The roots of culture

Just what do plants mean to you? To a plant biologist, they are objects of infinite fascination, but to many, plants are background — living wallpaper at best. However, the symbolic and cultural significance of plants is considerable, if often overused and undeserved.

Evidence of the influences of plants on human society is easy to find in *Nature Plants*. Our Books and Arts section, for instance, often reviews works that look at the interface between humans and plants. Research in this area is likely to take an historical view based on archaeological data as was the case with the recent study by Maezumi et al. (*Nat. Plants* 4, 540–547; 2018) on the reciprocal shaping of plant diversity and human occupation of Amazonian forests over the past 4,500 years.

Now that we in the northern hemisphere are entering what the poet John Keats called the “season of mists and mellow fruitfulness”, it seems apt that this month we consider the ripening of fruit. Peitao Lü et al. (*Nat. Plants* <https://doi.org/10.1038/s41477-018-0249-z>; 2018) have surveyed 361 transcriptome, 71 accessible chromatin, 147 histone modification and 45 methylome profiles held in the fruitENCODE database (<http://bit.ly/2PRvoip>). Despite the variety of fruits, it seems that the relatively few mechanisms of ripening, and the involvement of ethylene, have evolved independently several times.

Normally we associate the use of such phylogenetic analyses to determine the relationships between species and groups of organisms, tracing their evolution back to putative common ancestors. This is not their only use however, and many of the techniques applied by geneticists are equally powerful at uncovering other ancestries, such as the evolution over time of texts as ancient as the *Illiad* or as modern as Shakespeare's plays.

Instead, Teixidor-Toneu et al. (*Nat. Plants* <https://doi.org/10.1038/s41477-018-0226-6>; 2018) have applied comparative phylogenetic methods, not to plants themselves but to the medicinal roles to which they have been put. Even within ethnobotany this is not a common approach, but the ability to use multiple types of data (such as how the plants are used and what their common names are) can produce robust and detailed information about how cultural information is transmitted.

Figurative use of plants in advertising might also be an interesting application of this comparative approach. Mostly this is a straightforward indication that the product being pushed is of plant origin — tomatoes

advertising tomato soup — but there are also times when a plant is symbolic of something else. Most obviously plants are viewed as ecologically friendly — green is the colour of plants both literally and figuratively — so that leaves in a marketing image immediately suggest environmental responsibility.

Essential features of specific plants also enter the symbology of advertising. There are any number of sore throat treatments that have used cacti to visualise the feeling of discomfort, for example showing a round cactus plant in an ice cream cone, and one such advert used a pineapple made of broken glass. Broccoli, for some reason, is often a signifier of health, although any plant seems to be usable in this context except carnivorous Venus fly traps, which are indicative of a hostile rather than a healthy environment. This association of plants with vitality leads to many images where models of organs are constructed out of plants: brains sculpted from magnolias, stomachs made of floral bouquets, or lungs built of trees.

Recruiting plants as signifiers of abstract concepts is also seen on the covers of magazines, even those of prominent science journals. Here, the visual language often uses plants to indicate growth. This year alone *Nature* has illustrated a survey of differences in educational attainment and child growth in African countries with two heads made of stylised vines, one flourishing while a second withers (*Nature* 1 March 2018); a feature on ‘How to Grow a Healthy Lab’ with a cartoon research establishment in the shape of an apple (*Nature* 17 May 2018); and a study on preserving livers pre-transplantation by a Dali-esque landscape with trees growing in the shape of livers (*Nature* 3 May 2018).

Largely, this artistic technique carries on a tradition stretching back to at least the mediaeval period. Here meanings are readily apparent, such as the use of wilting flowers as a reminder of mortality, and white flowers (especially lilies) for purity and innocence. However, by the Renaissance the use of specific flowers in precise shades had become an intricate code employed by painters to give extra depth to their work. For example, the sixteenth century Italian painter Lorenzo Lotto includes in his painting *Venus and Cupid* (now housed in

the Metropolitan Museum of Art, in New York) several floral symbols: scattered rose petals for physical love, a myrtle leaf for marriage and its consummation, and ivy indicating fidelity. The picture is thought to have been commissioned by Mario d’Armano as a wedding gift.

Encoding meaning using plants, floriography, has fallen out of practice since the Victorian era. Modern artists tend to employ plants in much more straightforward ways. For example, Stephanie Rothenberg — an Associate Professor of Art at the State University of New York, in Buffalo — has used plants not merely to represent growth but to physically demonstrate it in her installation “Reversal of Fortune: The Garden of Virtual Kinship”, a map of the world assembled from plants in pots. The plants are watered robotically, but the amount of water they receive is dependent on the amount of microfinancing aid the regions they represent are receiving from philanthropic social media sites. The whole thing runs in real time so that the growth of the plants shows where aid is being supplied.

Endemic flora, particularly trees, can come to represent the entirety of a culture, and their health an allegory of a society's strength. Earlier this year Patrut et al. (*Nat. Plants* 4, 423–426; 2018) discussed the recent demise of Africa's iconic baobab trees. In New Zealand, a similarly iconic tree, the Kauri (*Agathis australis*), is under threat from the *Phytophthora agathidicida* pathogen, requiring dramatic measures to prevent extinction of the species (*Nature* 561, 177; 2018).

Contemporary society is frequently accused of plant blindness: the inability to notice the plants in one's environment and, as a result, failing to recognize their importance or appreciate their uniqueness, regarding them as of lesser status than animals. But plants are symbolically threaded through all forms and varieties of human culture; our subconscious is well aware of their significance. Which leaves one important question:

How can we see the trees (and other plants) for the cultural wood? □

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