



## CHAPTER 7

**GOJI GOES UNDER THE MICROSCOPE**

For the scientists trying to unlock the secrets of the goji berry, it quickly became apparent that there was probably no one “best” growing region. Therefore, they decided to do what scientists do. They determined that they would pull the goji berry apart in the laboratory. They dissected it to find out what makes it tick.

The goji researchers began with some simple vitamin, mineral and nutrient analysis, expecting to find results similar to other fruits. They were totally unprepared for what they found. This tiny fruit revealed itself to be quite possibly the most nutritionally dense food on earth!

**Goji Facts:**

- ❁ Contains 19 amino acids—the building blocks of protein—including all eight that are essential for life.
- ❁ Contains 21 trace minerals, including germanium, an anti-cancer trace mineral rarely found in foods.
- ❁ Contains more protein than whole wheat (13 percent).
- ❁ Contains a complete spectrum of antioxidant *carotenoids*, including *beta-carotene* (a better source than even carrots!) and *zeaxanthin* (protects the eyes). Goji berries are the richest source of carotenoids of all known foods.
- ❁ Contains Vitamin C at higher levels than even those found in oranges.
- ❁ Contains B-complex vitamins, necessary for converting food into energy.
- ❁ Contains Vitamin E (very rarely found in fruits, only in grains and seeds).

- ❁ Contains Beta-Sitosterol, an anti-inflammatory agent. Beta-Sitosterol also lowers cholesterol and has been used to treat sexual impotence and prostate enlargement.
- ❁ Contains essential fatty acids, which are required for the body's production of hormones and for the smooth functioning of the brain and nervous system.
- ❁ Contains Cyperone, a sesquiterpene that benefits the heart and blood pressure, alleviates menstrual discomfort, and has been used in the treatment of cervical cancer.
- ❁ Contains Solavetivone, a powerful anti-fungal and anti-bacterial compound.
- ❁ Contains Physalin, a natural compound that is active against all major types of leukemia. It has been shown to increase splenic natural killer cell activity in normal and tumor-bearing mice, with broad-spectrum anti-cancer effect. It has also been used as a treatment for hepatitis B.
- ❁ Contains Betaine, which is used by the liver to produce choline, a compound that calms nervousness, enhances memory, promotes muscle growth, and protects against fatty liver disease. Betaine also provides methyl groups in the body's energy reactions and can help reduce levels of homocysteine, a prime risk factor in heart disease. It also protects DNA.

### Goji Plays "Hard to Get"

Even with its extensive and diverse nutrient profile revealed, the goji still seemed to be holding on to some secrets. There appeared to be many therapeutic effects that simply could not be explained.

This was not a big surprise. With medicinal herbs, activity is hardly ever due to just one single chemical constituent, as is often the case with "conventional" drugs. Rather, it is usually a mixture of constituents that are responsible for the therapeutic or protective effect of botanical medicines. Many of these herbal components are unique to a single plant species. They are not found anywhere else in nature, and have not yet been chemically identified. There are countless thousands of these herbal

constituents called *phytochemicals* (from the Greek word for “plant”).

Very few official methods are available for analyzing phytochemicals. Researchers were forced to develop qualitative and semi-quantitative chromatographic methods of separation and analysis in the painstaking attempt to unravel the complex chemical nature of botanicals.

So it was with the goji berry. The goal of scientists was to try to determine all of its biologically active principles, so that they could ascertain which of the many varieties of *Lycium goji* berries might be the most beneficial to humans.

The researchers knew that it might take many years to isolate and quantify every chemical constituent. However, they had an ingenious idea for a shortcut that would allow them to positively identify and catalog each type of berry, separating even those that appeared to be identical. Their solution was called *spectroscopic analysis*, a fingerprinting technique borrowed from the science of astrophysics.

**“Astrophysics? You Expect Me to Understand Astrophysics?”**

Why not? After all, you must be a pretty smart person or you wouldn’t be reading this book. And honestly, wouldn’t you feel just a little bit cheated and insulted if we didn’t explain the spectroscopic fingerprinting technique to you?

Good, then we’re in agreement. Let’s move on.