

Dioscorides's *bruonia melaina* is *Bryonia alba*, not *Tamus communis*, and an illustration labeled *bruonia melaina* in the *Codex Vindobonensis* is *Humulus lupulus* not *Bryonia dioica*

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Abstract

The Cucurbitaceae genus *Bryonia* contains ten species that are distributed throughout the Mediterranean to North Africa and from central Europe to Kazakhstan. References to the medicinal uses of species of *Bryonia* span two millennia, including two passages in Dioscorides's *De Materia Medica*, written in about 65 CE. An illustrated copy of this text, known as the *Codex Vindobonensis* and dated 512 CE, is enriched with illustrations, including two labeled as *bruōnia* or *bryonia*. Here we argue that while Dioscorides's text clearly concerns the black-fruited *B. alba* and a red-fruited species, perhaps *B. cretica* or *B. dioica*, only one of the plates in the *Codex* shows a species of *Bryonia*, while the other shows *Humulus lupulus*.

INTRODUCTION

The Eurasian Cucurbitaceae genus *Bryonia* L. (bryony) comprises ten species that occur from central Europe to Kazakhstan and south through the Mediterranean to northern Africa (Jeffrey 1969; Volz and Renner 2008). Two species have been introduced in eastern North America and New Zealand. Medicinal uses of bryony have been recorded for over 2000 years, beginning with texts attributed to Hippocrates, who lived around 460-380 BCE (translations including the sections about *Bryonia* are available at <http://etext.library.adelaide.edu.au/h/hippocrates/>). Other early mentions are in Dioscorides's *De Materia Medica*, written in about 65 CE and Pliny's *Historia Naturalis*, completed in 77 CE (Wellmann 1906-1914). References to *Bryonia* also appear in ancient Egyptian sources (Haggag 1997).

A passage in the *Materia Medica* that describes a plant called *ampelos melaina*, since at least the Renaissance has been interpreted as referring to the Cucurbitaceae *Bryonia*. This interpretation, however, was changed in a new translation of *De Materia Medica* (Beck, 2005) that instead renders *ampelos melaina* as referring to the

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Dioscoreaceae *Tamus communis* L. (synonym *Dioscorea communis* (L.) Caddick and Wilkin; Wilkin et al. 2005), henceforth referred to as the *Tamus* hypothesis). This new interpretation implies that a painting labeled *bruōnia* (*bryonia*) *melaina* in the oldest illustrated copy of *De Materia Medica*, the *Dioscorides Codex Vindobonensis* or *Codex Juliana Anicia* written in CE 512, either was meant to represent *Tamus* or is a mislabeled painting of some other plant.

We here address three questions arising from these issues, (i) whether the interpretation of *ampelos melaina* as *Tamus* instead of *Bryonia* fits with Dioscorides's original description; (ii) whether the basis for the *Tamus* hypothesis may lie in Greco-Roman references that mixed uses of *Tamus* and *Bryonia*; and (iii) whether the two plates labeled *bruōnia* in the *Codex Vindobonensis* can be associated with particular Linnaean plant names.

DIOSCORIDES'S TEXT AND THE ILLUSTRATIONS ON FOLIOS 79r AND 82r IN THE CODEX VINDOBONENSIS

The standard edition of the Greek text of *De Materia Medica* is Wellmann's (1906-1914) three-volume Greek text *Pedanii Dioscuridis Anazarbei De Materia Medica*. The relevant passage (Wellmann, 1906, pp. 329-333, available electronically from SSR or JS) as translated by Beck (2005, p. 325-326), lightly revised by JS, states the following about *ampelos melaina*, "*The black bryony, called by some in the common tongue bryonia and others cheironios ambelos. Its leaves are similar to those of the ivy but are closer in appearance to those of the bindweed, as are also its stems, but these are larger. The black bryony also [like the bindweed] attaches itself to trees by means of its tendrils. Its fruit is in clusters, appearing at first as pale green, but as it ripens, it turns black. Its root-bark is black [viz. the 'outer rind' is black], but inside, it has the color of boxwood. (2). Also the stems of the black bryony, when first sprouting, are employed as vegetables. [As a medicine], they act as a diuretic, [and] act to initiate the menstruals, act to reduce a swollen spleen, and are appropriate [in treating] those who suffer from the Falling Sickness, those who have paralysis, and those who suffer from dizzy spells. The root has the same properties as [the other] bryony, and [the root] is suitable for the same purposes, although it is less potent. Made into a poultice with wine, the leaves are effective in treating [open] ulcers/sores on the napes of draft animals [viz. oxen], and [the leaves] likewise are applied for sprains.*"

Dioscorides also discusses a second species of *Bryonia*, viz. *ampelos leuka*, and the respective section is translated by Beck (2005) as "*The bryony: but some call it bryonia, others ophiostaphylon, others chelidonium, others mados or psilothron or archezostis or agrostis or cedrostis. Its twigs, leaves, and tendrils are similar to those of the cultivated grape, except that all of them are rougher; it too, entwines itself around the nearby shrubs seizing hold of them with its tendrils. Its fruit is in bunches and it is red. It is used to remove hair from pelts. Its shoots, when they first come out, are eaten boiled setting in motion micturition and bowel movement.*"

Full-color reproductions of the *Codex Vindobonensis*, the earliest illustrated version of *De Materia Medica*, were published by the Akademische Druck- und Verlagsanstalt Graz together with accompanying commentaries by Gerstinger (1965-1970) and Mazal (1998-1999). Plate 79r of the *Codex*, reproduced in color in Janick et al. (2007) and again here in black and white (Fig. 1A), shows a plant labeled with

an abbreviated Greek uncial and a Greek transcription *bruōnia leuka* (in English: white vine). The Greek uncials are from the 6th century, while the Byzantine transliteration is from about 1410, before the final fall of Constantinople in 1453 (Mazal, 1998).

Plate 82r is similarly labeled *bruōnia melaina* (= *ampelos melaina*); in English: black vine. It is reproduced in color in Janick et al. (2007), and in black and white as our Fig. 1B. Both illustrations show viney plants with large yellow root tubers. The plant on plate 79r has 6-lobed alternate leaves, tendrils arising in the leaf nodes, and clusters of small black fruits on thin long peduncles. The plant on plate 82r has much more deeply lobed and opposite leaves; it lacks tendrils and fertile parts.

PLINY THE ELDER'S TEXT AND THE LEXICAL RESEARCH LEADING TO THE *TAMUS* HYPOTHESIS

Wellmann's (1906-1914) *apparatus criticus* to Dioscorides cites as one of several parallel texts Pliny the Elder's *Natural History*, which Wellmann says is 'derived' from the (lost) works of Sextius Niger (Scarborough 2008). By comparing passages on specific plants in the Greek of Dioscorides with the Latin of Pliny the Elder, Wellmann and later scholars have ascertained that underneath both are occasional borrowings that indicate the original writings (in Greek) on medical botany (examples in Scarborough, 1986).

The passage in Pliny (*Natural History*, 23, p. 27; André, 1971) that Wellmann (1906, p. 331) cites as relevant to the plant *ampelos melaina* reads as follows, "For there is also a black vine, properly called the 'bryony,' but named by some the 'chironia,' by others the 'gynaecanth' or 'apronia,' quite similar to the preceding with the exception of its color, which -- as I have said -- is black. Its shoots, which resemble asparagus, are preferred more than the real asparagus as a food by Diocles as a diuretic and as a reducer of a swollen spleen. It is to be found growing among shrubs and more especially in beds of reeds. Its root is black on the outside, but its insides are the color of boxwood, and the root extracts bone-splinters even more effectively than the [bryony] mentioned previously, while it has the same properties as the other one. It has the special usefulness of treating open sores on the necks of beasts of burden. It is said, too, that if someone plants it around a farmstead, it keeps hawks away, and will ensure the safety of one's poultry. If attached around the ankles, it assuages (in men or animals) blood that has accumulated in those body-parts." (Translated from the Latin by JS.).

Besides citing Pliny, Wellmann (1906, pp. 331-333) lists multi-lingual synonyms for *ampelos* or *bryōnia melaina*, attached to the text through the centuries by copyists or ancient lexicographers, some perhaps from lost earlier sources. One of the most telling is Pliny's collection of details drawn from several sources (Latin and Greek), including Diocles of Carystos (living 330 BCE), who apparently was aware of both the "black vine" and the "white vine," and their pharmaceutical properties (van der Eijk 2000-2001). The multi-lingual synonyms include Latin/Etruscan, Dacian, and African common names.



Figure 1. Illustrations and photos of plants discussed in the text. (A) Folio 79r and (B) 82r from the *Codex Juliana Anicia* reproduced in the facsimile edition of *Die Wiener Dioskurides* (Mazal 1998-1999). The names *bruōnia leuka* (top folio) and *bruōnia*

melaina (bottom folio) were added about 1410. Folio 79r shows a member of the genus *Bryonia*, folio 82r shows hop, *Humulus lupulus*. (C) Tuber of *Bryonia monoica* (photographed by S. Volz in Uzbekistan). (D) Specimen of hop (leg. C. Gröger 1687, Bavaria, Bayerische Staatssammlung München).

DISCUSSION

Among European plants, the combination of lobed leaves similar to ivy, tendrils, and immature green fruits that turn black uniquely fits *Bryonia alba*. *Tamus communis* (= *Dioscorea communis*) lack tendrils and has bright red fruits; its leaves are heart-shaped. By contrast, all ten species of *Bryonia* have ivy-like lobed leaves, albeit with much variation in the depth of the lobes. Mature tubers of both, *Tamus* and *Bryonia* have a firm corky crust, with those of *Tamus* often reddish brown, those of *Bryonia* whitish (Fig. 1C). Dioscorides's list of pharmaceutical uses (quoted *in extenso* above) does not securely distinguish *Bryonia* and *Tamus* because there is considerable overlap in these plants' recorded medicinal uses (below). Based on the combination of tendrils, ivy-like leaves, and black fruits it is clear, however, that Dioscorides's *ampelos melaina* can only refer to *B. alba* L.

To understand why recent scholarly publications (André, 1985; Beck, 2005) have disregarded the botanical evidence in Dioscorides's text about *ampelos melaina*, preferring the *Tamus* hypothesis over the traditional *Bryonia* identification (Sprengel 1829-1830; Mankowsky 1890; Berendes 1902: pp. 470-471 firmly identifies *ampelos melaina* as *B. alba*; Gerstinger, 1965-1970; Mazal, 1998-1999), one needs to know that Dioscorides's original text was neither illustrated nor arranged alphabetically. When Dioscorides's material was resorted by alphabet and illustrations added for the *Codex*, mistakes likely crept in. The Byzantine artists who did the illuminations (there seem to have been at least four of them), painted some 20-25% of the plants in the total 483 folios from life. Other illustrations were taken from earlier sources, and yet others appear to have been attempts to 'match' the descriptions in the Greek text. Therefore, the illustrations in the 512 CE *Codex* are unreliable evidence for which plant Dioscorides's 65 CE text may have been referring to.

Furthermore, research on Greek and Roman plant names by André (e.g., 1971, 1985) suggests that a confusion of *Tamus* and *Bryonia* is reflected in the above-quoted passage from Pliny and some of the synonyms listed in Wellmann's (1906) *apparatus criticus*. For example, Pliny talks about "shoots, which resemble asparagus, [and] are preferred more than the real asparagus as a food." Such use of the young shoots of *T. communis* is well known (Dalby 2003), although the same culinary use has also been recorded for *Bryonia* (Pieroni 2000).

Unfortunately, in his 1971 edition of Pliny and his 1985 handbook on Latin and Greek plant names, André flatly re-interpreted Dioscorides's and Pliny's references to *ampelos melaina* as referring to *T. communis*, without detailing his reasons and without regard to the plant traits mentioned by Dioscorides and shown on the *Codex Vindobonensis* plates. Through these important reference works the *Tamus* identification is now spreading as a significant possible interpretation of *ampelos melaina* (e.g., van der Eijk, 2000-2001; Beck, 2005).

While the *Tamus* hypothesis thus has its roots in a mixing over the centuries of common names for, and uses of, *Tamus* and *Bryonia*, it can clearly be rejected for the

original *ampelos melaina* in the *Materia Medica*. As discussed above, there is excellent agreement between Dioscorides's descriptions of *ampelos melaina* and *ampelos leuka* and the characteristic traits of *Bryonia*, in particular the possession of tendrils.

This leaves the question whether the 512 CE folios 79 and 82 in the *Codex Vindobonensis* can be associated with particular Linnaean plant names. Of the five species of *Bryonia* occurring in Central and Mediterranean Europe (*B. acuta* Desf., *B. alba*, *B. dioica* Jacq., *B. cretica* L., and *B. marmorata* Petit), all of which are used medicinally, *B. alba* is the only one with black berries. All others have red berries. Since folio 79, labeled *bryônia leuka*, shows a plant with black fruits (as well as the requisite tendrils and alternate leaves) it has been interpreted as representing *B. alba* (e.g., Janick et al. 2007), even though Dioscorides's description of *bryônia leuka* concerned a red-fruited bryony.

Folio 82r, labeled *bryônia melaina*, shows a vine with opposite leaves that are much more deeply lobed and have serrate margins. It has been interpreted as representing *B. dioica* (e.g., Janick et al. 2007), but its opposite and serrate leaves do not fit Cucurbitaceae. Instead, the plant's habit and leaves fit the common hop, *Humulus lupulus* L., Cannabaceae, in all aspects (Fig. 1D). Hop can have large root tubers similar to those of *Bryonia* (HS, personal observation). The elongate thin shoot in the middle-right of the painting (Fig. 1B) exactly matches young shoots of hops with their characteristic pairs of small bracts (see <http://www.0000ff.de/herbarium/img/hopfen.JPG>).

The discovery that folio 82r shows hop adds a new twist to this many-layered story. Dioscorides's *Materia Medica* contains no mention of hop (cf. indices in Wellmann, 1906; Berendes, 1902; Beck, 2005). Yet whoever did the painting in the early 6th century clearly depicted a plant of *Humulus lupulus*. Hops were not used until about the 9th century to flavor alcoholic beverages, although extracts from the inflorescences were used in tonics or sedatives, and the leaves were common in salads. Our current hypothesis is that the artist who painted folio 82r knew hops as common in the Balkans and Asia Minor (as a food?) and perhaps thought that this vine was sufficiently similar to Dioscorides's "other *bryonia*" to stand in for a portrait. As explained above, the labeling of the *Codex* paintings (in Greek and Arabic characters) was done later and may simply reflect a "first guess" at the identity of the plant on folio 82r resulting from comparison with folio 79r. In essence then, folio 82r of *Humulus lupulus* appears to have been painted from life, yet was meant to represent Dioscorides's "other bryonia."

CONCLUSION

Dioscorides's discussion of the medicinal uses of *ampelos melaina*, "the black bryony, called by some in the common tongue bryonia" clearly refers to the cucurbit *B. alba*. His discussion of *ampelos leuka* concerns one of the red-fruited bryonies, probably *B. cretica* or *B. dioica*. Plate 82r in the *Codex Vindobonensis* shows *Humulus lupulus*, while plate 79r shows a *Bryonia*. Bryonies were and are used to treat a long list of ailments, and those that have been the subject of chemical analyses have been found to contain many biologically active compounds (Oobayashi et al. 1992; Krauze-Baranowska and Ciskowski 1995; Sturm and Stuppner 2000; Chen et al. 2005). Alcoholic extracts of the tubers in ancient times were used to relieve the

pain and cough of pleurisy (inflammation of the linings around the lungs) and, in higher doses, as a diuretic or cathartic for patients with dropsy, that is, fluid accumulation due to liver, kidney, or heart diseases that required hydrocatharsis. Today, tablets and extracts said to contain *Bryonia* are available as over-the-counter drugs and are distributed internationally over the internet.

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