

Origin and Domestication of Cole Crops (*Brassica oleracea* L.): Linguistic and Literary Considerations¹

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Origin and Domestication of Cole Crops (*Brassica oleracea* L.): Linguistic and Literary Considerations. Various attempts have been made to locate the area of domestication of *Brassica oleracea* crops (i.e., cole crops). Contrasting hypotheses suggest either a North Atlantic or a Mediterranean origin. In the absence of archaeological proof, linguistic and literary considerations can offer some insight into this issue. Expressions indicating a deep-rooted knowledge and use of these crops are present in early works of ancient Greek and Latin literature, while no trace of cole crops has been found in documents from ancient Egyptian or other Fertile Crescent civilizations. Most cole crop terminology used in modern European languages can etymologically be traced to ancient Latin or Greek roots, particularly those terms indicating the most obvious morphological feature of the primitive domesticated forms, i.e., the solid upright stem (*kaulos*, *caulis*). Celtic tradition is not documented earlier than the Christian era, other than in stone inscriptions, and there is no clear evidence of a "cole tradition" among the Celts. This paper gathers information from the linguistic, literary, and historical points of view that are compatible with the domestication of *B. oleracea* in the ancient Greek-speaking area of Central and East Mediterranean.

Origine e domesticazione dei cavoli (*Brassica oleracea* L.): considerazioni linguistiche e letterarie. Sono stati fatti diversi tentativi di localizzare l'area di domesticazione delle piante coltivate appartenenti alla specie *Brassica oleracea* (cavoli in senso lato). Sono state proposte ipotesi alternative che propongono un'origine Nord Atlantica oppure Mediterranea. In mancanza di prove archeologiche, considerazioni linguistiche e letterarie possono offrire qualche indicazione a proposito. Le prime opere scritte delle letterature greca antica e latina contengono espressioni che fanno riferimento ad una consolidata conoscenza e ad un utilizzo ben radicato di queste colture. Viceversa, i documenti scritti lasciati dalle civiltà antiche dell'Egitto e del Medio Oriente non hanno lasciato tracce riferibili alla presenza di cavoli. La terminologia utilizzata nelle lingue moderne europee per indicare i cavoli può essere fatta risalire etimologicamente a radici latine o greche, in particolare a quei termini che indicano la caratteristica morfologica più evidente che avevano le forme domestiche primitive, cioè il robusto fusto eretto (*kaulos*, *caulis*). La tradizione celtica non ha lasciato documenti scritti prima dell'era volgare, se non iscrizioni su pietra, e non è stata tramandata alcuna chiara evidenza di una tradizione celtica dell'utilizzo dei cavoli. Questo articolo raccoglie informazioni appartenenti alle sfere linguistica, letteraria e storica, tutte compatibili con una domesticazione di *B. oleracea* avvenuta nell'area di diffusione della antica lingua greca, cioè nel Mediterraneo Centrale ed Orientale.

Key Words: *Brassica oleracea*, cole crops, leafy kales, domestication, linguistic.

¹ Received 12 May 2009; accepted 1 February 2010;
published online 31 March 2010.

Introduction

Cole crops as diverse as leafy kale, cabbage, kohlrabi, broccoli, cauliflower, and Brussels sprouts are all of the same species, *Brassica oleracea* L., which is native to Europe. The extreme plasticity of the species has allowed differentiation, under human selection, of this large number of forms due to the specialization of different plant organs that have given rise to various crops and uses. These include, for example, the leaves in the case of cabbage and leafy kale, the stem in kohlrabi and marrowstem kale, the inflorescences in broccoli and cauliflower, and the axillary (lateral) buds in the Brussels sprout. The variation in forms and colors is marked within each of these crop types.

According to an extension leaflet of Iowa State University, all cole crops are cultivated varieties of the species *Brassica oleracea* (Haynes et al. 2009). We adopted this convenient terminology and therefore the cultivated crops of *B. oleracea* are referred to here as “cole crops” or “coles.” They share the same genome ($2n=18$ chromosomes) with a number of wild species of *Brassica* that are usually found growing on rocky limestone cliffs along the Atlantic coasts of Britain, France, and Spain, as well as in the Mediterranean basin (Snogerup et al. 1990). This large and complex gene pool constitutes the “section *Brassica*” of the “genus *Brassica*,” the taxonomy of which remains controversial. The results of crossing experiments involving ten wild taxa and six major groups of cultivated *B. oleracea*, showed that the fertility of hybrids among all the cultivated forms and wild populations is high and that all the studied forms belong to the same biological species (von Bothmer et al. 1995).

A question that has stimulated the interest of scholars is related to the location of the initial introduction into cultivation of the wild plants and the subsequent domestication process (De Candolle 1885; Gomez-Campo and Prakash 1999; Snogerup 1980; Song et al. 1990). The question is not merely academic, since understanding the history and evolution of crops can contribute to tracing existing wild and cultivated diversity, resulting in more efficient conservation and utilization. The general hypothesis is that ancient people were attracted by the fleshy leaves and tender shoots of wild *Brassica* species. These were introduced into home gardens or grown near the dwellings where less pungent and more

luxuriant plants were selected, eventually giving rise to the domesticated leafy kale. This crop type is currently widespread in European gardens, often grown by elderly people, and several specific regional differences in the crop have developed (galega kale in Portugal, curly kale in Northern Europe, black kale in Tuscany, *rashtan* in Montenegro, and many other types). Since wild relatives of cole grow on the Mediterranean coasts and on the Northwest Atlantic’s rocky coasts, there have been different opinions about the first use of cole crops and their introduction into cultivation. Taxonomically, the $2n=18$ spontaneous forms that grow on the West European Atlantic cliffs are included in the same species (*B. oleracea*) as all the cultivated $2n=18$ *Brassica*. These Atlantic forms have generally been considered to be the progenitors of the cultivated forms (Bailey 1922), and linguistic considerations proposed by (De Candolle 1885) promoted the idea of possible domestication by the Celts at the beginning of the first millennium B.C.E. Other early authors (Schiemann 1932; Schulz 1936), on the other hand, believed different Mediterranean wild species (also $2n=18$) to be the main source of the cultivars. Literary evidence of the use of these crops in ancient Greek and Roman times (Toxopeus 1974) adds weight to the hypothesis of domestication events in the Mediterranean area. Another hypothesis, based on morphological traits, proposed a multiple origin of the cultivated forms, assuming that cabbage derived from the wild Atlantic *B. oleracea*, while branching kale, stem kale, broccoli, and cauliflower could have derived from Mediterranean species such as *B. rupestris* Rafin., *B. incana* Ten., and *B. cretica* Lam. (Snogerup 1980). Molecular data and fertility analysis of hybrids have recently shown that the North Atlantic wild types have a closer genetic relationship than the Mediterranean wild forms to all the currently cultivated forms of *B. oleracea* (von Bothmer et al. 1995; Song et al. 1990). Recent molecular and genetic studies provide evidence suggesting that the cauliflower curd arose in southern Italy from a heading Calabrese broccoli via an intermediate Sicilian crop type (Smith and King 2000). However, the geographical origin of primitive domesticated leafy kale, from which all the other cultivated forms were probably derived according to our literary and linguistic findings, remains unclear.

Brassica seeds are occasionally found in prehistoric archaeological excavations. Only very well

preserved seeds can be identified with certainty at the species level, but this is a very rare occurrence. No unequivocal evidence can be found of *B. oleracea* archaeological remains before ancient Roman times, while *B. rapa* and *B. nigra* are better documented from Neolithic and Bronze Age sites.

For many vegetables, the absence of archaeological remains is, in some cases, compensated for by Mesopotamian Bronze Age literary sources and by drawings and descriptions from Egyptian tombs. However, this is not the case for the cole crops. They are not included in the list of plants grown in the garden of Merodach-baladan in Babylonia (722–711 B.C.E.), which includes lettuce, garlic, beet, and turnip (Körber-Grohne 1987), nor are they mentioned in the Bible or the Jewish Mishna (Zohary and Hopf 2000).

One possible approach to understanding the origin of crops is through linguistic and literary investigation. According to the linguistic approach, the area of the initial domestication of a certain crop is more likely to be associated with those societies that have names for the crop in their native language (De Candolle 1885). On the other hand, if the names are borrowed from a different language, the crop has probably been introduced from a different area.

The linguistic approach was applied by De Candolle (1885) and others (Hervé 2003; Hyams 1971) in attempts to find sources of evidence for the origin and spread of cole crops. The present study represents an additional contribution to this approach. The focus is on the ancient words that refer to *Brassica oleracea*, in an attempt to derive indications on the domestication of the cole crops. Only the earliest records of the use of each relevant word have been investigated and reported here. A wealth of citations that refer to cole crops in ancient Greek and Latin texts, including some from Medieval and Renaissance times, as well as a rich iconography, have not been reported here, but will be used in a different paper to refine further the understanding of the evolution of cole crops under domestication. This study is a part of a larger project focusing on the domestication of *Brassica oleracea* using various methods.

Methodology

The Greek and Latin “*Thesauri*” and “*Lexica*,” as well as other dictionaries and linguistic texts, were used as reference tools (Facciolati et al. 1864; Stephano 1841; Thesaurus 1906–1912). Greek and Latin *Thesauri* include all the forms of

the words used and their location in the ancient texts, as well as notes on the history of the words (etymology). *Lexica* are vocabularies, including all the words and expressions of a given language and an explanation of their meanings.

In our approach, we checked all the words that could refer to “*Brassica oleracea*” in the above reference books, searching for etymological information and references to the original texts where the words were used.

Following are the Greek words that we looked up: βράσκη (braske), καυλός (kaulos), κράμβη (krambe), κύμα (kyma), ὀλῦρα (olyra), and ῥάφανος (rhapphanos). The Latin words were *brassica*, *caulis*, *crambe*, *cyma*, and (*h*)*olus*.

Subsequently, the search of the original texts was facilitated using a number of on-line public domain resources, including “*Corpus Scriptorum Latinorum*” (<http://www.forumromanum.org/literature/index.html>, [20 December 2009]), “Perseus” (http://www.perseus.tufts.edu/cache/perscoll_Greco-Roman.html, [20 December 2009]), and “The Latin library” (<http://www.thelatinlibrary.com/index.html>, [20 December 2009]).

The hypothesis related to the meaning of the hieroglyph *shaut*, sometimes interpreted as “cabbage,” was considered on the basis of existing commentaries and personal communication with Egyptologists (Tiradritti, pers. comm.).

The Celts transmitted their traditions and literature orally, and their detailed language was not recorded before the common era (B.C.E.) The first attestations of Celtic language are limited to stone, ceramic, and coin inscriptions. For Continental Celts, the oldest records are Lepontic inscriptions, found in Cisalpine Gaul (VI century B.C.E.) and written in an old italic alphabet, while Gaulish language inscriptions using the Greek alphabet date back as early as the III century B.C.E. (Anonymous 2009a). Insular Celtic is attested by the Ogham inscriptions, standing stones from the IV–VII centuries C.E. (Anonymous 2009b). In the absence of relevant ancient written records, we report on existing interpretations of the Celtic linguistic heritage regarding *B. oleracea*.

English translations of Greek and Latin texts generally refer to the cole crops as “cabbage.” This translation is misleading since cabbages are headed *B. oleracea*, while usually in the ancient texts there is no indication of heads being part of the anatomy of the cole crops, at least until Pliny

uses the word “*capita*” (heads). We have therefore consistently replaced the words used in translations with the transcription of the crop name.

The format used for citing classical texts is the following: [Author], [Title] [Book]. [Chapter, if applicable]. [Section, if applicable]. [Line numbers cited, if applicable].

Linguistic Considerations

Κράμβη AND ῥάφανος

The main words of the ancient Greek language (i.e., before ca. 330 B.C.E.) meaning *B. oleracea* were κράμβη (krambe) (Doric dialect) and the corresponding Attic dialect word ῥάφανος (rhapphanos). It should be noted, as detailed below, that when used by non-Attic authors “rhapphanos” means radish (*Raphanus sativus*). According to Chantraine (1968), the word κράμβη evokes German words expressing the idea of “curling up,” “crumpling up” (German “*sich kräuseln*”), due to the habit of the leaves, and is based on the Indo-European terms **qremb-* and **qromb-*. Carnoy (1959) links the word ῥάφανος to ῥάφους (rhapfys) and ῥάπυς (rhapys), i.e., “turnip,” and to an Indo-European root with the meaning of “turn” or “roll into a ball,” while Chantraine (1968) is doubtful about its Indo-European derivation. Among the Proto-Indo-European roots listed by Pokorný (1959), the root “*rāp-*” means “turnip,” with the following derivatives in Indo-European languages: Latin: *rapum*; Old Church Slavonic: *repa*; Russian: *pera* (repa); Lithuanian: *ropė*; Old High German: *raba*; German: *Rübe*; Ancient Greek: ῥάφους (rhapfys); and Polish: *rzepa* (Anonymus 2009c).

Apart from independently surviving fragments of ancient Greek works, one rich source of ancient quotations—including κράμβη and ῥάφανος—is the work of Athenaeus, *Deipnosophistae* (The Deipnosophists or Banquet of the Learned) (Ateneo 2001). Athenaeus was born and lived in Naucratis, Egypt, in the III century C.E. Thanks to his work, large fragments of text from the ancient poets, which would otherwise have been lost, have been preserved. His work is written in the form of a dialogue in which a variety of characters debate a wide spectrum of topics. Luxury, diet, health, sexual relationships, music, humor, and Greek lexicography are all discussed, but the focus is on food, wine, and entertainment.

The earliest records of the word κράμβη date back to the Iambic poets of the VI century B.C.E.

(Hipponax of Ephesus and Ananius), where it was not used to describe the plant, but to curse or as a form of oath:

Καὶ σὲ πολλὸν ἀνθρώπων
ἐγὼ φιλέω μάλιστα, ναὶ μὰ τὴν κράμβην.

[And you more than anybody else in this world I surely love, oh, yes, by the **krambe**!]

—Ananius, *fragment 4 West* (Ateneo 2001)

A similar use of the word, as a comic oath form, is found in fragments from comic poets of the V century B.C.E. (Epicharmus of Kos, Eupolis, and Teleclides). Athenaeus mentioned that Nicander of Colophon (II century B.C.E.) defined κράμβη (krambe) as a “prophet,” since it was a sacred plant, and this could explain why it was used for curses and oaths. He also specifies that this type of oath was thought to be of Ionic origin and that it should not be seen as too surprising to swear by a κράμβη (krambe), since Socrates used to swear by a she-dog and Zenon used to swear by a caper. The word ῥάφανος can be traced back at least to the V century B.C.E., when it was used by the poets of the Attic comedy, Crates and Aristophanes:

Καὶ τῶν ῥαφάνων ἔψειν χρὴ

[**Rhapphanoi** have to be boiled]

—Crates of Athens, *fragment 19 Kassel-Austin* (Ateneo 2001)

Aristotle (384–322 B.C.E.) in his *Historia animalium*, speaks about ῥάφανος and κράμβη, as the same plant:

γίνονται δ' αἱ μὲν καλούμεναι ψυχὰ ἐκ τῶν καμπῶν, αἱ γίνονται ἐπὶ τῶν φύλλων τῶν χλωρῶν, καὶ μάλιστα ἐπὶ τῆς ῥαφάνου, ἣν καλοῦσι τινες κράμβην

[The so-called psyche or butterfly is generated from caterpillars, which grow on green leaves, chiefly on the **rhapphanos**, which some people call **krambe**]

—Aristotle, *Historia animalium* 5. 19. 15 (Aristotle 1952)

In Athenaeus, we find a fragment by Apollodorus of Carystos, citizen of Athens and writer of comedies of the III century B.C.E., where it is explained that the word κράμβη was used in

Athens, while *ράφανος* was used elsewhere to indicate the same plant:

εἰ δ' ὅτι καλοῦμεν *ράφανον*, ὑμεῖς δ' οἱ
ξένοι *κράμβην*, γυναιεῖ διαφέρειν οἶει δέ τι

[Do you think it makes any difference to women if you strangers call *krambe* what we call *raphanos*?]

—Apollodorus of Carystos, *fragment 32*
Kassel-Austin (Ateneo 2001)

The different meanings of *raphanos* are also explained by Hesychius, a grammarian of Alexandria (probably V century C.E.), who compiled the richest lexicon of unusual and obscure Greek words. The lexicon survives in a XV century C.E. manuscript, which is preserved in the library of San Marco in Venice, (Marc. Gr. 622). According to Hesychius, *ράφανος* (*raphanos*) was an ambiguous word, meaning “cole” (the Doric *krambe*) in Attic dialect, while in the rest of Greece it meant “radish.” The radish was called *ράφανίς* (*raphanis*) in Athens, but in the Doric language *ράφανίς* was the diminutive of *ράφανος*, meaning small radish.

<ράφανίς> (καὶ) <ράφανος> διαφέρει
παρα τοῖς Ἀττικοῖς· <ράφανος> μὲν γὰρ ἡ
κράμβη, <ράφανίς> δὲ ἡ παρ' ἡμῖν
ράφαν(ος). Τρύφων δὲ φησι, παρὰ Δωρ-
ιεῦσι τὰς μικρὰς <ράφανιδας> λέγεσθαι,
τὰς δὲ μέγας <ράφας>

[*Raphanis* and *raphanos* are two different plants for the Attic people: *raphanos* corresponds to *krambe*, while *raphanis* is our *raphanos*. As Triphon says, for the Doric people, the small ones are called *raphanis*, the big ones *raphas*]

—Hesychius, *Glossai* (Wikisource 2009)

Also Pollux, an Alexandrian grammarian and sophist, who taught at Athens in the II century C. E., explains the ambiguities between *κράμβη*, *ράφανίς* and *αφανίς*:

Ἡ *κράμβη* οὕτως (*ράφανος*) ἐκαλεῖτο· ἦν
δὲ οἱ πολλοὶ *ράφανον* καλοῦσι, *ράφανίς*.

[*raphanos* is called *krambe*, while many people call *raphanos* what actually is *raphanis*.]

—Pollux, *Onomasticon* 1. 247
(Stephano 1841)

Table 1 summarizes the different meanings in Attic and Doric dialect.

Βράσκη AND *BRASSICA*

Another Greek word, *βράσκη* (*braske*), only mentioned by Hesychius, is the possible origin of the Latin word *brassica*. According to *Thesaurus linguae latinae*, the etymology of the word *brassica* is unknown, but reference is made to the interpretation of Hesychius. In Hesychius one can read: *Βράσκη κράμβη* Ἰταλιώται [*braske* is *krambe* for the Italians]. According to Hesychius, *Βράσκη* was therefore a local name used in the ancient Greek colonies of Southern Italy (*Magna Graecia*), having replaced the use of the original word *κράμβη*.

The *Lexicon Totius Latinitatis* also points to the text of Hesychius, indicating that the Latins took the word from the Greeks living in South Italy. *Βράσκη* however remains a rare word, since we have no record of its use, other than in the lexicon of Hesychius. The *Lexicon Totius Latinitatis* and *Thesaurus Linguae Latinae* also quote, less convincingly, the etymological interpretations of Varro and Paul the Deacon. In his *De lingua Latina*, Varro (Marcus Terentius Varro, 116–127 B.C.E., an ancient Roman scholar and writer), indicates that “*brassica*” derives from “*praesica*” (from “*praesicare*” or “*praesecare*,” to cut), since from its stem, small pieces are cut off (*brassica ut praesica, quod ex eius scapo minutatim praesicatur*). A similar interpretation is given by Paul the Deacon (VIII century C.E.), in his epitome of the II century C.E. work of Festus, indicating that “*brassica*” derives from the action of cutting (“*praesecando*”) (*brassica a praesecando est dicta*). The similarity of the two interpretations is explained by the fact that Festus largely derived his encyclopedia from the *De verborum significatu* (“On the Meaning of Words”) of Verrius Flaccus, a learned grammarian and antiquarian of the

TABLE 1. MATRIX OF CROP NAMES.

English	Doric	Attic	Scientific Name
A cole crop	κράμβη (<i>krambe</i>)	ράφανος (<i>raphanos</i>)	<i>Brassica oleracea</i>
Radish	ράφανος (<i>raphanos</i>)	ράφανίς (<i>raphanis</i>)	<i>Raphanus sativus</i>
Small radish	ράφανίς (<i>raphanis</i>)		<i>Raphanus sativus</i>

Augustan Age, who in turn, in compiling his lexicon, undoubtedly used Varro's lost *Antiquitates rerum humanarum et divinarum* (47 B.C.E.) (Glinister and Renton 2006).

Another possible etymology of *brassica*, which is however indicated as being false by the *Lexicon Totius Latinitatis*, is a derivation from the Greek βράσσω (*brasso*) (= *sono* in Latin, from *sonare* = to play, to sing, to make noise). This would be owing to the crackling sound made by the plant when it is broken.

The word *brassica* is always translated from Latin to indicate a plant that we can botanically refer to as *B. oleracea*. At its earliest, the use of this word in Latin literature can be traced back to Plautus (254–184 B.C.E.), who was a comic play writer at the time of the Roman Republic, born at Sarsina, Roman Umbria, today in Romagna, near Forlì, Italy.

Plautus' comedies are among the earliest surviving intact works of Latin literature.

Coc.: non ego item cenam condio ut alii coqui, qui mihi condita prata in patinis proferunt, boves qui convivias faciunt herbasque oggerunt, eas herbas herbis aliis porro condiunt: indunt coriandrum, feniculum, alium, atrum holus, apponunt rumicem, **brassicam**, betam, blitum, eo laserpici libram pondo diluont, teritur sinapis scelera, quae illis qui terunt prius quam triverunt oculi ut extillent facit.

[A Cook: I don't cook a dinner too, like other cooks, who bring me up seasoned meadows of grass upon their dishes; who turn the guests into oxen, and supply the grass. This herbage, too, do they further season with other herbs: put in coriander, fennel, garlic, orache; they add, too, sorrel, **brassicam**, beet, and spinach. In this they dissolve a pound weight of asafoetida. The roguish mustard is pounded, which makes the eyes of those that pound it drop tears before they have pounded it.]

—Plautus, *Pseudolus*, Act 3, Scene 2 (Perseus Digital Library 2009)

“*Brassica*” is also present in the most ancient entire piece in Latin prose that has reached us, i.e., “*De agri cultura*”, the work of Cato (234–149 B.C.E.).

Brassica est quae omnibus holeribus antistat.

[It is the **brassica** which surpasses all other vegetables.]

—Cato, *De agri cultura* 156. 1 (The Latin Library 2009)

De agri cultura gives an idea of the social and economic situation of Italian farms during the first part of the II century B.C.E. It collects the indigenous traditions and folklore of the archaic farming society, as well as scientific and pseudo-scientific writing of Greek origin. It is the small encyclopedia of a landowner. The longest chapter of *De agri cultura* is dedicated to the healing properties of cole (*brassica*), ranging from digestive properties to the ability of curing wounds, swellings, and ulcers; healing strangury; curing all internal organs' ailments; and used against contusions, headache, deafness, scab, and even cancer. Linguistic elements such as scientific and technical terms and concepts such as the internal “forces” of the human organism (i.e., the Hippocratic δυνάμεις) indicate that the text is rich in information of Greek origin. It has been hypothesized that Cato wrote a small treatise specifically on the coles (*De brassica*), which was subsequently included in *De agri cultura*. He may have drawn information on the medicinal uses of coles from ancient Greek physicians. In particular, Chapter 157 deals with the “Pythagorean brassica” (*De brassica pythagorea*). This does not seem to be a taxonomic definition of a botanical species of *Brassica*, but “*pythagorea*” is rather an adjective referring to the fact that the properties of this plant had been described by Pythagoras or his school in South Italy. We regard *brassica pythagorea* as a generic, not better specified, cole crop. Pythagoras, born in Samos, probably in 571–570 B.C.E., came to Italy in 532–531 and died in 497–496. He established himself in Croton, Calabria, where he founded a school that was also a religious and philosophical cultural center. No written documents remain from him. In any case, the cole crops were considered among the most effective therapeutic plants according to ancient folk traditions, some of which must have been channeled into Cato's piece (Canali and Lelli 2000).

Καυλός AND CAULIS (OR COLIS)

The Greek word καυλός (*kaulos*), meaning “stem,” was also used to indicate several objects reminiscent of the form of an upright stem. Homer in the *Iliad* (VIII century B.C.E.) used καυλός to mean a spear-shaft (13.162 and 168) or a sword-hilt (16.338). Later authors used καυλός to indicate various tubular structures in animals (the neck of the bladder, the ovipositor of locusts, and so forth). As early as the V century B.C.E.,

the word was used to mean *membrum virile* by Hippocrates (*Of internal affections* 14), and then by Galen (II century C.E.) (*De usu partium* 14.12) and others. According to the Greek-English lexicon (Liddell and Scott 1982), as early as the IV century B.C.E., *καυλός* (*kaulos*) acquired the meaning of the entire plant (i.e., the cole) since it was used in this sense by the comic poets Alexis (fragment 127.5), Anaxandrides (fragment 41.58), and Eubulus (fragment 7.3) (Meineke 1839–1857). This rhetorical figure of speech is termed synecdoche, whereby a part of something is used for the whole.

The Latin word “*caulis*” (and its variation “*colis*”), derived from the Greek *καυλός* (*kaulos*), has the same principal meaning of “stem,” but other meanings also in this case, such as “penis” for Lucilius, a Latin author of satires in the II century B.C.E., and for Cornelius Celsus, a physician of the I century C.E. As of the I century B.C.E., also the Latin *caulis* (or *colis*) starts to be used to mean the entire cole plant, as in Horace (65–68 B.C.E.):

*Cole suburbano, qui siccis crevit in agris,
dulcior.* [Cole that grows in dry lands, is
sweeter than that about town.]

—Horace, *Saturae* 2.4.15
(Perseus Digital Library 2009)

The multiple meanings of the words *caulis* and *καυλός* (stem, cole, penis) are understandable if we relate them to the peculiarly thick upright stems of the leafy kales (see Fig. 1), i.e., the most likely type of coles that were grown at the time, rather than to the round heads of a cabbage. It is therefore no wonder that the whole plant started to be called “*kaulos*” or “*caulis*.”



Fig. 1. Black kale (*Cavolo nero*) in Italy.

The word “*caulis*” for “cole” became commonly used in the Latin world. It was used, for example, by Pliny, referring to the work of Cato from two centuries before:

Hortorum Cato praedicat caules.

[Cato speaks in high praise of *caules*.]

—Pliny, *Naturalis Historia* 19.19. 57
(Perseus Digital Library 2009)

In the I century C.E., Pliny speaks of *caules* as Cato’s coles, but Cato, in the III century B.C.E., was using the word “*colis*” only to indicate “stem” and the cole was “*brassica*.”

The use of expressions like “*brassicae coliculos*” [little *brassica*’s stems or *brassica*’s sprouts] (Cato, *De Agri cultura* 158.1) or “*brassicae colis*” [*brassica*’s stem] (Columella, *Libri rei rusticae* 6. 6. 1), ended up in simply being “*colis*” or “*caulis*” for simplification and synecdoche. Both Pliny and Columella (I century C.E.) were alternatively using both terms (*brassica* and *caulis*) with the same meaning:

Brassicae laudes longum est exsequi. [It would
be a lengthy task to enumerate the praises of
the *brassicae*.]

—Pliny, *Naturalis Historia* 20. 33. 78
(Perseus Digital Library 2009)

After the I century C.E., the use of the word “*caulis*” seems to have almost entirely replaced the use of the word “*brassica*”; this is evidently the root of the words used today in several modern European languages to indicate the cole crops (*Kohl* in German; *Kål* in Scandinavian languages; *Kaali* in Finnish; *Cal* in Irish; *Kaol* and *Kol* in Breton; *Cole*, *Collard* and *Kale* in English; *Cavolo* in Italian; *Col* in Spanish; *Couve* in Portuguese; *Chou* in French). On the other hand, *brassica* is only attested for Italian and Sicilian and passed to the Irish *braisisech*, the Welsh *bresych*, and the Serbian *bróskva* (Ernout and Meillet 1932).

Ὀλῦρα AND *HOLUS* (OR *OLUS*)

The Greek word Ὀλῦρα (*olyra*) was used in the *Iliad* (5.196 and 8.564), the oldest piece of literature in the Greek language, dating back to the VIII or VII century B.C.E. In this book, Ὀλῦρα is mentioned, together with white barley (κῆρι λευκόν), as food for horses and it has been translated as hulled wheat, either einkorn (Forster 1936) or emmer (Chantraine 1968). As mentioned by Isidore of Seville (ca. 560–636 C.E.) in

his work *Etymologiarum sive Originum*, the corresponding Latin word “*olus*” (or “*holus*”) was used by the Latins to indicate any comestible herbaceous plant. While Chantraine is dubious about the etymology of this word, according to Hervé (2003), it was derived from an Indo-European root “*ghel*,” meaning green, yellow. The meaning of “*holus*” was extended to generally designate all the green vegetables and specifically the cole crops. This is another sign of the importance of cole crops, considered “the vegetables” *par excellence*, at least linguistically, since the I century B.C.E.

The following example where *holus* has the meaning of a cole crop is taken from Varro (I century B.C.E.):

Si enim ad limitem querquetum habet, non possis recte secundum eam silvam serere oleam, quod usque eo est contrarium natura, ut arbores non solum minus ferant, sed etiam fugiant, ut introrsum in fundum se reclinent, ut vitis adsita ad holus facere solet.

[For instance, if he has an oak grove near the boundary, you cannot well plant olives along such a forest; for it is so hostile in its nature that your trees will not only be less productive, but will actually bend so far away as to lean inward toward the ground, as the vine does when planted near the *holus*.]

—Varro *Rerum Rusticarum* 1. 16. 6
(The Latin Library 2009)

The next example where *olus* has the meaning of a cole crop is taken from Pliny (I century C.E.):

Raphani...et vis mira colligendi spiritum laxandique ructum. ob id cibis inliberalis, utique si proxime olus mandatur.

[Radishes are flatulent to a remarkable degree, and are productive of eructations; hence it is that they are looked upon as an aliment only fit for low-bred people, and this more particularly if *olus* is eaten directly after them.]

—Pliny, *Naturalis Historia* 19. 26. 78–79
(Perseus Digital Library 2009)

The current binomial scientific name used for cole, *Brassica oleracea*, still conserves the adjective “*oleracea*,” from “*olus*, -eris.”

CRAMBE

Only in a few cases is the word “*crambe*” evidently derived from the Greek κράμβη, used

by the Latins. In Pliny, it is quoted as the name of one of three types of *brassica* distinguished by the most ancient Greek writers (“*selinoides*” or curly cabbage; “*helia*” with broad leaves, and the more bitter “*crambe*,” with thinner leaves):

Tertia <brassica> est proprie appellata crambe, tenuioribus foliis et simplicibus densissimisque, amarior, sed efficacissima.

[And a third <variety of *brassica*>, the name of which is properly *crambe*, with thinner leaves, of simple form, and closely packed, rather bitter, but extremely efficacious.]

—Pliny, *Naturalis Historia* 20. 33. 79
(Perseus Digital Library 2009)

Juvenal, a Roman poet active in the late I and early II century C.E., author of the *Satires*, also uses this same word:

Occidit miseros crambe repetita magistros.

[Re-cooked *crambe* kills the poor teachers.]
—Juvenal, *Saturae* 7. 154
(The Latin Library 2009)

In this case, the poet is making an allegory based on the Greek proverb “δῖς κράμβη θάνατος” (“*krambe* twice is death”), since the cole, when re-cooked or warmed up, was considered heavy to digest.

CYMA AND κύμα

Parts of the vegetable brassicas that are often used still today, especially in home gardens, are the young sprouts produced when the plant begins to form an inflorescence. It is for these tender shoots (called “*cime di rapa*” in Italian) that Italian turnip broccoli (*B. rapa*) is grown in gardens in South and Central Italy. The same use is made in Italy of the *B. oleracea* leafy kale, where the inflorescence-bearing shoots are called “*cime*” or “*broccoletti*.”

The same use of these plants was also evidently practiced among the Latins, who used the word “*cyma*” or “*cymatis*,” to indicate the tender shoots of some vegetables and especially of the coles. The word is derived from the Greek κύμα (*kyma*), which refers to anything swollen, ranging from the “fruit of a plant” to the “foetus,” or the “swollen sea,” hence “waves,” “billows.” It was also used to indicate young sprouts of plants by Theophrastus (370–287 B.C.E.) in his *Historia*

Plantarum (1.6.9), and especially those of a “cabbage” (where we prefer to read a “cole crop”), in the case of Galen (II century C.E.) (Liddell and Scott 1982).

We can find examples of the use of the word *cyma* by the Latins in Pliny and in Columella, another Roman writer of the I century C.E., author of 12 volumes on “Agriculture” (*De re rustica*):

Ex omnibus brassicae generibus suavissima est cyma, at inutilis habetur, difficilis in coquendo et renibus contraria.

[In all varieties of **brassica**, the part most agreeable to the taste is the **cyma**, although no use is made of it in medicine, as it is difficult to digest, and by no means beneficial to the kidneys.]

—Pliny, *Historia Naturalis* 20. 35. 90 (Perseus Digital Library 2009)

Cymam, caule<m>, capparim, ... compluribus diebus sub tecto siccari, dum flaccescat, et tum eodem modo condiri convenit quo ferulam.

[**Cymam, caule<m>**, capers...must be dried indoors for many days until they wither and they can then be dressed in the same way as ferula.]

—Columella, *De re rustica* 12.7.5 (The Latin Library 2009)

CAPUT

It is later, in the Middle Ages, that the medieval Latin *caputium* was used to designate the headed cabbage (*Brassica oleracea* var. *capitata*). The word derives from Latin *caput* (head) and it is easy to understand why the headed cabbages were named in this way (see Fig. 2). The



Fig. 2. Head cabbages at an Italian market.

French *cabus*, the German *Kappes*, the English *cabbage*, the Estonian *kapsas*, the Croatian *kupus*, the Hungarian *káposzta*, and the Slovak *kapusta* all derive from this.

THE HIEROGLYPH *SHAUT*

In his translation of Papyrus Harris, Breasted (1906) interpreted the word *shaut*, to his admission not above question, as “cabbage” (see Fig. 3). Papyrus Harris was written on the occasion of the death of Ramses III (1166 B.C.E.) and includes a list of all the benefactions that he made to gods and men during his entire reign. Among the various oblations (bread, beer, wine, honey, fruit, figs, olives, and so forth) that he offered for the feasts dedicated to the god Amon, there are also 620 *hekets* (corresponding to about three cubic meters) of *shaut* (cabbage?). However, Aufrère (1987) dismantled with good arguments the scarcely founded belief that coles were known to the ancient Egyptians. On the one hand, the word *shaut* should be interpreted as a generic “vegetable” (Keimer 1924 in Aufrère 1987). On the other hand, a confirmation that the Egyptians did not have an original word for “coles” comes from the use of the words “*grmb*” (Demotic), *krambe* (Coptic, Sahidic dialect), and *jarambo* (Coptic, Bohairic dialect), which all undoubtedly derived from the Greek κράμβη.

THE LINGUISTIC HYPOTHESIS OF A CELTIC ORIGIN OF THE COLES

According to De Candolle (1885), common names for the coles are numerous in the European languages, while they are rare and modern in the Asiatic languages, this being considered an indication that the species is of European origin, as opposed to Asiatic origin. Within Europe, De Candolle distinguishes four or five distinct and ancient roots, as follows:

- *Kap* or *Kab*: In several Celtic and Slavic names. From this root also the French name *Cabus* derives. The origin is the same as for *Caput*, due to the head shape of the cabbage.



Fig. 3. The hieroglyph *shaut*, from Aufrère, 1987.

- *Caul*, *Kohl*, of several Latin languages (*Caulis* means both stem and cabbage), German languages (*Chôli* in ancient German, *Kohl* in modern German, *Kaal* in Danish), and Celtic languages (*Cal* in Irish, *Kaol* and *Kol* in Breton).
- *Bresich*, *Bresych*, *Brassic*, of Celtic and *Brassica* of Latin languages, from which probably *Berza* and *Verza* of the Spanish and Portuguese, *Varza* of the Romanians.
- *Aza* of the Iberian Basques and, according to Charencey (1869, in De Candolle 1885), this is typical of the Euskara (i.e., ancestral Basque) language, although it is not much different from the previous names.
- *Krambai*, *Crambe*, of the Greeks and Latins.

Discussion

Consumption by human beings of fruits and vegetables has been a necessity at all times to satisfy nutritional needs, particularly for essential vitamins and minerals. Seeds of plants that could be used as leafy vegetables (*Chenopodium*, *Polygonum*, *Rumex*, *Atriplex*, *Malva* and also crucifers like *Capsella bursa-pastoris* (L.) Medik. among others) were documented in Neolithic sites of the Fertile Crescent, dated between the ninth and sixth millennia B.C.E. (French 1972; Helbaek 1964, 1970; Zeist 1970, 1972). Most likely these were weeds accompanying the cereals and legumes, but they also might have been collected from the wild to be used as salad greens, potherbs, or flavoring plants. Only after mastering irrigation did it become possible to grow vegetables in kitchen gardens and to start orchard husbandry. Fruit cultivation is documented in the early fourth millennium B.C.E. with the presence of olive, fig, grape, pomegranate, and date palm in the Palestinian area (Zohary and Hopf 2000). Vegetable gardens are supposed to have evolved together with fruit orchards and the first records of cultivated vegetables refer to fourth millennium B.C.E. onion, garlic, and kurrat leek remains found near the Dead Sea and in Jericho (Hopf 1983; Zaitschek 1980). Pictorial evidence shows the existence of vegetable gardens in Egypt in the third if not the fourth millennium B.C.E. (Leach 1982), where leafy vegetables such as lettuce and leek are recognizable. Accounts of transactions kept by tomb builders in the period 1300–1100 B.C.E. show evidence for the consumption of vegetables (Janssen 1975), but

specific individual crops were not itemized, since generic words were used by the Egyptians to indicate vegetables. Archaeological remains of vegetables from ancient Egyptian sites, dated from the Predynastic (ca. 3000 B.C.E.) to the ancient Roman period, allowed identification of onions, garlic, leek, radishes, celery, cucumber, melon, and watermelon (Murray 2000). According to the Bible (Numbers 11:5), the Israelites, in longing for the foods of Egypt during their exodus, which can be placed between the XV and XIII century B.C.E., mentioned the qishu'im (melons), avattihim (watermelons), hazir (kurrats), bezalim (onions), and shumim (garlics), that is, cucurbits and alliums, but no cole crops.

Important evidence for kitchen gardening in the Mesopotamian cultures of the first millennium B.C.E. is the tablet in cuneiform text describing the Babylonian garden of king Merodach-baladan (late VIII century B.C.E.) (Leach 1982). Other vegetable names are part of the list of ingredients for a consecratory feast given by the Assyrian king Ashur-Nasir-Apli II (IX century B.C.E.) (Leach 1982). These sources allow identifying with certainty a limited number of vegetables, including lettuce, beet, radish, turnip, leek, garlic, onions, cucumber, gourds, and several flavoring herbs (Leach 1982). Even though many plants remain unidentified, both in the garden lists and feast provisions (Leach 1982), cole crops are not specifically mentioned among the ancient Egyptian or Mesopotamian vegetable lists.

In the Upanishads, commentaries to the Hindu Veda books in Sanskrit, both black mustard (*Brassica nigra*) and yellow sarson (*Brassica rapa*) are mentioned (respectively as "Sarshap" and "Siddhartha"). These scriptures report oral traditions dating back to the second millennium B.C.E., although they were written much later, roughly around the middle of the first millennium B.C.E. However, there is no mention of coles in these books (Prakash and Hinata 1980). There is also no mention of coles in the Bible, where the closest item to our crop of interest is black mustard or *Brassica nigra* (σίναπι - sinapi), which appears in the New Testament (Mark 4:30–32 and Matthew 13:31–32).

The most ancient works of Greek literature (the Homeric poems of the VIII century B.C.E.) contain about 50 botanical names, as part of environmental descriptions or literary similes. These poems cannot therefore be expected to provide an exhaustive account of all the plants

and crops in use in Greece at the time. Among the cultivated vegetables, onions (κρόμμυον) are mentioned, but not the coles (Forster 1936).

The oldest written account that we can safely take to refer to the cole crops is the use of the Greek words κράμβη (Iambic poets of the VI century B.C.E.) and ῥάφανος (comedy poets of the V century B.C.E.), respectively in the Doric and Attic dialects (even though ῥάφανος has also meant radish outside of the Attic dialect speaking area). These words might have derived from ancestral Indo-European roots, evoking the idea of curling (of leaves) or turning, rolling into a ball (of leaves or roots). Both words continued to be used for many centuries and contemporary philologists have clarified that they were applied to the same plant.

Starting with the VI century B.C.E. and onward, ancient Greek literature is rich in references to the coles. These words were used by the early poets in comic forms of oath and to invoke the name of magic and prophetic vegetables. Later fragments tell us that leaves were used as simple food after boiling. The plant was considered an antidote against drunkenness as well as antagonistic to the growth of grapes. It was described as being rich in medicinal properties and able to cure all manner of diseases. Various types of coles, which we can interpret in all cases as being leafy kales, are described by Theophrastus (IV century B.C.E.) in his *"Enquiry into Plants"* (7.4.4) and later authors. Theophrastus mentions three types of raphanos (ῥάφανος): curly-leaved (οὐλόφυλλος - oulophyllous), smooth-leaved (λειόφυλλος - leiophyllous), and wild (ἀγρία - agria). Eudemus (II century B.C.E.) (Fragment 9 Garcia Lazaro in Ateneo 2001) speaks about three types of krambe (κράμβη): maritime (αλμυρίς - almyris), smooth-leaved (λειόφυλλος - leiophyllous), and celery-like (σελινούσα - selinousa). For Nicander (II century B.C.E.), krambe (κράμβη) can be smooth (λείη - leie), curly (οὐλή - oule), and purple colored (ἐπιφαινίσσουσα - epiphoinissousa) (Fragment 85 Gow-Scholfield in Ateneo 2001). Different qualities of krambe (κράμβη), based on their geographic provenance, are mentioned by Diphilus of Sifnos (III century B.C.E.): good and sweet from Cumae, bitter from Alexandria (Fragment 15 Garcia Lazaro in Ateneo 2001).

The linguistic hypothesis claims that another Greek dialectal word, βράσκη (braske), which was used by the Greek colonists in South Italy, became the *brassica* of the ancient Romans. This

idea points towards this area, which included coastal Greek settlements in Sicily, Calabria, Apulia, and Campania, as the possible location where cultural, agricultural, and medical traditions related to cole crops were transferred from the Greek to the ancient Roman world. That the medical tradition and high praise for cole crops were passed to the ancient Romans from the Greek colonies of South Italy, is indicated by the reference made by Cato to the so-called *Brassica pythagorea* (Pythagorean *Brassica*), which is a generic *Brassica oleracea*, and therefore to the Pythagorean culture that was established in Calabria in the VI century B.C.E. Indeed, "*brassica*" is the most ancient word used by the ancient Romans to indicate the coles and it is found in the earliest surviving work of Latin literature, in the comedies of Plautus (III century B.C.E.), as well as in the most ancient surviving piece of Latin prose, i.e., "*De agri cultura*" of Cato (II century B.C.E.). An entire chapter is dedicated by Cato to the healing properties of the coles, probably with information largely drawn from the Greek physicians.

Latin literature is extremely rich in references to the coles, which evidently occupied an important role in the vegetable gardens of the time. Greek knowledge and beliefs about coles are reported almost unaltered by Cato, Cicero, Pliny, and others. New information about several varieties of coles and their area of cultivation (prevalently in Central and South Italy) is provided by the writers on agriculture of the I century C.E., Columella and Pliny. Some of these varieties are probably heading types (i.e., cabbages or cauliflowers), according to the descriptions of Pliny.

In parallel with the use of the word "*brassica*," another word of Greek origin, i.e., καυλός, *caulis* in Latin, gradually became predominant, indicating all types of coles. This word, standing for "stem," which is the most characteristic part of the leafy kale, eventually started to be used to indicate the entire plant, and it remained in use, with little variation, in many European languages, even after the plant started to differentiate into many forms, where the stem was no longer always the most evident anatomical part. Another group of words that is currently used in European languages generally to indicate heading coles (cabbage, cabus, kapusta, Kappes), is derived from the Latin *caput*, "head." Interestingly, there is no Greek correspondence in this case, as if the

appearance of heading coles had started in a Latin speaking area.

De Candolle used the argument of the variety of names in the Celtic languages to consider it likely that the Celts did not import the plant and the corresponding terminology from elsewhere, but rather created a variety of linguistic roots themselves. However, all the “Celtic” roots quoted by De Candolle seem actually to derive from the Greek (*krambai* and *kaulos*) or Latin (*brassica*, *caput*, *caulis*) origins.

According to Wilson (1991), the wild cabbage is thought, on the grounds of linguistic evidence, to have been a food-plant among the Iron Age Celts along the Atlantic seaboard of Europe. This linguistic evidence, however, is not specified. As mentioned by Hervé (2003), the old Irish *brassech* and the Welsh *bresych* are sometimes considered the sources of the Latin *brassica*, but the reverse is also equally possible and actually indicated as the correct etymological derivation by Ernout and Meillet (1932). Incidentally, Hervé also mentions the word *burutzim* of the Punic language, the Phoenician dialect of Carthage, as being considered close to *brassica* by the philologists.

The Celtic literary tradition only begins with Old Irish from about the VIII century B.C.E. In any case, the presence of the *B. oleracea* in Celtic literature is not nearly as evident as in the Greek and Latin documents. It is therefore difficult to justify, on the basis of literary evidence, a deeply rooted tradition of the use of coles in the West Atlantic coasts or anything that might resemble a process of domestication.

The Celts entered into contact with the Greeks as early as the VI century B.C.E. or even before (Massalia/Marseille was established as a Greek colony around 600 B.C.E.) and started to fight the Romans in Italy from the beginning of the IV century B.C.E. At the start of the V century B.C.E., the Carthaginians dominated the Western Mediterranean and entered into contact with the Greek colonies in Sicily and elsewhere and with Etruscans and Celts. Their ships reached the Atlantic and the coasts of Britain, where they procured silver and tin. The numerous contacts between all these populations may have allowed the spread of seed, knowledge, and words, but it is no simple matter to define the directionality of the exchanges.

The linguistic indications and the literature outline provided in this article point to the

northeastern part of the Mediterranean, particularly the ancient Greek-speaking world, as the area where traditional knowledge and use of cole crops (probably just leafy kales in this case) were already deep-rooted as early as the VI century B.C.E. The presence of Greek traders in South Italy and the subsequent establishment of colonies starting from the VIII century B.C.E. seems to have influenced the Roman world linguistically, while at that time they might well have transferred uses, traditions, and perhaps seeds of cole crops. A great diversification of forms, colors, and shapes among leafy kales, cauliflowers, and broccoli seems to have taken place in Italy where the coles affirmed themselves among the most prominent vegetables. This is testified by the wide coverage they received in original works on agriculture, as well as through poetry and literary quotations documenting their vivid presence in the ancient Roman culture. The adoption of the word used for a generic vegetable (“*holus*”) to indicate the coles specifically as of the I century B.C.E., is another sign of the importance acquired by this crop. It is not difficult to imagine that the expansion of the Roman Empire might have also easily propelled the wider circulation (and further evolution) of this crop to other areas of Europe. The linguistic trace is compatible with this interpretation, whereby the descendants of the original vegetable stems (καυλός, *caulis*) are today named in a similar way in different parts of Europe (*cal*, *cavolo*, *chou*, *couve*, *kaal*, *kale*, *Kohl*, *kol*).

In summary, this paper synthesizes information from the linguistic, literary, and historical points of view that is compatible with domestication of *B. oleracea* in the ancient Greek-speaking area of the north-central and northeastern areas surrounding the Mediterranean. This area, during the VIII–VI century B.C.E., extended from Southern Italy to Greece and the west coasts of Turkey. There is a marked overlap of this area and the distribution area of the wild relatives of *Brassica oleracea* in the Mediterranean (Snogerup et al.1990). The absence of any trace of coles in ancient Near East documentary sources is therefore not completely surprising, but rather a confirmation that the origin of the cole crops is likely to be authentically North Mediterranean. The alternative hypothesis of a Northwest Atlantic origin, which mainly relies on the molecular findings of Song et al. (1990), is not supported by our essay. The molecular data indicated that the *B. oleracea* populations growing in the wild along

the North Atlantic coasts of Europe seem to be the closest to cultivated forms and, thus, they likely are the most closely related to the ancestors of cultivated *B. oleracea*. However, a correct interpretation of these data may not require that the domestication took place on the Atlantic coasts if we assume the possibility that the Atlantic wild *B. oleracea* are actually escapes from imported cultivated plants. This hypothesis has been already substantiated by Mitchell (1976), who observed that the wild derivatives of cultivated plants become morphologically indistinguishable from “native” plants within a few generations. On the basis of historical records of the wild populations of *B. oleracea* and their close proximity to villages and towns, he suggested that “cabbage” was brought to the British Isles by Romans or Saxons and that native populations of *B. oleracea* might be regarded as introductions. A suggestion was also made by Grenier and Godron (1848) that *B. oleracea* on the cliffs of the French Channel coast was adventive. The lack of correlation between genetic structure and geographic distribution of wild *B. oleracea* populations in England and Wales (Watson-Jones et al. 2005) and the high degree of genetic homogeneity among the wild North Atlantic *B. oleracea*, contrasting with the substantial diversity detected within the Mediterranean wild brassicas (Allender et al. 2007; Snogerup et al. 1990), support Mitchell’s hypothesis.

Forthcoming studies focusing, inter alia, on the difference between populations that are truly wild versus those escaped from cultivation, will further test the hypothesis that the cultivated coles are of Mediterranean origin.

Acknowledgments

The authors wish to thank Toby Hodgkin and Lorenzo Costantini for their encouragement and advice and for sharing their bibliographic material. We also thank Francesco Tiradritti for his advice on the Egyptian chapter, Maria Garruccio and Helen Thompson for their help in providing bibliographic sources, and the two anonymous reviewers of *Economic Botany* for their valuable remarks and their contribution to an earlier draft of this paper.

Literature Cited

- Allender, C. J., J. Allainguillaume, J. Lynn, and G. J. King. 2007. Simple Sequence Repeats Reveal Uneven Distribution of Genetic Diversity in Chloroplast Genomes of *Brassica oleracea* L. and (n = 9) Wild Relatives. *Theoretical and Applied Genetics* 114:609–618.
- Anonymous. 2009a. Gaulish language. <http://www.webcitation.org/5juOpvcj6> (19 September 2009).
- . 2009b. Ogham. <http://www.webcitation.org/5juPMH5w4> (19 September 2009).
- . 2009c. List of Proto-Indo-European Roots. <http://www.webcitation.org/5gCyUPAd7> (21 April 2009).
- Aristotle. 1952. *Historia Animalium*, with an English Translation by M.A. Peck. Vol. II. Heinemann, London and Cambridge, Massachusetts.
- Ateneo. 2001. *I Deipnosofisti - i dotti a banchetto*. Salerno editrice, Roma.
- Aufrère, S. 1987. Études de lexicologie et d’histoire naturelle XVIII–XXVI. *Bulletin de l’Institut Français d’Archéologie Orientale* 87:21–44 (XXV:40–42).
- Bailey, L. H. 1922. The Cultivated Brassicas. *Gentes Herbarium* 1:53–108.
- von Bothmer, R., M. Gustafsson, and S. Snogerup. 1995. *Brassica* sect. *Brassica* (*Brassicaceae*). II. Inter- and Intraspecific Crosses with Cultivars of *B. oleracea*. *Genetic Resources and Crop Evolution* 42:165–178.
- Breasted, J. H. 1906. *Papyrus Harris. Ancient Records of Egypt*, Vol. 4:87–139 (240).
- Canali, L. and E. Lelli. 2000. *Catone il Censore. L’agricoltura*, Arnoldo Mondadori Editore S.p.A. Milano, Italy.
- Carnoy, A. 1959. *Dictionnaire étymologique des noms grecs des plantes*. Publications Universitaires, Louvain, Belgium.
- Chantraine, P. 1968. *Dictionnaire étymologique de la langue Grecque*. Klincksieck, Paris.
- De Candolle, A. 1885. *Origin of cultivated plants*. D. Appleton and Company, New York.
- Ernout, A. and A. Meillet. 1932. *Dictionnaire étymologique de la langue latine, Histoire des mots*. Klincksieck, Paris.
- Facciolati J., A. Forcellini, and J. Furlanetti, editors. 1864. *Lexicon Totius Latinitatis*. Pata-vii Typis Seminarii.
- Forster, E. S. 1936. Trees and Plants in Homer. *The Classical Review* 50:97–104.
- French, D. H. 1972. Excavations at Can Hasan III, 1969–1970. Page 187 in E. S. Higgs, ed., *Papers in Economic Prehistory*, Cambridge, U.K.

- Glinister, F., and S. Renton. 2006. Festus Lexicon Project. <http://www.webcitation.org/5gD0YihpG> (21 April 2009).
- Gomez-Campo, C. and S. Prakash. 1999. Origin and Domestication. Pages 33–58 in C. Gomez-Campo, ed., *Biology of Brassica Coenospecies*. Elsevier Science B.V, Amsterdam.
- Grenier, M. and M. Godron. 1848. *Flore de France*. J.-B. Baillière, Paris.
- Haynes, C., E. Everhart, R. Jauron, D. Nelson, and J. Lenahan. 2009. *Cole Crops*. Iowa State University Extension. <http://www.extension.iastate.edu/Publications/PM1896.pdf> (20 December 2009).
- Helbaek, H. 1964. First Impressions of the Çatal Hüyük Plant Husbandry. *Anatolian Studies* 14:122.
- . 1970. Pages 197–198 and 233–234 in J. Mellaart, *Excavations at Hacilar*. Published for British Institute of Archaeology at Ankara. Edinburgh University Press, Edinburgh.
- Hervé, Y. 2003. Choux. Pages 222–234 in M. Pitrat and C. Foury, eds., *Histoire de légumes*. INRA Éditions, Paris.
- Hopf, M. 1983. Jericho Plant Remains. Pages 576–621 in K. M. Keynon and T. A. Holland, eds., *Excavations at Jericho*, Vol. 5. British School of Archaeology in Jerusalem, London.
- Hyams, E. 1971. Cabbages and Kings. Pages 33–37 in *Plants in the Service of Man*. J. M. Dent & Sons Ltd., London.
- Janssen, J. J. 1975. *Commodity Prices from the Ramessid Period*. E. J. Brill, Leiden, the Netherlands.
- Körber-Grohne, U. 1987. *Nutzpflanzen in Deutschland*. Konrad Theiss Verlag, Stuttgart, Germany.
- Leach, H. M. 1982. On the Origins of Kitchen Gardening in the Ancient Near East. *Garden History* 10(1):1–16.
- Liddell, H. G. and R. Scott. 1982. *A Greek-English Lexicon*, Eighth edition. Clarendon Press, Oxford, U.K.
- Meineke, A. 1839–1857. *Fragmenta Comiorum Graecorum*, vols. 1–5. Berolini, Berlin.
- Mitchell, N. D. 1976. The Status of *Brassica oleracea* L. subsp. *oleracea* (Wild Cabbage) in the British Isles. *Watsonia* 11:97–103.
- Murray, M. A. 2000. Fruits, Vegetables, Pulses and Condiments. Pages 609–655 in P. T. Nicholson and I. Shaw, eds., *Ancient Egyptian Materials and Technology*. Cambridge University Press, Cambridge, U.K.
- Perseus Digital Library. http://www.perseus.tufts.edu/cache/perscoll_Greco-Roman.html (29 November 2009).
- Pokorny, J. 1959. *Indogermanisches Etymologisches Woerterbuch*. Francke, Bern, Switzerland.
- Prakash, S. and K. Hinata. 1980. Taxonomy, Cytogenetics and Origin of Crop Brassicas, A Review. *Opera Botanica* 55:1–57.
- Schiemann, E. 1932. Brassica und andere Crucifere. Pages 271–288 in *Entstehung der Kulturpflanzen*. Handbuch der Vererbungswissenschaft, Berlin.
- Schulz, O. E. 1936. Cruciferae. Pages 227–658 in A. Engler and H. Harms, eds., *Die Natürlichhen Pflanzenfamilien*. [S.N.], Leipzig, Germany.
- Smith, L. B. and G. J. King. 2000. The Distribution of *BoCAL-a* Alleles in *Brassica oleracea* Is Consistent with a Genetic Model for Curd Development and Domestication of the Cauliflower. *Molecular Breeding* 6:603–613.
- Snogerup, S. 1980. The Wild Forms of the *Brassica oleracea* group (2n=18) and Their Possible Relations to the Cultivated Ones. Pages 121–132 in S. Tsunoda, K. Hinata, and C. Gomez-Campo, eds., *Brassica Crops and Wild Allies*. Biology and Breeding. Scientific Society Press, Tokyo, Japan.
- , M. Gustafsson, and R. von Bothmer. 1990. *Brassica* sect. *Brassica* (*Brassicaceae*): I. Taxonomy and Variation. *Willdenowia* 19:271–365.
- Song, K., T. C. Osborn, and P. H. Williams. 1990. *Brassica* Taxonomy Based on Nuclear Restriction Fragment Length Polymorphisms (RFLPs). 3. Genome Relationship in *Brassica* and Related Genera and the Origin of *B. oleracea* and *B. rapa* (syn. *campestris*). *Theoretical and Applied Genetics* 79:497–506.
- Stephano, H. 1841. *Thesaurus Graecae Linguae*. Parisiis, excudebat Ambrosius Firmin Didot, Instituti Regii Franciae Typographus.
- The Latin Library. <http://www.thelatinlibrary.com/index.html> (29 November 2009).
- Thesaurus. 1906–1912. *Thesaurus Linguae Latinae*. Editus Auctoritate et Consilio Academicarum Quinque Germanicarum. Lipsiae in Aedibus B.G. Teubneri.

- Toxopeus, H. 1974. Outlines of the Evolution of Turnips and Coles in Europe and the Origin of Winter Rape, Swede-Turnips and Rape Kales. Proceedings of Eucarpia "Cruciferae 1974," Dundee, Scotland, 25–27 September 1974, pp. 1–7.
- Watson-Jones, S., N. Maxted, and B. Ford-Lloyd. 2005. Genetic Variation in Wild Brassicas in England and Wales. *Crop Wild Relative* 3:20–24.
- Wikisource. 2009. <http://www.webcitation.org/5jvnCpCGg> (20 September 2009).
- Wilson, C. A. 1991. Food and Drink in Britain. From the Stone Age to the 19th Century. Academy Chicago Publishers, Chicago.
- Zaitschek, D. V. 1980. Pages 223–227 in P. Bar-Adon, ed., The Cave of the Treasure. Israel Exploration Society, Jerusalem.
- van Zeist, W. 1970. The Oriental Institute Excavations at Mureybit, Syria: Preliminary Report of the 1965 Campaign. Part III: The Palaeobotany. *Journal of Near Eastern Studies* 29:175.
- . 1972. Palaeobotanical Results of the 1970 Season at Çayönü, Turkey. *Helinium* 12:3–19.
- Zohary, D. and M. Hopf. 2000. Domestication of Plants in the Old World, 3rd edition. Oxford University Press, Oxford, U.K.