Demystifying "Qi": A Reverse Engineering Approach to Understanding the Concept of Qi in Botanical Medicine.

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The usefulness of the qi concept in the context of TCM is indisputable. It is a central theme and an agreed upon term that represents the quality of an organ, a tissue, or even a "meridian" or "pathway." It represents the functional vitality in the body, and is described in TCM as moving in distinct pathways. These pathways follow *form* - distinct physical structures that conduct measurable materials and charges throughout the body. Where there is function, there is qi. It is not coincidence that according to recent morphological studies, meridians follow peripheral nerve trunks or branches, blood vessels, and lymphatic vessels, many of which are associated with connective tissue planes.

One of the biggest hurdles for the modern doctor of traditional Chinese medicine (TCM), or a practitioner of any form of traditional herbal medicine, is the lack of translatability of traditional terminology into modern, scientific medical language. The question arises, should it be translatable? How much is lost in translation? The mystery of the qi concept has been a stumbling block for the acceptance of traditional Chinese medicine and acupuncture into the modern sciences for decades. In an effort to discredit acupuncture in the name of science, the qi concept has often been likened to "fairy dust," that is, an immaterial and fantastical substance used to describe phenomena that more primitive people don't understand.

The Wikipedia definition of qi reveals the fundamental misunderstanding of the qi concept in modern scientific thought, "*Believers* [emphasis mine] of qi describe it as a vital energy, the flow of which must be balanced for health. Qi is a *pseudoscientific,* unverified concept, which has *never been directly observed,* and is unrelated to the concept of energy used in science."

All models are approximations

"All models are wrong, but some models are useful."

This famous aphorism from the 20th century statistician, George E Box, is highly applicable in the conversation about the relevance of the *qi* concept in medical terminology. Box also wrote, "the very word "model" implies simplification and idealization." In 1942, the French philosopher Paul Valery stated the aphorism, "What is simple is always wrong. What is not is unusable."

Excessive elaboration leads to unnecessary complexity and can confound the usefulness of the model. The problem with elaborating on simple models to make them more like the physical phenomena that they represent is best described by another quote from Mr Box, "since all models are wrong, the scientist cannot obtain a "correct" one by excessive elaboration."

“The only question of interest is, is the model illuminating and useful?"

Qi is a concept, it is an approximation, just as all of our scientific models are. The difference is that our modern scientific perspective is concerned primarily with *form*, while the TCM concept of qi refers to *function.* In TCM, qi is described as the force that maintains the “lift” in the body, it’s what gives living things the ability to maintain their structure and their presence. If you’ve ever watched an animal or a person die, the process of the qi being depleted continues even after the moment of death. If you sit with that recently deceased person or animal, it is possible to perceive the subtle yet tangible fading of the qi from the body. Everything goes limp at first, and biological processes are still taking place in some cells and tissues. As time draws onward, the body becomes stiff and all processes eventually cease. As with all things TCM, qi is a description of a *functional* aspect of the body, not a distinct structure or a measurable substance.

The reverse engineering approach to understanding how qi works in botanical medicine begins with studying the medicinal plants that have direct effects on the qi of the body, and correlating these effects with modern scientific observations: their molecular components, and their physiological actions. By exploring both the TCM and modern biomedical physiology associated with botanical medicines that are known to act directly on the qi of the body, we will unravel some of the mystery of the qi concept, and we will understand its application in modern medicine.

ATP: The *currency* of qi.

One of the closest approximations I have found for equating qi to a substance is ATP, although because qi is not a measurable material, I like to think of ATP as the *currency of qi*. It is the material most closely associated with the functional quality of qi in a living organism.

As there are trillions of stars burning in space, there are trillions of mitochondria burning inside the cells that make up our living bodies. Some modern versions of evolution include a description of a symbiotic relationship that was formed between an early life form, a primitive bacteria that was exceptionally efficient at generating energy, that found its place within a eukaryotic cell. The cell and the mitochondria began to share resources – the cell provided protection and a stream of molecular resources, while the mitochondria provided the energetic substrate, ATP, to create an energetic currency that the cell could use for its own growth, reproduction, and protection.

The concept of qi overlays nicely on the concept of ATP and cellular energy. The body uses the chemical structure of ATP as an energetic matrix to store energy in a form that can be transferred throughout the body. In modern biology, ATP is known to provide the energetic substrate needed to drive the physiological activities of the body. In TCM thought, qi is the *force*, or the *energy* that is contained in physical structure. ATP serves as a good example, as the energy that is held in the ATP molecule is released through biochemical transformation to drive cellular processes.

When qi is deficient there is not enough energetic substrate to run the body's physiological systems, and observable symptoms develop.

Qi is better represented as a *quality* rather than a *quantity.*

The term qi represents the functional state or *quality* of living tissue. It can't be "measured" quantitatively because it is not represented by a discrete material substance.

Gravity is a force that we recognize in our world through the observation of physical objects. We can't see or directly measure gravity, but we have determined that it exists based on its observable effects. We can also measure its effect on physical objects using gravimeters like springs and scales, but again, we can't actually measure gravity. The concept of qi has a similar story. We can observe its effects on living systems, but we can't actually see it or measure it. From the perspective of a well-trained doctor of TCM, measuring the effects of qi on the body is nearly as simple as measuring the weight of an object with a scale. A different set of tools, including an observation of the body composition, the skin, the tongue, the pulse, the voice, and many more observable elements of human physiology all relate to the qi of the body.

Abnormal movement or function of qi in the body is associated with disease. Once we are able to effectively determine the state of the qi of a patient, we can then appropriately apply specific medicines that affect the qi to enhance its function and support its proper movement and presence throughout the body. Although virtually any medicine will have some effect on the qi of the body, many of the agents employed in traditional Chinese herbal medicine (TCHM) are categorized by their specific effect on the qi. We will focus on the following categories of botanical medicines from TCHM: Qi-Regulating Herbs, Herbs that Promote Qi Circulation, and Qi Tonifying Herbs. Exemplary herbal medicines from each category will serve to elucidate the qi concept in botanical medicine.

Qi Tonifying Herbs

- Ren Shen – Panax ginseng
- Dang Shen – Codonopsis pilosula
- Gan Cao – Glycyrrhiza glabra
- Huang Qi – Astragalus membranoceus

Qi-Regulating Herbs

- Chen Pi – Citrus reticulata
- Qing Pi - Citrus reticulata Blanco
- Xiang Fu – Cyperus – Cyperus rotundus
- Mu Xiang – Auklandia lappa

Herbs that Promote Qi Circulation

- Chuan Xiong – Ligusticum chuan xiong
- Chuan Lian Zi – Melia toosendan
- Jiang Huang - Curcuma longa
- Yu Jin – Curuma aromatica

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