

"It happens quietly": Plant Poetry and the *Botanification of the Imagination*

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The all-pervasive nature of the plant world is in contraposition to the actuality of plant blindness, the latter referring to a lack of attention to the existence and importance of the botanical world arising, perhaps, out of a view of the plant world as merely a background for animal life (Hall 5). This is especially seen in the context of literature and literary criticism, for the myriad relationships between literature and botany appear to have been little explored even within the field of science and literature. This lacuna is all the more glaring in light of current ecological concerns and the increasing need for what may be called the non-plant world to have a better understanding of, and interaction with, the plant world.

There have been, however, several attempts to bring developments in botany to bear upon readings of literary texts. Some of these have been restricted to literary analyses of botanical tracts (the 2011 issue of the *Journal of Literature and Science* [JLS 4.1] was a special issue on "Women and Botany") or the use of botanical metaphors in the literature of a particular period (*Bloom: The Botanical Vernacular in the English Language* is an attempt along these lines). Studies such as *The Poet as Botanist* by Molly Mahood offer detailed analyses of the methods and strategies used by poets of the past who were interested in botany and who used botanical research as raw material for their poetry. Among the analyses that Mahood's book carries is an elaborate one of the poems in Erasmus Darwin's "The Loves of the Plants" and the obvious Linnaean overtones in them.

The present article is an attempt along similar lines. It is based on the understanding that plants are not the passive, sessile creatures that exist in much of popular and scientific imagination. Based on this assumption, it theorizes a kind of poetry that uses plants neither as metaphors and similes, nor as personifications of human traits, but acknowledges them instead as thinking, active and intelligent creatures. The article connects such a picture of plants emerging from certain poems to recent developments in the field of plant neurobiology and a renewal of interest in the research of scientists such as Jagadis Chandra Bose and Charles Darwin's botanical studies, which reinforce the same idea.

Darwin, Bose and Plant Intelligence

Matthew Hall in *Plants as Persons* carries an insightful review of the history of botany, focusing on the attitude of scientists towards their objects of study. Going as far back as Theophrastus (circa 371–287 BCE), the Father of Botany, Hall traces the route through which the popular idea of plants as sessile, passive creatures came into being. Theophrastus's own writing, Hall points out, takes cognizance of the differences between the plant and animal worlds, thereby implicitly denying zoocentrism and anthropocentrism:

The fundamental recognition that plants should be treated on their own terms manifests itself in Theophrastus's recognition of the independence and autonomy of the plant kingdom. In contrast to the backgrounding philosophies of Plato and Aristotle, through his careful description of fruit

formation in *De Causis Plantarum*, Theophrastus recognizes a purposeful autonomy. (31)

Hall then goes on to give several instances of the wonder and amazement that characterized Theophrastus's observations of plants, tempered by the Greek scientist's view of plants as "autonomous beings, rather than as slaves for humankind" (32). However, while many aspects of Theophrastus's study have been used by later botanists, it is the hierarchical model of the world propounded by Plato and Aristotle that has attracted both the popular and scientific imagination, as even a cursory glance at the history of botany would suggest. The inability of plants to communicate (at least in a form that humans can understand), or move (at least at a rate that humans can detect), and their seeming dependence upon the ground and their environment appear to be among the main reasons for considering plants as beings devoid of intelligence. This is evident in the attitude of both lay people and the scientific community towards plants.

In most cases, plants have been studied in terms of their use to humans – from the early herbologists onwards, the value of plants has been in terms of what they can provide for human beings. The later importance given to taxonomy, especially the Linnaean system of classification of plants based on the number and arrangement of sex organs, had its roots in the medieval physic gardens where plants were studied for their medicinal values. The classification of plants was important in that, among other things, it helped botanists better understand the uses to which plants could be put.

The invention of the electron microscope in the early twentieth century made it possible to explore smaller details of plants, giving rise to nuances in the fields of plant biochemistry and plant cell biology. These fields shifted botany from being a field science to a laboratory science – a shift that has important implications in understandings of the plant world. As a field science, botany focused on plants in their natural environment; the possibility of studying plants in relation to other plants, animals, and other biotic and abiotic phenomena was quite strong. Unfortunately, when botany was a field science, the focus of much mainstream botany appears to have been on cataloguing, classifying and describing plants rather than on studying plants in their relationship with the world around them. František Baluška and Stefano Mancuso point out that studying plant behaviour within the controlled atmosphere of a laboratory will be necessarily a false observation for, in reality, plants constantly interact with a number of biotic and abiotic elements simultaneously, which can never be recreated accurately in the laboratory (206). With the shift to the laboratory, plants came to be studied under controlled conditions with the focus on the minutiae of the plant rather than on the plant in its entirety and its interactions with its world.

In the laboratory, plants are often seen as specimens to be studied rather than as organisms with emotions, intelligence and rationality. In fact, plant blindness in life and in literary studies is based on a perceived absence of intelligence, an inability to move at will or to communicate with others, all of which are often seen as markers of the lower status of plants in the hierarchy of evolution. While this anthropocentric attitude was by all accounts the dominant one, there were minds that questioned and critiqued it, while offering alternative ways of approaching plants.

Two such exceptions are significant in the history of botany – Charles Darwin and Sir Jagadis Chandra Bose – because of a radical difference in their beliefs, and thereby approach, to the plant world. Their research, and a recent revival of their explorations in botany, has since led to what Mancuso and Baluška have termed a "paradigm shift" in botany's perception of plants. Both Darwin and Bose offered

important analyses of plant movement and associated ideas of plant intelligence.

Charles Darwin (1809-82) is best known for his theory of evolution. With reference to botany though, in *The Power of Movement in Plants* (1880), Darwin identifies and documents the basic movement of circumnutation in plants. Darwin identifies this movement as occurring in a circular spiral, in irregular elliptical or oval figures. Darwin further asserted that every growing part of a plant is constantly circumnutating on different scales. Even the stems of the seedlings and buried radicles (roots) circumnutate as much as the surrounding earth permits (3). Though circumnutation is not easily observable in itself, it forms the basis of certain nuanced movements such as the twining of the tendrils, which occurs as a result of an increase in the amplitude of circumnutation. All the tropisms (movements) observed in a plant such as phototropism (the tendency of plants to turn "towards" light), geotropism (the movement of the shoot away from the ground and of the roots towards it) and so forth, are also modified forms of circumnutation. This movement of circumnutation, including its modified forms, is not automatic.

Darwin describes the plant, right from the stage of germination, as a sensitive being, consciously gauging and responding to the environment in a manner that ensures and extends survival. Though such responses can be seen in almost every part of a plant, the root tip, according to Darwin, is the most sensitive part. Darwin pointed out that the root tip can even detect a bead weighing 1/200 of a gram when attached to it. In addition to this, radicles are also sensitive to air and bend towards the side that contains moisture, a phenomenon observable under the soil as well as above it. Darwin concludes that "this sensitiveness resides in the tip, which transmits an influence causing the adjoining upper part to bend in opposition to geotropism towards the moist object," indicating that "roots will be deflected from their downward course towards any source of moisture in the soil" (551). This throws light on two significant aspects of plant movement. The first is that the detection of a stimulus by one part of the plant is transmitted to another to cause movement. This intra-plant communication between the sensory and motoric areas of the plant ensures the survival of the plant as a whole. The second aspect is that, at any given point of time, the plant is subject to, and detects, various stimuli. Based on the environmental conditions and the current needs of the plant, it chooses which stimuli to respond to, and how, thereby indicating an intelligence that drives these actions.

Stimulus and response also forms the basis of Bose's research. Sir Jagadis Chandra Bose (1858-1937) was an Indian scientist who began his scientific career as a physicist with several technical inventions to his name. His research in metals led him to discover similarities between responses of metals and living tissues, which in turn resulted in his experiments in plant physiology. The uncanny similarities he saw in the responses of plants and animals directed a definitive shift in his perception of plants. Bose's experiments recorded responses of plants to various stimuli that go undetected by other organisms. Plants respond "even to the fluctuations of light caused by a drifting cloud" (Bhattacharya 69). When compared to animals and humans, the range of plant perception of stimuli is significantly higher. These subtle responses could be recorded by his technical inventions, which overcame the obstacle of these plant movements occurring in a time and space that is often incompatible with human notions of temporality and spatiality.

Bose describes the response process as beginning with a protoplasmic change. The protoplasmic fluid in every cell of the part exposed to the stimulus undergoes physical, chemical and electrical changes. This is termed excitation. This excitation is then conducted, which leads to the mechanical manifestation that may be detected. Even

if the manifestation is too subtle to be detected, it does not negate the excitation and conductivity of the cells' response.

In a lecture titled "Sense Organs of Plants," Bose discusses the "three main obstacles which had hitherto stood in the way of advance in plant physiology." The first is "the belief that only a few plants are sensitive," the second is the "erroneous idea that plants do not possess a nervous system" and the third is "our inability to detect internal irritability that causes movement" (Bhattacharya 103). While the third obstacle can be overcome through advancements in technology, the first two obstacles are based on perceptions. The strong connection between perception and experimentation is clear in the reluctance of botanists to study plant sensitivity or intelligence, for if there is a strong disbelief in the possibility of an occurrence, there can be no initiative to record the occurrence. A shift in perspective, therefore, is necessary to direct the research towards further such possibilities.

Bose and Darwin, through their experiments and findings, encourage such a shift in perception of the plant world. The scientific nature of their experimentation validates the seemingly fanciful hypothesis of plants as sentient, intelligent, responsive beings. In fact, Darwin's book ends thus:

It is hardly an exaggeration to say that the tip of the radicle thus endowed, and having the power of directing the movements of the adjoining parts, acts like the brain of one of the lower animals; the brain being seated within the anterior end of the body, receiving impressions from the sense-organs, and directing the several movements. (572-73)

This suggests that a re-perception of the plant world requires a renewed understanding of the term intelligence. Research in the nascent field of plant neurobiology by scientists like Stefano Mancuso, Anthony Trewavas, František Baluška and others has led to a revival of the research of Bose and Darwin. Phenomena of communication, response, self-protection, problem solving and kin recognition are indicative of a definitive intelligence, and experiments in plant neurobiology seek to establish the same. Günther Witzany and František Baluška, in their book *Biocommunication of Plants*, discuss plants as "highly sensitive organisms which actively sense their environment" (1). Plant sensitivity and response is nuanced, and happens at three levels simultaneously. The first level is the intraorganismic interaction within the plant body. The second is the interorganismic interaction "with same, related, and nonrelated plants" and the third level is the transorganismic interaction "with nonplant organisms such as fungi, bacteria, and animals" (1). While the plant is engaged in this three-fold communication, it also interacts "with abiotic influences from the environment such as nutrient and water availability, light, gravity, wind, and temperature" (1-2). Therefore, when stress (lack of water, salt stress, aluminium toxicity and so forth) is perceived by any one part of the plant, it is communicated to the entire plant immediately for response. This intraorganismic communication was an important finding in Bose's research as well.

It must be understood, though, that response in plants, is not a simple jerking movement to or away from a source. The phototropic movement, students of botany are taught, occurs with the aid of auxin, the light sensing hormone. When one part of the stem is exposed to light more than the other, auxin is released from the cells, which then collects on the darker side of the stem. The auxin then releases protons, thereby reducing the pH in the cells. When the acidity of the cell increases, the cell wall activates enzymes called expansins, which break the bonds in the cell wall, making it less rigid. The acidity also breaks the hydrogen bonds in the cellulose of the cell wall.

When the cell wall strength decreases, the cell begins to swell. When this phenomenon occurs in all the cells in the darker side of the stem, it exerts the pressure needed that causes the stem to bend towards the source of light.

All responses in organisms are survival driven. This comes from the plant's ability to "distinguish between self and non-self" (Baluška and Witzany 5). When there is a threat to survival, by herbivorous animals for instance, the leaves of the acacia tree release "a gas that conveys a message to the nearby trees. When the trees receive the signal," David Attenborough remarks, in a film on "Plant Intelligence," "they react in a remarkable way. Toxins spread through the leaves." In half an hour, the leaves of the trees become toxic and the herbivore is forced to move away. In the event of failure of such direct defences, some plants release herbivore-induced plant volatiles (HIPVs) as additional "indirect defences" that "can be used by foraging predators or host-searching parasitoids to track down plants with prey, thereby augmenting the direct defences" (Baluška and Witzany 198).

Recent research in plant neurobiology, along with a revival of earlier research, is therefore compelling enough to necessitate a shift in perception of the plant world. Even a grudging acknowledgement of the plant world as intelligent and responsive, impels a corresponding shift from the perception of the living world as a hierarchy. If factors like intelligence, communication, decision-making, self-protection are what elevated humans to the top of the hierarchy, then the hierarchy is fruitfully compromised by new plant science. In the light of new findings therefore, a doggedly anthropocentric view of the world does not just indicate ignorance, it is unscientific. The biological world, then, might be better seen as a web, with no designated centre, where all the organisms are interconnected, interdependent beings, actively involved in their life processes.

That the literature produced in a specified historical period engages in myriad ways with the scientific preoccupations and beliefs of that period is an idea that is perhaps taken for granted. Thus, it is not surprising to note that the anthropocentric view of plants that for long characterized the botanical sciences is also reflected in much of the canonical texts of literature and literary criticism. In many ways, the relative absence of focus on how plants have been represented in literary texts is reminiscent again of the plant blindness.

It would not be an exaggeration to say that plants in literature are often a marginalized category. Where present, they mostly indicate certain human emotions or passions. Very often they function as metaphors; if they are portrayed as thinking or feeling, the narrative is often cast in an allegorical mode or encourages the reader to focus on the use of personification in the text. In other words, plants are rarely viewed as agential beings. In what could be defined as plant poetry, however, the agency of plants is the defining feature.

Plant Poetry

Plant poetry is, simply put, a view of the plant world as active, intelligent and as constantly interacting with its environment, being affected by it and affecting it in turn. Such a view makes it possible for us to place plant poetry within the larger conceptual framework of ecopoetry or ecoliterature.

Ecoliterature, variously called "green literature," or environmental literature, can be characterized by an approach that recognizes elements of nature as entities with an agency of their own. Laura-Gray Street points out that ecopoetry represents a non-anthropocentric way of thinking (Fisher-Wirth and Street xxviii). Scott Bryson in his introduction to *Ecopoetry: A Critical Introduction* traces various critics' definitions of

ecopoetry. Terry Gifford defines what he calls "green poetry" as poems that engage directly with environmental issues (5). Leonard Scigaj qualifies this definition by circumscribing as ecopoetry only poems that stress human cooperation with a dynamic nature (5). For Lawrence Buell, the important aspect in ecopoetry is the non-human presence which is more than a mere backdrop for the human interest in the text; rather this non-human presence is expanded beyond humanity while retaining the human accountability to the environment (5). Scott Bryson himself defines ecopoetry as a subset of nature poetry which, while adhering to certain conventions of romanticism, goes beyond them and takes on contemporary problems and issues. Ecopoetry may be identified by a characteristic emphasis on "an 'ecocentric perspective' that recognises the interdependent nature of the world which may either lead either to devotion to specific places or to land itself or to a deep awareness of the 'sacred hoop' that pulls all things into itself." The personas of ecopoetry typically possess a sense of humility in their interaction with the non-human world, which implies a non-anthropocentric view of the world. The cognizance of this interdependency also involves a scepticism of hyperrationality which is in turn an indictment of an over technologized world (Bryson 5-6).

In other words, ecoliterature foregrounds nature in its own terms. Within the larger corpus of ecoliterature, there is an identifiable tradition of plant poetry which portrays plants as active beings endowed with intelligence and an agency of their own, not as beings who need to be "appreciated" by humans to have meaning. This article will use selected poems by Denise Levertov, Jane Hirshfield, Marvin Bell and Barbara Meyn to identify this tradition. Plants in these poems are seen as the intelligent beings they are, responding actively to the biotic and abiotic stimuli around them and whose inter, intra and trans organismic communication skills are a manifestation of this very intelligence. This view of the plant world is one endorsed by scientists such as Bose and Darwin, and more recently by plant neurobiology.

This shift in perception from seeing plants as sessile and passive to viewing them as actively interacting with their surroundings (of which humans are a part) can, in hindsight, be seen as a result of a number of factors. The growing awareness of environmental crises alerted various disciplines to the need for a change in our perception of nature and environment. The different sciences, theology and philosophy have been involved in "greening" themselves in an attempt to address environmental issues. Simultaneously, ecology, the branch of biology concerned with the relations between organisms and their environment, has also grown significantly as an academic discipline. This has given further impetus to the study of the ways in which plants interact with various biotic and abiotic factors in the environment, leading consequently to the discovery that what had so far been considered involuntary and mechanical actions in plants were in fact a result of a deep-rooted intelligence that the community of botanists was only in the process of discovering. It is therefore evident that the rise and growth of ecopoetry, both as a creative as well as a critical endeavour, can be read alongside the discoveries and studies in nascent sub-branches of the botanical sciences such as plant neurobiology. A theoretical framework for plant poetry might be constructed and poems identified.

A respectful approach to the plant world comes from an innate understanding of the world as a web; this non-hierarchical worldview necessitates a cognizance that plants are as "living" as humans. The recognition of oneself, therefore, as Denise Levertov observes, "as *life that wants to live among other forms of life that want to live*" (*Poet* 53) is intrinsic to this approach. This recognition necessitates a paradigm shift in the human-nature equation that has existed for centuries that not only destabilizes that

oppositional equation, but re-creates newer models of the world, which are as minimally anthropocentric as possible. It involves, "a genuine – and often working, not only recreational – relationship to wild nature" (Levertov, *New* 5) and a certain displeasure at the reduction of elements of nature in literature to metaphors and similes and/or a stock personification of them. The displeasure stems from the understanding of nature, and the plant world in particular, as nuanced in its responses and is directed at the literature that does not reflect this understanding. The literature that does acknowledge the subtleties of the plant world encapsulates this approach, and plant poetry can therefore be characterized by its respect for the botanical world, a genuine attempt to understand it, an acknowledgement of ignorance, an intention to explore deeper, dismissing nothing as natural or obvious, an attention to detail and a willingness to engage with the plant world on its terms and a certain joy in doing so.

The poem "Optimism" by Jane Hirshfield (qtd. in Fisher-Wirth and Street 329), for instance, exemplifies these features. The poem begins by stating how the persona finds herself increasingly admiring the resilience of the tree, which is:

Not the simple resistance of a pillow, whose foam
returns over and over to the same shape, but the sinuous
tenacity of a tree: finding the light newly blocked on one side,
it turns in another. A blind intelligence, true.

Two phrases in these lines – "sinuous tenacity" and "blind intelligence" – are quite telling in their description and perception of the tree. The phrase "sinuous tenacity" suggests admiration and respect for the being that is resilient, while bringing out the fact that the poet is observing the tree very closely and with a sense of wonder and oneness. Such a close observation, an important feature of plant poetry, allows the observer to, in a way, come out of herself and experience the plant as it is. It is interesting that the poem expressly calls the tenacity "sinuous," much like the botanical description of a leaf. The poem continues its use of scientific terms, as the persona understands that it is out of such indefatigable endurance that turtles, rivers, mitochondria and figs arise. The choice of representatives of "all this resinous unretractable earth" seems eclectic.

The inclusion of mitochondria in this list is of particular interest. The mitochondria, often called the power houses of the cell, are the organelles responsible for converting the created and stored energy into usable forms through cellular respiration. They also play an active role in cell division and growth. The mention of mitochondria along with turtles, rivers and figs suggests at once a scientific understanding of the inner workings of the plant and an acknowledgement of the complexity of the tree. The tree is not a passive green-brown mass, where processes are "natural" and responses are automatic. Research has shown, as explained earlier, that the seemingly simple act of phototropism involves a chain of processes which require perfect co-ordination to function. It is this coordination that is captured in "finding the light newly blocked on one side, / it turns in another." The intelligence of the plant to turn in another direction when the light is blocked on one side is therefore "blind" only ironically, because it is the human world that is often blind to the complex decision-making and executing processes that occur within the plant, even at the cellular level.

"Optimism," therefore, carries most of the hallmarks of plant poetry – close observation, leading to a sense of curiosity that in its turn leads the observer to study and understand the nuances of what is observed (hence the description of phototropism not merely as a turning towards light, but as a more complex process). Associated with

these, the poem also carries a strong sense of irony that understands that the human intelligence has so far not really understood the plant world and its nuances. The approach that Hirshfield takes in this poem necessarily involves, as mentioned earlier, understanding and appreciating plants in their own terms. This is significant especially given the human inclination to cultivate perfectly pruned and maintained gardens and the general disdain for weeds. Plant poems move away from this norm by not judging, assessing or appreciating the plant world based on human concepts of beauty.

Levertov's "Annuals" (*Sorrow* 39) brings out this shift in perspective beautifully. The poem begins, as most plant poems do, with a scrupulous description that captures minute details, with the use of at least one scientific word (cotyledon). The persona describes the sprouting of the seedling:

first the cotyledon
then thickly the differentiated
true leaves of the seedlings,

but the persona is rather worried that "not one shows signs of a flower, / not one." Though this may seem wistful and indicate disappointment, what troubles the persona is not if or when the plant would flower, but if, when "August passes / flowerless" and it is winter:

will I have learned to rejoice enough
in the sober wonder of
green healthy leaves?

The question that troubles her is whether she will learn to move past a superficial appreciation of the plants and celebrate their innate plantness and recognize that the "sober wonder" of the leaves is reason enough for celebration.

Levertov reiterates the same idea in "Captive Flower" (*Breathing* 21) that can be read as a critique of gardening as an aesthetic, recreational and even environment-friendly activity. It is not surprising that the opening lines "This morning's morning-glory / trying to thrust / through the wire mesh towards the sun" are reminiscent of Hopkins, whose concepts of inscape and instress can be seen as another attempt at recognizing the uniqueness and "thisness" of the non-human world. Hopkins's "Windhover" with its associations of grandeur and freedom is evoked ironically here; the flower "is trapped" within the confines of its mesh. The human persona intervenes so that s/he can "see better its unfurling," an admittedly commendable desire, yet, even this desire, when carried out without respect for the "thisness" of the flower only leads to destruction as "it resigns / the dream. / Its petals / are scarred." The poem ends with the persona's guilty realization: "I had not thought myself / a jailor."

It is interesting that the scarring of one solitary flower should evoke such a strong response in the persona's mind, for one flower or leaf, or indeed even one branch or a whole plant, is not often considered important enough to evoke feelings of guilt if destroyed by human agencies. The persona in "Captive Flower" has ignored the phototropism of the plant ("trying to thrust / through the wire mesh towards the sun") probably because phototropism is too common a plant movement, and desires instead to see a flower unfurl (a romantic movement) leading to the death of the flower.

"Drawn in Air" (*Great* 49) can be read as a poem in contrast, for it begins by stating "[t]he arc of the branch is not perfect." This branch of "an aging, tallish, unpruned peartree" is imperfect precisely because it is "unpruned." This allusion to a common (mis)conception of perfection is followed by a close, detailed description of

not just the branch but the very process of branching. This branch, though "unremarkable," has a charm that is "peculiar," that is seen "in the branch's "brief hesitation" before it straightens out, its "post-arrival flourish" and the tapering that makes it slender as it grows out of the stem. The persona chooses, responds to and celebrates this branch not because it holds a metaphorical significance or because it is a flawless automated product of a 'natural' process." The branch is celebrated for what it is, "a pleasure in simply / line as line."

This pleasure is also the pleasure of observing the circumnutation of the branch. The "aging, tallish, unpruned peartree" is actually displaying the typical movements that Darwin had identified in *Power of Movements in Plants*. The path that the arc traces is somewhat similar to the irregular, elliptical circumnutation that plants display in response to environmental stimuli. It is notable that, as in many plant poems, "Drawn in Air" too uses a number of agential verbs while describing this circumnutation – the arc "reaches conclusion" but, before that, it "falters," loses impetus, briefly hesitates into straightness and "tapers," suggesting that the circumnutation is the result of an active plant intelligence and not an automated response.

The intensity in every being is what makes even the seemingly ordinary plants, or parts of the plant, subjects worthy of poeticization. Jane Hirshfield's poem entitled "For the *Lobaria*, *Usnea*, Witches' Hair, Map Lichen, Beard Lichen, Ground Lichen, Shield Lichen" (Fisher-Wirth and Street 330) is one such that celebrates the various kinds of lichens. Lichens, as the British Lichen Society details, are not single organisms, but a "symbiotic association between a fungus and algae and/or cyanobacteria" ("What Is a Lichen?"). While fungi are heterotrophic (need an external source of carbon for survival), algae and cyanobacteria are the photobionts of the lichens (they are the symbiotic partner that can photosynthesize). Lichens are an interesting botanical species precisely because of this symbiotic relationship. They are not colourful or beautiful in the traditional sense of the term; a closer look at the poem reveals the ways in which the poet has coupled a close observation of the lichens with a scientific knowledge of the species.

The title lists seven kinds of lichens, displaying a sensitivity to the plurality of the natural world in general and of lichens in particular. In fact, the poem begins by confessing that until the poet knew the lichens, her worldly knowledge was superficial:

Back then, what did I know?
The names of subway lines, busses.
How long it took to walk 20 blocks.
Uptown and downtown.
Not north, not south, not you.

Initially, the lichens are just something that is "grey-green, incomprehensible, old" hanging from half-dead, stone-like trees. The poeticization begins as the persona starts observing and understanding the lichen better:

Marriage of fungi and algae,
chemists of air,
changers of nitrogen-unusable into nitrogen-usable.

The lichens are seen as highly underrated chemists, almost alchemical in the nitrogen fixation that they make happen. They are "Transformers unvalued, uncounted. / Cell by cell, word by word, making a world they could live in." The poem therefore emphasizes the importance of lichens and their role in the web, underappreciated, often forgotten,

too gross a subject for art, but organisms that continue fulfilling their role and actively transforming the world around them:

Like those nameless ones
 who keep painting, shaping, engraving each day
 unseen, unread, unremembered.
 Not caring if they were no good, if they were past it.

Hirshfield's poem evokes in detail the surfaces on which lichens can be usually found and the myriad shapes they take: "Rock woods, water fans, earth scale, mouse ears, dust, / ash-of-the-woods," besides giving us the scientific nature and function of the lichens. At the same time, the tone of awe and wonder at the lichens and their valuable role in the ecosystem allows the poem to critique human and especially poetic attitude to species such as the lichens.

Marvin Bell's "The Book of the Dead Man (Fungi)" (Fisher-Wirth and Street 166) affords an interesting perspective on plant poetry. Moss, mould and fungi, like lichens, are not usually associated with a sense of beauty and aesthetic pleasure. The human world's interest in them is therefore based on their utility, and those that are not useful might as well cease to exist. The first section of the poem, entitled "About the Dead Man and Fungi," begins by stating how the dead man has changed his perception of moss, mould, yeast, mildew, rust, soot and ash:

Whereas once he turned from the sour and the decomposed, now he
 breathes deeply in the underbelly of the earth.

After death, when the man becomes part of the soil, he is forced to face all that disgusted him before – "mushrooms, baker's yeast, fungi of wood decay, and the dogs / preceding their masters to the burnt acre of morels." These "little seasonals," though, "stuck on their wobbly pin stems," are "not without a hint of the sublime, nor the curl of a hand." The poem continues with close descriptions of the various shapes and sizes of mushrooms:

These are the caps and hairdos, the mini-umbrellas, the zeppelins of a
 world in which human beings are heavy-footed mammoths.

These lines are interesting because they begin with a human perception of the mushrooms – caps, hairdos, umbrellas – and are indicative of an anthropocentric understanding, inevitable and natural. But the anthropocentricity is subverted, as the line continues to describe a "world in which human beings are heavy-footed mammoths." The entire world is then viewed from the mushrooms' perspective. Such a shift is characteristic of plant poetry.

The plant world is no longer the subject of, but a character in the poem. The poem continues to describe these "recurrent" and "recumbent" "[p]uffballs and saucers." The fungi are so varied and diverse in their existence that "they fill the encyclopedia." Filled with facts, the encyclopaedia records these mushrooms with scientific accuracy, but it does not capture how they are "[l]oners and armies alike appearing overnight at the point of return" or how "[t]hey live fast, they die young, they will be back." The nature of their existence is so vastly different from that of the humans that it takes a certain worldview, as mentioned earlier, to notice them in their element, understand their way of living and poeticize their subjectivity with minimal human impositions.

It takes humility and respect, as well as an innate understanding of and belief in plant subjectivity, to allow for such a shift in focal point. Levertov observes of the poetry of the Northwestern poets, that even the poems in which "the personal pronoun is present, we are given more of what is seen (or otherwise apprehended) and less emphasis on the poet's reaction to it" (*New* 5). This statement is also true of the plant poets discussed above. Less emphasis on the self of the poet does not and cannot lead to a complete negation of the human self. Plant poems are therefore not completely objective; however, there is "conscious attentiveness to the nonhuman" and "a more or less conscious desire to immerse the self in that larger whole" (5-6). It allows for plant subjectivity to infiltrate, deconstruct and uncomfortably juxtapose itself with anthropocentrism. This awkward, inevitable co-existence of plant subjectivity and anthropocentrism that comes through in plant poetry may be termed botanification.

Botanification

Botanification is the attempt to use the perspective of plants to perceive and understand the world. It involves a conscious shift away from anthropocentrism and includes moving out of human notions of space and time towards a plant-centric perspective. Botanification in plant poetry exists in that liminal space which is not completely anthropocentric and not entirely plant-centric. It fluctuates between an acknowledgement of plant subjectivity and attempts to negate the self in the plant world. This liminality ensures that there are myriad plant-human equations, none of them completely objective to the plant world, none of them arrogantly anthropocentric. An awareness of this liminality is marked by an acceptance of differences in spatiality, temporality, movement, intelligence, communication and response, and a willingness to re-define all of them. It is also marked by a humility that comes with this acceptance – humility in the face of the non-human world is one of the features of ecopoetry that disallows any notions of human superiority, and can lead to a human-plant connection, as Levertov remarks in *A Poet in the World*, that is "indissoluble, reciprocal, and dual" because "[t]here can be no self-respect without respect for others," and "no love and reverence for others without love and reverence for oneself" (53).

The notion of time in botanification, for instance, requires an understanding of what Robert Markley in *The Routledge Companion to Literature and Science* calls "geological time" (67), having borrowed the term from James Hutton. Plant time can be compared to geological time, for plant movements occur far too slowly for the naked human eye to perceive them; to see the amaryllis blossom, says Levertov in "The Metier of Blossoming" "would take / only a bit more patience than I've got / ... / the naked eye could register every hour's / increase in height" (*Great* 11). With advances in technology and especially time-lapse cameras, it has now become possible to view this different temporality, just as Bose had attempted with instruments such as plant autograph machines. Poems such as "About the Dead Man and Fungi" botanify the world, forcing the poet and the reader out of their anthropocentrism to acknowledge the different temporal and spatial reality that plants occupy.

Another unique example of botanification can be seen in Levertov's "A Tree Telling of Orpheus" (*Relearning* 81-83). The poem captures a tree's almost orgasmic response to the singing of a human. It is only the title that alerts us to the fact that the human is Orpheus, the mythical Greek musician who went into the underworld. The tree responds to the song with a tingling in its branches:

my own outermost branches began to tingle, almost as if
fire had been lit below them, and their twig-tips

and pours it generously through the glass,

The verbs allow for the plant's presence to infiltrate the poem, despite it being the persona's musings on the tree. While she thinks of her room, filled with "curious, precious things," she remarks how the maple tree signs to her "in shadows" and though it:

is not yet in the room, in the dark
I hear it whisper, know it's coming in.

Apart from the active presence of the maple tree, the relationship between the human persona and the maple tree is also interesting. Human-plant connections in plant poems are often markedly different from nature poems in their approach and description. In this poem, though the tree seems to be growing at a pace that threatens to destroy her house, the persona delights in the very presence of the tree, its actions and responses. The tree also seems to sense and enjoy the persona's delight; the connection between them is subtle, seen in the soft touch of its leaves, or the way in which it allows light into her window.

Differences like these are a quintessential part of plant poetry, characterized by a willingness to place humans as only one small part of the web, a perception of plants as an equally important part of the web, a poeticization of this understanding without humanizing the plant world. Such poetry offers a botanification of the world; it attempts to view the world through the stomata of the plant and it celebrates the ambiguities, the ignorance and the understanding in the process of doing so, as well as the absolute joy in finally getting to know the plant world.

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