

CUSCUTA (CONVOLVULACEAE)—THE STRENGTH OF WEAKNESS: A HISTORY OF ITS NAME, USES AND PARASITISM CONCEPT DURING ANCIENT AND MEDIEVAL TIMES

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ABSTRACT

We examine the etymology and the first names of *Cuscuta*, as well as some unexplored aspects in the early history of parasitism concept. The name "Orobanche" was used for the first time by Theophrastus possibly for *Cuscuta*, however for sure not for the today's broomrapes. The etymology of the generic name is neither Arab nor Greek, as commonly thought, but Aramaic and/or Hebrew. The ideas of parasitism from medieval ages are merely a regression of the Greek ancient concept. Whereas the ancient Greeks view the parasites as originating from their own seeds, during the medieval times and as late as the 17th century, *Cuscuta* plants were literally believed to arise from their hosts. Several lesser known uses of these plants during ancient and medieval times are explored in the Old as well as in the New World.

RESUMEN

Se examinó la etimología de los primeros nombres de *Cuscuta*, así como, aspectos no explorados en la historia del concepto de parasitismo. El nombre "Orobanche," fue utilizado por la primera vez por Teofrasto, posiblemente refiriéndose a *Cuscuta*; sin embargo, seguramente no para los actuales "japos de lobo." La etimología del nombre genérico no es ni árabe ni griega, como se creía comúnmente, aunque puede ser arameo y/o hebreo. El concepto con respecto a las plantas parásitas desde la edad media es solamente una regresión al antiguo concepto griego. Mientras que, el punto de vista de los antiguos griegos era que las plantas parásitas se originaban de sus propias semillas, en la Edad Media, a finales del siglo XVII, las plantas de *Cuscuta* se consideraron que literalmente surgían de sus hospedadores. Los usos de estas plantas en los tiempos antiguos y en la Edad Media son prácticamente desconocidos, por lo que éstos se están explorando en el Viejo y el Nuevo Mundo.

INTRODUCTION

Cuscuta is a worldwide distributed genus, that comprises about 150 species of parasitic plants (dodders) (Yuncker 1932). The etymology of the generic name is not clear since it has commonly been said to be either Greek (e.g. Dawson et al. 1994) or Arabic (Austin 1980). The history of these intriguing plants, and of parasitic plants in general, has been traced back to antiquity (Mirande 1900; Kuijt 1969). Such plants must have drawn the attention of both early scholars

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and farmers. As Theophrastus wrote: “the oddity is that a plant grows exclusively on another plant, and not on the ground. ...” (De causis plantarum 2:17.5, 1976). Since then, the concept of parasitism has evolved slowly. The early history of parasitism in plants is particularly poorly known. We examine the first names of *Cuscuta*, some unexplored aspects in the history of parasitism concept, and several less known uses of these plants.

Was Orobanche one of the first names of *Cuscuta*?

Theophrastus referred to a plant called “ὀροβάγχη” (“vetch strangler” from “orobos” - vetch - *Vicia ervilia* (L.) Willd., and “anchone” - to strangle) because “it overspreads the whole plant (of vetch) and holds it fast as if it were in coils, for it is thus that (vetch-strangler) strangles the plant” (Inquiry into plants 8.8.4, 1916). It is certain that, when using this name, Theophrastus did not have in mind the broomrapes (today’s *Orobanche*), because he apparently spoke about these in the next paragraph, under a different name. Thus, he mentioned αἰμόδορον, which is said to be like another unnamed plant that “springs straight from the roots of cummin” (*Cuminum cyminum* L.), and both these plants are “somewhat more peculiar in their habits.” This αἰμόδορον attaches itself to fenugreek” (*Trigonella foenum-graecum* L.) and its “root is more or less round” (Theophrastus, Inquiry into plants 8.8.5, 1916). Both these latter plants are probably the actual *Orobanche*, which cannot be the ὀροβάγχη, the “vetch-strangler.” It would be tempting to assume that “ὀροβάγχη” (the vetch-strangler) is *Cuscuta*. This would mean that one of the first names of *Cuscuta* was *Orobanche*. In support of this hypothesis are the habit of the plant and the chapter about weeds in which Theophrastus mentioned it (Inquiry into plants 8.8.3–5, 1916). Unfortunately, the “vetch-strangler” was not further described or mentioned elsewhere by Theophrastus, and Pliny the Elder did not carry on this name.

The Labyrinth of names and languages

Theophrastus also spoke about the “small Syrian weed kasytas (κασύταξ) that grows on trees, thorn-bushes and certain other plants” (De causis plantarum 2:17.3, 1976). Mirande (1900) argued that “kasytas” is probably not *Cuscuta*. He suggested that since Pliny’s subsequent reference to this plant (“cadytas”) allegedly alludes to some aromatic properties, this plant may be *Cassytha* spp., a coastal plant from Lauraceae resembling *Cuscuta* in the parasitic habit. It must be noted that Pliny in his description (Natural History 13:129, 1951) amalgamated “kasytas” with other, unnamed plant from the account of Theophrastus. About this unnamed plant, Theophrastus said that is “sown in the dog days on the thorn-bushes in Babylonia that sprouts the same day and then speedily envelops the bush” (De causis plantarum 2:17.3, 1976). Pliny referred to these two plants as if they were a single one, and added that this plant “is used in making spiced wine and it is cultivated for this purpose” (Natural History 13:129, 1951). An even earlier indication to the preparation of a drink can be found in the

Talmud: "Why are not sufferers from ra'athan in Babylon? Because they ... drink beer containing *Cuscuta* (growing on) the hizme shrub" (Kethuboth 77b; see Epstein 1961). Epstein (1961) indicated that the "hizme shrub" is "Spira (Spina?) Regia." We could not determine what this spiny shrub was: *Tragacantha* (*Astragalus tragacantha* L.), *Rhamnus* spp., *Paliurus* spp., *Berberis* spp., *Zizyphus*? Therefore, Theophrastus' "kasytas" may be either *Cuscuta* or *Cassytha*, and the etymology of the two names is probably the same. Even in the 16th century, Fuchs (1542) used the name "*Cassutha*" for a dodder (Fig. 1) that, judging by its mentioned host, was apparently *Cuscuta epilinum* Weihe.

Several authors mentioned that the name has Greek origin (e.g. Dawson et al. 1994). But "kasytas" does not have any meaning in Greek and it would be more logical to assume that the name was introduced. Although Austin (1979) initially suggested that the name comes from Aramaic, he mentioned later that the name has an Arabic origin (Austin 1980). However, apparently "kushkuut," "kashuut" or "koshouût" as Arabic names of *Cuscuta* are early Aramaic neologisms (Fraenkel 1886; Nakhle Al-Yassu'i 1986). Many ancient Arabic words, especially related to agriculture were introduced from Aramaic (Nakhle Al-Yassu'i 1986). Based on the new root "k-sh-w-th," the word "kushsha" meaning in Arabic "a lock of hair" was probably derived (David Mehall, pers. comm.). Since Theophrastus mentioned Babylonia (Assyria) as a place of origin for "kasytas," this was probably from the geographical source of the name as well. Indeed, the etymology can be retraced in Syriac Aramaic and Hebrew (ksutha and ksuth, respectively), two closely related Semitic languages. The triradical root of the verb K-S-Y (Kaph, Shin, Yodh) means "to cover." Based on this root, a verbal noun that signifies "cover," "clothing" or "garment" is constructed in both languages: K-S-W-T (in Hebrew) and K-S-W-T-A (Kaph, Shin, Waw, Tav, Aleph) in Aramaic (Yona Sabar, pers. comm.; Paul Flesher, pers. comm.; Sokoloff 1990). "Ksutha" is often mentioned in the Talmud (see Epstein 1961) and other Jewish-Aramaic texts such as the Targums (Jastrow 1950; Bowker 1969; Sokoloff 1990). The word was introduced into Arabic, Persian and Greek, creating a bridge between these fundamentally different languages and cultures.

Before Pliny, Dioscorides said that "Epithumon ... is ye flower of ye harder Thyme, & like to Satureja" (4:179, see Gunther 1959). Pliny mentioned two types of Epithymum: "one which is like the flowers of the thyme and satureia" ("*qui est flos e thymo satureiae simili*") and another one "that grows without a root, has slender a head like a long mantle, is red in color and is dried in the shade" ("*sine radice nasci, capite tenui similitudine pallioli, ruben, siccari in umbra*") (26:55-56). The recognition of these two "types" persisted until medieval age, when Tragus (1552) and Parkinson (1640) considered that they belong to "one kind growing on different herbs." Between the 16th and 17th centuries, dodders were called differently depending on the author. For example, Casper Bauhin (1623) used both "Epithymum" and *Cuscuta*. A common practice during that

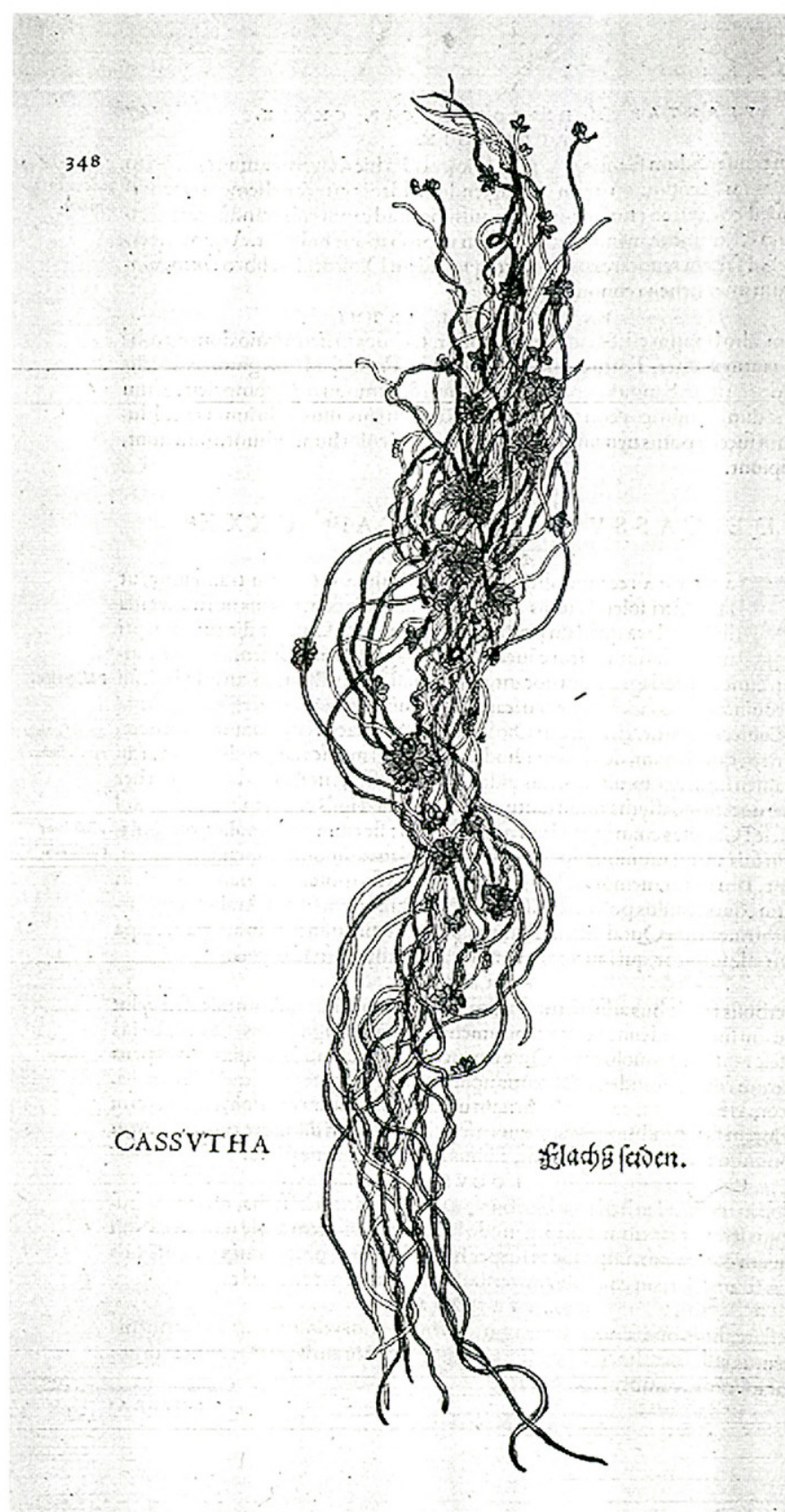


FIG. 1. *Cuscuta* spp. (probably *C. epilinum*). Fuchs, 1542.

time was to create a Latin name based on the hosts the dodders are growing upon, e.g. "Epithymum" (on *Thymus* spp.), "Epilinum" (on *Linum* spp.), "Epimajorana" (on Majoran), "Epistoebe" (on Stoebe - *Vicia* spp.), "Epiurtica" (on *Urtica* spp.) (e.g. Gerard 1633; Parkinson 1640). Apparently, Ray (1682) and Tournefort (1694–1695) were the first to retain only *Cuscuta*, which was later officially endorsed by Linnaeus (Sp. Pl. 124. 1753).

The parasite, "a spontaneous act of nature"

Kuijit (1969) suggested that the earliest reference to parasitic plants belongs to Theophrastus. However, an even earlier record can be found in Aristotle: "for even among land-plants there are some that are independent of the soil, and that spring up and grow, either parasitically upon other plants, or even entirely free (De partibus animalium 4:681b, 2001). Ancient Greeks were well-aware of the parasitic phenomenon. Even rooted, green lianas, like the ivy (*Hedera helix* L.) were regarded as "taking the food that belongs to the tree" (Theophrastus, De causis plantarum 2:17.4, 1976). And approximately three centuries latter, Pliny wrote: "it is a well-known fact that trees are killed by ivy" ("*hedera necari arbores certum est*") (Natural History 16:243, 1951).

The animal-oriented biological treaties of Aristotle have influenced our understanding of plant parasitism for almost 2000 years. Theophrastus was Aristotle's student and he developed many of the ideas of his teacher. "It may perhaps be that like animals, plants are fond of one another and live together" (Theophrastus, De causis plantarum 2:17.5, 1976). Or, that "some (plants) come from seed as through by a spontaneous act of nature. The latter come from rotting earth or from rotting parts of plants: for some are not constituted separately by themselves but are produced on trees, for example the mistletoe" (Aristotle, De generatione animalium 1:715b. 25–30, 1965). Following this idea, Theophrastus observed that maybe some plants "came from a corruption of something in the host" similarly to "some animals that can arise from other animals" (De causis plantarum 2:17.5, 1976). For example, like "those insects (such as lice and bed bugs) that ... live on the flavors of living flesh ... (and are produced) from the moisture from animals" (Aristotle, De partibus animalium 31:556b. 21–28, 2001; also De generatione animalium 1:715b. 5, 1965). But it must be emphasized that the Greek spontaneous concept does not preclude the origin of the parasite from seeds: "birds eat its fruit and let their droppings fall on the host tree." (Theophrastus, De causis plantarum 2:17.6, 1976). The wonder of ancient Greeks came from their belief that since plants "absorb the food already prepared from earth with their roots" they don't need a stomach, and they don't produce excrement (Aristotle, De partibus animalium 2.10, 2001). This is why plants "not growing on the ground at all is astonishing" (Theophrastus, De causis plantarum 2:17.5, 1976). In the Babylonian Talmud, the parasite was explicitly depicted as an integral part of its host: "if one plucks *Cuscuta* from shrubs and

thorns ... one is culpable as if it inserts his hand in an animal's bowels and detaches an embryo" (Shabbath 107b; see Epstein 1961).

Later, Arabians were inspired by Greek science and introduced it into Europe. The ancient meaning of the "spontaneous act" degraded and the parasite was literally viewed as arising from its host. For instance, Francis Bacon, in the England of the early 17th century, believed that mistletoes were an exudation (sap) "that the tree doth excern and cannot assimilate," and that the idea of birds spreading its seeds is merely a "fable" or a "tale" (*Sylva Sylvarum* 556–557, 1626). This misconception was reflected in the "Uva Barbata" or "Le Raisin Barbu," a *Cuscuta* spp. parasitizing *Vitis vinifera* L., and considered together with its host either as an entirely different species of grape wine (Tabernaemontanus 1588–1591), or a "monstrosity," a metamorphosis of the normal species (Jean Bauhin 1591). As late as 1831 such a blemish was connected to the appearance of the comet in the previous year (Kuijt 1969). In conclusion, the "spontaneous" concept regarding the origin of parasitic plants from medieval ages was merely a regression of the ancient Greek concept.

Rufinus, a forgotten botanist of the 13th century, was probably the first to observe that "*Cuscuta* ... is born in meadows and it ties to other plants, which it kills" ("*Cuscute ... nascitur in pratis et ligat alis herbas et necat eas*") (Rufinus approx. 1300 A.D.; see Thorndike 1946). His short note passed unobserved by all botanists and herbalists, and about three centuries later, Parkinson (1640) rediscovered that dodders "spring from their owne seede." He emphasized the discovery several times to "let all others understand": "... it may appeare plainly to any that neither Tyme, Savory, or any other herbe, doe naturally of their owne seede bring these strings or laeces but that they spring from their owne seede, either shed or scattered of themselves upon ground, or coming among the seedes of other hearbs that are sowne" (Parkinson 1640).

Cuscuta, the strength of weakness

Theophrastus compared parasitic plants with grafted shoots and buds that "get food that is more readily available and that has been prepared and practically concocted" (*De causis plantarum* 2:17.6, 1976). A good understanding of the parasitic phenomenon can be also encountered in the Babylonian Talmud, at approximately 100 BC. Although apparently it takes its food "from air ... *Cuscuta* derives its nourishment from soil (through its host); for we may observe that when the shrub (on which *Cuscuta* grows as a parasite) is cut off, *Cuscuta* dies" (Erubin 28b; see Epstein 1961). But "a plant seeking such food would be weak in its nature" (Theophrastus, *De causis plantarum* 2:17.6, 1976). Furthermore, such plants must be weaklings since they don't sprout and grow by themselves (Theophrastus, *De causis plantarum* 2:17.6, 1976). The same idea of helplessness, exemplified with "cadytas" and "viscum," can be found at Pliny: "because they have no abode of their own and consequently live in that of others"

("namque cum suam sedem habeant, in aliena vivunt," Natural History 16:39. 243-244, 1951). In a sense this is true; today we know that during the parasitizing stage, *Cuscuta* depends entirely on the nutrients provided by its host (Dawson et al. 1994). Nonetheless, gradually the harmful effect of dodders on their hosts outweighed other considerations. Fuchs (1542) noted that *Cuscuta epilinum* "grows ... over plants, quite often entangling them so thickly with its web that shuts off the sun like a tent. ... It forces out growth from the host plant, and strangles it with its filamentous stems, or, by continuous sucking of the mother's (host's) sap, reduces it to exhaustion" (Historia Stirpium:347). Even today, it is intuitively seductive and deeply rooted in our unconscious fears to imagine plant parasitism in terms of animal parasitology.

The hot or cold character of dodders and several old uses

Quoting Phoenicians and Arabs, Fuchs and other medieval herbalists (Ruellius 1529; Gerald 1633; Parkinson 1640; Culpeper 1652) believed that the curative powers of dodders depend on the "character of the parent (host): if it invades a warm plant, it strengthens its heating nature, and if it clings to a cold one, it will acquire the cold strength" (Fuchs, Historia Stirpium:349, 1542). This is why during medieval times, dodders were named according to the host they are growing upon (see above) (e.g. Gerard 1633; Parkinson 1640). Among these, "Epithymum" was said to have the best therapeutic properties because *Thymus*, its host, is dry and hot in the third degree, as indicated by Galen (Tragus 1552; Gerard 1633; Parkinson 1640; Culpeper 1652). "Physitians crying up Epithymum, (most of which comes from Hymettus in Greece, or Hybla in Sicilia, becaus those Mountains abound with Time) he is a Physitian indeed that hath wit enough to chuse his Dodder according to Nature of the Diseases and Humor peccant" (Culpeper 1652).

"That dodder growing upon Tares (*Vicia* spp.), being the most frequent in London, and wherewith our markets are onely in a manner furnished and Apothaecaries shoppes stored from thence ... can have no effectual quality comparable to Epithymum for ... Tares are hard of digestion and binde the bellye and the nourishment of them engendereth thicke blood apt to turn into melancholie" (Parkinson 1640). Today we know that, indeed, the parasite forms a biochemical continuum with its host, and that its chemical makeup may depend on the latter. Primary metabolic compounds, minerals, xenobiotics, secondary products (e.g. alkaloids and cardenolides), herbicides, viruses, and mycoplasmas are translocated from the phloem of the host via the haustoria to the parasite (Dawson et al. 1994). "You are what you eat" couldn't be more true for these plants.

Dioscorides, and later Pliny, recommended "Epythimum" as a purgative, as well as "for melancholicall, & ye puffed up with wind, ye quantity of an acetabulum to ye quantity of 4 dragms with honey & salt, and a little Acetum

(4:179, see Gunther 1959; also Pliny the Elder, *Natural History* 26:55). In an Arabic text dated before 1000 AD it is written: "If you put an euquia of blood (of the black dog) with a mithqal² of grounded *Cuscuta*; who will take this will never be reached by the spirits which causes enchantment. The meat (of black dog) in food with salt, is good a antidote against infantile epilepsy" (Alfonso-Goldfarb 1999). Other Arabic uses of *Cuscuta* have been reviewed by Guigues (1909), Hamarneh (1973) and Levey (1966). These were the main uses of dodders, which were later retained by all medieval herbalists. For example, Gilbertus Anglicus, around 1250 endorsed "Epithymum" as a remedy in a mixture of plants that "purge the head of evil humors" (Getz 1991). Culpeper (1652) noted that it is also good "to purge black or burnt Choller, which is the cause of many Diseases of the Head and Brains, as also for the trembling of the Heart, faintings, and swoonings." Since dodders are under the sign of Saturn, "this helps by Sympathy, & strengthens al the parts of the Body he rules: Melancholy, Addust Choller, Trembling, fainting, swooning, Spleen, Hypochondria, Obstructions, Gall, Jaundice, Liver, Disury" (Culpeper 1652).

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²euquia = 32.76g; 1 mithqal = 3.9g (Safa Jubran, pers. comm.)

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