Partitioning, phytocommunicability and plant piety

Walking through a crowded, urban, open-air fruit and vegetable market, glimpsing the sacred mediation of harmala seed incense wafting from a window and observing plant-based essential oils precipitate in a university chemistry lab in Fez, Morocco, I was struck by an emerging observation: urban residents – whether phytochemists, herbalists or housewives – daily encountered cut, picked, dried, pressed or distilled plant parts as a central aspect of their professional, therapeutic, culinary and spiritual relations. These partitioned plant modalities (fruits, seeds, pods, dried leaves, oils, roots and biochemicals) drew Moroccans into semiotic relations that differed from the plants’ lives as rooted organisms. I ask what such reconceptualized, partitioned plant engagements might mean for ethnographers interested in interspecies interactions. These kinds of relatiocity are shaped by flexible models for thinking about plant-human participation frameworks which I refer to as phytocommunicability.

In this article, I expand on Briggs and Hallin’s concept of communicability (2016: 8-10) to understand plant-human interaction. They analyzed the ways that health and medical news stories both conveyed content about health knowledge as well as cultural models for who was producing that health knowledge, how it was circulated and who should receive it. The communicability models for situating health authority and knowledge-making were background to the health news content, but were no less significant in shaping understanding. In a similar way, I suggest that the interactional models of phytocommunicability are as significant for understanding plant-human relations as the interactions themselves.

How do we recognize plant partitions as interlocutors? Anthropologists have analyzed participation as acts which coordinate interaction and involvement level by displaying what people are doing and how they expect others to respond (Goodwin & Goodwin 2004). Participation practices may vary, but are shaped by ideologies about what qualifies as interaction, how it should work and via which roles (Keane 2003; Kroskrity 2004). Instead of focusing on the content, forms or mechanisms for plant-human interactions, I suggest that we need to pay attention to the ways that participation ideologies shape these encounters. Here, I focus on phytocommunicability – flexible participation models which shape all kinds of encounters, from research to worship. I analyze the ways that Moroccan Muslims – specifically, a few plant scientists – view plant piety as recognizable, yet unknowable, and examine what that might teach us about interspecies ethnography.

When analyzing the work of phytocommunicability, I start by identifying certain assumptions about participant roles, statuses, sign mechanisms, communicative channels and ways of being that affect interaction. I will also take an analytical cue (Hartigan 2014: 26) from the partitioned Moroccan plants and suggest that plant-human phytocommunicability models can be partial and multiple. In other words, plants and humans do not interact with one another on the basis of one, single phytocommunicability model. Humans and plants encounter each other in patterned, emergent, situated processes of mutual sensing (Kockelman 2011). They store, share and adapt these patterns with others in their communicative networks (Briggs & Hallin 2016; Dudley et. al. 2013).

Phytocommunicability models are much more pluralistic in practice than scholarship suggests and emerge from the multiplicity of forms and contexts in which we encounter plants. The erasure of pluralism can create problematic binaries (science vs religion) and contribute to troubling sociality hierarchies in which some phytocommunicability models are viewed as better than others (Amerindian naturalism vs monotheistic religions). In order to explain my argument further, I have divided this article into some analytical roots, metaphysical stems and ontogenetic fruits: (1) thinking about plants and humans as interactional processes; (2) theorizing phytocommunicability; (3) a discussion of Moroccans, Islam and phytocommunicative ambiguity; and (4) ethnographic examples of plant-people prehension – situated interaction that relies on phytocommunicative pluralism.

Plant assemblages

Let me start with a plant ecology and biochemical hermeneutic and then ‘Moroccanize’ it. As horticulturists and plant scientists have known for some time, many disconnected plant cuttings, roots and seeds have the capacity to remake, regrow and re-establish when connected with new contexts or interactants – whether this be soil, rootstock, tissue culture or sunlight. In other words, in many species, plant partitions hold within themselves the potential wholeness of the entire organism. As described by European plant scientists in recent years, each plant is a modularly designed colony collective (Mancuso & Viola 2015: 36), a net ensemble of chemical selves (Ulanowicz 1997: 47), a ‘swarming self of swarming swarmers’ (Hoffmeyer 2008: 49).

The boundaries of entities have become less fixed: for scholars: plants have primary and secondary chemical processes and symbiotic and agonistic relationships with other membrane forms that contribute to their lived experiences (Hoffmeyer 2008: 25-28). Thus, environments and contexts shape the ways in which these plant assemblages emerge and become identified, while the organism ensembles themselves shape the emergent environment. Anthropologist Paul Kockelman recognized these processes as ‘envorganisms’: interrelationships of organisms, environments, interactional modalities and ideological practices (2011: 719).

One such Moroccan envorganism is sidra (Ziziphus lotus or wild jujube). Sidra is a medicinally and spiritually significant native fruit shrub found throughout North African and Iberian arid and semi-arid lands. Her marblesized drupes, brambly stems and deep roots draw all kinds of species into relations: low-lying undergrowth plants propagate more robustly under her protection (Tirado & Pugnaire 2005); ruminants graze on her leaves when they fall at the end of summer and avoid anything fenced by her thorny branches the rest of the year (Arndt et al. 2001); bees and ants are drawn to her yellow-green blossoms, laden with nectar (El Abidi & El Shatshat 2016); arid ecologists sing the praises of her drought and desertification root and leaf properties (Maraghi et al. 2014); agronomists decry her pesky competitive and regenerative roots in winter rain-fed croplands (Regehr & El Brahl 1995); phytochemists promote her chemically significant antimicrobial, antifungal, antioxidant, immunosuppressive and anti-inflammatory effects (Benammar et al. 2010; Rsasisi et al. 2013); herbalists tout her fruit and leaves as a natural purification for kidney, urine and digestive issues and as a diabetic aid (Jamila & Mostafa 2014: 83); Muslims associate her with the sidra mentioned in the Qur’an, as the tree separating earthly creation from God (Surah An-Najm 53: 14), which the Prophet Muhammad

1. Shiba wa harmala is an incense mixture of Peganum harmala seeds and alum minerals burned as a defence against the evil intentions of others. Not all families used this incense or believed in its mediating efficaciousness, but it had a presence in Morocco. 2. These scholars are writing from a theoretical biology known as organismism, and view plants as interacting layers of living, developmental, evolutionary, genetic and biochemical systems.
3. According to Arabic conventions, this shrub is grammatically female, and I animate her thus throughout the text.
4. Also known in Morocco as murrūbi, in scientific nomenclature as mentha rotundifolia and in English as Egyptian mint.
5. Studies of plant signalling between conspecifics, symbiotic and agonistic species occur primarily in controlled lab environments or specific ecological niches. These scholars seek to understand plant-plant or plant-insect or plant-rhizome/protozoa communication – not plant-human communication in everyday contexts. For many botanists, to talk of communicability is to promote fringe science or myths. That may be why Raguso and Kessler are explicit about borrowing this analogy from human language; they are not suggesting that plants actually speak. See Meyers (2015: 35-37) and Mancuso & Viola (2015: 14-26).
7. For a Native American example of contextualizing translation between multiple communicability models and scholarly genre conventions, see Kimermer (2013: 156-166).

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Fig. 1. Poppy petal picking in the Moroccan countryside.
Fig. 2. Sidra plant (Ziziphus lotus or wild jujube).

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Foltz, R.C. et al. (eds) 2003. Plant chemistry provides one of the primary “languages” through which plants interact with their environment, and volatile organic compounds emitted from flowers, leaves and roots epitomize the ubiquity and multifunctionality of chemical communication” (Raguso & Kessler 2017: 27). European continental philosopher Michael Marder has argued that plants have a soul and also have rights, because life communicates through (relatively imperceptible) mobility: changes in state, proliferation and decay (Marder 2011).

These are only a sample of the many approaches to interspecies communicability found in recent scholarship. In these works, the scholars have approached plant-people-environment engagements from the plant’s perspective, using a phyto comunicability model of some kind. These models include variations on participant roles (sender, receiver, speaker, listener, responsible, mediator, animate, inanimate); statuses (parent-child, predator-prey, kin and non-kin, conspecific-heterospecific); channels (mechanoreceptors, cavitation, chemical volatiles, sign sensormes, songs, regime, prayer, morphological features); spatial-temporal scales (microbiological, macroenvironmental, Anthropocene, lifecycles, afterlives) and ontological frames (animism, totemism, evolutionary biology, biochemical organismism, Aristotelian metaphysics).

Sometimes, when discussing plant-human-environment relations, scholars have framed their analysis with a domini
tory communicative model, where the medical community and have explicitly contrasted this with another community’s dominant model (Descopa 2013). In order to do so, they have backgrounded any differences between members of a community or even differences within a single individual, depending on the context of the engagements. Yet, ethnographically, we encounter far more fluidity in interspecies interactions. Just as there have been accounts of medical pluralism (Chudakova 2015) and sensorial pluralism (Stroeken 2008) that allow for the contextualized salient realization of a potential medical system or sensory mode, so can there be communicative pluralism. As Miller (2016: 120) and Kummerer (2013: 166) point out, it is possible to engage more than one plant-human-world-making model. Using Moroccan examples, I propose that this is partly because we often encounter plants via multiple modalities, partici
tant configurations, foregrounded sensoria and ideolog
cal frames. Thus, phyto comunicability models need not be totalizing, but are often multiple, partial and situational. Plant partitioning plays a role in what phyto comunicability possibilities emerge.

**Muslim phyto comunicability**

In the name of God, the Merciful and Compassionate

The seven heavens and the earth and whatever is in them exalt Him. And there is nothing except that it exalts [Allah] by His praise, but you do not understand their [way of] exalting. Indeed, He is ever Forbearing and Forgiving.

The Truth of God is Great.

(Qur’an 17: 44; ‘The night journey’ chapter, Sahih International interpretation)²

I chose to start this section with a common historical practice in Muslim scientific scholarship: opening with a Qur’anic invocation related to the topic at hand. Between the 8th and 19th century, every Muslim botanist, horticulturist, medical scholar and philologist would begin their writings with a Qur’anic rationale for their work. In the 20th and 21st century, however, Muslim scholars have utilized this formula only when engaging a Muslim audience, otherwise they have presented their work using European-developed genre conventions: abstract, hypothesis, literature review, methods, analysis, discussion and conclusion. I am not Muslim, and most likely the intended audience of this foray into ethnographic methods is not Muslim either. So why involve a theistic religious invocation about plant ways of being and knowing? I do so, because I wish to index the communicability frames for such scholars and many of their readers.

Most recent scholars writing about Muslim plant and animal theology have emphasized human personhood and humankind’s benevolent care of nature (Afrasiabi 2003, 2013). However, Islamic views on plants – derived from textual sources – differ from Muslim models in prac
tice (Foltz 2003: 252). Anthropologists have, in many cases, demonstrated that plant-human world views often involve a diversity of perspectives, forms and contexts (Ellen 2016: 12).

The Qur’anic verse cited above, emerged during a con
eration I had with a Moroccan chemist about plant forms of cross-species communication. As I will explain later, he evoked the verse to demonstrate that Moroccan Muslim plant scientists know that plants worship God, even if they may not know how to read the signs of such plant piety. For my Moroccan Muslim colleagues, plants and humans are maḥluq allahi – beings created by God. All beings in this field are created to worship, though the signs of such piety are not always readily apparent. With piety assumed, the chemist and his lab students studied the chemical pro
certies (antioxidant, antimicrobial, antifungal) of Moroccan plant cultivars, like the bark of Ziziphus lotus (L.) Desf. and Lavandula stoechas can (carob) and Lavandula stoechas essential oils, to discover their medicinal applications. He felt strongly that plants can sense the communicative signs of plant piety but may not know how to understand them. As the Qur’anic verse states, all creation worships God. Even if humans and other creatures don’t recognize those signs, they point toward God; they draw other entities into pious reflection. Meriem also expressed this idea during her interaction with sidra leaves described earlier. The plant forms and properties matter in this communicative process, but so too do the ideologies about who can worship and how.

There are many aspects of this phyto comunicability model I want to highlight analytically. First, some states of plant being involve communicative ambiguity. There is a way in which plants conceal some signs (of worship) from some beings (humans and possibly others), even though they reveal other signs (the existence of God) to some beings (those who can perceive that relationship) in the context of exalting God. Secondly, the sensory channel for apperception is context-specific. One doesn’t see, hear or feel plants worshipping God, but there is a channel for recognizing piety. One can, however, identify sidra’s gustatory communicative channel when its ingested ground leaves ease stomach aches. Thirdly, plant piety states of being include the intentional triangulation of indexical relations between at least three entities: a human perceiver, a plant signer and the signed. By indexical relations, I mean connections that rely on spatial-temporal contiguity for meaning. One doesn’t see the plant praying, but her very presence directs the viewer’s attention toward a creator. Lastly, those pietistic relations do not preclude interspecies communicability in other modes: lavender and carob can speak through cut, distilled, observed, weighed or mixed plant parts and assessed chemical signatures. Biological indexes also work by spatial-temporal contiguity: a plant’s antibacterial properties can only be observed in relation to bacteria that are no longer present.
Can we observe plant piety? The Moroccans I spoke to did not recite Muslim theological texts about the metaphysics of plant souls. Rather, most did, like the aforementioned chemist, have a rationale for thinking about plant-human relations which relied on the contexts in which they encountered them, the plant part itself and their assumptions about the audience they were engaging with. In other words, their plant interactions involved a socially embedded process of ‘prehension’. Ellen (1986) employed this term to explain how botanists and indigenous interlocutors in specific situations co-construct classifications and representations of plant identities (1986: 91-93).

I wonder, however, about the specific plant contributions to this social process: the state of plantbeing (leaf, stem, dried specimen, rooted organism), the sign channel connecting these interlocutors (touch, sight), the roles of plants and humans in this interactional frame and the way a plant form might communicate in a different context. What we prehend, as scholars, may be shaped by our actions, roles, affordances and identities (Kockelman 2011). Perceiving plant piety is partly tied to ideologies of plant-human sociality and communicability and the foregrounding of some plant property potentials (known in semiotics as ‘qualia’) over others within specific interactions. To situate this a little more, I shall provide an ethnographic example.

**Moroccan phytocommunicative pluralism**

The Moroccan scientists I interviewed were trained in European pharmacological research techniques and Linnaean classification. Yet, they also drew from a long Muslim scientific botanical tradition (al-Khwarizmi, al-Dinawari, Ibn Sina, al-Nabati, Ibn al-Baytar) as well as fieldwork among regional farmers – thus bringing arid ecologies, piety ideologies, plant parts and people together. These scholars liked to situate Morocco’s flora as unique for its regional context. Not only did they emphasize the wide range of eco-regions within a relatively small geographic area, but also highlighted the extent of plant diversity given such environmental variability. They situated Morocco’s plant uniqueness through comparative enumeration. According to Rankou et al. (2013), Morocco boasts 4,200 flora species, 879 of which are endemic and 500 are used in medicinal, aromatic and consumable forms – the second highest number of endemic plant species of the semi-arid Mediterranean region. Moroccan published studies have foregrounded the olfactic qualia of plants in their classifications: medicinal and aromatic plants have always been classed together. Scholars often told me that the arid climate of Morocco highlighted the aromatic and haptic qualities of medicinal herbs in the North African pharmacopeia.

In spring 2016, I sat with a Moroccan ethnobotanist and his phytochemist colleague, discussing their plant research. During our conversation, I asked the ethnobotanist how he approached the issue of plant-human interaction – how did he, and those he interviewed, understand the ways that plants communicated between species? I knew from our previous exchanges that both the ethnobotanist and his phytochemist colleague were devout Muslims. Our conversations had often involved religious greetings and interactions – unsurprising for Fez. The phytochemist – who was well-published internationally on the chemical applications of medicinal plants – had told me the previous year of his interest in the Islamic foundations of phytochemistry. He had presented a paper on this topic at a conference that brought religious scholars from al-Qarawiyyin (the Islamic university in Fez) together with faculty members on the medical campus. As he showed me the lab where his graduate students were working, he and his students showed me plant leaves, stems, roots, seeds, oils and the machines that weighed, spun, extracted, heated, separated

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**Fig. 3.** Harmal seeds (Peganum harmala) with shiba (alum) in a Fez herbalist shop.

**Fig. 4.** Mazhar: orange blossom water (hydrosol) used in Fez to freshen, extend hospitality and purify.

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and measured plant properties. Many of the plants that his students examined were mentioned in the Qur’an, Hadith and prophetic medicine texts. As with many of the non-specialist Moroccans I interviewed, they could recount stories of how family members had used these plants in the past, through simple compounds, tea infusions and poultices. It was often such experiences with these plant stories and applications that had stimulated their interest in plant chemistry. I sensed from our many discussions that both students and scholars held ambivalent views about evolutionary time, but applied aspects of natural selection theory to their research analyses. So I wasn’t too surprised by the direction our discussion went.

The phytochemist said that plants communicate in multiple ways, though we don’t always recognize their forms of communication. For example, a large number of plants are mentioned in the Qur’an, not only in terms of their descriptions and internal virtues, but also in relation to human health and psychology. The phytochemist explained that every creature, whether a tree or a stone, worships God. Except we don’t know how or what form this worship takes. He then quoted the Qur’anic verse I quoted above: ‘And there is not a thing except that it exalts Allah by His praise, but you do not understand their way of exalting’ (Qur’an 17: 44). He went on to explain that in some rural areas of Morocco, people cut and use trees growing outside the shrines of religious figures, but the ones inside the shrines are seen as blessed by the power of the saint and the fallen leaves are haled as curative. Some plants carry poison in them so that when animals eat them, they die, while others exhibit chemical traces that attract bees for nectar. The chemist listed all these as ways that plants can communicate: through some sort of channel, some participant role, some plant part, some interactional move, some specific context.

The ethnobotanist concurred, even chiming in union with the chemist’s recitation of the Qur’anic verse. Despite the claim that creations may not recognize the forms of worship of other species, neither scholar felt that this inhibited their reading of plant signs to interpret human-plant relations. The ethnobotanist furthered the discussion by mentioning a very common case in Morocco, which has been well established through experimentation and observation: orchard trees nearest the paths where people pass by produce more fruit because of the road, which could be picked by passers-by, always prowling for danger spirits, which the scientists understood as back-ward religious ideologies. Phytocommunicative pluralism, as a set of flexible models shaping research, consumption and worship practices, is a key mechanism of Moroccan plant-human sociability.

Conclusion

As we try to take seriously plant-human ways of being, we should keep in mind the communicability models that shape our understandings of those relations. Plant communication is not just about identifying the forms or content of interactions. It involves multiple ideologies about communicative participation frameworks that shape both interactional forms and content. For many Moroccans, plant piety is ambiguous and can be read in the movements, shadows, economically salient chemical properties and interdependence of creations that worship. The apprehension of signs and their attendant social possibilities relies on plant part qualia, interlocutor roles, perception channels, sign types and ideologies of interaction that are partial, multiple, overlapping, local and transnational. Moroccon plant scientists evoke multiple phytocommunicability models to view plants as pious, private, problematic and profitable partitions. They respond to partitioned plant qualia as communicative signals, but through flexible ideologies about plant-human interactions.

I don’t wish to argue that plant partitions teach humans about communicability, or that what I have described is merely humans mapping their meanings onto plants. Instead, I suggest that practices of plant-human engagements in Moroccan contexts provide a mutual sensing way of exploring phytocommunicative pluralism. This is possible because plants and humans are envoigement processes, interrelations that emerge through co-constructed prehension and which rarely involve one model of participation.