paired	narrow, elongated	mid-rib raised	on delicate stems growing from the axils	small	dark blue	similar to anagallis	
Proposals		**Habit**	**Leaves**			**Flowers**				**Lit.**
Lithospermum purpurocaeruleum		30 - 50 cm					< 20 mm			HEGI 5 (1927), p. 2154, Fl. Turk. 6 (1978), p. 314; Fl. Ital. 3 (2018), p. 142
Myosotis scorpioides		20 - 25 cm					6-8 mm	sky-blue		HEGI 5 (1927), p. 2161; Fl. Ital. 3 (2018), p. 185
Asperugo procumbens		10 - 70 cm					3 mm			HEGI 5 (1927), p. 2136; Fl. Ital. 3 (2018), p. 177
Lappula squarrosa		5-40 cm						sky-blue		HEGI 5 (1927), p. 2139; Fl. Ital. 3 (2018), p. 189

Fig. 4. Evaluation of the identifications for *myos ōta* (μυὸς ὦτα: Dsc., *MM* II, 183). © M. Haars.

It has been shown that none of the species corresponds exactly to Dioscorides' description. It cannot even be said that a species from the Boraginaceae family is meant here. The typical characteristics are not mentioned by Dioscorides. If instead of *leptotera* (λεπτοτέρα, "soft"), *leiotera* (λειοτέρα, in the sense of "smooth", "hairless") is to be read as a characteristic of the leaves, this would even be an exclusion criterion. As a consequence, the plant must therefore – with regard to the description in Dioscorides – be regarded as unidentified.[42]

5. *Heliotropion to mega* (ἡλιοτρόπιον τὸ μέγα), Dsc., *MM* IV, 190 (II, 338 W.)

The situation is different with the next example. The identification of the two *heliotropium* kinds by Fraas have again found their way into the LSJ s. v. *heliotropion he to mega* (ἡλιοτρόπιον: "ἡ. τὸ μέγα, *Heliotropium villosum*").

In my translation of Wellmann's text the description runs as follows:

[42] A more detailed table can be found in Haars, "Identifikation der Pflanzen" (appendix). Of course, it would be a methodological problem and would ultimately lead to circular reasoning if we were to recognize this species as the correct translation of the phytonym and assume that Dioscorides had made a mistake. That he makes mistakes is possible, even probable, but this could only be assessed – if at all – once all of his plant descriptions had been evaluated and compared with the parallel passages in Plin. Much research would still have to be done in this respect.

> Large *heliotropion* that some called *skorpiouron* from the morphology of its inflorescence (*apo tou peri to Anthos schēmatos*, ἀπὸ τοῦ περὶ τὸ ἄνθος σχήματος) and *heliotropion* from the phenomenon, that its leaves follow the position of the sun (*ek tou symperitrepesthai ta phylla tē tou heliou klisei*, ἐκ τοῦ συμπεριτρέπεσθαι τὰ φύλλα τῇ τοῦ ἡλίου κλίσει). It has leaves similar to those of basil (ōkimō *paraplēsia*, ὠκίμῳ παραπλήσια) but rougher and darker (*dasytera de kai melantera*, δασύτερα δὲ καὶ μελάντερα), two or three small stalks from the root, and from these, many branches; at the apices having a white flower, slightly purple, and curling like a scorpion's tail (*epikampes kathaper sporpiou oura*, ἐπικαμπὲς καθάπερ σκορπίου οὐρά); the root is thin and useless. It grows in rough places (*en trachesi topois*, ἐν τραχέσι τόποις).

The text Fraas used differs again in two words from Wellmann's but this time in reverse: Wellmann follows the Escorialensis manuscript (E) and Oribasius (Orib.) in which the leaves are described as *melantera* (μελάντερα), "darker", while Sprengel has *leukotera* (λευκότερα), "whiter". From a botanical point of view, both could be correct: the leaves of the identified species are indeed strikingly darker than those of basil. On the other hand, they have white hairs. Another variation is found in the colour of the flowers. Sprengel has Oribasius' reading *hypopyrron* (ὑπόπυρρον) while Wellmann follows the better witnessed *hypoporphyron* (ὑποπόρφυρον). Here, too, both could be justified from a botanical point of view. The flowers of *Heliotropium* species sometimes have a slightly purple shade and in some species the throat of the flower is also yellowish.

The illustrated mss. offer beautiful figures (Fig. 5, esp. a–c). In my opinion, *Heliotropium* species are certainly represented here. Not only the charecteristic inflorescences, but also the shape of the leaves are well taken.[43]

Because of the indication of the scorpion-like inflorescences, Linné used the name for this genus from the borage family. The inflorescences are like this throughout the genus: "[Genus] *Heliotropium* L....flowers generally in branched... scorpioid, terminal cymes".[44] However, in some species these are so shortened that the inflorescence looks like an umbel, at least no longer like a scorpion tail. These species are not in question here. Although this inflorescence is also frequently found in other genera of the Borrage family, a restriction to *Heliotropium* seems justified to me due to the combination of characteristics (inflorescence terminal, leaves similar to *ōkimon* (ὤκιμον) – *Ocimum basilicum* L. and white to slightly purple flowers. For plant-geographical reasons, all three proposed species come into question (Fig. 6).[45]

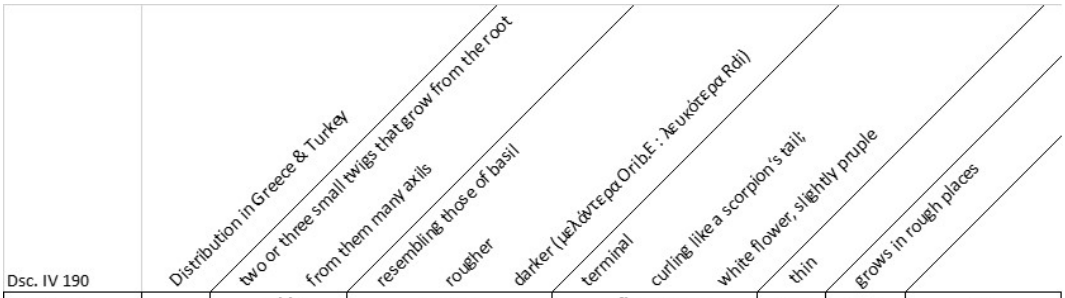
However, as Dioscorides describes the root as thin, *H. europaeum* with its thick taproot falls out. I have not found any information on the root of *H. hirsutissimum*. Such information

[43] Cf. the drawings in Fl. Ital. 3 (2018), 139, especially on *Heliotropium europaeum* L.

[44] R[obert] D. Meikle, *Flora of Cyprus*, vol. 2 (Kew: Royal Botanic Gardens, 1985), 1120.

[45] At least all species are described as native to the eastern Mediterranean region, which refers to a time well before the authors discussed here.

Fig. 5: a) Vindob. med. gr. 1, f. 291v (s. v. *skorpiouron*); b) Neap. ex-Vindob. 1, f. 81r; c) detail from a): scorpioid cymenes; d) *Heliotropium hirsutissimum* Grauer. Photo © Danin; e) Par. gr. 2179, f. 141r. Public Domain.



Dsc. IV 190	Distribution in Greece & Turkey	two or three small twigs that grow from the root	from them many axils	resembling those of basil	rougher	darker (μελάντερα Orib.E.: λευκότερα Rdi)	terminal	curling like a scorpion's tail;	white flower, slightly pruple	thin	grows in rough places
Proposals		**Habit**		**Leaves**			**Inflorescence**			**Root**	**Hab.**	**Lit.**
Heliotropium europaeum		twigs not small				canescent			white, bluish, yellow throat	strong taproot	Roadsides, fields, wasteland	HEGI vol. 5 (1927), p. 2132, Fl. Turk. 6 (1978), p. 252; Fl. Ital. 3 (2018), p. 139
Heliotropium hirsutissimum		10-50 cm	stems much branched			dark green, but canescent			white with a yellow centre	?	fields waste ground	Fl. Turk. 6 (1978), p. 254; Fl. Cypr. p. 1123
Heliotropium supinum		7-40 cm				densely canescent			corolla white		wetlands, cultivated ground, field margins	HEGI 5 (1927), p. 2130, Fl. Cypr. p. 1123f.; Fl. Turk. 6 (1978), p. 255; Fl. Ital.3 (2018), p. 139

Fig. 6. Evaluation of the identifications for *hēliotropion to mega* (ἡλιοτρόπιον τὸ μέγα: Dsc., *MM* IV, 190. © M. Haars.

is usually not found in standard works such as Davis' *Flora of Turkey*. So here we can state that the identification as *H. hirsutissimum* is possible with reservation of the root. *H. supinum*, which Suzanne Amigues also draws here, has the wrong habitat[46]; it fits better with that of the small *heliotropium* of Dioscorides. Fraas also offers information here that can only be obtained by autopsy, for example on the nature of the fruits.

6. *Sēsamoeides to mikron* (σησαμοειδὲς τὸ μικρόν), Dsc., *MM* IV, 163 (II, 309 W.)

The text for our third example does not differ in Sprengel and Wellmann. The plant is described in detail: It has span-long stalks (*kaulia spithamiaia*, καυλία σπιθαμιαῖα), leaves similar to *korōnopous* (κορωνόπους), but rougher and smaller (*dasytera mentoi kai mikrotera*, δασύτερα μέντοι καὶ μικρότερα). At the apex of the stalk are heads of faintly purple flowers (*ep' akrou de tōn kauliōn kephalia antheōn hupoporphyrōn*, ἐπ' ἄκρου δὲ τῶν καυλίων κεφάλια ἀνθέων ὑποπορφύρων) and the centre of the flower is white (*hōn to meson leukon*, ὧν τὸ μέσον λευκόν), the seed sesame-like (*sperma sēsamō eoikos*, σπέρμα σησάμῳ ἐοικός), bitter, pale yellow (*pikron,*

[46] Dioscorides' statement "It grows in rough places (*en trachesi topois*, ἐν τραχέσι τόποις)" can of course mean many things. But it seems rather unlikely to me that it refers to wetlands.

Dsc. IV 163	Distribution in Greece & Turkey	span-long stems	similar to Plantago coronopus	rougher	smaller	terminal	in heads	flower slightly pruple	centre white	sesame-like	pale yellow	bitter	tender / thin	grows in rough places	
Proposals		**Habit**	**Leaves**			**Inflorescence**				**Fruits (Seeds)**			**Root**	**Hab.**	**Lit.**
Sprengel: *Reseda canescens* = *Caylusea hexagyna*	Only North Africa and Israel / Syria			(folia glabra)								?		inter rudera	Schimper (HBG508889) and Forsskål (C10002867), cf. Fl. Aegypt.-Arab. (1775), p. 92
Sprengel: *Reseda canescens* = *Sesamoides interrupta (?)*	Only Italy and westwards	5-15cm	with leaf rosette								dark brown with yellow bulge	?		stony ridges and rocks, but > 1200 / 1800 m!	Flora Iberica 4 (1993), p. 477, Euro+Meds. v., Fl. Ital. 2 (2017), p. 883, HBSI 4.2 p. 483sq.
Fraas: *Aubrieta deltoidea*	Throughout Greece, Turkey: W.Anat. Islands	8-20cm						petals purple	white / yellow	drawingin Fl. Ital.	(red / dark brown)	?		Rocks, 500-2100 m.	Fl. Turk. vol. 1 (1965), p. 441; Fl. Ital. vol. 2 (2017), p. 951; A. STRID /B. STRID vol. 7/8

Fig. 7. Evaluation of the identifications for *sēsamoeides to mikron* (σησαμοειδὲς τὸ μικρόν: Dsc., *MM* IV, 163). © M. Haars.

kirron, πικρόν, κιρρόν), the root tender (*rhiza leptē*, ῥίζα λεπτή), the herb grows in rough places (*en trachesi chōriois*, ἐν τραχέσι χωρίοις).

Fraas identified the herb in question as greek rockcress, *Aubrieta deltoidea* (L.) DC.,[47] which matches many characteristics given by Dioscorides (Fig. 7). He explicitly rejected Sprengel's identification as *Reseda canescens* L.[48] The systematics of this last sp. (Linné, *Syst. Nat.*, ed. 12, 2: 330. 1767?) is complicated. According to Euro+Med and herbarium specimens of "*Reseda canescens* L." collected in Egypt by Schimper (HBG508889) and Forsskål (C10002867) we are dealing here with *Caylusea hexagyna* (Forssk.) M.L. Green (syn. *Caylusea canescens* A. St.-Hil.). This is a north-African, Near-East sp. not native to Greece or Turkey. However, according to World Flora Online[49] *Reseda canescens* L. is considered as a synonym of *Sesamoides interrupta* (Boreau) G.López – a western mediterannean, mountaineous sp. (> 1200 / 1800 m!), native in some regions in Italy,[50] the Iberian Peninsula, France, esp. Corsica, Sardinia and the Pyrenees.[51]

Since Sprengel refers to an Egyptian and "Asia Minor" species, the first is certainly meant.

[47] "I think that this plant [*A. deltoides*] is much better suited than *Reseda canescens* according to Sprengel... Common on all dry mountains and rocks, from 500 to 3000 feet (Attica, Tripolitza)", Fraas, *Synopsis*, 118–119.

[48] Cf. Sprengel, *Dioscoridis*, vol. 2, 635.

[49] https://www.worldfloraonline.org (accessed December 11, 2023).

[50] Piemonte and Liguria, cf. Fabio Conti et al. (ed.), *An Annotated Checklist of the Italian Vascular Flora* (Roma: Palombi, 2005), 165 and Fl. Ital. 2 (2017), 883: 1200–2200m (!) with drawing.

[51] Santiago Castroviejo (ed.), *Flora Iberica. Plantas vasculares de la Peninsula Ibérica e Islas Baleares*, vol. 4 (Madrid: Real Jardín Botánico, 1993), 477.

Fig. 8. *Sēsamoeides to mikron* (σησαμοειδὲς τὸ μικρόν: Dsc., *MM* IV, 163). a) Vindob. med. gr. 1, f. 325v; b) Neap. ex-Vindob. 1, f. 160r; c) Pierpont Morgan Library MS M.652, f. 155v. Public Domain.

In fact, both species can be excluded: None is native to Turkey or Greece, moreover they differ significantly in morphology from the description in Dioscorides.

However, *Aubrieta* does not have pale yellow seeds, but dark ones that bear little resemblance to sesame. Furthermore, and more important, the flowers are not arranged in heads as Dioscorides describes. The illustrations also shows a kind of spike (Fig. 8). This may also be the reason, why a *Sesamoides* sp. was considered. Nevertheless, it seems remarkable that Fraas has made a proposal that André accepted "sans doute".

As was to be expected, the illustrated manuscripts are of no help here. Remarkable at best is the identification by Emmanuel[52] as *Astrocarpus sesamoides* (syn. *Sesamoides clusii* (Spreng.) Greuter & Burdet) – according to Euro+Med this is a western Mediterranean sp.

7. Cupressaceae – Dsc., *MM* I, 74–77

As a final example, we look at the nomenclature of the Cypress family in Dioscorides, which Fraas contributed to clearing up. Dioscorides deals with representatives of this family in chapters 74 to 77 of his first book. Since ancient botanists had neither a species concept in the

[52] Emmanuel, "Étude comparative", 70.

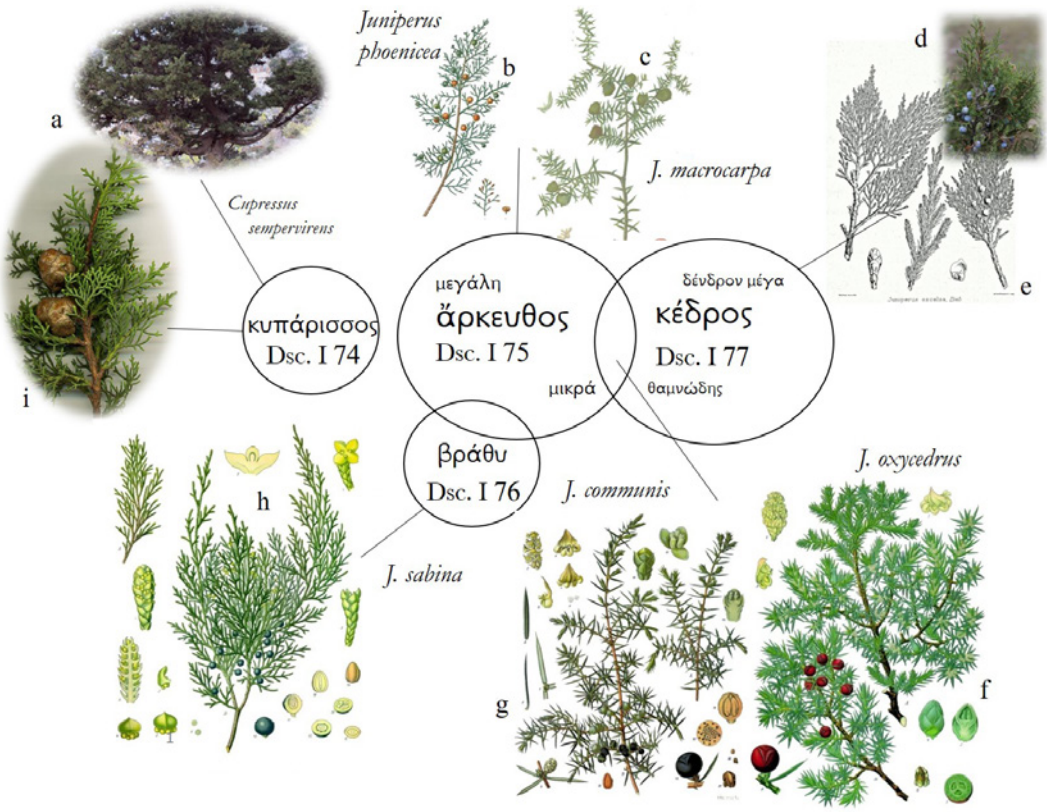


Fig. 9. Cupressaceae in Dsc., *MM* I 74–77. Photos a, d, e: © M. Haars; b, c, f–i: Public Domain.

modern sense, nor the instruments and – to a certain degree – the necessity to distinguish between e. g. *Juniperus communis*, *J. oxycedrus* and similar spp., the terminological distinctions are not quite sharp. In Fig. 9 this fuzziness is symbolized by the overlapping circles.

a. Kyparissos (κυπάρισσος), Dsc., MM *I, 74 (I, 73 W.)*

Nevertheless, there is little doubt about *kyparissos* (κυπάρισσος) that has long been identified as *Cupressus sempervirens* L.[53] – although this is not necessarily the avenue tree that characterises the landscape in Tuscany with its typical slender, columnar growth habit. The form *C.*

[53] Dioscorides offers no description of this tree, which is assumed to be known. However, there are abundant specifications in Thphr. and Plin., compiled by Franz Olck in his detailed RE article "Cypresse", in *Pauly's Real-Encyclopädie der classischen Altertumswissenschaft*, ed. Georg Wissowa et al. (Stuttgart: Metzler, 1893–1980), here vol. 4/2 (1901), col. 1909sq. The most important passages from Thphr. are all referred to *Cupressus sempervirens* L. by Amigues, *Théophraste. Recherches*, vol. 5, 306. Native to the eastern Mediterranean basin, it was apparently brought to Italy early as a cultivated tree, while the wild form var. *horizontalis* (Mill.) Gord. occurs in our area from Crete and eastwards above 300 up to 1200/1400 m, cf. Arne Strid, *Atlas of the Aegean Flora* (Berlin:

sempervirens var. *stricta* Aiton is the result of centuries of breeding and artificial cultivation since Roman times.[54]

Dioscorides I, 74 uses the fresh green cones (*chlōra sphairia*, χλωρὰ σφαιρία). Most of the uses listed, such as hemoptysis, dysentery, or external trauma, can be attributed to the astringent and cooling properties of the tannin-rich cypress cones. Dioscorides also uses the leaves (*ta phylla*, τὰ φύλλα) for other indications. All this information fits well with cypress – both in terms of its later use in folk medicine and pharmacies, as well as in terms of its effective ingredients.[55]

Then follow in chapters 75–77 species of the genus *Juniperus*: *arkeuthos*, *brathy* and *kedros* (ἄρκευθος, βράθυ and κέδρος).

b. Brathy (βράθυ), Dsc., MM *I, 76 (I, 75 W.)*

Both kinds of *brathy* in Dioscorides are defined by all authorities as the sade tree, *Juniperus sabina* L. (with its varieties or closely related spp.),[56] to be distinguished from other *Juniperus* spp. because of its toxicity and smell. This identification is also possible for the figures in the illustrated manuscripts.[57] However, there are obviously problems of distinction to *J. foetidissima* Willd.[58]

Furthermore, some final doubts remain, since Dioscorides speaks of a tree (although grown more in width, *to dendron eis platos mallon ekcheomenon*/τὸ δένδρον εἰς πλάτος μᾶλλον ἐκχεόμενον), while *J. sabina* grows mostly as a shrub.[59] One should therefore not exclude similar spp. like the before mentionned, up to 10m growing *J. foetidissima* L. (for Greece and Turkey).

c. Arkeuthos megalē (ἄρκευθος μεγάλη), Dsc., MM *I, 75 (I, 74 W.)*

Dioscorides distinguishes a large cypress-like tree with fruits the size of a hazelnut (*a. megalē*, ἀ. Μεγάλη) and a small one with sweet-bitter bean-sized berries (*a. mikra*, ἀ. Μικρά). Fraas identified the large *arkeuthos* as *J. phoenicea* L. and the small one as *J. oxycedrus* L.

BGBM, 2016), vol. 2, map 55 and Id. (ed.), *Mountain flora of Greece*, 2 vol. (Cambridge: Cambridge University Press 1986–1991), here vol. 1, 45; see also HEGI 1.2 (1981), 107; Fl. Turk. 1 (1965), 76 and Fl. ital. 1 (2017), 84.

[54] Fl. Ital. 1 (2017), 84: "In epoca certo antichissima, forse già dagli Etruschi".

[55] Cf. Schneider, *Lexikon zur Arzneimittelgeschichte*, vol. 5/1 (1974), 400–401 and Karl Hiller and Matthias F. Melzig, *Lexikon der Arzneipflanzen und Drogen* (Heidelberg: Spektrum, 2010), 173 and Wolfgang Blaschek et al. (ed.), *Hagers Enzyklopädie der Arzneistoffe und Drogen* (Stuttgart: Springer 2007), vol. 5, 430–431.

[56] Dsc. *MM* I, 76 distinguishes two kinds of the sade tree, which can be related to *J. sabina* var. *tamariscifolia* Aiton and *J. cupressifolia* Antoine ex K. Koch., cf. Sprengel, *Dioscoridis*, vol. 2, 386; Fraas, *Synopsis*, 259–260 and Blaschek et al., *Hagers Enzyklopädie*, vol. 9, 222. In current taxonomy, they are considered as syn. to the more formal *J. sabina*, cf. WorldFlora (s. v), https://www.worldfloraonline.org (accessed December 11, 2023).

[57] The illustrations in Cod. M.652, f. 19r and f. 244v (Morgan Lib. note: "J. sabina"); Cod. Vindob. med. gr. 1, f. 84r and Cod. Neap. ex-Vindob. med. gr. 1, f. 30r show a shrub which can well be compared with *J. sabina*. I even have the impression that in M (19r) the brachyblasts are represented, cf. the drawing in HEGI 1.2 (1981: 118). I cannot follow the suggestion of Emmanuel, "Étude comparative", 64: Tamarix [gallica?]), because inter alia the inflorescences are quite different.

[58] Fl. Turk. 1 (1965), 82f.

[59] Cf. Fl. Ital. 1 (2017), 89; Mount. fl. Gr. 1 (1989), 49; HEGI 1.2 (1981), 116–120 and Fl. Turk. 1 (1965), 82.

Is it that simple? Unfortunately, not. The problem here is that Fraas relies on the text of the interpolated Dioscurides. The information on the habitat in rough areas and near the sea (*en trachesi kai parathalassiois topois,* ἐν τραχέσι καὶ παραθαλασσίοις τόποις) and the comparison with the cypress (*empherēs kyparissō*, ἐμφερὴς κυπαρίσσῳ) are Pseudo-Dioscorides and additionally in brackets in Wellmann's edition. It is of course still possible that Dioscorides would also have agreed with these later scholia – but here we are in the realm of speculation. Since without this information, one would at least also have to consider *J. macrocarpa* Sm.

d. Kedros dendron mega (κέδρος δένδρον μέγα), Dsc. MM *I, 77*

We are now concerned with the large *kedros*, from which, according to Dioscorides the *kedria* originates (*ex hou he legomenē kedria synagetai*, ἐξ οὗ ἡ λεγομένη κεδρία συνάγεται). This is a famous tree resin that was also used by the Egyptians to preserve mummies. According to Dioscorides its fruit is much smaller than that of the cypress (*hōsper kyparissos, mikroteron mentoi para poly*, ὥσπερ κυπάρισσος, μικρότερον μέντοι παρὰ πολύ).[60]

Fraas is the first[61] to identify the large *kedros* as *Juniperus excelsa* M. Bieb. and all authorities follow him.[62] This is the most common tree-like juniper in the relevant area.[63] Other common species do not reach this height. Therefore, the identification with Dioscorides' large tree seems justified to me. Its fruits are admittedly smaller than those of the cypress, but not necessarily much smaller. Highly interesting are Fraas remarks on the resin, which he found especially in *J. phoenicea*, but less so in *J. excelsa*: "As for the kedria, I found – 1) almost pure

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[60] The ripe female cones of *Cupressus sempervirens* measure 2–4 cm, cf. Fl. Ital. 1 (2017) 84. In Plin., *HN* XIII, 53, however, the seed is meant (*semen eius cupresso simile* – if not semen is here also to be understood as a cone).

[61] Sprengel, *Dioscoridis*, vol. 2, 386–387: *J. phoenicea* s. l. This is a rather small tree of max. 4m (in rare cases up to 8m), the fruits measure up to 15 mm, cf. Fl. Ital. 1 (2017), 88. It is common in Italy and Greece, but occurs in Turkey only on some islands, see the map in Fl. Turk. 1 (1965), 81. E-med.-material belongs probably to *J. turbinata* Guss, cf. Atlas Aeg. Fl. 1 (2016), 24.

[62] *Juniperus excelsa* is a tree up to 20 m high with cones 7–10 mm in size, which is widespread in the E-Mediterranean region. Its occurrence in central and N-Greece is well documented according to Panayotis Dimopoulos et al. (ed.), *Vascular Plants of Greece. An annotated checklist* (Berlin/Athen: BGBM, 2013), 42. In Turkey it is one of the most widespread *Juniperus* spp., cf. Fl. Turk. 1 (1965), 83. Completely unjustly Fraas was reprimanded for this suggestion by Karl Koch, *Die Bäume und Sträucher des alten Griechenlands* (Stuttgart: Enke, 1879), 40f. who wanted to exclude this sp. for Greece. Fraas' identification was accepted in LSJ s.v. κ.; André, *Noms de plantes*, 54 and by Amigues, *Théophraste. Recherches*, vol. 2, 164.

[63] The highest-growing *Juniperus drupacea* Labill. will not be excluded here, although it has only been recorded in very few places in the relevant area today, cf. Fl. Turk. 1 (1965), 19: "Above 1000 or 1200 m... the Mediterranean region is largely dominated by conifers... native *Cupressus sempervirens* (s. Map 11) and *Juniperus drupacea* (s. Map 12 [p. 77]) are confined to the mountains of South Anatolia; *Juniperus excelsa* (s. Map 17) often forms the tree-line." (Map 12 [p. 77]). Dioscorides does not name a place of growth, but Plin., *HN* XIII, 53 states that the timber of the large cedar comes from (Cilician) Seleukeia, among other places. See on this important species in the ancient Near East Marie-Françoise Besnier et al., "On the Junipers of Ugarit, Part 1: The Word Diprānu and Its Wanderings", in *Scribes et érudits dans l'orbite de Babylone*, ed. Carole Roche-Hawley and Robert Hawley (Paris: De Boccard, 2012), 201–259, esp. 212sq.

gum on *Juniperus oxycedrus* and *macrocarpa* on the Taygetos, covering the whole tree and branches almost completely, it seemed to be a pathological product, as is also often observed on *Juniperus communis* when it is very wet. – 2) More resin-like, pleasant-smelling and similar to sandarach on *Juniperus phoenicea* in Vattica, from Monembasia to Argos, but only on individual specimens. This is the *kedria* of the ancients; – 3) also of this kind, but only rarely on *J. excelsa*".

Fig. 10. Resin excretion on *Cedrus libani*. Photos taken on Cyprus, © M. Haars.

These are valuable observations, even if they only relate to a few individuals.

Finally, it should be pointed out that *kedros* was often identified with *Cedrus libani* A.Rich., the true cedar of Lebanon, perhaps also in the New York manuscript.[64] Of the cedar the resin is used pharmaceutically, too.[65] This tree forms still today large populations in Turkey. I have tried the resin from a cedar in Cyprus. It is somewhat aromatic and I have no doubt, that it was used pharmaceutically in ancient times (Fig. 10).

8. Conclusions

What can the examples presented teach us? First of all, I think that we should not ignore the authors of the 19th century or dismiss them as "uncritical". To a large extent, we owe our current level of knowledge to them, or, to put it another way, we are still working off them. Especially in the days when ancient studies were still regarded as the leading disciplines, there were many clever and hard-working minds at work – with a workload on the subject itself that few people can comprehend today. To a certain extent, this also applies to Fraas, as he in many cases – only four could be mentioned here – laid the foundations for our current understanding of Greek plant names. This is reflected in the more recent works (LSJ, André, Amigues).

[64] Pierpont Morgan Library MS M.652, f. 251v (Morgan Lib. note: "Juniperus"), available online: https://www.themorgan.org/collection/de-materia-medica/143825/504 (accessed December 12, 2023). At least, these are not the fruits of *Juniper* species. It would also come as no surprise that this cedar, which is still widespread in southern Turkey today, is depicted in the manuscript originating in Asia Minor.

[65] Geiger reports around 1830: "The fragrant cedar wood (lign. Cedri) was once officinal; the fragrant resin (resina, gummi Cedri) flowing from the trunk, which is similar to mastic, and the pleasantly resinous-smelling and sweet-tasting seeds (sem. Cedri) were also in common use. – From the leaves oozes a kind of manna (Manna Cedrina), which has been used as a medicine since ancient times", quoted after Schneider, *Lexikon zur Arzneimittelgeschichte*, vol. 5/1 (1974), 256. In the 20th century the essential oil of the wood was used in pharmaceutical products as an aromatic, cf. Blaschek et al., *Hagers Enzyklopädie*, 3, 1025–1026.

On the other hand, there are also suggestions by Fraas that are correct and appear neither in André nor in LSJ – this may be another reason to critically consult the older literature without over-relying solely on the newer one.

And perhaps the most important aspect with regard to Fraas: botanical autopsy is a precondition for plant identification. For Dioscurides makes many statements which we cannot check in all cases with the help of botanical (e.g. Davis' Fl. Turk.) or pharmaceutical (e.g. Hagers Enzyklopädie) reference works or herbarium specimens.

Aditionally, Fraas has observations from a pre-industrial time in Greece. Natural habitats are unfortunately disappearing more and more in Greece and the chances of finding untouched nature, as was the case at the turn of the 19th century, are dwindling in the Mediterranean region.

However, this literature such as Fraas must not be used uncritically: We must be clear beforehand: What is the textual basis of Fraas? And: How reliable is the identification?

One aspect that was perhaps less developed in the 19th century was cooperation between scholars from different disciplines. The title of this paper is also an allusion to the lone wolf approach of a mountaineer (Heinrich Harrer) during his seven years in Tibet. To get higher and further requires a rope team of specialists who can rely on each other as a research group.