Tacuinum Sanitatis: Horticulture and Health in the Late Middle Ages

Lavishly illustrated manuscripts known as the Tacuinum Sanitatis were first commissioned by northern Italian nobility during the last decades of the 14th century. These manuscripts were based on an 11th century Arabic manuscript known as the Taqwim al-Sihha bi al-Ashab al-Sitta (Rectifying Health by Six Causes), which was a guide for healthy living written by the Christian physician and philosopher Abu al-Hasan al-Mukhtar ibn al-Hasan ibn ‘Abdun ibn Sa’dun ibn Butlan (d. 1063), who was born and educated in Baghdad and whose travels took him to localities that are today in Iraq, Syria, Egypt, Israel, and Turkey. The Taqwim was a guide for healthy living, based on ancient philosophical concepts of Greek sciences. It summarized in tabular form information on some 280 health-related items, in particular food and especially vegetables and fruits. A Latin translation of the Taqwim was commissioned by the Court of Sicily towards the middle of the 13th century, and was to become known as Tacuinum Sanitatis.

One hundred years later the first illuminated copies of the Tacuinum Sanitatis were commissioned of artists by northern Italian nobility (Cogliati Arano, 1976; Segre Rutz, 2002; Hoeniger, 2006). The illustrated Tacuinum Sanitatis manuscripts portray an utopian feudal society in which nobles are engaged in play and romance whilst feudal laborers work the estate (Cogliati Arano, 1976; Witthoft, 1978; Opsomer-Halleux, 1991; Segre Rutz, 2002; Bertiz, 2003; Bovey, 2005; Hoeniger, 2006; Mane, 2006). Rich in horticultural imagery, they include vivid scenes of the harvest of vegetables, fruits, flowers, and culinary and medicinal herbs. Each scene is accompanied by a brief summary of the health aspects of the subject. These documents connect vegetables and fruits as well as the garden itself with human health (Bertiz, 2003).

Six Tacuinum Sanitatis recensions with full page illustrations have survived and are located in libraries in Austria, Belgium, France, Italy, and Spain (Table 1). Four of them can be viewed online (http://mandragore.bnf.fr/html/accueil.html, http://bibliotheque.rouen.fr and http://www.casanatense.it) and a number of facsimile editions have been published. These six copies are a rich source of information on cultivated plants of the late medieval period as the vivid, large images depict plants growing and being harvested in situ. Half a dozen of related manuscripts also exist, but their illustrations are not as large or as informative horticulturally.

<table>
<thead>
<tr>
<th>Text reference</th>
<th>Catalog no.</th>
<th>Depository</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paris 1673</td>
<td>Nouv. Acq. Lat. 1673</td>
<td>Bibliothèque Nationale de France, Paris</td>
<td>1380-1390</td>
</tr>
<tr>
<td>Liège 1041</td>
<td>Ms. 1041</td>
<td>Bibliothèque de l’Université de Liège</td>
<td>1380-1400</td>
</tr>
<tr>
<td>Vienna 2644</td>
<td>Cod. Ser. N. 2644</td>
<td>Österreichische Nationalbibliothek, Vienna</td>
<td>1390-1400</td>
</tr>
<tr>
<td>Rome 4182</td>
<td>Ms. 4182</td>
<td>Biblioteca Casanatense, Rome</td>
<td>1390-1400</td>
</tr>
<tr>
<td>Paris 9333</td>
<td>Latin 9333</td>
<td>Bibliothèque Nationale de France, Paris</td>
<td>1445-1451</td>
</tr>
<tr>
<td>Rouen 3054 and Liechtenstein2</td>
<td>Ms. 3054 [Leber 1088]</td>
<td>Bibliothèque municipale, Rouen, and private collection2</td>
<td>1450</td>
</tr>
</tbody>
</table>

1 Dates are according to Cogliati Arano (1976), Opsomer-Halleux (1991), Segre Rutz (2002), Bovey (2005), and/or Hoeniger (2006), and/or respective depository catalogues.
2 The Rouen 3054 and Liechtenstein manuscripts are actually two parts of the same Tacuinum manuscript, separated from one another in the 19th century (Bertiz, 2003; Bovey, 2005).

The Hippocratic Concept of Medicine

The Taqwim was the synthesis of ancient medical tradition, lore, philosophy, superstition, and science that traces back to the philosophical system of Empedocle (ca. 490-435 BCE) in which four elements – water, air, fire and earth – were the principal components of matter. Hippocrates (ca. 460-370 BCE), now considered the Father of Medicine, indicated that diet influenced health and recommended moderation.
His concept was that health was based on a balance of “humors” – three observable entities, phlegm, blood, and yellow bile, and a theoretical entity, black bile. It was the balance between the four humors that determined health; their disequilibrium resulted in pain or disease. Each of the four humors was associated with a particular temperament or complex (the phlegmatic, the sanguine, the choleric, and the melancholic). The humors also corresponded to four qualities (warm, cold, dry, moist) – each varying in four degrees of intensity - as well as to the four seasons and the four ages of man: infancy, youth, adulthood and old age (Fig. 1).

The therapeutic use of plants was a key part of ancient medicine. In the first century, Dioscorides (20-70 ce) assembled a treatise, De Materia Medica, that compiled the health giving properties of hundreds of herbs including many plants that were to become horticultural foods (Beck, 2005). The medical concept of Hippocrates was further developed by Galen (129-200 CE) who proposed six causes (called “non-naturals” in the Latin translations) that influence health: food and drinks, ambient air, movement and rest, sleep and wakefulness, elimination and retention, and psychological states. This conceptual corpus, adopted, elaborated upon, and further developed by Byzantine and Arab physicians, was later translated from Greek and Arabic into Latin, and dominated medicine until the 18th century. For a sick patient, the physician’s role was to diagnose the elements responsible for the loss of balance and design a treatment with elements having opposite characteristics to those of the defecting humor, according to the compensation principle contra aria contraria (Ullmann, 1978).

The medical treatise of Ibn Butlan emphasized that a balanced regimen was the prerequisite to prevent disorders and diseases. He coordinated the doctrine of the six “non-naturals” by detailing 280 health-related items, their name, their nature according to the four elements, their degree, the best type, the usefulness, the noxious effects, the remedies to the noxiousness, the effects, the proper temperaments, the age, the season, the country, the authorities cited, and additional notes. These properties of the 280 items were arranged in 40 tables of 15 columns by Ibn Butlan so as to provide the general population with a direct, easy guide to preventive medicine.

**HORTICULTURAL CROPS IN THE TACUINUM SANITATIS**

Numerous horticultural crops are listed in the tables of the Taqvim (Elkhadem, 1990). The Tacuinum Sanitatis recensions illustrate a large sample of these, but also present some other plants, those grown in northern Italy during the late 14th century. The images in the six Tacuinum Sanitatis manuscripts depict harvest, when the horticultural product has reached the proper stage for consumption, and there are no images in the Taquinum Sanitatis manuscripts. In the concluding section we will compare medieval and present-day attitudes toward horticulture and health.

**Root Vegetables**

*Radish.* In a neat medieval garden enclosed by a wattle fence in which trees are planted, a kneeling woman harvests evenly spaced small white-rooted plants, probably radishes, *Raphanus sativus*, from a straight row mound to increase drainage (Fig. 2A). In another image labeled Rafani (Fig. 2B) a gardener harvests white radish (or possibly horseradish, *Armoracia rusticana*) while a lady washes the roots in a stream. Two harvested bunches show roots slightly longer than a person’s head and foliage about the same length. In Fig. 2C, labeled napones, a peddler with a large basket strapped to his back overflowing with heart-shaped, black roots, probably radishes, offers a bunch to an elegantly gowne lady.

![Figure 2. Root vegetables: (A) radish (*Raphanus sativus*) from Liechtenstein Ms folio 32r; (B) radish from Paris 9333 folio 49r; (C) black radish from Vienna 2644 folio 51r; (D) turnips (*Brassica rapa*) from Liège 1041 folio 23v; (E) parsnip (*Pastinaca sativa*) from Vienna 2644 folio 28r; (F) carrot (*Daucus carota*) from Roma #182 folio 49r.](image-url)
Interestingly all Tacuinum Sanitatis manuscripts allocate the name rafani to white roots, and napones to black roots of plants we identify as R. sativus suggesting that both radish types were distinguished as different crops. The texts associated to Fig. 2C indicate that fresh sweet roots from the garden are best, provide good nourishment to people of all ages, and help urination but provoke flatulence and swellings.

**Turnip.** An image, labeled rappe, displays a harvest of white turnips being packed in a basket by a woman while her male companion carries off a full basket (Fig. 2D). Their shape is globular although the images of this crop in the other manuscripts show more elongate types. The text indicates that the best ones are domestic and although difficult to digest, improve eyesight and stimulate coitus.

**Parsnip.** In a similar scene to the above and also labeled capitulary_charlemagne.htm. plants of Charlemagne (www.oldcook.com/ en/capitulary_charlemagne.htm).

**Carrot.** In a similar scene to the above and also labeled pastinace, a gardener harvests very long and narrow, pale yellow roots of a species identified as parsnip, Pastinaca sativa, on the basis of the color of the roots and the shape of the leaves. In medieval Latin, pastinace designated both parsnip and carrot, but both species were sometimes distinguished as in the late 8th century list of garden carrots, but both species were sometimes distinguished in the late 8th century list of garden crops. The texts of Charlemagne (www.oldcook.com/en/capitulary_charlemagne.htm).

**Leafy Vegetables**

**Kale.** Fig. 4A, labeled caules onati, shows plants growing in an enclosed garden and a man carrying on his head a basket full of plants apparently cut at the base of the stem. The crop resembles kale (Brassica oleraceae Acephala Group), a non-heading crucifer much like coleworts and collards. Although B. oleraceae is represented in the Tacuinum only as kale, other sources, such as the Mesnagier de Paris (14th century), indicate that other cultivar-groups of this species were grown in late-medieval Europe (Mame, 2006). The caules onati, described as best when fresh and fleshy, were considered effective against constipation but could be damaging to the intestines.

**Lettuce.** Labeled lactuce, Fig. 4B depicts a smartly dressed couple placing bunches of leaves harvested from erect, rosette plants with narrow leaves, quite reminiscent of cos lettuce, Lactua sativa. The text indicates that the best lettuce has large yellow leaves and was extolled as alleviating insomnia and gonorrhea but harmful to eyesight and sexual vigor.

**Spinach.** Fig. 4C shows rosette plants of spinach, Spinacea oleracea, with spade-shaped leaves, regularly planted and weeded in a neatly tended garden. A woman is about to exit the garden with a basket full of freshly harvested leaves on her head. Spinach was described as moderately nourishing, good for coughs, but spoiling digestion.

**Cucurbits**

**Cucumber.** In an image labeled cucumeres et citruli, a couple examines vine plants bearing yellow, short cylindrical fruits (Fig. 5A). As these fruits are clearly tuberculate, they can be identified as cucumbers, Cucumis sativus. In another Tacuinum manuscript, the image labelled identically depicts chate melons, Cucumis melo, instead of cucumber (Paris et al., 2009). The bipartite label can be traced back to Table 10, line 66 of the Taqwim, the Arabic being al-qitha.
wa al-khiyar (Elkhadem, 1990) for the chate melon and the cucumber. This indicates that the Latin translation as cucumeres et citruli meant “melons and cucumbers.” The qitha (chate melon) and the khiyar (cucumber) were to be used similarly, marinated in vinegar or pickled (Elkhadem, 1990). Although Fig. 5A shows mature fruits that have turned yellow, the text advises green ones as best to consume. They were considered to reduce burning fevers thanks to their cold moist nature, to be diuretic, produce watery blood, but cause stomach aches.

Melon. In Fig. 5B, a courtier in a red tunic and a blue-gowned lady examine round, yellow melons labeled melones indi et palestini. The man is smelling the fruit indicating its fragrance. The text advises that the best ones are lemon-colored, large, sweet, and watery. They were good against warm, acute illnesses and suited to those with hot temperaments. The text indicates, though, that they can hinder digestion, but this can be remedied with sugar. Hence, these melons could not have been sweet like modern melons, and possibly were of the Adana Group (Pitrat et al., 2000). Other depictions of melons in the various Tacuinum manuscripts include chate melon (discussed above), casaba melon, which is also labelled cucumeres et cetruli, and snake melon, labeled Langurie (Paris et al., 2009).

Watermelon. A gardener with a knife in his hand detaches a striped watermelon, Citrullus lanatus (melones dulces) from vines, which are illustrated as growing erect to better show the fruits within the plant canopy (Fig. 5C). The fruits are being harvested at the peak of ripeness as indicated by the split ones on the plants and in the basket and that display their red flesh. The flowers are appropriately yellow. The text advises that the best Melones dulces are from Samarqand (modern Uzbekistan). Beneficial properties include splitting kidney and bladder stones, cleansing the skin, and curing fever, hepatitis, cough, and inflammation of urinary tracts. A noxious effect is the provoking of diarrhea. Illustrations of citron watermelons, labeled melones insipidi, are also found in the Tacuinum manuscripts (Paris et al., 2009).

Bottle Gourd. Two gowned ladies are displayed under an arbor from which dangle long, narrow bottle gourds, Lagenaria siceraria, labeled cucurbite, correctly shown as bearing white flowers (Fig. 5D). Long, narrow bottle gourds are the ones best suited for culinary preparation. The text indicates that the best ones are fresh and green. Nourishment is modest, but they quench thirst and are a swift laxative. In the other copies of the Tacuinum, both long, narrow and bottle-shaped forms are depicted, the latter for use when mature and dry, as vessels.

Other Vegetables

Asparagus. Labeled sparagus, the depiction (Fig. 6A) shows the harvest of green asparagus (Asparagus officinalis). A man snaps off by hand a green stalk while another man with two yoked baskets on his shoulders carries off the harvest. Asparagus does not appear to be planted in rows and is not mounded; it grows in a field or perhaps in the wild. The best ones are said to be fresh with tips bending towards the soil. Asparagus opens up occlusions and spurs coitus.

Cowpea. A blue-gowned lady with an apron is shown harvesting faxioli, i.e. cowpeas, also known as black-eyed peas, Vigna unguiculata (Fig. 6B). The pods are collected in a basket to be poured into a large sack nearby. Ibn Butlan

---

**Figure 5. Cucurbits:** (A) cucumber (Cucumis sativus) from Vienna 2644 folio 23v; (B) melon (Cucumis melo var. melo Adana Group) from Vienna 2644 folio 22r; (C) watermelon (Citrullus lanatus) from Vienna 2644 folio 21r; (D) bottle gourd (Lagenaria siceraria) from Paris 1673 folio 36v.

**Figure 6. Other vegetables:** (A) asparagus (Asparagus officinalis) from Paris 9333 folio 23v; (B) cowpea (Vigna sinensis) from Vienna 2644 folio 50v; (C) eggplant/aubergine (Solanum melongena) from Vienna 2644 folio 31v.
indicates that the best cowpeas are red and whole; they are very nourishing and stimulate urination (Elkhadem, 1990). Other legumes (broad beans, chickpea, lupine) are depicted in separate images.

Eggplant. A dramatic scene labeled melongiana portrays a garden of eggplants, Solanum melongena. A fondling, amorous couple is being admonished by a lady (Fig. 6C). Although we have not found any reliable textual source mentioning the aphrodisiac properties of eggplant, this assumption must have been persuasive based on the artist interpretation. The plants bear prolifically a crop of egg-shaped, purple fruits, a familiar shape and color close to the present ‘Black Beauty’ market type. Moreover, the plants, including their undulate leaf laminae, are depicted accurately in this image, but the attractive purple flowers are absent. Ibn Butlan mentioned the young, nonbitter, medium-sized Persian fruits are best, and are beneficial to the blood vessels and for stomach weakness (Elkhadem, 1990).

Temperate Fruits

Grape. Grape (Vitis vinifera) is found several times in the Tacuinum manuscripts, either illustrated for itself as uve, or for the production of verjuice (juice of immature grapes used in ancient and medieval cuisine), or as a symbol of fall, the time of wine making. Depending on the images, the vines grow on trees or are trellised, and bear black, light red, or gold grapes. In Fig. 7A, two men under an arbor constructed between trees prepare verjuice; one laborer washes the grapes, while the other extracts the juice with a mortar and pestle. Grapes were considered to cause thirst and cleanse the intestines.

Apple. Labeled mala acetosa (sour apple), Fig. 7B shows a courtier bringing down large apples, Malus sp., with a stick while an elegant lady carrying a basket watches in amazement. The best sour apples are very juicy, alleviate fainting and hepatitis but adversely affect joint articulation. Sweet apple (mala dulcis) shown in another illustration strengthens the heart.

Pear. The image labelled pira (Fig. 7C) shows two gowned ladies entranced by their pet monkey who is climbing on a pear tree, Pyrus communis. The tree bears long-necked russet pears. Ripened pears are said to be the best. Pears were advised for people with weak stomachs but are diarrheic.

Cherry. Tart cherries (Prunus cerasus), labeled cerosa acetosa, are being harvested by a child who has climbed into the tree (Fig. 7E). A well-dressed lady opens her gown to catch fallen fruits and another elegant lady carries off two full baskets balanced on a pole. The very sour ones were considered best. The fruits cure bilious attack and dry out and settle upset stomachs. Cerosa dulcia, sweet cherry (Prunus avium), which softens the stomach, is displayed in a separate image.

Subtropical Fruits

Lemon. The image of citra (Fig. 8A) displays a lemon tree, Citrus limon, under which a courtier shows a large, yellow fruit to two elegantly dressed ladies. The best lemons are said to be large and with a strong scent. Lemons stimulate bile flow and syrup prepared from the juice helps against infectious fevers. A hindering effect on digestion is mentioned.

Pomegranate. An elegantly gowned woman places in a basket pomegranates, Punica granatum, labelled granata acetosa (Fig. 8B). Some ripe fruits are burst open, revealing their red arils on which a bird is pecking, while a rabbit nibbles at a fruit on the ground. Watery fruits are best and are good for inflamed liver, but harmful to the chest and voice. Sweet pome-
Nuts
Chestnut. Labeled castanee (Fig. 9A), the image shows a man and perhaps his son under the tree, roasting fallen chestnuts, Castanea sativa (Fig. 9A). The fully ripe chestnuts of Brianza were considered the best. Nutritious and favorable to coitus, chestnuts were also described as causing flatulence and headaches.

Hazelnut. The image labeled avelane (Fig. 9B) can be interpreted as a family scene, in which the father harvests nuts of Corylus sp., while his daughter offers them to her seated mother. Large fresh hazelnuts are best, stimulating the brain faculties, but weakening the stomach (Elkhadem, 1990).

Flowers
Rose. Labeled roxe, the image portrays two well-dressed ladies next to a large clump of rose plants, Rosa sp., bearing both white and red flowers (Fig. 10A). A standing lady harvests flowers while her seated companion with a floral wreath in her hair prepares a floral necklace.

Lily. The miniature labeled lilia depicts tall white lilies, Lilium sp., about to be cut with a knife by a gowned lady while her red-gowned male companion places some in a large, multicolored vase, indicating ornamental use (Fig. 10B). Lilies were supposed to dissolve the superfluities of the brain, but the indication of the blue color of the best ones suggests some confusion between lily and iris.

Violet. A young man harvests violets (viole) in the countryside (Fig. 10C). The best plants have lapis-lazuli colored flowers and with many leaves. Smelling the flowers soothe and induce sleep, and when used as a beverage, release bile.

Culinary Herbs
Sage. Two elegant ladies are shown picking a plant labelled salvia, a Salvia species, growing in an enormous basket (Fig. 11A). Domestic sage was considered best and was good for paralysis and for the nerves, although slow to be digested.

Marjoram. The image labeled maiorana shows a man and a woman tending marjoram, Origanum marjorana, grown in a large urn on a bench; the woman holds an upturned vase and is watering the plant (Fig. 11B). Very small, aromatic marjoram was considered best, good for cold and moist stomachs, and to purify the blood. No noxious effects are described.

Dill. This image, labeled aneti, shows a woman and a child harvesting dill, Anethum graveolens, in a wild or weedy setting (Fig. 11C). The herb was considered best when green, fresh, and tender and was recommended for cold and flatulent stomachs but was harmful to the kidneys and nausea provoking.

DISCUSSION AND CONCLUSION
Horticulture is a little-recorded aspect of medieval life because textual sources are few and discontinuous (Bresc, 1972). Detailed medieval iconography of horticultural plants is quite scarce, widely dispersed, and difficult to obtain, although accessibility is easing. In this light, the illustrated Tacuinum Sanitatis manuscripts are an outstanding source of informa-
tion on late medieval horticulture in northern Italy and its environs, presented through the lens of courtly life and play on the estates of the nobility (Bertiz, 2003).

The horticultural crops illustrated in the Tacuinum manuscripts are familiar to us and, by-and-large, their appearance has changed little over the centuries. Of the vegetable crops, radish, turnip, onion, leek, kale, spinach, cucumber, watermelon, bottle gourd, asparagus, and eggplant, appear identical to some existing cultivars. The manuscripts were made prior to the encounter of Columbus with the Americas and thus New World species such as potato, tomato, capsicum pepper and Cucurbita species are absent. Polymorphism, as expressed by phenotypic variation in the illustrations, is evident for carrot, turnip, onion, melon, watermelon, bottle gourd, grape, apple, cherry, pomegranate, roses and other crops not presented here. Scenes of gardens and fields planted in rows, garden fences and gates, raised beds, container grown plants, trellising, pruning, hand harvest at the peak of ripeness, bunching of produce, wine and juice production, roasting nuts, and retail trade display a medieval version of horticulture that is in many ways not basically different from traditional horticulture practiced today in many parts of the world, although much different in scale.

Vegetables are shown harvested mostly in gardens and fields, in dense plantings. In contrast, fruit trees are never pictured in orchards, though orchards existed in the Middle Ages (Mane, 2006), and this pictorial choice is probably due to the artist’s concern of representing plants with as much details as possible. Aromatics are generally depicted in the Tacuinum manuscripts as growing in fields or open environments, though those pictured as growing in particularly tended conditions (beds or pots) such as sage and marjoram shown here, indicate that these plants were prized. Peasants and laborers are frequently pictured with the root and leafy vegetables, which were their basic food (Mane, 2006). Conversely, courtiers are more frequently found next to fruit vegetables such as cucurbit and eggplant, which because of their recent introduction in Europe (Daunay et al., 2008; Paris et al., 2009) were probably considered as rare curiosities affordable to the elite only. The upper class is also pictured next to fruit trees, and this is probably because fruits were considered a luxury food and thus reserved for the privileged (Mane, 2006). The medieval idea that the garden was a place for healing, relaxing, and physical and mental well-being was a premonition of horticultural therapy, now stressed in schools, hospitals, geriatric and rehabilitation centers, prisons, and community gardens (Flagler, 1990; Waliczek et al., 2005).

Interestingly, all of the horticultural crops presented in the illustrated Tacuinum manuscripts were allocated physiological effects on the body and were fully part of the medieval pharmacopoeia. Clearly, then as now, the population was concerned with general health and bodily functions, including flatulence, bladder and kidney stones, ill-health, and sexuality. Remarkably, the very short text that accompanies each illustration in the Tacuinum provides information for balancing the beneficial and noxious effects of each plant.

Although the basis of medicine has completely changed from the ancient philosophical concepts that date to the Greeks, the results are amazingly the same. All cultures, ancient, medieval, and modern have come to the same conclusion: horticulture is basic to a healthy life. Although, modern knowledge of medicine and nutrition has changed our understanding of food through advances in biology, chemistry, and genetics and as we now view foods in terms of calories, vitamins, antioxidants, polyphenols, polysaccharides, proteins, and lipids (Goldman, 2003), it does appear as if all the analyses, ancient and modern, come to the same result: the horticultural crops we eat are sustaining, nutritious, healthy, and delicious. Although we no longer evaluate them on the basis of hot, cold, wet, or dry, or the effect on the “humors,” yet some of the ancient feelings still persist. We still say colloquially “cool as a cucumber,” we refer to pungent chili peppers as “hot”, we associate spicy foods with passionate temperaments, and consider aroma and fragrance to affect our well-being. At times it may seem, as we investigate the healthful attributes of our food through chemistry, that we merely seek accreditation for our preferences. While we smile indulgently at the extravagant claims of the ancients, it appears that in a number of cases their experience was prescient. Thus, it turns out that horseradish does have a factor that affects urinary health (Shehata et al., 2008), and we have confirmed that in a number of cases their experience was present. It is clear that the present-day emphasis on the connection between horticulture and health is an extension of ancient and medieval concerns. We suggest that our present understanding of nutrition will probably be considered naïve in the coming centuries and in the future the approach for attributing health benefits to horticultural crops will likely be very different from the present one. We predict however that the conclusions will be similar: horticultural crops are essential to good health!

Acknowledgements

We thank Anna Whipkey for help with the figures. We also thank Albert Bonnet, François Boulinaud, Richard Brand, Mark Farnham, Richard Fery, Brigitte Maisonneuve, Charles-Marie Messiaen, Antonio Monteiro, Philipp Simon and Alan Walters, for help in identification concerning some of the illustrations. However, any errors in identification and interpretation of these images are solely our responsibility. We acknowledge financial support of the Lillian Goldman Charitable Trust (New York).

References

About the Authors

Marie-Christine Daunay
Jules Janick
Harry S. Paris

Dr. Marie-Christine Daunay, scientist, INRA (Génétique et Amélioration des Fruits et Légumes), Montfavet, France, is involved in the coordination of French and European networks devoted to the management of genetic resources of solanaceous crops. Her research is focused on eggplant genetics and solanaceous crop history. Email: daunay@avignon.inra.fr.

Dr. Jules Janick is James Troop Distinguished Professor of Horticulture at Purdue University, USA, and Director of the Indiana Center for New Crops and Plant Products. Email: janick@purdue.edu

Dr. Harry S. Paris is a Senior Research Scientist in the Department of Vegetable Crops and Plant Genetics of the Agricultural Research Organization, Neve Ya’ar Research Center, Ramat Yishay, Israel. His research is devoted to the genetics, breeding, development, and crop history of cucurbits. Email: hsparis@volcani.agri.gov.il


