

# THE SEA, IDENTITY AND HISTORY

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*From the Bay of Bengal to the South China Sea*

*Edited by*

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# If Only Plants Could Talk . . . : Reconstructing Pre-Modern Biological Translocations in the Indian Ocean\*

TOM HOOGERVORST

## Introduction

The human impact on landscapes reveals itself in various ways. Human populations affect their environment, but also adjust to it. The plants they cultivate shape their agricultural systems, village structures, culinary and medicinal traditions, rituals and art. Therefore, the study of plant remains from archaeological sites (archaeobotany) provides us with valuable insights into the early agriculture and cultural contact of a region. The names given to plants tell a different story, highlighting the actors featuring on the prehistoric stage of inter-ethnic contact. The Indian Ocean, with its favourable sea currents and monsoon winds, has facilitated maritime trade since time immemorial. Along with the exchange of religions and religious ideas (cf. Noor, this volume), material culture and technology, several cultigens diffused widely and across ethno-linguistic boundaries as a result of the interconnectedness of the

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regions around this ocean. This is often reflected by the adoption of loan-words from the people who introduced certain plants into a geographically contiguous society. In other words, lexical data can tell us who gave what to whom. Hence, this study focuses on the anthropogenic dispersal of a set of Southeast Asian plants and their distribution across the Bay of Bengal and beyond, using a combination of archaeobotanical and linguistic evidence.

Although bringing together linguistic and archaeobotanical data is a rather novel approach, previous scholars have established the benefits of such an interdisciplinary enterprise in gaining new perspectives on an otherwise poorly documented part of history (e.g. Mahdi, 1998; Blench, 2003; Beaujard, 2010). This study does not claim to present a complete picture of plant translocations from Southeast Asia into the wider Indian Ocean. The dispersal of spices and aromatics will be dealt with elsewhere (Hoogervorst, 2012) and plants that travelled in the opposite direction will also not be addressed here (but cf. Gonda, 1973: 322-9). Instead, this paper focuses on the origins and transoceanic dispersal of sandalwood, the coconut palm, lime cultivars, ginger and galangal. These plants originated in Southeast Asia, although the coconut palm may have been domesticated independently. After their translocation across the Bay of Bengal, the cultigens travelled further westward to the Middle East and East Africa. Archaeobotanical data tell us very little about the agents in these transoceanic dispersals. Therefore, this study will examine lexical data, both attested and reconstructed, to cast new light on this insufficiently explored aspect of the Indian Ocean's pre- and proto-history. In the light of Southeast Asia's sophisticated ship types and its people's renowned seafaring skills (cf. Pham, this volume), this paper especially aims to provide new perspectives on the role of Malay and other Southeast Asian speech communities in the trans-regional setting of the Indian Ocean.

Recent archaeobotanical research has shed new light on agricultural developments in this region. To understand the time-depth and distances travelled by the early navigators of the Indian Ocean, it is of special significance to look at the introduction of East African crops into South Asia and, to a lesser extent, South Asian domesticates travelling in the opposite direction. This series

of agricultural exchanges probably started around 2000 BCE (Blench, 2003; Fuller, 2003; Boivin et al., 2009). They were followed by the translocation of Southeast Asian cultigens, which are the focus of this study. Upon examining these biological translocations, one should keep in mind that discontinuous distributions of phylogenetically related species, if not caused by climate change, are strong indicators of anthropogenic dispersal (Asouti and Fuller, 2008: 71-4). Such human-mediated distribution patterns are found throughout the Indian Ocean. A better known instance of long-distance travelling foodstuffs is the prehistoric introduction of several insular Southeast Asian agricultural items into Africa, including yam varieties (*Dioscorea alata* and *D. esculenta*), taro (*Colocasia esculenta*), banana/plantain (*Musa* spp.), sugar cane (*Saccharum* spp.) and possibly Asian rice (*Oryza sativa*) (Murdock, 1959: 222ff.; Mitchell, 2005: 106-8). In addition, recent mitochondrial DNA analysis reveals a Southeast Asian contribution in the gene pool of East African chicken populations (Bjørnstad et al., 2009; Mwacharo et al., 2011). Chami (2001) reports the finding of chicken bones in Zanzibar dated to the last millennium BCE, but it is uncertain as to which part of Asia these domestic chickens originated from. In any case, most of these agricultural items seem to have transgressed the Indian Ocean through a trajectory not yet fully understood, in the form of a package, which has been called the 'Malaysian complex' (Murdock, 1959: 223-4) or the 'Tropical Food Kit' (Blench, 2009: 364). While African bananas/plantains have received a fair deal of scholarly attention (cf. Blench, 2009: 365-7; Neuman and Hildebrand, 2009: 353-4), our general understanding of biological translocations across the Indian Ocean is still in its infancy.

### Sandalwood

The sandalwood tree (*Santalum album*) is a 4 to 9 m high species of the *Santalaceae* family. This parasitic tree grows best in semi-arid areas and partly draws its nourishment from the roots of other trees. Although the sandalwood tree is easily cultivated, its bark is very delicate and suffers considerably from accidental injuries. The tree is therefore often found in protected areas, such as forests or

stony soils (Watt, 1889-96/vi.ii: 462; Burkill, 1966/2: 1987). Sandalwood is famous for its fragrance, which develops after its dead wood dries (Heyne, 1927/1: 590). In some textual sources, the wood is called 'white sandalwood' to distinguish it from the inferior 'red sandalwood' (*Pterocarpus santalinus*), a tree native to south India. In Indic cultures, sandalwood powder was initially used as a cosmetic and subsequently acquired a ceremonial function with the emergence of Hinduism and Buddhism (Burkill, 1966/2: 1989). In insular Southeast Asia, sandalwood is traditionally made into a porridge known for its aromatic and medicinal properties (Heyne, 1927/1: 591). The presence of sandalwood in South Asia seems to be of considerable antiquity and its use is deeply rooted in Indic culture. Sandalwood occurs in various Sanskrit texts, such as the late 1st millennium BCE *Rāmāyaṇa* and the fourth-fifth century CE works of Kālidāsa. The identification of sandalwood in the charcoal records at Sanganakallu in southern India suggests that it was used in South Asia by at least 1400-1300 BCE (Asouti and Fuller, 2008: 117; Fuller and Madella, 2009: 345).

In the light of the antiquity of sandalwood in South Asia, it is difficult to imagine that this tree might be of foreign origin. Nevertheless, this has been claimed by some early twentieth-century scholars (Sprague and Summerhayes, 1927; Fischer, 1927, 1938) and more recent archaeobotanical work points towards the same conclusion (Harbaugh and Baldwin, 2007). These studies provide several arguments for the non-indigenous origin of the sandalwood tree in South Asia. First, the geographical distribution of species in the genus *Santalum* shows remarkable discontinuity between southern India on the one hand and the entire area between Nusa Tenggara, northern Australia and most of the Pacific region on the other, which, if not caused by massive extirpation in the intervening area, can only be the result of human-mediated introduction. Second, there is an absence of entirely wild populations in the South Asian subcontinent, even though the tree is known for its ability to reproduce quite easily without human intervention. Third, early European sources uniformly identify Nusa Tenggara (also known as the Lesser Sunda islands) as an important export centre, whereas they do not mention any South Asian agency in the sandalwood trade.



In addition, the Chinese seem to have obtained their sandalwood directly from Southeast Asia, not from India (Laufer, 1919: 318).

Despite the insular Southeast Asian origin of the tree, the nomenclature for 'sandalwood' is almost entirely of Indic derivation. Only in Nusa Tenggara and adjacent regions, where the tree is found in wild populations, are several local names used (Heyne, 1927/1: 589). Although Sanskrit has many synonyms to refer to the tree (cf. Donkin, 2003: 22), the most widespread term is *candana*, itself a borrowing from a Dravidian source (Burrow and Emenau, 1984 #2448; Zvelebil, 1990: 80). This Sanskrit form yielded various reflexes across South Asia (cf. Turner 1966 #4658), spread westward as Farsi *čandan* - *čandal*; Aramaic *š-n-d-r* (Löw, 1881: 107); Arabic *šandal*, Swahili, †*sandali* and eastward as Late Middle Chinese \**tšian-tán* (旃檀) - \**tšian-tán* (填檀) (Hirth and Rockhill, 1912: 209; Burkill, 1966/1: 1988), Tibetan *tsan dan*, Khmer *can*, Malay *candana* and Cham *candal*. This word has also been identified as the attested form *santáline* found in the *Periplus* (Schrader, 1917-23/2: 279). In addition, it occurs in sixth century CE Hellenistic texts as *sándanon* (*Sixteen Books on Medicine*) or *tzandánē* (*Topographia Christiana*), although these words were later replaced by *sántalon* (Quaritch, 1893: xxxii; Yule & Burnell, 1903: 790; Dalby, 2000: 31). Thus, throughout the Indian Ocean littoral and beyond, the adopted word for 'sandalwood' was Sanskrit *candana*. The fact that even the insular Southeast Asian speech communities adopted this word may have been partly trade related: the Indians made the world aware of the high economic and religious value of the tree. Its important function in Hindu and, later, Buddhist rituals made the use of a Sanskrit name for 'sandalwood' even more likely.

### Coconut Palm

The coconut palm (*Cocos nucifera*) is a large, pinnate-leaved palm with a straight or slightly curved stem. The tree is currently found throughout the tropics, where it is mainly cultivated for its nuts. In addition, practically every other part of the coconut palm can be used, making the tree of high economical value and cultural significance. Its leaves are used for roof-thatching, and making

mats or baskets, while the leaf-veins can be bound together to make brooms. In Indonesia, the young pale coconut leaves (*janur*) are made into ceremonial decorations. The roots of the coconut palm are used medicinally for various illnesses, including dysentery (Heyne, 1927/1: 400). Its wood, known as 'porcupine wood', can be used for house construction and boat-building in the absence of more suitable timbers. The juice of the inflorescence (toddy) is known for its sweet taste and can be boiled down to make palm sugar (jaggery) or distilled to make a strong spirit (arrack) or vinegar, although sugar cane and palm species in the *Borassus* and *Arenga* genera are preferred for this purpose. Finally, the haustorial organ or 'coconut apple' of a germinating embryonic nut can be eaten as cabbage or pickled (Watt, 1889-96/ii: 448; Heyne, 1927/1: 401).

The coconut is characterized by various stages of development. After flowering, a green fruit bud develops. In the Malay world, these young fruits (*mumbang*) are used medicinally. As the nut ripens, a shell develops within (endocarp), whereas the outer skin (exocarp) and the husk (mesocarp) become harder and darker. An air cavity develops on the inside, allowing the formation of kernel liquid. This substance, commonly known as coconut water, is enjoyed as a refreshing beverage throughout the tropics. At a later stage, the husk dries and the kernel meat (endosperm) develops, at first thin, creamy and transparent and later succulent, firm and white. The coconut meat, also known as desiccated coconut, is used to make coconut milk and other culinary condiments. At the next growing stage, the exocarp becomes brown, the kernel liquid turns bitter and the endosperm becomes harder and thicker, after which the dry nut falls from the tree and sprouts. As is the case with parts of the coconut palm in general, almost all parts of the nut can be used. Coconut shells are used as drinking beakers, bailers, resonators for musical instruments and coals for goldsmiths (Heyne, 1927/1: 402; Burkill, 1966/1: 617; Kapil and Bhatnagar, 1976: 451), whereas the coarse fibre from the husks of matured fruits (coir) is manufactured into ropes, mats or mattresses by a process of manual removal (de-husking), beating, soaking and re-drying. Coir ropes play a key role in the boat-building traditions of South Asia (Varadarajan, 1998: 50-

81). The sundried kernel meat (copra), in addition to its nutritional value, can be grated and boiled to produce coconut oil. In India, this oil is traditionally used for lamps, to make soap and to adorn the body (Watt, 1889-96/ii: 441). The de-oiled residue (poonac) is rich in proteins and can be used as fodder for domestic animals.

The coconut palm has a large number of different cultivars, reflecting mankind's continuous attempts to improve its quality, productivity and shape (Foale, 2003: 21). Recent research on coconut phylogeography points out that there were at least two separate domestication events of the tree, resulting into two highly differentiated genetic sub-populations corresponding to the Pacific and Indian Ocean basins, the latter probably from a south Indian or Sri Lankan centre of domestication, with an admixture between the two populations occurring in East Africa (Lebrun, 1998; Gunn et al., 2011). This dual origin sheds new light on earlier theories of coconut dispersal. Hornell (1920: 221ff.), for example, correlated the introduction of the coconut, purportedly from Indonesia to Sri Lanka and thence to the mainland, with the migration of certain Sri Lankan palm tree cultivator and toddy-tapper castes known as *Tivān*, *Īlavan* or *Cānār* to coastal south India (Caldwell, 1875: 110; Iyer, 1909: 277; Thurston, 1909: 37-8). This hypothesis, which has found its way into the wider literature, is based on a number of assumptions. The Tamil word for 'coconut', it is argued, is *tēnkāy*, which can be explained as 'fruit from the south', alluding to its presumed insular origins. This etymology, however, is not watertight, as *tēnkāy* can equally well mean 'sweet fruit'. Its connection to the south, if any, could be the result of folk etymology. In further support of an insular origin of the coconut palm, scholars have noted that coconut cultivation plays an extremely marginal role in the large corpus of Indic literature prior to the beginning of the Common Era (Kosambi, 1965: 189; Mahdi, 1998: 396ff.), strongly suggesting that it was carried out by peripheral, coastal populations but not (yet) by the early Brahmins. Hornell (1920: 232ff.) believes these coastal populations were of partly 'Malayo-Polynesian' ancestry and cites the results of cranial measurements conducted among several communities to support this claim. Regardless of whether this

excursus contains any element of truth or not, a Sri Lankan origin of the coconut palm in South Asia is the most plausible scenario. In Sri Lanka, the tree may have been domesticated independently.

In accordance with the dual domestication of the coconut tree, the Indian Ocean features two major protoforms (i.e. forms that can be reconstructed to an earlier stage of a language family based on regular sound correspondences) for 'coconut palm': proto Malayo-Polynesian \**niuR*, which is regularly reflected in insular Southeast Asia and the Pacific (but not in Taiwan), and Old Indo-Aryan \**nārikēla*. Although the somewhat unsettled character of the Old Indo-Aryan form (cf. Turner, 1966 #7075) suggests borrowing, I do not agree with the view that the Old Indo-Aryan form is connected to or derived from the Malayo-Polynesian form, as has been suggested by several authors (Chatterji and Bagchi, 1929: xxii; Merrill, 1939: 123-4; Blench, 2008: 122). Instead, a Dravidian etymology from \**nari* 'fibre, rope' and \**ket-i-a-u* 'tree, bush', as first suggested by Bloch (1930: 740) and later reaffirmed by Southworth (2005: 82), seems to be more in line with the linguistic data. Either way, the Indo-Aryan form spread throughout South Asia (e.g. Turner, 1966 #7075), from which it was adopted as Farsi *nārgīl* 'coconut palm', Arabic *nārgīl* and Swahili *nazi id*. We may also compare the Hellenistic textual attestations *argellia* (*Topographia Christiana*) and *naūplios* (*Periplus*). The latter is usually emended to *nargīlios*, which resembles its tentative Indic precursor even more. In addition, the traditional coconut growing regions of the world display a large amount of specific vocabulary, including terms for different cultivars, various parts of the tree, growing stages of the nut and items manufactured from the tree. Although many of these terms are of descriptive nature and vary from one language to another, a small set of terms have been borrowed cross-linguistically. The Malay word *kəlapa*, referring predominantly to what Burkill (1966/1: 607) describes as 'the dry nut which the trader stocks and carries about', seems to be a borrowing from Sanskrit *kalāpa* 'bundle', alluding to the way in which the nuts were sold (Uri Tadmor, <http://wold.livingsources.org/s.v.>). Another instance of lexical borrowing is Swahili *ki-tamli* 'k.o. coconut', which appears to go back to Sinhala *tāmbili* 'king coconut (*Cocos nucifera* var. *aurantiaca*)' (Krain et al., 2002), a variety bearing yellow, ovoid nuts famous for their sweet juice.

Two specific palm-related terms from Malay seem to have found their way into Tamil. The first is the Malay *kajang* 'mat-awning'. In the Malay world, thatching is done with the leaves of several palm species, especially the mangrove palm (*Nypa fruticans*). This word appears to have been borrowed twice into Tamil: (1) *kacañku* 'wild date-palm; stalk, as of the date-leaf used in making plaited baskets' and (2) *karicañku* 'temporary roof of coconut leaves put up in an Indian raft for protection against inclemencies of weather'. However, it has been argued that palm thatching was a European introduction into south India (Yule & Burnell, 1903: 139-40), so the intermediate form might have been Indian-English 'cadjan'. Of more interest, therefore, is the word for 'palm wine'. The Malay word *tuak* 'fermented palm sap' has travelled across the Indian Ocean. It occurs as *tuwāq* in an account by the eighth-century CE Arabic author Abū Ḥanifa (Ferrand, 1913-14/1: 295). It also found its way into the Tamil language, which generally displays *kaḷ* 'toddy'. However, we also find the forms *tuvacar* 'toddy-sellers, dealers in spirituous liquors' and *tuvara-mañkaiyar* 'women selling toddy'. The insular Southeast Asian provenance of these Tamil words seems beyond doubt, although the exact route by which they spread to southern India remains obscure. It is tempting to speculate that these toddy-sellers were of Southeast Asian origin. In that regard, we may also note that the Malay *nira* 'fresh palm-sap' is borrowed from the Sanskrit or Tamil *nīra* 'water; juice, liquor'. The adoption of this South Asian word by Malay is additional evidence suggesting that Malay toddy-sellers once operated in the subcontinent, adopting local terms such as *nira* and *kaḷapa*. In addition, Beaujard (2010: 370) argues that Swahili *tembo* 'toddy' is derived from Malay *təbu* 'sugar cane', which suggests that Malay-speaking toddy-tappers played a similar role in East Africa. As mentioned before, both sugar cane and palm species are used in the Malay world to produce alcoholic spirits.

### Lime cultivars

Citrus trees are small evergreens known for their acidic fruits. The genus *Citrus* is believed to have originated in Southeast Asia, north-east India and southern China. At present, citrus fruits are predominantly cultivated for their culinary properties, in particular

the sweet orange (*C. sinensis*), mandarin (*C. reticulata*) and grapefruit (*C. paradisi*). Nevertheless, human consumption might be a relatively late addition to the wide range of functions that people have attributed to citrus fruits. Citric acid has traditionally been used as a sanitizer, disinfectant, insecticide, fungicide and medicine for various diseases. Indeed, the first citrus variety introduced into Europe and the Middle East from India was the inedible citron (*C. medica*), which was used medicinally and in (Jewish) religious ceremonies. Sweet varieties from China and Southeast Asia arrived on the scene much later (Burkill, 1966/1: 569; Zohary and Hopf, 1994: 173). Our understanding of citrus taxonomy is still quite rudimentary. Citrus fruits hybridize easily, accounting for an unclear number of species and difficulties in reconstructing their early phylogeographic dispersal. For this reason, the history of citrus cultivars cannot be seen in isolation from related species. The lemon (*C. limon*), for example, is probably a citron-based cultivar (*C. medica*) with phylogenetic contributions of the pummelo (*C. maxima*) and mandarin (*C. reticulata*) subspecies (Gulsen and Roose, 2001). Conventional thinking has it that citron cultivation commenced in the area of present-day north-eastern India and northern Myanmar. More recently, Gmitter and Hu (1990) have made a convincing case for its origins in Yunnan, south China, where uncultivated citron populations are found in the wild. Other citrus cultivars, such as the mandarin (*C. reticulata*) and the bitter orange (*C. aurantium*), probably originate from the same region. The round, green citrus varieties known as 'limes' are native to Southeast Asia. The best known limes are the key lime (*C. aurantiifolia*) and kaffir lime (*C. hystrix*).

The global dispersal of lime cultivars is of particular interest to linguists. The words used for 'lime'—together with an (ultimately) related set of words denoting 'lemon'—are among the world's most widespread borrowings, equalled only by the word 'tobacco' (Laufer, 1934: 143). European languages obtained their words for both 'lemon' and 'lime' through distinct lines of borrowing from Farsi through Arabic. Arabic medieval accounts lead us to believe that the fruits were imported into the Middle East from India, perhaps by Persian merchants (Glidden, 1937: 381ff.). Although the linguistic data support this scenario, the word used by early authors may have

denoted either 'lemon', 'citron' or 'lime' (Johnson, 1934: 50). The apparently related Indo-Aryan form (*\*nimbū*) is not attested in any literature prior to the 1235-50 dated *Rājanighaṇṭu* (Glidden, 1937: 386), a neo-Sanskrit lexicon on herbs, suggesting that the denoted fruit was an introduced species in the South Asian subcontinent as well. A century prior to its earliest attestation in the Indic literary record, we encounter the word in a Chinese botanical account by Fan Chengda as Late Middle Chinese *\*liaj-məwŋ* (黎藤; hence the Vietnamese *ninh môn* 'lemon'), after which it re-occurs in various contexts and renderings throughout Chinese literature (Laufer, 1934: 145ff.). Again, it is impossible to determine which variety was meant in these literary sources. The great variation of Chinese transcriptions strongly suggests that the word is borrowed. From the south of China, the word was probably propagated westwards by Persian merchants as a word meaning 'lemon', e.g. the Farsi *limūn* 'lemon, citron', Arabic *laymūn* 'lemon' and eventually the European words for both 'lime' and 'lemon' (cf. Mahdi, 1998: 408).

It has been pointed out that many Indo-Aryan forms display fluctuation between /n/ - /l/ in the word-initial consonant and between /e/ - /i/ in the initial vowel (Mahdi, 1998: 408; Southworth, 2005: 215). The level of irregularity in the vernacular attestations and the late occurrence of the literary Sanskrit form put into question the hypothetical reconstruction of the Old Indo-Aryan *\*nimbū*. Instead, we may consider the possibility of a back-formation from a vernacular term, e.g. the Hindi *limū* 'lime'. Uhlenbeck (1898-9: 148) suggests that the hyper-corrected form *nimbū* may have been influenced by *nimba* 'neem' (*Azadirachta indica*), another tree used in traditional Indian medicine. In any case, a foreign introduction is the most plausible scenario to account for its late occurrence in the literature. Early scholars have suggested various Austro-Asiatic precursors of the word *\*nimbū* in Indo-Aryan languages. However, upon closer inspection the Muṇḍā attestations appear to be derived from the Indo-Aryan forms, rather than the other way around (Osada, 2009: 136), while Mon-Khmer languages display unrelated reflexes of *\*kruəc* - *\*kruuc* 'citrus' (Shorto, 2006 s.v.). A Dravidian etymology is equally unlikely, since the phonological system of Dravidian languages does not permit a word-initial /l/

(Burrow, 1945: 614-15). Having discarded the Austro-Asiatic and Dravidian etymologies, let us now explore the terms for citrus fruits in Austronesian languages. Several scholars consider the possibility of an insular Southeast Asian, in particular Malayic, etymology for this word (Bonavia, 1890: 237-44; Kern, 1897: 272-3; Uhlenbeck, 1898-9: 148; Mahdi, 1998: 407ff., 2008: 322). Indeed, many Malayo-Polynesian languages display reflexes of \**limaw*, apparently a generic name for citrus fruits (Kern, 1897: 273; Clercq, 1927: 57; Mahdi, 1998: 408), e.g. the Malay *limau* 'citrus fruit' and the Old Javanese *limo* 'a citrus fruit, the lime'. The presence of endemic limes in insular Southeast Asia might hint at the antiquity of this form, which appears to have been borrowed as Sinhala *lima-dehi* '*C. medica* (*dehi* = 'citrus fruit')'; the Arabic *līm(ai)* 'lime' (Glidden 1937: 385); the Farsi *līmū* 'lemon, citron' and the Swahili *ndimu* 'lime'.

To substantiate the possibility of a Malayo-Polynesian origin of the word for 'lime' in South Asia, we may also call attention to the more recent trade in citrus fruits from Java to India. As first argued by Bonavia (1890: 30-1), several Indic trade names for citrus fruits are derived from the toponyms 'Jakatra' (= Jakarta) and 'Batavia', both names for the most important harbour of western Java since the mid-second millennium CE. The following forms are derived from the toponym 'Jakatra': Hindi *chakotara* 'a fruit of the lime kind, a citron; pompelmoose, shaddock', Marāṭhī *cakōtrā - cakōtra* 'a fruit, pompelmoose or shaddock', Pañjābī *chakotrā* 'the name of a large fruit of the citron kind, the shaddock or pummelo'; Nepāli *cakhetra - sañkhetra - sañkhatra* 'pummelo' and Bengali *cākhantrā* 'orange' (Turner, 1961: 163). From Malay *Bətawi* (< Dutch *Batavia*) have been borrowed: Tamil *vattāyi - vattāvi* 'Batavian orange', Bengali *bātābi* 'the shaddock, the pompelmoose, the pummelo' and Hindi *māhtābi* 'a sort of muskmelon'. If we accept that citrus cultivars, presumably lime varieties, were exported from insular Southeast Asia to the Indian subcontinent, we need to also re-examine the antiquity of the precursor \**limaw*. Many of its reflexes look surprisingly uniform and could be Malay loanwords, while the regional languages of Indonesia display slightly more variation. Austronesianists have registered different opinions on the antiquity of \**limaw*, varying from an assignment to proto-Austronesian (Tryon, 1994: 490) or proto-



Malayo-Polynesian (Zorc, 1994: 547) to a relatively late introduction via Portuguese *limão* 'lemon' (Wolff, 1994: 532; Jones, 2007: 183; Blust, 2009: 703). However, the antiquity of \**limaw* reflexes in insular Southeast Asia predates the arrival of Portuguese sailors in the Indian Ocean. The form *limo* has several attestations in Old Javanese literature prior to European contact (Zoetmulder, 1982/1: 1030). The earliest of these is found in the Javanese *Rāmāyaṇa* (Kern, 1900: 89 l. viii.10; 178 l. xvi.44), which is dated to mid-ninth century CE (Jiří Jaki; pers.comm.). The word also occurs on the Keboan Pasar copper plate inscriptions dated CE 964 (Krom, 1913: 141 l. lxiii.1b, 2a). Furthermore, it is found in the *Tantri Kāmandaka* (Hooykaas, 1931: 40 l. 24[12]), dated to the mid-fifteenth century CE, and in a later version of that work known as *Tantri Kadiri* (Soekatno, 2009: 98). In none of these texts it is clear what kind of citrus variety is denoted by *limo*, making the above textual attestations of less use for the study of citrus phylogenetics.

Next to its occurrence in pre-modern Javanese literature, a closer look at the geographical distribution of \**limaw* reflexes across the Malayo-Polynesian languages may help us understand the dispersal of Southeast Asian citrus fruits. To substantiate his claim for an indigenous Southeast Asian origin of \**limaw*, Kern (1897: 273) compares the forms *rima*, attributed to an undetermined Formosan language (presumably Siraya), and *moli*, attested in Polynesian languages and purportedly the result of metathesis (a process by which the order of sounds is changed). I have not found Kern's Formosan reflex in the literature; its closest resemblances are Pazeh *ʔarim* 'peach' and Favorlang *aliem* 'all kinds of lemons and citrons' (Tsuchida, 1977: 110). The Polynesian attestations are also slightly problematic. Although the botanical record has it that all edible citrus species were European introductions into the Pacific, there is a regular proto-oceanic reconstruction for 'citrus fruit' (\**moliS*), which may have originally denoted inedible or barely edible citrus or citrus-like genera (Ross et al., 2009: 338-9). Species such as the wild orange (*C. macroptera*) and the pummelo (*C. maxima*) were probably present in the Pacific in pre-European times (cf. Bonavia, 1890: 31-2; Thaman and Whistler, 1996; Walter and Sam, 2002). Illustratively, Raluana, a language spoken in New Britain, displays

the inherited term *muli* 'the native shaddock or large orange' (*C. maxima*) alongside the borrowing *nimomo* 'lemon or lime'. All things considered, both *\*limaw* and *\*moliS* appear to be of considerable antiquity, whether they are related or not (through metathesis or otherwise). The only other Malayo-Polynesian protoform with a comparable geographical distribution is *\*muntay* 'kind of citrus tree and its fruit' (Clercq, 1927: 57; Pallesen, 1977: 470; Verheijen, 1990: 201; Blust, 1995 s.v.; Sakiyama, 2009: 250; Wolff, 2010/2: 912), which has been attributed to proto-Austronesian (Wolff, 1994: 519) or proto-Malayo-Polynesian (Tryon, 1994: 490; Blust, 2009: 703).

Returning to the discussion on the ultimate etymology of the word for 'lime', it seems that its likeliest source is a Malayo-Polynesian language, in which reflexes of *\*limaw* tend to denote endemic citrus fruits in general. This form was then adopted into Indic languages, in which it specifically referred to Southeast Asian citrus cultivars. As the Indic languages also display indigenous protoforms for citrus or citrus-like genera, centuries of trade, cross-breeding and hybridization considerably complicated the citrus terminology in this part of the world. From the subcontinent, the word for 'lime' ended up in the Middle East and reached Europe through Middle Eastern merchants. The relation between insular Southeast Asian reflexes of *\*limaw* 'citrus' and similar-looking Chinese names denoting 'lemon' and possibly other citrus species merits further research. Possibly, both forms go back to a now-extinct language in southern China.

## Ginger

The ginger plant (*Zingiber officinale*) is a tuber with spicy rhizomes used widely for human consumption. Ginger is thought to have originated in Southeast Asia, although it is not found in a wild state anywhere today (Purseglove et al., 1981/2: 447). The ginger plant is propagated by replanting pieces of its rhizome, rather than its seeds, so that its dispersal typically requires human intervention. Its introduction into South Asia is presumably anthropogenic (Asouti and Fuller, 2008: 49). From India, the plant was introduced into the Middle East, Africa and Europe. Prior to Ptolemy, Graeco-

Roman authors were unaware of the Asian origin of ginger, as the Middle Eastern traders kept its source a secret (Warmington, 1974: 184). In all these regions, it was (and is) used in cuisine and in medicine, most commonly against the flu, common cold and nausea. Ginger was described by Dioscorides and Pliny and is also mentioned in the Qur'an (Burkill, 1966/2: 2338; Purseglove et al., 1981/2: 448). The most geographically widespread protoform for 'ginger'—reconstructed as Old Indo-Aryan \**śṛṅgavēra* (Turner, 1966 #12588)—is indeed reflected across South Asia, the Middle East and Europe, e.g. the Sinhala *iṅguru*, the Dhivehi *iṅguru*, the Farsi *šankalīl*, the Arabic *zanġabīl*; the Syriac *zangebīl*, the Aramaic *zangebīl* (Ross, 1952: 18; Crone, 1987: 76), the Old Greek *ziggiberi*, the Latin *zingiber* id., hence our 'ginger'. The form was also borrowed by Swahili (*tangawizi*) and several other East African languages, although these reflexes display irregular sound correspondences and their direct origins remain obscure (Ross, 1952: 19).

Interestingly, Malagasy has not inherited a Malayo-Polynesian reflex for 'ginger', suggesting that the plant was not introduced during the initial colonization of the island. Instead, the Malagasy word for 'ginger' is *sakarivo* (Merina dial.) or *sakaviro* (Sakalava dial.), also used for endemic plants in the *Hedychium* genus (Heckel, 1910: 340). Whether or not these Malagasy forms are related to Old Indo-Aryan \**śṛṅgavēra* is uncertain. If the forms are of Indic origin, this would seem to be the only instance of an Indic loanword in Malagasy not paralleled in the languages of Indonesia (cf. Tuuk, 1865: 421; Thomas, 1905; Ferrand, 1908: 361-6; Dahl, 1951: 104-7; Simon, 1988: 81; Adelaar, 1989, 1994, 1995, 2009). On the other hand, a reflex of *śṛṅgavēra* may have existed previously in an obsolete variety of Malay. In any case, the Malagasy attestations, especially Sakalava *sakaviro*, represent the Sanskrit form rather faithfully. The Sanskrit form is itself almost certainly a back-formation, regardless of folk-etymologies with *śṛṅga* 'horn'. It probably consists of the Dravidian elements *iñci* 'ginger' and *vēr* 'root' (Burrow & Emenau, 1984 #429, #5535), as suggested by various scholars (Gundert, 1869: 352; Yule and Burnell, 1903: 374; Hultzsch, 1912, 1914; Schrader, 1917-23/1: 541-2; Burrow, 1943: 130 n. 2; Southworth, 2005: 83). The Dravidian forms reflect an earlier \**cinki* (Krishnamurti, 2003: 5),

which is also attested in various other language families in Asia, such as Tibeto-Burman, Austro-Asiatic and Tai-Kadai (Jolly and Thomas, 1905: 169; Ross, 1952: 15-16; Marrison, 1967/2: 108; Burrow and Emeneau, 1984 #429). Therefore, it seems that this protoform for 'ginger' reached South Asia from a north-eastern source through overland trade networks.

In addition, Old Indo-Aryan displays a protoform with possible Malayic origins: *\*ārdraka* - *\*āllaka* 'fresh ginger' (as opposed to *\*śunṭhī* 'dried ginger'; Turner, 1966 #12515). Burkill (1966/2: 2339) was the first to call attention to the resemblance between the Indic reflexes and the Malay *halia* 'ginger', which goes back to the proto-Malayo-Polynesian *\*laqeya* through metathesis (Adelaar, 1992: 387). The form *\*laqeya* is reflected across insular Southeast Asia and the Pacific and is of considerable antiquity (Ross et al., 2009: 414; Wolff, 2010/2: 884). I would reconstruct the dispersal of the above forms as follows. The Malay form *halia* 'ginger' spread to India at an early stage, reflected as MIA *\*allaya* 'fresh ginger'. This form yielded Marāṭhī *ālē* - *alē* 'fresh ginger, ginger plant' and Kōṅkaṇī *ālē* 'ginger' (Turner, 1966 #1341). In addition, we find Kannaḍa *alla* 'ginger', Tamil *allam* id. and Telugu *allamu* 'green ginger'. That the loanword *\*allaya* was subsequently hyper-corrected, according to regular sound correspondences, to *\*āllaka* is not an isolated example. Sinhalese also exhibits a back-formation from /y/ to /k/ between vowels, for example *lakāra* 'sail' from *layāra* (another Malay loanword) and *karavika* 'to cause to be made' from *karaviya* (Smith, 1933: 216). Through folk-etymology, some speakers associated the resulting form with *\*ārdra* 'wet' and hyper-corrected it once more, yielding the late Sanskrit *\*ārdraka* and forms such as the Nepālī *aduwā* 'dried ginger', the Pañjābī *addā* 'ginger', the Bengali *ādā*, the Hindi *ādā*, the Gujarātī *ādū* id. (Turner, 1966 #1341) and the Sinhala *adda* 'green ginger'.

### *Galangal*

The *galangal* (*Alpinia galanga*) is a herbaceous plant of the family *Zingiberaceae*, which also encompasses the ginger. Recent molecular phylogenetic analysis of species in the genus *Alpinia* points out that

*A. galanga* is most closely related to *A. nigra* and *A. conchigera*, both native to Southeast Asia (Rangisuruji et al., 2000). The rhizomes of *galangal* are famed for their culinary and medicinal properties and can be used fresh or in powdered form. Most botanists infer a Southeast Asian origin of the *galangal*, but the plant may have been cultivated in East Bengal and southern India for a long time (Rangisuruji et al., 2000: 11). Early colonial sources mention Java as the greatest exporter of the plant. From India and the Middle East, *galangal* reached Europe in medieval times, where it was valued as a medicine (Dalby, 2000: 78-9). This diffusion is reflected in the linguistic evidence: the late Sanskrit *kulañja(na)* 'galangal' (*A. galanga*), the Sinhala *kalañjana*, the Hindi *kulījan*, the Dhivehi *kolizān*, the Farsi *halanjān*, the Arabic *kulunḡān* and the late Latin *galangal* id.

Miller (1969: 52) argues that the Indic form probably originates from China, where the plant can be found in the southern regions. A less convincing etymology explains the form as a south Dravidian word in the meaning of 'esulent or bulbous root' (Dalgado, 1919/1: 414; cf. Burrow & Emenau, 1981 #1578). One of its Chinese names is Early Middle Chinese \**kaw-lian-kian* (高良薑) 'superior ginger', which denotes the lesser *galangal* (*A. officinarum*) and other *Alpinia* species. In support of Miller's hypothesis, we may also compare the Old Khmer *ramtyan* 'galangal' (*A. galanga*) (hence Khmer *rumdeen* id.), which resembles the last two elements of \**kaw-lian-kian*. Several insular Southeast Asian attestations look similar and might have been borrowed from Old Khmer or another source on the Southeast Asian mainland, e.g. the Sudanese *laja*, the Makassarese *laja* and the Javanese *laos* (from an older *laja*) id. (Heyne, 1927/1: 480). The attestations in insular Southeast Asia suggest a secondary diffusion of the Javanese term *laos*, cf. the Balinese *ka-lawas-an*, Karo Batak *kə-lawas*, Simelungun Batak *ha-lawas*, Lampung *lawas*, Ternate *galiasa* id. (cf. Heyne, 1927/1: 480). This corresponds to early European observations of Java as the main exporter of *galangal*. The data further suggest that the plant was introduced into Java and other Southeast Asian islands from the mainland—perhaps through interaction with speakers of the Mon-Khmer languages—and ultimately from China. Via an undetermined route, possibly over land, the same Chinese

word also ended up in South Asia from which it spread to the Middle East and Europe.

### Conclusion

Our understanding of pre-modern inter-ethnic contact and agricultural exchange is the product of various disciplines. In this study, it is demonstrated that several cultigens that are widely in use across the Indian Ocean littoral have their ultimate origins in Southeast Asia. In many cases, the diffusion of these plants from Southeast Asia to the South Asian subcontinent and further westward is supported by linguistic data. Sometimes the linguistic data provide contrasting perspectives, encouraging us to find alternative explanations. The overall picture we get is that South Asia played a key role in the trans-oceanic diffusion of culturally and economically important plants, from where they were eventually dispersed to the Middle East, East Africa and Europe. Many of these cultigens already had a long history in the region prior to their westward dispersal. The agents in these inter-ethnic networks were probably of diverse ethnic origins and included Middle Eastern, South Asian, Chinese and Southeast Asian merchants. In the Bay of Bengal, the linguistic data suggest a significant Malay element.

Some cultigens, such as ginger and *galangal*, might have reached South Asia via overland trade but the introduction of the other plants examined here is in all likelihood the result of maritime trade with insular Southeast Asia. Nevertheless, this study does not claim to present a comprehensive overview of trans-oceanically dispersed Southeast Asian cultigens, highlighting instead only those cases where bringing together data from different disciplines 'works'. Although the exploration of lexical data can tell us who the cultivators and traders of certain plants were in terms of their ethno-linguistic affiliations, it remains inconclusive in other instances. For several plants, such as turmeric (*Curcuma domestica*), sugar cane (*Saccharum officinarum*), mango species (*Mangifera* spp.), jackfruit (*Artocarpus heterophyllus*) and others, the place of first domestication, the possibility of other domestication events and the early diffusion patterns are less known. In the absence of phylogenetic research, I have not found the

linguistic data on these plants sufficiently helpful to propose wide-ranging reconstruction hypotheses. New insights from disciplines other than linguistics are likely to increase our understanding of the history of these cultigens in due course. Within historical linguistics, there are caveats as well. We have seen that languages such as Sanskrit can conceal the foreign acquisition of loanwords by 'correcting' them to resemble the indigenous vocabulary. In addition to this, the 'high' status of Sanskrit as a cosmopolitan vehicle of religion and literature *vis-à-vis* the perceived 'low' status of trade vernaculars, such as Malay, accounted for a socio-linguistic situation in which speech communities preferred to borrow Sanskrit terms, even for indigenous concepts, to enrich their parlance, thereby obscuring the geographical origins of certain plants. All these facets make the story of biological translocations in the Indian Ocean an extremely interesting one to unravel.

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