

Classical and Hebrew Sages on Cultivated Biennial Plants Part I

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Of the potherb class some have only one stem and come as it were to have the character of a tree, such as cabbage and rue: wherefore some call these tree-herbs (δενδρολάχανα) (Theophrastus, *HP* 1.3.4).

... it is said that the radish was rated so far above other articles of food that, such is the frivolity of the Greeks, in the temple of Apollo at Delphi, a radish modelled in gold was dedicated as a votive offering, though only a silver beetroot and a turnip of lead (Pliny, *NH* 19.87).

To some degree [the properties of wild lettuce] are similar to those of opium poppy, thus some people mix its juice with opium (Dioscorides, *MM* II. 136).

The turnip and the rape, and the cabbage and the thin cabbage, the chards and the sorrels are not forbidden to sow with one another (Mishna, Kil'ayim I: 3).

Theophrastus (371-287 BCE) established the foundations of botany in *Historia Plantarum* (*HP*) and the *Causis Plantarum* (*CP*) (Greene, 1983; Morton, 1986; Sharples, 1995: 124-7). Among the plants treated by him are a number of biennials (most of which are cultivated potherbs, and a few wild ones). Biennial plants complete their life cycle in two seasons — in one or two successive years. During the first, some biennials produce hypogeous storage and perennation organs, such as bulbs, corms, rhizomes, stem- and root-tubers (*Glossary* at Raven, Evert and Eichhorn, 1992). At the same time, the short stems of carrot, radish, cabbage and lettuce develop a leafy rosette. During the second season, the stem elongates, blooms and produces seed. The product of the first stage, the tuberous hypocotyl-root¹ of the carrot, radish, turnip or beet, the scales of the onion bulb, the cloves of the garlic enclosed within thin dried leaves of its bulb, and the leaves [heads] of cabbage and lettuce, are consumed. Seeds of biennials are grown for propagation, whereas oil is produced from those of radish and lettuce.

In *Naturalis Historia* (*NH*), Pliny (23-79 CE) inserted numerous Theophrastian sections concerning the biennials and incorporated information from other sources, such as Mago, the Carthaginian whose agricultural treatise was translated into Latin, by Senate order, after the fall of Carthage in 146 BCE (*NH* 28.22; Morton, 1981: 77, 1986), and the Roman agriculture authors Cato and Varro.² In *NH* 1.65-127, Pliny named the

¹ The hypocotyl is the axial part of the embryo, or seedling, located between the cotyledon(s) and the radicle, or the root (Esau, 1977: 512; Raven et al., 1992).

² According to White (1970: 17), apart from Pliny, Theophrastus' work goes almost unacknowledged by Roman writers. He is cited once by Pliny's contemporary, Columella (*On agriculture* 1.1.7) and not at all by Cato (234-149 BCE), Varro (116-27 BCE) or Palladius (4th-5th century CE). Theophrastus' text on cabbage is, however, reflected without mentioning his name in Cato's *On agriculture* 157 (Sharples, 1995: 172).

authors he cited in his botanical books. Even so, his original contribution to botany was not insignificant (Beagon, 1992: 233-7, n. 52; Greene, 1983: 227-8; Lloyd, 1983: 135-49; Meiggs, 1982: 19-29; Morton, 1981: 70-1; 1986; Stannard, 1965). Pliny's contemporary, Dioscorides, scrutinized, in *Materia Medica* (*MM*), plants,³ animals and minerals (Greene, 1983, I: 6, 218-23; Riddle, 1985, 1992; Scarborough and Nutton, 1982; Wellmann, 1914). Galen (120-201 CE) considered Dioscorides to have displayed in a most beautiful way the teaching about the medical materials (1965, IX 794).

The agricultural tractates of the Mishna, Tosefta and Gemara (Talmud) show that Jews shared the Classical agricultural practices. The Talmudic sources, themselves, reflect diverse agricultural territories and traditions, Eretz Israel in the Mishna and the Jerusalem Talmud (Yerushalmi), versus Mesopotamia in the Babylonian Talmud (Feliks, 1963, 1986; Lieberman, 1962; Newman, 1932). These territories certainly varied in their climate and agricultural practices.

The present article reviews the biennial vegetables described by Theophrastus, Pliny, the Roman writers on agriculture: Cato, Varro, Columella and Palladius, Dioscorides and Hebrew sages.

General features of biennial herbs

Theophrastus describes the common features of the biennial herbs. They share, mainly, a taproot system, which is tuberous⁴ or not, in both geophytes and hemicryptophytes,⁵ and two stages of stem development, a contracted rosette and an elongated flowering stem.⁶ Concerning their roots Theophrastus says:

... in general most of the potherbs have single roots, as cabbage, beet, celery ... but some have large side-roots, as celery and beet, and in proportion to their size these roots are deeper than trees.⁷ Again of some the roots are fleshy,⁸ as in radish, turnip ... (*HP* 1.6.6).

Pliny converts, in this passage (as in many others), the Greek *ράφανος* (cabbage) into the Latin *raphanus* (radish) and says that celery and beet have a fibrous root system (*NH* 19.98-100).

³ In the 6th century illustrated manuscript of *MM*, the roots are usually drawn curved -- in order to save space. However, geophyllous organs of perennation and storage are drawn in their correct orientation (Dioscorides, 1965-1970).

⁴ Without a magnifying glass Theophrastus' plant anatomy was minimal (n. 9). Theophrastus, who rarely described or named a plant organ (*μέρος* = part) not commonly known, excluding his invention *περικάρπιον* (Greene, 1983, I: 165-7, & n. 101; Morton, 1981: 33), could not distinguish between the part of the shoot lacking leaves (the *hypocotyl*) and the adjacent root. Only during the mid-19th century was it established that, in some species, the hypocotyl and the base of the taproot jointly form a fleshy structure = the tuberous root (Artschwager, 1926; Esau, 1940; 1965: 518).

⁵ Geophytes and hemicryptophytes bear their regeneration buds below and at ground level, respectively (Raunkiaer, 1934).

⁶ After seed formation, the bi-seasonal or biennial plant dies.

⁷ We have changed this sentence following Amigues' translation.

⁸ In describing geophyllous organs of axial and foliar origin: bulbs, corms, tubers and rhizomes, Theophrastus reluctantly used the term root, since they did not correspond to his strictest definition of the term (*HP* 1.6.8-10; Negbi, 1989).

Theophrastus described the root of beet merely as fleshy; in others, the roots gained an almost anatomical description:

... some again are made, as it were, of bark and flesh, as those of radishes and turnips (*HP* 1.6.7; also *HP* 7.2.5-6).⁹

While defining his life-form classes (trees, shrubs, under-shrubs and herbs), Theophrastus describes herbs as:

... a thing which comes up from the root with its leaves and has no main stem ... for instance, corn and potherbs.

These definitions ... must be taken and accepted as applying generally ... For in the case of some plants it might seem that our definitions overlap, and some under cultivation appear to ... depart from their essential nature, for instance, mallow [*Lavatera arborea*] when it grows tall and becomes tree-like ... So too is it with the beets, they also increase in stature under cultivation ... (*HP* 1.3.2-3).¹⁰

In the mallow and the beet, Theophrastus considers shoot bolting from the rosette to the caulescent stage to be a result of cultivation and not a normal developmental sequence. Yet he says that some under-shrubs and potherbs have only one stem that:

have the character of a tree, such as cabbage and rue: wherefore some call these *tree-herbs*; and ... all or most of the potherb class when they have been long in the ground ... the whole plant comes to have a tree-like shape, though it is shorter lived than a tree (*HP* 1.3.4).¹¹

Transplanting was already a known practice in his time:

All herbs grow finer and larger if transplanted ... Transplanting is done especially in view of collecting seed: and, while most herbs bear it well, as long onion,¹² leek, cabbage, cucumber, celery, turnip, lettuce, others bear it less well (*HP* 7.5.3; cf. *HP* 7.4.3).

To this Pliny adds that transplanting has a 'medicinal' effect, and long onion, leek, radishes, apium, lettuces, turnip and cucumber cease to suffer from injuries when transplanted (*NH* 19.184; cf. *NH* 19.171). It is noteworthy that Pliny ingeniously expressed the optimal *age* for seedling transplanting in *leaf number*.

According to the Jerusalem Talmud (circa 200-400 CE) and other Talmudic sources, it was common, in Roman and Byzantine Palestine, to leave a few cabbages and onions in the field to bolt, bloom and produce seeds. These were called 'מִתְחַוֵּת' (mothers) of cabbage (Yerushalmi, Sheviit 9a, 227) and onion (Mishna, Pe'ah 3.4 and Yerushalmi, Pe'ah 17c). Radishes and turnips were transplanted from the field to a small plot for this aim (Mishna, Ma'asrot 5b; Feliks, 1963: 128, 180).

Theophrastus relates to potherb phytopathology in a rather concise section:

⁹ Plant anatomy initiated with the use of the microscope by Malpighi and Grew, who presented their *Anatome plantarum idea* and *The anatomy of vegetables begun*, to the Royal Society in 1671.

¹⁰ Compare to *HP* 1.9.2; 6.1.2, and Amigues' n. 5 to *HP* 1.3.

¹¹ However, these 'tree-like stems' die soon after they set seed. *Dendrolakhana* is a folk term (introduced by 'some call these') and not a scholarly one coined by him.

¹² Γήθουον, *Allium cepa* var. in Hort; and chive, *A. schoenoprasum*, in Amigues' n. 19 to *HP* 1.6.9.

... radish is attacked by spiders [flea-beetles],¹³ cabbage by caterpillars and grubs, while in lettuce, leek, and many other herbs occur 'leek-cutters'. These are destroyed by collecting green fodder, or when they have been caught somewhere in a mass of dung, the pest being fond of dung emerges, and, having entered the heap, remains dormant there; wherefore it is then easy to catch ... against spiders it is of use to sow vetch among the crop; to prevent the spiders from being engendered ... there is no specific [method?]. (*HP* 7.5.4).

In what follows, the treatments of the various biennial taxa described by Classical and Hebrew sages (Table 1) are taken up separately.

Table 1: Greek, Latin, Hebrew & Aramaic names of the biennial plants discussed here.

Family <i>Species</i>	Theophrastus' <i>HP & CP</i> and Dioscorides' <i>MM</i>	Pliny's <i>NH</i>	Hebrew sages' Mishna, Tosefta and Gmara (Talmud)
Chenopodiaceae			
beet: <i>Beta vulgaris</i>	τεύτλον (τευτλίον)	beta	אָקל'ס'וּם יִדְמָת
Umbelliferae			
Celery: <i>Apium graveolens</i>	σέλινον, σέλινον τὸ ἔλειον & ἐλειοσέλινον	apium ^A	כַּרְפַּס
marsh celery: <i>A. nodiflorum</i> ^B	σέλινον τὸ ἔλειον & ἐλειοσέλινον		
alexanders & Cretan alexanders: <i>Smyrnium olusatrum</i> & <i>S. perfoliatum</i> (in <i>NH</i>)	ἵπποσέλινον	olusatrum hipposelinum smyrnium-ion zmyrnium-ion	
parsley <i>Petroselinum sativum</i> = <i>P. crispum</i>	ὄρειοσέλινον		פַּרְסֵלְיִן
carrot & wild carrot: <i>Daucus carota</i> sub- species <i>sativus</i>	δαῦκον, δαῦκος ^C (= σταφυλίνας)	Daucus-um	אֵיסְטְפִינִי
Cruciferae			
radish: <i>Raphanus sativus</i>	ῥαφανίς	raphanus	צַנּוֹן
turnip: <i>Brassica rapa</i> ^D	γογγυλίς	rapa-um	תַּפְת
rape: <i>Brassica napus</i>	—	napus	נַפּוּס, נַפּוּץ

¹³ Prof. S. Amigues wrote to us that: Contresens dans le traduction Hort: le texte donné *psioullai*, qui signifie *pouces*, et non *araignées* (ce serait *arakhnai*). Les *pouces* en question sont très probablement...de l'espèce *Altica oleracea* [of the Coleoptera] particulièrement nuisible pour les choux...et autres crucifères des jardins.

cabbage: <i>Brassica oleracea</i> , wild cabbage: <i>B. cretica</i>	ράφανος ράφανος ὄρεις	brassica & olus	כרוב, תרובתור (see n. 81)
Compositae			
lettuce: <i>Lactuca sativa</i>	θρίδαξ, θρίδαξ ἡμερος & some θριδαχίνη	lactuca	חסא, חזרת
wild lettuce: <i>L. scariola</i> or <i>L. serriola</i>	θριδαχίνη ἄγρια θρίδαξ	(acid lettuce in <i>NH</i> 19.126)	חס דיגרין, חזרת גלים
Liliaceae			
onion: <i>Allium cepa</i> , garlic: <i>A. sativum</i> , leek: <i>A. porrum</i> , shallot: <i>A. ascalonicum</i> , chive: <i>A. schoenoprasum</i> and other <i>Allium</i> spp.	γήθιον, γήτειον, κρόμμιον, κρόμμιογήτειον, σκόροδον, πράσον, κρόμμιον τὸ σχιστόν	cepa, alium, porros	בצל, בצל אשקלוני, בצל כופרי, בצל הסריסים, בצלצול, שום, שומנית, כרשה, כרתי, קפלוטין

^A *Apium* applies also to parsley, *Petroselinum sativum* (Plants index in *NH*). We will use *apium* when transcribing *NH*.

^B Perennial marsh celery recorded from the Levant (Post, 1932: 515; Feinbrun-Dothan and Danin, 1998: 480).

^C Another Greek name, καρωτόν, appears in Athenaeus (c. 200 CE; Liddell and Scott, 1968).

^D Rape and turnip were used frequently as synonyms (cf. Webster Dictionaries).

Chenopodiaceae

Beta vulgaris (τεῦπλον, τευτλίον)

Theophrastus dealt only with a cultivated beet having a swollen root. Hence, we consider his beet to be *B. vulgaris* subsp.¹⁴ *vulgaris* (Aellen, 1967; Ball, 1964; Campbell, 1976). *B. vulgaris* is a biennial with a hypocotyl-root-tuber (Esau, 1965). According to literary sources, beets (probably chards, *B. vulgaris* subsp. *cicla*), were already being cultivated in Mesopotamia during the 8th century BCE (Thompson, 1924). Theophrastus says that beet and cabbage have fleshy leaves (*HP* 1.10.4). This is mentioned, probably, since leaves of both tuberous and leafy varieties of beet are edible (*HP* 7.2.6; *NH* 19.134; Ball, 1964; Feliks, 1967: 83).

Since only a few archaeological remains precede the Classical period, there is no definite knowledge concerning the kinds of beet used in the eastern Mediterranean in antiquity (Zohary and Hopf, 2000: 200-1).

Theophrastus pays considerable attention to beet's 'seeds'. He describes them as being enclosed in ἐμφλοιοσπέρματα (*emphloiospermata*), translated by Hort as

¹⁴ Sub-species.

integument (HP 7.3.2),¹⁵ consisting most probably of the swollen perianth and receptacle around each of the two to three single-seeded fruits comprising the dispersal unit (*seed ball*) of the beet (Ball, 1964). These, with some other seeds, keep well in storage (HP 7.5.5, cf. NH 19.181).

Theophrastus reports on the speed of germination of beet seeds:

Not all herbs germinate within the same time ... Beet in summer takes six days, in winter ten (HP 7.1.3; cf. HP 7.1.5; NH 19.117).¹⁶

Theophrastus relates the differences in germination speed of beet to seasonal differences, but says that radish germinates equally rapidly in summer and winter (HP 7.1.5). He treats beet germination from another aspect:

There is ... a singular feature about beet; the seed [in the same seed ball] does not all germinate at once ... some of it not for some time, some even in the next or in the third year; wherefore it is said that little comes up from much seed (HP 7.1.6; cf. CP 4.3.2; NH 19.118).

Here, in a concise description, two phenomena, the temporal and spatial spreads of germination are described. These phenomena are part of *heteroblasty*, a Greek term coined by Evenari (1961: 601; 1980/81; 1984).

Concerning the tuberous hypocotyl-root, Theophrastus says:

The beet has a single long stout straight root like that of the radish, and has stout outgrowths, sometimes two ... three, [or] ... only one and the small ones are attached to these. The root is fleshy and sweet and pleasant to the taste, wherefore some eat it raw. The *bark* is not thick and cannot be detached, like that of the radish ... (HP 7.2.6; cf. HP 1.6.6; 7.2.5).

Theophrastus describes two kinds of beets, neither of which is known today: 'the white kind has a better flavour than the black and produces fewer seeds; some call it "Sicilian" beet' (HP 7.4.4; Sharples, 1995: 152-3). It is possible that the different colours represent those of the edible leaves of chards (Campbell, 1976; Zohary and Hopf, 2000: 200-1). Pliny also describes two, but different, kinds of beet:

Our people distinguished ... according to time of sowing, spring ... and autumn beet, although beet is also sown in June, and transplanted in autumn. Beets also like even their roots to be smeared with dung, and have a similar liking for a damp place.¹⁷ Beets are also made into salad with lentils and beans, and dressed ... with the bitterness of mustard (NH 19.132-133).

According to Dioscorides, beet (roots?) mixed with *nitrum* (Na₂CO₃) cleans the nostrils; he attributes the same medicinal effect to cabbage (MM II.121-122). Note that beets and

¹⁵ Hort's *integument*, first used in English by Grew in 1671 (Simpson and Weiner, 1989), differs from its present botanical sense: outer cell layers enveloping the angiosperm ovule and differentiating into the seed coat (Esau, 1977: 513).

¹⁶ Since Greek and Roman counting is inclusive, beet will germinate 5 days after planting in summer and 9 in winter.

¹⁷ Beets, as many other chenopods, are *halophytes*, and tolerate dung and dampness.

cabbage share a few chemicals, two of which, acetaldehyde and oxalic acid, will, when isolated, irritate mucous membranes (Riddle, 1985: 117).

Lack of beet remains prior to the Classical period impedes the possibility of dating their domestication. Nevertheless, Zohary and Hopf (2000: 200-1) place it in the Mediterranean and the Near East, where 3 wild subspecies of *B. vulgaris* (*maritima*, *macrocarpa* and *adaninsis*) from which the crop could have been derived, spread widely (cf. Brothwell and Brothwell, 1998: 117; Germer, 1985: 31-2).

In a chapter titled by Hort: *On the propagation of potherbs, and on the differences in their roots*, Theophrastus tells about offsets in beets:

Some plants even which are not bulbous but longer lived make offsets, as celery and beets, for these send out roots from which grow leaves and stems (*HP* 7.2.2).

These *side-roots* may be underground, horizontally creeping shoots (stolons), which are not presently known in cultivated or wild *B. vulgaris*. Pliny (in *NH* 19.121) rendered this problematic sentence:

Others make shrubby growth and without heads, for instance *apium* and beet.

Here the subject changes from plants that are *not bulbous* to just *others*. Another change, in the translation from Greek to Latin, may be of some importance. The term 'offset' is missing, or deliberately omitted, and only the outcome — shrubby beet and *apium* — described. This fits better with the common observation that cultivated beet and *apium* (both celery and parsley) sometimes branch quite profusely on the top of the *root*.

Beets are usually mentioned in Hebrew and Aramaic sources by the names *thradim* and *silka*,¹⁸ the latter more commonly used in Babylonia, where beets were considered an important food (B. Ketubot 77b). Beet leaves are regarded as unhealthy when fresh (B. Erubin 28b), but healthy when cooked (B. Berachot 44b). *Anigrón*, the water in which the beets brewed, was used as a potion (B. Berachot 35b).

The Yerushalmi forbids a graft or cross between beet and amaranth, but its seed yields a plant named *croslachinon*. This one is an edible chenopod, either *Atriplex halimus* or according to Löw, *A. hortensis* (Feliks: 1967, 92, 108-9; Mandelbaum, 1990: 28).¹⁹

¹⁸ Kil'ayim I: 3; B. Brachot 35b, 44b; B. Erubin 28b; B. Pesachim 114b.

¹⁹ Here, as in a number of other forbidden grafts or hybrids, are plants from two families; Chenopodiaceae and Amaranthaceae, respectively, receive Greek or pseudo-Greek names. Walnut grafted on peach yields *Carry Persia*; zargon and turnip yield *istapnini* or *istaphnini*: from the Greek *staphylinos* = carrot; fennel and celery yield *pitroselinin* (Yerushalmi, Kil'ayim 27: a; cf. Feliks, 1967: 90-4, 109-15).

Umbelliferae

Apium graveolens and *A. nodiflorum*

*Selinon*²⁰ of *HP* translated by Hort (1916, 1926) into celery, *Apium graveolens*. Pliny's *apium* is rendered into celery and into parsley (*Petroselinum sativum* = *P. crispum*). Theophrastus described some other kinds of celery. One of them, *marsh-celery*, is a wild taxon (discussed below).

While Theophrastus does not specify the uses of wild and cultivated celery, Pliny describes the culinary and medicinal uses of the plant (either celery or parsley). Wine is made from the seed, cooks use (probably the root) to remove the tang of vinegar from dishes, butlers to rid wine of disagreeable odour, and its leaves are used as a bottom crust for country loaves (*NH* 14.105; 19.168; 19.188). 'Male' and 'female' *apium*²¹ is used to cure a great variety of medicinal problems (*NH* 20.112-115). Theophrastus describes celery as a biennial plant, for it takes two years to bear fruit (*HP* 1.2.2; 7.1.7). Moreover, he reveals the perception of family affinity, Umbelliferae in this case, when he describes the fragrant juices of celery, dill, fennel and the like (*HP* 1.12.2; cf. *NH* 19.186).

Celery is sown by scattering or by planting in the second sowing period of January (*HP* 7.1.2). Theophrastus shows a great interest in germination velocity:

Savory and marjoram take more than thirty days [to germinate]; but celery germinate with the greatest difficulty of all; for those who make the time comparatively short, say forty days, and others fifty, and that too, at whichever period it is sown, for some sow it as a 'secondary crop' at all the periods (*HP* 7.1.3; cf. *NH* 19.118).²²

Germination difficulty of celery seed may be overcome in the following way:

... if a quantity of seed is sown in the same place, the resulting crop comes up and germinates better, thus they tie up seed of leek and celery in a piece of cloth before sowing and then there is a large crop ... one should sow ... [celery] seed in a piece of cloth after hammering in a peg and filling the hole with dung and soil (*HP* 7.3.4-5; cf. *CP* 5.6.9).

Pliny renders these methods somewhat differently from the original (*HP* 7.3.5):

In any case plants grow better when the seed is sown in heaps than when it is scattered, indeed it is on that principle that they sow leek and *apium* tied up in strips of rag, also before sowing *apium* they make a hole with a dibble into which they put dung (*NH* 19.121).

Concerning germination difficulties, Evenari (1980/81: 7) raised the question of whether germination is stimulated when seeds germinate close to one another. This can be explained by the possibility of the plant growth hormone, gibberellic acid, leaking from

²⁰ Σέλινον, the Greek name for celery and water parsnip, is considered to be pre-Greek and may have been used in the Aegean during the Bronze Age (Vickery, 1936: 51, 57, n. 6*).

²¹ By 'male' and 'female' plants the ancients often referred to different species (Translator's note).

²² According to Riggs (in Smartt and Simmonds, 1995: 481-4), the Greeks used wild celery as a medicinal plant and in funeral wreaths. Note that, in *HP* 7.1.3 and in what follows, Theophrastus speaks, definitely, of celery as a cultivated plant.

the seed of one species or both and stimulating their germination (Bewley and Black, 1982, 2: 186-8). Moreover, urine in the dung (animal manure) contains the hormone auxin, known to affect seedling growth (Stiles, 1969: 381-90).

Theophrastus mentions two more features of the germination process of celery seed:

Some come up quicker from old seed, as celery, beet ... (unless indeed they are raised from fresh seed in the manner which we have mentioned²³) (HP 7.1.6).

Here Theophrastus dealt with three phenomena: *heteroblasty*, *after ripening* and *priming*, which have attracted the attention of modern plant physiologists. Nevertheless, the causes of the first two are still not clear. The various seeds in the dispersal unit of beet may vary temporally in the quantity of (or their sensitivity to) germination inhibitors or promoters in or around them (Bewley and Black, 1982, 2: 67-9, 1994: Chapter 5; Evenari, 1961: 601, 1980/81; 1984). Seed priming, known already to the ancient Carthaginians (Evenari, 1980/81),²⁴ is today carried out by soaking seed in osmotica, before sowing (Bewley and Black, 1982, 2: 320-3). Among the seeds benefiting from osmotic priming are those of celery (Khan et al., 1980/81).

Celery seed germination and development are affected by post planting soil treatment:

Again in potherbs change is produced by cultivation; for instance, they say that, if celery seed is trodden and rolled in after sowing, it comes up curly;²⁵ it also varies from change of soil, like other things (HP 2.4.3; cf. CP 5.6.7).

To this Pliny adds an important remark, that the seed of *apium* is first pounded in a mortar (NH 19.158). Now we know that destruction of the outer coats of the dispersal units of celery (and lettuce) overcomes germination difficulties (Bewley and Black, 1994: 206-15; Pressman et al., 1977).

Seedling transplantation in the field is carried out with celery, which bears it well (HP 7.5.3). Celery seedlings are also transplanted into ready-made holes, similar to those used for sowing (HP 7.3.5; cf. NH 19.184). Another way to improve germination and subsequent plant development is by pelleting *apium* and other seeds in goat's dung (NH 19.185).²⁶

Celery has a deep, single, stout and fleshy root with side roots of equal thickness (HP 7.2.5; 7.2.8). Theophrastus described *side-roots* that are offsets from which shoots grow (HP 7.2.2). *A. graveolens* offsets have not been observed in cultivated celery in Israel (Dr. E. Pressman, personal communication). Conversely, the perennial marshwort or water parsnip, *Apium nodiflorum*, is a procumbent plant, rooting at the lower parts of its stems and growing in aquatic habitats (Post, 1932: 515), and might fit the following description:

²³ In this manner, described earlier in the same section, cucumber seeds are soaked first in milk or water, to make it germinate more quickly.

²⁴ See earlier.

²⁵ From Theophrastus' use of *they say* one may assume that he was skeptical concerning the effect of seed treading on the shape of the developing plant. He uses this phrase quite often when he tells outlandish tales, mostly in HP 9 (Lloyd, 1983: part III).

²⁶ This method may improve seedling development; see earlier (Stiles, 1969: 381-90).

Marsh celery, which grows by irrigation-ditches and in marshes, has scanty leaves, and is of no close habit, yet it somewhat resembles the cultivated kind in smell, taste and appearance (HP 7.6.3; cf. HP 4.8.1 and NH 19.124).

We therefore identify the *marsh celery* of HP as *A. nodiflorum* and relate to this species the vegetative propagation of *selinon* by offsets. In Israel, both *A. graveolens* L. and *A. nodiflorum* are wild plants of wet habitats; the first is annual or biennial and the second is perennial (Feinbrun-Dothan and Danin, 1998: 479-80). Amigues (n. 2 to *Recherches sur les plantes* [HP 4.8.1]) maintains that the *marsh celery* is a wild *A. graveolens*, common in ditches, marshes and near the sea in Greece.

The other two *selinons* mentioned in HP 7.6.3-4 are, according to the *Enquiry*, alexanders (see below) and parsley (Table 1), of which Theophrastus said:

Oreoselinon (parsley) exhibits even greater differences, its leaf is like that of hemlock [*Conium maculatum*], the root is slender, and the fruit like that of dill [*Anetum graveolens*],²⁷ but smaller, it is given in dry wine for diseases of women (HP 7.6.4).

Garlands of wild celery foliage were discovered on Tutankhamun's mummy (14th century BCE) and in a Rameside tomb (12th-11th centuries BCE; Germer, 1985: 137-8; Hepper, 1990: 9, 14; Manniche, 1999: 76-7). However, no celery roots have been reported in an archaeological context in the Old World.

Dioscorides treats celery and its relatives at some length (MM III. 67). He describes several *selinons*: *selinon* (*A. graveolens*), *elioselinon* (id.), *oreoselinon* (*Athamantha libanotis* L.,²⁸ *Seseli libanotis*),²⁹ *petroselinon* (*Apium petroselinon*),³⁰ and *ipposelinon* (*Smyrniium olusatrum*), predominantly for their medicinal properties (cf. n. 27). The botanical description begins with the widely known σέλινον, which is used as a starting point for the descriptions of the other kinds.

Dioscorides describes the stem of *oreoselinon*, which was of a span length, and its thin root with small offshoots (MM III. 69) — like a hemlock. The description of *oreoselinon* almost directly follows that of hemlock. Dioscorides considers celery and alexanders as different plants, although quite often confused. They have slightly similar names (*smyrniium* also called *petroselinon*), but they still look different. Alexanders has a stem which looks like that of celery, with many offshoots, and wider leaves that incline downwards. It has an umbel like that of dill. The seed is round and black, like that of cabbage.

The Tosephta (Kil'ayim A,a) named celery³¹ with other umbelliferous plants, fennel (*Foeniculum*), coriander (*Coriandrum*) and dill (*Anethum*).³² Although similar to one

²⁷ Hemlock and dill also belong to the Umbelliferae. Whereas Theophrastus referred to the morphological likeness between celery and hemlock, Dioscorides allied hemlock with other umbelliferous plants according to their chemical composition (Riddle, 1985: 110-111, 117).

²⁸ *Athamantha*, 15 Mediterranean species, 6 European. *A. cretensis* (Candy carrot) is a liqueur flavouring (Mabberley, 1993: 51). Note that Riddle (1992: XIV 57) identified the Greek σταφυλίνος as *Athamantha cretensis*.

²⁹ *Seseli*, 34 European species (Mabberley, 1993: 536).

³⁰ Mabberley (1993) and Zeven and Zhukovsky (1975) mention no such species.

³¹ Karpas. Moreover, a woman who eats celery will bear beautiful children (B. Ketubot 61a).

³² Shoomar, koosbara and sheveth, respectively.

another, hybrids between them are forbidden (Lieberman, 1955). The Yerushalmi also mentions a graft between fennel and celery, which supposedly results in *pitroselinin* (Kil'ayim 27, a).³³

Smyrniium olusatrum* and *S. perfoliatum

Horse-celery (*ipposelinon*) of *HP* is alexanders, *Smyrniium olusatrum*, in the *Enquiry*. In *NH* there are either alexanders or Cretan alexanders (*Smyrniium perfoliatum*). The latter differs from the former by being nearly glabrous and by alternate upper branches. *S. olusatrum* has a tall (50-100 cm), stout and solid stem and its upper branches are often opposite; it is nowadays a biennial or perennial wild Mediterranean plant (Feinbrun-Dothan and Danin, 1998: 475; Post, 1932: 536; Tutin, 1968: 328; M. Zohary, 1972: 403-4).

Theophrastus described *horse-celery* as having:

leaf like that of the marsh [celery], but is of close habit and has a big stalk ... its root is as thick as a radish and black, the fruit is also black, and ... larger than the seed of a vetch (*HP* 7.6.3).

Pliny's horse-celery is grown in dry places (*NH* 19.124), though labelled in another place as a garden herb (*NH* 19.188). He gives a fuller description of *smyrnion*, not based on *HP*:³⁴

Smyrniium has a stem like that of celery, and broad [juicy] leaves ... bending toward the ground ... with a drug-like smell not unpleasing ... The colour shades off to yellow; the heads of the stem are umbellate, as are those of celery; the seed is round and black. It withers at the beginning of summer. The root has a smell, and a sharp, biting taste, being soft and full of juice. Its skin is dark ... but the inside is pale. The smell has the character of myrrh, whence too the plant gets its name (*NH* 27.133).

The description is slightly similar to that in *MM*. Note that both Pliny and Dioscorides used a common source, Sextius Niger (Morton, 1986: 90; Riddle, 1985: 13-6; Scarborough, 1986: 67). Its root is described in *HP* (7.4.2) as thick and black, and in *NH* as pungent, pale, soft inside and with dark skin, and the seed as larger than those of vetch (*HP*) and round (*NH*). These features strengthen the possibility that horse-radish (*Armoracia rusticana*, Cruciferae) is described here rather than horse-celery (Ball, 1964; see below and n. 48).

Theophrastus describes different species of *Smyrniium*. It is an evergreen (*HP* 1.9.4), having a fleshy root (*HP* 7.2.8), with a thin detachable bark (*HP* 7.2.6). This plant is one of a few medicinal plants that contain gum in the root (*HP* 9.1.3), which serves as the source of a tale:

Now the juice of alexanders is like myrrh, and some, having heard that myrrh comes from it, have supposed that, if myrrh is sown, alexanders comes up from it, for, as was said, this plant can be grown from exudation, like the lily³⁵ and other plants (*HP* 9.1.4).

³³ *Petroselinum hortense* (Feliks, 1967: 92).

³⁴ There is nothing in the details given by Theophrastus or Pliny to prefer one of the five Greek species of *Smyrniium* (Tutin, 1968).

Pliny's version is presented here in some detail, in order to illustrate his poor discrimination:

An herb of exceptionally remarkable nature is a black-herb [alexanders, translators' note], the Greek name for which is horse-parsley,³⁶ and which we call *zmyrniun*. It is reproduced from the gum that trickles from its ... stalk, but it can also be grown from a root. The people who collect its juice say that it tastes like myrrh, and Theophrastus states that it sprang first from sown myrrh seed.³⁷ Old writers had recommended sowing horse-parsley in uncultivated stony ground near a garden wall; but at the present day it is sown in land that has been dug over and also after a west wind has followed the autumn equinox (*NH* 19.162-163; cf. *NH* 19.124, 187-188).

Theophrastus and Pliny mention the medicinal values of alexanders (*HP* 9.15.4-5; *NH* 20.186; 20.117; 27.133-135). Dioscorides describes *ipposelinon* mainly for its medicinal properties, while comparing it to celery:

It is bigger and whiter than it [*selinon*] is. Its stem is hollow, high, fragile and striped. Its leaves are wider and have a red tinge. It has a kind of parasol, as *libanotis*³⁸ does, which after the blossom turns into a round head. The seed is black and oblong ... The root is white ... very thick and smells and tastes well (*MM* III. 67: 1-2).

Though cultivated in antiquity, today alexanders is a wild plant of shady places in the Mediterranean that extend towards the Euro-Siberian plant's geographic territories, its cultivation having been replaced by the superior celery (Bailey, 1942, 1: 245; Mabberley, 1993; Zeven and Zhukovskiy, 1975: 106).

***Daucus carota* subsp. *sativus* (Heywood, 1968: 373-4)**

Theophrastus says that δαῦκον grows in Arcadia, a state that produces medicinal herbs. On the plant itself he says only: 'a saffron-coloured plant like bay' (*HP* 9.15.5). If the inflorescence is saffron-coloured, Thiselton-Dyer, who compiled Hort's index, is correct in his identification of the plant with *Malabaila aurea* Boiss. *Daukon* also appears here as a healing plant with a black root that grows in the Patrai district of Achaea (*HP* 9.15.8: 9.20.2).

Pliny, according to W.H.S. Jones, considers the name *daucus*, (-um) a generic name applied to several umbellifers, carrot, wild carrot, *Athamanta* spp., *Malabaila* and *Buplerum fruticosum*:

Petronius Diodotus distinguished four kinds of daucus.³⁹ There is no point in giving the details of these, as there are but two species [*differentiae*]. The most highly valued grows

³⁵ 'Exudates' of *HP* 2.2.1 and *CP* 1.4.6 are, probably, *bulbils* and/or *bulblets* (Negbi and Negbi, 2000; cf. Stearn, 1992: 379).

³⁶ *Hipposelinon* in Pliny's Latin.

³⁷ Pliny cites Theophrastus on the origin of the plant but omits the latter's remark 'some have supposed', as he does in other cases (cf. Lloyd, 1983: 145-6).

³⁸ Most probably *Athamanta cretensis* (= *Libanotis cretensis*) or *Seseli libanotis* (Dietrich, 1988, 2: 425).

³⁹ According to Pliny (*NH* 20.77) and Smith (1844-49, III: 218-9), Petronius Diodotus was a controversial author of a medical herbal. Actually, *they were* two 1st century CE writers mentioned by Dioscorides and Galen. Petronius wrote on materials of medicine and

in Crete, the next in Achaia and everywhere in dry districts; it resembles fennel, but has paler, smaller and hairy leaves, a straight stem a foot high, and a root with a very pleasant taste and smell (*NH* 25.110-112).

Pliny describes another relative of the carrot:

In Syria very great pains are taken over kitchen-gardens ... They sow a vegetable called by some gingidion that is very like staphylinus, only it is slighter and more bitter, though its properties are the same. It is eaten, cooked and raw, with great advantage to the stomach, for it dries up all its humours, however deep these may lie (*NH* 20.33).

Dioscorides wrote about a plant called γιγγίδιον, probably a species of wild carrot, *Daucus gingidium* L., as follows:

It grows plentifully in both Cilicia and Syria, a little herb like the wild carrot (σταφυλίνος) ... but thinner and ... bitterer; its root is somewhat white, pungent. It is grown as a potherb, eaten raw, boiled and pickled. It is good for the upper digestive tract, and is diuretic (*MM* II.137, Riddle, 1992: XIII, 97).

It seems that during Theophrastus' time the carrot did not reach vegetable status. However, from Pliny and Dioscorides we may assume that in the 1st century CE, the carrot was already a cultivated plant in the Levant. Nevertheless, it is difficult to assess the nature of the various carrots described in *NH* and *MM*. A Mediterranean, biennial wild carrot with a tuberous root, *Daucus carota* L. subsp. *maximus* (Desf.) Ball. is also considered as a forerunner of the cultivated carrot (Feinbrun-Dothan and Danin, 1998: 1447, erroneously marked as annual; Prof. A. Danin, pers. comm.). Banga (1976) views Afghanistan as the centre of diversity of anthocyanin, including carotene-containing forms of *D. carota* subsp. *carota*. In the 10th century CE, the carotene carrot spread eastward and westward, accompanied by anthocyanin-deficient forms. The selection to pure carotene carrots began around 1600 in the Netherlands (Bailey, 1942, 1: 674; Riggs, in Smartt and Simmonds, 1995: 478-9). Note, however, that in the Anicia Juliana Codex of *Materia Medica* of 512 CE, the carrot is shown with a thick and orange-coloured root (Zohary and Hopf, 2000: 201-2).⁴⁰

Cruciferae

Raphanus sativus, radish, (*raphanis* of *HP* and *raphanus* of *NH*), cultivated for its edible tuberous hypocotyl-root,⁴¹ is of unknown origin — one possibility is that it originated east of the Mediterranean (Banga, 1976; Ting and Wren, 1980; Zeven and

Diodotus on collecting flowers (Riddle, 1985: 11, 13-4, 20-1; Scarborough, 1986: 65; Scarborough and Nutton, 1982).

⁴⁰ Sharples presents another view: our orange carrot (*Daucus carota* [subsp.] *sativus*) is a hybrid of a black Afghan carrot and a wild Mediterranean white *D. carota* [subsp.] *carota* (1995: 153 n. 460). The diversity and the evolution within *Daucus* L. sect. *Daucus* (Heywood, 1983) require further study. Carrot seeds found in Neolithic Swiss lake dwellings are of a wild taxon (Brothwell and Brothwell, 1998: 111-12; Jacomet et al., 1991; Prof. S. Jacomet, pers. comm.).

⁴¹ The hypocotyl part is relatively small.

Zhukovsky, 1975: 30, 63, 95). Note that some radish variants are transitional to wild European radishes (Chater, 1964).

Radish is already mentioned in Thompson's Assyrian Herbal dating to the end of the 2nd millennium and/or the beginning of the 1st millennium BCE (Manniche, 1999: 62, 141). Its remains have been found in excavations beginning in the Egyptian Middle Kingdom and later, in the tomb of Tutankhamun. There is some uncertainty concerning the archaeological finds of radish in Egypt (Germer, 1985: 55-6; Hepper, 1990: 51; Manniche, 1999: 141-2; Zohary and Hopf, 2000: 139-40). Hence Herodotus' story (II.125) is of great significance:

An inscription is cut upon [the lowest part of the pyramid of Cheops]... recording the amount spent on radishes,⁴² onions, and leeks⁴³ for the labourers [who built the pyramid] (*The Histories*, trans. de Sélincourt, 1996: 132).⁴⁴

The single root of radish and turnip is fleshy, made of bark and flesh, runs deep, and has small side-roots attached to it (*HP* 1.6.6; 7.2.5; 7.2.8; cf. *NH* 19.62; 19.78-79). In some cases the flesh of the radish root hardens and turns to wood (*HP* 1.2.7). Radish is sown early in winter; during winter and early spring the shoot remains a rosette, while the root is enlarging. Vernalising winter temperatures and lengthening spring days cause the radish to turn its rosette into a flowering stem at the beginning of the summer (Vince-Prue, 1975: 13, 284). Theophrastus wrote that banking of radish⁴⁵ prolongs its juvenile period:

In most cases the roots persist, but they do not in all cases produce fresh growth [probably a flowering stem]. Thus radish and turnip persist till summer, if earth is thrown on them, and they increase in size; and some gardeners do this deliberately; but they do not make fresh growth nor send out leaves, even if one removes the earth heaped over them (*HP* 7.2.5).

This could have been done to keep the storage organ (with earth thrown on them), as mentioned with radish and turnip in the Mishna (Kil'ayim I: 9, cf. below), and is still common with onion. Another possibility is that roots were covered by earth to prevent them from greening or to delay bolting.

The flowering stem of radish has side shoots (*HP* 7.8.2), of which Pliny writes:

When the stalk is cut back, nearly all plants except those which have not got a rough stem throw out fresh shoots, indeed basil, radish and lettuce put out new shoots that can be used; lettuce is thought to be even sweeter if grown from a fresh sprouting (*NH* 19.122).

Theophrastus says that the cruciferous radish, mustard and turnip have their seed in pods⁴⁶ (*HP* 7.3.4; cf. *NH* 19.119). Radish, like cabbage and turnip, is sown after the

⁴² Manniche (1999: 142) commented that the word for radish (*syrmaia*) used by Herodotus is disputed, since it actually denoted a laxative (which could have been prepared from radishes).

⁴³ Garlic in Godley's (1946) and Grene's (1987) translations.

⁴⁴ Some Egyptologists now believe, however, that this was a misreading of inscriptions and that the vegetables were a list of offerings rather than of rations (Hepper, 1990: 55).

⁴⁵ Heaping earth over the lower part of the plant.

⁴⁶ Botanically, the cruciferous pods are *siliquae*.

summer solstice in July for the *winter* period (HP 7.1.2). Seed planting is better than scattering (HP 7.5.3). Radish is among the speediest, taking about 3 days, to germinate (HP 7.1.3). However, since Greek counting is inclusive, radish will germinate 2 days after planting.⁴⁷ Seedlings of radish are transplanted to the field to increase their size (HP 7.5.3). Transplanting is no longer common with radish. Theophrastus describes the adaptation of turnip and radish to the winter period:

Both this plant [turnip] and radish like exposure to winter; for it is supposed that this makes them sweeter and that they are thus made to grow [storage] roots rather than leaves. With a south wind and warm weather they run up quickly. It needs explanation that both plants should thus adapt themselves in special ways (HP 7.4.3).

Theophrastus mentions several kinds of radish.⁴⁸ On the true radishes he says:

The Corinthian is ... the strongest in growth, and it has an exposed root, for it pushes upwards, and not downwards like the others. The Leonthassian ... stands the winter best. The Boeotian is ... the sweetest and round in shape likes that of Cleonae. Those kinds whose leaves are smooth are sweeter and pleasanter to the taste, those whose leaves are rough have a somewhat sharp taste ... there is yet another, whose leaves resemble those of rocket [εὐζώμω ὄμοιον = *Eruca sativa*] (HP 7.4.2).

Pliny renders the above section almost word-by-word but as a kind of *napus* (= navew, rape, *Brassica napus*) instead of *raphanus* (NH 19.75-76). Pliny also tells of other Greek kinds, but this time he mistranslates ῥάφανος (cabbage of HP 7.4.4) into *raphanus* (radish in NH 19.80), and then he speaks of Roman radishes:

Our ... people have made other classes: the Monte Compatri radish ... a long and semi-transparent radish, and another shaped like a turnip which they call Syrian radish, about the sweetest and most tender of any, and exceptionally able to stand the winter. ... There is also one wild variety, called by the Greek *cerais*, in the Pontus country *armos*, or by other people *leuce*, and by our nation *armoracia*; this radish⁴⁹ grows more leaves than root. But in testing the value of all kinds of radishes most attention is given to the stems, as those of harsh flavour have stems that are rounded and thicker ..., and the leaves themselves are more crinkled and have prickly corners (NH 19.81-82; cf. Lloyd, 1983: 139).

Pliny describes its cultivation:

⁴⁷ Pliny, in the parallel section, says that it takes 9 days for the radish to break out of the ground (NH 19.117). This difference, the only one out of 19 plants mentioned by them, is due to a wrong translation from HP's *raphanos* = cabbage, into the Latin *raphanus* = radish.

⁴⁸ One of them, *raphanis e amorrea*, which is probably the perennial horse-radish (*Armoracia rusticana*) which has a deep tuberous root, is not mentioned elsewhere in HP. Does the taxonomic affinity between radish and horse-radish in Greek: *raphanis* and *raphanis e amorrea*, come from Theophrastus or from earlier folk names? Amigues maintains that '... en ce qui concerne les noms de plantes, Théophraste se conforme à l'usage de ses informateurs, comme il est naturel en l'absence de nomenclature scientifique' (1988, *Recherches* I: xxxviii).

⁴⁹ An annual wild radish, *Raphanus raphinistrum* (Feinbrun-Dothan and Danin, 1998: 267), most probably known to ancient Greeks and Romans (NH 26.72; HP 7.4.4; 7.6.1-2; 9.15.5).

The radish likes to be sown in loose, damp soil. It dislikes dung and is content with a dressing of chaff; and it is so fond of cold that in Germany it grows as big as a baby child. Radish for the spring crop is sown after February 13, and the second sowing, which is a better crop, [starts at] about the Festival of Vulcan (August 23-30) ... When it begins to make the growth, it pays to bank up every other leaf on each plant and to earth up the roots themselves, as the root that projects above the ground becomes hard and full of holes. Aristomachus⁵⁰ advises stripping off the leaves during winter, and piling up earth round the plants to prevent muddy puddles forming round them; and he says that this will make them grow a good size in summer. Some ... stated that if a hole is made by driving in a stake and covered at the bottom by chaff to a depth of six inches, and a seed is sown in it and dung and earth are heaped on it, a radish grows to the size of the hole. All the same they find saltish soils specially nourishing, and so they are even watered with salt water, and in Egypt, where they are remarkable for sweetness, they are sprinkled with soda (*NH* 19. 83-84).⁵¹

Radish is a most popular crop in Egypt, where it:

produces oil, which they make from its seed. The people are very fond of sowing radish seed ... because they make more profit from it than from corn and have a smaller duty to pay on it, and because no plant there yields a larger supply of oil (*NH* 19.79).

Dioscorides says that some use radish [seed] oil to treat skin diseases, but the Egyptian use it for cooking (*MM* I.45). He also says that radish [seed oil?] restores hair loss and has minor harmful side effects (*MM* II.137). The Copts used radish seeds to treat internal complaints and its oil for cooking and anointing (Manniche, 1999: 141).

Radish seed oil was permitted to light Sabbath candles (Mishna, Sabbath 2, 2; Amar, 2000: 292; Newman, 1932: 101). Radishes are mentioned in the Talmudic literature, often together with turnip. They were allowed to be stored during the summer under the grapevine, if parts of their foliage were exposed⁵² (Mishna, Kil'ayim I: 9). This method explains the story concerning the wealthy Rabbi Yehuda Hanasi⁵³ and the Roman Emperor Marcus Aurelius Antonius [Caracalla] that lettuce, cucumber and radish were never missing from their table, neither summer nor winter (B. Avoda Zara 11a). Whereas lettuce and radish are winter herbs, cucumber is a typical summer herb; all of them served, perhaps, as appetisers.

Wild and cultivated radishes provided cures for various ailments, as noted by Pliny (*NH* 20.13), Dioscorides (*MM* I.45; II.112; Riddle, 1985: 53, 65) and the Talmud (B. Erubin 56a).⁵⁴

⁵⁰ A Greek writer on agriculture, quoted by Pliny (Smith, 1844-49, 2: 307).

⁵¹ Pliny says that the Greek author Moschion, a physician mentioned by other Classical authors (Smith, 1844-49, 2: 1114), wrote a whole volume on the radish (*NH* 19.87).

⁵² As long as the leaves are exposed, the radishes are not regarded as planted in the soil, which has various Halachic consequences.

⁵³ Judah the Prince in English (cf. Newman, 1932).

⁵⁴ Maimonides states that radish is unhealthy and should be avoided.

Brassica rapa⁵⁵

HP's γογγυλῖς (*gongulis*) and *NH*'s *rapa* (-um) were translated into turnip (Liddell and Scott, 1968, *HP* and *NH*).⁵⁶ *Brassica rapa* or *B. campestris* subsp. *rapifera*⁵⁷ is an annual or biennial with a fusiform or tuberous taproot and long, up to 150 cm, stem (Heywood, 1964).

Turnip and radishes are winter crops that are sown from July onwards (*HP* 7.1.2; *NH* 18.314). When sown in the hot season [both] push their shoots up and go to seed sooner (*HP* 7.1.7). 'Thus radish and turnip persist till summer, if earth is thrown on them ...' and keep their roots longer, whether they increase in size or not (*HP* 7.2.5). Transplanting benefits both (*NH* 7.5.3; *NH* 19.183) and when exposed to winter they produce sweeter roots rather than leaves (*HP* 7.4.3).

Theophrastus distinguishes male and female turnips (*HP* 7.4.3; cf. *NH* 18.129; 19.75). Both Theophrastus and Pliny maintain that the male and female turnips are not two separate taxa (Negbi, 1995). They differ in shape and quality because of unique cultivation methods 'as every gardener or farmer knows' (Tortzen, 1991: 103), and other environmental variables.⁵⁸ Theophrastus also distinguishes as a third kind wild turnip that has, like the radish, a long root and a short stem (*HP* 7.6.2).

Pliny adds that wild turnip grows chiefly in fields; it is bushy, with a white seed twice as big as the poppy's; its root is not useful (*NH* 20.20), though other parts of the wild turnip have medicinal value (*NH* 18.130). In Loeb editions of *HP* and *NH* no attempt is made to name the wild turnip. A good candidate is *B. rapa* subsp. *sylvestris*, a rudero-segetal plant in Greece and much of Europe (Heywood, 1964).

Pliny describes a method to transport cuttings:

If however cuttings of fruit trees have to be brought from a considerable distance, it is believed that they best preserve their sap if they are inserted in a turnip ... (*NH* 17.114).

This method of keeping cuttings in a moist plant medium is comparable to that described by Theophrastus and Hebrew sages in the squill's bulb (*HP* 7.2.2; Negbi, 1989). The Mishna⁵⁹ (Kil'ayim I: 3, 9)⁶⁰ mentions turnip (*lepheth*) as a vegetable, but not as a medium to keep cuttings.

Pliny adds much about the turnip:

... since its utility surpasses that of any other plant ... to begin with it grows as fodder ... nor is it the lowest in rank among herbs to satisfy the needs of ... various ... birds. Cattle also are fond of its leaves, even man esteeming turnip tops ... turnip itself keeps if left in

⁵⁵ Theophrastus and Pliny described turnips and radishes as having similar roots, seeds and siliquae (*HP* 1.6.6-7; 7.3.2; 7.3.4; 7.9.4; *NH* 19.98; 19.119).

⁵⁶ Γογγυλῖς in *HP* 1.6.6 is translated by Amigues as rave, which is a relative of turnip (Augé et al., 1964).

⁵⁷ McNaughton (in Smartt and Simmonds, 1995: 62-88) and Hather et al. (1992).

⁵⁸ The date palm is the only plant described by Theophrastus with which the terms male and female are used, almost, in their modern sense (*HP* 2.8.4; *CP* 2.9.15). Otherwise these terms denote morphological and metaphoric meanings (Singer, 1921; Negbi, 1995; Tortzen, 1991).

⁵⁹ Arranged at the beginning of the 3rd century CE.

⁶⁰ Translated into English by Blackman (1964).

the earth where it grows, and also [after lifting] if left spread out, almost till the next crop comes, and it serves as a precaution against scarcity of food. It ranks third after wine and corn among the products of the country north of the Po. It is ... growing where almost nothing else can be grown. It actually thrives on moist and frost and cold, growing to a marvellous size: I have seen turnips weighing over 40 pounds⁶¹ (*NH* 18.126-128; cf. *NH* 19.122).

Pliny quotes Cato (234-149 BCE) concerning the resistance of turnip to fog (*NH* 18.163). Pliny's citation of Cato differs from Dalby's translation to English:

A fat and fertile ground, with no trees, can be a wheat field. One that tends to be cloudy should be sown with rape [turnip], radish, broom-corn millet, foxtail millet (Cato 6.1, cf. also 35.2. See note ^D in Table 1).⁶²

Of seed rotation in tender soil, Pliny says that in Campania it is as follows: barley, millet or turnip, barley or wheat (*NH* 18.191; Spurr 1986: 98, 118). He followed Cato (*On agriculture* 35.2) who says that turnip must be sown in manured ground. Sowing turnip, bean or millet, is recommended for:

Meadows that go off with age revived by sowing them [with] ... beans or turnip or millet, and in the following year corn, and in the third ... left fallow (*NH* 18.259).

An expanded agricultural treatment of the turnip is that of Pliny's contemporary Columella:

[Both] navew [*B. napus*] and the turnip ... are filling food for country people. The turnips ... are more profitable, because they yield a greater increase and serve as food ... also for cattle, especially in Gaul, where [it] provides winter fodder ... Both require a loamy, loose soil, and do not grow in heavy ground. Turnips, however, like level and moist places, while ... navew prefers sloping and dry ground ... and ... grows better in gravely and sandy lands. The nature of the situation changes the seed of both: thus, turnips sown in one soil are changed into navews in two years' time, while in the other the navew likewise takes the appearance of the turnip.⁶³ In well-watered situations both are properly sown after the summer solstice ... They demand a ... well prepared ... and generously manured ... [soil]. One *iugerum* of ground sown with not more than four *sextarii* of turnip seed; of the navew, one-fourth more is to be scattered,⁶⁴ because it does not widen out into a globular shape but pushes its slender root straight down (*Res Rusticae* 2.10.22-24; cf. 10.420-424, 11.3.16, 11.3.18, 11.3.59).

⁶¹ Forty pounds are more than 13 Kg.

⁶² Varro, who lived between Cato and Pliny (116-27 BCE), cites a third version in his *On agriculture* (1.24.1), cf. *NH* 18.165-166.

⁶³ H.B. Ash, in translating *Res Rusticae*, adds a note: Compare to Palladius, VIII.2.2, Pliny's remark that the Greeks and the medical men (*NH* 18.129; 19.75) distinguished *male* from *female* turnips or navew, and that the original sex is determined by soil qualities. Negbi (1995) failed to mention Palladius and Pliny's rendering of Theophrastus on this subject.

⁶⁴ In the metric system, this equals 2.27 and 2.84 liters of turnip and navew seed, respectively, to 2,529 m², quite dense sowing compared to modern practices. In Israel, 150g sown per 1000 m² (Zuta, 1992), which would be 379.35g per *iugerum*. With wheat, the Roman sowing amounts agree well with those commonly broadcast in Italy not long ago (Spurr, 1986: 56-57, cf. 96-97).

On the phytopathology of turnip and navew Columella says:

He who sows this seed in the summer must beware lest, as a result of drought, the ground-flea does not devour the ... tender leaves as they creep forth. To prevent this, the powder ... found above the arched roof or soot which adheres to the ceiling above the hearth should be collected; then, the day before the sowing ... it should be mixed with the seeds and sprinkled with water, so that they may have a whole night to absorb the juice ... [so] they will be in good condition for sowing ... Democritus ... advise[s] that all seeds should be doctored with the juice of ... house leek⁶⁵ and that the same remedy should be used against small vermin; experience has taught us that this is true. For all that, since that there is not a large quantity of this plant available ... more frequently [we] use soot and the above-mentioned powder and thus ... ensure that the plants are not damaged (*Res Rusticae* 11.3.60-61).

Columella gives detailed pickling instructions for turnips and navews (12.41.1-5). The comprehensive treatment of both indicates that by the mid-first century CE, oil was no longer being extracted from their seeds.

Turnip is mentioned in Talmudic literature (see earlier under radish). The size of its root was occasionally very large and heavy, up to 60 litres (B. Ketubot 111b).⁶⁶ According to one source: 'woe to the house through which the turnip passes' (B. Brachot 44b), but this is then interpreted to mean that the turnip has to be cooked properly, preferably with meat (*ibid.*). It can also be inferred that it was customary to cook meat with turnip (B. Hullin 99b).

There are archaeological remains of turnip in the Dokki Agricultural Museum, Cairo, one of unknown date, the second of late Roman period (Germer, 1985, 1: 50-1). Charred tissue of turnip tuberous root was found in a refuse pit in Byzantine Sparta (Hather et al., 1992). For earlier finds of *Brassica* species, see Zohary and Hopf (2000: 139, 199-200).

Brassica napus or B. napa

Napus of *NH* is translated into *navew* (rape), *B. napus*, and it is probably not related to any plant in *HP*. Hebrew sages refer to it by the Latin name as *napus* or *naputs* — as one would expect of a new crop — (Mishna, Kil'ayim I: 3; Cizik, 1952: 858; Feliks, 1967: 74-9, 116). It is an annual or biennial plant, with a slender or stout, fusiform tuberous taproot and stem up to 150 cm, cultivated in most European countries. Pliny deals, probably, with its subsp. *rapifera* Metzger, a biennial with a thickened, fleshy, edible tuberous hypocotyl-root (Heywood, 1964; McNaughton, 1995).

Pliny often describes *napus* with other cruciferous taxa: radish, turnip and cabbage. Navew is grown for its sweet tuberous root (*NH* 19.62, 19.85, 21.109). It has the same nature as turnip and is equally fond of cold places (*NH* 18.131). The ground in which it grows must be ploughed twice and manured before sowing, four-sixteenths of a pack of seeds sown per acre (*NH* 18.129, cf. Columella, 2.10.22-24 and above on turnip).

⁶⁵ House leeks (= aeizoon, *Sempervivum tectorum*, Crassulaceae) have alkaloids, including nicotine (Mabberley, 1993: 534).

⁶⁶ 'A fox nested in a turnip, was found to contain 60 litres of Sepphoris'. The Greek and Roman litre equals 358.5g. (Even-Shoshan, 1969).

Sowing time is from autumn (NH 18.314) until March 1st (NH 18.131). Seeds are quick to germinate; it takes 2 days for them to break the ground (NH 19.117).

Navews also benefit from transplanting (NH 19.183). Besides their main use as food, they are also useful in medicine, such as a wine made of navews (NH 19.109). Pliny described more uses:

The Greeks retain in pharmacology also two varieties of navews ... one with angular leaf-stalk, and a flower like that of a dill, called bunian, is beneficial for purgings of women, for the bladder ... The other kind ... bunians, it is like ... radish and turnip, its seed being splendid remedy for poisons, for which reason it is also used in antidotes (NH 20.21).⁶⁷

Navews suffer from springtails,⁶⁸ for which no remedy is suggested (NH 19.177). However, they are protected if some bitter vetch [*Vicia ervilia*] is sown with them ... as it keeps off caterpillars (NH 19.179).

The similarity between turnip and rape leaves made Hebrew sages permit their mixed sowing. However, they forbid mixed sowing of radish and rapes, which have similar leaves, since their roots differ in taste (Feliks, 1967: 74-5).

Crucifers were already well-established oil crops in Classical times (Zohary and Hopf, 2000: 139-40). We found no mention of such oils, besides radish seed oil (see above), in the Classical and Jewish literature, nor in some of the 20th century literature (Bailey, 1942; Brouk, 1975: 142, 239-40; Hather et al., 1992: 399; Zukovskij,⁶⁹ 1968: 19).

Brassica oleracea and *B. cretica*

HP's raphanos is translated as cabbage, *Brassica cretica*, in the index of *Enquiry* (*kruv* and *trubatur* in the Mishna). *Brassica cretica* is a wild taxon endemic to south-eastern Greece and the Aegean islands, and from Crimea to Syria and, rarely, in Israel (Feinbrun-Dothan and Danin 1998: 261; Hedge, 1965; Heywood, 1964). Theophrastus, however, deals mostly with cultivated *raphanos*, excluding the one mentioned in *HP* 7.6.1 (see above and *HP* 1.10.4). Cultivated cabbage, *B. oleracea*, which has many cultivars and grows wild on east Atlantic and Mediterranean maritime cliffs, is a better candidate for Theophrastus' *raphanos*.⁷⁰ Archaeological remains of cultivated cabbage were uncovered in Hawara, Egypt, from the Hellenistic-Roman period (Germer, 1985: 51-52).

Raphanos is first mentioned in *HP* with respect to its becoming tree-like. This quality may be attributed to the biennial *B. cretica* that has a stem up to 1.5m long. Perhaps it was *B. oleracea*, with its 3m tall stem, that caused Theophrastus to write:

⁶⁷ Pliny's other attempt to classify navews (NH 19.75-77) is identical with Theophrastus' classification of radishes (*HP* 7.4.2).

⁶⁸ Springtails are, probably, wingless insects of the order Collembola. The same chapter lists other insects and slugs infecting cultivated plants.

⁶⁹ His name was differently spelled in his book with A.C. Zeven, 1975.

⁷⁰ *B. oleracea* has a wild relative — *B. sylvestris* (Heywood, 1964) or *B. oleracea* var. *oleracea* (Helm, 1963; Thompson, 1976; Zohary and Hopf, 2000: 199), a feral species that may compete with *B. cretica* as being Theophrastus' wild cabbage (Heywood, 1964).

For of under-shrubs and those of the potherb class some have only one stem and come as it were to have the character of a tree, such as cabbage and rue: wherefore some call these *tree-herbs* ... (HP 1.3.4; cf. HP 6.1.2).

The impressive tree-like cabbage and kale stems support Theophrastus' observation (cf. Helm, 1963). He knew the differences between trees and potherbs, but his integrity as an objective nature observer forced him to state that the borders between classes of plants are not always clear-cut (Morton, 1981: 35-6). These two classification possibilities of the cabbage as a tree or a vegetable also occur in the Yerushalmi, Kil'ayim 30a (Lieberman, 1962: 284-5).⁷¹ Lieberman stressed that the similarity of definitions used by Greek and Jewish scholars stems from the philosophical needs of the former and the religious needs of the latter. Nevertheless, he hesitated over whether Greeks and Jews came to the same notion from older heritages independently, or through interchange between various peoples of the Hellenic sphere (Lieberman, 1962: 293).

In the chapter entitled by Hort: *On the time of sowing and germination of potherbs*, Theophrastus includes cabbage with other plants sown for winter just after the summer solstice (HP 7.1.3). Pliny says that cabbage is:

sown all the year round, since it is also cut all the year round, but it pays best to sow it at the autumnal equinox; and it is transplanted when it has made five leaves (NH 19.137, cf. HP 7.5.3).

Nevertheless, superstitiously, Pliny says that old cabbage seeds produce turnip (NH 19.176). Cabbage can propagate by *sucker*, a torn-off piece attached to the root (HP 7.2.1; cf. CP 1.4.2). The stem of cabbage will shoot again if broken; a fact used as a method to produce better cabbages:

Be that as it may, it is admitted that in the case of cabbage the stem is sweeter if it should have grown again after being broken, provided that [rosette] leaves are stripped off before the plant runs to stalk (HP 7.2.4).

Theophrastus distinguished between three kinds of cabbages:

The wild form has a small round leaf; it has many branches and many leaves, and a sharp medicinal taste, wherefore physicians use it for the stomach. Between the other two kinds there seem also to be differences, inasmuch as one of them bears no seed or only inferior seed. In general the curly-leaved kind has a better flavour than the smooth and it has larger leaves (HP 7.4.4).

It is possible, from the limited description of the two cultivated cabbages, to assume that they were not cabbages but leafy kales (*B. oleracea* var. *acephala*), grown by the Greeks as early as 600 BCE (Thompson, 1976; see also Brothwell and Brothwell, 1998: 117-18). Pliny faithfully translated this section, but again describing radishes instead of cabbages (NH 19.80).⁷² However, Pliny says:

⁷¹ Feliks (1967: 80-1) identifies the *kruv* and the *trubatur* of the Mishna as leaf cabbage (*B. oleracea* var. *acephala*) and head-cabbage (*B. oleracea* var. *capitata*), respectively.

⁷² The translator says (n. a to NH 19.80) that the wrinkled (or crispy-leaf) radish would be cabbage, but does not remark on the other two kinds.

The earliest Greeks divided cabbage into three varieties: (a) the curly, which they called *selinas* from the resemblance of its leaves to those of *apium*, useful for the stomach and moderately laxative,⁷³ (b) the *helia*, with broad leaves growing out of the stem, for which some have called it *caulodes*, of no importance in medicine, (c) *crambe* properly so called, with thinner leaves of plain shape and very close together, is more bitter but very beneficial (*NH* 20.79).⁷⁴

This section does come, probably, from Theophrastus: the third kind of cabbage is not called wild (and considered a term for a form of cultivated cabbage in the index of *NH*), but the similarities are obvious. Note that in *HP* only the wild kind is mentioned in a medicinal context, while in *NH* the *crambe* and the curly cabbage are treated as such. Pliny quotes praises of the cabbages as food and medicine from Hippocrates, Erasistratus⁷⁵ and Cato (*NH* 20.78-96).

Theophrastus says, in a chapter entitled by Hort: *On cultivated herbs: the wild forms of potherbs*, that some uncultivated herbs have:

the same names as the cultivated kinds ... most of them resemble the cultivated kinds in appearance, except that in the wild forms [leaves and stalks are] smaller and rougher, [more pungent and stronger in taste]. A peculiarity of *wild cabbage* as compared with the others is that its stems are rounder and smoother than the cultivated kind, and, while in the latter the attachment of the leaf is flat, in the wild kind it is rounder, and the leaf itself has less angles ... (*HP* 7.6.1-2).

This description strengthens the identification of the wild cabbage of *HP* with *B. cretica*, a species having cauline leaves that are auriculate at their base (Heywood, 1964).

Pliny says that cabbages and kales that have pre-eminence in gardens were not honoured among the Greeks. On the other hand:

Cato sings marvellous praises of the head of cabbage,⁷⁶ which we shall repeat when we deal with medicine (*NH* 19.136; cf. 20.78-96).⁷⁷

Pliny therewith describes cultivation methods of different kinds of cabbages, kales and broccoli and their outcome (*NH* 19.136-144).

Theophrastus already knew plant allelopathy:

Again some things ... enfeeble the tree as to production of flavours and scents, thus cabbage and sweet bay (*Laurus nobilis*) have this effect on the vine. For they say that the vine scents the cabbage and is infected by it. Wherefore the vine-shoot, whenever it

⁷³ A variety considered in the index of *NH* as Savoy cabbage (*B. oleracea sabauda*).

⁷⁴ In *NH's* index, cultivated *brassica* and *olus* are *B. oleraca*, while the wild *brassica* is *B. cretica*, respectively. *Caulis* and *caulodes* are kales: *B. oleracea* var. *acephala* and *cyma* are spring sprouts of cabbage and especially broccoli, *B. cymosa*. Unfortunately, quite a number of times Pliny confused Theophrastus' *raphanos* with *raphanis*, and rendered it as radish.

⁷⁵ A physician, native of Cos, who lived in Alexandria (3rd century BCE).

⁷⁶ None of which seems to be head cabbage, *B. oleracea* var. *capitata*, even though Cato praises the head of the cabbage.

⁷⁷ Cato says that the medical value of cabbage surpasses all other vegetables (*On agriculture* 156-7). In a recent translation of *De agricultura* (1988), Dalby says that chapter 157 was not written by Cato (27, 227-33).

comes near the plant, turns back and looks away, as though the smell were hostile to it. Indeed Androkydes⁷⁸... demonstrates the use of cabbage ... to expel the fumes of drunkenness for, said he, even when it is alive, the vine avoids the smell (*HP* 4.16.6).

Pliny cited the relationship between the cabbage and the grapevine and added cyclamen and wild marjoram to the list (*NH* 24.1) and 'the antipathy between radishes and vines which shrink away from radishes planted near them' (*NH* 19.88).

Known facts concerning plant allelopathy gained, with the classicists, a fabulous folkloristic scope. Cabbages, like many other crucifers, are quite rich in chemical inhibitors. Crucifers contain glucosinolates, like mustard oils (Kjaer, 1976), toxic to microbes and fungi as well as higher plants (Evenari, 1949; Rice, 1984: 54-5, 236-7, 239). In contrast to the implied allelopathy, Pliny says that poppy is grown together with cabbage and purslane (*NH* 19.167).

On pests, Theophrastus says that caterpillars and grubs attack the cabbage; however, a remedy is not mentioned (*HP* 7.6.1). According to Pliny, springtails, slugs and snails infested the cabbage (*NH* 19.177); moreover, he gives remedies against insects:

It protects navews to sow some bitter vetch with them, and similarly chick-pea for cabbages, as it keeps off caterpillars. If neglect of this precaution has led to the appearance of caterpillars, the remedy is to sprinkle them with decoction of wormwood or of houseleeks⁷⁹... It is stated that if cabbage seed is soaked in the juice of houseleek before being sown, the cabbage will be immune from all kinds of insects (*NH* 19.179-180).

Dioscorides mentions the effects of cabbages, *B. oleracea* and *B. cretica* (leaves?), in curing sinusitis, gout and cancer (*MM* II.120-122; Riddle, 1985: 46-7, 55, 117).

Cabbage was a most widespread vegetable crop during the Talmudic era and various aspects of its cultivation and use are mentioned in the Jewish texts. Several types of cabbage were grown: the Mishna (Kil'ayim I: 3) mentions *kruv* and *trubatur*, the latter being a thin or small-size cabbage.⁸⁰ The type usually grown is the loose-leaf cabbage (*B. oleracea* var. *acephala*, cf. Feliks, 1986: 408-9). Legendary sources describe the cabbage as a tall plant: in order to collect its upper leaves, a ladder had to be used (B. Ketubot 111b). Some cabbages, 'mothers of cabbage', were left in the field to bolt and seed (Yerushalmi, Shevi'ith 9: 1; Feliks, 1986: 409). The Mishna refers to irrigated versus non-irrigated cabbage types, indicating different agricultural methods (Terumot 10: 11).

The cabbage is regarded as a nourishing and healing food (B. Berachot 44b). It is mentioned together with *isparagos* (Mishna, Nedarim 6: 10), a term that denotes the edible soft stems sprouting from the cabbage roots and called by the Greeks *krambospargon* (Löw, 1924-34, 1:484).⁸¹

⁷⁸ A medical man who preached temperance to Alexander, compare to *NH* 14.58 and 17.240.

⁷⁹ *Artemisia absinthium* and *Sempervivum tectorum*, respectively: see also earlier on turnip and n. 65.

⁸⁰ Yerushalmi, Kil'ayim 27a.

⁸¹ On adventitious buds see Esau (1977: 284). *Krambospargon* is a compound Greek term, from *krambe* (cabbage) and *asparagos*, respectively (Lieberman, 1967: Nedarim 3: 451: 31-2).

Compositae

Lactuca graeca (*libanotis e akarpos*), *L. sativa* (*thridax*, *thridax emeros*) and *L. scariola* (*thridakhine* = prickly lettuce)⁸² are the three lettuce species described in *HP* according to Hort.

Lactuca graeca

Theophrastus describes the wild *L. graeca*, reported from south Albania and north-central Greece (Feráková, 1976), mainly for its medical uses:

The barren kind [*libanotis e akarpos*]⁸³ has a leaf like that of the bitter lettuce [*thridakhine tes pikras*], but rougher and paler; the root is short. It grows where there is abundance of heather. The root can purge both upwards and downwards ... Also, if it is put among clothes, it prevents moths. It is gathered at the time of wheat-harvest (*HP* 9.11.11).

Dioscorides says that the wild lettuce (*agria thridax*) is astringent and, therefore, good for dysentery, watery eyes, and the like; its seeds, however, have little cooling effect (Riddle, 1985: 38-9).

The wild lettuce, *L. serriola* (*thridakhine*), a ruderal and segetal species (Feinbrun-Dothan and Danin, 1998: 751), receives more attention. The Greek terminology, in *MM*, concerning cultivated and wild lettuces is simpler and straightforward, being *thridax emeros* and *agria thridax*, respectively (Riddle, 1985: 27-8). In *HP* 7.6.2 and 9.8.2, *thridakhine* is translated as wild lettuce and *emeros* refers to the cultivated one.

Lettuce was probably domesticated in the eastern Mediterranean during the third millennium. It shows close genetic affinities to some wild west Asian *Lactuca* species, its closest relative being the wide-spread (Euro-Siberian, Mediterranean and Irano-Turanian) *L. serriola* (Feinbrun-Dothan and Danin, 1998: 749; Hepper, 1990: 51; Maniche, 1999: 112-14; Zohary, 1991; Zohary and Hopf, 2000: 198). Archaeological remains of lettuce in Egypt include seeds from Old Egyptian and Roman periods (Germer, 1985: 185-6).

Lactuca sativa, cultivated lettuce (θρίδαξ and some θρίδαχίνη).⁸⁴

Cultivated lettuce (under the name *thridakhine*), a secondary crop among beet, rocket, monk's rhubarb, mustard, coriander, dill and cress (*HP* 7.1.2), is listed among potherbs (*HP* 1.12.2, 7.5.4). July is lettuce's sowing time (*HP* 7.1.7) and its germination speed 4 to 5 days (*HP* 7.3.2).

Theophrastus knew more than one variety of cultivated lettuce:

... the white kind is sweeter and tenderer. Of this plant there are three other kinds, the flat-stalked, the round-stalked, and the Laconian [which] has a leaf like the golden thistle,⁸⁵

⁸² Labelled today as *L. serriola*.

⁸³ The fruitful *libanotis* is the umbelliferous *Lecokia cretica*.

⁸⁴ Hort identified *thridakhine* as the wild *L. serriola*. Note that in the Index of *Enquiry* it is said: *Thridakhine* (properly, but not always, distinguished from *thridax*), wild lettuce, *Lactuca serriola*. We will demarcate the two species according to context and include under the title of *L. sativa* all obvious mentions of *thridax* and *thridakhine*.

⁸⁵ *Scolymus hispanicus* (Compositae).

but is erect and strong-growing and has no side-shoots ... The third kind has much milky juice and small leaves and a white stem, [and] is like a wild plant (*HP* 7.4.5).

Theophrastus is interested in the stem, the root and transplanting of cultivated lettuce:

When the stems are cut back practically all except the stemless (?) ones sprout again, and most evidently ... basil, lettuce and cabbage. In lettuces they say that the stems that come up again are better eating, since the first stem is rennet-like in quality and bitter, as being uncocted, whereas others say that on the contrary the second stems are more rennet-like in quality but appear sweeter so long as they are tender (*HP* 7.2.4, Einarson & Link's version in note *a* to *CP* 2.15.6; cf. *NH* 19.122 cited above).

In *CP* 2.15.6, Theophrastus mentioned only the first opinion concerning the quality of the second stem. Furthermore, he gives it a physiological explanation: 'the parts come up tender and plump because the roots are stronger ... and not only attract more food but concoct it better'.⁸⁶ Theophrastus describes the lettuce root system as having only slender side-roots, and says that it may be called a plant of a single root (*HP* 7.2.9).

Theophrastus says that lettuce bears transplanting better than other herbs (*HP* 7.5.3). Lettuce suffers from *leek-cutters*, which are probably leaf maggots (*HP* 7.5.8). His knowledge of lettuce is equally impressive in calling its achene 'pappus bearing seed' (*pappospermaton*, *HP* 7.3.2).

***Lactuca serriola*, wild lettuce (some *Thridakhine* & *agriá thridax*)**

Theophrastus compares wild to cultivated lettuce:

The wild lettuce has a shorter leaf than the cultivated kind, and, as the plant matures, it becomes spinous; the stem is also shorter, while the juice is pungent and medicinal. It grows in fields; they extract its juice at the time of wheat-harvest, and it is said that it purges away dropsy and takes away dimness of sight and removes ulcers on the eye, for which purpose it is administered in human milk (*HP* 7.6.2).

On the collection method he says that from those that do not yield abundant juice [*latex*], it is taken with a piece of wool, as that of wild lettuce (*HP* 9.8.2).

Pliny based his contribution on lettuce on *HP*, although listing more varieties and giving the medicinal properties of both cultivated and wild lettuces (*NH* 19.125-128; 20.58). The latex' importance is mentioned several times:

There is a variety of white lettuce, the Greek name for which is poppy-lettuce, from its abundance of juice with a soporific property ... This was the only kind of lettuce in Italy in early times, which accounts for the Latin name of lettuce ... derived from the Latin for milk (*NH* 19.127).

They relieve the stomach of distaste for food and promote appetite. At all events ... the late ... Augustus in an illness, thanks to the sagacity of his doctor, Musa, was cured by lettuce, which was refused him by the excessive scruples of his previous doctor ... this was ... a good advertisement for lettuces that the method was then discovered of keeping them into the months when they are out of season, pickled in honey-vinegar (*NH* 19.128).

⁸⁶ Note that Theophrastus' physiological explanations, here and generally in *CP*, are taken from the realms of cooking and brewing (Einarson and Link, 1976, Introduction to *De Causis Plantarum*: xviii-xix). Similar analogies were used much later by Grew (see n. 9).

Dioscorides described clearly the use of both lettuces (*MM* II.136):

Cultivated lettuce [is] good for upper tract, a little cooling, sleep causing, softening of the lower tract, and increasing lactation. Boiled down it increases nutrition. When it is eaten unwashed it is suitable [or useful] for reconciliation of gastric troubles.⁸⁷ Its seeds being drunk are good for [those who] continually dream and they avert sexual intercourse, eaten too often they cause dim-sightedness. They are preserved in brine. The stalk growing up has something like the potency of juice and sap of wild lettuce.

Wild lettuce [*L. serriola*] is similar to the cultivated, larger stalk, leaves whiter, thinner, more rough, and bitter to taste. To some degree its properties are similar to those of opium poppy, thus some people mix its juice with opium. Whence its sap ... with sour wine purges away watery humors through the digestive tract, it clears away albugo [a white opacity of the cornea], misty eyes. It assists against the burning [of eyes] anointed with woman's milk (Riddle, 1985: 27).⁸⁸

Lettuces' latex caused the ancients to use it with woman's milk and with opium. Its cure of lactation problems is similar, logically, to the signature doctrine, in which a plant or animal part can cure a body part that looks like it (Allbutt, 1921: 30, 51-2; Greene, 1983, I: 123, 457 n. 6; Porter, 1955: 414), though here, the similarity is that of milk colour to lettuce and opium latexes.

According to the Mishna, lettuce and wild lettuce ... are not considered diverse kinds (Kil'ayim 1: 2).⁸⁹

Lettuce (= חזרת) is mentioned in Talmudic sources mainly as one of the 'bitter herbs' (מרורים), to be eaten on the Passover night together with unleavened bread (Matzah) and the Passover sacrifice.⁹⁰ Five species are listed in the Mishna (Pesachim 2,6) as bitter herbs; lettuce appears first on this list. It is also mentioned in Mishna, Kil'ayim 1,2 — 'Lettuce and mountain lettuce [identified by Feliks 1967: 44 as *L. scariola*] are not forbidden to sow with one another'.

Lettuce is a typical winter herb; winter herbs are not usually available during the summer. Only wealthy noblemen such as Rabbi Yehuda Hanasi and the Roman Emperor could have lettuce on their table year-round (B. Avoda Zara, 11a), as already seen in the section dealing with radish.

Growing vegetables beneath trees, in the shade, can be recommended only during the summer when excess irradiation can be harmful to the plants. Lettuce is an exception, however, and growing it in the shade results in better quality (Mishna, Avoda Zara 3,8); presumably leaves developing in the shade are of a more delicate consistency and taste better. **End of Part I.**

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⁸⁷ The translation of this sentence was amended by N.S.

⁸⁸ *L. serriola* is still used for similar purposes in Lucca Province, Italy (Pieroni, 2000).

⁸⁹ Wild lettuce is according to Rabbi Hananiah a *has-digron*, namely a field lettuce that grows wild (Yerushalmi, Kil'ayim I: 2; Feliks, 1967: 54-5; Mandelbaum, 1990: 24).

⁹⁰ "ומצות על מרורים יאכלהו" ו"על מצות ומרורים יאכלהו" (שמות י"ב: ח ובמדבר ט"א) respectively.

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