

## Oral presentation

### Doctrine of Signatures: A Further Examination

Bradley C. Bennett<sup>a</sup>

<sup>a</sup>Department of Biological Sciences and Center for Ethnobiology and Natural Products, Florida International University, Miami, FL 33199

**Introduction.** The Doctrine of Signatures is found throughout the world. Most scholars dismiss it as a “primitive” or “prescientific” idea. Despite its long history, the doctrine has had little critical review. In its broadest sense, DOS could be stated as form recapitulates function; physical characteristics of plants reveal their therapeutic value. For example, bloodroot (*Sanguinaria canadensis*) contains the orange-red alkaloid sanguinarine (Bennett et al. 1990). According to DOS proponents, the reddish color indicates the plant’s efficacy in treating blood ailments. DOS also has a more specific meaning. Some believe that the physical clues to a plant’s use were given by the Creator. While DOS is often dismissed as primitive superstition, I offer an alternative explanation. Despite the claims of theologians, historians, philosophers and even botanists, it is primarily a literary device used to transfer information, especially in preliterate societies.

**Objectives.** In this presentation, I will examine four aspects of DOS: 1. Its historical context from the Greeks to modern writers. 2. The lack of a priori evidence for DOS as a means of discovering medicinal plants. 3. The probability of signature-bearing plants being used medicinally. 4. The role of DOS as a mnemonic.

**Methods.** I reviewed the major botanical literature from Pliny and Dioscorides, 16th and 17th herbals, through modern economic botany texts and recent publication. To test whether pharmacopoeias are biased toward signature bearing plants, I searched the International Plant Name Index (<http://www.ipni.org>) for six specific epithets that refer to heart-shaped leaves. I then randomly selected 80 binomials (ca. 3% of the total) and determined the currently accepted name and synonyms for each taxon using TROPICOS and the International Plant Name Index. I then searched the literature and internet using both accepted names and common synonyms for ethnobotanical usage and pharmacological studies. These data were compared to a second randomly-selected data set using a two-tailed Fishers Exact test.

**Results.** A careful evaluation of signatures suggests four things. 1. There is no evidence that morphological plant signatures ever led to the discovery of medicinal properties. 2. Plants with morphological signatures are no more likely to be used medicinally than are those lacking them ( $P=0.578$ ). 3. Signatures are post hoc attributions rather than a priori clues to the utility of medicinal plants. 4. Redefining signature to include organoleptic properties associated with therapeutic value is productive.

**Conclusion.** A careful evaluation of signatures suggests four things. 1. As classically defined, signatures seldom if ever, led to the discovery of medicinal plants. Considering DOS in this manner is unproductive and largely untestable. 2. Signatures are post hoc appellations rather than a priori clues. Seeing a particular signature often requires a vivid imagination. 3. A broader concept of signatures that includes organoleptic properties associated with therapeutic value is productive. Strong odors, for example, are correlated with the presence of volatile and often biological active compounds. 4. DOS should be considered for what it primarily is -- a way of disseminating information. The Doctrine of Signatures fundamentally is a mnemonic, and therefore exceedingly valuable in traditional cultures.

Keywords: medicinal, plant, selection, mnemonic, Paracelsus

#### Selected References

1. Arber, A. 1988. [first published in 1912]. Herbals: Their origin and evolution, a chapter in the history of botany 1470-1670, 3rd Edition. Cambridge University Press, New York.
2. Gould, S.J. 2000. The Jew and the Jew Stone. *Natural History* 109 (June): 26-39.
3. Shepard, G.H., Jr. 2002. Nature’s Madison Avenue: Sensory cues as mnemonic devices in the transmission of medicinal plant knowledge among the Matisgenka and Yora of Peru. Pages 326-335 in J.R. Stepp, F.S. Wyndham and R.K. Zarger, eds., *Ethnobiology and biocultural diversity*. International Society of Ethnobiology, Athens, GA.

Presenting Author: Bradley C. Bennett, [bennett@fiu.edu](mailto:bennett@fiu.edu)