LOOKING THROUGH THE LENS OF SCIENCE AT THE TEN ESSENTIALS OF TAI CHI CHUAN

PART 2

Written and illustrated by **Holly Sweeney**

Yang Chengfu's Ten Essentials insured that the practice of Tai Chi Chuan would improve people's health. It is impossible to overstate the importance of these Ten Essentials in identifying the elements that make Tai Chi Chuan a healthful practice. Without the Ten Essentials, it is doubtful that Tai Chi Chuan would be recognized all over the world as a unique exercise system that offers special benefits to those who practice it.

PART I

Part II: Looking at: "Song yao", "Loosen the waist"

For this essay, we first have to define the concept of "the waist." We will use two established definitions for the term "yao."

One definition describes the structures that comprise "the waist." It states that "yao," or "waist," refers to the entire lumbar region between the hip bones and the ribs. It includes the lower back and kidney area, also, the "dantian" below and behind the navel.

The other definition describes a less tangible idea and states "the waist" can "be regarded as the space between two vertebrae, rather than a circle girding the middle of the body." [I]

Both definitions will help us in our search to understand the intricate structure and complicated action of "the waist" in our Tai Chi Chuan practice.

The phrase: *"Song yao," "Loosen the waist"* is elegant in its simplicity. "Loosen" means to UNDO something rather than DO something and that is the most important thing to notice about this principle. It is the concept of UNDOING that makes "Loosen the waist" such a profound statement.

Investigating this principle will lead us into two different but related areas of biomechanics. One area involves the physical properties of the tissues that comprise our bodies. The other area examines the overall architecture of our bodies and seeks to understand these riddles: How can we achieve stability? How can we move? How can we be stable and move at the same time?

We will begin with the first area of biomechanics, the structure and function of the tissues that create body structure. We will continue from Part I, in this series of essays (Journal #16, pg.14) which described "motor units" (a nerve cell and all the muscle fibers activated by it) and tendons (the passive elastic tissues that attach muscles to bones).

To begin to decipher, *"loosen the waist"*, we look again at muscles.

Despite great advances in scientific understanding of how various parts of our body works, muscles remain somewhat mysterious. There are still many things that we do not know about HOW they work even though we have recognized them as structures since ancient times. In fact, the name, "muscles," comes from the Greek word "mys," which means both muscle and mouse. When muscles ripple under the skin they have the appearance of mice running under a tight covering. [II]

Muscles are the most abundant type of tissue in our bodies and we know well the jobs that they fill: they protect our bones by absorbing shock, they produce movement at our joints, they provide postural support, and they can even help us stay warm when we're chilled. [III]

FIGURE 1

FIGURE 2

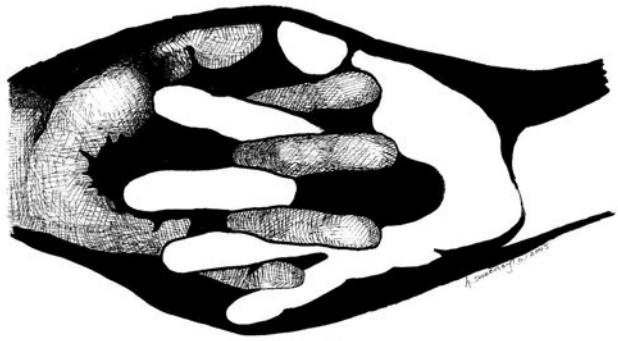

FIGURE 3

Muscles provide all these services by doing three things:

1) getting shorter
2) getting longer
3) staying the same length

Although it was not until the mid-1950's that science had a clue about how muscles actually did these three things. Two scientists, working independently, made the same discovery: muscles work because of overlapping, interdigitating filaments within each fiber. Ironically, the two scientists, although unrelated, shared the same family name, Huxley. The filaments they discovered were named Actin and Myosin. [IV]

We can imagine these overlapping, interdigitating filaments if we interdigitate one of our hands with the other. That is, interweave the fingers of one hand with fingers of the other hand and then slide the fingers into and away from one another. We will call the fingers on one hand, Actin, and the fingers on the other hand, Myosin.

When the fingers on our two hands have the most contact with one another, they represent a muscle when it is at "resting length." At resting length, the Actin and Myosin have the greatest number of attachments to one another. (Fig. 1) If we slide our hands away from each other, like a muscle growing longer, we have fewer Actin-Myosin connections. (Fig. 2) If we slide our hands toward one another, letting our fingers dovetail at the base of each finger, this mimics a muscle as it shortens. In this situation, we also have fewer Actin-Myosin attachments. (Fig. 3)

There is an old saying that states 'the biggest trick the Devil ever played was to make people think he didn't exist.' Well…the biggest trick our muscles play on us is to generate the most force when they are at resting length. In other words, our muscles are at their strongest when we think they're not doing anything at all!

Muscles produce their greatest force when they are not changing length at all. [V] This makes sense when we look at the sliding filaments within muscle fibers. At resting length, there is the greatest number of Actin-Myosin bonds. When a muscle lengthens, some of the bonds are pulled apart and the muscle loses some strength. When a muscle shortens, the filaments bunch up overtops one another and bonds are lost between Actin and Myosin. Whenever the number of bonds is decreased, the muscle loses strength.

Understanding this aspect about how our muscles work is the first step in deciphering the principle, "loosen the waist." It explains why we need to UNDO. Allowing our muscles to be at resting length increases their strength. To increase the strength of our waist, we need to let the muscles in that area relax into their resting length. With this UNDOING; not contracting, not stretching, we find "song," From loosening, we find our greatest strength.

There is much more to investigate about "loosening the waist." The second part of this essay will appear in our next issue.

RESOURCES FOR THIS ARTICLE:

I International Yang Style Tai Chi Chuan Association. *Journal #3,* August, 2000. Pg. 16.

II *Prime Mover.* Steven Vogel. Pg. 9.

III *Basic Biomechanics of the Musculoskeletal System.* Margareta Nordin, Victor Frankel. Pg. 89

IV *Prime Mover.* Steven Vogel. Pg. 46

V *Prime Mover.* Steven Vogel. Pg. 25