

Over-the-Counter
Nutritional
Supplements:
U.S. Market
Trends and Key
Players

Eric Minkwitz
Decision Resources, Inc.

Published by
Decision Resources, Inc.

July 1999

Contents

1. Business Implications	1
2. Introduction: Nutritional Supplements Grow in Popularity	2
3. What Are Nutritional Supplements?.	4
The National Institutes of Health Definition	4
Dietary Supplement Health and Education Act Definition.	5
4. Nutritional Supplement Sales	5
5. Market Characteristics.	8
Factors Driving the Nutritional Supplement Boom.	8
Favorable Demographics	14
Positive Publicity About Supplements and Increased Consumer Interest	14
The Growing Influence of HMOs	15
Increased Funding for Vigorous Scientific Research	16
Advantageous Regulatory Environment	17
Wider Distribution of Products.	18
A Trend Toward Healthier Habits	19
Supplement Categories and Target Markets	19
General Population	23
Men	23
Women.	24
People Older than Age 50	24
Athletes and Fitness Enthusiasts	24
Indication-Specific Groups	25
Near-Term Product Development Trends	25
Supply-and-Demand and Crossover Phenomena	26
Growth Prospects by Supplement Type	27
Corporate Strategies.	30
6. Pharmaceutical and Chemical Company Involvement	31
7. Regulatory Environment	35
8. Industry Structure	37
Manufacturers of Fine Ingredients/Raw Materials	37
Strategies for Success	38

Challenges	39
Leading Companies	40
Ashland Chemical	40
Bio-Botanica	42
Botanicals International	44
Hauser	45
M.W. International	46
Pfanstiehl Laboratories	48
Quality Botanical Ingredients	49
Supplement Product Formulators and Marketers	50
Strategies for Success	50
Challenges	52
Leading Companies	53
American Home Products	53
General Nutrition Companies	56
Leiner Health Products	57
Natrol	59
Natural Alternatives International	60
NBTY.	61
Pharmavite.	64
Rexall Sundown	65
TwinLab	67
Weider Nutrition International.	69
Retailers and Wholesalers	71

Keywords: Alternative therapies, Chemical industry, Ginkgo, Herbal medicines, Herbal remedies, Kava kava, Nutraceuticals, Nutritional supplements, Over-the-counter dietary supplements, Pharmaceutical industry, Phytotherapy, R&D, Regulations, St. John’s wort, Strategic planning

Companies: American Home Products, Ashland Chemical, Bio-Botanica, Botanicals International, General Nutrition Companies, Hauser, Leiner Health Products, M.W. International, Natrol, Natural Alternatives International, NBTY, Pfanstiehl Laboratories, Pharmavite, Quality Botanical Ingredients, Rexall Sundown, TwinLab, Weider Nutrition International

Tables

Table 1.	Phytotherapy or Herbalism Products (per NIH definition)	6
Table 2.	Orthomolecular Medicine Products (per NIH definition)	7
Table 3.	Top 50 Nutritional Supplements in the U.S. Market, Their Purported Health Benefits, and Their 1998 Sales	9
Table 4.	Target Groups/Conditions for Selected Supplements.	20
Table 5.	Promising New Supplements for the U.S. Market	28
Table 6.	Selected Acquisitions, Partnerships, and New Business Units Among Pharmaceutical and Supplement Companies	33
Table 7.	Leading U.S. Suppliers of Botanical Raw Materials	41
Table 8.	Leading U.S. Supplement Manufacturers and Marketers	54
Table 9.	U.S. Channels of Supplement Distribution.	72

1. Business Implications

- In 1998, sales of over-the-counter nutritional supplements reached approximately \$13.66 billion in the United States. We expect the annual growth rate for this industry to continue at 11-13% from 1998 to 2001, and then slow to a more moderate rate of 7-11% for 2001-2003.
- Because of new scientific evidence that supports their efficacy, and because of positive media attention, nutritional supplements are moving from the status of alternative medicine to that of legitimate health remedies. Other factors—such as the aging of the U.S. population, increased consumer awareness, favorable changes among HMOs and regulatory agencies, and wider distribution and penetration of products—will continue to create market opportunities for both raw material suppliers and supplement formulators.
- St. John's wort, ginkgo biloba, and kava kava—supplements currently popular in the United States—are crossover products that have a longer track record in the mature markets of Europe. The next blockbuster products for the U.S. market may also be crossovers from Europe, but new supplements that carry certification of quality and serve multiple applications could be popular as well.
- Raw material manufacturers must master dramatic fluctuations in their incoming supply of herbs in order to have a consistent reserve of fresh, potent, high-quality botanicals and herbs. Raw material manufacturers that employ techniques such as counter cropping, product specialization, innovative quality analysis, product branding, and advanced milling and extraction methods are likely to have a secure and prosperous business through the early 2000s.
- The recent entrance of large, highly capitalized pharmaceutical companies such as American Home Products, Bayer, and Warner-Lambert into the supplement arena may mark the start of a larger trend. Traditional drug companies will begin to leverage their research, development, and marketing power and brand recognition to broaden their product portfolios with a variety of nutritional supplement formulations.

- As more supplement formulators and distributors enter the marketplace, companies must continually modify the way they do business in order to stay competitive. Strategies such as releasing innovative products on a timely basis, launching multiple-ingredient formulas, providing scientific evidence to support a product's claims of efficacy and safety, and tactfully embracing the prospect of being acquired by a pharmaceutical or chemical company conglomerate could prove to be successful business practices.

***2. Introduction:
Nutritional
Supplements
Grow in
Popularity***

Over-the-counter (OTC) nutritional supplements, also called OTC dietary supplements, are becoming so popular in the United States that most analysts expect the industry to grow at an annual rate of 11-13% between 1998 and 2001, followed by a more moderate growth rate of 7-11% for 2001-2003. Prior to 1998, the annual growth had been approximately 8%. We estimate that the U.S. market for nutritional supplements was \$13.66 billion in 1998. The U.S. supplements market is not as mature as the European market, in which nutritional supplements have been well established for more than 80 years in countries such as Germany and France. Analysts expect that the European market, believed to be somewhat larger than the U.S. market, will grow at a slower pace—8-10% per year between 1998 and 2003. Nevertheless, the worldwide nutritional supplement industry is enjoying remarkable growth, and, as consumers continue to take self-directed measures to improve their health and prevent disease, raw material suppliers, supplement manufacturers and formulators, food processors, retailers, and pharmaceutical industry giants will be jockeying to take advantage of the industry's momentum.

Between 1997 and 1998, the number of U.S. consumers buying nutritional supplements reportedly increased by 18 million. In addition to growing in number, the customer base is becoming more experienced and more educated. Consumers are looking for a greater variety of multinutrient products, they are demanding products that have clinical data to support claimed health benefits, and they are showing a preference for products that are manufactured by reputable, well-known companies.

The U.S. nutritional supplement industry is still young and highly fragmented, but with a growing customer base, a number of untapped consumer groups, and increasing competition among raw

materials suppliers, formulators, and retailers, the future looks promising and dynamic for consumer and supplier alike. Competition is surging as more participants enter the market, but the supplement companies that employ a strategy that combines scientific research, highly specialized processing techniques, and timely, innovative products are certain to rise to the top of the rapidly evolving competitive environment.

According to *Natural Foods Merchandiser*, multivitamins were the most popular nutritional supplement category in the United States in 1998. Nevertheless, interest in herbal remedies is steadily growing. In 1997, 10% of the U.S. population used garlic, ginseng, or ginkgo biloba—by far the three most popular herbal preparations in both 1997 and 1998. Demand for other herbals (e.g., St. John's wort) increased by 100-140% between 1997 and 1998, according to *Chemical Market Reporter*. Well-educated and affluent members of the expanding group aged 50 and older are seeking the latest natural remedies to combat age-related conditions and to promote mental clarity and physical performance. As knowledge of herbal and other OTC health remedies builds, so will demand for products that are effective, safe, high in quality, and competitively priced.

Longer-term prospects for the nutritional supplement industry are less certain. Because supplements are distributed through seven different channels (pharmacy/drugstores, high-volume retail grocery/supermarkets, network marketing and mail order, health food supermarkets, vitamin/supplement stores, gyms and health clubs, and health food stores), visibility of supplements in the marketplace is approaching a point of saturation. Pricing pressures and brand consolidation may also slow market growth. As the market matures, supplement manufacturers and suppliers will need to focus not only on strategies to convince skeptical consumers that supplements are effective but also on ways to increase consumption levels among existing customers.

This report examines some of the more popular nutritional supplements and the market forces that are driving the supplement industry in the United States. We discuss the structure of the industry, forecast consumer and industry trends, analyze the challenges posed by an evolving competitive landscape, and investigate the successful business practices of leading raw materials manufacturers and supplement formulators and marketers.

3. What Are Nutritional Supplements?

Nutritional supplements, along with functional foods and medical foods, make up a category of consumables called nutraceuticals.¹ According to the U.S. Dietary Supplement Health and Education Act (DSHEA) of 1994, nutraceuticals are nutritionally or medically enhanced “foods or parts of food that provide health benefits, including the prevention and treatment of disease.” We estimate that the overall U.S. nutraceutical market (including functional foods, medical foods, nutritionally fortified foods, and all nutritional supplements and nutritional food additives) reached approximately \$250 billion in 1998 and will grow at an annual rate of 15-20% between 1998 and 2003. This growth rate will closely match that of the dietary supplement segment. The nutritional supplements examined in this report, as well as other supplements and nutritional products, are consumed separately as extracts or tablets or are added to functional foods.²

Estimates of the size of the nutritional supplement market and the expected growth rate for this industry vary according to how nutritional supplements are defined. To clarify what is included in our definition of nutritional supplements, we have adopted terminology from the National Institutes of Health (NIH) and DSHEA.

The National Institutes of Health Definition

The NIH Office of Alternative Medicine classifies a variety of complementary, alternative, and unconventional medical practices and therapies. Among the categories described by the NIH are biologically based therapies, a grouping that includes four subcategories:

- *Phytotherapy or herbalism.* This category includes plant-derived preparations that are used for therapeutic and preventive purposes. The compounds contained in these products are considered to have medicinal properties.
- *Special diet therapies.* This segment includes alternative dietary approaches and distinct dietary modifications, such as vegetarian and Mediterranean diets, that are applied as alternative therapies for treating risk factors or chronic disease.

1. For analysis of the overall nutraceuticals market, see “Roadmaps to Market: Commercializing Functional Foods and Nutraceuticals.” *DR Reports*, Decision Resources, Inc., August 1998.

2. For detailed analysis of the nutraceutical additives market, see “Nutraceuticals.” *Spectrum Special Reports*, December 1998.

- *Orthomolecular medicine.* This designation refers to non-plant-derived products that are used as nutritional and food supplements for preventive or therapeutic purposes. These therapies are often used in combinations and at high doses.
- *Pharmacological, biological, and instrumental interventions.* This category includes products and procedures (e.g., cell therapy, cartilage, enzyme therapy) that are applied in an unconventional manner.

***Dietary
Supplement
Health and
Education Act
Definition***

The 1994 DSHEA defines nutritional supplements as follows:

[A] product . . . intended to supplement the diet that bears or contains . . . a vitamin; . . . a mineral; . . . an herb or other botanical; . . . an amino acid; . . . a dietary substance for use by man to supplement the diet by increasing the total dietary intake; or . . . a concentrate, metabolite, constituent, extract, or combination [of any of the aforementioned ingredients].

This report examines the major phytotherapy/herbalism products and orthomolecular medicine products that are driving the OTC nutritional supplement industry. Because this report covers supplements that have recently recorded impressive sales or that are likely to record such sales, it includes several products that are not in the NIH definition. For example, the NIH does not recognize the high-selling supplements creatine monohydrate, chromium, or omega 3-fatty acids as supplements. Table 1 lists herbs in the phytotherapy/herbalism NIH category. Table 2 lists nutrients in the orthomolecular medicine NIH category. Our definition includes the 50 top-selling supplements, which comprise some phytotherapies and some orthomolecular products.

***4. Nutritional
Supplement Sales***

In 1998, nutritional supplements represented the fastest-growing segment of the \$25.3 billion U.S. natural food and beverage industry. This segment is expected to maintain this distinction well into the next century. The natural food and beverage sector accounted for 2.4% of total food dollars spent in the United States in 1998, and this sector is expected to grow at an annual rate of 20% between 1998 and 2003. In 1998, the U.S. market for nutritional supplements reached \$13.66 billion, and the annual growth rate for this market is expected to be 11-13% over the next three years,

Table 1. *Phytotherapy or Herbalism Products (per NIH definition)*

Common Name	Scientific Name
Aloe vera	<i>Aloe ferox, A. barbadensis</i>
Bee pollen	
Bilberry	<i>Vaccinium myrtillus</i>
Capsicum	
Cat's claw	<i>Uncaria tomentosa</i>
Dong quai	<i>Angelica sinensis</i>
Echinacea	<i>Echinacea purpurea and related species</i>
Evening primrose	<i>Oenothera biennis</i>
Fenugreek	
Feverfew	<i>Tanacetum parthenium</i>
Garlic	<i>Allium sativum</i>
Ginger	<i>Zingiber officinale</i>
Ginkgo biloba	
Asian ginseng	<i>Panax ginseng</i>
Green tea	
Hawthorn	<i>Crataegus oxyacantha</i>
St. John's wort	<i>Hypericum perforatum</i>
Kava kava	<i>Piper methysticum</i>
Licorice root	<i>Glycyrrhiza glabra and G. uralensis</i>
Mahonia aquifolium	
Marshmallow	
Mistletoe	
Oleum menthaepiperitea	
Psyllium	<i>Plantago ovata and P. major</i>
Saw palmetto	<i>Serenoa repens, Sabal serrulata</i>
Tea tree oil	
Turmeric	
Nettle	<i>Urtica dioica</i>
Valerian	<i>Valeriana officinalis</i>
Witch hazel	
Yohimbe	

Source: NIH Office of Alternative Medicine Clearinghouse, 1998.

Decision Resources, Inc.

followed by a more moderate rate of 7-11% for 2001-2003. Vitamins accounted for \$5.62 billion in 1998, herbals and botanicals for approximately \$4.17 billion, sports supplements for \$1.37 billion, minerals for \$1.26 billion, and specialty/other formulas for \$1.24 billion. We expect that the nutritional supplement market will reach approximately \$22 billion in 2003.

Table 2. Orthomolecular Medicine Products (per NIH definition)

Biotin	Glandular products	Molybdenum	Vitamin A
Boron	Glucosamine sulfate	Niacin	Vitamin B1 (Thiamin)
Calcium	Glutamine	Niacinamide	Vitamin B2 (Riboflavin)
Carnitine	Inositol	Phenylalanine	Vitamin B5 (Pantothenic acid)
Carotenes	Iodine	Phosphatidylserine	Vitamin B6 (Pyridoxine)
Choline	Iron	Potassium	Vitamin C
Chondroitin sulfate	Lipoic acid	Probiotics	Vitamin D
Coenzyme Q10	Lysine	S-adenosylmethionine	Vitamin E
DHEA (Dehydro-epiandrosterone)	Magnesium	Selenium	Vitamin K
Fatty acids	Manganese	Silicon	
Folic acid	Medium chain triglycerides	Taurine	
Gamma-oryzanol	Melatonin	Tyrosine	
		Vanadium	

Source: NIH Office of Alternative Medicine Clearinghouse, 1998.

Decision Resources, Inc.

Many natural products companies (i.e., companies manufacturing, formulating, or distributing natural consumables such as nutritional supplements, personal health care products, and organic foods) experienced strong sales through the first half of 1998 and then a gradual decline in sales as the year came to a close. According to industry analysts, the recent slowdown may be a result of either (1) an overcrowded marketplace and an oversupply of some supplements or (2) a correction period in which the nutritional supplement industry slowed down from its frantic pace of the past few years. We believe that over the next five years, the industry will experience a period of consolidation and then a phase of moderate growth.

The ten top-selling nutritional supplements in 1998 in the United States were multivitamins, vitamin C, vitamin E, calcium, ginseng, garlic, vitamin B6, creatine monohydrate, vitamin D, and ginkgo biloba. The top five botanicals used as bulk raw materials in 1998 were ginseng, garlic, echinacea, St. John's wort, and kava kava.

According to sales data for the first half of 1998, the hottest three supplement formulations were St. John's wort, children's herbals, and organ support herbals, such as garlic and chamomile products. The popularity of St. John's wort in the United States is beginning to approach that found in Germany, where the supplement is used by the mainstream medical profession to treat depression. Brain/circulation formulas, men's herbal formulas, and calmatives

herbal formulas also showed impressive sales through the first half of 1998.

In terms of new sales (sales of supplements to first-time consumers) in 1998, the top ten supplements, from one to ten, were vitamin E, ginkgo biloba, glucosamine, calcium, vitamin C, kava kava, garlic, St. John's wort, 5-hydroxy tryptophan (5-HTP), and selenium.

Table 3 lists the top 50 nutritional supplements in 1998 in the United States. In many cases, sales figures are estimated because many supplement formulations are multiple-ingredient products comprising combinations of nutrients, vitamins, minerals, and/or botanicals.

5. Market Characteristics

This section discusses the trends that are fueling the popularity of nutritional supplements, the targeted markets, the prospects for growth, and business strategies for exploiting the market.

Factors Driving the Nutritional Supplement Boom

Several factors—including changing demographics, heightened consumer awareness, the pervasiveness of HMOs, and the desire for a healthy and vital lifestyle—have led consumers in general to take a more active role in their health care decisions. Consumers are learning to be committed to a healthy lifestyle and are assuming a more proactive approach in ensuring their wellness rather than relying strictly on what doctors tell them. The Stanford Center for Research in Disease Prevention (SCRDP) reported that 69% of people in the United States in 1998 used some form of complementary medicine (i.e., saw a nontraditional medical specialist, such as an herbalist or acupuncturist, or self-medicated with nutritional supplements). Increasingly, consumers perceive nutritional supplements as necessary for promoting health and preventing disease.

Over the past five years, multiple stimuli have triggered explosive growth of the nutritional supplement industry. These forces are shaping and are being shaped by the health products and natural foods revolution, and they are expected to continue to be powerful influences well into the next century. Use of nutritional supplements is beginning to gain credibility in the medical community now that scientific studies are proving the efficacy of various herbs, minerals, and vitamins, including vitamin E, St. John's wort, and

Table 3. Top 50 Nutritional Supplements in the U.S. Market, Their Purported Health Benefits, and Their 1998 Sales

Rank	Nutritional Supplement	Purported Health Benefits	1998 U.S. Sales (\$MM)
1	Vitamin C	This vitamin is an antioxidant that promotes healthy cell development and may fight cancer, cataracts, and heart disease. It plays a major role in wound healing and resistance to infection.	843
2	Vitamin E	This powerful antioxidant helps protect cells from free radical damage and may help lower the risk of certain cancers (most notably prostate cancer), Alzheimer's disease, kidney disease, cataracts, and heart disease. It maintains healthy cell membranes and strengthens immune system function in the elderly.	731
3	Calcium	Essential mineral for building bone mass and maintaining integrity of teeth. Calcium assists in blood clotting, muscle contraction, and nerve transmission, and it reduces the risk of osteoporosis.	-500
4	Asian ginseng (<i>Panax ginseng</i>)	This root bolsters the immune system, prevents and treats colds and flu, helps reduce stress, and increases energy and endurance.	416
5	Garlic (<i>Allium sativum</i>)	This plant has been approved throughout Europe as a remedy for cardiovascular conditions including the treatment of high cholesterol and triglyceride levels. It also assists in the prevention of colds, flu, and other infectious diseases.	302
6	Vitamin B6 (Pyridoxine)	This vitamin is essential for protein metabolism, nervous system and immune function, and hormone and red blood cell synthesis.	-300
7	Creatine monohydrate	This amino acid precursor has been extensively studied in athletes and has been shown to increase lean muscle mass, explosive power, sprint ability, cell volume, and muscle torque.	-300
8	Vitamin D	This vitamin aids in the absorption and maintenance of calcium and phosphorous, helps build bone mass, and prevents bone loss.	-300
9	Ginkgo biloba	Several studies in Europe demonstrate its therapeutic effect on age-related conditions. It dilates arteries to allow more blood flow to the brain, and it may have a modest effect on improving symptoms of Alzheimer's disease.	-280

(continued)

Table 3. Top 50 Nutritional Supplements in the U.S. Market, Their Purported Health Benefits, and Their 1998 Sales (cont.)

Rank	Nutritional Supplement	Purported Health Benefits	1998 U.S. Sales (\$MM)
10	Echinacea (<i>Echinacea purpurea</i> and related species)	This plant stimulates the immune system and makes cells more efficient in fighting bacteria, viruses, and abnormal cells. May improve resistance to a variety of infectious conditions.	276
11	Glucosamine	This natural compound strengthens and protects joints and cartilage cells and alleviates joint pain and swelling. Studies in Europe have indicated it may diminish osteoarthritis.	~200
12	Vitamin B1 (Thiamin)	This vitamin is necessary to convert carbohydrates into energy. It plays a crucial role in nervous system function and heart muscle function.	~200
13	Folic acid	This B-vitamin plays a role in normal growth and development and red and white blood cell formation. It is critical in embryo nerve formation and may ease depression and anxiety.	~200
14	Beta-carotene	This precursor of vitamin A is a powerful antioxidant and may help protect against certain cancers, cataracts, and heart disease.	~150
15	Branched chain amino acids (BCAAs)	These building blocks of protein play a crucial role in physical growth and performance, weight control, and immune response.	~150
16	St. John's wort (<i>Hypericum perforatum</i>)	This plant is used as an antidepressant for treating mild to moderate depression. Clinical studies have shown that efficacy is equal to pharmaceutical-grade antidepressants.	128
17	Kava kava (<i>Piper methysticum</i>)	Studies in Germany suggest that this botanical alleviates anxiety and tension. It has also been found to relieve symptoms of menopause. Furthermore, it is used for its calming and muscle-relaxing properties and to fight insomnia and nervousness.	106
18	Saw palmetto (<i>Serenoa repens</i> ; <i>Sabal serrulata</i>)	This plant promotes prostate gland health, increases urine flow, and reduces frequency of nighttime urination.	62
19	Selenium	This mineral is a key antioxidant enzyme that is necessary for normal growth and development. It may reduce the risk of certain cancers.	>50

(continued)

Table 3. Top 50 Nutritional Supplements in the U.S. Market, Their Purported Health Benefits, and Their 1998 Sales (cont.)

Rank	Nutritional Supplement	Purported Health Benefits	1998 U.S. Sales (\$MM)
20	Chromium	This trace mineral helps metabolize glucose, fats, and proteins and regulates blood sugar and insulin levels. It may help control diabetes and hypoglycemia.	>50
21	Zinc	This mineral plays an important role in producing enzymes that are necessary for digestion, metabolism, and wound healing.	>50
22	Iron	This macromineral plays a vital role in blood cell formation and function.	>50
23	Magnesium	This macromineral activates various enzymes and aids in nerve and muscle function.	>50
24	Ginger (<i>Zingiber officinale</i>)	This plant has been used to treat a variety of digestive conditions.	~50
25	Chondroitin	This natural compound helps make cartilage resilient, helps rebuild damaged cartilage, and may ease osteoarthritis symptoms.	~50
26	Choline	This nutrient is involved in brain development and proper liver function. It may reduce the risk of cardiovascular disease and cancer.	~25
27	Manganese	This macromineral is necessary for the development of skeletal and connective tissues and is involved in the metabolism of carbohydrates, blood sugar regulation, and bone and cartilage formation.	~25
28	Goldenseal (<i>Hydrastis canadensis</i>)	The root of this herb has antibiotic, anti-inflammatory, and antibacterial properties. It is used to heal wounds and as a remedy for colds and flu.	24
29	Evening primrose oil (<i>Oenothera biennis</i>)	The essential fatty acids in this supplement are vital elements for cellular structures and are involved in controlling cardiovascular ailments, proper hormone function, PMS symptoms, arthritic inflammation, and hyperactivity in children.	21
30	Guarana (<i>Paullinacupana</i>)	The red berry from this plant has been used to increase mental alertness and fight fatigue.	~20

(continued)

Table 3. Top 50 Nutritional Supplements in the U.S. Market, Their Purported Health Benefits, and Their 1998 Sales (cont.)

Rank	Nutritional Supplement	Purported Health Benefits	1998 U.S. Sales (\$MM)
31	DHEA (dehydroepiandrosterone)	This naturally occurring steroid may have utility for a variety of conditions including treating cardiovascular disease, high cholesterol, diabetes, osteoporosis, cancer, memory deficits, and immune system disorders.	<15
32	L-glutamine	L-glutamine is the most plentiful amino acid in the body, and it assists in the release of growth hormones, prevents muscle catabolism, and may enhance immune system function.	<15
33	Whey protein	Whey protein delivers better protein synthesis and higher anti-catabolic activity than any other form of protein. This readily absorbable and assimilated protein may help boost immune function.	<15
34	Pyruvate	This compound helps to raise one's metabolic baseline to help burn fat faster. It may also promote athletic endurance.	<15
35	Grape seed extract	This antioxidant prevents and repairs damaged tissues by promoting the structural stability of weakened blood vessels, especially in the heart. It may lower LDL cholesterol levels and has been used to treat vision ailments.	14
36	Cranberry	This fruit is a urinary antibiotic that targets <i>E. coli</i> bacteria.	9
37	Valerian (<i>Valeriana officinalis</i>)	Extract from this root has a sedative quality and is used to treat insomnia, anxiety, nervousness, colic, and muscle cramps.	9
38	5-HTP (5-hydroxy tryptophan)	This metabolite helps to support serotonin levels, thereby relieving anxiety and enhancing mood.	<5
39	Coenzyme Q10 (ubiquinone)	This compound resembles vitamin E and has potent antioxidant properties. Studies indicate that it may help prevent tumors and leukemia. In addition, it may strengthen the heart by lowering blood pressure and relaxing constricted blood vessels.	<5
40	Aloe vera (<i>Aloe ferox</i> ; <i>A. barbadensis</i>)	This plant is used as a laxative and for treating a variety of other ailments.	<5

(continued)

Table 3. Top 50 Nutritional Supplements in the U.S. Market, Their Purported Health Benefits, and Their 1998 Sales (cont.)

Rank	Nutritional Supplement	Purported Health Benefits	1998 U.S. Sales (\$MM)
41	Chamomile (<i>Matricaria recutita</i>)	This herb is used to treat various gastrointestinal conditions such as indigestion, flatulence, gastrointestinal spasms, and inflammation of the gastrointestinal tract.	<5
42	Feverfew (<i>Tanacetum parthenium</i>)	Three published studies indicate that feverfew prevents and moderates migraine headaches.	<5
43	L-carnitine	This nutrient may increase lean muscle mass, enhance endurance, suppress triglycerides and cholesterol levels, and help control diabetes.	<5
44	Lecithin	This compound emulsifies fat and facilitates its transport throughout the body. It may help prevent the formation of atherosclerotic plaque.	<5
45	Milk thistle (<i>Silybum marianum</i>)	This herb contains potent liver-protecting substances and may stimulate the growth of new liver cells and prevent the formation of damaging leukotrienes. Clinical studies have confirmed its utility in treating cases of cirrhosis, toxic liver, and other chronic liver conditions.	<5
46	Omega-3 fatty acids	This essential fatty acid plays a vital role in the formation of cell membranes and hormones. It has been linked to a reduced risk of heart disease and may treat attention deficit disorder, arthritis, and colitis.	<5
47	Psyllium (<i>Plantago ovata</i> and <i>P. major</i>)	This seed has been shown to reduce the risk of heart disease and is an effective laxative.	<5
48	HMB (beta-hydroxy beta-methylbutyrate)	HMB has been shown to improve immune system function, promote recovery after intense exercise, increase lean body mass, decrease body fat, and lower LDL cholesterol.	<5
49	Melatonin	This hormone regulates our internal clock to produce sleep and seasonal cycles. It may also be a potent sleep-inducing agent and immune system stimulator.	<5
50	Pycogenol	This powerful antioxidant comes from the French maritime pine tree and may be effective in treating vascular disease, Alzheimer's disease, and diabetes.	<5

Note: Sales figures do not account for the approximately \$2.8 billion in sales of multivitamins.

Source: Decision Resources, Inc.

glucosamine and chondroitin.³ Widespread media coverage of these studies has raised consumer awareness and heightened the perceived legitimacy of these products.

Favorable Demographics

The largest age cohort in the history of the United States is now entering middle age. Approximately 10,000 people turn 50 each day, and the population aged 50-59 is particularly significant in health-related markets. The 50-59 age bracket is the largest, wealthiest, and most health-conscious group in the United States, and people in this cohort face a wide array of health concerns. Most notable for men in this group are the risk of prostate cancer, impaired sexual function, and decline in muscle mass. For women, menopause, osteoporosis, and osteoarthritis are key concerns that make supplements an attractive option. In addition, natural products geared toward enhancing mood, relieving neurological conditions, increasing energy, and improving immune system function are popular among both men and women in this age-group. Given that only 43% of the total population currently consume vitamins, tremendous market potential exists in this area, especially among older adults.

Positive Publicity About Supplements and Increased Consumer Interest

Information about the health benefits of supplements is disseminating at a staggering rate from various sources, including medical journals, newspapers, World Wide Web sites, cable stations, and network TV. Over the past few years, studies in medical journals and exceptional levels of media coverage have widely publicized the link between diet and health, as well as the positive attributes of a number of supplements, such as ginkgo biloba, ginseng, and St. John's wort. A growing number of World Wide Web sites offer information, support, and wellness services designed to improve health and fitness. Several leading nutritional supplement manufacturers and retailers offer their products through the Web. Television networks air special features on how to improve health and promote

3. For more information regarding the study of the chemistry and medicinal properties of supplements, explore the International Bibliographic Information of Dietary Supplements (IBIDS) database. Located at <http://natasha.nal.usda.gov>, this database contains published international scientific literature on dietary supplements, vitamins, minerals, and botanicals.

mental and physical vigor. New cable networks are emerging that focus solely on health and fitness programming, emphasizing the importance of proper nutrition and supplementation in bolstering physical and mental performance.

The Growing Influence of HMOs

Enrollment in managed health care plans continues to grow. To promote health and decrease hospital visits, these plans highlight disease prevention, health promotion, and use of regular dietary supplements. Health care practitioners, as well as patients, are beginning to emphasize “staying well” over “getting well” in order to cut costs for both parties. Consumers are looking for natural alternatives to pharmaceuticals because of the inconvenience and costs associated with visiting a physician and filling a prescription. For example, rather than waiting to visit a doctor, many people prefer to self-treat acute conditions such as colds and nasal congestion with an herbal preparation. Doctors may even choose not to prescribe pharmacotherapy and instead allow the patient to self-medicate his or her own condition.

Independent studies of HMOs and their allocation of health care dollars indicate that successfully preventing a disease costs one-thirtieth as much as successfully treating the same disease. One major HMO recently distributed the first nutritional supplement mail-order catalog to its members to promote the use of supplements as part of an everyday health maintenance program (Weider Nutrition International’s Schiff brand of vitamins was included in this catalog), and other HMOs are working on similar approaches.

Ever vigilant in their quest to contain costs, HMOs may prove to be the strongest stimulus behind the expected increase in OTC dietary supplement use over the next five years. In 1997, 25% of HMOs reportedly authorized the reimbursement of complementary and alternative health care procedures, including chiropractic and acupuncture. The medical community and insurance providers are beginning to recognize the consumer trend toward preventive and self-directed health care. Managed health care providers may soon introduce new programs that extend reimbursement to dietary supplements.

Increased Funding for Vigorous Scientific Research

Most physicians believe that alternative medical products have utility, but they are reluctant to prescribe supplements because, unlike prescription drugs, they do not offer the certitude of placebo-controlled, double-blind studies to illustrate their efficacy and safety. As more vitamin, mineral, and herbal preparations acquire scientific evidence to support their claims, physicians will begin to recommend them more often, and this support will help propel supplements from the alternative medicine category into the mainstream.

In recent years, government agencies, universities, and private companies have increased their sponsorship of research on supplements and the role they play in human physiology. Studies are showing that supplements can reduce health care costs. In 1992, Congress established the Office of Alternative Medicine and the Office of Dietary Supplements within the NIH in order to “facilitate the evaluation of alternative medical treatment modalities” to determine their effectiveness. The establishment of these offices recognizes the growth of the industry and lends more legitimacy to the use of supplements. Another initiative that promotes research on alternative and complementary therapies is the Corporate Alliance for Integrative Medicine (CAIM), which comprises ten supplement companies (including Natrol, Rexall Sundown, Nature’s Way, and Weider). Each company in the alliance agreed to give \$50,000 to help fund university-conducted clinical trials of herbs and other nutritional supplements. The CAIM group will help fund trial protocol, and additional funding from the NIH will help pay for other aspects of the trials.

The Institute for Nutraceutical Advancement (INA) was founded in 1997 with the support of 30 sponsoring companies, including suppliers, manufacturers, and distributors. This initiative helps member companies improve their testing of supplements. According to science director Mark Lange, the INA’s Methods Validation Program (MVP) gives the herbals, botanicals, and nutritional supplement industries legitimate, reproducible, validated methods that can be used by manufacturers, importers, and independent labs to test herbs for purity and label claims. Whether MVP testing measures will be incorporated will depend on how manufacturers perceive the program’s methods, viability, turnaround time, and cost per sample. The INA advocates full-cycle monitoring of product

quality—from the product’s harvest in the field to its arrival on the store shelf.

The INA’s 30 member companies agreed to contribute a minimum of \$10,000 per year for two years. Many member companies are in favor of MVP technicians making random plant visits to take samplings. Tested products would receive an MVP seal of approval, which supplement companies could use as a marketing tool. The INA plans to publish testing protocols in trade journals and on the Web so that both consumers and manufacturers can benefit from test results and reach their own conclusions about product quality.

Studies indicate that substantial health care cost savings are possible when patients consume vitamin E supplements. In the Cambridge Heart Antioxidant Study (CHAOS) of 1996, a double-blind, placebo-controlled trial involving 2,002 patients, vitamin E reduced nonfatal heart attack risk by 77%. The American Heart Association estimates that 1 million nonfatal heart attacks occur each year, a statistic that translates to \$578 million in health care costs. Thus, an average of \$578 per year per patient could be saved as a result of the reduction in hospital admissions, medical procedures, and medication. (See Part 6 of this report, “Pharmaceutical and Chemical Company Involvement,” for a discussion of St. John’s wort, ginkgo biloba, kava kava, and the properties that make these supplements viable competitors to various pharmacological therapies.)

Advantageous Regulatory Environment

The DSHEA of 1994 established specific regulatory guidelines for the nutritional supplement industry. The DSHEA allows companies to market products that do not meet the strict, established definitions of “food” (a product used primarily to impart taste, aroma, or basic nutrition) or “drug” (a product used to cure, mitigate, treat, or prevent disease) without having to go through the FDA approval process. In response to the DSHEA, regulatory restrictions on dietary supplements have been relaxed and the safety standards for the use of these ingredients have changed. Although new products now face tighter regulations on the claims that are made about them after they reach the market, stringent preclearance of claims is not required.

Manufacturers and retail establishments are now able to provide their customers with packaging and point-of-sale information regarding the efficacy of their products. The law permits retailers to distribute books, brochures, and other publications that provide health-related information and supplement recommendations. The regulatory environment that the DSHEA has created is one in which small, start-up nutritional supplement companies can thrive and in which the industry as a whole, with FDA supervision, can regulate itself. The FDA will approve labeling claims, but it will not regulate the process leading up to approval. (See Part 7 of this report, "Regulatory Environment," for further discussion of the regulations surrounding nutritional supplements.)

Wider Distribution of Products

Consumers obtain nutritional supplements via seven distribution channels:

- Pharmacies/drugstores (e.g., CVS, Walgreen's).
- Grocery stores/supermarkets (e.g., WalMart, Costco).
- Direct mail (e.g., network marketing, mail-order outfits).
- Health food supermarkets (e.g., Bread and Circus, Whole Foods).
- Vitamin/supplement stores (e.g., GNC, Vitamin World).
- Club stores (at various gyms).
- Health food stores (various independent operations).

Mass-volume retail operations, such as pharmacies/drugstores and club stores, are projected to be the fastest-growing supplement distribution channels over the next five years, with anticipated annual sales growth rates of 12-16% between 1998 and 2003. The success of large chain drugstores, supermarkets, and wholesale clubs has enhanced mass appeal of nutritional supplements.

No longer are supplements found only in health food stores and other specialty food stores. Many mass-market retail chains, especially chain drugstores and chain supermarkets, are beginning to cash in on the high margin (40% in 1997) that supplements deliver.

As supplements gain more credibility, availability and usage will surge. Growth of other marketing schemes—the World Wide Web, multilevel marketing, and mail order—will further expand the mass-market avenues through which supplements are sold.

Many supplement manufacturers are launching initiatives to alleviate confusion regarding the common uses of many supplements. Leiner, for instance, provides point-of-sale information to consumers at various retail drug chains. This information appears clearly in the supplement section and categorizes products by their health-improving attributes without making unsubstantiated claims. Other nutritional products companies are taking similar approaches toward educating the consumer. For instance, Rexall Sundown, arguably a leader in brand awareness, is in the midst of a vigorous national advertising campaign.

A Trend Toward Healthier Habits

A variety of other health- and fitness-related segments have experienced growth that coincides with that of the nutritional supplement industry. For instance, sales at organic and whole food stores increased 10-15% per year between 1993 and 1998. Health club memberships increased 51% from 1988 to 1998, and usage of dietary supplements and specialized sports supplements is high among health and fitness advocates. In general, people in the United States are changing their eating habits to include a strategy of enhancement instead of avoidance. Rather than fixating on reducing intake of substances such as fats, sodium, and cholesterol, many people have begun to add more beneficial compounds, including supplements, to their diets.

Supplement Categories and Target Markets

As the list of herbals, botanicals, vitamins, minerals, sports nutrition products, and specialty formulas grows, these supplements can more readily be categorized according to their targeted consumer groups and their health-promoting qualities. Certain consumer groups represent more enticing markets than others because of demographic factors such as age, income, education, activity level, and health status. Table 4 identifies the groups and conditions targeted by various supplements.

Table 4. Target Groups/Conditions for Selected Supplements

Nutritional Supplement	Target Group or Condition							
	General Population	Men	Women	People Older than Age 50	Athletes and Fitness Enthusiasts	Immune System Improvement	Neurologic / Mood Enhancement	Cardio-vascular Health
5HTP (5-hydroxy tryptophan)							X	
Beta-carotene	X							X
Branched chain amino acids (BCAAs)		X			X	X		
Calcium	X		X					
Chamomile (<i>Matricaria recutita</i>)				X				X
Choline	X						X	X
Chondroitin			X	X	X			
Chromium	X				X			
Cranberry				X				X
Creatine Monohydrate		X			X			
DHEA (<i>dehydro-epiandrosterone</i>)		X		X	X			
Echinacea (<i>Echinacea purpurea</i> and related species)	X			X		X		
Evening primrose oil (<i>Oenothera biennis</i>)	X		X		X			X
Feverfew (<i>Tanacetum parthenium</i>)							X	
Folic acid	X		X					

(continued)

Table 4. Target Groups/Conditions for Selected Supplements (cont.)

Nutritional Supplement	Target Group or Condition								
	General Population	Men	Women	People Older than Age 50	Athletes and Fitness Enthusiasts	Immune System Improvement	Neurologic / Mood Enhancement	Cardio-vascular Health	Gastro-intestinal Health
Garlic (<i>Allium sativum</i>)						X		X	
Ginger (<i>Zingiber officinale</i>)				X					X
Ginkgo biloba				X			X	X	
Ginseng (<i>Panax ginseng</i>)		X		X	X		X		
Glucosamine			X	X (women)	X				
Goldenseal (<i>Hydrastis canadensis</i>)	X					X			
Grape seed extract								X	
Guarana (<i>Paullinacupana</i>)					X		X	X	
HMB (beta-hydroxy beta-methylbutyrate)		X			X				
Iron	X		X			X			
Kava kava (<i>Piper methysticum</i>)			X				X		
L-carnitine					X		X		
Lecithin							X	X	
L-glutamine					X	X			
Magnesium	X								
Manganese	X								
Melatonin						X	X		

(continued)

Table 4. Target Groups/Conditions for Selected Supplements (cont.)

Nutritional Supplement	Target Group or Condition								
	General Population	Men	Women	People Older than Age 50	Athletes and Fitness Enthusiasts	Immune System Improvement	Neurologic / Mood Enhancement	Cardio-vascular Health	Gastro-intestinal Health
Milk thistle (<i>Silybum marianum</i>)				X		X			
Omega-3 fatty acids	X			X	X			X	
Psyllium (<i>Plantago ovata</i> and <i>P. major</i>)								X	X
Pycogenol						X	X	X	
Pyruvate					X				
Saw palmetto (<i>Serenoa repens</i> ; <i>Sabal serrulata</i>)		X							
Selenium	X								
St. John's wort (<i>Hypericum perforatum</i>)		X					X	X	
Valerian (<i>Valeriana officinalis</i>)				X			X		
Vitamin B1 (Thiamin)	X				X		X		
Vitamin B6 (Pyridoxine)	X								
Vitamin C	X	X				X			
Vitamin D	X		X	X					
Vitamin E	X	X			X			X	
Whey protein	X				X				
Zinc	X								

Source: Decision Resources, Inc.

Generally speaking, supplements target one or more of the following market segments:

- General population.
- Men.
- Women.
- People older than age 50.
- Athletes and fitness enthusiasts.
- Indication-specific groups.

General Population

The quintessential supplement product in the general health promotion consumer category is the multiple vitamin and mineral supplement. A host of herbals and antioxidant vitamins are mainstays in this category. People in this group consume more than average amounts of zinc, potassium, calcium, selenium, and vitamins A, B, D, and E. Although consumers in this category span every age-group and education level, female senior citizens are a main cohort. These women may have lower education and income than consumers in other categories because higher education was not a standard pursuit among women 40 or more years ago. Considering the vast number of people consuming multivitamin formulas, this category is by far the largest target group, and many consumers in this group use multiple products.

Men

The supplements consumed by the “men’s health” group include prostate gland support formulas, energy- and virility-promoting products, and sports nutrition items. Vitamins C and E are consumed by many members of this group. Younger users focus primarily on sports performance products such as creatine, amino acids, HMB (beta-hydroxy beta-methylbutyrate), ginseng, and ephedrine/ma huang. Users older than 40 are more inclined to buy such herbals as saw palmetto (for prostate health) and St. John’s wort (to treat depression). This category contains people with above-average income and education levels. Supplement manufacturers and marketers should note that the men’s health segment holds significant untapped potential.

Women

The main products marketed in the women's health category are those that relieve the symptoms of premenstrual syndrome (PMS), prevent osteoporosis, and combat arthritis. This segment consumes large amounts of vitamin D, calcium, folic acid, glucosamine, and chondroitin. Among all the botanicals that claim to ease PMS, a clear favorite that demonstrates safety and efficacy has yet to emerge. Lesser-known herbals such as black cohosh and evening primrose oil could capture this huge consumer group. In general, the women's health segment comprises experienced supplement users; this group could be one that would readily use multiple-ingredient, multiple-formula supplements.

People Older than Age 50

The over-50 segment, which contains the large demographic group known as "baby boomers," is forecast to grow significantly over the next five years. These consumers tend to experiment with a wide range of products, and they often make impulse purchases. Because of their high education and income levels, people in the over-50 category show the greatest potential to be multiple-product users. A wide range of products with the alleged benefits of increased mental and physical performance and disease prevention are consumed by this group. These consumers tend to use symptom-specific herbals (e.g., echinacea, ginkgo biloba, valerian) and supplements akin to familiar foods and teas, such as cayenne, ginger root, chamomile, ginseng, green tea extract, royal jelly, cranberry extract, and licorice root.

Athletes and Fitness Enthusiasts

Consumers in this category use a range of products designed to increase endurance, boost energy, promote lean muscle growth, increase strength and power, and support fat loss. Sports nutrition products are no longer marketed only to the elite athlete. Rather, they are directed toward a large and ever-expanding group of fitness and outdoor enthusiasts. Education and income levels in this consumer category span relatively wide ranges, but many users are inclined to experiment with different products and combinations of formulas. Both naïve and experienced supplement users in this category represent a great deal of market potential.

Indication-Specific Groups

Many supplements target specific indications or are intended to reduce the risk of certain diseases. The subcategories with the largest consumer groups and the greatest market potential are immune system improvement, neurologic and mood enhancement, cardiovascular health promotion, and gastrointestinal health maintenance. Many of the products marketed to indication-specific segments are multiple-herb formulas.

Near-Term Product Development Trends

The next five years will most likely bring increased media coverage and additional scientific studies that will enhance consumer understanding of dietary supplements. In the past few years, we have seen supplements quickly evolve from little-known alternative remedies available only at health food stores to legitimate, mass-marketed options for health promotion and disease prevention. The next five years will spur greater innovation in terms of supplement marketing strategies, increased emphasis by both consumers and suppliers on quality control, and growth in the number of applications claimed by supplements. Offered through a myriad of mainstream, mass-market channels, supplements are now readily accessible to every consumer group, and this availability produces an environment ripe for competition. As the natural foods industry becomes saturated with raw materials manufacturers and suppliers, the companies that take extra steps to produce a value-added, albeit more expensive, product will eventually experience the greatest success.

Value-added, quality-ensured products with clinical evidence to support their claims of purity, potency, and safety will become more prevalent in the nutritional supplement industry. The anticipated entrance of more and more highly capitalized pharmaceutical and chemical companies into the supplement arena will provide further impetus for the use of new procedures in the development of nutritional supplement products. We believe that the successful players in the supplement industry will modify and adopt many of the same techniques used in pharmaceutical drug development. The following procedures could become standard practice in the supplement industry, and their adoption may even help more products to partially penetrate the U.S. pharmaceutical market:

- Using “fingerprints” or “markers” as indicators of the composition, uniformity, and reproducibility of multicomponent botanical products.

- Replacing animal toxicity data with an adequate predictor of safety in humans (e.g., long-term use that shows no negative effects).
- Establishing clinical “pilot studies” to demonstrate effectiveness in long-term human use.
- In lieu of pilot studies, clinical testing in the proposed indication.
- Conducting Phase IV–type studies to address specific concerns about long-term usage and drug, food, or supplement interactions.

In addition, successful supplement formulators and marketers will continually offer new end-product options to consumers and food processing companies. Supplement tablets and capsules will always have their place in the market, but supplements need to have flexibility in end-product application so that they can be incorporated into sprays, beverages, confectionery products, lozenges, baked goods, foods, nutritional bars, powdered drinks, meal replacement formulas, and cereals. Functional foods represent a convenient delivery method for vitamins, minerals, botanicals, and other supplements.

Supply-and-Demand and Crossover Phenomena

Given the explosive nature of new supplement product launches, demand may initially outweigh supply. Soon after, however, competitors often create an oversupply of raw materials and finished products. When St. John’s wort was introduced in the United States, an initial surge of popularity and demand far outstripped supply. This phenomenon is bound to repeat, especially with products that are gaining in popularity in European countries, particularly Germany. The German market is a strong predictor for the U.S. market because of cultural, historical, and regulatory influences, as well as a medical community that actively promotes the research and development of nonpharmaceutical health products. Because the U.S. market, after a slight delay of approximately six months to a year, tends to mirror the European market, certain products are expected to do well in the United States over the next few years.

The following supplements, which are very popular in Germany, are crossover candidates that are likely to exhibit U.S. sales surges over the next three years: black cohosh, horse chestnut, vitex agnus-castus, artichoke leaves, nettle root, devil's claw root, neem, olive leaf, red clover, rosemary leaf, and hawthorn leaves. Table 5 lists selected supplements that are relatively new to the U.S. market but have potential—based on their success in Europe, recent findings in nutritional science, or an improved formula—to be hot sellers in the future.

Kava kava, a prime example of a crossover product from Germany, experienced a sharp increase in U.S. sales during the fourth quarter of 1998. The herb is approaching a transition phase with respect to its availability and marketability. Over the next two years, demand will likely soon exceed supply in the United States and the shortfall will probably boost interest in special extracts derived from kava herb stems and leaves (the traditional practice is derivation of extract from the root). New applications and processing techniques will emerge for other herbals as well, when supply is exceeded by demand.

For some of the most popular botanicals and herbals of 1998, such as ginkgo biloba and ginseng, a raw materials oversupply existed. Because so many sources of botanicals and herbals are now available, the future will bring greater concentration on overall quality standards. In order to ensure efficacy and safety, raw materials manufacturers, supplement formulators, and consumers will increasingly focus on whether their herbal or botanical comes from a quality source. As consumers become more educated about supplements, they will opt to pay a higher price for a high-quality product from a reputable company.

***Growth
Prospects by
Supplement Type***

Because of various factors, the markets for the different types of nutritional supplements will grow at different rates over the next five years. We expect that bulk vitamins will be the strongest segment over the next few years. The benefits of vitamins A, C, and E are well documented, and their large target groups and expanding application in fortified foods and beverages will fuel bulk vitamin sales growth. The “Three Gs” (ginseng, ginkgo biloba, and ginger) will continue the solid success they enjoyed in 1998, and we expect them to show moderate, steady growth, between 9-11% over the next five years.

Table 5. Promising New Supplements for the U.S. Market

Supplement	Purported Benefits	Targeted Consumer Group or Condition
Artichoke	The leaves are used as a digestive aid and to reduce cholesterol levels.	>50
Black cohosh	This plant is widely used in Europe to ease the symptoms of menopause.	Women
Cat's claw (<i>Uncaria tomentosa</i>)	The bark of this plant is used to treat intestinal conditions, gastric ulcers, arthritis, and tumors.	>50; gastrointestinal conditions
Devil's claw (<i>Harpagophytum procumbens</i>)	The root of this plant has been used to alleviate arthritis pain.	>50
Hawthorn (<i>Crataegus oxyacantha</i>)	The leaves and berries of this plant are used in Europe to prevent cardiovascular degeneration and treat mild forms of angina.	>50
Horse chestnut (<i>Aesculus hippocastanum</i>)	This plant may have astringent and anti-inflammatory properties.	Immune system enhancement
Hyperzine A	This botanical ingredient is extracted from the Chinese club moss and may have memory-boosting effects by regulating acetylcholine levels in the brain. It may have synergistic benefits when taken with ginkgo biloba, an herb that enhances microcirculation in the brain. It may reduce the symptoms of presenile and senile dementia.	Neurological enhancement; >50
Liquid or effervescent creatine	This naturally occurring metabolite has greater bioavailability and is more readily assimilated into the bloodstream than the powdered form. It is used for promoting muscle power and lean muscle mass growth and for improving recovery following intense exercise.	Power and speed athletes and bodybuilders
Neem	This plant is used for its antioxidant properties, to combat infections, and to purify the blood.	Immune system enhancement
Nettle (<i>Urtica dioica</i>)	The root of this plant eases the symptoms of benign prostatic hypertrophy.	Older men

(continued)

Table 5. Promising New Supplements for the U.S. Market (cont.)

Supplement	Purported Benefits	Targeted Consumer Group or Condition
Olive leaf	This leaf is touted as an immune system booster with the ability to treat a broad spectrum of microbial disorders.	Immune system enhancement
Phosphatidylserine	This naturally occurring phospholipid nutrient is used to improve cognitive ability and to enhance memory function. It also suppresses the stress hormone cortisol to reduce muscle catabolism following intense exercise.	Neurological enhancement; power and strength athletes and bodybuilders
Red clover (<i>Trifolium pratense</i>)	This plant contains isoflavonoids, which are effective in cancer prevention.	General health; >50
Rosemary	The leaves are used for their antioxidant properties.	General health
Soy-based products	Soy delivers a high protein efficiency rating and has certain anticancer properties. Its naturally occurring plant estrogens may help to alleviate symptoms of menopause.	Power and speed athletes and bodybuilders; older women.
Vitex (<i>Vitex agnus-castus</i>)	A preparation from this plant is used to treat menstrual disorders.	Women

Source: Decision Resources, Inc.

St. John's wort formulas will continue their rise in popularity over the next five years. A huge untapped market for this supplement is the United States, where 17 million adults suffer from severe, chronic depression, and many more claim to have experienced mild and/or less frequent depression.

Sales of magnesium and calcium also have the potential to grow because of a wide variety of applications and vast target populations. Clinical evidence supports calcium's usefulness in slowing colon-cancer cell growth, lowering blood pressure, and reducing the symptoms (irritability, aches, pains, and headaches) associated with PMS. Magnesium, an essential mineral that is involved in a variety of

critical physiological processes, is consumed by a number of different target groups.

Specialized sports and fitness supplements will also be a fast-growing sector of the nutritional supplement industry from 1998 to 2003. These supplements will branch out from their original target group of elite athletes and bodybuilders to include the average sports and fitness enthusiast. We foresee creatine use continuing its steady rise, although we do not expect to see the 80-90% annual growth rates it attained between 1995 and 1998. Other creatine formulations and applications, such as liquid creatine and effervescent creatine, as well as products that combine creatine with other ingredients such as L-glutamine and HMB, will be strong sports nutrition sellers over the next five years.

Products based on echinacea, a natural immune system enhancer, are expected to be another hot nutritional supplement category in 1999 and beyond. Echinacea sales grew 150% from 1997 to 1998, yet the product's scientifically proven benefits in fighting colds and flu are relatively small. Combination formulas of vitamin C, zinc, and echinacea, as well as other ingredients, will likely be popular products during the next five years.

Milk thistle could become an important supplement over the next few years. It has the potential to be the only herbal product to be promoted for its ability to cleanse the liver of toxins and impurities. Milk thistle's market potential is enormous; alcohol drinkers and consumers of nonsteroidal anti-inflammatory drugs (NSAIDs) may benefit from its liver-purifying properties.

Corporate Strategies

The supplement companies that will have the greatest success over the next five years will be those that focus on building solid brand awareness and establishing customer loyalty. These objectives can be achieved by employing three interrelated strategies:

- Given the rapid rate at which scientific studies are highlighting the efficacy and importance of certain supplements in disease prevention and health maintenance, companies must respond quickly and introduce products that match emerging research.
- Companies need to be involved in programs that educate their prospective customers. To help secure product recognition in a highly fragmented industry, nutritional supplement companies

should engage in several avenues to heighten consumer awareness of the role of proper nutrition and supplementation in ensuring optimal health.

- Small supplement companies that take advantage of strategic alliances and partnerships with pharmaceutical companies, chemical companies, consumer products giants, other supplement companies, and/or specialty health product companies will most likely enjoy the greatest success over the next five to ten years. Small-cap nutritional products companies that begin to demonstrate consistent revenue growth have the highest potential to be acquired by a pharmaceutical or chemical multinational over the next five years. Many of the multinationals are intently watching the nutritional segment boom and are eager to enter the arena when the stock prices of nutritional products companies settle down. The companies in the best situation for acquisition are TwinLab, Rexall, Natrol, Balance Bar, and Celestial Seasonings. An effective strategy for these companies may be to position themselves for an alliance or buyout.

***6. Pharmaceutical
and Chemical
Company
Involvement***

Spurred by the large profits and high growth rates found in the nutritional supplement sector, many biopharmaceutical companies have begun to include natural and herbal products in their conventional drug portfolios. Pharmaceutical companies are using their research and development might, their vast amounts of capital (needed both for testing natural compounds and for acquiring supplement companies), their name recognition, and their marketing expertise to enter the natural products arena.

Pharmaceutical companies most often enter the supplement industry through direct line extensions and partnerships. With direct line extensions, pharmaceutical firms augment their own product lines through direct acquisition of smaller botanical and supplement firms. They then apply their well-known branding and rigorous marketing capabilities to promote a lesser-known natural product or herbal extract. Partnerships are especially effective when the core competencies of one company complement those of the other. For example, a company with strong marketing and distribution capabilities can benefit from an alliance with a company that has strong research, development, and manufacturing capabilities

but is relatively weak in promoting and delivering products to consumers.

The entrance of pharmaceutical companies into the supplement arena is a strategically sound move for a number of reasons. First, as the supplement market becomes saturated with a myriad of players, pharmaceutical companies can take advantage of their name recognition and obtain customers based solely on the fact that consumers can identify a pharmaceutical giant much more readily than they can a slew of lesser-known companies. Second, the supplement market is maturing, and the use of dietary supplements is becoming a mainstream option for health promotion and disease prevention. Pharmaceutical companies have the advantage of being able to attract the consumers who are more comfortable with purchasing from a widely recognized company whose products have long track records of safety, consistent potency, and efficacy. Formulas that offer multiple-vitamin, -mineral, and -herbal ingredients backed by clinical studies could easily become viable competitors of various pharmaceutical products. The pharmaceutical companies that apply to herbals and vitamins the same identification and development techniques used for pharmacotherapies will have a competitive advantage. Table 6 lists selected acquisitions, partnerships, and new business units among pharmaceutical and supplement companies.

Three popular supplements—St. John's wort, ginkgo biloba, and kava kava—currently present significant competition for drugs and are causing anxiety throughout the pharmaceutical industry.

St. John's wort outsells prescription fluoxetine (Prozac) three to one in Germany; given the former's early popularity in the United States, U.S. sales of St. John's wort may eventually rival those of Prozac.

EGb-761, a standardized extract from ginkgo biloba, is approved in Germany for treatment of primary degenerative dementia and vascular dementia. An open, uncontrolled trial was conducted in the United States to compare the pharmacological activity of ginkgo biloba with that of tacrine, the first agent approved specifically for Alzheimer's disease in elderly patients with mild-to-moderate dementia. Results demonstrated that ginkgo biloba exhibited "cognitive activator" profiles in more patients than did tacrine. Chronic administration of ginkgo biloba also produced more "cognitive activator" responses and demonstrated better therapeutic effects.

Table 6. Selected Acquisitions, Partnerships, and New Business Units Among Pharmaceutical and Supplement Companies

Biotech, Pharmaceutical, or Life Science Company	Dietary Supplement/ Nutritional Products Company	Business Arrangement/ Development
AMBI Tarrytown, NY	Nutrition 21 San Diego, CA	AMBI purchased Nutrition 21 and will market chromium picolinate products (Chromax); specialty cardiovascular supplements; selenium (Selenomax); zinc (Zinmax); and magnesium (Magnemax).
American Home Products Madison, NJ	PharmaPrint Irvine, CA	American Home Products will pay \$43.5 million for research, development, marketing, and licensing fees for the process-patented standardized herbal products. PharmaPrint will supply ingredients for American Home Products' Centrum Herbal's line of supplements: St. John's wort, ginkgo biloba, garlic, ginseng, echinacea, and saw palmetto.
Bayer AG Germany	Bayer Consumer Group Morristown, NJ	In August 1998, Bayer launched its One-a-Day brand herbal product line. The seven new formulations are Prostate Health, Cholesterol Health, Menopause Formulation, Bone Strength Formula, Tension & Mood Formula, Memory & Concentration Formula, and Cold Season Formula.
Chattem Chattanooga, TN	Sunsorce International Chattanooga, TN	Chattem purchased all assets of Sunsorce and exclusive worldwide rights to Garlique, Rejuvex, Melatonex, Echinex, and Propalmex.
DuPont Pharmaceuticals	Newly formed nutraceuticals division	This unit will focus on three major areas: plant-derived drugs, food and feed additives, and dietary supplements.
Lifeway Foods Skokie, IL	GalaGen Arden Hills, MN	GalaGen partners with Lifeway, manufacturer of kefir products and new Basic Plus supplements, to promote gastrointestinal health.

(continued)

Table 6. Selected Acquisitions, Partnerships, and New Business Units Among Pharmaceutical and Supplement Companies (cont.)

Biotech, Pharmaceutical, or Life Science Company	Dietary Supplement/ Nutritional Products Company	Business Arrangement/ Development
Monsanto St. Louis, MO	General Nutrition Company Pittsburgh, PA	GNC introduced a Monsanto-manufactured DHA-omega-3 nutraceutical line of products in its specialty health food stores. These products contain Monsanto's proprietary ingredient SeaGold, a DHA oil.
Nutraceutix Redmond, WA	Weider Nutrition International. Salt Lake City, UT; Nutraceutical Park City, UT; and Rexall Sundown Boca Raton, FL	Weider, Nutraceutical, and Rexall Sundown have robust distribution and advertising resources to match Nutraceutix's Calcium D-glucarate, a substance that may provide protection against chemical carcinogens, including cigarette smoke, and may reduce the risk of breast and prostate cancers.
Rhodia Food Ingredients Cranbury, NJ (Parent company: Rhône-Poulenc Rorer)	GalaGen Arden Hills, MN	The two companies collaborated for the development and marketing of nutritional products. The products will contain GalaGen's natural immune components coupled with Rhodia's strain of <i>Lactobacillus acidophilus</i> .
Shaman Pharmaceuticals San Francisco, CA	Lipha Italy	Shaman is in collaboration with Lipha on nutritional supplements and type 2 diabetes research.
SmithKline Beecham London, England; Philadelphia, PA	Abtei Germany	SmithKline Beecham is test marketing several standardized herbals: Abtei Mood, Abtei Memory, Abtei Stamina, Abtei Prostate.
Warner-Lambert Morris Plains, NJ	Complementary Medicine Division	In September 1998, this newly created unit launched two standardized herbal products to the mass market: Quanterra Mental Sharpness with ginkgo and Quanterra Prostate with saw palmetto. Additional herbal products, supported by clinical tests, are slated for release in 1999.
Zila Phoenix, AZ	Oxycal Laboratories Prescott, AZ	Zila purchased Oxycal, manufacturer and marketer of patented vitamin C products, including Ester-C.

Source: *Decision Resources, Inc.*

Kava kava is the newest herbal product to directly compete with pharmacological agents. Its muscle-relaxing, antianxiety properties are making it a natural alternative to drugs such as alprazolam (Xanax) and diazepam (Valium), which are used in treating anxiety disorders.

Whether St. John's wort, ginkgo biloba, or kava kava will provide stiff competition in their respective indications for the leading pharmacotherapies in the United States remains to be seen. Pharmaceutical companies need to be aware of potential competitive forces outside of their own industry. An effective strategy for pharmaceutical companies may be to offer a wide range of both pharmaceutical agents and natural remedies in order to be more capable of handling various changes in the competitive environment.

7. Regulatory Environment

The passage of the U.S. Dietary Supplement Health and Education Act of 1994 (DSHEA) established a new regulatory framework for supplements and essentially gave more companies the ability to compete in this marketplace. The act benefits many parties involved in the supplement industry because it eases regulatory restrictions by allowing the industry to regulate itself. Prior to the DSHEA, the Nutritional Labeling Act (NLA) gave the FDA wide interpretive powers in establishing the propriety of certain labeling claims. Many in the supplement industry believed that the NLA was exerting too much regulatory control over the sale of alternative health products.

The nutritional supplement industry embraced the DSHEA. The legislation clearly defines dietary supplements, creates a regulatory body to address safety issues, regulates health claims and labeling of dietary supplements, provides for good manufacturing practice (GMP), and establishes new government bureaus to review regulations and encourage research on dietary supplements. Provisions of the act address seven areas:

- ***Definition.*** A dietary supplement is any product that contains one or more dietary ingredients, such as vitamins, minerals, herbs or botanicals, amino acids, and other ingredients used to supplement the diet. Supplement formulators and manufacturers can market their products without having to go through the FDA approval processes established for "foods" (products used

primarily to impart taste, aroma, or basic nutrition) and “drugs” (products used to cure, mitigate, treat, or prevent disease).

- **Safety.** The FDA retains authority to remove a product from the market if it presents a risk of illness or injury or contains a deleterious substance.
- **New Products.** Prior to marketing a dietary supplement, the manufacturer must supply the FDA with information adequate to provide “reasonable assurance that the ingredient does not present a significant or unreasonable health risk of illness or injury.” This information must be supplied at least 75 days before the product is available to consumers.
- **Claims.** The DSHEA permits the labels of dietary supplements to contain truthful and non-misleading structure/function claims and nutritional support claims that describe the role of the nutrient in supporting wellness. Rather than require rigid preclearance of claims, the law establishes policing authority only over claims made after a product has been placed on the market. Supplement sellers are permitted to provide their customers with information regarding the nutritional benefits of dietary supplements. This information can be in the form of “statements of nutritional support,” which appear on labels, or it can be referral of customers to books, articles, and other publications that provide health-related information.
- **Labeling.** A dietary supplement label must list the names and amounts of each active ingredient. For botanicals, the label must identify the part of the plant from which the ingredient is derived. All information must be presented in a format appropriate to the product.
- **Good Manufacturing Practice.** Supplement producers must comply with current good manufacturing practice (GMP). The FDA reserves the right to issue special regulations, modeled after food GMP, for dietary supplement manufacture.
- **New Government Entities.** The DSHEA establishes two new government bodies: the Commission on Dietary Supplement Labels and the Office of Dietary Supplements. The Commission on Dietary Supplement Labels will conduct a study on dietary supplement

label claims and “evaluate how best to provide truthful, scientifically valid, and not misleading information to consumers so that consumers may make informed and appropriate health care choices for themselves and their families.” The Office of Dietary Supplements was established within the NIH to coordinate research on dietary supplements and disease prevention, to develop a database of supplement research, and to advise the Secretary of Health and Human Services on supplement regulation, safety, and health claims.

In the wake of the DSHEA, a veritable tidal wave of newcomers has hit the supplement industry. Some of these new companies are quickly trying to take advantage of the business opportunities that lie within the industry, and they are often producing inferior products. Some of these companies may be inexperienced in the botanicals and supplement area, and they may offer unsubstantiated claims and inaccurate labeling. This environment creates retail and consumer confusion because it is difficult to determine which products contain effective ingredients. Many industry analysts predict that this situation will lead to further regulations. (DSHEA provisions give the FDA significant latitude to increase regulation of the supplement industry.)⁴

8. Industry Structure

This section presents an overview of the companies that comprise the OTC nutritional supplement industry. The leading companies in this sector are briefly profiled.

Manufacturers of Fine Ingredients/ Raw Materials

Independent vendors supply about 60% of the raw materials used in OTC nutritional supplements. Worldwide, more than 150 small companies provide these raw materials, with a substantial portion coming from the Pacific Rim. Raw materials manufacturers supply supplement formulators with refined herbs, liquids, and powders, which are then put in tablet, capsule, or other consumable form.

4. For further discussion of the regulatory environment, see “Nutraceuticals.” *Spectrum Special Reports*, December 1998.

Strategies for Success

Given the tremendous consumer demand for safe and effective supplements and the growing number of companies entering nutritional supplement-related businesses each year, ingredient suppliers are under increased pressure to locate and process reliable sources of raw materials. Because of the growing number of companies looking to profit from the burgeoning supplement market, some raw materials manufacturers are not delivering a high-quality product. These companies may be speeding up their production cycle in order to feed the demand, or they may be trying to take advantage of new, inexperienced companies. To stay competitive in this market, suppliers and manufacturers will need to test samples from the early stages of processing up to the finished extract to ensure that they are supplying high-quality ingredients.

Reputable and dependable raw material manufacturers provide proof of the quality of their raw material sources with certificates of analysis issued by independent laboratories, and they have test programs in place at various phases of the production process to guarantee the purity of their ingredients. There are relatively few manufacturers of raw materials in this industry. However, several newcomers to the industry pass themselves off as reputable manufacturers, when they are, in fact, merely sacrificing quality in order to rapidly rush their products to market.

The raw materials manufacturer's Certificate of Analysis is the first way for supplement companies to ensure that they are using quality ingredients. The most reliable suppliers of high-quality ingredients have their products tested by several independent labs. Manufacturers that test at only one lab should be viewed cautiously because the lab could be dependent on the manufacturer for business, and its impartiality could be called into question. Testing of samples at each phase of the manufacturing cycle is also good business strategy for raw materials manufacturers.

The supplement formulators and marketers also have an obligation to ensure that they deliver a quality product to the consumer. To fulfill this obligation, they must research the methods used by their materials manufacturers in order to identify how the herbal ingredients are being grown, when they are harvested, and what other products the source grows or produces. They must also verify the cleanliness of the manufacturing and storage facilities.

Challenges

The botanical and herbal business has traditionally faced fluctuations in supply and demand. These fluctuations are inevitable in a market dependent on living organisms. For instance, many plants, including ginseng and echinacea, need to mature several years before they can be harvested. When new scientific studies highlight the health benefits of a particular herb or botanical, demand for new products that use this herb or botanical sometimes outpaces supply. In order for the manufacturers of herbal and botanical raw materials to succeed in the near future, they need to understand market and industry research and provide timely products as soon as new scientific reports are published. One way to do so is to fund projects that test the efficacy and safety of new supplements and to equip their facilities with versatile components that can be easily reconfigured when new raw materials need to be processed.

Raw materials manufacturers are employing several techniques to help increase their resistance to supply and demand irregularities. One technique is counter-cropping, which is the practice of planting crops in different regions of the world at alternate times of the year to ensure a year-round supply of an herb or botanical. This technique minimizes inventory levels and ensures a constant supply of fresh materials. Other companies choose to specialize in one particular process, product, or class of ingredients to become the leader of their particular field.

Another challenge that raw material suppliers must confront is finding high-quality materials containing the desired botanical or herbal ingredient and extracting them with batch-to-batch uniformity and dependable quality control. The process used to manufacture the botanical or herbal product will affect the physical properties, pharmacological impact, clinical efficacy, and safety of the product. Because botanicals are products of nature, sources of biological variation must be understood and accounted for during the manufacturing process. The location of the crop, season, climate, soil conditions, and cultivation practices also present significant sources of batch-to-batch variation well before the manufacturing process begins. In addition, the elements to which manufactured products are exposed in their storage facilities must be monitored and controlled.

To reduce batch-to-batch variations, some companies are using new analytical and extraction technologies. Mass spectrometer/gas chromatography (MS/GC) and other advanced techniques are used to define heterogeneous botanicals through standardized chromatographic fingerprints. With such technologies, companies can produce medicinal botanical products containing heterogeneous botanical mixtures with acceptable batch-to-batch uniformity, stability, and dosage-form acceptability. Raw materials companies can now obtain composition-of-matter patents for botanicals.

The branding of raw materials through trademarks and patents is another technique that some raw material manufacturers employ to give them a more competitive position in the marketplace. Branding offers enormous commercial advantages by giving the manufacturer a virtual monopoly on a particular compound, process, or application. It is also effective in gaining customer loyalty. The branding of raw materials also benefits consumers by letting them know where a particular product or item comes from and assuring them that high-quality ingredients are used. End consumers tend to choose supplements with branded ingredients rather than nonbranded ingredients; consumer surveys indicate that they are more comfortable using familiar brands.

The following companies are U.S. leaders in production and refinement of the natural raw materials and premixes that are then used in the formulation of nutritional supplements. Table 7 lists the leading worldwide suppliers of botanical raw materials. These botanical and herbal products encompass a wide range of plant-derived components, including roots, seeds, leaves, stems, and nuts, or a combination of parts or the whole of the plant.

Leading Companies

Ashland Chemical

Ashland Chemical
Fine Ingredients Division
5200 Blazer Parkway
Dublin, Ohio 43017

Telephone: (614) 790-3333
Internet: www.ashchem.com

President: Dave D'Antoni
Group vice president, specialty chemicals: Jim Duquin

Table 7. Leading U.S. Suppliers of Botanical Raw Materials

Company	Estimated 1997 U.S. Sales (\$MM)
<i>Based in the United States</i>	
Botanicals International	50
Hauser	30-50
Optipure (Chemco)	30-50
Folexo	15-20
East Earth Herbs	15-20
Mafco Worldwide	15-20
Triarco	15-20
Sabinsa	15-20
MW International	10-15
AYSL	10-15
Quality Botanical Ingredients	10-15
PureWorld	10-15
Technical Services International	10-15
Starwest Botanicals	10-15
Trout Lake Farm	10-15
<i>Based in Europe</i>	
Henkel (Germany)	30-50
Flachsmann (Germany)	30-50
Martin Bauer (Germany)	20-30
Schweizerhall (Germany)	15-20
SKW Trostburg (Germany)	10-15
Indena (Italy)	50
Euromed (Spain)	15-20
Arkopharma (France)	10-15

Source: Nutrition Business Journal. 1998; 3(6):3.

Decision Resources, Inc.

Ashland Chemical is a division of Ashland, a major chemical, oil refining, and energy conglomerate. Ashland is a public company and has been traded on the New York Stock Exchange for more than 60 years under the symbol ASH. In 1997, it employed 21,100 people and recorded \$14.2 billion in sales with \$279 million in net income.

The Fine Ingredients Division of Ashland Chemical supplies a wide range of ingredients, additives, and processing aids to the food and

beverage, nutritional, pharmaceutical, and personal care and cosmetic products industries. Its products can be categorized as follows:

- Amino acids.
- Antioxidants.
- Botanicals.
- Green foods.
- Mineral chelates.
- Mineral specialties.
- Nutritional supplements.
- Specialty items.
- Standardized botanical extracts.
- Vitamin/mineral premixes.
- Vitamins.

Having entered the market in 1996, Ashland Chemical's Fine Ingredients Division is a relatively new player in the nutritional products business. The division has made large investments in infrastructure improvements and in new testing equipment for raw-material refinement and processing. The company now offers 1,400 nutritional products and, because it is highly capitalized, has the ability to be a prominent player in the future.

Bio-Botanica

Bio-Botanica

75 Commerce Drive
Hauppauge, New York 11788

Telephone: (516) 231-5522; (800) 645-5720

Fax: (516) 231-7332

Internet: www.bio-botanica.com

President, chief executive officer: Frank D'Ameilo

Chief financial officer: Bill O'Reily

Founded in 1973, Bio-Botanica is a privately owned company that manufactures and supplies pure botanicals and ingredients for the food, pharmaceutical, and cosmetic industries. The company supplies the following products:

- Standardized botanical extracts.
- Tinctures.
- Nutraceuticals.
- Cosmetic intermediates.
- Certified organic herbs.
- Phytochemicals.
- Homeopathic preparations.
- Custom formulations.

Bio-Botanica's rigid quality-assurance procedure is perhaps its greatest attribute. The company uses specialized equipment and a team of highly trained scientists to strictly analyze and identify all raw materials before they are considered for processing. It sustains the largest authenticated set of herbarium samples in the United States. These properly speciated herbal samples have been collected over the past 50 years and are used in comparison tests of the morphology of incoming samples from various farms. The company also operates two analytical facilities in which it verifies the Certificate of Analysis of samples throughout the herbal extraction process.

The company uses two unique processes to ensure that its finished products are of high quality and potency. In a "pilot plant," which is a scaled-down replica of its manufacturing facilities, the company duplicates the raw-material manufacturing process on a much smaller scale and observes the effect of different variables on the finished product. The company's proprietary cold-vacuum distillation process, Bio-Chelation, yields a concentrate that retains all of the volatile oils found in the raw herb.

***Botanicals
International***

Botanicals International
2550 El Presidio Street
Long Beach, California 90810

Telephone: (310) 637-9566

Fax: (310) 637-3644

Internet: www.botanicalsintl.com

President, chief executive officer: Ralph Heimann

Vice president, controller: Terry Feit

Founded in 1979, Botanicals International (BI) is a subsidiary of Zuellig Group. In 1997, with more than \$50 million in domestic sales, BI was the largest supplier of botanical raw materials in the United States. BI supplies its products to the dietary supplement, pharmaceutical, and food and beverage industries. It manufactures more than 700 products in the following forms:

- Powdered botanicals.
- Standardized extracts.
- Simple drug-ratio extracts.
- Whole, raw-cut, and sifted botanicals.
- Whole and ground spices.

With German companies from the Martin Bauer Group, BI maintains two strategic alliances that allow it to be truly vertically integrated. BI is actively involved in all phases of the production of a supplement, from raw materials manufacture to marketing. By virtue of its alliance with Finzelberg of Nuremberg, Germany, BI is the exclusive North American distributor of Finzelberg's pharmaceutical-grade standardized extracts. Plantextrakt of Vestenbergsgrueth, Germany, provides BI with food-grade extracts for the tea and beverage industries.

BI operates its production facilities using pharmaceutical good manufacturing practice (GMP). The company's exclusive Identilok system, a unique internal quality-control measure, guarantees that its products have the highest levels of purity, authenticity, and cleanliness. It also employs several other quality-control measures.

Through its program of diversification, BI is modifying the way raw materials suppliers have traditionally done business. It has introduced a full line of trademarked products called CombiNature and NaturSpan. The company contends that diversification of businesses is one way for raw materials suppliers to remain viable in the rapidly evolving herbal industry.

Hauser

Hauser

5555 Airport Boulevard
Boulder, Colorado 80301

Telephone: (303) 443-4662

Fax: (303) 441-5803

Internet: www.hauser.com

Chairman, president, chief executive officer: Dean P. Stull, Ph.D.

Executive vice president, chief technical officer: Randall J. Daughenbaugh, Ph.D.

Founded in 1983, Hauser trades on the NASDAQ under the symbol HAUS. For the six-month period ending October 31, 1998, revenues rose 22%, to \$16.7 million. In 1997, with more than \$50 million in domestic sales, Hauser was the second-largest raw materials supplier in the United States. Employing 320 people, Hauser develops, manufactures, and markets special products from natural resources using proprietary technologies in extraction and purification. The company has three business units:

- *Bulk natural ingredients.* This unit includes NatureEnhance herbals and nutraceuticals, StabilEnhance food ingredients, and ColorEnhance flavor extracts.
- *Technical services.* This unit includes Hauser Labs and Shuster Labs, which conduct contract laboratory analysis and research and development in the fields of chemistry, engineering, materials science, and consumer products (e.g., foods, pharmaceuticals, household products).
- *Pharmaceuticals.* This unit works on natural and custom-synthesized compounds used in a variety of drug development and commercial applications.

Hauser began by providing laboratory services and by manufacturing patented pharmaceutical ingredients. In addition to its foundation business, Hauser now supplies a broad spectrum of herbs for a variety of applications. The company cultivates its own crops in locations in the United States and abroad. Its proprietary extraction process, called dynamic liquid/solid extraction (DL/SE), is applied to preserve the balance of compounds in the raw herb and ultimately the finished product.

In December 1998, Hauser merged with Zuellig Botanical Extracts (an herbal extract marketer and distributor), Wilcox Drug (which cultivates and sources organically grown botanical raw materials), and ZetaPharm (an importer and distributor of bulk vitamins, nutritional supplements, pharmaceutical ingredients, and food additives) for a purchase price of \$66 million. Hauser's purchase of these three companies effectively created the largest U.S. supplier of herbal extracts, botanical raw materials, and related products to manufacturers of dietary supplements and nutraceuticals. In fiscal 1998, the combined revenues of the four companies reached approximately \$125 million.

***M.W.
International***

M.W. International
225 Long Avenue
P.O. Box 308
Hillside, New Jersey 07205-2349

Telephone: (973) 926-4025

Fax: (973) 926-0989

Internet: www.mwinternational.com

President/cofounder: Michael W. Moers

Vice president/cofounder: Lewis N. Wayne

M.W. International is a private company that supplies a complete line of raw materials for use in the health food, pharmaceutical, cosmetic, and animal health industries. The company offers 70 products from the following product categories:

- Vitamins.
- Amino acids.
- Herbal extracts.

- Phytonutrients.
- Food and feed additives.
- Pharmaceuticals.
- Fine chemicals.

M.W. International has established itself in the herbal raw materials industry by producing several trademarked and patented items. In its product line, M.W. International has approximately 20 branded products whose claims of efficacy and safety are supported by scientific evidence.

The company's Pycogenol and Kaviar are two promising products that have the potential to be hot sellers over the next few years. Both of these products are characterized by their unique processing techniques and product profiles.

Pycogenol, which is now distributed by Henkel Nutrition, is an antioxidant source derived from French maritime pine-bark extract that contains more than 40 water-soluble antioxidants and flavonoids.

With Kaviar, M.W. International has the ability to capture a large share of the U.S. market. During the second half of 1998, demand for kava kava extract increased substantially and is predicted to grow steadily from 1998 to 2003. Kaviar is an aged full-spectrum kava extract that contains 22 different full-spectrum high-performance liquid chromatography (HPLC)-identified, biologically active kavalactones. Unlike other kava kava products on the market, Kaviar is made up of only whole, mature, lateral roots that are aged a minimum of seven years. Most other companies produce kava kava extract from the roots, leaves, and stems, thus reducing the total percentage of bioactive kavalactones available in the finished product. The company contracts its kava kava growers (other companies often buy whatever is available on the spot market), a practice that gives M.W. International the ability to control the harvest rate and to choose only the best quality plants. Kaviar is available in a water-dispersible form, giving it the capability of being added to water-based products such as liposome sprays.

The company performs multiple quality-control measures to ensure that its products meet its own high standards. It obtains a

Certificate of Analysis with every shipment of raw materials that arrives, in addition to performing its own lab analyses.

***Pfanstiehl
Laboratories***

Pfanstiehl Laboratories
1219 Glen Rock Avenue
Waukegan, Illinois 60085-0439

Telephone: (847) 623-0370; (800) 383-0126

Fax: (847) 623-9173

Internet: www.pfanstiehl.com

President: George Holstein

Vice president: Ed Holstein

Pfanstiehl Laboratories is a private company founded in 1919 to provide the United States with rare sugars and biochemical products. Today, the company is involved in the following businesses:

- Synthesizing pharmaceutical intermediates and bulk-active drugs.
- Manufacturing more than 225 fine chemicals, including carbohydrates and related compounds, sodium lactate, and lactate salts.
- Isolating and purifying naturally occurring substances.

In the United States, Pfanstiehl is by far the largest raw-material supplier of creatine monohydrate, a performance-boosting sports supplement that has experienced tremendous sales growth over the past three years. In 1998, the company held 30-40% of the approximately \$200 million annual U.S. wholesale market for creatine monohydrate. The total volume of creatine raw materials sold annually in the United States is estimated at 3 million to 4 million kilograms.

Pfanstiehl manufactures creatine in its own newly built 10,000-square-foot facility, which provides an annual production capacity of more than 4 million kilograms. In July 1998, Pfanstiehl introduced a new creatine monohydrate sucrose aggregate that is directly compressible and instantly soluble. This new creatine/sucrose aggregate is the result of a patented process that subjects a supersaturated sucrose/creatine monohydrate solution to rapid agitation, resulting in spontaneous crystallization. The crystals, which have a sponge-like appearance, increased surface area, improved taste profile, and offered less viscous composition, can be added to meal replacement

bars, cream centers, and extruded snack products without further processing. The creatine aggregate should satisfy the demands of athletes and fitness enthusiasts for a more versatile, readily assimilated, and potent form of creatine to fuel their workouts. The aggregate may also find applications in liquid creatine and effervescent creatine.

***Quality
Botanical
Ingredients***

Quality Botanical Ingredients

500 Metuchen Road
South Plainfield, New Jersey 07080

Telephone: (908) 668-0088

Fax: (908) 561-9682

Internet: www.4qbi.com

Chairman, chief executive officer: Nathan Belkowitz

Chief financial officer: Lucy Ortiz

A private company founded in 1976, Quality Botanical Ingredients (QBI) is currently a leading manufacturer and supplier of bulk botanical ingredients to a variety of natural products companies in the vitamin, food, herbal tea, pharmaceutical, diet and sports supplements, health and beauty care, and pet and equine products industries. The company has grown 45% over the past six years, and sales reached nearly \$30 million in 1998. QBI manufactures more than 500 herbs, 50 dried fruits and vegetables, and a selection of concentrated and standardized herbal extracts. It is a source for the following raw materials:

- Botanical powders.
- Guaranteed-potency herbs.
- Standardized botanical extracts.
- Concentrated extracts.
- Fruit and vegetable powders.
- Antioxidants.
- Bioflavonoids.
- Ginseng products.

- Chinese botanicals.
- Diet and sports supplements.
- Beehive products.
- Nutraceuticals.

QBI plans to merge with ATCA Products, Bactolac Pharmaceuticals, and Northbridge Laboratories. The merger will be consummated upon successful completion of a planned IPO of \$69 million, and the company will be called Advanced Nutraceuticals (the proposed ticker symbol is ANUI).

QBI has the capability to manufacture more than 4 million pounds of herbs annually. Two years ago, when sales increased 49% in one year, QBI met increased demand by installing a sophisticated nitrogen inerting, food grade, stainless steel cryogenic system that tripled its production capacity. QBI invented this cold-processing system, also called cryogenic milling, which preserves volatile herbal oils and active compounds and allows grinding of hygroscopic and aromatic botanicals. The advantages of this process are that the herbs and botanicals need not be cooked—usually standard procedure—and that they are fully bioavailable.

QBI is involved in other innovative practices that distinguish it from its competitors. It recently launched a domestic cultivation program with its affiliate Herb-Tech. Both companies plan to farm selective botanicals and herbals without the use of chemicals, thus producing a more specialized, value-added product.

***Supplement
Product
Formulators and
Marketers***

Strategies for Success

The nutritional supplement industry in the United States is relatively young, highly fragmented, and rapidly evolving. The major players are small to midsize food processing and noncyclical natural products companies that offer a broad spectrum of single- and multi-ingredient formulas for vitamins, minerals, herbals, botanicals, sports-nutrition items, amino acids, specialty nutrients, nutraceuticals, fibers, beverages, nutrition bars, and other products. The companies that build and maintain customer loyalty, offer various avenues through which to market their products (for example, via independent and chain pharmacies, wholesalers, retailers,

supermarkets, health food stores, and direct mail), and continue to offer new supplements that are responsive to the innovative research documented in new scientific studies will remain leaders in the industry.

We expect that, over the next five years, the following developments will lead to the introduction of more inventive multiple-formula products:

- Industrywide consolidation.
- Increased use of the nontraditional mass classes of trade, such as Internet selling and mass-market outlet selling.
- More-aggressive advertising and consumer education programs.

Products that offer multiple-nutrient, -mineral, -vitamin, and -herbal ingredients in one formula may accelerate the trend toward multifaceted and complete supplements. Educated consumers are increasingly looking for one supplement formula that can address multiple conditions. In addition, as competition increases, supplement manufacturers and marketers may benefit from concentrating resources on developing key brands and de-emphasizing others.

We also foresee that over the next five years many supplement manufacturers and marketers will be acquired by or become allied with large, well-capitalized pharmaceutical or specialty chemical companies. These newcomers to the industry are beginning to apply to supplements the same scientific approach they used when developing pharmacotherapies in order to attract those consumers who may be concerned that some supplement products are unsafe. Pharmaceutical and specialty chemical newcomers are also using their name recognition, purchasing power, and vast research, development, and marketing skills to gain a stronger foothold in the supplement field.

The smaller, established players in the industry will have to adapt to the presence of the large companies on the scene. They will need to back up their products with some scientific evidence illustrating efficacy and safety. In addition, direct sales to independent distributors will help the smaller companies circumvent the threat posed by the large competitors' brand recognition. Smaller companies can promote brand awareness through zealous advertising campaigns.

Offering innovative, timely products with multiple ingredients and proven efficacy will help to increase consumption among existing customers.

Challenges

Through the first half of 1998, many leading supplement manufacturers and marketers were still enjoying an impressive annual sales growth rate of 15-20%. However, during the second half of 1998, some small-to-mid-cap industry stalwarts such as Weider, TwinLab, and Rexall Sundown began to experience steady losses. This poor performance reflects the very dynamic nature of the supplement sector. The fall in stock prices is also indicative of the vulnerability of small-to-mid-cap companies during market downturns. Indeed, small-to-mid-cap company stocks are more volatile, but falling prices are often the result of broader economic trends rather than of factors in specific sectors.

The growing popularity of nutritional supplements with the average U.S. consumer is setting the stage for an increasingly competitive environment among supplement manufacturers and marketers. Large pharmaceutical firms, food processors, specialty chemical companies, and mass-market retailers have entered the arena. The challenge will be for these smaller supplement firms to adapt to the new competitive forces and to continually modify the way they do business.

The entrance of pharmaceutical giants Bayer, Warner-Lambert, and American Home Products (and the imminent entry of SmithKline Beecham and Schering-Plough) into the nutritional supplement business has raised some concern among supplement manufacturers and marketers. However, this pharmaceutical industry involvement has some advantages. First, the presence of these giants in the industry increases the market size and creates greater consumer awareness of supplements. Second, larger supplement manufacturers and marketers are able to compete against these pharmaceutical companies because companies like Rexall Sundown, NBTY, and TwinLab can research, manufacture, market, and distribute innovative new supplements more rapidly than the multinational giants. The larger supplement manufacturers have specifically tailored manufacturing facilities, a grasp of varied distribution avenues, and more experience in the supplement sector. These attributes allow them a tremendous turnaround of their products

because these firms can quickly configure their equipment for supplement formulation and then bring their products to the store shelf.

Table 8 lists the leading nutritional supplement manufacturers and marketers in the United States.

Leading Companies

American Home Products

American Home Products (parent company)

Five Giralda Farms
Madison, New Jersey 07940

Telephone: (973) 660-5000

Fax: (973) 660-5771

Internet: www.ahp.com

President, chairman, and chief executive officer: John Stafford

Senior executive vice president, chief financial officer: Robert Blount

Whitehall-Robins Healthcare

Five Giralda Farms
Madison, New Jersey 07940

American Home Products (AHP) was founded in 1926 and trades on the New York Stock Exchange under the symbol AHP. AHP recorded \$14.2 billion in sales in 1997, ranking sixth in overall sales for global pharmaceutical and health care products companies. With its 60,523 employees, the company is involved in the discovery, development, manufacture, and marketing of the following products:

- Prescription drugs.
- OTC medications.
- Vaccines.
- Biotechnology products.
- Agricultural products.
- Animal health care products.

Whitehall-Robins, the consumer health division of AHP, employs 1,700 people in the United States and had \$1.4 billion in U.S. sales

Table 8. Leading U.S. Supplement Manufacturers and Marketers

Manufacturer/Marketer	Headquarters' Location	Estimated 1997 Supplement Sales (\$MM)
Leiner Health Products (Your Life)	Carson, CA	425
Pharmavite (Nature Made)	San Fernando, CA	340
American Home Products (Centrum)	Madison, NJ	325
Rexall Sundown	Boca Raton, FL	291
NBTY	Bohemia, NY	281
General Nutrition Companies	Pittsburgh, PA	260
Weider Nutrition Group	Salt Lake City, UT	219
Twin Laboratories	Hauppauge, NY	213
Abbott Labs (Ross Products)	Columbus, OH	170
Perrigo	Allegan, MI	152
Solgar Vitamin & Herb Company	Hackensack, NJ	120
Bayer Corporation	Pittsburgh, PA	110
IVC Industries	Freehold, NJ	109
Experimental & Applied Sciences (EAS)	Golden, CO	108
Natures Way Products (MMS)	Springville, UT	100
Nutraceutical International	Park City, UT	98
Pharmaton Natural Health Products	Stamford, CT	90
PowerFoods	Berkeley, CA	90
MET-Rx USA	Irvine, CA	88
Country Life Vitamins	Hauppauge, NY	70
Mead Johnson	Evansville, IN	70
Amrion (Whole Foods Market)	Boulder, CO	65
Now Foods	Glendale Heights, IL	55
Enzymatic Therapy	Green Bay, WI	50
Anabolic Labs (Vitamer)	Irvine, CA	50
Vitatech International	Downey, CA	50
Natural Alternatives	San Marcos, CA	49
Optimum Nutrition	Aurora, IL	45
Natrol	Chatsworth, CA	43
Balance/Bio Foods.	Carpinteria, CA	40
Chattem (Sunsorce)	Chattanooga, TN	40
Nature's Plus	Melville, NY	35
Planetary Formulas	Scotts Valley, CA	35
HVL	Pittsburgh, PA	34
Weinstein Nutritional Products (Ashland)	Irvine, CA	33
Metagenics	San Clemente, CA	32
Pharmanex	Simi Valley, CA	32
Standard Process	Palmyra, WI	30
Tishcon	Westbury, NY	30

Source: Nutrition Business Journal. 1998;3(9):18.

in 1997. Three Whitehall-Robins products—Advil, Robitussin, and Centrum—are among the five top-selling nonprescription products in the United States. The company's products fall in the following categories:

- Analgesics.
- Respiratory remedies.
- Nutritionals.
- Gastrointestinal health.
- Topical products.

Based predominantly on its sales of Centrum, AHP was the third-largest supplement manufacturer and marketer in the United States in 1997, with \$325 million in sales. In late 1998, the company introduced six new herbal products in the Centrum line (Centrum Echinacea, Centrum Garlic, Centrum Ginkgo Biloba, Centrum Ginseng, Centrum Saw Palmetto, and Centrum St. John's Wort). These products are developed using the PharmaPrint Process to identify active compounds of the herbals and ensure optimum potency. The resulting products offer consistent doses of active ingredients. This unique technology, developed by PharmaPrint in 1996, serves in the following functions:

- Identification, quantification, and control of the active components of an herbal compound.
- Determination of the activity of each component in a specific bioassay.
- Ensurance that components are present in predetermined quantities for a given manufactured herbal batch.

AHP plans to be a powerful presence in the natural health products industry. In August 1998, Whitehall-Robins paid \$400 million for Solgar Vitamin & Herb (Hackensack, New Jersey), an herbal, vitamin, and mineral manufacturer. In 1997, Solgar ranked eleventh among U.S. supplement manufacturers and marketers, with \$120 million in revenues.

**General
Nutrition
Companies**

General Nutrition Companies
300 6th Avenue
Pittsburgh, Pennsylvania 15222

Telephone: (412) 288-4600

Fax: (412) 288-4743

Internet: www.gnc.com

President, chief executive officer: William E. Watts

Executive vice president, chief financial officer: Edwin J. Kozlowski

Founded in 1947, General Nutrition Companies (GNC) is traded on the NASDAQ under the symbol GNCI. It employs 13,800 people and had \$260 million in sales in 1997. GNC, the only nationwide, vertically integrated supplement retailer, is involved in all phases of formulation, distribution, and marketing of the following product lines:

- Vitamin and mineral supplements.
- Sports nutrition.
- Herbal formulas.
- Personal care products.
- Specialty health care products.

GNC is the number-one specialty dietary supplement retailer in the United States. Its products are sold through a network of approximately 3,900 retail stores operating under the following names: General Nutrition Centers, Health & Diet Center, Nature's Fresh, GNC Live Well, and Amphora. GNC stores are located in all 50 states and in 23 international markets.

In late 1998, GNC purchased a progressive chain of natural food and wellness stores called Nature's Northwest. The stores blend the mainstream supermarket experience with a comprehensive natural-health retail and services offering. In these stores, consumers can buy organic produce, prescription drugs, and homeopathic remedies; take a yoga class; get a massage; and learn how to cultivate herbs. Because both GNC and Nature's Northwest serve the same customer base—health-conscious baby boomers—GNC hopes to further penetrate the health and wellness market by accessing its

core customers through means other than its traditional health and supplement stores.

In January 1999, GNC and Rite Aid—the third-largest drug chain in the United States—agreed to become partners in a multitiered deal. Under the provisions of the agreement, GNC will open 1,500 boutique stores in select Rite Aid locations across the country over the next three years. The deal expands GNC's retail operations by approximately 40%.

Additional provisions of the agreement state that GNC will manufacture a complete line of dietary supplements under the PharmAssure brand name for exclusive distribution in all 3,900 Rite Aid stores and 3,650 domestic GNC outlets. GNC will also become the exclusive manufacturer of Rite Aid's entire private-label vitamin and supplement line. Both companies believe that this partnership will be successful because the credibility of Rite Aid pharmacists, who will be able to recommend specific products to consumers, will add a great deal of value to the GNC product line. Through this partnership, GNC hopes to recapture market share that it lost to mass-market retailers such as Wal-Mart and Costco.

On January 19, 1999, GalaGen announced an exclusive collaboration agreement with GNC. Under the agreement, GNC and GalaGen will develop (using GalaGen's Proventra formulations) and market a range of immune system-boosting dietary supplements and sports-nutrition formulas for specialized and mass-market retailers. The products will be launched in the second half of 1999.

***Leiner Health
Products***

Leiner Health Products
901 East 233rd Street
Carson, California 90745

Telephone: (310) 835-8400

Fax: (310) 952-7760

Internet: www.leiner.com

Chief executive officer: Robert Kaminski

Vice president of marketing: Bob LeFerriere

The largest supplement manufacturer and marketer in the United States, Leiner Health Products is a private company with \$425 million in revenues in 1997. For the quarter ending September 30,

1998, net sales were \$149.4 million, an increase of \$37.2 million, or 33%, over the comparable period in 1997. In its quarter ending December 31, 1998, net sales were \$162.2 million, a 22% increase over the comparable previous year period. The company markets more than 470 products under the following brand names:

- Your Life—an ever-expanding line of vitamins, minerals, essential nutrients, herbal products, and specialty formulas.
- Pharmacist Formula—various OTC pharmaceutical products.
- Bodycology and Natural Life—skin-care products.

Leiner's growth over the past few years can be attributed in part to its extensive private-label business. Leiner is a leader in the private-label business, which generates nearly 62% of all vitamin E sales. However, the private-label business provides only 20% of herbal sales. Thus, the herbal private-label market has tremendous potential, and Leiner has future designs on capturing a larger stake in it. The company believes that there is a natural progression in terms of how consumers purchase their supplements. First, they buy through the health food channel; then, some consumers switch to the nationally recognized brands available through mass retail outlets; and finally, a sizable group of consumers trade down to the lower price points offered through private-label brands. Because consumers are developing confidence in the mass-market outlets of CVS, Eckerd, Walgreen's, and others, the potential is great for private-label supplement suppliers such as Leiner to further penetrate this market segment.

Based on Leiner's sheer volume of product, the company maintains the most extensive manufacturing and distribution facilities of all supplement manufacturers and marketers. Its 540,000-square-foot product manufacturing and packaging plant minimizes cycle time in the manufacturing and distribution process, thus allowing rapid product turnaround and lower prices for customers.

Natrol

Natrol

21411 Prairie Street
Chatsworth, California 91311

Telephone: (818) 739-6000; (800) 326-1520

Fax: (818) 739-6001

Internet: www.natrol.com

Chief executive officer: Elliot Balbert

Chief financial officer: Dennis R. Jolicoeur

Founded in 1980, Natrol is a public company traded on the NASDAQ as NTOL. The company has 195 employees and recorded \$43 million in sales in 1997. For the nine months ending September 30, 1998, net sales rose 66% to \$48.9 million. Net income totaled \$5.3 million, up \$2.4 million from the same period of the previous year. The company manufactures a diverse line of dietary supplements, including the following:

- Vitamins.
- Minerals.
- Herbs.
- Nutritional hormones.
- Diet aids.
- Dietary products.
- Specialty formulas.

The three impressive products in Natrol's specialty-formula category—vitamin C, garlic, and kava kava—contain ingredients with diverse histories and characteristics.

Natrol's Ester-C is an ascorbate complex bound with calcium carbonate that is naturally processed in purified water (i.e., without the use of alcohol or acetone solvents). Ester-C has less acid than similar vitamin C formulas on the market. The Ester-C product line contains formulas with added herbals such as echinacea and garlic to help bolster the body's resistance to illness.

Natrol's GarliPure lines have the potential to be hot new sellers. GarliPure contains standardized garlic actives extract with key constituents like alliin, allicin, sulfur, thiosulfonates, and gamma glutamyl cysteines. GarliPure is intended to alleviate cardiovascular conditions and ease cold and flu symptoms.

One of the most aggressive promoters of kava kava, Natrol spent \$2 million on print and broadcast ads in 1997. Kavatro contains kava root extract, chamomile, hops, and schizandra herbs and is used as a general relaxant. Results from a randomized, double-blind, placebo-controlled study indicated that Kavatro is effective in reducing daily stress and anxiety in adults. Natrol is also developing two kava kava products for children with anxiety disorders.

Natrol made two new acquisitions in 1998 that helped to significantly diversify its product lines and boost its name recognition in the industry. In March, Natrol purchased Pure-Gar, makers of a broad spectrum of botanical supplements, for \$11.1 million. On September 21, Natrol acquired Laci Le Beau, manufacturer and marketer of herbal teas, for \$7.5 million. Laci Le Beau had 1997 sales of \$7.2 million, with an unaudited gross profit margin of about 20%.

***Natural
Alternatives
International***

Natural Alternatives International

1185 Linda Vista Drive
San Marcos, California 92069

Telephone: (760) 736-7780

Fax: (760) 744-9589

Internet: www.nai-online.com

Chief executive officer: Mark LeDoux

Executive vice president: David Lough

Founded in 1986, Natural Alternatives International (NAI) is a public company that is traded on the NASDAQ under the symbol NAI. NAI's sales have increased steadily over the past six years, from \$14.5 million in fiscal 1992 to \$67.9 million in fiscal 1998 (ending June 30, 1998). For the three months ending September, 30, 1998, revenues increased 41%, to \$17 million. The increase can be attributed to the company's efforts to diversify its customer base. NAI is involved in the following businesses and services in the field of nutritional science:

- Formulating, manufacturing, and marketing customized nutritional supplements such as herbal preparations, vitamins, minerals, hormones, amino acids, and specialty products.
- Assessing clinical studies.
- Managing and supporting marketing.
- Designing packaging and delivery systems.
- Assisting in international product registration.

NAI formulates, manufactures, and markets client-specific nutritional supplements that are then distributed to leading consumer health products companies and fitness clubs. For example, NAI's products are distributed to companies such as Jenny Craig, Bally Total Fitness, Avon, and Nordic Track under brand names.

NAI is taking a number of steps to remain competitive. First, it diversified its customer base by adding Herbalife, Pharmavite, and Alcon Pharmaceuticals as new clients. NAI plans to continue diversification as part of its strategy for growth over the next year. Second, by mid 1999, the company plans to move its headquarters to a new 82,000-square-foot manufacturing facility. This move will allow the company to double its current manufacturing capacity and will facilitate its introduction of a new line of specialty supplements. NAI also plans to acquire a facility in Switzerland to help boost its European presence and to avoid the high costs of shipping products to Europe from the United States.

NBTY

NBTY

90 Orville Drive
Bohemia, New York 11716

Telephone: (516) 567-9500

Fax: (516) 567-7148

Internet: www.nbty.com

Chairman, president, and chief executive officer: Scott Rudolph

Chief financial officer, secretary, and executive vice president: Harvey Kamil

Founded in 1971, NBTY is traded on the NASDAQ under the symbol NBTY. For the fiscal year ending September 30, 1998, sales increased 61% to \$573 million, compared with \$356 million for the same period of the prior year.

NBTY is a vertically integrated manufacturer, marketer, and retailer of more than 1,000 products, including vitamins, minerals, herbals, amino acids, and specialty supplements. The company's strength lies in its practice of manufacturing a product and then delivering the products directly to retail outlets, without using a broker to mediate the process. NBTY brands include the following:

- Nature's Bounty.
- Vitamin World.
- Puritan's Pride.
- Holland & Barrett.
- Nutrition Headquarters.

NBTY, along with Weider and Rexall Sundown, is ahead of all other supplement formulators and marketers in terms of presence in international markets. In August 1997, NBTY purchased Holland & Barrett Holdings, one of the leading nutritional supplement retailers in the United Kingdom, for an aggregate price of approximately \$169 million. Not only did the merger give NBTY a significant presence in Europe, but it also gave the company a boost in revenue; for the year ending September 30, 1998, the Holland & Barrett retail operations accounted for 23% of NBTY's overall revenue.

Another recent merger was orchestrated to increase NBTY's mail-order operations. In April 1998, the company purchased a group of affiliated, privately held companies known for their mail-order services collectively referred to as the Nutrition Headquarters Group. The purchase of Nutrition Headquarters Group cost approximately 8.8 million shares of its common stock and \$3.3 million in transaction fees. In the later part of 1998, NBTY integrated Nutrition Headquarters Group's mail-order businesses. This acquisition makes NBTY the single-largest direct-mail source of nutritional supplements in the United States.

NBTY delivers its products directly to its own retail operations (Vitamin World in the United States and Holland & Barrett in the United Kingdom), to wholesale outlets, and to mail-order operations. NBTY has 200 Vitamin World stores and 415 Holland & Barrett stores in operation, and its goal is to have 800 stores worldwide by the end of 1999 and 1,000 stores by 2001.

NBTY follows pharmaceutical industry good manufacturing practice and takes a conservative marketing approach by not making any claims on the labels of its products. With 750,000 square feet of manufacturing space, NBTY has the capacity to manufacture 1.4 billion tablets per month, 600 million softgel capsules per month, and 400 million two-piece capsules per month. The company is ranked third in supplement-manufacturing capabilities.

Recently, NBTY introduced Radiance, a one-per-day, multiformula, multinutrient, vitamin/mineral complex aimed specifically at consumers older than 50. This product has all the benefits of a complete multivitamin, coupled with ingredients that may produce a more health-promoting profile. To make Radiance, NBTY incorporated the newly popular ingredients CoEnzyme Q10, Pycogenol, red wine and green tea extract, chromium piccolinate, ginseng, garlic, and vitamins B and C into one multivitamin tablet. Radiance also comes with a comprehensive packet of information regarding the key ingredients. Given the popularity of comprehensive and innovative products, Radiance is at the forefront of a new industry trend—offering one product that contains multiple vitamins, minerals, herbals, and specialty nutrients.

NBTY plans to expand its online shopping and mail-order capabilities. Puritan's Pride, an NBTY division and the highest-volume vitamin catalog in the United States, offers a variety of products at low, factory-direct prices and has recently launched an online shopping catalog. NBTY's investments in infrastructure over the past two years will give the company the ability to handle and process the growth in order volume generated by anticipated Internet sales.

Pharmavite

Pharmavite

15451 San Fernando Mission Boulevard
Mission Hills, California 91345

Telephone: (818) 837-3633

Fax: (818) 837-6178

Internet: www.vitamin.com

President, chief executive officer: Tatsuo Higuchi

Chief financial officer: John Vickers

Founded in 1971, Pharmavite has, since 1989, been a subsidiary of Japanese drug giant Otsuka Pharmaceutical, an \$8 billion pharmaceutical and OTC products manufacturing and distribution company. With \$340 million in revenues, Pharmavite was the second-largest supplement manufacturer and marketer in the United States in 1997. (Data for 1998 are not available.) The company has four major product brands:

- Nature Made vitamin-supplement brand.
- Nature's Resource premium herbs.
- Jogmate, a supplement targeting endurance athletes.
- Vitesse, an energy-boosting supplement.

In an independent market survey of regular supplement users, Nature Made showed 82% brand awareness, the highest of any supplement line in the United States. In addition, Nature Made has an 18% share of the vitamin E market. The nearest competitor has a 4% market share.

Pharmavite is committed to supporting its entire product line, as opposed to concentrating on only a few products. Like the Nature Made brand, the Nature's Resource product line also enjoyed tremendous recent success (1998 sales of this product line were nearly double those of 1997). Its other brands were successful, but their growth rates were not as remarkable.

In January 1999, Pharmavite and Fuisz Technologie announced the national launch of Fuisz's proprietary calcium soft-chew products under the brand name Nature Made's Calburst. Fuisz will supply the necessary quantities of the calcium soft-chew product, which is manufactured using Fuisz's patented Shearform technology. Shearform

technology produces a rapidly dissolving tablet that provides a timed release of its ingredients. Both companies plan to identify, develop, and launch other innovative products.

Rexall Sundown

Rexall Sundown

6111 Broken Sound Parkway N.W.
Boca Raton, Florida 33487

Telephone: (561) 241-9400

Fax: (561) 995-0197

Internet: www.rexallsundown.com

Chief executive officer: Christian Nast

Chief financial officer, vice president, and treasurer: Geary Cotton

Founded in 1976, Rexall Sundown became a public company in 1993 and is traded on NASDAQ under the symbol RXSD. The company employs 1,200 people in 17 facilities in the United States, South Korea, China, Mexico, and Taiwan. In 1997, the company recorded net sales of \$263 million, a 41% increase over 1996. It also posted strong results in 1998, with sales reaching \$377.2 million for the nine months ending May 31.

Rexall Sundown develops, manufactures, markets, and sells vitamins, minerals, herbals, homeopathic remedies, weight-management products, skin care products, OTC pharmaceuticals, and nutritional supplements through three channels of distribution: (1) sales to retailers, (2) direct sales through independent distributors, and (3) mail order.

Rexall Sundown sells 1,500 products nationwide and to 50 countries under the following six product lines:

- *Sundown.* As the number-one broad-based vitamin brand in the United States in terms of units sold and total dollar sales, Sundown products are distributed through mass merchandisers, drugstores, and supermarkets. Sundown's Osteo-Bi-Flex preparation, a patented blend of glucosamine and chondroitin intended to promote healthy joint function in arthritis sufferers, became the third-highest-selling national-branded nutritional product in the vitamin category after only four months on the market.
- *Rexall Showcase International.* This product line offers health and wellness products through independent distributors. Six new

products were introduced in 1997, spurring a 38% increase in sales to \$105 million. The group also expanded its business into South Korea, Mexico, and Hong Kong.

- *Rexall*. This product line offers a wide spectrum of vitamins and nutritional supplements through drugstores, wholesalers, and convenience stores.
- *Thompson*. This product line provides nutritional products to health-food wholesalers.
- *Rexall Managed Care*. This product line offers nutritional products to HMOs.
- *SDV Vitamins*. This product line features value-priced products available through mail-order sales.

In December 1998, Rexall Sundown signed an exclusive worldwide licensing agreement with ProteoTech, a drug-discovery company that identifies therapeutics and diagnostics for human disease utilizing proteoglycan technologies. Under the provisions of the agreement, ProteoTech granted Rexall Sundown an exclusive license in the dietary supplement field to manufacture, sell, and distribute products based upon PTI-00703, a proprietary ingredient discovered by ProteoTech to have promising amyloid-inhibitory characteristics. PTI-00703 has been shown to prevent or disrupt the formation of brain amyloid deposits, which are believed to play a major role in Alzheimer's disease. ProteoTech will provide additional research and development support to Rexall for PTI-00703, as well as similar compounds for use as dietary supplements.

ProteoTech and University of Washington researchers discovered that PTI-00703 also has the ability to disrupt and/or dissolve pre-formed Alzheimer's disease amyloid fibrils in vitro. By mid 1999, both companies plan to begin human clinical trials of various nutritional supplements that contain PTI-00703 on patients with early-to-moderate Alzheimer's disease. PTI-00703, Cat's claw, and ginkgo biloba are ingredients in Sundown NeuroSharp, a supplement launched in late 1998 that is intended to improve digestion and mental alertness.

Rexall Sundown is ahead of other companies in the industry in its acquisition quest for products that have the potential to be patented

and for companies that can enhance its position in the marketplace. The company plans to continue this strategy and to expand upon such recent additions as ProPortion nutritional bars, Aestival personal care products, and Sundown NeuroSharp.

TwinLab

TwinLab

150 Motor Parkway
Suite 120
Hauppauge, New York 11788

Telephone: (516) 467-3140

Fax: (516) 630-3490

Internet: www.twinlab.com

Chairman, chief executive officer, and president: Ross Blechman

Chief financial officer: John McCusker

Founded in 1970 and incorporated in 1996, Twin Laboratories (TwinLab) is a public company traded on the NASDAQ under the symbol TWLB. Total sales for 1998 are expected to be approximately \$338.4 million, a 47.4% increase over 1997. Net income for 1998 showed an increase of 50.8% over 1997. Sales in 1997 were \$213 million, ranking TwinLab eighth among U.S. supplement manufacturers and marketers.

TwinLab's operations comprise five divisions:

- *TwinLab Division* manufactures and markets high-quality herbal preparations, vitamins, minerals, nutraceuticals, antioxidants, fish and marine oils, and amino acids. This division also produces a full line of sports nutritional supplements that target the special nutritional requirements of high-performance athletes who need to replenish lost glucose and electrolytes, enhance lean muscle growth, and increase energy and stamina. TwinLab's DietFuel and RippedFuel are two of the leading fat loss/energy-promoting supplements on the market. Specialty products, such as MaxiLIFE Glucosamine Sulfate and Chondroitin Sulfate Formula and the MaxiLIFE Protector series, are marketed for specific age-related conditions such as osteoporosis, joint pain, and arthritis.
- *Nature's Herbs Division* offers herbs and phytonutrients that are natural alternatives to OTC medications.

- *Alvita Tea Division* produces herbal teas containing various botanical supplements.
- *Changes International*, TwinLab's direct-sales subsidiary, produces specially formulated nutritional supplements that are aimed at the educated and discerning over-50 age bracket.
- Acquired by TwinLab in August 1998, *PR*Nutrition* makes nutritionally enhanced food bars and powdered drinks.

PR*Nutrition recorded \$16.5 million in net sales in 1997. This acquisition is in line with TwinLab's goal of augmenting its already substantial sports-performance nutrition series. TwinLab can leverage its own advertising, development, and distribution expertise to include PR*Nutrition food bars and powdered drinks, items that are becoming very competitive in the traditional retailing sector.

TwinLab did not become involved in the mass-market channel of distribution until 1998. Large initial purchase orders during the first half of the year were followed by lower-than-expected orders for the last half of the year. Using the mass-market sales data from 1998, the company is in a better position to predict orders for 1999. TwinLab hopes to increase this distribution channel in order to expand its already strong footing in its core health-food business. TwinLab recently reaffirmed its position in the health-food sector by signing a multiyear agreement with its largest health-food customer.

TwinLab's presence and brand recognition in the sports supplement market are very strong. Its DietFuel, RippedFuel, and various creatine products are, according to many experienced athletes, among the best on the market for increasing energy, fat loss, and muscle growth. In an effort to improve its standing in the herbal and botanical domain, TwinLab introduced a new product line called TwinLab TruHerbs under the brand name Ironman Triathlon. In 1998, 51 of the company's 100 new products came from the TruHerbs line. TwinLab is the first company to offer herbs in pills that offer a sustained, pharmaceutical-style release over a 12-hour period. This timed-release quality is imparted during tablet formulation, when raw materials are specially blended to trap the nutrients in a tablet matrix.

In 1998, only 5.7% of TwinLab's business came from the international market and less than 1% came from the mass-retail market. These two markets offer TwinLab the greatest potential for future growth. TwinLab plans on targeting the nearly 47,000 retail outlets in the United States with its new mass-market group.

***Weider Nutrition
International***

Weider Nutrition International
2002 South 5070 West
Salt Lake City, Utah 84104-4726

Telephone: (801) 975-5000

Fax: (801) 972-6532

Internet: www.weider.com

Chief executive officer and president: Richard B. Bizzaro

Chief financial officer and executive vice president of operations: Stephen D. Young

Founded in 1947, Weider Nutrition International first traded on the NYSE in 1997 under the symbol WNI. Weider had \$219 million in sales in fiscal year 1997, an increase of 17.3% over fiscal year 1996. For the past five years, the compound average annual growth rate for net income was 45%. Weider has 625 employees and manufactures its branded products in five facilities in California, Nevada, South Carolina, and Utah.

Weider manufactures and markets 1,400 products in a broad range of capsules and tablets, powdered drink mixes, bottled beverages, and nutrition bars. It markets its branded products in four categories:

- Sports nutrition.
- Vitamins, minerals, and herbs.
- Dietary products.
- Healthy snacks.

More than 50 years ago, Weider became the first company to offer sports nutrition products to support muscle growth, increase stamina and energy, and reduce body fat. Today, these products are some of the most recognizable in the supplement industry. In addition, the company has successfully expanded its portfolio of brands

and product categories to appeal to a variety of other consumer groups.

Weider is ahead of its competitors in terms of investments in manufacturing and production infrastructure. The company recently completed a 418,000-square-foot manufacturing and distribution facility. Weider is also an industry leader with its multibrand, multi-channel strategy. Its extensive distribution network includes 14 classes of trade—among them are mass-volume retailers, health and nutrition stores, private-label, health clubs, and international retailers. The company's Schiff brand and Great American Nutrition brand are profitable products in health food stores and mass-market outlets, respectively.

Weider's product portfolio is extensive, and it has successfully become an aggregator of niche brands by developing or acquiring brands within specific areas of the industry. Its vitamin, mineral, and herb category consists of several products intended for consumers in discrete demographic groups. For instance, Great American Nutrition's Prime Time is one of the first comprehensive health programs that incorporate a range of supplements aimed specifically at men older than age 40. Prime Time's nutritional supplements, exercise program, and dietary recommendations are designed to increase energy, assist in weight control, promote mental alertness, and maintain prostate health and virility. Schiff's herbals and botanicals target the over-50 demographic group and aim for the specific goal of disease prevention. Schiff is one of the industry leaders in developing the phytonutrients lycopene, which is believed to be effective in lowering prostate cancer risk, and beta glucan, which is effective in lowering blood-cholesterol levels.

Weider's ability to offer distinct brands to each distribution channel allows it to focus on expanding each of these channels without compromising its brands or becoming overly dependent on any one of them. For the future, Weider plans to develop new products and to continue to augment its multibrand, multichannel strategy. It also plans to continue its strategic acquisitions (seven have been made in the past three years). Among the companies and entities acquired were manufacturing and distribution facilities, several brands, and international operations, including Haleko, the largest sports nutrition company in Germany. In 1998, 25% of Weider's revenues came from international business; it hopes to build on this figure with

selective acquisitions and other overseas business development tactics.

Retailers and Wholesalers

OTC nutritional supplements reach the consumer primarily by way of seven different channels of suppliers. Because the majority of the players in the supplement industry are small marketing businesses, each company usually targets one or two distribution channels. In 1998, the size of the dietary supplement market reached through mass-retail outlets was approximately \$4 billion. The drugstore channel owned a commanding share of this market, roughly 31%, or \$1.72 billion. Table 9 lists the seven distribution channels and the major competitors in each channel.

In 1998, natural-product retailers sold approximately \$25.3 billion worth of products. Their sales included conventional grocery goods such as organic and nonorganic meats, dairy products, beverages, produce, and bakery items, plus nonconventional items such as natural medicine products, food service items, personal care articles, and vitamins and supplements. Vitamins, minerals, sports nutrition, herbs/botanicals, and specialty supplements made up 54% of overall natural-product retail sales, amounting to \$13.66 billion. Natural foods and beverages accounted for \$8.60 billion (34%) and natural personal care products for \$3.04 billion (12%).

Table 9. U.S. Channels of Supplement Distribution

Distribution Channel	Percentage of Supplements Purchased from Channel	Major Supplement Marketers and Suppliers	Projected Annual Growth of Distribution Channel, 1997-2000
Pharmacy/drugstore: American Drug, CVS, Rite Aid, Walgreen's, etc.	31%	GNP Pharmavite Leiner Tishcon Northbridge Labs	11-15%
Mass volume retail grocery/supermarket: Wal-Mart, K-Mart, Costco, Target, Sam's, Albertson's, Giants, Ralph's, etc.	22%	Weider Nutrition International TwinLab Amerifit Rexall Sundown Richardson Labs Slim-Fast Thompson Medical Cybergenics	12-16%
Direct sale, network marketing, and mail order marketers	15%	Amrion Amway Herbalife Nu-Skin USANA	6-10%
Health food supermarket: Bread and Circus, Whole Foods	10%	Costello's Nature's Best	8-12%
Vitamin/supplement store: General Nutrition Center, Vitamin World, and various other independent chains	9%	Weider Nutrition International E.A.S. TwinLab MetRx Nature's Way Nutraceutical International	8-12%
Gyms and health clubs: Bally's Health and Fitness, Gold's Gym, World's Gym, Powerhouse Gym	8%	Weider Nutrition International E.A.S. TwinLab Nature's Way Nutraceutical International	6-10%
Health food store: small independent operations	5%	Various companies	3-7%

Source: Decision Resources, Inc.

About the Author

Eric J. Minkwitz is a research associate at Decision Resources, Inc., where he has worked on a variety of consulting projects focusing on infectious disease, acute neurology, pain management, and urological disorders. He is also a personal fitness trainer and counsels clients on proper strength and conditioning techniques and nutrition programs. He holds a B.A. in biology and environmental science from Williams College.

About Decision Resources, Inc.

Decision Resources is an international publishing and consulting firm that evaluates worldwide markets, emerging technologies, and competitive forces in the life sciences, information technology, and process industries. Decision Resources links client companies with an extensive network of technology and business experts through consulting, subscription services, and reports.

For more information, contact David M. Fleming (by phone at 781.487.3767, by fax at 781.487.5750, or by E-mail at dfleming@dresources.com) or visit our World Wide Web site at <http://www.dresources.com>.

Program Director

Elliot Barber, Ph.D.
Vice President, Decision Resources, Inc.

Editors

Catherine Cuddihee, Director
Beth Castrodale
Siobhan Donovan
Sarah Graffam
Barbara Holland
Lisa Smith
Ron Welter

Production Staff

Ruth Greco, Manager
Donald Cooke

Graphics

Deborah DiRocco
Renée Hughes

Fulfillment

Paula T. Sturgis
Mary R. Kanaskie

A DECISION RESOURCES publication.

© 1999 by Decision Resources, Inc. DECISION RESOURCES and SPECTRUM are registered in the U.S. Patent and Trademark Office.

Purchase of this report is on a nonexclusive basis. This material, prepared specifically for clients of Decision Resources, Inc., is furnished in confidence and with the understanding that the report, and any additional copies purchased at a reduced price, will be used only within the operating division for which it is purchased. Nothing in this document may be used or duplicated in any form without our prior permission in writing. The opinions stated represent our interpretation and analysis of information generally available to the public or released by responsible individuals in the subject companies. We believe the sources of information on which our material is based are reliable, and we have applied our best professional judgment to the information obtained. We do not assume any liability for the accuracy, comprehensiveness, or use of the information.