

# the Alembic



## Chair's Corner

Winter is coming sooner than I want. These cold November mornings mean that I should clean out my garage so that I do not need to scrape the windows free of frost! I should get to it soon, before the first real accumulation of snow. I am hoping that there will be good weather for our November meeting. The November meeting should be interesting, as we will be touring Ortho Molecular Products, a company specializing in therapeutic nutritional supplements. It will also be the last meeting of the year, and the last meeting when I will be Chair of our section. Steve Nieland will be taking over for a second term in January. I have enjoyed being Chair.

I was just reading about a study that looked at measuring the amount of barbituates in the environment. Barbituates were used as tranquilizers until about thirty years ago when other tranquilizers replaced their use. However, barbituates do not

biodegrade very easily and the authors were interested in finding the amount of barbituates present in a few sites. They concluded that there were significant amounts of barbituates in a river near a landfill and they suspect the source to be from the landfill. They recommend that groundwater be monitored near landfills containing medical waste. I have always wondered how landfills are built to limit leakage of material or degradation products of materials. I would hope that as technology and new products are developed that our landfills will leak less contamination into the environment.

I hope to see you at the November meeting!

*Laura*

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# "Ortho Molecular Products Inc. - Plant Tour and Discussion"

by

**Thomas Guilliams**

Director of Science and Regulatory Affairs for Ortho Molecular Products

Thursday, November 9, 2006  
Portage County Industrial Park  
3017 Business Park Drive, Stevens Point

Ortho Molecular Products is a premier manufacturer and distributor of therapeutic nutritional supplements sold through health care professionals. The plant tour will allow the attendees to see the process of receiving raw material (typically powders) through the stages of weigh-out, blending, encapsulation, bottling, labeling and distribution. Although not all stages will be in operation at the time of the tour, an explanation of each will be provided; as well as a brief discussion of the quality assurance procedures involved with many of the steps. Our discussion will be lead by Tom Guilliams, Ph.D., where he will be discussing the role of dietary supplements as preventative and therapeutic agents as they are being used in many clinical practices throughout the United States. A brief discussion of how drugs, foods and supplements differ will follow as time permits.

**\*\*\*About the Speaker\*\*\***

Tom Guilliams earned his B.S. from the University of Wisconsin - Stevens Point (Biology Major/ Chemistry Minor) and his doctorate in biochemistry and molecular immunology from the Medical College of Wisconsin. He has been the Director of Science and Regulatory Affairs for Ortho Molecular Products since 1996, and is a Clinical Instructor-School of Pharmacy at the University of Wisconsin-Madison. A frequent guest-speaker, Dr. Guilliams provides training to a variety of health care disciplines in the use of natural medicines.

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Prior to the meeting, dinner will be served at Ortho-Molecular. We will be eating at 5:30, with Rockman's Catering setting up the dinner. The dinner is \$10.00 per person and will include: Roast Pork with sautéed peppers and mushrooms, twice baked potatoes, buttered broccoli spears, tossed salad with rolls, soda, water, coffee and pumpkin walnut cheesecake. Contact Marv Lang at **(715) 346-3609, (or Cristina at 346-2888) or email: cmlang@uwsp.edu** by Monday November 6th for reservations.

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Business Park Drive is located off of County Road HH, about ¼ mile east of the exit from I-39, and heading north from there.

Up-to-date information about section activities including the Alembic and meeting notices.

Also visit [www.chemistry.org](http://www.chemistry.org) for latest chem news.

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### Making Sense of Supplements

by Rebecca Ephraim, R.D.

from Conscious Choice Magazine  
[www.consciouschoice.com](http://www.consciouschoice.com) August 1999

#### *Faith Feeds the Food Supplement Industry*

I worked for a couple of months this winter in the supplement section of a Wild Oats natural food store. Since it's presently estimated that about 50 percent of Americans use dietary supplements at least some of the time, I consider this retail experience vital to my role as a nutritionist and reporter (as well as a dietary supplement user). The majority of requests I encountered were for particular forms of vitamins, minerals, and other supplements regardless of brand names. Many came in to compare prices and others "just wanted something" to treat this or that. Although there were always the few confident customers who knew exactly what they wanted, most puzzled over the thousands of supplement bottles and scores of brands as if the secret of the world was before them...but written in hieroglyphics.

And who could blame them? This is a subject that very few people know much about. In fact, when you think about it, everything about supplements is based on trust. You trust the information source that told you about the supplement — whether it was a news story, a physician, or Aunt Minnie. You trust the place from where you bought the supplement. You trust the supplement company and you trust the many manufacturers of the ingredients that went in to making the supplement. That's a lot of trust, especially when it pertains to your health.

As one supplement maker put it, shopping for supplements today "comes down to customer beware." That's a scary prospect. But without knowing the intimate workings of the manufacturing processes and production techniques of the supplement world even a degree in biochemistry probably wouldn't help. So here's my best attempt at a primer in how to buy a supplement. Let's begin with a look at consumers' first concern: where to buy.

#### *Faster Than the Eye Can See*

Supplement distributors are hatching at record speed. Currently, about fifteen different distribution channels are selling supplements. The Hartman Group, a natural products research agency out of Bellevue, Washington, says its statistics on this subject are proprietary and can't disclose figures but does give us a hint as to the leading industry players. Currently, a majority of the supplement purchases are done through what's called the "mass market" which includes drug stores, grocery stores, discount stores (e.g. K-Mart and Target), club stores (e.g. Sam's and Costco) and convenience stores. Health food/vitamin stores and direct mail are the next two biggest players. A diverse

variety of smaller — but rapidly growing — sources also populate the landscape. These include the Internet, multi-level marketing, infomercials, military bases, insurance companies/HMOs and healthcare practitioners who carry and sell supplement lines out of their offices.

#### *Uneven Playing Field*

Growth in the supplements industry is so red hot that the mainstays are issuing warnings. "Many of these players do not know anything about dietary supplements or botanicals," says Nature's Way chairman, Ken Murdock, "It's just a business opportunity for them." Murdock believes an increasing number of companies are pumping out poor quality supplement products.

Enzymatic Therapy's vice-president of scientific affairs, Matt Schueller, calls it a "wild, wild west situation." For instance, he says, "A consumer may go out and see two bottles next to each other and they both say ginkgo extract with 40 milligrams per capsule. One may be on the shelf for \$20 and the other for \$7." What often happens he says is that the cheap product "is not concentrated, the levels of the compounds may vary from what's been used in clinical research. It may have higher levels of impurities. These are things that may not always make it onto the label."

#### *Expert Testimony*

The deluge of companies rushing in to vie for your supplement dollars is only the most visible part of the equation. True to supply and demand, the suppliers from whom the supplement companies are getting their raw ingredients are proliferating too. Many of these, according to biochemist **Tom Guilliams**, Ph.D. in molecular immunology, who directs R & D at **Ortho Molecular Products**, are springing up in China and producing "active" ingredients (vitamins, minerals, etc.) of very low quality. "Some companies will use forms of minerals or vitamins that are less absorbable, very inexpensive, and not as good as others." Much of it, he says, is used in animal feed but also channeled into supplements for human use.

**Guilliams** audits the international scene of supplement materials for Ortho Molecular, a high-end supplement company that sells exclusively to health care practitioners for resale to their patients. From his lab in Stevens Point, Wisconsin, he scouts the world for quality raw materials to create the supplements that are in the company's product line. Ortho imports about three hundred different raw ingredients, typical for a company with their size product line.

I asked **Guilliams**, "Will a cheap and badly made supplement carry any benefit at all?" "In many cases it will," he replied. But he indicated that it's a crap shoot. "It'd be like saying, if I go to a used car dealer can I get a good car? The answer would be 'yes,' sometimes. In the case of vitamins and minerals...some companies will use a lot of binders and a lot of fillers. [In addition] some forms of minerals and vitamins are less absorbable and not as good as others. Usually, but not always, you get what you pay for."

So imagine a supplement company that buys the low grade vitamins, minerals, etc. and combines them with cheap and/or excessive amounts of binders and fillers plus unhealthy colorings, flavors, or preservatives. If corners are cut and inferior

active and inactive ingredients are used, chances are your body won't get the presumed benefit of the supplement. In fact, various additives contain toxins that would be hard on the liver or cause allergic reactions.

#### *Will it be Capsules, Tablets or Liquid?*

If taking dietary supplements is a regular part of your life, no doubt you've noticed the innumerable shapes and sizes available. Basically, however, you have three choices from which to choose: tablets, gelatin capsules, or liquid.

To make a tablet, the active ingredients need to be mixed with inactive ingredients that are required to build the actual body of the tablet. These ingredients, called excipients, include fillers, binders, disintegrants (enables the tablet to break apart in the digestive system), coatings, and other agents. Because of all the inactive bulk, **Guilliams** points out that it's difficult to pack as much active ingredient into a tablet as you can into a capsule.

For this reason, he's a fan of capsules. "You can manufacture a capsule without adding anything to it. That is to say if I wanted to put a powder in a capsule, I basically have 100 percent of that powder... [with] a miniscule amount of lubricant... that allows the capsules to open and close without getting stuck".

Despite his preference for capsules, **Guilliams** says tablets do have an advantage. "Tablets, in general, are more protected from the elements once they're finished," he says, "Oxygen, moisture, and those types of things aren't going to destroy them as quickly as a gelatin capsule which would allow oxygen and moisture to get through the product." (Of course, storage, which we'll talk about later, is an important consideration).

Moreover, tablets are as easily absorbed as capsules, providing that the protective coating put on tablets is not thicker than intended, resulting in an undissolvable tablet.

Gelatin capsules, on the other hand, are animal-based products mostly derived from the hooves of cows and pigs. Vegetarians who don't eat meat for ethical reasons need to look for supplements made with vegetable-based capsules, which **Guilliams** acknowledges are much more expensive.

A hybrid form of the capsule is the soft-gel. This, according to **Guilliams**, is the best dosage form for oil-based active ingredients such as vitamin E, CoQ10, saw palmetto, and the various essential oils such as flax, evening primrose, and pumpkin seed. Because these supplements are highly susceptible to spoilage, the soft gels fuse an airtight seal and protect the properties from oxygen and light. Although powdered forms of some are available, **Guilliams** says higher percentages of active ingredients generally are in the oil state.

Liquid and chewable supplements, usually vitamins and minerals, can work well for children and adults who have difficulty swallowing tablets or capsules. But read the labels to avoid products that have added excessive sugar, dyes, or artificial sweeteners to make them palatable.

#### *Natural? Who Knows?*

This term "natural" as in "natural vitamins" appears to have the supplements industry in a tizzy. The nagging question is how many chemical procedures can a natural substance be put through before it's not a natural substance anymore? The organization that represents the dietary supplements industry,

Council for Responsible Nutrition (CRN) says even the government is confused. "There isn't likely to be a regulatory definition," according to CRN's director of scientific and regulatory affairs, Annette Dickinson, "because the FDA can't define what 'natural' is."

Supplement company representatives seem to believe that the important distinction lies in how the body reacts to chemically modified substances. If the body can physiologically recognize it as useful then it really doesn't matter how often the vitamin, mineral, or whatever has been crystallized, heated up, or put through a myriad other lab procedures.

Industry assurances aside, it might be wise to search for supplements that have the fewest additives, including artificial colors, flavors and preservatives. It makes some sense to conclude that "cleaner," less-processed formulas would be more natural.

#### *Tailored Supplements*

Many, or even most of us who use dietary supplements take a shotgun approach to deciding what we need. Boston-based Ideal Health is attempting to take the guesswork out of planning a supplement regimen by offering, directly to the consumer, custom dietary supplementation based on urine test analyses.

Research suggests that urine tests can identify the level of nutrients needed to: remove toxins from the body, protect against free radical damage, and balance the inflammatory/immune response.

In the past, supplement customization based on so-called metabolic testing has primarily been limited to patients of alternative healthcare practitioners — usually for testing fees of \$200-\$500. Ideal Health works with two labs that have streamlined the process. The urine test analyses cost \$80 and then, based on those results and personal history, a customized supplement package is offered for \$45 per month sent to you through the mail.

One RD I know who's also a genetics scientist, cautious and conservative in her ways, has just started using this product in her practice and raves about the accuracy of the tests and the quality of the supplements. Each day's allotment is an individual package of six capsules containing up to fifty-five ingredients.

But be aware that Ideal's supplement program applies to vitamins, minerals, and a limited number of herbs and other compounds. Any additional supplementation you'd take — say, CoQ10 for heart health or saw palmetto for prostate health — would have to come from another source and be added to your regimen of pills.

#### *Smart Storage*

Supplements do have a limited shelf life. With the range of supplements available there's no uniform time of how long they'll be good. That's why it's best to buy brands that carry expiration dates. To maximize their freshness, supplements should be stored away from heat and light — like a room-temperature closet or a spice rack — unless refrigeration is required (e.g. essential oils, probiotics). Refrigerating everything is unnecessary, in fact, the moisture is not good for some supplements.

On the day-to-day level, I've heard many complaints about how time-consuming it is to take dietary supplements, particularly if you take several. According to a study published last year in the industry trade journal, *Natural Foods*

Merchandise, 31 percent of users take seven or more supplements regularly. That's a lot of bottles to open and close every day.

To avoid all that work, I suggest using a plastic container with compartments. Make sure it's opaque and can be sealed tightly. Add little labels to the various compartments and fill them with your supplements. Then all you have to do is snap it open to have your full complement of supplements easily accessible.

*What Next?*

Regulation, which used to be a dirty word in the supplement industry, is now being welcomed by supplement company execs. Some support self-regulation; others want the U.S. Food and Drug Administration to step in.

Introduced last March, the Supplement Facts box is a required part of a supplement label. Not all companies are in compliance yet.		
Serving Size 1 capsule		
I Capsule Contains	% Daily Value	
Vitamin C (as Ascorbic Acid)	400mg	665%
Acerola Extract (18%)	100mg	*
Grape Skins	100mg	*
Hesperidin Complex	50mg	*
Hibiscus	50mg	*
Rutin	50mg	*
Quercetin	50mg	*
* % Daily Value not established Other ingredients: Natural preservative-free gelatin capsules, magnesium stearate		

*Picks List*

The FDA has drafted a set of Good Manufacturing Practices (GMP) inspection guidelines for the industry, but it may be quite some time before a final version is issued. Speculation is that some form of these new regs could be out sometime next year. Enzymatic's Matt Schueller says the regulations would go a long way toward cleaning up the industry. "GMPs would drive the lowest common denominators out of business," he predicts.

In the meantime, it's obvious that consumers shouldn't grab blindly for just any supplement. Supplement reps will readily tell you to avoid a supplement with a price that's too good to be true, and, of course, they emphasize loyalty to brands you can trust.

Nutritionists and industry representatives alike suggest that consumers use the supplement facts box on every supplement bottle — and follow it up with visits to reference sources. One that I use and find quite complete is A Consumer's Dictionary of Food Additives by Ruth Winter. Another is The Food Additives Book by Nicholas Freyberg and Willis A. Gortner.

Consultants in the supplement departments of health food stores, among them Certified Clinical Nutritionists (CCN), are often well-informed sources, though sometimes a good

portion of their education comes from the supplement companies themselves.

Pharmacists are said to be an increasingly good resource for information on supplementation, and physicians are improving greatly in their understanding of nutrition and supplements.

As for me, I find an increasing number of registered dietitians like myself who are well-versed in dietary supplementation; many even offer them in their private practices.

If you really want to get to the source, be aware that supplement reps say they welcome calls from consumers with questions. A few companies publish toll-free numbers, but in most cases, a call to the company is on your own dime.

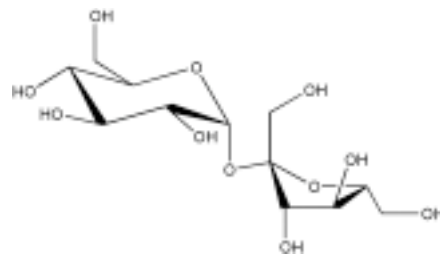
If all this effort sounds like a lot of work, remember that in most cases, you look up information once, but use it over and over again. In any case, the time and money spent in attaining or maintaining good health often amounts to less than you spend on medical treatments for catastrophic conditions. Given the chaos that surrounds the dietary supplement industry, it's a good thing that nutritionists, sales clerks, and educated reps abound. People and paperwork are there to help. Good luck, and good health!

Rebecca Ephraim is a Registered Dietitian and nutrition reporter in Chicago.

*Resources*

- Carlson Labs, Arlington Heights, IL, 847-255-1600
- Enzymatic Therapy, Green Bay, WI, 800-783-2286
- Ideal Health, Lynnfield, MA, 781-716-2700
- Nature's Way Products Inc., Springville, Utah, 801-489-1520
- Nature's Life, Garden Grove, CA, 714-379-6500
- Ortho Molecular Products, Stevens Point, WI, 715-342-9881

**Molecule of the Month**



“Sugar” refers to a family of related chemical compounds that includes **sucrose**, the ordinary refined sugar found in Halloween candy. Sucrose is a disaccharide, or two-part molecule, formed by linking the monosaccharide sugars glucose and fructose. Honey—mostly a mixture of sucrose, glucose, and fructose—is formed when honeybees digest plant nectars using enzymes called invertases to break apart the sucrose molecules.