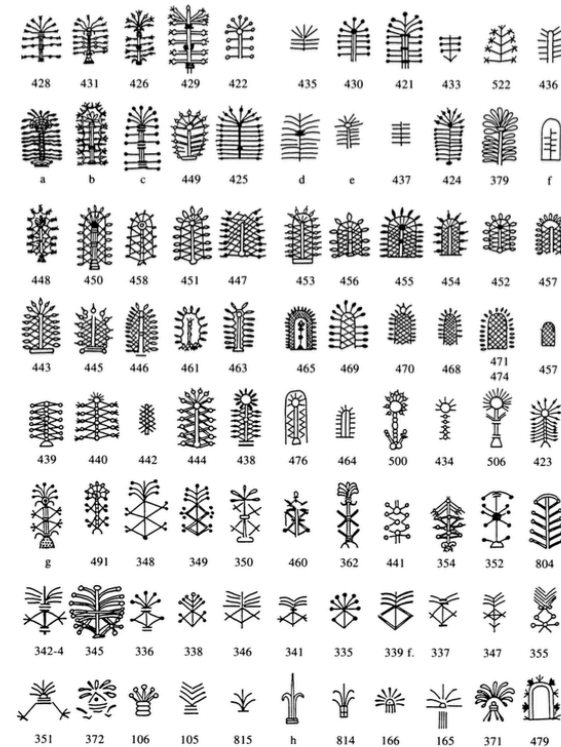


Matteo Pasquinelli

### The Arborescent Mind: The Intelligence of an Inverted Tree

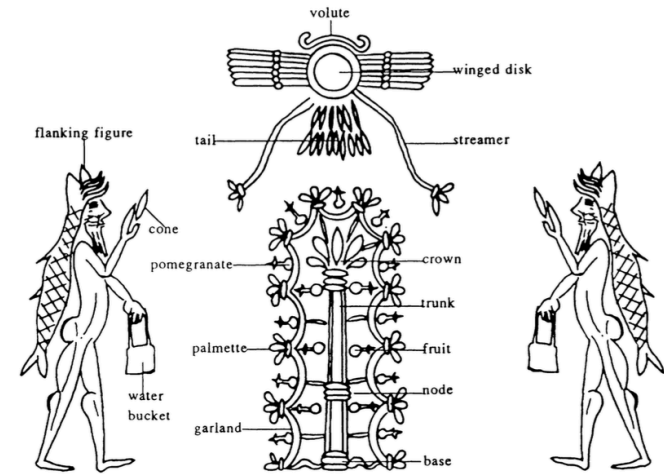
The aim of this text is not to prove a linear academic thesis, yet to record a spectrum of homologies and resonances across the history of the tree as a symbolic and logic form. The inspiration for this sort of Warburgian excursus comes from the simple recognition that a plant is found at the centre of ancient cosmologies as much as at the centre of modern epistemologies. The tree form has been adopted to support religious architectures as much as the abstract world of logic. “We’re tired of trees” remarked, though, the French philosophers Deleuze and Guattari in 1980, especially after reading Julien Pacotte’s book *Le réseau arborescent, schème primordial de la pensée* (The arborescent network, primordial diagram of thought). Already in 1936 Pacotte explored the abstract tree form in disciplines such as mathematics, biology and chemistry. He believed that the ramifying network is a “universal aspect of intimate reality” and “the very foundation of formal thought”.<sup>1</sup> In any case the enslavement of a natural form says more about political and social structures and hierarchies of human knowledge than about the mind itself. As much as other biomorphic symbols, the tree figure is but a mirror of the human and through the inversion of its branches we discern the society of its time.



Glyptic variants of the Assyrian Tree. Source: Simo Parpola, “The Assyrian Tree of Life: Tracing the Origins of Jewish Monotheism and Greek Philosophy”, *Journal of Near Eastern Studies*, vol. 52, n. 3 (July 1993), 161-208.

## 1. The Assyrian Sacred Tree

The most famous tree of the Western tradition is of course the Tree of the Knowledge of Good and Evil, sometimes described as the Tree of Life (fig 1). It appears in the book of Genesis but it was acquired into the Jewish tradition via Assyrian culture during the Babylonian captivity.<sup>2</sup> The Assyrian Sacred Tree was a basic diagram of social order: the tree was the symbol of fertile and prosperous agriculture and the king was depicted beside it protected by the spirit of a winged sun (which will later developed in the iconic Faravahar of Zoroastrianism). Aside from carrying the simple sketch of social organization (economic, political and spiritual power), this image is said to refer also to a cosmogenesis and to more complex scales of knowledge. In many bas-reliefs the Sumerian tree appears very stylized and abstract, with each branches referring to a specific god. According to a controversial yet suggestive genealogy the very Sefirotic tree of the Kabbalah would have been originated by the Sumerian tree via a further abstractification of its elements. The Sumerian gods (Anu, Sin, Ea, Mummu, Samas, Marduk, Istar, Adad, Nabu, Nergal) would have been replaced by a system of abstract faculties (Crown, Wisdom, Understanding, Kindness, Severity, Beauty, Eternity, Splendour, Foundation, Kingship).<sup>3</sup> In order to save the unicity of god (that is to avoid the military disintegration of the chosen people), monotheism had to transform the tree of the many gods in a tree of incorporeal ideas: abstraction was the fruit of a tree.



Structural elements of the Assyrian Tree Motif. Source: Simo Parpola, "The Assyrian Tree of Life: Tracing the Origins of Jewish Monotheism and Greek Philosophy", *Journal of Near Eastern Studies*, vol. 52, n. 3 (July 1993), 161-208.

## 2. *Arbor inversa*

In the ancient tree-based cosmologies there was no active space recognized to the human, being the man and the woman, like Adam and Eve, just subjects to the Tree that is to the religious and political order. A different and indeed more secular tradition of symbolism appears in Ancient Greece, in which the human conquers the tree form and politically turns it upside down. In *Timaeus* Plato defined the man as a “heavenly plant” with its branches on earth and roots in heaven. If the plant absorbs nutrients from the soil, on the opposite the human protrudes its roots in the heaven of Ideas. “Man is an inverted tree, and a tree is an inverted man,” echoed Aristotle in *On the Parts of Animals* and after him repeated many Jewish, Christian and Muslim scholars in the Middle Ages (fig. 2). Traditionally the image of the inverted tree, or *arbor inversa*, signifies that the human is projected towards the spiritual in opposition to the instinct of beasts. The growing roots of the human mind are a vivid metaphor of the ever growing knowledge of humankind. It is clear that this image represents a political re-appropriation of the tree-form and almost a statement of independence of the citizen in the age of the Athenian democracy, if compared with the oppressive symbolism of the ancient tree of power. The figure of a tree that connects heaven and earth will be subsequently and more famously represented by the cross of Christ, that is the most influential of all abstract trees. The tree of Christianity appears to repeat the reversal of the Judaic Tree of Life: once again it is no longer the tree of fertility and prosperity but the one of exile and suffering.

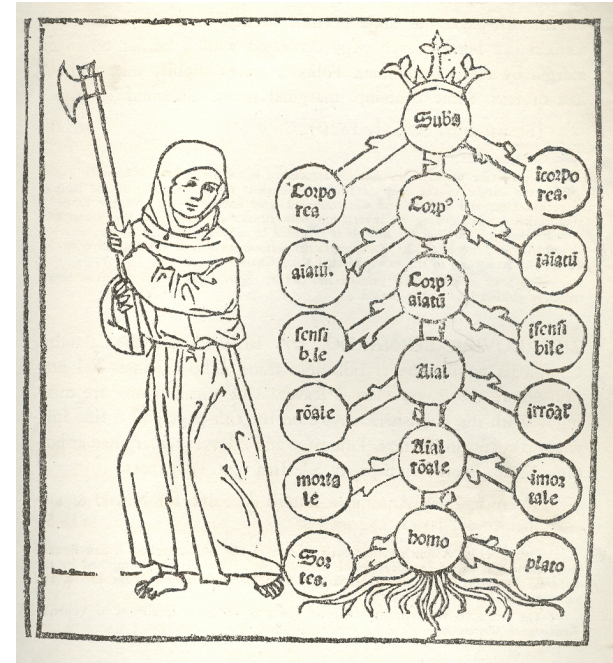


The man as inverted tree. Source: Laurentius van Goidtsenhoven and Gérard de Jode, *Mikrokosmos, Parvus mundus*. Antwerp: Gerardt de Jode, 1579.

Web: [www.uni-mannheim.de/mateo/desbillons/mikro/seite40.html](http://www.uni-mannheim.de/mateo/desbillons/mikro/seite40.html)

### 3. The Porphyrian Tree

In medieval logic the tree form returns as a scheme of Aristotle's categories, that were in their own a vision of the cosmos, dividing knowledge and the universe in genera and species that were scaling down from the highest genus ('universal substance') to the lowest species ('mortal human being', for example). The Porphyrian tree was developed by the Neoplatonic philosopher Porphyry of Tyre in the 3rd century CE under the influence of Plotinus's theory of emanationism (fig. 3). According to emanationism the world is created by the progressive and systematic emanation from the One (God) as a cascade of beings. Porphyry gave to this 'scale of being' the form of a logic tree, that will have a long term influence on many other abstract trees from Linnaeus' taxonomy (1735) to Darwin's evolutionary tree of life (1837). But the Porphyrian tree was immediately also a theory of language. Umberto Eco, among other modern scholars, has shown that this tree, qua logic, is very rigid and it does not solve linguistic and conceptual aporias: it does not distinguish a dog from a horse, for instance. According to Eco, the only way to make this tree-based semiotics consistent would be by proliferating each node with another independent tree of genuses and species.<sup>4</sup> Eco was writing already in the age of hypertexts and networks and his note is not surprising. According to him, the Porphyrian tree has to germinate and further proliferate in any direction to innervate all possible meanings of language and reach all the things of the universe, indeed like a network.



The destruction of a Porphyrian Tree. Source: *Destructio sive eradicatio totius arboris Porphirii: magni philosophi ac sacrae theologiae doctoris eximii Augustini Anthonitani ordinis fratrum Heremitarum Sancti Augustini*. Bologna: 1503.

#### 4. *Signatura rerum*

Plants and trees managed to escape their metaphorical destiny to become symbols of their own nature with the doctrine of the signatures. The doctrine of signatures, also known to ancient physicians Dioscurides and Galen, states that herbs that resemble specific parts of the human body can be useful to treat the illness of those parts. For instance, St. John's wort (*Hypericum perforatum*) was said to heal wounds and traumas, as the little transparent bubbles on its leaves that look like lesions. The mandrake (*Mandragora officinarum*, in fact a hallucinogenic plant) was said to have deadly and magical properties, as its root resembles a homunculus (fig. 4). The doctrine of the signatures was codified by the Swiss German polymath Paracelsus in *De signatura rerum naturalium* (1537) and it can be considered a precursor of the methodology of modern science, as for the first time a logical correlation is established between the hidden nature of a being and its external appearance. For Paracelsus, "nothing is without a sign (...) since nature does not release anything in which it has not marked what is to be found within that thing".<sup>5</sup> And again: "There is nothing exterior that is not an announcement of the interior".<sup>6</sup> Then "*signatura* is the science by which everything that is hidden is found, and without this art nothing of any profundity can be done".<sup>7</sup> The innovation of the doctrine of the signatures is that the morphology of the plant expresses the *Gestalt* of its very nature, while it keeps resonating with the surrounding cosmos.

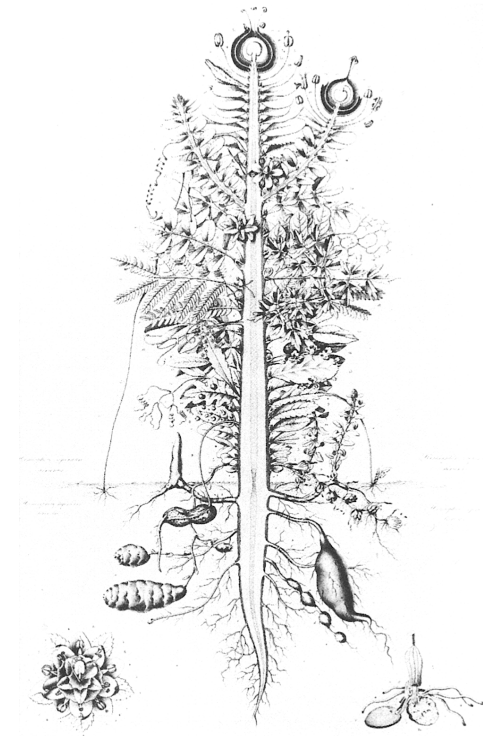


Human-like mandrake root. Source: *Tacuinum sanitatis in medicina*, Codex Vindobonensis Series nova 2644, Österreichischen Nationalbibliothek (circa 1390).

Web: [commons.wikimedia.org/wiki/File:Tacuinum\\_Sanitatis\\_Mandrake\\_Dog.jpg](https://commons.wikimedia.org/wiki/File:Tacuinum_Sanitatis_Mandrake_Dog.jpg)

## 5. The Metamorphosis of Plants

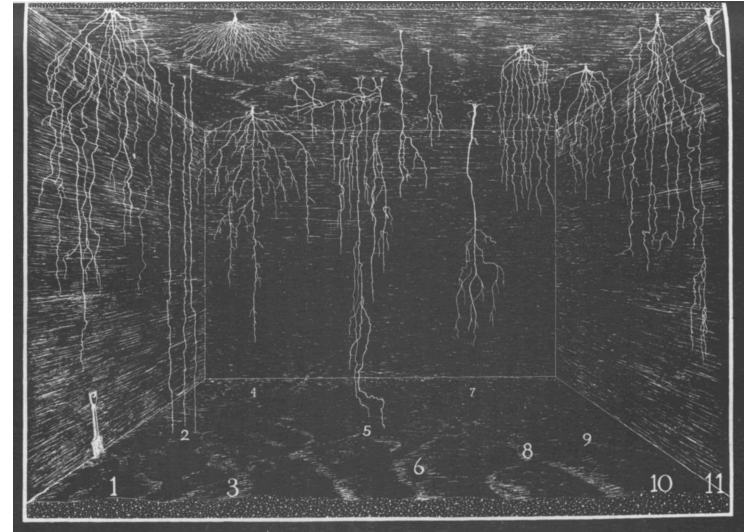
In September 1786 Johann Wolfgang von Goethe left Weimar to commence his Italian journey also with the idea to search for the *Urpflanze*, or the archetypal plant that he thought it would condense all the general forms of the vegetable kingdom (fig. 5). While in Sicily, he candidly wrote in his diary: "There must be such a plant, after all. If all plants were not moulded on one pattern, how could I recognise that they are plants?"<sup>8</sup> In 1790 Goethe published *The Metamorphosis of Plants*, the first book of natural morphology that influenced the whole *Naturphilosophie* and the first evolutionary biology, from Alexander von Humboldt to Jakob von Uexküll (not to mention the artworks of Ernst Haeckel and Karl Blossfeldt). The first lines of *The Metamorphosis of Plants* read: "Anyone who has paid even a little attention to plant growth will readily see that certain external parts of the plant undergo frequent change and take on the shape of the adjacent parts". Goethe continues: "In many plants we find that one node arises from another".<sup>9</sup> Goethe defined his procedure "genetic method", or a method for following the genesis of things. In Goethe the inner *Gestalt* of beings emerges to acquire genetic power and to grow autonomously. The lineage of German vitalism (that recognized often and tragically the purity of nature's life over human life) sprouted from the *Urpflanze*, a plant that did not exist.<sup>10</sup>



The ideal plant, or the plant-idea. Source: Illustration by Pierre Jean François Turpin (1837) for the French edition of Goethe's *Versuch die Metamorphose der Pflanzen zu erklären* (1790).

## 6. The Brain Root

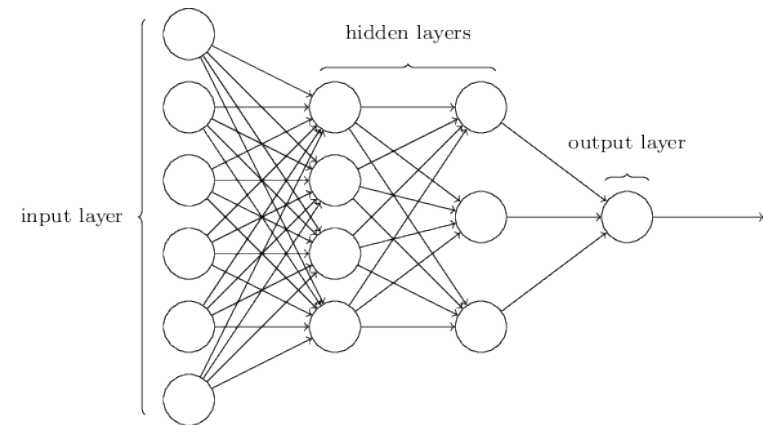
In 1837 Charles Darwin sketched an abstract tree on his notebook to illustrate the evolution of species. Darwin's evolutionary tree is a very competitive one and branches fight and kill each other. In the *Origins of the Species* (1859) he writes: "The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during each former year may represent the long succession of extinct species. At each period of growth all the growing twigs have tried to branch out on all sides, and to overtop and kill the surrounding twigs and branches, in the same manner as species and groups of species have tried to overmaster other species in the great battle for life".<sup>11</sup> It is often forgotten that Darwin's last book was about *The Power of Movements in Plants* (1880), in which he stresses the similarities between animals and plants, such as sensitivity to touch (thigmotropism), light sensitivity (phototropism) and gravity (geotropism). The book concludes with the suggestive hypothesis that the plant's root functions like the brain in animals: "The course pursued by the radicle in penetrating the ground must be determined by the tip; hence it has acquired such diverse kinds of sensitiveness. 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".<sup>12</sup>



Drawing of prairie plants roots after excavation. Source: John Weaver, *Prairie Plants and Their Environment* (Lincoln: University of Nebraska, 1968).

## 7. The Arborization of Networks

“We’re tired of trees”, wrote Giles Deleuze and Félix Guattari in the famous introduction on the rhizome to *A Thousand Plateaus* that is better to report in the original: “The Tree or Root as an image endlessly develops the law of the One that becomes two, then of the two that become four... Binary logic is the spiritual reality of the root-tree”.<sup>13</sup> “We should stop believing in trees, roots, and radicles. They’ve made us suffer too much. All of arborescent culture is founded on them, from biology to linguistics. Nothing is beautiful or loving or political aside from underground stems and aerial roots, adventitious growths and rhizomes”.<sup>14</sup> “Thought is not arborescent, and the brain is not a rooted or ramified matter... Many people have a tree growing in their heads, but the brain itself is much more a grass than a tree”.<sup>15</sup> Against the vertical tree form Deleuze and Guattari propose the horizontal rhizome form, that will become popular across the 1990s as a metaphor of the network society.<sup>16</sup> Deleuze and Guattari’s own dichotomy between tree and rhizome will be overcome by information technologies themselves and specifically by the neural networks of artificial intelligence. Neural networks elaborate horizontal layers of data into consistent patterns, that is by transforming a myriad of nodes into a Gestalt (McCulloch and Pitts invented them by observing the disposition of neurons in a frog’s eye).<sup>17</sup> Neural networks are able to turn rhizomic networks into the source of a centralizing intelligence. The rise of global datacenters (and the new computational capitalism) indicates how the good old rhizome has been reversed into a new tree of power.<sup>18</sup>



Neural network architecture. Source: [neuralnetworksanddeeplearning.com/chap1.html](http://neuralnetworksanddeeplearning.com/chap1.html)



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<sup>1</sup> Julien Pacotte, *Le réseau arborescent, schème primordial de la pensée* (Paris: Hermann, 1936). Quoted and translated in: Christy Wampole. *Rootedness: The Ramifications of a Metaphor* (University of Chicago Press, 2016), 183.

<sup>2</sup> Mariana Giovino, *The Assyrian Sacred Tree: A History of Interpretations* (Freiburg: Academic Press, 2007).

<sup>3</sup> Simo Parpola, "The Assyrian Tree of Life: Tracing the Origins of Jewish Monotheism and Greek Philosophy", *Journal of Near Eastern Studies*, vol. 52, n. 3 (July 1993), 161-208.

<sup>4</sup> Umberto Eco, *Semiotics and the Philosophy of Language* (Bloomington: Indiana University Press, 1986).

<sup>5</sup> Paracelsus, *Von den naturlichen Dingen* (1537). In: *Bücher und Schriften*, ed. Johannes Huser (1859; Hildesheim-New York: Georg Olms, 1972), vol. 3.7, 131. Translated in: Giorgio Agamben, *The Signature of All Things: On Method* (MIT Press, 2009), 33.

<sup>6</sup> Paracelsus, *Liber de podagricis*, In: *ibid.*, vol 2.4, 259. Translated in: Agamben, cit., 33.

<sup>7</sup> Paracelsus, *Von den naturlichen Dingen* (1537). In: *ibid.* vol 3.7, 133. Translated in: Agamben, cit., 33.

<sup>8</sup> J. W. Goethe, *Versuch die Metamorphose der Pflanzen zu erklären* (Gotha: Ettinger, 1790). Translation by G.L. Miller, *The Metamorphosis of Plants* (MIT Press, 2009)

<sup>9</sup> *Ibid.*

<sup>10</sup> The biologist and illustrator Ernst Haeckel will expand the idea of *genetic Gestalt* in his famous phylogenetic trees, that were supposed to show familiarity and difference among species in a more organic way compared to Charles Darwin's famous tree of life, in which the adaptation to and selection by the environment had a major role. See: Benoît Dayrat, "The roots of phylogeny: how did Haeckel build his trees?", *Systematic Biology* 52.4 (2003): 515-527. See also: Nils Petter Hellström, "Darwin and the Tree of Life: the roots of the evolutionary tree", *Archives of natural history* 39, n. 2 (2012): 234-252.

<sup>11</sup> Charles Darwin, *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life* (London: John Murray, 1859)

<sup>12</sup> Charles Darwin (assisted by Francis Darwin), *The Power of Movements in Plants* (London: John Murray, 1880). See in particular: František Baluška et al., "The root-brain hypothesis of Charles and Francis Darwin", *Plant signaling & behavior* 4.12 (2009).

<sup>13</sup> Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, vol. 2. (Minneapolis: University of Minnesota Press, 1987) 5-15.

<sup>14</sup> *Ibid.*

<sup>15</sup> *Ibid.*

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<sup>16</sup> It must be noted that Deleuze and Guattari, writing in 1980, were already referring to the network form. See: Deleuze and Guattari, cit., 519, notes 13-15. Specifically they quoted: Pierre Rosenstiehl and Jean Petitot, "Automate asocial et systèmes acentrés", *Communications* 22.1 (1974): 45-62.

<sup>17</sup> Warren McCulloch and Walter Pitts, "A logical calculus of the ideas immanent in nervous activity", *The bulletin of mathematical biophysics* 5.4 (1943): 115-133.

<sup>18</sup> Deleuze and Guattari were aware that the concept of rhizome was introducing a new rhizome/tree dichotomy and tried to resolve it: "There exist tree or root structures in rhizomes; conversely, a tree branch or root division may begin to burgeon into a rhizome. The coordinates are determined not by theoretical analyses implying universals but by a pragmatics composing multiplicities or aggregates of intensities. A new rhizome may form in the heart of a tree, the hollow of a root, the crook of a branch". Deleuze and Guattari, cit., 15.