2019

ELSA GOVEIA MEMORIAL LECTURE

Human beings and baobab and tamarind trees in India and the Caribbean: Ethnographic, historical and evolutionary perspectives on an ancient African mimetic complex

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HUMAN BEINGS AND BAOBAB AND TAMARIND TREES IN INDIA AND THE CARIBBEAN: ETHNOGRAPHIC, HISTORICAL AND EVOLUTIONARY PERSPECTIVES ON AN ANCIENT AFRICAN MIMETIC COMPLEX

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The Elsa Goveia Memorial Lectures honour the memory of the distinguished West Indian historian Elsa Vesta Goveia (1925-1980). Born in British Guiana, Elsa Goveia took her Ph.D. in History at University College, London. In 1950 she joined the Department of History at the University College of the West Indies, Mona, as Lecturer, and in 1961 she was appointed Professor of West Indian History. Elsa Goveia was the first female Professor in the University and at her death was the longest serving West Indian Professor. Her major published works included **A study on the Historiography of the British West Indies to the End of the Nineteenth Century** (1957) and **Slave Society in the British Leeward Islands at the End of the Eighteenth Century** (19965). Memorial Lectures are also presented at the Cave Hill campus of the University of the West Indies.

John Rashford graduated from the Graduate Center of the City University of New York in 1982 with a PhD in anthropology and a research interest in ethnobotany. He began his teaching at the College of Charleston in 1983 and retired (Professor Emeritus) in 2018. He has been an active member of the Society of Economic Botany for most of his academic career. His participation in the Society has included service as a council member, treasurer, and President. He is this year's Distinguished Economic Botanist and is currently a science board member of the National Tropical Botanical Garden.

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Good evening.

I would like to start by thanking Dr. Enrique Martinez and his colleagues of the Department of History and Archaeology for the invitation to present this year's Elsa Goveia Memorial Lecture. As a Jamaican and a Portlander, I especially appreciated receiving this invitation as it was extended to me in the context of highlighting interdisciplinary research in the Caribbean in ways that will benefit students in history, heritage studies and archaeology. Of course, I am also mindful, that the occasion honors Dr. Elsa Goveia, a pioneer of historical research on slavery and the Caribbean, and to her I pay my respect.[1]

INTRODUCTION

The baobab (*Adansonia digitata* L.) and tamarind (*Tamarindus indica* L.) are highly valued multipurpose fruit trees of the African savanna that were long ago introduced by human beings to Indian and more recently to the Caribbean.[2] The essential correlation between these trees in India and the Caribbean that forms the basis for my talk this evening is their taste-alike fruits with similar uses and their shared tamarind name. The scientific consensus is that the African savanna is the landscape of human evolution. My goal is to explain why these trees with contrasting appearance are called tamarinds in various parts of two very different regions of the world and to do so by identifying an evolved mimetic complex involving human beings and baobab and tamarind trees. Following a brief account of research methods, the major sections of this presentation begins with a discussion of the baobab's tamarind names in India and the Caribbean focuses on the uncanny taste resemblance and similar use of the fruit of both trees. The next section shows that the remarkable correspondence

between these two trees also includes the fact that they grow entwined, have similar reproductive strategies, and are often discussed together by scholars. The last section of this talk identifies the baobab/tamarind complex in the landscape and in human imagination as a reflection of an entwining relationship involving mutualistic Müllerian mimicry.

METHODS

My talk is one outcome of an ongoing effort to document the history and cultural importance of the baobab in the Americas. It is based on field research in Florida, the Caribbean and Brazil that incorporates a review of the literature, media interviews, and online sources. Key informant interviews were used whenever possible to learn about the history of specific trees from people who were in a position to know. Informal interviews were conducted with individuals who were present at the site when the trees were being observed. Located trees were measured, photographed and mapped and the presence of leaves, flowers, fruits and ecological associates noted. Information on baobab tamarind names in India is based on a literature review, newspaper articles, and the many online sources of information that are now available. Although no fieldwork was done in India, I am familiar with the country and its landscape. As a college student I spent almost a year studying in India where my travels were extensive. Figure 1 shows examples of old baobabs in Brazil for comparison with similar illustrations of trees from Africa, India and the Caribbean that are presented in this talk.

Examples of Old baobabs in Brazil for comparison with those of India and the Caribbean

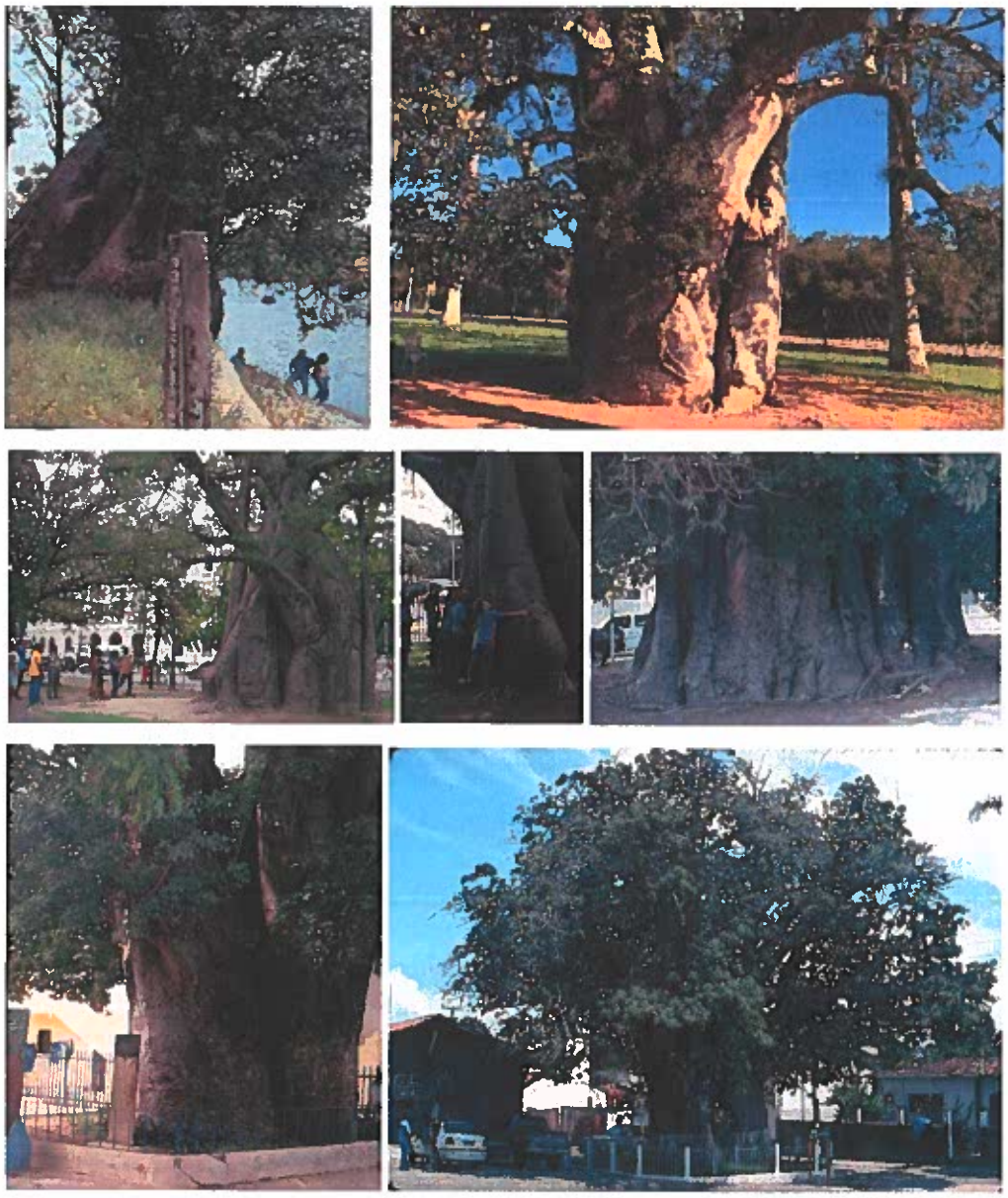

Figure 1. Examples of some of the oldest baobab trees in the Americas. (Top left) The Capibaribi baobab in Recife, Pernambuco. (Top right) The Quissamã baobab in the interior of Rio de Janeiro. (Center left and in the middle) These two photographs are of one of Brazil's most well-known baobab trees growing in the historic Praça da República in Recife, Pernambuco. (Center right) The Baobab of the Poet (Diogenes da Cunha Lima) in Natal, Rio Grande do Norte. (Bottom left) The Nossa Senora do Ó Baobab in Ipojuca, Pernambuco. (Bottom right) The Nísia Floresta Baobab in Rio Grande do Norte.

WHY IS THE BAOBAB NAMED AS A KIND OF TAMARIND IN INDIA AND THE CARIBBEAN?

I turn now to the focus of my talk which is an explanation for the baobab's tamarind name. Just looking at the baobab and tamarind without knowing anything about these two trees, it would be impossible to say why they should share the same name in widely separate places on opposite sides of the world.

Figure 2. The baobab and the tamarind compared with respect to trees, leaves, flowers, fruits, fruit pulp, and seeds. The photography of the tamarind flower was taken by Mike Bush and posted on Flickr, 2009.

Even though the baobab and tamarind share the tamarind name it has opposite meaning for each species. *Tamarindus indica* is appropriately identified as the real, true, genuine or actual tamarind. For this species, 'tamarind' used without qualification is its specific name. For the baobab, tamarind is its generic name. The baobab's many vernacular binomial tamarind names tell us that it is not the true tamarind, but a particular kind of tamarind. There is no confusion here in the thinking of the people of India and the Caribbean. What we find in both places is that the baobab's tamarind name is continuously being re-invented by people that eat the fruit of both trees. Yet, the common idea in the literature is that the shared tamarind name is simply the result of 'a confusion' between the two trees.[3] According to Burton-Page,[4] "The confusion is already found in *c.* 1595 in Abu'l-Fazl's description of Mālwā[5]: "here the tamarind grows as large as a coconut, and its fruit is extremely white." Armstrong[6] supports the confusion thesis when he writes "Whatever the explanation for the ecological link [of the two trees growing together], it appears that the name was transferred from one partner to the other during the journey to India." Other researchers have accepted this assessment of the baobab's many tamarind names in India. But these 'confusion' explanations are unacceptable because the nature of the mix up to which they allude is never made clear.

The ambiguity, then, is partly in the thinking of researchers with a limited appreciation of the baobab/tamarind complex. For example, in his influential 1969 article on the introduction of the baobab to India, the archaeologist Burton-Page (1969:332) is tentative in suggesting that "perhaps the common feature of a fruit with an acid pulp is responsible" for the baobab's tamarind names. There is no need for uncertainty, however. The taste-alike fruits of the baobab and tamarind is definitely responsible for their shared tamarind names all over India and in all India's major languages with the

exception of those languages associated with environments in which the baobab does not grow. Fruit-taste resemblance is also responsible for the baobab's tamarind names across the Caribbean. The idea of confusion points to the need for a comprehensive explanation for why these very different African savanna trees should grow entwined, have taste-alike fruits with similar uses, and share the same tamarind name.

The tamarind as model in India and the Caribbean

A well-known evergreen of the pea family (Fabaceae), the tamarind is widely valued for its beauty, shade, durable wood, medicinal uses, and religious significance. Most of all, it is appreciated for the sweetly acidic pulp of its fruit which is everywhere used for food, health and income. The fruit is eaten fresh and used to make drinks, sweets, preserves and sauces. According to Adams,[7] the tamarind is "now cultivated and naturalized throughout the tropics and subtropics of both hemispheres." The five factors involved in the worldwide dispersal of the tamarind are the abundance of seeds produced each year by mature tamarind trees; the widespread human use of the fruit whose seeds are mostly discarded; the ease with which these seeds germinate and establish themselves when incidentally discarded; the protection and transplanting of naturally occurring seedlings, including those that have been human incidentally dispersed; and the intentional planting of seeds. It is precisely because the tamarind is a familiar feature of the human environment that it is used to 'mark' – and thereby make known – a variety of other plants that are part of the same environment. The great majority of trees and shrubs identified as kinds of tamarind in the Caribbean and elsewhere around the world are, like the true tamarind, members of the pea family with similar leaves or fruits. They can appropriately be described as look-alike tamarinds. The shared resemblance is a result of their descent from a common ancestor. The African baobab, the most well-known member of the genus *Adansonia* (which includes six species native to Madagascar and one to Australia), is the notable exception to plants that share the tamarind name.[8] It is a taste-alike tamarind, not a look-alike tamarind.

The baobab is legendary for its extraordinary size, longevity and utility. More than any other tree, it is emblematic of Africa and of Africans and a powerful icon of the African savanna as the landscape of human evolution. Unlike the look-alike tamarinds, the baobab is a taste-alike tamarind belonging to the hibiscus family (or Malvaceae).[9] The taste resemblance between the fruits of the baobab and tamarind has been viewed in the literature as merely a chance occurrence. The main point that is being emphasized here, however, is that the resemblance is not incidental. It is the necessary outcome of a co-evolved alikeness. Similar-tasting fruits, similar uses, and similar names are expressions of a mutually advantageous Müllerian mimetic complex that benefits human beings (and other dispersal agents) and has real consequence for the overall reproductive success of the baobab and tamarind. The tamarind springs up readily from incidentally discarded seeds, but my research in the Caribbean and Brazil suggest that the baobab is most often planted. Worldwide, this means the baobab compared to the tamarind is rare, and baobab populations mostly consist of scattered individual trees and groves.

ARE BAOBAB TAMARIND NAMES IN INDIA THE RESULTS OF A CONFUSION?

Figure 3. (Left) Two of the trees of the Savanur baobab grove of Karnataka. (Right) The baobab tree at Shiva temple (on Balachandruni hill, Telangana). Photographs taken by Siddeshwar whose blog is titled Journeys across Karnataka.

The Regional baobab populations of India

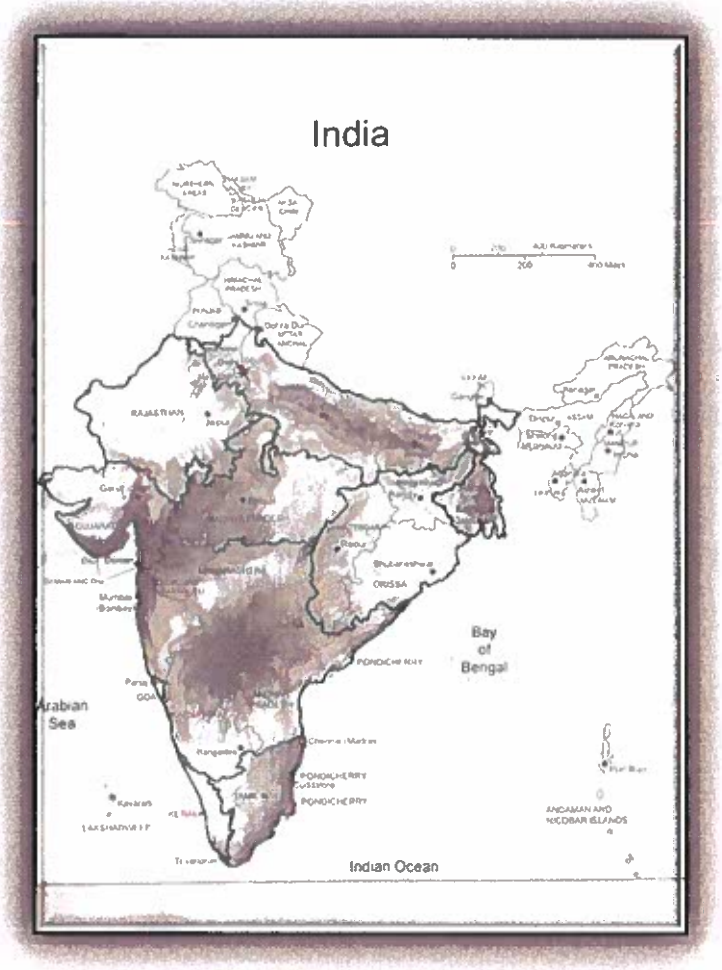

Figure 4. Dark outline of one or more states indicates the regional baobab populations of India and shaded areas indicate areas of baobab concentration discussed in the text. Adapted from a royalty free map of the states of India and their capitals (copyrighted by Bruce Jones Design Incorporated, 2010).

Judging from the colonial literature, commercial Internet sites, researchers, reporters, travelers and bloggers, the baobab can indeed be described as widespread in India where it has vernacular names in the major languages of the country that are spoken in places favorable to the growth of the species.[10] To appreciate the significance of India's baobab tamarind names it is necessary to situate the discussion in the context of the nine regional baobab populations of India. These populations are comprised of states or combination of states and each represents a distinctive feature of India's diverse topography.

They include the Ganges basin (Haryana, Delhi, Uttar Pradesh, Bihar, West Bengal), Madhya Pradesh, Gujarat, Rajasthan, the Konkan coast of Maharashtra, Kerala, the Deccan (Maharashtra, Telangana, Karnataka, Andhra Pradesh), Tamil Nadu, and the peninsula northeast (Jharkhand, Chhattisgarh, Orissa). With respect to these populations, it has long been noted that the baobab is mostly concentrated along India's coast and in the Central Highlands and Deccan. It is fairly common on the northwest Gujarat and Konkan coasts and on the southeast Tamil Nadu coast. In the central Highlands it is especially plentiful in the Malwa region of western Madhya Pradesh. In the Deccan it is found in Maharashtra, a state with strong ties to northern India, and in Karnataka, Andhra Pradesh, and Telangana, which are states with strong ties to southern India.

Ganges baobabs, *kalpa vriksha*, and Sanskrit baobab tamarind names

The fertile Gangetic plain of northern India is important because it is the agricultural landscape of the Sanskrit language and of the rich religious literature of Hinduism. Some researchers regard the Ganges valley as the first region to which the baobab was introduced from the horn of Africa over two thousand years ago. Burton-Page[11] reports an "older planting" of baobab trees in the Ganges valley (with specific reference to "around Delhi and Allahabad") but he does not discuss this population except to note in passing "the Mughal taste for curiosa." Nor does he record the *kalpa vriksha* and *parijat* names associated with the baobabs of northern India.[12] When we consider all the Ganges baobabs, however, it is clear that the species has mostly been reported for Uttar Pradesh, and there is no doubt that the states of Uttar Pradesh and Bihar combined are the heartland of the Ganges baobabs. Ten locations have been identified for Uttar Pradesh (including Bilara, Agra, Etawa, Barrollia, Fatehpur, Kanpur, Barabanki, Sultanpur, Lucknow, and Allahabad) compared to one for Haryana, three for Delhi, two for Bihar, and six for West Bengal.

According to Burton-Page,[13] there is no mention of the baobab in 'ancient' Sanskrit literature, and Wickens[14] in his influential 1982 article states without qualification that the baobab has no Sanskrit

name. It is clear, however, that Sanskrit names – including Sanskrit tamarind names – have long been reported for the baobab in northern India and although Sanskrit names were not identified by Wickens in 1982, they were by Wickens and Lowe in 2008. Of the 13 Sanskrit names for the baobab catalogue by Wickens and Lowe, the most important is *kalpa* tree (*kalpa vriksha*), variously identified in the literature as *kalpavriksha, kalbriskh, kalpbriskh, kalapbirchh, kalpataru, karpaga viruksham, kalpadruma,* and *kalpapadapa*.[15] The *kalpa* tree, described as 'heavenly', 'holy', 'divine' or 'sacred', is the long-lived wishing tree of ancient Hindu religious texts and that is also featured in the tradition of Jains and Buddhists.[16] What is truly significant about the baobab's *kalpa* name in India is that even when the baobab is not called the *kalpa* tree it is still widely regarded in India as the wishing tree especially valued for its health benefits and religious significance. For example, Reddy and colleagues[17] report that in the Jhalawar district of southeastern Rajasthan, people call the baobab *maansapooran*, meaning the "one which fulfills the aspirations," and they note that, as in the Ajmer district of northern Rajasthan, "They tie a small stone with red colored sacred tag (*lachha*) to the branches after praying for their wishes to be fulfilled."

In the chronology of Hindu mythology, *kalpa* means lasting for a single day of Brahma, a creation-to-destruction cycle of 4,320,000,000 years identified as one Brahmanic eon. In reality, this mythic conception identifies the baobab as a long-lived tree – the longest living flowering tree in the world. In mythology, *kalpa* means indestructible and this identifies the baobab as tenacious in its grip on life. K*alpa* means wishing-fulfilling and this is a tribute to what can ideally be described as the baobab's all-purpose use. And in a general sense *kalpa* also stands for extraordinary things of a mythical or imaginative nature. This alludes to the inspirational value of the baobab's massive size and bizarre shape which makes it, not only a curiosity and ornamental, but also an inspirational presence that seems otherworldly.

Wickens and Lowe[18] note that the baobab "is often associated with temples, shrines and religious ceremonies" in India and this is particularly true of local communities that identify the baobab as the mythic *kalpa* tree.[19] According to Vaid, the true botanical identity of the *kalpa* tree has been "haunting the minds" of scholars for a long time. Emphasizing the correspondence between features of the baobab and those of the mythic *kalpa* tree as presented in religious narratives, Vaid argues that the multipurpose baobab is indeed the wishing tree "mentioned in all . . . puranic literature" and associated with cosmology, ancient religious sites, temple sculpture, oral traditions, and contemporary ritual practices.[20] Contrary to the emphasis on Arab traders (and prior to the growing recognition of the African contribution to the introduction and spread of the baobab in India), Vaid suggests the baobab was earliest introduced from the horn of Africa to the west coastal of India by Indian seafarers. The genetic evidence[21] and current newspaper reports[22] confirms the multiple introduction of the baobab to India and there is no reason to doubt that Indian seafarers may also have played a role in introducing the baobab to India. Unfortunately, the link between the Ganges baobabs and the horn of Africa has received little attention in the literature.[23]

Kirtikar and Basu[24] identifies the name *kalpa vriksha* (in the form of *kalbriskh* and *kalpabriskh*) only for Delhi, but Vaid[25] says "In certain remote and far-flung places in India where occasional baobabs still stand, the local people know them as heavenly kalpa-vriksha, parijat, etc., and festivals are held to worship them as the 'wishing tree'." The *kalpa vriksha* name for the baobab appears to be more restricted in occurrence than Vaid suggests. In addition to Delhi, it has only been reported for Haryana (formerly eastern Punjab), for Mangaliyawas (near Ajmer), and for northern Rajasthan. These locations are the western part of the Ganges baobabs. In support of Vaid's argument, however, it must be noted that even people who do not call the baobab the *kalpa* tree still identify it as the wishing tree of Hinduism associated with celebrated spiritual beings such as Brahma, Shiva and Indra.

Because Vaid's focus was the *kalpa* tree name he did not discuss baobab tamarind names in India. It is noteworthy, however, that of the thirteen reported Sanskrit names for the baobab, four identify it as being a kind of tamarind, including exotic tamarind (*vilayati imli*, *vilayti imli*, *vilaiti imli*, *vilayti-imli*, *vilayati imli*, *vilayyati imli*), *chor* tamarind (*choramli*, *choramli*), *kashmir* tamarind (*kasmiramlika*), *ravana* tamarind (*ravanamlika*), and *sudan* tamarind (*sudanlika*). Place-associated baobab tamarind names are important in India and the Caribbean. They include place-of-origin names, place-of-transit names, and place names. *Sudan* tamarind could well be considered a true place-of-origin name that links the baobab to Sudan and more broadly to the horn of Africa. *kashmir* tamarind is obviously a place-of-transit name that links the baobab to the northern gateway into India and to the baobabs of Haryana and the rest of the Ganges basin. And *ravana* tamarind is likely an Indian place name (of which there are several possibilities given the importance of the name Ravana in India's religious thought and geography).

Khurasani tamarind, *mandu* tamarind, *bari* tamarind, or *millan* tamarind

In India the baobab is most widely known by binomial vernacular names that identify it as being a kind of tamarind and *khurasani* tamarind (*khurasani imli*) is one of the earliest reported tamarind names for the baobab in the British colonial literature.[26] According to Burton-Page, the "greatest concentration of baobabs in India" is in the Deccan, and "above all" in Malwa, Madhya Pradesh, especially "in the towns of Chandērī and Māndū and its suburbs Na'lcha." And he reports that in Malwa the baobab is called *khurasani* tamarind (*khurasani imli*) and in the Deccan (specifically in Bijapur, Karnataka) it is called *gorakh* tamarind (*gorak imli*).[27] Contrary to the colonial literature, the *khurasani* tamarind name has only been reported for Madhya Pradesh. Burton-Page identified three baobab locations for Madhya Pradesh but five more have since been reported, including Dhar, Bhopal, Vidisha, Rewa, and Raipur. Oommachan[28] records the *khurasani* tamarind name in his study of the flora of Bhopal in central Madya Pradesh.

Burton-Page[29] regards *khurasani* tamarind as a place-associated name, but not a place-of-origin or place-of-transit name. In his view, *khurasani* tamarind means only 'not-from-here' tamarind, equivalent to the various vernacular names for the baobab in India that identify it as exotic tamarind, foreign tamarind, and frontier tamarind. He writes, "The epithet Khurasani is fanciful, for the tree is unknown in Khurasan; it seems to be no more than an elegant word meaning 'foreign,' as in *American cloth, Russian salad*." For some researchers, however, while *khurasani* tamarind is clearly not a true place-of-origin name, it could be considered a place-of-transit name. Rangan records the name *khurasani* tamarind (*Khorasani imli*) in a visit to Mandu and she writes "In the past, Khorasan referred to a region of Central Asia that included parts of western Afghanistan, northeast Iran, Uzbekistan and Turkmenistan."[30] Wickens and Lowe[31] identify *khurasani* tamarind as a Punjabi name. The tree has been documented for what was eastern Punjab and is now the state of Haryana. Haryana baobabs, as previously noted, represent the western part of the Ganges regional population. K*hurasani* tamarind as a Punjabi name makes the link to Persia and to Khurasan (as transit routes for the baobab) more realistic.[32]

It appears that baobab tamarind names are continuously being generated in India and the Caribbean by people who eat the fruit of both trees. Consider the baobabs of Mandu, for example, which are often mentioned in the literature. They are sufficiently plentiful to characterize the landscape as a baobab savanna with scattered individual trees and groves. Burton-Page only reports the *khurasani* tamarind name for this population. Today, however, scholars, newspaper reporters and bloggers who visit the ruins of the Mandu fort complex have also recorded location names for the baobab, including *mandu* tamarind (*mandu imli*), *bari* tamarind (*bari imli*), and *millan* tamarind (*millanamli*). These sources provide illustrated accounts of the sale of the whole fruit, of a nutritious refreshing drink made from a mixture of fruit pulp and seeds, and of small plastic bags containing bite-size bits of fruit pulp

with and without seeds. Not surprisingly, these sources also indicate that in addition to baobab products the fruit of the tamarind is also offered for sale.

Gorakh tamarind names in India

In contrast to *khurasani* tamarind which appears to be limited to Madhya Pradesh, the name *gorakh* tamarind is the most widely reported vernacular name for the baobab in India. The comprehensive list of baobab names in India's major languages produced by Wickens and Lowe[33] shows that some version of the Gorakh name, especially *gorakh* tamarind, appears in Sanskrit, Hindi, Cutchi, Gujarati, Marathi, and Tamil. In a number of publications, *gorakh* tamarind is the only common name provided for all of India.[34] The baobab's Gorakh name commemorates the celebrated 10th-century yogi and guru of Hindu religious texts, mythic narratives, and popular legends. The three published forms of the *gorakh* tamarind name include *gorakh imli* (*gorakh-imli*, *gorak-imli*), *gorakh amli* (*gorak amli*, *gorakh amali*, *gorakamli*, *gorakhamli*, *gorakhamali*, *gorakamali*, *gorakh ambli*, *gorakhambli*), and *gorakh chinch* (*gorakh-chinch*, *gorak-chinch*, *gorakhchintz*, *gorakhincha*, *gorekh chinch*). With one exception, the *gorakh* tamarind name does not appear in the languages of South India where the baobab has other kinds of tamarind names. The exception is Tamil Nadu where among its many vernacular names the baobab is also called *gorakh* tamarind (*korakkarpuli*). In light of the above, it is reasonable to ask what accounts for the India-wide association of the baobab with Gorakh and Gorakhnathis, and by extension, with Shiva (of which Gorakh is an incarnation), with Shiva shrines and temples, and with Ravana, one of Shiva's greatest devotees. Shiva is one of the principal deities of Hinduism. Among other things, he is patron of yoga and its practice of meditation and also patron of dance (as the emblem of cosmic dynamism) and of the arts generally (including notions of time and change and of spiritual energy and creative and procreative power) .

Although Gorakh is revered in northern, western and central India much of the about the historical circumstances of his life remain uncertain. He is generally identified as the first and most

prominent student of Matsyendranatha, widely regarded among Hindus as the first human teacher of spirituality. Gorakh is also recognized for his contribution to establishing the tradition of Hatha Yoga as the spiritual path to serenity through physical and mental discipline and for being the author of a now lost treatise on Hatha Yoga. The earliest explanations for the baobab's association with Gorakh is that he either 'taught' or 'gathered' with his fellow yogis in the shade of the baobab which, as a settlement amenity tree, probably also served as an attraction, landmark, boundary marker, hollow-trunk room, rest spot, campsite, and community tree.[35] Other practical uses for the baobab would likely have included food, especially the fresh fruit, the nutritious refreshing drink made from a mixture of the fruit pulp and grounded seeds, and the cooked leaves. Health care in the form of medicines and other treatments would also have been important and they remain so today. The technology applications of the baobab probably included the use of the woody fruit pod as a water container and for making fishnet floats, and the use of the bark fiber form making rope and other cordage. Exchange involving income from gifting, bartering, or sale of the fruit and other baobab products, cannot be ruled out.[36] The baobab's inspirational value as a link to the *gorakh tamarind* name is also likely to have been aesthetic, with respect to the tree's great size and curios shape; religious, with respect to the tree being regarded as a spiritual being or a place of spirits and its use as an altar site; commemorative, with respect to the baobab's Gorakh name as a memorializing of one India's revered religious teacher; and representational, with respect to the distinction conferred on the baobab for having been selected to be a symbol of Gorakh as a great yogi and spiritual teacher. In accounting for the baobab's tamarind name in India, Reddy and colleagues[37] naively dismiss the settlement amenity arguments, emphasizing instead the association of Gorakh with health and with the baobab's health benefits. But reports of the baobab as a food source, health promoter, settlement amenity, wishing tree, and a seasonal rain indicator in Gujarat could all be considered aspects of the baobab's association with the name of Gorakh.

According to the digital encyclopedia Philtar, "The doctrine of Gorakhnath is open to all castes, which helps account for Gorakhnathis being found all over India," and we learn that they "can be found especially in the Punjab, Gujarat, the Ganges basin, Nepal, Maharashtra, and the Northern Deccan and Central India."[38] With the exception of Nepal, these places are also among the most important baobab regions of India. We also learn that "Gorakhnathis are not required to only live in a monastery and the Gorakhbodh allows them to live in market places and roads and in the shade of trees. Thus, Gorakhnathis can be found in almost any locality and are as widely scattered as any of the ascetic orders. They can be seen as wandering ascetics or living as hermits, and sometimes they travel in groups." It is in this context that the baobab's inspirational value, settlement advantages, and other practical uses mentioned above could have led to the tree being called *gorakh* tamarind. These factors also explain why Gorakhnathis are planting baobab trees. On a visit to the Shivarama Karanth Biological Park (at Pilikula, Mangaluru, on the coast of Karnataka), a reporter for The Hindu newspaper, wrote that Udayakumara Shetty, the Horticulture Supervisor of Medicinal Plants for the Biological Park, "who procured a few [baobab] saplings from the Soans Farm in Moodbidri has gifted a couple of them to Kadri Temple. Gorakhnath of the Nath Tradition – to which the temple belongs – was said to be very fond of baobab."[39]

The name *gorakh* tamarind is deeply associated with the traditions of African Indians called Siddis. Rangan and Bell[40] note that "Among the diverse vernacular names for the baobab in northern Indian languages, the words '*gor*' and '*gorakh*' are most common, followed by the suffix reference to" the tamarind identified as *amli* or *chinch*. Burton-Page says he could find no reason for this, but based on their fieldwork, Rangan and Bell report that "it is interesting to note that when we visited a baobab shrine at the coastal settlement of Gorakshmadhi in Junagadh district of Gujarat, we were told that the place was named after a Hindu ascetic called *Gorakhnath* who had planted the baobab tree at the site and few more in nearby areas." What stands out most for Rangan and Bell is "The correspondence of

the name *Gor* for the Muslim saint, and *Gorakh* for the Hindu ascetic (the suffix *-nath* is an honorific term in Sanskrit for 'lord'), with the vernacular names for baobab was particularly striking, and pointed to the kind of syncretic evolution of folk beliefs and traditions that arise from repeated and intensive interactions between different communities." Based on their research, Rangan and Bell conclude that Gorakh was likely a Nubian. They indicate that "another linguistic connection that is worth investigating is the close correspondence between the western Indian vernacular name *gorakh* and *'kwora'*, which is listed as a name for the baobab in the Nubian languages of Delami and Umm Brembeita of Eastern Sudan."

The people of India have been impacted by the repeated waves of immigrants from Africa, Arabia, Persia and Central Asia, especially following the rise of agricultural states and their specialized long-distance land and sea traders. Against this background it has long been noted that the distribution map for African Indian communities and for significant concentrations of baobab trees in India are an unambiguous match.[41] Both are associated with the Gujarat and Konkan Coasts, with western Madhya Pradesh, and with the Deccan states of Maharashtra, Karnataka, Andhra Pradesh and Telangana. Given this correspondence, the question that arises is what accounts for the significance of the baobab for African Indians? One important factor is without doubt the baobab's inspirational value as a place of spirits which makes it a place for shrines where people establish contact with spirits. The celebrated spirits of the Siddis that are associated with the baobab include religious teachers, Muslim saints, and Hindu deities (most notably Shiva, Brahma and Lakshmi). They also include ancestors linked to Africa descent and the promotion of kinship solidarity. This aspect of the baobab's religious significance for African Indians includes the important activity of planting the baobab at grave sites.

***Gorakh* tamarind and other baobab tamarind names in Gujarat**

The research of Reddy and colleagues[42] shows that the baobab is widespread in Gujarat where they have recorded a total of 79 trees for North, Central and South Gujarat, for Daman, and for the

Saurashtra and Kachchh peninsulas. Among these are some of India's most impressive old trees such as the Vadodara baobab in Central Gujarat and the Bhuj baobab in Kachchh. Randhawa[43] and others identify *gorakh* tamarind (in the Marathi form of *gorakh chinch*) as the popular vernacular name for the baobab in India and the only name for the tree in Gujarat. But nine common names have been reported for the baobabs of Gujarat and four of these are baobab tamarind names. Gujarat has three linguistic forms of the *gorakh* tamarind name, including *gorakh imli* in Hindi and Punjabi, *gorakh chinch* in Marathi, and *gorakh amli* in Gujarati ((*gorak amli*, *gorakh amali*, *gorakamli*, *gorakhamli*, *gorakhamali*, *gorakamali*, *gorakh ambli*, *gorakhambli*, *gorakh*).

Reddy and colleagues[44] report, however, that it is only at "some places in Gujarat" that the baobab is known as gorakh tamarind (*gorakh amli*). The tree is also called *chor* tamarind (*chor amli*), *mor* tamarind (*morambali*), and *Kachchh* tamarind (*chhamakali*). These authors[45] translate *chor* tamarind (*chor amli*) as "duplicate tamarind" and Wickens and Lowe[46] as "not genuine tamarind." These translations are related to the names false tamarind and imitation tamarind and could be interpreted as having the same meaning, but this is not necessarily the case. In the context of the present discussion of baobab/tamarind mimicry, the different connotations deserve consideration. It is significant that Reddy and colleagues[47] not only identify the baobab as 'duplicate tamarind' in Gujarat, they also note that the fruit of the baobab is "used as a substitute for tamarind." Here is a case in which taste resemblance and substitutable use have resulted in the shared tamarind name. By contrast, the "not genuine tamarind" translation of Wickens and Lowe accurately denotes that the baobab is not the true tamarind. It wrongly connotes, however, that the baobab as an imitation tamarind is not substitutable for the real tamarind; it is a false tamarind.

The name *Chhamakali* appears to be specific to the Godpar baobab in Bhuj which is in the middle of Kachchh peninsula of eastern Gujarat. The names *deda* and *deda tree* have also been

reported for the kachchh tamarind. This means *mor* tamarind and *Kachchh* tamarind (*Chhamakali*) are the two baobab tamarind place names for Gujarat.

The more widely used vernacular names for the baobab in Gujarat, however, appear to be *rhukdo* (*rukhdo, rukhado, rukhda, rukhada,*), *gandiyu zaad,* and *ghelu zaad.* Reddy et al.[48] interpret these three names as references to the baobab being conspicuously leafless when other trees were in full leaf. *Rhukdo* they say means "naked," "deciduous," or "dry appearance" and they identify this as the basis for naming the baobab the "mad tree" (*gandiyu zaad* or *ghelu zaad*).[49] But Rangan and Bell[50] give a different meaning for *rhukdo* (*rukhdo, rukhado, rukhda,* rukha, *rukhada, burka, bukha, bukhdo*). They note "In some instance in Coastal Gujarat, the baobab tree itself has been deified as *Rukhda dada* and worshipped by local Hindu communities. In these areas, the baobab often goes by the name of *rukhda* or *rukhdo*, where the word *rukh* is a modification of the Sanskrit word *vriksha*, or tree, and *dada* means (paternal) 'grandfather'. *Rukhda dada* thus stands for 'grandfather tree'." The *dada* name in its various forms, including grandfather tamarind, is particular important because of its link to a vital part of Siddi religious tradition and to the Deccan. Rangan and Bell document the religious significance of the baobab for Siddis for whom the tree is used as a shrine associated with ancestors, religious teachers, Muslim saints, and Hindu deities. What Rangan and Bell missed, however, is the planting of the baobab in association with graves. This is an important omission. In a blog posted by the ReDiscovery Project and titled "Murud Janjira's African past and the mystery of the Boab tree," the authors wrote "The Siddis it seemed had a tradition of planting Baobab next to their graves, and we encountered this not only in the Khokari tomb complex, but also near another dilapidated tomb we found sitting forlornly by the sea."[51]

Figure 5. Photography by Damitr of baobab grave planting in Janjira.[52]

Baobab tamarind names in the in the northern Deccan of Maharashtra

The meaning of 'Deccan' varies considerably but two important senses of the word are clarified here to avoid ambiguity. Geographically, the Deccan means the Deccan Plateau – the triangular-shaped and topographically diverse interior upland of peninsula India extending from the Ganges basin south to the state boundary of Kerala in the southwest and Tamil Nadu in the southeast. Popularly understood, however, the term Deccan refers to the vast plateau from the Satpura Range south that includes Maharashtra, Telangana, Karnataka, and Andhra Pradesh. Burton-Page describes the baobab as plentiful in the Deccan, but for Maharashtra he only identifies Mumbai, Chaul, and Janjira along the Konkan coast, and Ahmednagar for the interior of Maharashtra which comprises the northern Deccan. Today, eight baobab locations have been identified for the Maharashtra Deccan. In addition to Ahmednagar, they include Pune, Karwand, Junnar,[53] Aurangabad, Meherabad, and Amravati.

In Marathi the baobab is primarily called *gorakh* tamarind identified as *gorakh chinch* (*gorak-chinch*, *gorakhchinch*, *gorakh chinchi*, *gorakhchincha*, *gorakhchintz*, *gonik-chintz*), but the names *gorakh-amali* (*gorakhaamli*, *gorakh amli*) and *sumpura gorakh chinch* have also been reported for

Marathi. Other Marathi tamarind names include false tamarind (*chor amli*) and horse tamarind (*choyarichinch, chori chinch*).[54]

The problem of the *gorakh* tamarind name in the Deccan

Burton-Page[55] says he could "find no reason for the Deccan association with Gorakh . . . unless there may be some association with death, for here the baobab was traditionally the tree under which executions took place (why? From its being merely an easy landmark for a rendezvous, or because its leaflessness all the year, except for the rains, suggested also lifelessness?)." There is, however, a simpler explanation for the problem of the *gorakh* tamarind name in the Deccan. Bidar and Bijapur in Karnataka are the only baobab locations Burton-Page identifies for the southern Deccan and from his discussion it is clear that he was specifically concerned with the *gorakh* tamarind name (*gorakh imli*) in Bijapur. But Bijapur and Bidar are close to the boarder with Maharashtra to the north. It is reasonable to assume that they share some traditions with Maharashtra, including the gorak tamarind name. This would not have been obvious to Burton-Page, however. He identifies five of the nine baobab regions for which he reports one or more locations. This includes four locations in the Ganges basin (Delhi, Allahabad, Jaunpur, Calcutta); one in Gujarat (Surat); two in Madhya Pradesh (Chanderi, Mandu); three on the Konkan coast of Maharashtra (Mumbai, Chaul, Janjira); one in the interior of Maharashtra which comprises the northern Deccan (Ahmednagar); two in the southern Deccan (Bidar, Bijapur); and one in Tamil Nadu (Madras). This means that apart from Bidar and Bijapur, Burton-page overlooks the baobabs of the southern Deccan states of Karnataka, Andhra Pradesh and Telangana where instead of *gorakh* tamarind the tree has other tamarind names.

Baobab tamarind names in the southern Deccan of Karnataka and Andhra Pradesh

Baobab tamarind names occur in Kannada (Karnataka), in Telugu (Andhra Pradesh and Telangana), and in Tamil (Tamil Nadu). The six baobab locations identified for Karnataka are Bidar, Bijapur, Raichur, Nalgonda, Savanur, and Bangalore (representing a minimal population of eight trees

including the grove of three trees in Savanur). And of the five baobab names recorded for the state, two are baobab tamarind names, including elephant tamarind (*aane hunise*, *anehunese*) and *brahma* tamarind (*brahamlika*, *bhrahmlika*, *brahmamlika*, *bhrahmlica*, *brahmamlica*, *brahma-amli-ca*, *brahmambika*). The other three baobab names of Karnataka are *hathikhatyan*, *derki*, and *maggimavu* (*maggivaamu*, *magimaavu*, *magimavu*). The Savanur baobab grove is particularly well known in India and in Savanur the baobab is called grandfather tamarind tree (*dodda hunise mara*).

The three baobab locations identified for Andhra Pradesh are Nellore, Jaggayyapeta, and Enugula Vada. The baobab at the "locality" identified as Enugula Vada (which was called elephant tree, *enugu chettu*) toppled in 2017.[56] The two baobab locations have been identified for Telangana and they include Hyderabad and Nalgonda. There are an estimated 20 trees in Hyderabad, including near Chappel Road, Vansthalipuram, Attapur,[57] Nanakramguda, and Chengicheria Reserve Forests. Elsewhere in the state there is also the famous Golconda Fort baobab and the baobab of Nanakramguda. This adds up to a minimal of twenty-two baobabs for Telangana. The magnificent baobab of Golconda Fort, called the elephant tree (*hatiyan jhad*), is one of the largest and best-known of India's historic baobab trees. Telugu is the major language of Andhra Pradesh and Telangana and the Telugu baobab names also include *brahma* tamarind (*brahaamlika*, *brahma-mlika*, *brahmaamlika*, *brahmanlika*) and *maggimavu* (which are names Telugu shares with Kannada but not with Marathi), and the name foreign tamarind (*seemasinta*, *simachinta*, *simae-chinta*, *seemachinta*, *seemachintakaaya*, *seemai*), which Telugu shares only with Tamil. *Seema* or *seemai* means "frontier in southern Indian languages" and the idea of frontier tamarind could be considered the equivalent of foreign tamarind or exotic tamarind.[58] It is worth noting that Telangana shares the *chinch* (tamarind) name with Marathi, but not with Karnataka or Andhra Pradesh, and it shares the *brahma* and *maggivaamu* names with Karnataka, but not with Marathi.

Baobab tamarind names in Tamil Nadu

The Tamil Nadu coast extends from the Tiruvallur District bordering Andhra Pradesh to the Kanniyakumari District at the southern tip of the peninsula. The state of Tamil Nadu, particularly its coast, is generally recognized as home to one of India's important regional baobab populations. This is so, not only because of its many baobabs, but also because the coastal concentration of trees is linked to the state's strategic location in connecting the Arabian Sea with the Bay of Bengal and the Indian Ocean. Fourteen baobab locations have been identified for Tamil Nadu. In his emphasis on the baobab's coastal distribution in India, Maheshwari (1971:58) describes the species as "a fairly well-known tree" on the Chennai and Negapatam coasts. Bahadur,[59] in his *Materia Medica of Madras*, notes that although the baobab fruit was not sold in the bazaar, it could "be obtained easily and abundantly in the gardens of Madras." Today, however, the anonymous author of a *Times of India* article (2016) reports that there are only "a few [baobabs] in Chennai." Other baobab locations for Tamil Nadu include three trees in Madurai, two trees in Sivaganga, and one tree in Rajapalayam. Unlike Chennai and these other locations, the accounts of researchers, reporters and bloggers suggest that the coastal district of Ramanathapuram is the area where baobab trees are most concentrated in Tamil Nadu. The baobab locations of Ramanathapuram include Devipattinam, Afagankulam, Senthanenthal, Erwadi, Mummudisanthan, and Thangachimadam. Ramanathapuram District In southeastern Tamil Nadu is the entryway to the east-west chain of low-lying islands and shallow reefs connecting India and Shri Lanka via the Pamban Bridge. This connection also separates the Gulf of Mannar to the southwest from the Palk Strait to the northeast. The baobabs of the southeast are most plentiful on both sides of the connecter. A review of historical accounts indicate that the baobab population of Shri Lanka and Tamil Nadu has suffered significant decline in recent years. "Today," writes Vandercone and co-authors "about 40 trees survive in Sri Lanka, of which 34 have been identified and measured in the island of Mannar."[60]

Tamil is one of the most widely spoken Dravidian languages of south India and the many Tamil names for the baobab include elephant tamarind (*aanai puli*, *anaippuli*, *anaipuli*, anai-puli, anaippuli, anaippuli, *yanaippuli*), elephant tamarind tree (anai-*puliya-maram*, *anaippuliyamaram*, *anai-puliiya-maram*, *anaipuliamaram*, *anaipuliamaram*, *anaimaram*, *yanaippulimaram*, *yanaipuliyamaram*), and elephant tree (anaimaram); African tamarind (*paparapuli*, *paparapulia*, *Papparapuli*, *papparappuli*, *parparappuli*, *paparaphulia*, *papparapapa-puli*, *pappura puli*, *pepper-appaulu*);[61] fat (big, huge, large) tamarind, fat tree, (*perukkamaram*), and just fat (*perukku*); puri tamarind (puri-puli) and puri tree (*puri-maram*, *purimaram*, *purinelli*, *purippuli*); and *pontaipullimaram* (*pontampuli*), which seems to be a place name meaning Pontai tamarind tree. Curiously, Wickens and Lowe also report the name *gorakh* tree (*korakkarmaram*) and *gorakh* tamarind (*korakkapuli*) for Tamil. However, Wickens and Lowe did not record the frontier tamarind name for Tamil, but others have (*cimaippuli*, *simai-puli*). Tamil names for the baobab also include *totimaram* (*toti*, *totimaram*, *totiyam*, *totiyamaram*), *arucka* (*aruckamaram*, *arukkankopikam*, *arrukkankopika*-maram), and *malukikam* (*malukikamaram*).

IS THE BAOBAB TAMARIND NAMES IN THE CARIBBEAN ALSO A CASE OF CONFUSION?

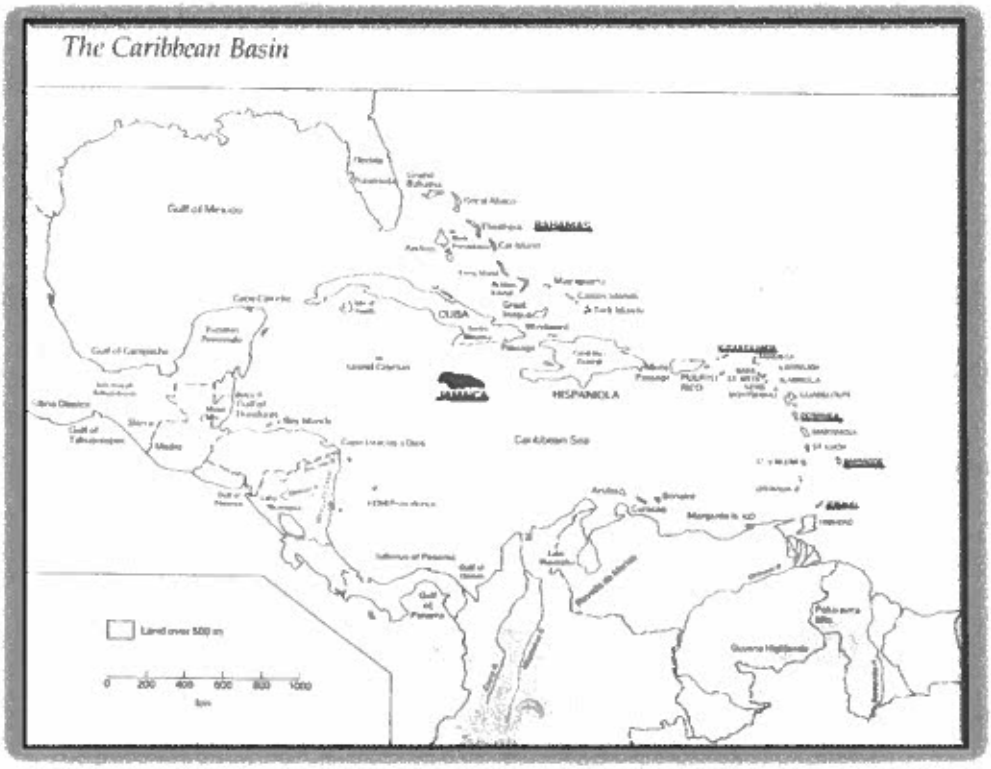

Figure 6. Caribbean territories that are shaded or underlined have baobab tamarind names (Barbados, St. Croix (U.S. Virgin Islands), St. Eustatius, Tobago, Jamaica, Bahamas, and Dominica). St. Eustatius, which is not identified on the map, lies just to the northwest of St. Kitts in the Lesser Antilles. Map adapted from Peter Ashdown, *Caribbean History in Maps* (Trinidad and Jamaica: Longman Caribbean Ltd., 1979).

The old baobabs of Brazil and the Caribbean are post-Columbian plantings associated with the trafficking of millions of Africans across the Atlantic as the labor force of European sugar-producing slave plantations in Brazil, the Caribbean, and elsewhere in the Americas. This development reached its peak from the mid-17th century through the 18th century when, "in terms of numbers," writes Sherlock, "Africa took possession of the West Indies." Ethnographic research in the Caribbean reveals the curious fact that the baobab is also called a kind of tamarind in the Caribbean. This suggests the baobab tamarind names in India and the Americas cannot be explained away as a simply a case of confusion. The six recorded baobab tamarind names in the Caribbean are *guinea tamarind*, *monkey tamarind*, *jamaica tamarind*, *africa tamarind*, *cushion tamarind*, and *flour tamarind*. The names *guinea tamarind*, *monkey tamarind*, *jamaica tamarind* and *africa tamarind* have been reported in the literature and

guinea tamarind and *monkey tamarind* are associated with several Caribbean islands. The other two tamarind names are *flour tamarind* and *cushion tamarind*. These are local names specific to the community of people who live with one or more trees in their immediate environment, who eat the fruits of both species, and who have given the baobab a tamarind name. The fact that Caribbean territories do not use the same modifiers suggests that these baobab tamarind names developed independently and were also spread within the region with the movement of the tree.

Flour tamarind in Barbados

Figure 7. The Queens Park Savannah baobab on the left and the Warren baobab on the right.

Among the places in the Caribbean to which the baobab was earliest introduced (judging from the location of the oldest baobab trees of the Americas) was the sugar-growing landscape of Brazil and Barbados. First then is the baobab's tamarind name in Barbados where 40 trees have been documented. The largest of these are the Queens Park Savanna Baobab in the heart of Bridgetown, the island's capital, and the Warren Baobab which in earlier times was on the outskirts of historic Bridgetown. These impressive trees are among the most well-known baobabs or even the Caribbean, but of the Americas. Their origin dates back to the early history of Barbados as the first important

British slave-based sugar colony in the Caribbean that was completely dependent on African labor. These old baobabs flower profusely. The Warren baobab regularly produces an abundance of large fruits, but the Queens Park Savanna Baobab aborts its fruits shortly after they begin to develop.

'Baobab' is the widely used common name in Barbados but the community that lives in association with the Warren tree call it *flour tamarind*. In 1995 I did an interview with the Barbados Advocate newspaper while doing fieldwork in Barbados. In my attempt to head off any confusion I remember emphasizing to the reporter that the local name for Warren Baobab was *flour tamarind* and I spelled out the name for him.[62] Yet, when the interview was published, the reference was to "flower tamarind" and not to *flour tamarind*. When I contacted the reporter to find out what had happened, he said the editor changed it to flower tamarind because flour tamarind made no sense. But in fact, *flour tamarind* makes sense. The flour qualifier alludes to the dry, white, powdery nature of the baobab's fruit pulp which does bear a resemblance to flour. It is the name flower tamarind that makes no sense except to those who do not eat the fruit. In fairness to the editor of the Barbados Advocate, however, it should be noted here that not all baobab trees bear fruit. Most Barbadians would know the Queens Park Savanna baobab but not the taste of its fruit. As earlier noted, this tree aborts its immature fruits.

Guinea tamarind in St. Croix, St. Eustatius, and Tobago

Figure 8. The Grove Place baobab in St. Croix, US Virgin Island. The author in the center and Kwame N. Garcia, then Director of the Cooperative Extension Service of the University of the Virgin Islands, on the left, and Olasee Davis, a UVI Extension Officer on the right.

Guinea tamarind is an important Caribbean vernacular name for the baobab because it is a true place-of-origin name associated with Virgin Islands, St. Eustatius and Tobago. There are those who argue that in Tobago *guinea tamarind* is a place-of-origin name indicating that the baobab was brought to Tobago directly from Guinea, West Africa, and was spread from there throughout the eastern Caribbean.[63] But the *guinea tamarind* name seems to have its origin in the Virgin Islands, specifically in St. Croix, the only island in the Caribbean where the species has been described as naturalized. There are more 30 baobabs in St. Croix and the oldest of these are significantly larger than those of Tobago and St. Eustatius. This suggests that the baobab and its *guinea tamarind* name was introduced to Tobago and St. Eustatius from St. Croix. I interviewed a group of school boys on a field trip to the Grove Place baobab in St. Croix and they also identified this tree as *guinea almond.* They did so because they eat the seeds of the baobab which they said were similar in taste to those of the tropical almond

(*Terminalia catappa*) which eaten by children throughout the Caribbean. Both boys and girls also identified the baobab as *cushion tamarind*, an allusion to the fuzzy exterior of the fruit.

Monkey tamarind in Jamaica, Bahamas, and Dominica

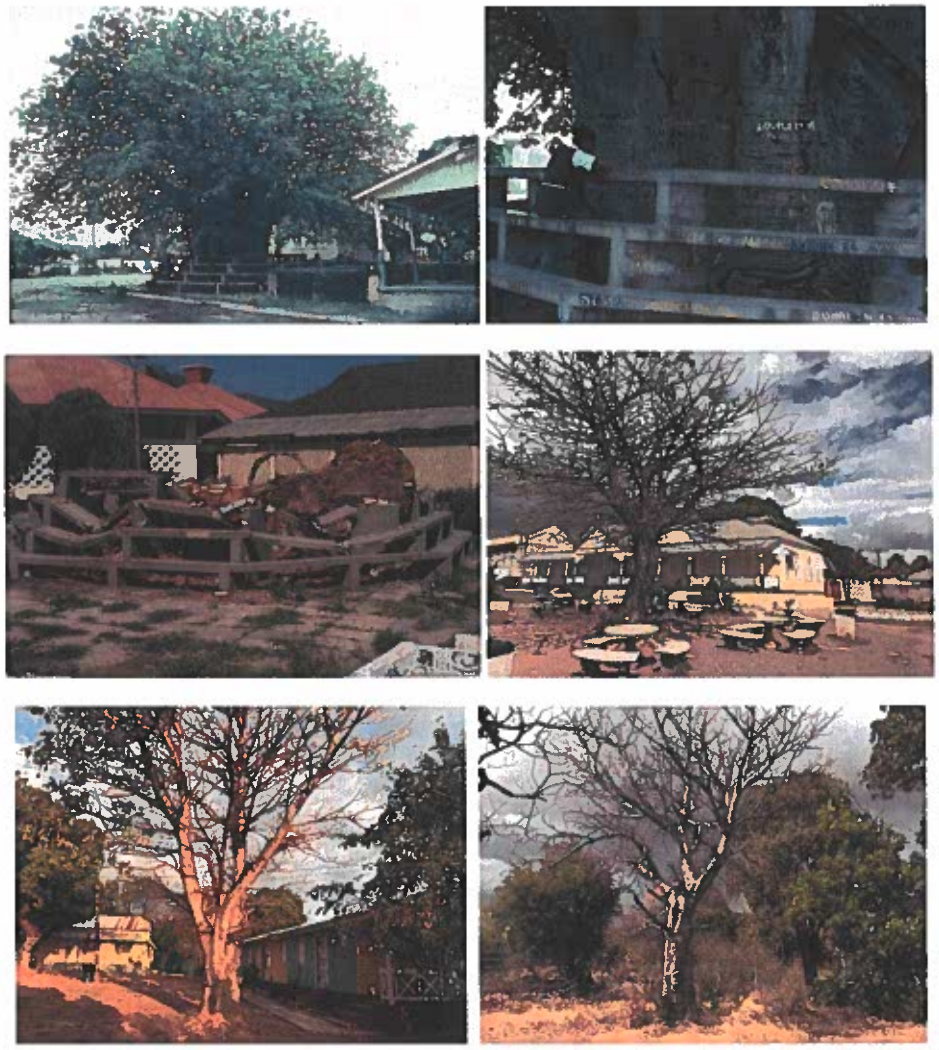

Figure 9. (Top left, top right, and middle left) Photographs of what was the oldest baobab in Jamaica at the Convent of Mercy Academy "Alpha" School in Kingston, Jamaica, founded in 1894. (Middle right) The young baobab planted to take its place. (Bottom left and right) The other two young baobabs on the Alpha campus. In the picture on the right, the baobab can be seen growing not far from a tamarind tree in the background.

The name M*onkey tamarind*, like *guinea tamarind*, is also associated with several islands. It seems to have originated in Jamaica (where it is still current)[64] from where it spread to the Bahamas and Dominica. Even though it is likely that a Jamaican name, *monkey tamarind* was not recorded in such standard works as *Jamaica Talk*,[65] the *Dictionary of Jamaican English*,[66] or in the *Dictionary of Caribbean English Usage*.[67] Most published accounts of the baobab in Jamaica only mention the names baobab, Ethiopian sour gourd, or monkey bread which are not Caribbean names.[68] Although monkey tamarind is not among the common names frequently mentioned in the literature, it was recorded from as early as the end of the nineteenth century. Baillon[69] recorded it in the *Dictionnaire de Botanique* (1876-1892) and Gerth Van Wijk[70] cited Baillon as the source of the name in the *Dictionary of Plant Names*.

Rock[71] provided one of the earliest references to the monkey tamarind name in the Caribbean and he is the only one that mentions the name *africa tamarind*. His account of the baobab in the "West Indies" is ethnographically situated in Jamaica and his discussion suggests the name monkey tamarind came to his attention in association with Jamaica. The inference is based on the fact that he regarded the baobab as "indigenous to Africa and the West Indies," noting that although it was not among the most common trees of Jamaica, "the pulp and rind or shell of the fruit are employed medicinally," and that "the nuts are occasionally exposed for sale in the markets at Kingston and elsewhere."[72]

Further evidence of *monkey tamarind* as a Jamaica name for the baobab comes from Charles Ives' *The Isles of Summer; or Nassau and the Bahamas*.[73] Ives describes a tree in the Bahamas which he identified as *jamaican tamarind* noting that it was "sometimes" called *monkey tamarind*. Although he did not offer a scientific name, it is obvious from the names *monkey tamarind* and *jamaican tamarind*, and from the details of his description, that he was in fact discussing a baobab – a tree that was probably introduced to the Bahamas from Jamaica as suggested by *jamaica tamarind* as a place-of-transit name. It is noteworthy that the name Jamaica tamarind has never been reported for Jamaica or

any other Caribbean territory. Although the baobab is popularly known as *guinea tamarind* in Tobago, it is interesting to note that the names *jamaica tamarind* and *monkey tamarind* were identified in an exhibit focused on gourds at the Tobago Museum (in Scarborough, the island's capital) that included the fruit pod of the baobab.

Nine baobabs have been documented for Jamaica. It is clear from published accounts, however, that at the end of the Nineteenth Century the baobab in Jamaica, though not abundant, was far more common than it is today. There were several well-known old trees in Old Harbor and Spanish Town (in the parish of St. Catherine) and also in Kingston, the island's capital. We can infer from this that the baobab is slowly been disappearing from the landscape of the Jamaica. I found only one sapling over the course of my research which began in the 1980s, and of the island's three largest baobabs, one was cut down because it grew too big, another because it began shedding branches which raised a safety concern for school children, and the third died after it was severely limbed to protect a building.

Dolly tree in Antigua

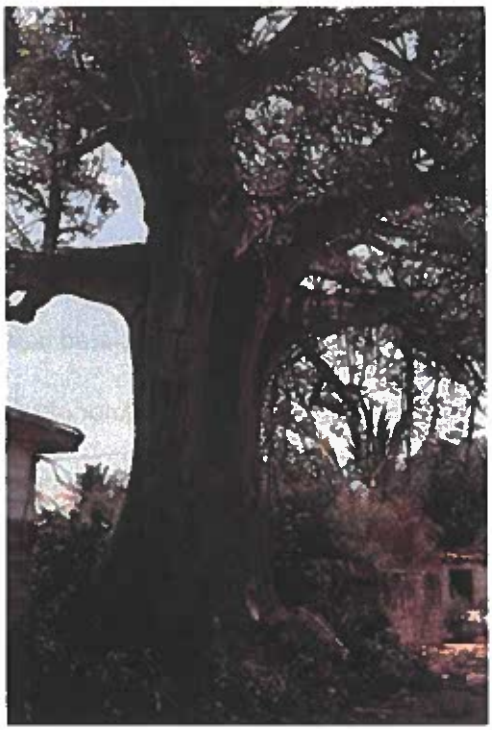

Figure 10. The baobab in Parham, Antigua, that is called the dolly tree.

One of the first baobab trees I encountered in the Caribbean was in Parham, Antigua. The name baobab is used in Antigua but the children of Parham who were playing under the tree when I was photographing and measuring it called it the dolly tree. I did not realize it then, but it soon became clear as my studies progressed that people who do not eat the fruit of the baobab do not give it a tamarind name. The Parham baobab flowers and fruits profusely, but it aborts its fruits before they develop fully. The immature pods that fall from the tree are without fruit pulp or developed seeds and the boys said they used these pods to make toy boats. At the end of the large staminal tube of the baobab's hibiscus-like flower is a terminal ball comprised of numerous stamens. When the petals are removed and the staminal tube is turned upside-down and placed on one of the fingers, it has the appearance of a head of hair. Hence, the name dolly tree. Non-fruiting baobabs are fairly common. They are widely reported for Africa, and in addition to Antigua, I have encountered them in Brazil, Barbados, Jamaica. That non-fruiting baobabs are not uncommon throughout the range of the species is evident in the recognition of 'male' and 'female' baobabs in West Africa.[74]

Comparing the qualifiers for the baobab's tamarind names in India and the Caribbean

The qualifying terms in Caribbean binomial tamarind names for the baobab do not memorialize distinguished individuals or pay tribute to celebrated spiritual beings as they do in India. They are related instead to the qualities of the fruit and to place-associated names. Modifiers that allude to the exterior texture of the fruit pod and to the consistency and color of the fruit pulp have only been recorded for the Caribbean. Place-of-origin and place-of-transit tamarind names occur in India and the Caribbean. However, baobab tamarind place names, such as *Morambali* in Gujarat and *mandu* tamarind in Madhya Pradesh, have only been recorded for India. What truly stands out for India, however, are qualifiers related to the most important spiritual beings of Hinduism. The name b*rahma* tamarind

honors Brahma, the creator who set the cosmos in motion, and from whose unity of four heads (representing the four qualities of the universe) developed the four Hindu scriptures known as the Vedas. The difference between India and the Caribbean in the modifiers of baobab binomial tamarind names is no doubt partly due to the longer history of the baobab in India and to the intricate world of spiritual beings associated with Hinduism. In the African religious traditions of Jamaica, Haiti, Cuba, Brazil, and other places of the Americas, the naming of trees like the cotton tree and the baobab is also linked to concepts of a Supreme Being and other celebrated spirits, but not in association with baobab tamarind names.[75]

NO CONFUSION IN NAMING THE BAOBAB AND THE TAMARIND IN AFRICA

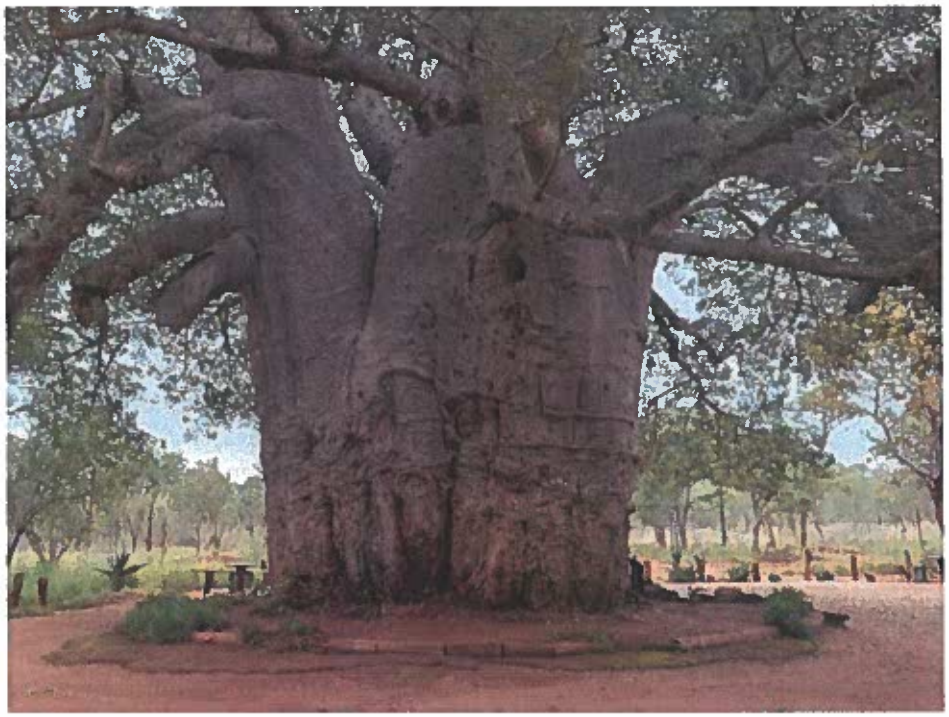

Figure 11. A baobab estimated to be 2000 years old in Leydsdorp, South Africa.

It is difficult at the present time to determine if there are baobab tamarind names in Africa as the documentation for African names (in the great diversity of languages represented) rarely involve translation or explanation.[76] My preliminary research leads me to theorize, however, that tamarind

names for the baobab are not common in Africa (if they are at all present) because both trees are familiar in the environment and there is no need to mark the rare baobab by reference to the familiar weedy tamarind. However, this does not mean Africans are not aware that the trees grow together and have taste-alike fruits, and that their fruits and leaves have substitutable uses for food, medicine and income. We have only to consider Hausa proverb that cautions us (with regards to the importance of distinguishing appearance from reality) that no matter how strikingly similar the fruits of the baobab and the tamarind might be in taste, they are in actuality different fruits.

OTHER LIKENESSES BETWEEN THE BAOBAB AND TAMARIND

Taste-alike fruits with similar uses are not the only things that support the taste-mimicry argument for this paper presents. The argument is strengthened when we also consider the entwining of the baobab and tamarind in the landscape, in reproductive strategy, and in the thinking of scholars.

The baobab and tamarind entwined

Many arboreal species have been identified as trees of life around the world because they are viewed as manifesting, imparting or representing life. Notable examples include figs (*Ficus* spp.), evergreens, palms, and bombax trees (most notably the cotton tree, *Ceiba pentandra*). The baobab is appropriately identified as a manifest tree of life because of its size, tenacity, fruitfulness, and biologically diverse environment. With respect to its environmental impact, the baobab's size, shade, spreading roots, folded bark, leaves, flowers, fruit pulp, seeds, tree cavities, and stored water are the things that make it an important contributor to the species diversity of the environment in which it grows. The baobab is at the center of a complex ecosystem of its own making and in scholarly and popular works it is frequently identified as an ecological tree of life. As such, the baobab can be characterized as an island-like ecosystem or a tree oasis of the African savanna. The baobab status as an ecological tree of life is also the basis for its importance as the exemplary multipurpose tree of the African savanna.

Discussions of the baobab as an ecological tree of life have focused on its association with a great variety of resident and visiting insects, birds, reptiles and mammals, but the baobab's association with microbes, fungi, and other plants also deserve consideration. The plant component of the baobab's biological community is comprised of epiphytes, incidental tree perchers, parasites, vines, shrubs, and trees. In various combinations, these plants contribute to the development of the baobab's canopy gardens, understory plants, and peripheral associates. Writing of the Sudan, Sweeney[77] describes what he calls the baobab's miniature gardens that form in the many crotches, folds, and cavities of its enormous trunk and branches, and the components of these gardens he identified as "lichens, grasses, orchids, *Sansevieria* and many others." The lichens and orchids are true epiphytes. Other epiphytic associates of the baobab, especially in humid environments such as the Botanical Garden of Rio de Janeiro and the interior upland of Tobago, include mosses, ferns and bromeliads. The "many others" Sweeney alludes to but does not specify include several widely used trees of the African savanna. The baobab/plant association in particular is an important contributor to the overall biodiversity that the baobab supports and to the biodiversity of the environment in which it grows.

The close ecological association between the baobab and tamarind has long been noted, in the literature. According to Sullivan[78] writing towards the end of the 19th century, "The Ethiopian region comprises Africa south of the great desert, the tropical part of Arabia, and Madagascar," and he notes that "The most remarkable trees [of this region] are the tamarind, baobab, and oil palm." Around the same time, Reclus[79] states in his account of West Africa that "As in Senegal, the [Hausa] landscape derives its distinctive character from the tamarind, baobab, and other giants of the vegetable kingdom." Recent studies offer similar reports for the Arabian Peninsula[80] and Madagascar.[81]

As natives of the African savanna, the baobab and the tamarind are routinely reported as growing, not only in the same localities, but also in the vicinity of each other, side by side, and often

entwined. In fact, I began my own research into this curious multifaceted intertwining of the two trees when I discovered baobabs and tamarinds growing together in the Caribbean, which according to Lely[82] is "fairly common" in the landscape of Africa. One of the earliest of the 19th century accounts of the baobab and tamarind growing entwined is that of Barth[83] who writes of traveling "through a fine country where the tamarind and monkey-bread-tree [i.e., the baobab] were often interlaced, as I have repeatedly observed to be the case with these species of trees." Similarly, Dalziel[84] notes that "The association of tamarind and baobab is often observed . . . in this case the former is often without a proper bole and spreads itself half-scandent amongst the stout branches of the baobab."

According to Aubréville[85] and Jansen,[86] the entwining of these two trees occurs because the baobab provides a favorable environment for the germination and establishment tamarind seedlings. This involves the buildup of baobab-associated organic material from such things as leaf litter and the various other organic remains of plant and animal associated with the tree. It also involves higher soil moisture from the baobab's runoff and shade-reduced surface evaporation that last for a period of time after it rains. What these authors do not account for are the ways in which tamarind seeds end up at baobab trees. El-Siddig and colleagues[87] note that "Germinated seedlings [of the tamarind] often survive under the parent trees where they become established if protected from grazing animals. Seeds transported by birds and other wildlife germinate readily under the shade of another tree, such as baobab and on termite mounds." They also report that "In South India, monkeys are the major seed dispersing agent" for the tamarind. Wickens and Lowe[88] identify human beings and birds as the likely agents for transporting tamarind seeds to the baobab. However, no species of birds that spread tamarind around baobab trees has ever been identified. In a record of the fruits and seeds dispersed by mammals and birds in what was then the Singida District of Tanganyika Territory, Burtt and Salisbury[89] documented the presence of baobab and tamarind seeds in the dung of elephants and baobab seeds in the dung of elands.[90] They write, "Seeds of *Adansonia digitata* L., *Balanites aegyptiaca* Del., *Balanites*

tomentosa Mildbr. and *Tamarindus indicus* L. were found very rarely, a surprising fact, as these species are common in the neighbourhood of the seasonal rivers and are heavily laden with fruit." These authors do not tell us the time of the year in which dung was examined for seeds and fruits, but they note that stomach contents were examined from August to September which is the mid-winter to the start of spring in Tanzania. At this time of the year tamarind fruits are least likely to be available. Burtt and Salisbury also report, "While at Matelele it was noticeable to what an extent local fruits played a part in the meals of the Turu Natives. During his work of bush cutting the native was usually eating some fruit or other, either expectorating the seeds or swallowing the fruit pulp together with the seeds enclosed." The baobab and tamarind [whose seeds "are expectorated after the palatable coating has been eaten"] was included among the nine species identified, five of which were species of *Grewia*. Lely[91] suggests that human beings are the primary dispersers of tamarind seeds to the baobab and I agree.[92]

Similar food-bribe dispersal strategy

The reproductive strategy of the baobab and tamarind includes overlapping flowering period, a long fruit-harvest period, similar fruit morphology associated with food-bribe dispersal, complementary fruit-ripening seasonality, and shared specialized dispersal agents. Both trees flower during the annual rains. The baobab begins flowering in the early spring of April and ends in the mid-autumn of November, while the tamarind flowers in the summer. From these flowers develop indehiscent fruit pods containing many hard seeds surrounded by a sweetly acidic pulp that is the food bribe that facilitate the dispersal of the seeds. Although both trees flower during the annual rains, they ripen their fruits in opposite seasons. From the perspective of human beings as the main dispersal agent for these two trees, we can say that these fruits are complementary in their ripening seasonality. The peak baobab harvest is in the autumn-winter dry time with dwindling supplies in spring, and the peak tamarind harvest is in the spring-summer wet time with dwindling supplies in autumn.

There is no reason to doubt that the baobab and tamarind have shared dispersal agents, especially primates, chief among them being human beings. And although both trees contribute to the cost of supporting their shared dispersal agents, seasonally complementary fruit ripening avoids the trees competing for dispersal agents. It also means their dispersal agents will benefit from a year-round supply of nutritious taste-alike fruits, which for humans have substitutable uses. For human beings, both fruits are available during the annually recurring period of seasonal hunger which occurs in the spring and early summer. The problem that has been reported for local communities of West Africa is that the high year-round demand for the similarly used fruits and leaves of the baobab and tamarind, which are only seasonally available. Despite their complementary seasonality, people must preserve the fruits and leaves of both trees to ensure their year-round availability. Or, they must make up for the shortfall by purchasing baobab and tamarind fruit and leaves.[93] It is in the context of year-round use, the need for storage, and resorting to purchase that we can appreciate the importance of the complementary harvest seasonality of the baobab and tamarind. From the perspective of human use, especially from a seasonal point of view, the fruits of the baobab and the tamarind serve as alternates and substitutes for each other in food, beverage, healthcare, and income. Taste-alike fruits have made the baobab and tamarind partners in a mutually beneficial relationship with each other and with human beings (and other species) that serve as dispersal agents for their offspring.

In the folk systematics of the Caribbean and India, the tamarind is the model and the baobab is the taste-alike copy. However, from an evolutionary point of view it is the reverse. The baobab is the taste model of which the tamarind is the copy. The tamarind is, after all, a genus represented by only one species and mimicry is well represented among the pea family to which the tamarind belongs. As natives of the African savanna, the baobab and tamarind are part of an ancient evolutionary complex that also includes human beings, and the coevolved alikeness in fruit taste is simply the way in which

both trees have become partners in a mutualistically enhanced dispersal of their seeds in what can be described as a case of Müllerian mimicry.

The baobab and tamarind entwined in the thinking of scholars

There is a long history of scholars discussing the baobab and tamarind together both in passing and as the focus of attention.[94] No doubt, their value as characteristic multipurpose fruit trees of the African savanna accounts for the three most important ways in which they are discussed in the literature. The first is the entwining of these trees in the landscape and in scholarly thinking as a reflection of the ways in which they are intricately entwined in the lives of the people that are being studied. [95] Relish, broadly defined, includes foods such as spices, seasoning, flavoring, sauces and stews that are a necessary taste component of consuming the large quantities of relatively bland starches derived from roots, cereals, and fleshy fruits that are associated with the worldwide development of agriculture. For example, Scudder[96] reports that for Gwembe Tonga farmers of Zambia, the fruit of the baobab and tamarind are "the two most important" fruits that are "mixed in with cereal flour and then cooked up in porridge form."

The second reason for the entwinement in scholarship is the potential of the baobab and tamarind to contribute to the economic and social development of local communities, a process that will require the systematic cultivation of what are often identified in the literature as 'underutilized' trees. Intensive cultivation will involve choosing appropriate growing environments, selecting the best cultivars, improved management strategies, and a more creative use of the many actual and potential products these trees provide, especially as sources of food and income.[97] For example, Gebauer[98] compares the salt tolerance of the baobab and tamarind and this suggest a consideration of the specific kinds of local environments in which both trees could be profitable grown.

The third reason for the entwinement in scholarship is their great potential for contributing to nutritional improvements in local diets. Kilungu and Njoroge[99] presents a comparative compositional analysis of the seeds of the baobab and tamarind. The results shows, among other things, that "the protein contents were observed to be 24.98% for baobab and tamarind respectively." Kilungu and Njoroge also noted, "These values are fairly high compared to cereal and root crops such as whole maize 9.3% and fresh cassava 1.2% which are the main staples in the regions where baobab and tamarind grow." Adams and his collaborators[100] have discussed improved yam-baobab-tamarind flour blends.

MÜLLERIAN MIMICRY COMPARED TO THE OTHER THREE FUNDAMENTAL KINDS OF MIMICRY

We have here is a relation involving three widespread species of the African savanna that for the baobab and tamarind includes growing together, similar food-bribe dispersal strategy, complementary seasonal availability, taste-alike fruits with overlapping uses, shared tamarind name, and entwinement in scholarly discussions. These remarkable correlations cannot be dismissed as mere coincidences. My hypothesis is that they are expressions of a co-evolving Müllerian mimetic complex involving human beings and baobab and tamarind trees. Mimicry, broadly defined, identifies a species that has evolved an adaptive resemblance to some feature of its environment by which it signals or is concealed, both of which occur in the service of defense and in seeking an advantage.

Defensive signaling

The modern view of mimicry has its foundation in the pioneering 1862 research of the English naturalist H. W. Bates published in the Biological Journal of the Linnaean Society.[101] Bates sought to explain in Darwinian evolutionary terms the deceptive defensive signaling he observed between different species of conspicuously colored Amazonian butterflies. He reasoned that unpalatable butterflies were brightly colored to warn off predators while palatable butterflies defended themselves by evolving similar warning colors. Following Bates, the history of mimicry studies has given rise to two fundamental sets of opposite concepts that are essential for explaining all cases of mimicry in a

systematic way. The opposites are defense and advantage which identify the goals of mimicry and signaling and concealment which identify the means for achieving these goals. The four combinations of these sets of opposites are defensive signaling and defensive concealment and advantageous concealment and advantageous signaling. Although Bates discussed all four basic forms of mimicry, his name became synonymous with false-repelling defensive signaling, known today as Batesian mimicry.

Defensive signaling is the form of mimicry most widely discussed in the literature, and although early studies focused on the warning colors insects, the strategy of false-repelling signaling is also well represented among plants. Plants have received far less attention in theorizing mimicry than animals and as a number of authors have noted, this is evident in the fact that there are fewer well-documented cases, peer-reviewed studies, and experimental confirmations of mimetic plants. Although Wickler's[102] influential 1968 book was titled *Mimicry in Plants and Animals*, when Wiens[103] published his widely-cited summary on plant mimicry in 1978 he noted that the subject had "never been considered seriously" and that the information that existed was "extraordinarily scattered, largely anecdotal, and typically in little-known publications." Nevertheless, by the end of the 20th century Barrett[104] was able to conclude that "It has become clear that plant mimicry is far more widespread than has been supposed." The many kinds of herbivore-deterring resemblances reported in the literature now include plants that have been hypothesized to mimic ants, aphids, caterpillars, spider webs, bird droppings, egg deposits, disease patterns, and thorns.[105]

Defensive concealment

Judging from the number of published reports, defensive concealment is far more common among animals than plants, and for the latter, this strategy is best represented by stone-mimicking seeds and succulent plants. *Caesalpinia bonduc* (L.) Roxb. thrives in tropical coastal environments and its pebble-like seeds reflect the color of the sandy beaches wherever it grows. The most striking group of plants that bear an uncanny likeness to their rocky substrate are succulents that pass for pebbles and

stones, especially species of the genus *Lithops* which belongs to the Mesembryanthemaceae, popularly known as the southern African ice-plant family. In addition to stone mimics, there are also reports of succulents that imitate the dead leaves and branches among which they grow.

Advantageous concealment

Mimetic resemblances in the form of advantageous concealment and advantageous signaling are generally categorized as aggressive mimicry and both appear to be more widespread among animals than plants. For animals, advantageous concealment is the stealth strategy of ambush predators specifically identified here as predatory advantageous concealment. For plants, this strategy is aimed not at predation but at competition-based advantageous concealment.[106] The most well-known examples include crop-mimicking weeds,[107] several genera of host-mimicking parasitic Australian loranthaceous mistletoes,[108] and the chameleon-like leaf-mimicking *Boquila trifoliata*[109] vine (of the Lardizabalaceae family), the sole member of its monotypic genus native to the temperate forests of central and southern Chile and Argentina. For crop mimics, the benefit of advantageous concealment is the enhanced growing conditions of the agricultural environment that human beings provided for their crops; the benefit for the mistletoe is the means of life it obtains from its parasitized host; and the benefit for the shape-shifting *Boquila trifoliata* vine is the climbing support provided by its host which is necessary to reach the sunlit canopy where its disguised leaves are also out of the range of terrestrial herbivores.[110] The crop mimics do not want to be weeded out, the mistletoe to be targeted for food, or the *Boquila trifoliata* to be preyed on before it can reach the sunlight of the canopy. These plants are often characterized as merely defensively concealed mimics when in fact their evolved concealment is for defense, not as an end in itself, but in pursuit of an advantage.[111]

Advantageous signaling

Advantageous signaling is common for both animals and plants but there is a difference in goals. With the notable exception of the mimetic insectivorous plants with their false-enticing floral traps,

predatory advantageous signaling is only associated with animals and so is predatory advantageous concealing. There is no doubt, however, that one of the most widespread forms of plant mimicry is reproductive advantageous signaling in the service of pollination and seed dispersal. According to Barlow and Wiens "The best known examples of mimicry in plants involve pollination phenomena."[112] For plants, pollination-based advantageous signaling is especially associated with the evolution of non-rewarding flowers that are similar to the reward-producing flowers of other species. Orchids are the master of deceptive flowers, including flowers that masquerade as the receptive female counterpart of their pollinating male insects. Some of the most remarkable expressions of this kind of pollination mimicry are carrion-like flowers that replicate the appearance, texture and odor of rotten flesh. This false-enticing death signal attracts pollinators in the form of carrion-feeding and carrion-breeding insects like flesh flies (Sarcophagidae), blowflies (Calliphoridae), house flies (Muscidae), and some beetles (e.g., Dermestidae and Silphidae). Midgley and colleagues[113] report that fecal mimicry by seeds ensures their dispersal by dung beetles. The pea family to which the tamarind belongs is also a notable example of a taxa that has produced a number of mimetic species that benefit from dispersal-based advantageous signaling (See Figure 12). According to Wiens,[114] "Most (but not all) dispersal mimicry involves plants which produce nonnutritious seeds mimicking nutritious fruits normally eaten by birds." Citing Pijl,[115] Barlow and Wiens[116] note that "In the leguminous genus *Adenanthera* the seeds mimic berries so effectively that they are rejected by seed-eating birds, whereas frugivorous birds readily accept them."

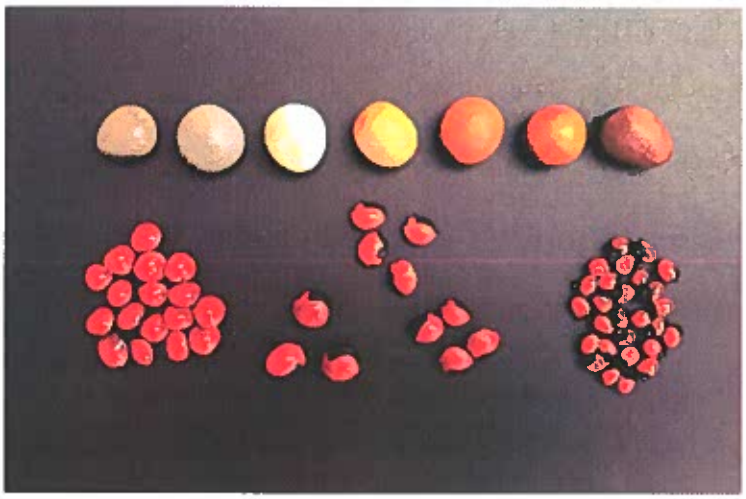

Figure 12. A sampling of mimetic seeds of the pea family (Fabaceae). The top row shows the pebble-mimicking seeds of *Caesalpinia bonduc* (L.) Roxb. that reflect the color of the sand of the Caribbean beaches where they were collected. The bottom row from left to right are the berry-mimicking seeds of *Adenanthera pavonina* L., followed by the seed mimics of arillate fruits represented by species of the genus *Ormosia* on the left (and other unidentified species to the top and to the right), and by *Abrus pracatorius* L. on the right.

Deploying multiple mimetic strategies

Clear distinctions can be made between the fundamental kinds of mimicry, but it is important to keep in mind the many intricate ways in which mimetic strategies are deployed even by an individual organism. It seems reasonable to theorize that the camouflage mimetic resemblances of some predators (like leaf frogs and stick insects) have more than one function. As prey, the benefit is defensive concealment in the form of a disguise or as something cloaked, and as stealth predators the benefit is the advantageous concealment necessary for ambushing their prey. The combining of mimetic strategies is associated with animals, particularly insects. For example, as predator and prey, some praying mantises (Mantidae) and stick insects (Phasmatodea) make use of advantageous and defensive concealment. When startled, however, they switch to the strategy of deterrence signaling involving eyespots, snake heads, and dazzling colors to scare off or momentarily distract predators.

Deceptive or honest: Batesian, Müllerian and Mertensian mimicry

The two additional kinds of defensive signaling that were described in the years following Bates's pioneering contribution are Müllerian mimicry and Mertensian mimicry. The fundamental difference between these three historically recognized kinds of predator-deterring defensive signaling is the extent to which the resemblance between the mimic and the model is false or true, an important distinction also expressed as deceptive or honest, superficial or substantial, and apparent and essential. Müllerian mimicry is distinguished from Batesian mimicry by the fact that the Müllerian mimic and model bear a true resemblance to each other; both are unpalatable. With Mertensian mimicry, the members of a mimicry complex represent a combination of false and true resemblances since mimics and models are to varying degrees palatable and unpalatable.[117] Classic Müllerian mimicry is true-for-all predator-repelling defensive signaling that can be characterized as defensive Müllerian mimicry. By comparison, the baobab/tamarind taste resemblance is true-for-all disperser-enticing advantageous signaling that can be characterized as advantageous Müllerian mimicry.

The theoretical importance of distinguishing between defensive and advantageous Müllerian mimicry is clear when we consider Wiens[118] discussion of Müllerian mimicry. He defines Müllerian mimicry as predator-deterring defensive signaling which he characterizes as "a good example of group convergent evolution." But in discussing the concept of Müllerian mimicry as it is used by other scholars, Wiens writes Müllerian "convergence" has been considered a factor in the evolution of plant pollination systems. Thus , Grant (1966)[119] suggested that the convergence of red floral colors in many phyletically diverse hummingbird-pollinated flowers was an exam of Müllerian "Mimicry."" He also notes that "In a slightly different sense Proctor and Yeo (1972)[120] proposed that Müllerian "mimicry" was an explanation for the repeated floral patterns occurring in unrelated species clusters of European plant communities." Wiens discussion makes it clear that the deterrence defensive signaling of animals is definitely different from the enticing pollination-based advantageous signaling of plants.

With advantageous Müllerian mimicry in the specific form of enticing dispersal-based advantageous signaling, human beings, baobab and tamarind are the beneficiaries of the baobab/tamarind mimetic complex. For humans, it is nutritious taste-alike fruits of both trees; for the baobab and tamarind, it is the dispersal of their offspring, the results of which are the increased reproductive success of individual trees and enhanced species regeneration which is now associated with their global dispersal. The tamarind is here theorized to be the monotypic mimic that takes advantage of the baobab and human beings to ensure its widespread dispersal as a highly weedy tree. Since it regenerates readily from human incidentally dispersed seeds and the baobab does not – which makes the tamarind a very common tree wherever it grows and the baobab, a rare tree overwhelmingly dependent on human planting – the tamarind is used to name the baobab outside of Africa where both trees are found growing in the same location (as they often are), and where people eat the fruit of both trees (as they often do).

To theorize, however, that the baobab is the model and the tamarind is the mimic is not to suggest that the baobab has remained unchanged through time and the tamarind has been changing through time. As an expression of Müllerian mimicry where mimetic resemblance does not have to be as precise as is theorized for Batesian mimicry, it could be argued that both trees represent a mutually beneficial co-evolving convergence with respect to the enhanced benefit they derived from human beings as their most important shared dispersal agent. Current studies have documented clear baobab and tamarind preferences in Africa relative to the fruit-taste variability of these species which ranges from insipid to unpalatably bitter or acidic. And this means both species continue to be the dynamic outcome of ongoing human selective pressures.[121]

CONCLUSION

My research in the Caribbean adds to the documentation of baobab's tamarind names in the region and it shows that these names are similar in their ethnolinguistic construction and practical

significance to baobab tamarind names in India. The baobab's many tamarind names in widely different parts of the Old and New world tell us that it is a kind of tamarind. The explanation for taste-alike fruits, similar uses and shared names, I have argued, is that they are features of a mutually advantageous Müllerian mimetic complex in which human beings have played an important part. Human selective pressure as the basis for the development of a mimetic complex is not a new subject. Plant mimicry involving human beings as the selective agent is well-known in the scientific literature in the form of the evolution of crop-mimicking weeds.[122] What makes the baobab/tamarind taste resemblance of great interest is that it adds to the reported case of plant mimicry involving humans. The most important difference between crop mimics and baobab/tamarind mimicry, however, is that crop mimics are associated with the origin of agriculture some 10,000 years ago, while the baobab/tamarind taste-alikeness stretches by to the early history of human beings evolving on the African savanna.

[1] For the benefit of readers and researchers, this published version of my talk was expanded to include a more detailed account of the argument, bibliographic references, illustrations, and maps of the baobab in India and in the Caribbean. I thank my colleagues George Dickenson, Hector Qirko, and Christine Finnan (of the College of Charleston's Department of Sociology and Anthropology) for their helpful comments in preparing this talk for publication.

[2] See G. E. Wickens, *Baobab: Africa's Upside-down Tree*. Kew Bulletin 37 (1982), 173-209; G. E. Wickens and P. Lowe, *The baobabs: Pachycauls of Africa, Madagascar and Australia* (Dordrecht: Springer, 2008); and J. Gebauer, K. El-Siddig and G. Ebert, *Baobab (Adansonia digitata L.): A Review on a Multipurpose Tree with Promising Future in the Sudan*. Gartenbauwissenschaft, 67 (2002), 155–160.

[3] Burton-Page, *The problem of the introduction of Adansonia digitata into India*. In P. J. Ucko and G. W. Dimbleby (eds.), *The domestication and exploitation of plants and animals* (Chicago: Aldine Atherton, Inc., 1969). See also Haripriya Rangan and Karen L. Bell, *Elusive Traces: Baobabs and the African Diaspora in South Asia*. Environment and History 21 (2015), 103-133.

[4] Burton-Page, 332.

[5] Abu'l-Fazl *c.* 1596. *Á'in-i Akbarí*, 2. (ed. Bibl. Ind.), 197.

[6] P. Armstrong, *The Disjunct Distribution of the Genus Adansonia. L.* National Geographic Journal of India (1983), 159.

[7] Charles Dennis Adams, *Flowering Plants of Jamaica* (Kingston, Jamaica: University of the West Indies, 1972).

[8] D. A. Baum, *The comparative pollination and floral biology of baobabs (Adansonia - Bombacaceae)*. Annals of the Missouri Botanical Garden 82 (1995a), 322–348. D. A. Baum, *A systematic revision of Adansonia (Bombacaceae)*. Annals of the Missouri Botanical Garden 82 (1995b), 440–470. D. A. Baum, R. L. Small and J.F. Wendel. 1998. *Biogeography and floral evolution of baobabs (Adansonia, Bombacaceae) as inferred from multiple data sets.* Systematic Biology 47(1998), 181–207. See also Rupert Watson, *The African Baobab* (South Africa: Struik Publishers, 2007) and Wickens and Lowe, 2008.

[9] E. A. Menninger, *Fantastic Trees* (New York: The Viking Press, 1967).

[10] Wickens and Lowe, 2008. See also K. L. Bell, H. Rangan, C. A. Kull, and D. J. Murphy, *The history of introduction of the African baobab (Adansonia digitata, Malvaceae: Bombacoideae) in the Indian subcontinent.* Royal Society Open Science 2: 150370. doi: 10.1098/rsos.150370. eCollection 2015 Sep.

[11] Burton-Page, 1969.

[12] For a discussion of the Ganges valley baobabs see K. M. Vaid, *Concluding chapter of a "Kalpa-vriksha.* Indian Forester 90 (1964), 1963-2964; Vaid, *Where Is the Mythical 'Wishing Tree'?* Science Today (April 1978a), 35-44; and Vaid, *Temple and the Tree*, Wildlife Newsletter of Indian Forest College (October, 1978b), 58-59. Also, Jack R. Harlan, *Crops and Man* (Madison, Wisconsin: American Society of Agronomy, Inc. and Crop Science Society of America, Inc., 1992). Although V. N. Misra and M. D. Kajale in their *Introduction of African Crops into South* Asia (Pune, India: Indian Society for Prehistoric and Quaternary Studies, 2003) do not discuss the baobab, they do shed considerable light on the links between the horn of Africa, East Africa, and South Asia.

[13] Burton-Page, 1969.

[14] Wickens, 1982.

[15] Sankar Sen Gupta, *Sacred Trees Across Cultures and Nations.* Calcutta: Indian Publications (1980).

[16] Vaid, 1964, 789. For a discussion of the baobab in the Ayurveda tradition see Sane Hema and Vinaya Ghate, *Exotic Medicinal Plants: Antiquity in Ayurveda and Ethno-medico-botany.* Asian Agri-History 4 (2000), 283-296. Also, C. P. Kharia (editor), *Indian Medicinal Plants: An Illustrated Dictionary* (Berlin: Springer, 2007).

[17] See page 346 of A. S. Reddy, K. B. Anjaria, and Rama Rao Vendrapati, *Baobab: An exotic tree with a promise*? Asian Agri-History 6 (2002), 343-350.

[18] Wickens and Lowe, 2008, 268.

[19] Vaidya P. Satyanarayana Sastry, *Baobab: The Wishing Tree.* Asian Agri-History 4 (2000), 315-318.

[20] Vaid, 1978a, 35.

[21] See Karen L. Bell, Haripriya Rangan, Christian A. Kull and Daniel J. Murphy, *The history of introduction of the African baobab (Adansonia digitata, Malvaceae: Bombacoideae) in the Indian subcontinent.* Royal Society Open Science 2 (2015), 150370 [https://doi.org/10.1098/rsos.150370]. See also Haripriya Rangan and Karen L. Bell, *Elusive Traces: Baobabs and the African Diaspora in South Asia*. Environment and History 21 (2015), 103-133.

[22] Debjani Chatterjee (Editor), *President* [of India] *Ram Nath Kovind Plants Baobab Sapling at Rashtrapati Bhavan. This Tree Lives For 2000 Years!* https://www.ndtv.com/india-news. The article reports that "The sapling was a gift from the University of Madagascar, as a goodwill gesture, in return of a Neem tree that President Kovind had planted at the university campus in Antananarivo, during his visit to Madagascar in March. The Baobab, known in India as kalpavriksha or a wish-fulling tree, is a rare sight."

[23] This lack of knowledge about the Ganges baobab is evident in the excellent article *Elusive Traces: Baobabs and the African Diaspora in South Asia* by Rangan and Bell (Environment and History, 21, 2015, 111) who report that apart from central and southern India, the islands of Mauritius and Reunion in the western Indian Ocean, and a single sample from Penang in Malaysia, they "could not obtain samples [for genetic analysis] from other potential source populations such as Sudan, Ethiopia and Eritrea in north-east Africa, or from other locations in South Asia where baobabs were introduced, such as Sri Lanka and Pakistan."

[24] K. R. Kirtikar and B. D. Basu, *Indian Medicinal Plants*. (Allahabad, India: Sudhindra Nath Basu, M. B. Panini Office, Bhuwanéswari Asrama, Bahadurganj, 1918), 353.

[25] Vaid, 1978, 39.

[26] Wickens and Lowe 2008, 352-355, and Haripriya Rangan and Karen L. Bell, 2015.

[27] Burton-Page, 1969.

[28] M. Oommachan, *The Flora of Bhopal* (Bhopal, India: J. K. Jain Brothers, 1977), 69.

[29] Burton-Page, 1969, 332.

[30] Haripriya Rangan, *Elusive Traces: African Baobabs in India*. Blog (Posted on May 3, 2018). Accessed on October 22, 2019.

[31] Wickens and Lowe, 2008.

[32] James Sykes Gamble, *A Manual of Indian Timbers: An Account of the Structure, Growth, Distribution, and Qualities of Indian Woods.* Calcutta: Office of the Superintendent of Government Printing (1881).

[33] Wickens and Lowe 2008, 352-355.

[34] See, for example, Charles McCann, *Trees of India: A Popular Handbook.* Bombay: D. B. Taraporevala Sons & Co. (1947). Also, A. B. Damania, *The Mystery of the Baobab Tree in India.* Asian Agri-History 4 (2000), 241-243.

[35] See J. C. Varmah and K. M. Vaid, *Baobab: the historic African tree at Allahabad.* Indian Forester. 104 (1978), 461-464.

[36] For the use of the baobab for health, the fruit pod for fishnet floats by Gujarat fishermen, and the eating of baobab leaves in India, see Charles Pickering, *Chronological History of Plants: Man's Record of his own existence illustrated through their names, uses, and companionship* (Boston: Little, Brown, and Company, 1879). The use of baobab fruit pods as "floats for fishing nets" is also mentioned by Vishnu Mittre, *Wild Plants in Indian Folk Life – A Historical Perspective.* In: S. K. Jain (editor), *Glimpses of Indian Ethnobotany* (New Delhi: Oxford and IBH Publishing Company, 1981), 45. For health uses see A. S Reddy, K. B. Anjaria, and V. R. Rao, *Baobab: An Exotic Tree with a Promise?* Asian Agri-History 6 (2002), 343-350.

[37] A. S. Reddy et al., 2002.

[38] *Overview of World Religions*. Overview of World Religions Project, Division of Religion and Philosophy, University of Cumbria. www.philtar.ac.uk/encyclopedia/index.html.

[39] Anonymous, *Will Baobab make it big at Pilikula ?* The Hindu (2014). https://www.thehindu.com . Retrieved on November 29, 2019.

[40] Rangan and Bell, 2015, 126.

[41] See John C. Hawley (editor), *India in Africa: Africa in India* (Bloomington: Indiana University Press, 2008; Amy Catlin-Jairazbhoy; Edward A. Alpers, *Sidis and Scholars: Essays on African Indians* (Uttar Pradesh, India: Rainbow Publishers, 2004); Nicole Boivin, Alison Crowther, Richard Helm, and Dorian Q. Fuller, *East Africa and Madagascar in the Indian Ocean world*. Journal of World Prehistory 26 (2013), 213-281; and Rangan and Bell, 2015.

[42] A. S. Reddy, K. B. Anjaria, and V. R. Rao (2002).

[43] M. S. Randhawa, *Flowering Trees* (New Delhi: National Book Trust India, 1965).

[44] A. S. Reddy, K. B. Anjaria, and V. R. Rao, 2002,

[45] A. S. Reddy, K. B. Anjaria, and V. R. Rao, 2002, 345.

[46] Wickens and Lowe, 2008.

[47] A. S. Reddy, K. B. Anjaria, and V. R. Rao, 2002, 345.

[48] A. S. Reddy, K. B. Anjaria, and V. R. Rao, 2002, 345.

[49] A. S. Reddy, K. B. Anjaria, and V. R. Rao, 2002.

[50] Rangan and Bell, 2015, 123.

[51] *Murud Janjira's African past and the mystery of the Boab tree.* The reDiscovery Project (2018). *https://rediscoveryproject.com › 2018/04/23. Retrieved November 26, 2019.*

[52] Damitr, *Baobab-Siddi-tomb.* https://commons.wikimedia.org › wiki ›. Retrieved November 26, 2019.

[53] The Junnar baobab was mentioned by Charles Sinclair in *Notes on the central Talukas of the Thana Collectorate.* Indian Antiquary 4 (1875), 65-69.

[54] Wickens and Lowe 2008, 353.

[55] Burton-page, 1969, 332.

[56] "Centuries-old 'Enugu chettu' falls," The Hindu, June 01, 2017.

[57] "Centuries-old African Baobab tree collapses at Attapur," *The Hindu*, August 17, 2018.

[58] See Wickens and Lowe 2008, 352-355, and Rangan and Belle (2015).

[59] Mohideen Sheriff Khan Bahadur, *Materia Medica of Madras VI* (Madras: The Madras Government, 1891, 67).

[60] Rajnish Vandercone, T. M. Sajithran, S. Wijeyamohan, and Charles Santiapilla. *The status of the baobab (Adansonia digitata L.) in Mannar Island, Sri Lanka.* Current Science 87 (2004), 1709-1713.

[61] Anonymous, *Tuvarai-mōṭṭai, Maruk-kārai-mōṭṭai, Perukkaṭi-mōṭṭai, Karuṅkāli-mōṭṭai, Muracu-mōṭṭai.* Know the Etymology *96.* Place Name of the Day: Monday, 27 February 2017. Copyright 1997-2019, TamilNet URL: ttp://www.tamilnet.com.

[62] "Professor looking for baobabs," *The Barbados Advocate*, Tuesday, July 18, 1995.

[63] Rupert Watson, *The African Baobab.* (Cape Town, South Africa: Struik Publishers, 2007), 43.

[64] See V. Soarez, *Monkey tamarind tree.* Hibiscus (Convent of Mercy Academy "Alpha" newspaper, 1977). Also, A. D. Hawkes, *Save Jamaica's rare African baobab tree*, Daily Gleaner 16 April 1970; John Rashford, *The search for Africa's baobab tree in Jamaica.* Jamaica journal 20 (1987), 2-11; *The Grove Place baobab tree.* Virgin Islands Agriculture and Food Fair, Bulletin No. 5 (1991), 65-69; *Africa's baobab tree: Why monkey names.* Journal of Ethnobiology 14 (1994), 173–183; *The search for the St. John baobab.* Journal of the Virgin Islands Historical Society 6(1992), 8–12; *The distribution, history and use of the African Baobab in Barbados.* Proceedings of the 31st Annual Meeting of the Caribbean Food Crops Society, St. Michael, Barbados, 10–14 July 1995, 50–61; *An explanation for tamarind and baobab trees growing together in Africa and The Caribbean: The case of St. Croix.* Virgin Islands Agriculture and Food Fair 11 (1997a), 22–26; and *Africa's baobab tree in Jamaica: A further comment.* Jamaica Journal 26(199b), 51–58.

[65] Frederic G. Cassidy, *Jamaica Talk: Three Hundred Years of the English Language in jamaica.* London: MacMillan (1971), and Frederic G. Cassidy and Robert B. LePage. *Dictionary of Jamaican English.* Cambridge: University of Cambridge Press.

[66] Cassidy and Le Page, 1980.

[67] Richard Allsopp, *Dictionary of Caribbean English Usage.* Kingston, Jamaica: University of the West Indies Press (1996).

[68] Bryan Edwards, *History, Civil and Commercial of the British Colonies in the West Indies*. London: Stockdale (1794), 195; John Lunan, *Hortus jamaicensis*. Spanish Town: Gasette, St. Jago de la Vega (1814), 46; James MacFadyen, *The Flora of jamaica. Vol. II*. Printed in jamaica (1850); D. Morris, *Cultivation and Distribution of Economic Plants*. Government Printing Establishment, Kingston, Jamaica: Annual Report of the Public Gardens and Plantations for the Year Ending 30th September 1883 (1884); William Harris, *Notes on fruits in jamaica*. Bulletin of the Department of Agriculture 2(1912), 160; Dennis Adams, *Flowering Plants of jamaica*. Mona, jamaica: University of the West Indies (1972), 479.

[69] M. H. Baillon, *Dictionnaire de Botanique* (Paris, France: Hachette Publisher, 1876).

[70] H. L. Gerth Van Wijk, *Dictionary of Plant-Names*. Vaals-Amsterdam: A. Asher and Company (1971), 4.

[71] Thomas D. Rock, *Monkey bread nuts or fruit of the Baobab*. Technology 1 (1861), 347.

[72] Rock, 1861, 349.

[73] Charles Ives, *The Isles of Summer: or Nassau and the Bahamas* (New Haven, Connecticut: Published by the Author, 1880).

[74] A. E. Assogbadjo, R. Glèlè Kakaï, F.J. Chadare, L. Thom-son, T. Kyndt, B. Sinsin and P. Van Damme. *Folk classification, perception and preferences of baobab products in West Africa: Consequences for species conservation and improvement*. Economic Botany 62(2008), 74–84. See also C. M. Swanepoel, *Baobab phenology and growth in the Zambezi Valley, Zimbabwe*. African Journal of Ecology 31(1993), 84-86, and S. M. Venter, L. L. Glennon, E. T. F. Witkowski, D. Baum, G. V. Cron, R. Tivakudze, and N. Karimi, *Baobabs (Adansonia digitata L.) are self-incompatible and 'male' trees can produce fruit if hand-pollinated.* South African Journal of Botany Volume 109 (2017), 263-268.

[75] John Rashford, *Candomblé's Cosmic Tree and Brazil's Ficus Species*. In: *African Ethnobotany in the Americas*. Robert Voeks and John Rashford editors. New York: Springer (2013).

[76] See, for example, G. E Wickens and P. Lowe, 2008.

[77] R. Charles H. Sweeney, Naturalist in the Sudan (New York: Taplinger Publishing Company, 1974), 58.

[78] Robert Sullivan, *An Introduction to Geography and History, Ancient and Modern* (Dublin: Sullivan, Brothers, 1883), 17.

[79] Élisée Reclus, *The Earth and its Inhabitants: Africa* (New York: D. Appleton and Company,1888), 308.

[80] James Aronson, Thibaud B. Aronson, Annette Patzelt, Sabina G. Knees, Gwilym P. Lewis, Darach Lupton, Hatem Taifour, Martin F. Gardner, Henry Thompson, Saif Al Hatmi, Abdul Wali Al Khulaidi, *Paleorelicts or archaeophytes: Enigmatic trees in the Middle East*. Journal of Arid Environments 137 (2017), 69-82 (See page 76).

[81] See R. W. Sussman and A. Rakotozafy, *Plant and structural analysis of a tropical dry forest in southwestern Madagascar*, Biotropica (1994), 241-254.

[82] Hugh V. Lely, *The Useful Trees of Northern Nigeria*. London: Crown Agents for Overseas Governments and Administrations (1925), 9.

[83] Henry Barth, *Travels and Discoveries in North and Central Africa* (New York: Harper and Brothers, 1859), 41.

[84] J. M. Dalziel, *The Useful Plants of West Tropical Africa* (London: Crown Agents for Oversea Governments and Administrations, 1937), 200.

[85] A. Aubréville, *Flore Forestière Soudano-Guinée* (Paris: Société d'Editions Géographique, Maritimes et Coloniales, 1950), 8.

[86] P. C. M. Jansen, *Spices, condiments and medicinal plants in Ethiopia, their taxonomy and agricultural significance.* (Wageningen: Centre for Agricultural Publishing and Documentation, 1981).

[87] K. El-Siddig, H. P. M. Gunasena, B. A. Prasad, D. K. N. G. Pushpakumara, K. V. R. Ramana, P. Vijayanand, J. T. Williams, *Fruits for the Future: Tamarind (Tamarindus Indica L.)* (Southampton, UK: International Centre for Underutilised Crops, 2006), 54. For their identification of monkeys as a dispersal agent for the baobab these authors cite R. S. Troup, *The Silviculture of Indian Trees Vol. 11.* Leguminosae (Caesalpinieae) to Verbenaceae. 7. *Tamarindus indica* L. (Oxford: Clarendon Press, 1921), 263-363.

[88] Wickens and Lowe, 2008, 282.

[89] B. D. Burtt and E. J. Salisbury. *A Record of Fruits and Seeds Dispersed by Mammals and Birds from the Singida District of Tanganyika Territory*. Journal of Ecology, 17(1929), 351-355.

[90] See Vaid, 1978b.

[91] H. V. Lely, *The Useful Trees of Northern Nigeria*. London: Crown Agents (1925).

[92] John Rashford, *An Explanation for Tamarind and Baobab Trees Growing Together in Africa and The Caribbean: The Case of St. Croix.* Virgin Islands Agriculture and Food Fair, Bulletin Number 11, University of the Virgin Islands (1997a), 22-26.

[93] Heather B. Leach, Christine Van der Stege, and Christian R. Vogl. *Baobab (Adansonia digitata L.) and Tamarind (Tamarindus indica L.) Management Strategies in the Midst of Conflict and Change: A Dogon Case Study from Mali.* Human Ecology 39 (2011), 597–612.

[94] J. Gebauer, *Comparison of the salt tolerance of the two under-utilised fruit species, baobab (Adansonia digitata L.) and tamarind (Tamarindus indica L.).* Conference on International Agricultural Research for Development (2005), 1-4. See also Sitske De Groote, Emmy De Caluwé and Patrick Van Damme, *Domestication and Development of Baobab and Tamarind (DADOBAT).* Conference on International Agricultural Research for Development, University of Kassel-Witzenhausen and University of Göttingen, October 9-11, 2007.

[95] Heather B. Leach, Christine Van der Stege, and Christian R. Vogl, 2011, 597-612. Also, Sarah Prehsler, *The use and management of Baobab (Adansonia digitata) and Tamarind (Tamarindus indica) by three ethnic groups (Peulh, Serer, Wolof) in Senegal : an ethnobotanical study.* Thesis. Wien, Univ. für Bodenkultur, Dipl.-Arb., (2009). Bibliographic Reference (VLID)1031661.

[96] Thayer Scudder, *Gathering among African woodland savanna cultivators. A case study*: The Gwembe Tonga. Zambian Papers, No 5, University of Zambia Institute of African Studies.

[97] Nina Van den Blicke, *Baobab and Tamarind: Biology and Derived Food Products: Towards Domestication in West Africa.* (Proefschriffen UA-WET, 2014). Also, Emmy De Caluwé, *Market chain analysis of baobab (Adansonia digitata L.) and tamarind (Tamarindus indica L.) products in Mali and Benin.* PhD Thesis (Ghent, Belgium: Ghent University Faculty of Bioscience Engineering, 2011).

[98] J. Gebauer, *Comparison of the salt tolerance of the two under-utilized fruit species, baobab (Adansonia digitata L.) and tamarind (Tamarindus indica L.).* Conference on International Agricultural Research for Development, Stuttgart-Hohenheim, October 11-13, 2005.

[99] J. K. Kilungu and C. K. Njoroge, *The Compositional Analysis of Adansonia digitata (baobab) and Tamarindus indica (tamarind) Fruit Seeds.* Journal of Agriculture, Science and Technology 4 (2002).

[100] Zeenatu Suglo Adams, Faustina Dufie Wireko Manu, Jacob Agbenorhev, and Ibok Oduro, *Improved Yam-Baobab-Tamarind flour blends: Its potential use in extrusion cooking*. Scientific African 6 (2019).

[101] H. W. Bates, *Contributions to an insect fauna of the Amazon valley. Lepidoptera: Heliconidae.* Transactions of the Linnean Society of London 23 (1862), 495–566. Georges Pasteur. *A Classification Review of Mimicry Systems*. Annual Review of Ecology and Systematics 13 (1982), 169-199. Published by: Annual Reviews.

[102] Wolfgang Wickler, *Mimicry in Plants and Animals*. New York: McGraw-Hill (1968).

[103] Delbert Wiens, *Mimicry in Plants*. Max K. Hecht, William C. Steere, and Bruce Wallace editors. Published in *Evolutionary Biology Volume* (1978), 365. New York: Plenum Press.

[104] Spencer C. H. Barrett, *Mimicry in Plants*. Scientific America 257 (1987), 255. See also John R. Pannell, Mimicry in Plants, Current Biology 26 (2016), R784-R785; H. Martin Schaefer and Graeme D. Ruxton, *Deception in plants: mimicry or perceptual exploitation?* Trends in Ecology and Evolution: Review 24 (2009), 676-685, DOI: https://doi.org/10.1016/j.tree.2009.06.006; and G. B. Williamson, *Plant mimicry: evolutionary constraints*, Biological Journal of the Linnean Society, 1982. https://doi.org/10.1111/j.1095-8312.1982.tb02033.x

[105] See Simcha Lev-Yadun and Moshe Inbar, *Defensive ant, aphid and caterpillar mimicry in plants?* Biological Journal of the Linnean Society 77 (2002), 393-398.

[106] Meredith M. Rainey and Gregory F. Grether, *Competitive mimicry: synthesis of a neglected class of mimetic relationships*. Ecology 88 (2007), 2440-2448. DOI: 10.1890/06-1717.1

[107] J. Scott McElroy, *Vavilovian Mimicry: Nikolai Vavilov and His Little-Known Impact on Weed Science*, Published online by Cambridge University Press: 20 January 2017. DOI: https://doi.org/10.1614/WS-D-13-00122.1

[108] Bryan A. Barlow and Delbert Wiens, *Host-Parasite Resemblance in Australian Mistletoes: The Case for Cryptic Mimicry*, Evolution 31 (1977), 69-84.

[109] The scientific authority for the name *Boquila trifoliata* is Decne.

[110] See Ernesto Gianoli and Fernando Carrasco-Urra, *Leaf Mimicry in a Climbing Plant Protects against Herbivory*, Current Biology 24 (2014), 984-987. DOI: https://doi.org/10.1016/j.cub.2014.03.010

[111] See Bryan A. Barlow and Delbert Wiens (1977), 69-84.

[112] Bran A. Barlow and Delbert Wiens (1977), 69.

[113] Jeremy J. Midgley, Joseph D. M. White, Steven D. Johnson, and Gary N. Bronner, *Faecal mimicry by seeds ensures dispersal by dung beetles*, Nature Plants 1, 15141 (2015) doi:10.1038/nplants.2015.141

[114] Delbert Wiens, *Mimicry in Plants* (1978), 369.

[115] L. van der Pijl, *Principles of Dispersal in Higher Plants*. Berlin: Springer-Verlag.

[116] Bryan A. Barlow and Delbert Wiens (1977), 70.

[117] F. Müller, *Ituna and Thyridia: a remarkable case of mimicry in butterflies.* Proc Entomol Soc Lond (1879), xx–xxiv.

[118] Delbert Wiens (1978), 370-371.

[119] K. Grant, *A hypothesis concerning the prevalence of red coloration in California hummingbird flowers.* The American Naturalists (1966), 997-1001.

[120] M. Proctor and P. Yeo, *The Pollination of Flowers* (1972), New York: Taplinger Publishing Co.

[121] Achille E Assogbadjo, Romain Lucas Glele Kakaï, F.J. Chadare, L. Thomson, Tina Kyndt, Brice Sinsin, and Patrick Van Damme. *Folk Classification, Perception, and Preferences of Baobab Products in West Africa: Consequences for Species Conservation and Improvement.* Economic Botany 62 (2008), 74-84.

[122] See David Rindos, *The Origins of Agriculture: An Evolutionary Perspective*. New York: Academic Press (1984), and J. Scott McElroy, *Vavilovian Mimicry: Nikolai Vavilov and His Little-Known Impact on Weed Science*, Published online by Cambridge University Press: 20 January 2017. DOI: https://doi.org/10.1614/WS-D-13-00122.1