A SCIENTIFIC HERB BOOK

Leuzea
AND YOUR HEALTH

The Siberian wonder-plant which improves stamina, slows the effects of aging and increases your resistance to disease.

Anatoly Antoshechkin, M.D., Ph.D.

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Translated from Russian

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PART I
A Rare Medicinal Plant

CHAPTER ONE

A History of the Discovery of the Leuzea plant

Hundreds of years ago in a distant, hard-to-access mountain region in south-eastern Siberia, healers began using a wonder-plant which they called the Maral root. They named it after a local variety of Maral deer (also known as Siberian stags) which dig out and eat the plant roots during rutting season when males need strength to fight. Only a few people knew the whereabouts of the scarce roots, and this knowledge was passed down from one generation of healers to the next.

The Siberian healers used Maral roots for physical tiredness, after exhausting diseases, to counter senile weakness and for reduced sexual function. They harvested the roots in the fall from mountain forests and alpine meadows, washed them in mountain creeks and dried the roots under straw awnings to protect them from direct sunlight and rain.

In those early days, herbs were practically the only source of medication. Centuries of testing the effects of each type of herb growing in a certain region enabled healers to isolate those with curative effects. This is how the "drugstore" of the past was formed. Despite this apparently primitive approach,

the keenness and inquisitive minds of such folk-medicine healers has allowed us to know which are the most effective curative plants in any given region. It was as a result of the work of these Siberian healers that the Maral root—which now has the botanical name *Leuzea carthamoides* (synonyms: *Rhaponticum carthamoides*, *Leuzea uniflorum*)—became the subject of scientific studies in Russia in the 1940's.

During World War II, Russia needed medications to help heal wounds and restore the strength and stamina of its soldiers. The Soviet government sent expeditions to the region of Siberia where a magical, curative plant was rumored to exist. These expeditions found the Leuzea plant in the mountain woods and meadows of a limited territory in the remote region of Altay and Sayani. These early scientists provided us with the first botanical description of the plant and brought the first bales of Leuzea roots to research centers for experimental and clinical studies.

Leuzea is a large perennial plant from the *Compositae* family which can grow to a height of over 180 cm (6 feet). Leuzea has a wood-like horizontal rhizome and multiple long and hard roots. Judging by morphology, the plant has an ancient origin, being related to ferns. Leuzea is endemic plant; it is is found in the Altay—Sayani area of Siberia and does not grow wild in any other part of the World. Because of its uniqueness, scarcity and remarkable properties, the Russian Committee for the Protection Natural Resources has limited its collection in the wild.

CHAPTER TWO

Physiological Actions of Leuzea Preparations

After the first expeditions to find Leuzea, scientists used it for numerous studies on animals and humans. The aim of this research was to determine biochemical and physiological changes in the organism under the influence of Leuzea root extracts. These clinical observations focused both on people in poor health as well as on healthy individuals subjected to frequent stress. While these studies took place in various medical institutes in the Soviet Union, the Tomsk Medical Institute under Dr. A. Saratikov was the primary Leuzea research center. Because of the military application of these studies at the time, most results were classified and were not published in available scientific journals.

This early research established conclusively that an alcohol extract from Leuzea roots produce the following effects:

- Increases the rate at which ATP or adenosine triphosphate (which supplies cells with energy) is restored in working muscles and increases the content of creatine phosphate and glycogen in muscles;
- Contributes to an increase in muscle mass;
- Reinforces heart muscle contractions;

• Improves blood circulation in muscles and brain both during physical work and while at rest;

• Elevates viability and mobility of spermatozoids in vitro;

• Accelerates sexual maturity and the first pregnancy of female animals;

• Increases resistance to oxygen starvation;

• Prevents the development of experimental hyper- and hypoglycemia, leukocytosis, leukopenia, erythrocytosis and erythropenia;

• Improves impulse transmission in interneuronal synapses, which is decreased by sodium barbital;

• Neutralizes the suppressive action which sodium barbital has on the brain;

• Restores mental work capacity in persons suffering from mental fatigue;

• Increases resistance to the common cold.

In addition to these benefits, clinical observations show that Leuzea extract is useful to treat depression, asthenic syndrome and sexual malfunction as well as to reduce fatigue of the central nervous system in persons whose work require a high degree of concentration (such as air traffic controllers, pilots and cosmonauts). Leuzea extract eliminates sleep disorders and does not cause the unpleasant side effects commonly associated with the sleeping drugs elenium and diazepam (psycho-emotional retardation, sluggishness, apathy and headaches). Further research has shown that Leuzea extract slightly decreases the sugar content in blood in the initial stage of diabetes mellitus.

The above-mentioned effects of Leuzea formed the

basis for including Leuzea in the category called adaptogenic plants. Adaptogenic plants are those that are capable of increasing the nonspecific resistance of the human organism to stress.

Based on this extensive clinical testing, Leuzea extract has been included in the Russian Pharmacopoeia as a preparation which generally strengthens the body and which elevates mental capacity. Over a period of 50 years, numerous tests and clinical trials have demonstrated that a 70 percent ethanol extract from dried roots of Leuzea carthamoides (1:1) in normal doses of 1-2 ml a day does not cause any toxic effects even during a prolonged intake.

CHAPTER THREE

The Active Constituents in Leuzea Extract

While physiologists and physicians were recording the effects of Leuzea extract on animals and humans, biochemists tried to determine which specific compounds in the extract had such beneficial effects.

Leuzea roots contain a variety of physiologically active compounds. Flavonoids—phenol compounds which have hydroxyl groups that easily enter into oxidizing reactions, thereby reducing the compounds which are reacting with them—account for the strong antioxidant properties of Leuzea. Antioxidant effects are also inherent in Leuzea lignins (polyphenol compounds). Some glycosides in the plant can directly stimulate the immune system. Leuzea roots contain organic acids which affect specific metabolic processes. One of these is tartaric acid that impairs the conversion of carbohydrates to fat. Other physiologically active compounds include ascorbic acid, carotenoids, aucsines, kinines and some other presently unidentified compounds.

Physiologically active plant compounds have generally been poorly studied compared with compounds found in the human body. Except for

vitamins, flavonoids and some polyunsaturated fatty acids, we do not understand well the role of many physiologically active plant compounds which enter the human body with food. Undoubtedly, some of these compounds participate in the regulation of the human body's metabolism. It was while trying to the determine the physiologically active compounds in Leuzea that researchers discovered the substance *ecdysterone*. Among the constituents of Leuzea extract, ecdysterone is the one which is most interesting but least known.

Ecdysterone belongs to the ecdysone group of polyhydrohylated sterols; it is the most biologically active member of this group. These substances exist in some plants and in small amounts also in insects and crustaceans (crabs, lobsters and prawns) but are absent in vertebrate animals and humans. The ecdysterone content in Leuzea roots can reach as high as 0.7%.

Studies show that the major action of ecdysterone is the activation of protein synthesis in cells. This applies both to contractile proteins in muscles and to enzymes (proteins which play the role of catalysts of biochemical reactions in cells). For example, ecdysterone induces synthesis of catalase, an enzyme that destroys the oxidant H_2O_2 which induces mutation in DNA and destroys lipids in cellular membrane. Ecdysterone regulates the synthesis of hemoglobin, the carrier of oxygen and CO_2 in the blood. It also triggers the production of dopa decarboxylase, an enzyme that participates in synthesis of catecholamines (some neurotransmitters, adrenaline). Ecdysterone increases

the activity of glucose dehydrogenase, an enzyme essential for carbohydrate metabolism. It induces synthesis of acetylcholine esterase, an enzyme which participates in the transmission of impulses between neurons. It stimulates expression of acid phosphatase and malate dehydrogenase which take part in cell energy generation processes.

Because ecdysterone was not known to exist in vertebrate animals, scientists initially did not consider attention to animals and humans as subjects when researching the actions of ecdysterone. Only later did researchers establish that ecdysterone can induce protein synthesis and influence some biochemical processes in vertebrates, including humans, despite the fact that it is not an endogenous compound. Specifically, research has shown that ecdysterone:

- Activates RNA synthesis in liver cells (an indicator that protein synthesis has increased);
- Increases the amount of purine and pyrimidine nucleotides in the blood (which also indicates that an increase in the body's protein synthesis is occurring);
- Possesses considerable capacity to increase muscle mass but does not affect androgen function;
- Activates the synthesis of glutamic decarboxylase (an enzyme which is responsible for synthesis of gamma-aminobutyric acid, a neurotransmitter) in the brain;
- Increases the brain activity of acetylcholine esterase (an enzyme which participates in the regulation of transmissions of nerve impulses between cells in the nervous system);
- Provides protective action against of experimental atherosclerosis in rabbits;

• Protects nuclear chromatin (a chromosome component) in liver cells against free radical oxidation induced by tetrachloromethane in experimental animals, thereby greatly increasing their survival;

• Restores phospholipids in liver mitochondrial membranes which had been pathologically changed as a result of an insulin insufficiency under experimental alloxan diabetes mellitus in animals;

• Eliminates experimental arrhythmia and improves heart muscle contractility during coronary artery occlusion in animals;

• Exerts an immuno-modulating action on lymphocyte production in the spleen.

Judging by the molecular structure and the nature of its effects, ecdysterone acts similarly to human steroid hormones. This means that steroid hormone receptors in human cells are able to interact with ecdysterone. Endogenous hormones, however, have a significant advantage over ecdysterone since their binding affinity to cell receptors is much greater. When the human organism produces sufficient steroid hormones, ecdysterone cannot effectively compete with endogenous hormones for cell receptors and therefore has no action. But if a deficiency exists in the body's own hormones, ecdysterone can bind to unoccupied hormone receptors and thus replace missing endogenous hormones. In this way, ecdysterone acts as a buffer which compensates for a deficiency in the body's steroid hormones. Deficiencies in such hormones are commonly the result of stress.

Similar to many other plants, Leuzea contains flavonoids, some of which also have an ability to

interact with steroid hormone receptors. The Leuzea constituent *kaempferol* possesses estrogen activity. Ecdysterone apparently has a higher affinity to testosterone receptors, while kaempferol is more attracted to estrogen receptors. The affinity of kaempferol to estrogen receptors is of course lower than that of endogenous estrogens. Ecdysterone and kaempferol therefore aid in the restoration of a normal balance of steroid hormones both in men and women when there is a hormonal insufficiency.

Not all the beneficial effects of Leuzea extract are caused by ecdysterone and kaempferol; other constituents in the extract also contribute to physiological actions, although their roles at this writing have not been fully determined. Existing data prove that different compounds in Leuzea extract act cooperatively and synergistically. The spectrum of activity of any isolated compound is narrower and its efficiency is lower than when it is part of the whole extract.

Part II:
Spheres of Applications

CHAPTER FOUR

Increasing Muscle Power

All of us know fatigue but not everyone understands what causes it. In the young and those at middle age, physical fatigue is primarily the result of physical exertion. Sport plays an important role in modern society and this chapter focuses on fatigue among athletes.

The most general characteristic of fatigue caused by physical exertion is a significant decrease of the ATP content in muscle tissues. ATP (adenosine triphosphate) is a universal accumulator of chemical energy in cells. It forms from glucose in the mitochondria of muscle cells, a process which takes place most efficiently when cells are well supplied with oxygen. When the body is at rest, glucose is stored in muscles in the form of glycogen. Another source of ATP synthesis are the lipids stored in the liver and lipid tissue. When the body needs energy, lipolysis (fat disintegration) begins so that muscle cells use free fatty acids to generate ATP. Amino acids released from muscle protein catabolism (breakup of protein) are also a source for ATP synthesis.

In addition to a depletion of ATP and glycogen reserves in muscles, an athlete's intensive and prolonged physical exertion (such as takes place during training) produces the following changes in the body:

• A relative insufficiency in some of the oxidative enzymes needed for the formation of ATP in muscles;

• An increase in glucocorticoid secretion by the adrenals, suppressing the synthesis of testosterone and estrogens;

• A decrease in muscle protein synthesis;

• An increase in muscle protein catabolism;

• A suppression of the activity of the immune system.

These changes in the body take place as a result of the influence of the hypothalamic-pituitary-adrenal system (also known as the stress system). This system responds in particular to heavy physical exertion (such as when an athlete trains and prepares for competition).

It has been well documented that Leuzea extract acts to mitigate or counter such effects, but what is the mechanism by which this takes place? Most likely, ecdysterone in Leuzea extract induces additional oxidative enzymes in muscle cells. As a result, oxygen supply to mitochondria grows, the formation of ATP increases and glycogen reserve are restored more rapidly. Ecdysterone also activates genes which control the synthesis of muscle protein, thus compensating for the breakup of muscle protein and counteracting the suppression of its synthesis by glucocorticoids. Besides compensating for protein loss during physical exertion, ecdysterone promotes additional synthesis of muscle protein through its anabolic action. As a result, muscle mass increases, triggering an adaptive response by the body to the physical exertion.

Russian athletes and coaches as well as scientists working in the field of sports physiology have found that preparations containing Leuzea rapidly restore energy, both during a short break in long competition (such as soccer, basketball, ice hockey and tennis) and between repeated shorter appearances on same day (such as weight lifting, gymnastics and swimming). Leuzea extract also increases endurance in middle- and long-distance runners and cross-country skiers. Multiple observations of top level athletes, including members of Russian Olympic teams, during preparation for competitions have confirmed the efficacy of such preparations to help improve athletic results. This is the reason why in Russia the latest of such Leuzea-containing adaptogenic preparations has been given the name “RusOlympic”.

CHAPTER FIVE

Protection Against Mental Stress

Long-term regular training and preparation for competitions is often accompanied by psycho-emotional fatigue in an athlete. This is often referred to as "overtraining". Not only do muscles, heart and lungs work intensively during physical exercise—the brain constantly analyzes and coordinates movements. It regulates by means of hormones many of the processes involved in the body's physical activity. Just as muscles consume ATP and glucose, so does the brain. The brain also gets tired during physical exercise. It often needs more time for recovery than muscles.

Mental stress can, on its own and accompanied by no physical exertion, produce important biochemical changes in the organism. For example, scientists have observed the identical changes in erythrocyte production among soccer players who are on the field playing and among reserve players sitting on the side line watching the game. Similar effects were produced in the same soccer players when away from the match by the introduction of a therapeutic dose of hydrocortisone (a derivative of glucocorticoids excreted by adrenals under stress). This shows that during emotional stress, despite the fact that it was

not accompanied by physical stress, the stress system causes an increased production of glucocorticoids in the adrenals as a reaction to the stress.

Perfection of training techniques is the obvious principal approach to improve athletic results. There are, however, limitations to the adaptive capabilities at some stage during human conditioning. The organism's physiological state also changes under the influence of factors such as poor health caused by climactic changes, changes in food, biorhythm disturbances caused by moving to another geographical time zone and the general emotional weariness which can set in during a long and strenuous period of training. The emotional state of athletes can vary from day to another and even during the same day. You can observe this in any sport. For example, in matches between top-ranked tennis players, a more fit player may lose because he is "out of shape" on the day of the match. Anxiety or stress just preceding a major competition can inhibit the basic reactions of the immune system. This is often followed by upper respiratory tract inflammation and is the reason an athlete's ability to perform may drop prior to important competitions. Using adaptogenic Leuzea-containing preparations mitigate or prevent such negative reactions to stress and help an athlete to "peak" at the right time.

Emotional stress affects anyone in daily life. Stress which does not exceed a certain level—characteristic for each person—and which does not repeat too often, can be considered to have a positive influence on health. But stress factors which are too strong or

act over a long period of time are harmful for the organism. Pilots, cosmonauts, air transport controllers and others whose work requires focused attention over long periods are more subject to stress.

The first manifestation of emotional stress is often an inability to sleep well. Leuzea extract prevents and eliminates such sleep disorder. As an example, sleep disorders among navy sailors was corrected by Leuzea extract. During a long sea voyage, researchers observed sleep disorders among twenty operators whose work involved handling sophisticated computerized equipment. This was manifested by confusion while falling asleep and a shallow sleep with frequent awakening and dreams. The result of such sleep disorders was a impaired ability to perform work. The sleep of the sailors was normalized in five to seven days of taking Leuzea extract. Unlike some synthetic sleeping pills, the Leuzea extract did not produce any unpleasant subjective sensations.

Even a person who does not work under extreme stressful conditions may be subject to emotional stress at work or otherwise in daily life. The resistance to stress factors varies greatly from person to person. Those who are less resistant to stress will benefit more from taking prophylactic preparations containing Leuzea.

CHAPTER SIX

Hypodynamia

The main objective of a government or a society should be the increase in the standards of living for its people. Developed countries have had success in this area, but this in turn has given rise to a new problem: hypodynamia (low physical activity). This has become virtually an illness of civilization.

From an early age, more and more people become sedentary. Parents drive children to school. Children sit at their school desks for much of the day. At home, they sit down to do homework and to watch TV. The widespread use of home computers has further worsened this situation. Technological advances in recent years has made the chair the main place of work for most people.

Hypodynamia causes an atrophy of skeletal muscles and it is not surprising that as a result, most people have increased levels of fat deposits. The main reason for such fat deposits is an imbalance between the calories that the body gets from food and the calories it uses. Randomly asking ten men under 45 to do chin-ups (lift one's body two feet up on a parallel bar), would reveal that only two or three people were able to perform three repetitions.

This simple test, which requires no sophisticated equipment, gives an good estimation of a person's overall physical condition. This test is used to select soldiers to the French Foreign Legion (15 chin-ups are required for admittance). According to estimates, a man under the age of 45 who in normal physical condition should be able to lift his weight at least three times. A woman should be able to do so once. From these simple estimates, one can conclude that the muscle power of approximately seventy percent of people is too low in relation to body weight. Statistical data shows that about fifty percent of the US population is overweight.

There may seem to be no direct connection between low muscle mass, fat accumulation and health. This is far from true. The metabolism of man, like the one of wild animals, evolved during conditions where muscle work was necessary for survival. Muscle activity is therefore a necessary and genetically programmed factor for human health.

Human and animal brains have specialized structures that control muscle activity, either directly or through the secretion of special hormones. Because such regulation occurs by the feed-back principle, reduced muscle activity suppresses the function of those brain structures. Metabolites that working muscles excrete into the blood stream are important for the overall metabolic balance of the organism. One such metabolite, lactic acid, excreted by working muscles into the blood, is an important source of energy for the heart muscle. A non-optimum metabolic balance during hypodynamia may influence

some biochemical processes and lead to emotional suppression. Most people who exercise are familiar with the satisfied feeling which usually follows exercise, even when the muscles are tired. This feeling reflects a satisfaction in the brain and the muscles from the physical exertion. Mild and regular muscle work is not only useful for skeletal muscles and the brain but it also improves the condition of heart vessels and the immune systems. It is a well known fact that physically active people are usually more healthy, both physically and emotionally. Animal experiments have established that greatly limiting their movements causes stress.

An obvious result of hypodynamia for many is excessive accumulation of fat. It is a widely-held belief that an excessive consumption of food is the reason for fat accumulation. This is not quite true. The quantity and quality of food is, of course, important factors in fat accumulation, but it is not more important than hypodynamia. A person accumulates fat not because he or she eats too much but because he or she does not move enough. If one performs physical work which burns the same number of calories as one obtained from food, the body will not accumulate fat. Of course, inherited predominance can play an important role, but even in such cases, the effects of genetic inheritance are triggered, to great extent, by hypodynamia. Individuals who are overweight are comparably less physically active.

Not wanting to exercise is an important reason for hypodynamia. That is usually not because a person is

lazy but because he or she lacks energy. Leuzea extract can help such a person to begin an exercise regimen because the extract stimulates energy production and increases general activity of the organism.

Writing about the benefits from physical exercise is sometimes perceived by sedentary people as a theory which is far from the reality of life. Some think that exercise is too difficult or takes too much time and therefore isn't for them. My own example may help to illustrate this; it is usually more persuasive than general reasoning. For the last fifteen years, I do a simple set of short gymnastic exercises daily (see Appendix I, page 39) which are based on overcoming the weight of my body. They can be done at home and do not require complicated equipment. When I first began this training program, I had to force myself to do the exercises because I felt weak and had no desire to do them. Each morning I took a Leuzea tablet and made myself exercise. After only a month, my muscles grew stronger and I began to feel a need in my body to exercise. It was as if my muscles, by themselves, asked me for the work. Earlier in life, I often suffered from back pain, had unpleasant sensations in the heart area and was ill from the flu or a cold. Today, even though I live a sedentary life, I am rarely ill.

If you do these simple exercise each day for 30-40 minutes in the morning for two months, the activity of oxidative enzymes in the mitochondria of your muscle cells will increase by thirty to forty percent. The quantity of muscle fibers and blood vessels in your muscles will also increase dramatically. However, if you stop exercising, the results can be

virtually eliminated after one to two months. It is therefore necessary to exercise regularly to keep your body in shape.

Your success in the quest for a healthy body can be evaluated by using the same simple method: doing chin-ups. If you can lift your body three times, the result is satisfactory, six times—good, and nine times—excellent. These values should be three to four times lower for women. It is difficult to determine the upper age limit for this estimation scale. One may think that after a person turns 45 years old, these values should decline. But don't think that the age of 60 or 70 is a critical barrier for physical exercise. At the time of this writing, I am 63 years old, yet fifteen chin-ups is my norm during exercise. Independent of your age and whether or not you are overweight, start exercising regularly. After only a month, you will feel a necessity to continue. If you skip an exercise session, your body will remind you that it did not receive its daily work load. Through regular exercise, your victory over hypodynamia—the illness of civilization—is close at hand.

CHAPTER SEVEN

Adaptation to Aging

Several centuries ago in the regions of Siberia where Leuzea grows, healers noticed that a powder or extract from the plant's roots had a beneficial influence upon the elderly population. These observations have recently been confirmed in scientific studies. An explanation of the "rejuvenating" action of substances found in Leuzea, should begin with a review of the biochemical mechanisms of the aging process.

At the present, this is the explanation of the mechanism of aging considered most probable: As we age, our bodies accumulate damages in the molecules of nucleic acids. Such damage is caused by endogenous "oxidants"—the products of oxidative reactions in cellular metabolism. These oxidants (H_2O_2, $HO^{\bullet}$, O_2^- and some others) are by-products of normal oxidative reactions in the body. Because these oxidants are harmful, cells have some defense mechanisms which neutralize them. With age, the activity of these defensive reactions decreases and this further accelerates the aging process.

One of these defense reactions is the conversion of hydrogen peroxide (H_2O_2) to H_2O and O_2 by the enzyme catalase. As mentioned earlier, ecdysterone promotes the synthesis of catalase. Leuzea also contains flavonoids which act against other oxidants. Leuzea, through these antioxidant properties, protects

cellular DNA, slowing the aging process.

The fundamental character of the aging process is the change of the general orientation of the body's metabolism. Each cell in the body exists and carries out its specific functions because of metabolism, an extremely complex system of interconnected and quantitatively balanced biochemical reactions. These reactions can be divided into two categories depending on their directions: anabolism and catabolism. Anabolic reactions result in synthesis of more complex compounds from simpler ones, while catabolic reactions are those whereby complex molecules break down into simpler ones, eventually producing CO_2 and water. Anabolic processes are the processes of synthesis while catabolic processes are the processes of disintegration.

The most important anabolic process essential for the existence of any cell is protein synthesis. It is because of protein synthesis that both muscle fibers and enzymes exist and function. As we age, the breakdown (catabolism) of protein accelerates. A decreased enzyme activity leads to a drop in metabolic processes. Degradation of muscle proteins leads to physical weakness and a reduction of active life span.

By stimulating the synthesis of some enzymes, ecdysterone activates numerous metabolic reactions, thereby improving the general state of the body and emotional mood. This is important since older people sometimes suffer from some form of emotional depression. Ecdysterone in Leuzea can have a positive influence on the general state of elderly men with reduced testosterone production by increasing their

sexual potency. The ability of ecdysterone to activate hemoglobin synthesis is also important since there is a decrease of the supply of oxygen to the brain and the heart muscle as we age.

The degradation of muscle protein is an obvious manifestation of old age. Though this is a natural process which takes place at any age, the total amount of muscle protein generally increases before the age of 20. Between the age of 20 to 40, anabolism and catabolism of protein are more or less balanced, but from the age of 40 and on, catabolism begins to dominate. From the age of 35, both men and women usually accumulate fat at an average rate of about 0.4-1.8 pounds per year. At the same time, the functional capacity of the cardiovascular system drops and the risk of coronary heart disease risk increases (as a result of atherosclerotic lipid deposition in heart vessels). From about the age of 30, the volume of muscle fibers drops while fat accumulation increases. Muscle mass decreases an average of thirty percent from the age of 50 in people who live a sedentary lifestyle. In the United States, 28 percent of men and 66 percent of women who are 74 years old are not able to lift a ten pound weight.

It may seem impossible to influence the predominance of catabolism as we age. This is not the case. A powerful weapon exists in the fight against the catabolism of aging: the activation of protein synthesis. Regular exercise makes it possible for a 65 year-old person to regain muscle mass—even to reach a percentage of muscle mass similar to when he or she was 30 years old. Studies made at the Russian Olympic

Committee show that a man who is between 50-60 years old can compete in body building with younger athletes. Some of the research subjects started regular exercises as late as at the age of 45. Using Leuzea extract helps to reach such results.

What is needed to preserve or even increase the volume of muscle protein? First, you must regularly exercise the muscles. Depending on the initial level of muscle atrophy, fat accumulation and the condition of the cardiovascular system, the intensity of the exercise has to be different. You can use the set of exercises described in the Appendix on page 41or any other regimen you prefer. It is important that your exercise does not cause unpleasant sensations in the heart area and that after each exercise, the pulse rate returns to near the resting rate. You will gradually discover what intensity of works for you. Gymnastic exercise, where various muscle groups are worked uniformly, are ideal. Other types of physical activity such as golf or jogging are very useful as additional physical training but should not be used as substitutes.

Old age occupies one third of our lives. Instead of simply focusing on living longer, our emphasis should be on how to get full value out of this time of our lives. There is no doubt that the answer is exercise. If you are over the age of 40 and you have not already begun to fight against age-related catabolism, start now! It is your most important weapon. The unique adaptogenic plant Leuzea can help you start your exercise program and maximize your benefits from it. The sooner you start this fight against catabolism, the better. But it is never too late, even if you are 70

years old. Exercise will give you great pleasure. You will have more energy and feel better and after four to six weeks, you will marvel at how easy it was for the anabolism of youth to conquer the catabolism of aging.

APPENDICES

APPENDIX I

Exercises for Overcoming Hypodynamia

These exercises are based on your muscles working to overcome the resistance of your own body weight. As equipment, you only need a parallel bar (placed over your head at a height of your outstretched hand) plus two dumbbells, the weight of which should just enough so you can do about twenty arm curls. As you muscle strength increases, you should get heavier dumbbells.

1. Do push ups from your hands and toes (or knees).
2. Standing straight, hold and rock the dumbbells slightly in your arms.
3. Standing straight, do arm curls with the dumbbells in your hands.
4. Lying on the back, do sit ups by contracting your stomach muscles, then (when you feel the muscle strain) lift your legs straight up until they are perpendicular to the floor, then lower them.
5. Do chin-ups on the parallel bar.
6. Raise and lower yourself on your toes, then squat completely with your heels flat on the ground, then stand up.
7. Jump lightly on your toes.

Do these exercises every day in the morning, as many repetitions as you can. Between exercises, relax for about two minutes (three minutes if you are older) until your heart beat has returned to almost its resting rate. Do the set of exercises twice in the described sequence. The total time for the two repetitions should be no more 30-40 minutes.

APPENDIX II

Trial of the Leuzea-Containing Preparation "Rus-Olympic" Under Extreme Conditions

by V. Semenov, M.D., Director, Anti-Doping Center
of the Russian Olympic Committee, Moscow, Russia.

Summary: Rus-Olympic is an adaptogenic biostimulator, containing an extract of Leuzea, which is used by Russian Olympic athletes during training and competition. This study was carried out comparing the effects of the Rus-Olympic with other nutritional sports supplements on world-class Russian athletes during training under extreme winter conditions. The results show conclusively that the ingredients in Rus-Olympic produce superior results enhancing the athletes' endurance, immune system response and general functional state.

In January, 1997, the Russian Committee for Physical Culture carried out a series of tests at the Krasnoyarky Kray athletic camp in Siberia to determine the physiological activity of the Rus-Olympic preparation. Thirty-six top level wrestlers, divided into three groups, took part in three weeks of experiments which were held both under normal condi-

tions indoors and outside in low temperatures.

The first group of athletes, a control group, received no restorative supplements. Athletes in the second group took traditional restorative supplements for athletes: potassium orotate, inositol, multi-vitamins and protein. Athletes in the third group took potassium orotate, inositol and one daily dose of the adaptogenic biostimulator Rus-Olympic. Physical training efforts were the same for all athletes in the three groups: Two intensive training periods per day for five days weekly. During the testing period, physicians monitored changes in the health and functional state of the athletes.

The test results showed that athletes in the first group endured strenuous physical exercise with no health changes for five to seven days. After that period, all members in the group registered a sharp decrease in their general immunity and sensitivity to cold. Their hormonal profiles showed a decrease in androsterone, etiocholanolone, testosterone, dihydroepiandro- sterone and some other hormones.

The athletes in the second group endured the training program for nine to thirteen days. Forty percent had manifestations of colds and were referred for treatment.

Eleven of the twelve athletes in the third group—the ones using Rus-Olympic—endured all twenty-one days of the testing program. Only one person left the program after nineteen days with symptoms of a respiratory infection. Tests of the eleven who finished the program showed their A, G and M immu-

noglobulin levels to be normal. Hormonal profile readings for androgens was within the normal range for most while in others, levels had decreased to 10 to 20 percent below normal.

Based on the objective testing data from this study, we have concluded that the Rus-Olympic preparation has positive effects on the functional state, immune system response and general endurance to physical stress in athletes.

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About the Author

After graduating from the First Moscow Medical Institute as a medical doctor in 1961, Anatoly G. Antoshechkin, was sent to the Soviet Missiles Forces as a military physician to carry out toxicology research. This important and ground-breaking work earned him a special citation by the Commander of the Soviet Missiles Forces. Following his military discharge in 1964, Dr. Antoshechkin did postgraduate work at the Institute of Molecular Genetics at the Russian Academy of Sciences in Moscow.

In 1968, after receiving his Ph.D. degree, A.G. Antoshechkin was appointed senior researcher at the Institute of Space Research of the Russian Academy of Sciences where he worked on bio-medical problems related to space exploration. Following this experience in sophisticated space technology, Dr. Antoshechkin in 1978 began studying the biochemical basis of inherited metabolic diseases in his laboratory at the Institute of Molecular Genetics in Moscow.

Dr. Antoshechkin has pioneered research in the study of human metabolism and its defects using modern analytical techniques including gas chromatography-mass spectrometry and pyrolysis-mass spectrometry. He has mapped the molecular structures of some previously unknown metabolites, a work that is significant for the understanding of human metabolism.

Since 1991, as a scientific consultant to the Anti-Doping Center of Russian Olympic Committee, he has participated in the development and testing of new adaptogenic biostimulators.

Dr. Antoshechkin's research has been published in Russian and international scientific journals. He is a member of the New York Academy of Sciences, American College of Medical Genetics and other scientific societies.

Dr. Antoshechkin now resides in the United States where he works as a researcher, author and lecturer.

A WONDER-PLANT FROM THE FORESTS OF SIBERIA

Centuries ago in a distant, hard-to-access mountain region in Siberia, local healers began using a plant—which they named Maral root but which now has the botanical name *Leuzea carthamoides* (synonyms: *Rhaponticum carthamoides*, *Leuzea uniflorum*)—as a remedy for physical tiredness, after exhausting diseases and to counter senile weakness and reduced sexual function. Since then, much biomedical research in Russia and elsewhere has confirmed these benefits and shown that Leuzea also improves athletic performance, strengthens the cardiovascular system and even increases resistance to the common cold. This scientifically precise book will take you on an exciting journey from the Siberian mountain meadows where locals gather the plant to the scientific laboratories where doctors and biochemists have worked to study the effects of Leuzea and to isolate its active components. Read about how Russian Olympic athletes have used the plant during training and how you can use Leuzea to improve your own fitness and health.

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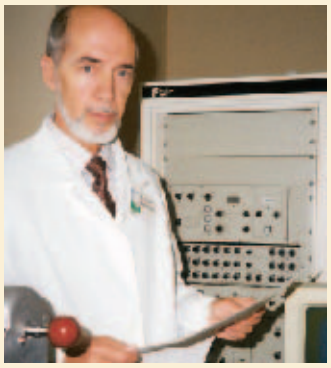

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