

Medieval herbal iconography and lexicography of *Cucumis* (cucumber and melon, Cucurbitaceae) in the Occident, 1300–1458

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• **Background** The genus *Cucumis* contains two species of important vegetable crops, *C. sativus*, cucumber, and *C. melo*, melon. Melon has iconographical and textual records from lands of the Mediterranean Basin dating back to antiquity, but cucumber does not. The goal of this study was to obtain an improved understanding of the history of these crops in the Occident. Medieval images purportedly of *Cucumis* were examined, their specific identity was determined and they were compared for originality, accuracy and the lexicography of their captions.

• **Findings** The manuscripts having accurate, informative images are derived from Italy and France and were produced between 1300 and 1458. All have an illustration of cucumber but not all contain an image of melon. The cucumber fruits are green, unevenly cylindrical with an approx. 2:1 length-to-width ratio. Most of the images show the cucumbers marked by sparsely distributed, large dark dots, but images from northern France show them as having densely distributed, small black dots. The different size, colour and distribution reflect the different surface wartiness and spininess of modern American and French pickling cucumbers. The melon fruits are green, oval to serpentine, closely resembling the chate and snake vegetable melons, but not sweet melons. In nearly all manuscripts of Italian provenance, the cucumber image is labelled with the Latin caption *citruuli*, or similar, plural diminutive of *citrus* (citron, *Citrus medica*). However, in manuscripts of French provenance, the cucumber image is labelled *cucumeres*, which is derived from the classical Latin epithet *cucumis* for snake melon. The absence of melon in some manuscripts and the expropriation of the Latin *cucumis/cucumer* indicate replacement of vegetable melons by cucumbers during the medieval period in Europe. One image, from British Library ms. Sloane 4016, has a caption that allows tracing of the word 'gherkin' back to languages of the geographical nativity of *C. sativus*, the Indian subcontinent.

Key words: Art history, crop history, cucumber, *Cucumis melo*, *Cucumis sativus*, Cucurbitaceae, cultivar-group, etymology, gherkin, melon, plant iconography, plant lexicography, plant taxonomy.

INTRODUCTION

The genus *Cucumis* L. includes two important vegetable crops, cucumber and melon, both of which are procumbent, herbaceous, tendril-bearing annual vines (Whitaker and Davis, 1962; Kirkbride, 1993; Robinson and Decker-Walters, 1997). Cucumber, *C. sativus* L., plants are stiffly hairy and have acutely pentagonal leaf laminae. Melon, *C. melo* L., plants are softly hairy and have rounded cordate leaf laminae. In both species, the flowers are borne in leaf axils and are bright yellow, approx. 2–3 cm in diameter, open in the morning and remain viable for much of the day, during which they are visited by bees. Melons usually are andromonoecious or monoecious; hermaphroditic and pistillate flowers do not differentiate on the main stem (or primary shoot) but can appear at the first one or two nodes of branches (side shoots; Rosa, 1924). Cucumbers usually are monoecious; the staminate flowers differentiate at the first leaf axils but the tendency to produce pistillate flowers increases during plant development; pistillate flowers can differentiate at leaf axils on the main shoot as well as side shoots (Shifriss, 1961). In

both species, the pistillate and hermaphroditic flowers have inferior ovaries which can develop into fruits after pollination.

Cucumber fruits usually are harvested when young and immature, 5–10 d after anthesis, at which time they have achieved a size range for culinary use, fresh or processed. Although most melons grown today are harvested as mature fruits, 4–6 weeks or more past anthesis, some melons are also grown for the use of their young, immature fruits, like cucumbers. The young fruits of melons, however, are easily distinguished from cucumbers. Young melons are softly hispid and often marked by distinct, bold longitudinal stripes, lobes and furrows, or wrinkles. Cucumbers, on the other hand, are glabrous except for the usual presence of tubercles, which are bumpy outgrowths or excrescences often referred to as 'warts', that are capped with short, hard, usually black but sometimes white 'spines'; striping, furrowing or wrinkling are indistinct or absent (Paris and Maynard, 2008).

Cucumis sativus is thought to have originated and been first domesticated on the Indian subcontinent and spread eastward to China by 2000 years ago (De Candolle, 1886; Li, 1969; Keng, 1974; Walters, 1989; Kuriachan and Beevy, 1992;

Bisht *et al.*, 2004). New molecular-based evidence has indicated that *C. melo*, too, has an Asian origin (Sebastian *et al.*, 2010). Primitive and reportedly indigenous melons have also been found outside of Asia, in closer proximity to the Mediterranean Basin (Mohamed and Yousif, 2004). Many writers thought that cucumbers were familiar to civilizations around the Mediterranean Sea in antiquity and the classical period, but upon closer examination this assumption has been shown to be devoid of evidence (Janick *et al.*, 2007). The fruits illustrated in those eras and named *sikyos* (Greek), *cucumis* (Latin) and *qishu'im* (Hebrew) were elongate melons, *C. melo*, and mistakenly interpreted as cucumbers, *C. sativus*. However, upon cursory examination, young cucumber fruits are distinguishable from young melon fruits by not being hairy and having neither distinct striping nor lobing and furrowing. So, in fact, *C. sativus* is unrecorded in ancient or classical times in Europe or around the Mediterranean Sea.

A good understanding of the history of a crop species in a given region can best be achieved by using a multidisciplinary approach that considers botany and horticulture, cookery, philology, archaeology, history and iconography (Dalby, 2003). Of these fields of study, iconography can be singled out as the most important, particularly in regard to fruit vegetables (Wang *et al.*, 2008) and especially cucurbits (Eisendrath, 1961; Paris, 2000). However, iconography as a tool for understanding crop history is only as useful as the accuracy of the depictions. Reality is often offset by cultural factors (Sillasoo, 2006) and lack of familiarity of the artists with the subject material, or pressure for completion of the work by its patron. The resolution of the depictions can be limited by the materials used too; for example, mosaics have obviously limited resolution (Janick *et al.*, 2007).

Quite probably, accurate illustrations were made of plants in the classical period and were copied but are now lost (Pächt, 1950; Collins and Raphael, 2004). In the earliest known surviving illustrated herbal manuscript, the *Juliana Anicia Codex* of 512 CE, the illustrations are of high quality but apparently derived from a no longer extant manuscript production (Hummer and Janick, 2007). Most early medieval herbals did not contain images, but those that did were ‘mindlessly copied again and again’ (Givens, 2006) and often stylized by artists who were not familiar with the plants. The result is that the illustrations of plants are so inaccurate that they are often useless for taxonomical identification to the species level (Pächt, 1950; Collins, 2000).

However, around the year 1300 CE, a new, independent movement of manuscript illumination began, based not on existing manuscripts but on how the plant appeared in life (Pächt, 1950; Baumann, 1974; Collins, 2000; Collins and Raphael, 2004; Givens, 2006). The illustrations in these manuscripts are sufficiently accurate to allow positive identification of many plant species. One group of illustrated manuscripts, known as the *Tacuinum Sanitatis*, are manuals of horticulture and health depicting the plants as growing in gardens and fields *in situ* (Pächt, 1950; Cogliati Arano, 1976; Hoenerig, 2006; Janick *et al.*, 2010). These were produced in northern Italy beginning in the late 14th century, and among the many images are depictions of cucumbers and melons. The *Tacuinum* manuscript referred to as Vienna 2644 (Vienna, Österreichische Nationalbibliothek, cod. ser. n. 2644) displays,

on folio 23v, an illustration that is clearly and undoubtedly of cucumber plants. Vienna 2644 and other *Tacuinum* manuscripts also contain images of melons from several cultivar-groups (Paris *et al.*, 2009). Another group of manuscripts are botanical herbals produced in Italy and France, some of which contain original, detailed, accurate illustrations of plants. The contents of these herbals are becoming increasingly accessible by publication in print or electronically. This has substantially eased collection, comparison and evaluation of the images. Analysis of these illustrations, together with their captions, could provide valuable information concerning crop history and development, including the time of introduction of crop species, the phenotypes of the earliest introduction(s) and the phenotypic variation that accumulated over time from subsequent introductions and/or local selection for any particular characteristic(s). Although the literary content of medieval western manuscripts consists mostly of repetition and elaboration of Greek medical doctrine from the 2nd century CE, we will show that the captions can provide some lexicographical information that is potentially important for deciphering the naming, adoption and integration, and ultimately the time of introduction, of crop plants in different countries or regions.

Our objective, as part of our continuing investigation into the history of cucurbit crops, was to access, collect and examine as many medieval images as possible that are purportedly of cucumber and melon, *C. sativus* and *C. melo*. We attempted to confirm their identity but, indeed, we did not find any original early medieval images of *Cucumis* that were accurate and detailed enough to allow positive identification to the level of species. However, we did indeed find realistically detailed, original imagery of *Cucumis* that dates to around 1300. The original and most informative images are reproduced here to document our findings and serve as the foundation for our understanding of the history of cucumber and melon in Mediterranean Europe and beyond.

SOURCES OF THE ILLUSTRATIONS

Our main sources concerning the existence and places of deposition of accurately illustrated medieval manuscripts were the fine reviews of late medieval illustrations by Baumann (1974), Collins (2000) and Givens (2006), and the online manuscript collection of the Bibliothèque Nationale de France, Paris (BNF; www.mandragore.fr).

The origin of these illustrated manuscripts can be traced to the medical school at Salerno, southern Italy, whose scholars undertook to collect medical material from Greek, Latin and Arabic sources (Pächt, 1950; Opsomer *et al.*, 1984; Collins, 2000; Collins and Raphael, 2004; Givens, 2006). During the latter half of the 11th century, a scholar and translator known as Constantine the African arrived there and translated a number of works from Greek and Arabic into Latin, allowing integration of medical knowledge and theory derived over the centuries from antiquity. A written synthesis of the accumulated knowledge obtained in medical botany, elaborated with his own personal experience and that of his colleagues at Salerno, was compiled by Matthaeus Platerius (d. 1161). His work is most often referred to as *Circa Instans*, the first two

words of its prologue, but it is also known by other names, including *Liber de Simplicibus Medicinis* and *Secreta Salernitana*. The *Circa Instans* was held in the utmost esteem; copies became widely distributed in medieval Europe and it was translated from Latin into other languages. The original *Circa Instans* described 273 simple (as opposed to compound) medicines in alphabetical order, of which 229 were plants, but contained no images. Variants were derived from it, with copyists modifying the text or adding material from elsewhere. A late 12th century copy of the *Circa Instans* is possessed by the New York Botanical Garden (Platearius, 1200).

The direct, illustrated descendant of the *Circa Instans* was *Tractatus de Herbis*, the earliest known copy of which appears to have been compiled around 1300 in Salerno and resides in London at the British Library, where it is catalogued as Egerton ms. 747 (Collins, 2000; Collins and Raphael, 2004; Givens, 2006). This is a scholarly treatise that was created to record accumulated knowledge about simple medicines and aid in their identification. It would have been suitable for a master of medicine from Salerno whose task it was to control the making of medicines by pharmacists. Most probably, Egerton 747 was produced by a scholar of the natural sciences, such as Rufinus (Thorndike, 1945), whose contemporary herbal, *Liber de Virtutibus Herbarum*, had similar literary content.

Egerton 747 was written and illustrated in southern Italy (Collins, 2000). It retains the prologue, general arrangement and text of the *Circa Instans* but has added supplementary text and many more plants. Added in small letters, in the margins, is a Latin translation of the early 10th century Arabic treatise on diet, *Kitab al-Aghdhiya wa'l-Adwiya* by Is-haq ibn Suleiman al-Isra'ili (around 832 to around 932 CE) of Qayrawan, modern Tunisia, who is also referred to as Isaac Judaeus or just Ysaac. Plants from the *Circa Instans* are illustrated in Egerton 747, but those mentioned only in the margins (by Ysaac) are not (Collins and Raphael, 2004; Givens, 2006). Egerton 747 inspired the production of other realistically illustrated herbals, of which Collins (2000) recognized two main groups.

One group is headed by the *Tractatus de Herbis, de Avibus et Piscibus*, of *Manfredus di Monte Imperiali*, Paris, BNF ms. lat. 6823 (below referred to as the Manfred Manuscript), which was also produced in southern Italy, in Naples or Salerno (Collins, 2000). Soon after the middle of the 14th century, both manuscripts had been moved northward, Egerton 747 probably to France and the Manfred Manuscript to Lombardy. The Manfred Manuscript was obviously much esteemed as it inspired others like it. One of these, referred to (below) as Masson 116, was commissioned of accomplished artists working in the Padua–Verona–Milan area. Others followed, including those referred to as Casanatense 459 and Sloane 4016, which were expensively illustrated by leading artists for wealthy bibliophiles.

The other group is formed by the manuscripts produced in France, and the earliest surviving illustrated copies of this French-language version, called the *Livre des Simples Médecines*, date from the second quarter of the 15th century and the majority from the second half (Collins, 2000; Givens, 2006). These illustrated copies were produced by

professional artists for wealthy and noble patrons. The artists are thought to have roughly copied the iconography of Egerton 747 but had little interest in observing nature, and so the illustrations are stylized and not very reflective of the plants themselves. They are considered to form two sub-groups, those that were produced in western France and those that were produced in more northerly or easterly parts of the country.

One other manuscript, the Carrara Herbal (Baumann, 1974), has original, realistic, images of plants but is not part of the series derived from the *Circa Instans*. Instead, it was derived from a translation of an 11th century Arabic treatise on medical simples by Ibn Sarabi (Serapion the Younger). This magnificently illustrated herbal was produced in Padua, northern Italy.

The exact year of production of each of these herbal manuscripts is usually unknown, but falls within a time range. The years given below are approximate, falling within the middle of the range given by scholars and depositories (Table 1).

THE ILLUSTRATIONS

Tractatus de Herbis, 1300: British Library (London), ms. Egerton 747, fol. 26v

The illustrations for the archetypal *Tractatus de Herbis* manuscript, Egerton 747, appear to have been made mostly after the text was written, but the scribe and the artists co-operated closely (Collins and Raphael, 2004). The drawings portray a plant laid out on a flat surface or pressed, naturalistic but partially diagrammatic (Pächt, 1950).

Folio 26v (Fig. 1A) has faithful depictions of parts of two cucurbit plants, *C. sativus* (left) and *Lagenaria siceraria* (Mol.) Standl., bottle gourd (right). The plant on the left is viney with tendrils, has acutely pentagonal leaf laminae and small orange-yellow flowers. Two or more flowers can be seen per leaf axil, in some cases a more orange, old wilted flower together with a more yellow, fresh, open flower. Post-anthesis, cylindrical ovaries are depicted, apparently unfertilized, as none has grown into fruits. The realism of the depiction is even more noteworthy when the cucumber plant is compared with the gourd, which is shown to have large, solitary white flowers.

Folio 27, which immediately follows, contains the corresponding portion of the text from the *Circa Instans*, opening with *Cucurbita et Citruli*. *Cucurbita* is the Latin name for the bottle gourd, hence, *citruli* refers to the cucumber, *C. sativus*. The bottom margin of folio 27 contains a relevant portion from Ysaac's text, consisting of two paragraphs (both missing an initial 'C'; for explanation see Givens, 2006, p. 123). The first, longer paragraph is concerned with *Cucumeres*, and the second, shorter paragraph is concerned with *Citruli*. The *cucumeres* and *citruli* correspond to the *qitha* and *khiyar* of the Arabic text (Sabbah, 1992), for vegetable melons, *C. melo*, and cucumbers, *C. sativus*, respectively (Paris et al., 2009). Egerton 747 does not have an image of *C. melo*.

TABLE 1. Provenance, depository, catalogue number and date of herbal manuscripts containing original, accurate illustrations of Cucumis

Provenance	Name	Depository	Catalogue number	Date	Abbreviated name used in text	<i>Cucumis sativus</i> caption	<i>Cucumis melo</i> caption
Southern Italy	<i>Tractatus de Herbis</i>	London, British Library	Ms. Egerton 747	Around 1300	Egerton 747	<i>citruli</i>	–
Southern Italy	<i>Tractatus de Herbis, de Avibus et Piscibus, Manfredus di Monte Imperiali</i>	Paris, Bibliothèque Nationale de France	Ms. Latin 6823	1330–1340	Manfred Manuscript	<i>citruli</i>	<i>melones</i>
Northern Italy	<i>Tractatus de Herbis</i>	New York, Pierpont Morgan Library	Ms. 873	Third quarter 14th century	Morgan 873	<i>cucumer</i>	–
Northern Italy	<i>Tractatus de Herbis</i>	Paris, Bibliothèque de l'École nationale Supérieure des Beaux Arts	Ms. Masson 116	Around 1375	Masson 116	<i>citruli, circea</i>	<i>melones</i>
Northern Italy	<i>Tractatus de Herbis</i>	London, British Library	Ms. Sloane 4016	Around 1440	Sloane 4016	<i>citruli, chache, circea, dircea</i>	<i>mellones</i>
Northern Italy	<i>Historia Plantarum</i>	Rome, Biblioteca Casanatense	Ms. 459	Around 1395	Casanatense 459	<i>citroli</i>	<i>melones</i>
Northern Italy	Carrara herbal	London, British Library	Ms. Egerton 2020	1390–1404	Carrara Herbal	<i>citron piccolo, citrollo</i>	<i>molom, cogombaro</i>
Northern France	<i>Livre des Simples Médecines</i>	Copenhagen, Kongelige Bibliotek	Ms. 227 2°	1420–1440	GKS 227	<i>coucourdes, cucumeres</i>	<i>citrules, citruli</i>
Northern France	<i>Livre des Simples Médecines</i>	Paris, Bibliothèque Nationale de France	Ms. Français 12321	Middle 15th century	BNF fr. 12321	<i>coucourdes, cucumeres</i>	<i>citrules, citruli</i>
Western France	<i>Livre des Simples Médecines</i>	Paris, Bibliothèque Nationale de France	Ms. Français 1311	Middle 15th century	BNF fr. 1311	<i>coucourdes, cucumeres</i>	–
Eastern France	<i>Livre des Simples Médecines</i>	Modena, Biblioteca Estense	Lat. 993 = α . L. 28	1458	BE 993	<i>cucumerus</i>	–

* Provenance and dates are taken from Baumann (1974), Collins (2000), Givens (2006) and the depositories.

Tractatus de Herbis, de Avibus et Piscibus, Manfredus di Monte Imperiali, 1335: Bibliothèque Nationale de France (Paris), ms. lat. 6823, fols. 42v, 106

The Manfred Manuscript is close in content, format and organization to Egerton 747 (Collins, 2000). It too was conceived in southern Italy, but its illustrations are not at all copies of Egerton 747, being much more highly detailed and lifelike.

Folio 42v (Fig. 1B) has depictions of a part of two plants, *C. sativus* (left), and *Citrullus lanatus* (Thunb.) Matsumura & Nakai, watermelon (right). The text refers to the cucumber as *Citruli* and the watermelon as *Cucumeris*, as in the modern Italian *ceetrioli* and *cocomeri*. The image of cucumber is quite realistic, clearly showing the tubercles, the bumpy outgrowths or excrescences often referred to as ‘warts’ that are capped by hard, prickly spines, on the blocky, short cylindrical, green fruits. The flowers are correctly depicted as small and yellow, but the leaf laminae, most shown as halves, while acutely edged, are not clearly pentagonal as in real life. The watermelon plant is shown as viney with tendrils; the leaf laminae, depicted from the side, can nevertheless be seen as realistically pinnatifid, and the fruits are shown as smaller than the leaf laminae, round, and dark green with black longitudinal veining.

Folio 106 (Fig. 1C), labelled *Melones*, has a lifelike depiction of a plant of chate melon, *C. melo* Chate Group (Burger

et al., 2006). The tendril-bearing vine bears small yellow flowers in the leaf axils. The leaf laminae, seen from the side as halves, are realistically depicted as cordate. The fruits are smaller than the leaf laminae, derived from leaf axils on short thin pedicels, light green, distinctly furrowed, and long oval, approximately twice as long as wide.

Tractatus de Herbis, 1363: Pierpont Morgan Library (New York), ms. 873, fol. 29v

Pierpont Morgan 873 appears to have been produced for illustrations only, but a volume of text may have been associated (Collins, 2000). Produced in the third quarter of the 14th century, it generally follows the order of the Manfred Manuscript. The previous two manuscripts were produced in southern Italy, but this manuscript is thought to have a northern origin, perhaps Veneto.

On folio 29v is an image (Fig. 1D) of a thin-stemmed vine having highly spiralled tendrils and small bright yellow flowers. The unrealistically nine-angled leaf laminae are longer than the long oval, blunt-ended fruits, which are depicted as having one or two longitudinal lines and bearing distinct large, dark, sharp spines. The most basal and apical fruits are yellow, probably mature; the others are



FIG. 1. (A) *Tractatus de Herbis*, British Library ms. Egerton 747, folio 26v. The plant at the lower left is cucumber, *Cucumis sativus*. The plant at the right, labelled *Cucurbita*, is bottle gourd, *Lagenaria siceraria*. (B) *De Herbis, de Avibus et Piscibus*, Manfred Manuscript of Pisa, Italy. BNF ms. Latin 6823, folio 42v. The plant at the left, labelled *citruli*, is cucumber, *Cucumis sativus*. The plant at the right, labelled *Cucumeris*, is watermelon, *Citrullus lanatus*. (C) *De Herbis, de Avibus et Piscibus*, Manfred Manuscript of Pisa, Italy. BNF ms. Latin 6823, folio 106r. The image, labelled *melones*, depicts chate melon, *Cucumis melo*. (D) *Tractatus de Herbis*, Pierpont Morgan Library ms. 873, folio 29v. The plant labelled *Cucumer* is a depiction of cucumber, *Cucumis sativus*.

light green and immature. Clearly, the depiction is of *C. sativus*. Unlike the preceding two manuscripts in which the image of *C. sativus* is referred to as *Citruli*, in this manuscript it is labelled *Cucumer*. Melon, *C. melo*, is not illustrated, even though this manuscript has clear, original illustrations of other cucurbits, including watermelon and bottle gourd.

Tractatus de Herbis, 1375 and 1440: *Bibliothèque de l'École nationale Supérieure des Beaux Arts (Paris)*, ms. Masson 116, fols. 77r, 226v–227, and *British Library (London)*, ms. Sloane 4016, fols. 32v and 58r

Masson 116, compiled around 1375, is another work of northern Italian origin, perhaps Padua (Collins, 2000).

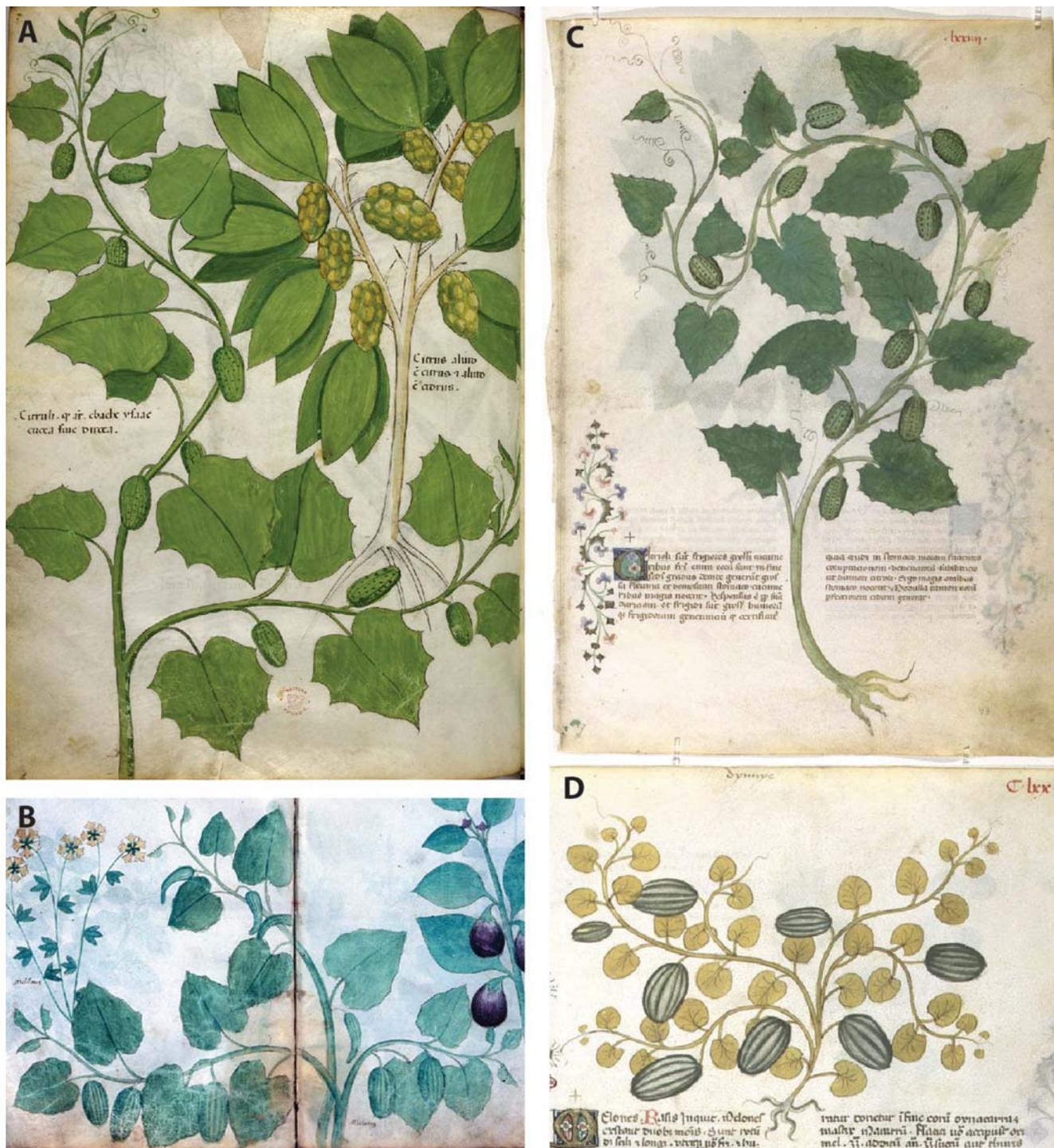


FIG. 2. (A) *Herbal*, British Library ms. Sloane 4016, folio 32v. The plant at the left, labelled *citruli*, is cucumber, *Cucumis sativus*. The plant at the right, labelled *Citrus*, is citron, *Citrus medica*. (B) *Tractatus de Herbis*, Bibliothèque des Beaux Arts ms. Masson 116, folios 226v–227r. The central two plants, labelled *Melones*, are chate melons, *Cucumis melo* Chate Group. (C) *Historia Plantarum*, Casanatense ms. 459, folio 74r. The plant, labelled *Citruli*, is cucumber, *Cucumis sativus*. (D) *Historia Plantarum*, Casanatense ms. 459, folio 170r. The plant, labelled *Melones*, is chate melon, *Cucumis melo*.

British Museum ms. Sloane 4016, compiled around 1440, has nearly identical images, probably faithfully copied from Masson 116 (Baumann, 1974). The images of *Cucumis* are labelled but have no adjacent texts.

Masson 116, folio 77r, and Sloane 4016, folio 32v (Fig. 2A), show two plants, *C. sativus* (left) and citron, *Citrus medica* L. (Rutaceae) (right). The cucumber is a robust vine having tendrils only near the apices of its two

branches, only one small flower bud, and leaf laminae that are acute but not pentagonal. The many cucumber fruits are much smaller than the laminae, short cylindrical, medium green, finely striated, and have scattered dark dots to represent the tubercles and spines. The citron is depicted as a tree bearing large fruits that are almost entirely covered with large yellow bumps. The placing of the *Citruli* and the *Citrus* on the same page is part of the alphabetical scheme of this herbal, but also conveniently highlights the visual similarity between the fruits of the two plants and the linguistic relationship between their names, the diminutive *citruli* vs. *citrus*. In the earlier manuscript, Masson 116, the image of *C. sativus* is labelled *Citruli* and *Circea*. However, in the later manuscript, Sloane 4016, this image has a more elaborate label: *Citruli q. ar. chache Ysaac* (*Citruli* that is in Arabic *chache* of Ysaac), *circea sive dircea*; as the Latin ‘c’ is velar, not sibilant like ‘s’, both *chache* and *circea* suggest derivation from the Arabic *khiyar*.

Masson 116, folios 226v and 227r (Fig. 2B), and Sloane 4016, folio 58r, present two plants labelled *Melones* and *Mellones*, respectively. The fruits of the two plants are green, distinctly furrowed, on one they are long oval and on the other they are curved, cylindrical but broader at the peduncle end, with a length-to-broadest width ratio approximating 3:1. Evidently, the two plants represent two cultigens of chate melons. The plants have nearly cordate but acute leaf laminae and lack tendrils and flowers.

Historia Plantarum, 1395: Biblioteca Casanatense (Rome), ms. 459, fols. 74r, 170r

Casanatense 459, known as *Historia Plantarum*, is a deluxe collection of fine illustrations and brief texts (Collins, 2000).

Folio 74r (Fig. 2C) depicts for *Citroli* a viney plant bearing tendrils but no flowers. The leaf laminae, although acute as in cucumber, are not pentagonal, but instead acutely wavy, as in the images of cucumber in the Manfred and Masson 116 manuscripts. The small, striated, elliptical green fruits have numerous dark spots in neatly arranged rows. Although an image of *C. sativus*, the fruits are depicted in an idealic fashion, too perfectly elliptical and spots arranged linearly.

Folio 170r (Fig. 2D) is labelled *Melones* and shows an image of a plant of *C. melo* that is similar but smaller and much inferior in detail to the one in the Manfred Manuscript. The plant is viney but scarcely tendrilled and without flowers, having roundly cordate leaf laminae. The stems and leaves are brown and the fruits are dark grey and larger than the leaf laminae, but the relatively large size might be a disproportionate reflection of the overall low quality of the image. The fruits are distinctly lobed and furrowed, long oval in profile, similar to the chate melon in the Manfred Manuscript.

Carrara Herbal, 1400: British Library (London), ms. Egerton 2020, fols. 162v, 161v, 162r

The Carrara Herbal has magnificent illustrations and Italian text in a Paduan dialect, and was prepared between 1390 and 1404 (Baumann, 1974). A manuscript in Venice, Marciana Biblioteca ms. lat. VI, 59 = 2548, also known as the

Roccabonella Herbal (around 1448), has images reproduced from the Carrara Herbal, with minor changes but maintaining much of its striking quality.

Folio 162v (Fig. 3A) has the most accurate and beautifully stunning image of cucumber in the medieval period. The viney, tendril-bearing plant has leaf laminae that are acutely pentangular, exactly as in *C. sativus*. The small, intensely yellow flowers, borne in the leaf axils, are shown as five-, six- and seven-petalled. The fruits are unevenly short cylindrical, striated, green, and sparsely warted, and have short, thick peduncles. The accompanying text is entitled *Del citron picolo* (small citron) that is called *citrollo* (diminutive form of the word *citron*). The cucumber is smaller than the citron, but resembles it by being elongate with a warted surface and having developmental colouration of green turning yellow.

Folio 161v (Fig. 3B) shows a strikingly realistic depiction of a chate melon, *C. melo* Chate Group, and has accompanying text entitled *Del molom*. The tendril-bearing vine has cordate leaf laminae and small, intensely yellow flowers, both staminate and pistillate or hermaphroditic, borne in the leaf axils. The fruits are depicted as smaller than the leaf laminae and derived from the leaf axils on long, thin peduncles. They are light green turning light orange, clearly lobed and furrowed, and egg-shaped, though somewhat acute at the styler end.

Folio 162r (Fig. 3C) shows a magnificently realistic and gorgeous image of a snake melon, *C. melo* Flexuosus Group, closely resembling the modern ‘Tortarello Scuro’ (or simply, ‘Tortarello’; Paris, in press), an Italian cultivar, and has accompanying text entitled *Del cogombaro*. The viney plant has long, spiralled tendrils and leaf laminae that are rather serrated and acute. The small intensely yellow flowers are shown as five-, six- or seven-petalled and borne in the leaf axils. The fruits are very long, narrow and curved, dark green, and furrowed, and borne on long, narrow peduncles originating from the leaf axils.

Livre des Simples Médecines, 1430: Kongelige Bibliotek (Copenhagen), ms. GKS MS 227 2°, fols. 77v, 76r

The French translation of the *Tractatus de Herbis* is known as the *Livre des Simples Médecines* (Givens, 2006). This translation is thought to derive from the late 14th century, by which time the Egerton 747 manuscript had been brought to France. GKS MS 227 2°, produced between 1420 and 1440, is one of two considered to be the oldest known illustrated copies of the *Livre des Simples Médecines*. It belongs to the sub-group of manuscripts made in northern France and, while the illustrations are considered to be derived from Egerton 747, they are not nearly as detailed and realistic (Collins, 2000).

The top of folio 77v has a much simplified image of *C. sativus* that is labelled *Coucourdes* (Fig. 4A). The acute leaf laminae are unrealistically wavy, but the plant is recognizable as a tendril-bearing vine having two nearly equally developed shoots with tendrils and bright yellow flowers. Its four dark green fruits are unevenly cylindrical and have a length-to-width ratio of nearly 2:1. Notably, the three fruits on the branch to the left have many small, densely distributed, black dots, but the one fruit on the branch to the right has larger, sparser, dark green dots, suggesting that the artist was depicting two different types of cucumbers. The ones on the left are similar to those



FIG. 3. (A) Carrara Herbal, British Library ms. Egerton 2020, folio 162v. The plant, labelled *citron picolo*, *citrollo*, is cucumber, *Cucumis sativus*. (B) Carrara Herbal, British Library ms. Egerton 2020, folio 161v. The plant, labelled *molom*, is chate melon, *Cucumis melo* Chate Group. (C) Carrara Herbal, British Library ms. Egerton 2020, folio 162r. The plant, labelled *cogombaro*, is snake melon, *Cucumis melo* Flexuosus Group.



of the modern French Cornichon Group and the one on the right to the American Pickling Group (Paris and Maynard, 2008). The different fruit morphotypes are shown together probably in order to save space (Paris, 2001; Daunay et al., 2008). Below, to the right, is an illustration labelled *Citrules* showing what appears to be a small *Citrus* L. tree bearing many small, spherical fruits, some red and some white, identified as *citronnier*, lemon tree (www.mandragore.fr). The text accompanying these two images are French translations of the two paragraphs taken from Ysaac, on *Cucumeres* and *Citruli*, presented in Egerton 747.

Folio 76r has a much simplified image, labelled *citruli*, which can nevertheless be identified as *C. melo* (Fig. 4B). Here too, the plant is a tendril-bearing vine having bright yellow flowers and acutely wavy leaf laminae. The two branches bear acutely ellipsoidal, small, green, developing ovaries that are not warted, as in *C. melo*. The accompanying text for this image and one of *L. siceraria* (bottle gourd) is taken from the passage *Cucurbita et citruli* of the *Circa Instans*, also printed in Egerton 747.

BNF (Paris) ms. Arsenal 2888 is thought, together with GKS 227 2°, to be the earliest of the *Livre des Simples Médecines* manuscripts (Givens, 2006). Its images of *Cucumis*, however, are inferior in detail and perhaps copies of those in GKS 227 2°.

Livre des Simples Médecines, 1450: Bibliothèque Nationale de France (Paris), ms. fr. 12321, fols. 76v, 75v

BNF fr. 12321 was produced in northern France some time in the middle of the 15th century (www.mandragore.fr).

Folio 76v (Fig. 4C) contains a much simplified image of a cucumber plant above the text passage *Cucumeres ce sont coucourdes*. The image is similar to the one on folio 77v of GKS MS 227 2°. The leaf laminae have the same inaccurate shape; the tendril-bearing vine consists of two branches with small yellow flowers and short, unevenly cylindrical green fruits that are narrow at the stylar end. All four fruits have many small black dots, similar in appearance to the three fruits on the left branch of the *C. sativus* image in GKS MS 227 2° and thus reminiscent of the French cornichons. A copy, BNF fr. 12319, folio 115r (around 1463), also shows all fruits with very numerous, small black dots. A clear image of cornichons is present in another northern French manuscript, BNF fr. 9137 (around 1475), on fol. 109r.

Folio 75v (Fig. 4D) has depictions of two tendril-bearing vines, with the top one labelled *cucurbita* and the bottom one labelled *citruli*. They are easily identifiable as *L. siceraria* and *C. melo*, respectively, even though their leaf

laminae are not depicted accurately. The plants have the correct flower colours, white and yellow, respectively. The fruits of the gourd are depicted as large and elongate bell-shaped, but those of the *Cucumis* are quite small. This size difference is reminiscent of Egerton 747, folio 26v, in which the bottle gourd, *cucurbita*, has large fruits but those of *C. sativus*, *citruli*, are undeveloped. Unlike the image in Egerton 747, however, the small fruits are acutely oval and plain, unmarked, instead of cylindrical and dotted. Three other *Livre des Simples Médecines* manuscripts from northern France, BNF fr. 12319, fr. 12320 and fr. 19081, have similar images and the same arrangement, i.e. *cucurbita* and *citruli* on the same page and warty *cucumeres* afterwards, separately, representing bottle gourd (*L. siceraria*), chate melon (*C. melo*) and cucumber (*C. sativus*), respectively.

Livre des Simples Médecines, 1450: Bibliothèque Nationale de France (Paris), ms. fr. 1311, fol. 11r

BNF fr. 1311 was produced in western France sometime in the middle of the 15th century (www.mandragore.fr).

Folio 11r (Fig. 4E) has a much simplified, but easily identifiable portrait of *C. sativus* quite different from the one in the manuscripts from northern France. However, it has the same opening text, which appears in the previous folio, identifying the French *coucourdes* as the Latin *cucumeres*. The plant is a tendril-bearing vine having a single shoot with bright yellow flowers. The shape of the leaf laminae is rounded cordate, which, strangely, is much closer to reality than that shown on folio 77 of GKS MS 227 2°, which is thought to be the earlier manuscript (Givens, 2006). The acutely oval, light yellow-green fruits have large dark studs, similar to the fruit on the right branch of the cucumber plant in GKS MS 227 2° and reminiscent of American pickling cucumbers. A similar image appears in BNF fr. 1307, folio 92v (around 1480), in Modena, Biblioteca Estense, ms. Estero 28 = a. M. 5. 9, folio 50v, and BNF fr. 12322, folio 147v (around 1525). Unlike the manuscripts of northern France, these western manuscripts do not have an illustration of *C. melo* but, like them, the following paragraph, on *citrules*, is accompanied by an image of a citrus tree bearing small fruits which, in BNF fr. 1311, are yellow-brown.

Livre des Simples Médecines, 1458: Modena, Biblioteca Estense, Ms. lat. 993 = α. L. 9. 28, fol. 43r

BE 993 contains hundreds of illustrations and a text described as ‘written in a French bastard script’ (Baumann,

FIG. 4. (A) *Livre des Simples Médecines*, Kongelige Bibliotek, ms. 227 2°, folio 77v. The image at the top, labelled *coucourdes*, is of *Cucumis sativus*. The three fruits on the shoot to the left have small, densely distributed, black dots, suggestive of the Cornichon Group. The fruit on the shoot to the right has large, rather diffuse, dark dots, suggestive of the American Pickling Group. The image at the right, labelled *citrules*, appears to be of a *Citrus*. Later copies of the *Livre des Simples Médecines* have a similar image with the same label. The BNF, on its website (www.mandragore.fr), identifies it as *citronnier* (lemon tree), *Citrus limon* (L.) Burm. f. (USDA, ARS, 2011). (B) *Livre des Simples Médecines*, Kongelige Bibliotek, ms. 227 2°, folio 76r. The image is of a plant of *Cucumis melo*, apparently of the Chate Group. (C) *Livre des Simples Médecines*, BNF, ms. Français 12321, folio 76v. Northern France, mid-15th century. The image, labelled *coucourdes*, is of a plant of *Cucumis sativus* Cornichon Group. (D) *Livre des Simples Médecines*, BNF, ms. Français 12321, folio 75v. Northern France, mid-15th century. The image at the top, labelled with Latin *cucurbita*, is of a plant of bottle gourd, *Lagenaria siceraria*. The image at the bottom, labelled with Latin *citruli*, is of a plant of *Cucumis melo*, apparently of the Chate Group. (E) *Livre des Simples Médecines*, BNF, ms. Français 1311, folio 11r. Western France, mid-15th century. The image at the left is of a plant of cucumber, *Cucumis sativus* American Pickling Group. (F) *Livre des Simples Médecines*. Biblioteca Estense ms. 993, folio 43r. Bourg, Eastern France, 1458. The image, labelled *Cucumeres*, is of cucumber, *Cucumis sativus* American Pickling Group.

1974; Collins, 2000). This work is from Bourg-en-Bresse, eastern France, and bears the date 1458.

Folio 43r (Fig. 4F) has an original depiction of *C. sativus*. The plant, labelled *cucumerus*, is depicted as consisting of two shoots having acutely cordate leaf laminae but no flowers at anthesis and only one flower bud. The fruits are yellow-green, almost uniformly cylindrical although narrowing somewhat toward the distal ends. They have sparsely distributed, large green dots, reminiscent of the large warts of the American pickling cucumbers. This manuscript does not have an image of *C. melo*.

DISCUSSION

The images presented herein provide vivid snapshots of *Cucumis* in Italy and France in late medieval times. Each of them exhibits originality, though to differing extents. The artists or, if some of these manuscripts were but copies of earlier exemplars, their predecessors must have been familiar with cucumbers and some of them were familiar with melons, too. The images, however, differ greatly in their overall quality. Those of the Carrara Herbal are the most accurate and detailed and they are also stunningly lifelike (Fig. 3A–C). Second only to them are the images of the Manfred Manuscript (Fig. 1B, C). In contrast, the French *Livre des Simples Médecines* productions are of a lesser quality but, nonetheless, they are good enough to allow positive identification to *Cucumis* species and even cultivar-groups. All of these manuscripts contain an image of *C. sativus*. Most of the manuscripts of Italian origin also have an original image or two of *C. melo*. The images of melon in manuscripts from northern France lack originality, apparently being based on a single model, and the manuscripts from western France do not have an image of melon.

Cucumber

The images of *Cucumis sativus* contained in the *Tractatus de Herbis* manuscripts and the Carrara Herbal are highly original, highly detailed and accurate. Their taxonomic identity as *C. sativus* is unequivocal.

The *Tacuinum Sanitatis* manuscript Vienna 2644 (around 1390) has an image showing that, by the end of the 14th century, *C. sativus* had become a familiar garden plant in northern Italy (Paris et al., 2009). The *Tractatus de Herbis* manuscripts Egerton 747 (around 1300; Fig. 1A), Manfred Manuscript (around 1335, Fig. 1B), Pierpont Morgan 873 (around 1363, Fig. 1D) and Masson 116 (around 1375, reproduced in Sloane 4016, Fig. 2A) antedate this *Tacuinum Sanitatis* manuscript, containing the earliest accurate images known to us of cucumber in Europe. The text for the image of *citruli*, cucumbers, in Egerton 747 is taken directly from the mid-12th century *Circa Instans* of Platearius (Platearius, 1200; Collins, 2000), thereby implicating the presence of *C. sativus* in southern Italy by that time. The word *citruli* is absent from Roman writings on agricultural and natural history (Sturtevant, 1891). As there is no evidence, textual or iconographic, for the presence of *C. sativus* in Europe or the Mediterranean Basin in antiquity and the classical period

(Janick et al., 2007), this taxon must have arrived sometime in the medieval period, between 500 and 1150 CE.

Original, accurate, detailed iconography is the most dependable type of evidence for the presence of particular food plants within a geographic area and time frame. For *C. sativus*, this type of evidence appears to be absent from Europe prior to 1300. Other approaches could be used to narrow the possible time frame for the arrival of cucumber in Europe, but these should be considered critically and, wherever possible, be corroborated by independent evidence (Dalby, 2003). For example, reports of preserved seeds of cucumber in Europe dating to early medieval times (Opravil, 1979; Wasylikowa, 1984; Moravec et al., 2004) must be interpreted with caution, as seeds of *C. sativus* and *C. melo* are often indistinguishable, even in freshly harvested samples (Bates and Robinson, 1995).

The late medieval images of *C. sativus* are so detailed as to allow an assessment of the phenotypic variability of its fruits at that time in medieval Italy and France. The fruits are short, having a length-to-broadest-width ratio approximating 2:1, which is typical of fruits that today are consumed after pickling. Absent from these medieval images of *C. sativus* are the longer fruited cucumbers which are typically eaten fresh in salads. These, as well as nearly round cucumbers and pyriform cucumbers, were to appear in printed herbals of the Renaissance, such as that of Gerard (1597), in which a long-fruited form is referred to as ‘Spanish cucumber’. Immature fruit colour shows variation from medium green (Figs 1B, 2A, C, 3A and 4A, C) to yellow green (Fig. 4E, F) and light green (Fig. 1D). Mature fruits are shown only in the Pierpont Morgan 873 manuscript (Fig. 1D); they are yellow, the same as in the *Tacuinum Sanitatis* Vienna 2644 manuscript (Paris et al., 2009), but in the Villa Farnesina paintings of the early Renaissance they are yellow, orange or cream (Janick and Paris, 2006). Most of the images of cucumbers, those originating in Italy and western and eastern France, show them as having scattered large warts and spines (Figs 1A, B, D, 2A, C, 3A and 4E, F). Likewise, the cucumbers commonly found in the symbolically rich paintings of Madonnas by Carlo Crivelli from the last two decades of the 15th century, and in many of the frames of the Luca and Andrea Della Robbia ceramics of the same period, also are short and have large warts. In the *Grandes Heures d’Anne de Bretagne*, produced near Tours in the Loire Valley of western France, and in the frescoes of the Villa Farnesina, in Rome, of the first and second decades of the 16th century, respectively, the cucumbers illustrated are also short and large-warted (Janick and Paris 2006; Paris et al., 2006). All of these are much like the fruits of the American Pickling Group (Paris and Maynard, 2008). In images from northern France, however, the cucumber fruits are depicted as having densely distributed, small spines (Fig. 4A, three of four fruits; Fig. 4C), much like the fruits of the French Cornichon Group.

Yellow-green fruit colour is recessive to green and conferred by a single gene; light green is recessive to green and conferred by another gene (Wehner, 2005–2006). Four distinct mature fruit colours, described as red, orange, yellow and cream, are conferred by two allelic states of only two genes. The density and size of spines is controlled by one or two genes, with densely distributed, small spines being recessive.

Thus, the phenotypic differences among the cucumbers depicted in late medieval and early Renaissance Europe are based on only a few genes. Although more than one introduction of *C. sativus* to Italy and France in the medieval period cannot be ruled out, the phenotypic variation evident in the images could have resulted from one original introduction that was heterozygous for the few genes responsible. Apparently, the recessive trait of small, densely distributed spines, characteristic of the French Cornichon Group, was first selected in northern France, not long before the advent of the illustrated versions of the *Livre des Simples Médecines*.

GKS 227 2°, produced in northern France, is one of the earliest known illustrated *Livre des Simples Médecines*, of around 1430 (Collins, 2000; Givens, 2006). The image it contains of *C. sativus* (Fig. 4A) is recognizable as such, but is highly simplified and not very accurate. Subsequently produced manuscripts from northern France, as exemplified by BNF fr. 12321 (Fig. 4C), have rather faithful copies of this image and show the cucumber plant as composed of two shoots having unrealistically shaped leaf laminae bearing dark green fruits with densely distributed small black dots. The manuscripts derived from western France, as exemplified by BNF fr. 1311 fol. 11 (Fig. 4E), have a very different image. They show the cucumber plant as a single shoot having nearly realistically shaped leaf laminae and acutely oval yellow-green fruits with sparsely distributed, large dark dots. A manuscript from eastern France, BE 993, folio 43r (Fig. 4F), shows a plant consisting of two shoots of unequal size but no flowers and having nearly realistically shaped leaf laminae and cylindrical yellow-green fruits with sparsely distributed, large grey dots. The ultimate model for all of these manuscripts, Egerton 747, folio 26v (Fig. 1A), has two shoots of equal size with very realistic leaf laminae, tendrils and flowers, but with undeveloped fruits, and bears the label *citruli*. Therefore, it is difficult to reconcile the marked differences among the images of *C. sativus* in these copies of the *Livre des Simples Médecines*, unless the artists were familiar with the plant material, or earlier copies of the *Livre des Simples Médecines* existed, or other *Tractatus de Herbis* copies served as models. The acutely wavy leaf laminae shown in the manuscripts from northern France resemble those of Manfred Manuscript, Masson 116, and Casanatense 459, but not Egerton 747.

Melon

The images of *Cucumis melo* contained in these medieval herbals vary in accuracy and detail. The most vivid and lifelike images are those in the Carrara Herbal (Fig. 3B, C), which contains the only illustration of snake melon, *C. melo* Flexuosus Group (Fig. 3C). A contemporary image of snake melon is found in another, late medieval work of Italian provenance, the *Tacuinum Sanitatis*, Bibliothèque de l'Université de Liège, ms. 1041, folio 19v (Paris et al., 2009). The other melon illustrations from the Italian herbals show distinctly lobed and furrowed, oval or short cylindrical fruits (Figs 1C and 2B, D), apparently of the Chate Group, and are labelled *melones* (or similar). The melon images in the French herbals, labelled *citruli*, are crude and show undeveloped or very young, acutely oval fruits (Fig. 4B, D), apparently chate melons as well. Both snake melons and chate

melons are eaten when immature, like cucumbers. Absent from these herbals are images of sweet melons or other melons eaten when mature, suggesting that they were not widely appreciated in Italy or France in late medieval times. On the other hand, a greater variety of melons, including dessert melons, is found in the *Tacuinum Sanitatis* manuscripts (Paris et al., 2009), which were not herbals but instead depicted horticultural scenes for healthy living (Janick et al., 2010). Images of a fragrant, probably non-sweet or at best mildly sweet dessert melon, *C. melo* Adana Group, and a potentially sweet casaba melon, *C. melo* Inodorous Group, labelled *cucumeres et citruli*, are contained in several *Tacuinum Sanitatis* manuscripts (Paris et al., 2009). A non-sweet dessert melon was familiar around the Mediterranean as early as Roman times and known to Pliny as *melo* (Janick et al., 2007). Apparently, truly sweet melons, like the casabas, muskmelons (Reticulatus Group) and cantaloupes (Cantalupensis Group) so familiar today, were absent or unrecognized in much of Europe throughout the medieval period.

Even though all of the manuscripts we collected contain an image of *C. sativus*, not all have one of *C. melo*. Of the Italian manuscripts, only Egerton 747 and Morgan 873 do not have an image of melon. The manuscripts from western France do not have an image of *C. melo*, and the illustrations provided in the manuscripts from northern France lack detail, with no readily apparent originality in successive manuscripts, as exemplified by the two presented here (Fig. 4B, D). It seems that the French producers of the *Livre des Simples Médecines* were not familiar with melons.

The double commentary on *citruli* (La., Fr. *citrules*) in the *Livre des Simples Médecines*, once with *cucurbita* and again after *cucumeres*, derives from Egerton 747. The main body of text in Egerton 747 is from the *Circa Instans* and the related text in the margins is from Ysaac. The *Circa Instans* has a section opening with *Cucurbita et citruli* and, in the manuscripts from northern France, this is accompanied by illustrations of bottle gourd (*L. siceraria*) and chate melon. Following are two paragraphs from Ysaac, one each on *cucumeres* and *citruli*. The first is accompanied by an illustration of cucumber. The second, which is the second description of *citruli*, confused the producers of the *Livre des Simples Médecines*. The French translation is true to the Latin version of Ysaac's text: *Citrules sont encore plus froid que coucourdes* (*Citrules* are colder yet than *coucourdes*), but this passage is accompanied by an illustration of a citrus, probably lemon (Fig. 4A; www.mandragore.fr). As lemon is not better adapted than melon to the temperate climate of most of France, it is difficult to comprehend how it could have been substituted, except that lemons look like small citrons. Once again, it seems that the producers of the *Livre des Simples Médecines* were not familiar with melons. Moreover, they were not familiar directly with the Arabic writings of Ysaac and others. As the vegetable melons and cucumbers, *qitha* and *khiyar*, have similar properties, they were discussed together not only by Ysaac. In another Arabic treatise, the 11th century *Taqwim al-Sihha bi al-Ashab al-Sitta* (*Rectifying Health by Six Causes*) by Ibn Butlan, the *qitha* and *khiyar* are presented as a single item, in line 66, of the table of health (Elkhadem, 1990). The *Taqwim*, after it was translated

into Latin, served as the basis for the production of the illustrated *Tacuinum Sanitatis* manuscripts (Cogliati Arano, 1976; Hoeniger, 2006; Paris et al., 2009).

Image captions and etymological derivations in Cucumis

In most of the manuscripts of Italian provenance, the cucumber, *C. sativus*, is given the Latin label *citruli*, or similar. We have not encountered this Latin word in works of the classical period. It may have been first recorded in Salerno by Constantine, in his late 11th century translation of the works of Ysaac, for the Arabic *khiyar* (cucumber, *C. sativus*). The origin of the word *citruli*, which appears to be the diminutive of citron (*C. medica*), as the text in the Carrara Herbal would indicate (Fig. 3A), is curious. Although the plants are unrelated and morphologically very distinct, one being a vine and the other a tree, there are strong fruit similarities. Citrons resemble cucumbers in shape and surface texture, although they are considerably larger. Also, both fruits are initially green and commonly turn yellow as they ripen. They are sometimes shown together, as in Masson 116 and Sloane 4016 (Fig. 2A). In the *Tacuinum Sanitatis* manuscript Liège 1041, folio 20v, the fruits of both are painted orange-yellow and show the characteristic surface bumps (Paris et al., 2009). Interestingly, the medieval Persian *wadrang* can mean a cucumber or a citron (A'lam, 1993) and the modern Persian *badrang* can also mean a kind of cucumber or an orange (Steingass, 1963). Apparently, the name *citruli* must have been applied in Latin Europe to the then newly arrived cucumber fruits in relation to the citron, which was well known in Mediterranean antiquity (Nicolosi et al., 2005).

Modern Italian for *C. sativus* is *cetrioli*, from Latin *citruli*. Modern French for *C. sativus* is *concombres*, from classical Latin *cucumis*. In classical Latin writings, *cucumis* was used for elongate, immature melons, mostly snake melons (Janick et al., 2007). Each of the manuscripts from northern France contains two images of *Cucumis*, one of *C. melo* labelled *citruli* (Fig. 4B, D) and the other of *C. sativus* labelled *cucumeres* (Fig. 4A, C). The manuscripts from western France have only one image, of *C. sativus* labelled *cucumeres* (Fig. 4E). Clearly, during the 15th century in both northern and western France, the Latin word associated by the herbalists with *C. sativus* was *cucumeres*. Apparently, the expropriation of *cucumeres* from *C. melo* to *C. sativus* took place in medieval times. Cucumbers and vegetable melons are similar in taste and culinary usage but, as *C. sativus* is better adapted than *C. melo* to the cooler climate of much of Europe, cucumbers would have been easier to produce. The original depictions of chate and snake melons are few in number, indicating that the displacement of these vegetable melons by cucumbers was well underway by late medieval times. In Europe at present, vegetable melons have the status of a relict crop (Laghetta et al., 2008). A similar progression for cultivated *Cucumis* occurred in China. Oriental pickling melons, *C. melo* Conomon Group, are an ancient crop in China (Keng, 1974). *Cucumis sativus* was introduced perhaps 2000 years ago, and 1500 years ago it was still not as widely grown as *C. melo* (Li, 1969). As in the Occident, the preference for cucumbers over vegetable melons strongly increased

over time, such that today cucumbers are far more widely grown.

Presently, in many parts of temperate Europe, words equivalent to the modern English 'gherkin' are used for short, pickling cucumbers. This word had been thought to derive, through the Greek *angourion* for watermelon or cucumber, from middle Persian (Gove, 1993). However, Persian *angur* is 'grape' and thus 'gherkin' has been considered to be of unknown ultimate origin (Simpson and Weiner, 1991). The caption of the cucumber image in Sloane 4016, of around 1440 (Fig. 2A), provides the missing link, with *Citruli* (Latin) and *chache* and *Circea* (distortions of the Arabic *khiyar*). These became, in the *Hortus Sanitatis* of Peter Schöffer (1485), *Citrullus* (Latin) and *Kychern* (vernacular). Subsequent Renaissance writings gave the German as *Gurchen* (Fuchs, 1549; Matthioli, 1562; Du Pinet, 1567) for cucumber or watermelon. Thus, the modern English 'gherkin', modern German *Gurken* and similar counterparts in other European languages can be traced, through Arabic and Persian *khiyar*, to Hindustani (Urdu and Hindi) and Bengali *khira* or *k-hira* (Forbes, 1857; Platts, 1960; Chakravarty, 1982) which are widely spoken in the region of the ancestral home of *C. sativus*, the Indian subcontinent (De Candolle, 1886; Kuriachan and Beevy, 1992; Bisht et al., 2004).

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