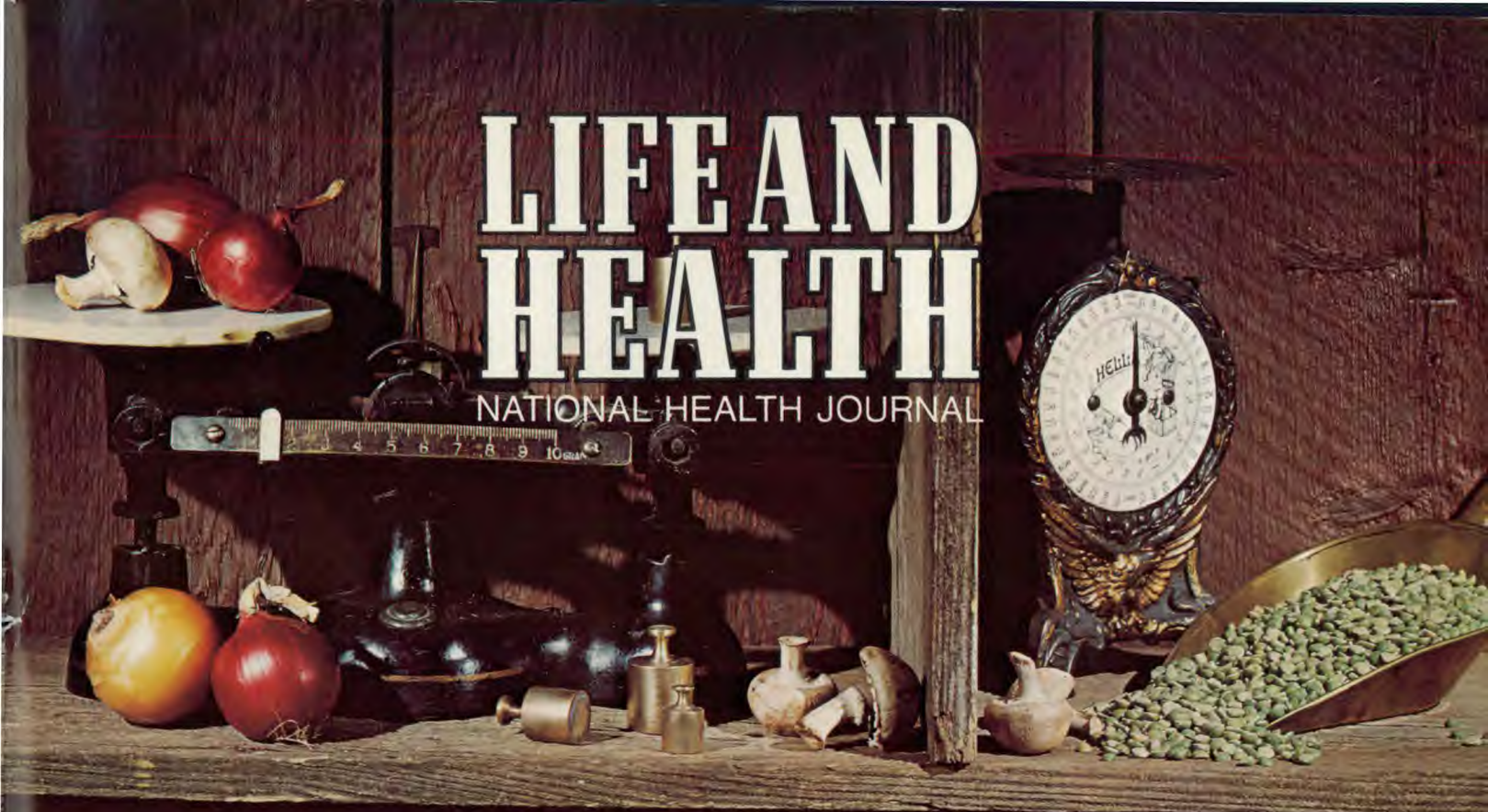


# LIFE AND HEALTH

NATIONAL HEALTH JOURNAL



## Vegetarianism







Really turns your appetite on, doesn't it!

See page 39





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*Did you think  
vegetarianism was  
a new, faddist idea?  
Think again.*

# Vegetarianism – a New Concept?

## The ancient Scriptures

The earliest record of a vegetarian diet is found in ancient Hebrew Scriptures. In the very first chapter God instructs Adam, the first man, "I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat." After Adam was exiled from the Garden of Eden for disobedience, this first diet of fruits, nuts, and grains was modified to include the whole plant, not just its fruit.<sup>1</sup>

Account of the first permission to use animals themselves for food is also found in these ancient writings. They tell how a millennium later, following the flood in Noah's time that destroyed all vegetation, God said, "Every moving thing that liveth shall be meat for you; even as the green herb have I given you all things."<sup>2</sup> This was not to be a *carte blanche* permission, for three qualifications accompanying this sanction are usually overlooked:

1. The flesh was to be drained of blood.<sup>3</sup>
2. Only "clean" animals were to be used as food.<sup>4,5</sup>
3. There was to be no unnecessary killing of animals.<sup>6</sup>

The Christian concept of redemption and salvation allows man to take the life of an animal, for which Christ did not die, to preserve the life of man for whom He did die. This provision was granted in an emergency when the regular diet was not available.

These Bible teachings are seen in various Christian customs, philosophies of the Middle East and the Orient, and practices of orthodox Jews.

## Nations of the East

Buddhism, Brahmanism, Hinduism, and Jainism believe in the transmigration of the soul and extol a vegetarian diet. Those who do not adhere to it, however, are not penalized. The lower castes usually eat anything available, which is generally of

vegetable origin. Buddha taught that no creatures should be killed but didn't make an issue of eating animal flesh.<sup>7</sup>

As Buddhism waned in India, it was introduced into China before the birth of Christ. It became the state religion in the fifth century A.D. Two popular maxims of the times were "Do not butcher the ox that plows thy field" and "Do not indulge a voracity that involves the slaughter of animals." Even today the dietary staples of the northern Chinese are wheat, millet, and corn, while rice is used most extensively in southern China. Meat and milk are used when the economy permits.

During the sixth and seventh centuries A.D. Buddhism spread into Japan, where the basic diet is rice and beans. Historically, when they could afford it, the Japanese included fish and flesh.

## Middle East nations

The Egyptians, nicknamed "eaters of the bread," raised cereals from earliest times. Studies of the intestinal contents of the mummies indicate their diet was predominantly of plant foods.

Although the Persians were omnivorous (eating both animal and vegetable food), Porphyry states that the magi or priestly caste used no meat. Moslems are vegetarians only from necessity except for abstaining from certain unclean animals, notably swine.

## European nations

It is interesting that the dietary patterns of nations pass through various well-defined stages. When a nation is struggling to grow and its people are poor, the diet is usually frugal, consisting chiefly of plant foods. As prosperity increases, animal foods and wine become more plentiful. Later, self-indulgence and decay set in. Philosophers of every age who observed these trends concluded that they led to the downfall of nations. Thus arose those who





*The health food and breakfast food industries had their origin here at the world-famed Battle Creek Sanitarium in Battle Creek, Michigan.*

advocated a return to a more simple life-style, including diet, when their nation was at the height of its attainment.

Although not strict vegetarians themselves, the Greek philosophers Pythagoras, Socrates, and Plato popularized the idea and supported such a program as natural and hygienic. Pythagoras is considered the founder of the vegetarian movement but is known to have eaten meat on occasion.<sup>8</sup>

With the fall of the Roman Empire, the vegetarian concept also lost its appeal and practically died out except among certain orders of the Catholic Church. However, with the Renaissance came a restudy of ancient teachings and new concepts evolved, some leading to the development of modern vegetarianism. A considerable number of influential people in the literary, scientific, and religious fields supported it. Among them was Benjamin Franklin, who wielded a strong influence on both sides of the Atlantic on behalf of the vegetarian diet.

In the nineteenth century a number of vegetarian societies were formed, one of the best-known being the German Vegetarian Society. The Nazis squelched it in 1934 but it was re-established in 1946. Most European countries and Britain had strong vegetarian movements by the mid-1800's. From there they spread to most of the British colonies.

#### **To America, with love**

The vegetarian organization was brought to America from England by the Reverend William Metcalfe, who, with forty-one of his church members, arrived in Philadelphia in 1817. Sylvester Graham, a young Presbyterian minister, was one of his converts. The latter's enthusiasm was particularly due to his regaining his own health from eating a vegetarian diet. He is best remembered for originating the baking of bread from unbolted (coarse) "Graham" flour. His zeal and impressive arguments gave great impetus to vegetarianism and caused him to be

known among his contemporaries as the apostle of temperance.

At this time several prominent men were convinced of the value of a meat-free diet and became strong advocates of it. Among the group were Reuben D. Massey, first president of the American Medical Association, and Edward Hitchcock, president of Amherst College.

After revisiting England, in 1850 Reverend Metcalfe called together a convention of diet reformers in New York. This convention laid the framework of the American Vegetarian Society.

During the mid-1800's it was still acceptable medical practice to drug, purge, bleed, and blister the sick.<sup>9</sup> Three courageous physicians, William Alcott, Isaac Jennings, and R. T. Trall, were willing to break with such conventional methods and began to vigorously advocate prevention and treatment of disease by hygienic methods, including a meatless diet.<sup>10</sup>

At this time a number of vegetarian sanitariums were established. Probably the two best-known were Dr. Jackson's sanitarium at Danville, New York, and Battle Creek Sanitarium, sponsored by the Seventh-day Adventists, under the direction of Dr. John Harvey Kellogg, at Battle Creek, Michigan. The health food and breakfast food industries originated here under the leadership of the late William K. Kellogg, brother of Dr. Kellogg.

#### **Vegetarian restaurants**

Another advance step for vegetarianism was the establishing of restaurants featuring meat-free menus in prominent cities. Most famous of these were John Maxwell's in Chicago and Bernarr McFadden's Physical Culture and Strength Food Restaurant in New York City.

#### **Vegetarianism's golden era**

Vegetarianism faced new challenges during World



War I and II. During the intervening years it lost much of its stigma of "cultism" and developed on a more scientific basis. This period of time between the two wars is often considered the golden era of vegetarianism.<sup>11</sup>

The adequacy of a diet containing little or no meat was put to the test in Denmark during World War I. Because of the Allied blockade of imports, the government was afraid there would be a critical shortage of food. It asked Denmark's vegetarian society and Dr. Mikkel Hindhede, a strong advocate of simple living, to organize the rationing program. The Danish people came through the war with *improved* health and lowered death rates, although eating primarily whole grain and bran bread, barley porridge, potatoes, greens, and dairy products.<sup>12,13</sup>

Norway went through a similar experience during World War II. From 1940 to 1945 their consumption of animal foods was drastically cut, and the use of cereals, potatoes, and other vegetables was increased. Deaths from circulatory diseases were considerably fewer during this period of time. With the end of the war, however, the people returned to their prewar diet and the death rate promptly rose to prewar levels.<sup>14</sup>

Since the end of World War II there has been an increasing amount of scientific evidence that a flesh-free diet is not only adequate for man throughout all periods of life—childhood, pregnancy, adulthood, and old age—but may actually be superior. And, more recently, we are learning that conventional diets, with their abundance of animal flesh, are major contributors to the high death rate from heart disease and stroke, today's greatest killers.

### Current scene in the United States

Four very distinct groups of vegetarians currently exist in the United States. One is the Trappist monks of the Catholic Church, an agricultural group which follows a very simple way of life. Bread is made from whole grains and milk is usually included in their diet.

Another group is comprised of members of the Seventh-day Adventist Church, which came into existence in the middle of the last century. The exclusion of flesh from the diet has always been entirely an individual choice, although it is officially recommended.

Members of the youth counterculture constitute a very new, very popular third group. Confused and confusing, their motivation and practice range from simply limiting the diet to "organic" foods to strict prolonged use of "Zen macrobiotic" diets, which has led to death from malnutrition. These young people are concerned about chemical fertilizers and pesticides, naturalness, love of animals, food "highs" to replace abuse of drugs, and the purported tendency of such "yang" foods as meat and eggs to foster greediness, sexuality, and aggressive brutality versus "spirituality." With some it may reflect revolt against the "establishment," reveling in the values of free time for organic gardening, "grinding wheat, baking bread, preparing yogurt, and making a quiet ceremony of cooking and eating."<sup>14</sup>

The fourth group of people adhering to a vegetarian regimen is loosely knit and exhibits a wide variety of motives for following such a course. Few of them are lifetime vegetarians. Many place emphasis on the pioneers of the movement. Tradition tends to be a binding force. Because little effort is made to keep up with modern scientific progress, their views are often unsound. Included in this heterogeneous group are some who are not a part of the counterculture, but whose vegetarianism is also based on nonviolence and animal friendliness.

### Classification of vegetarians

There are three different kinds of vegetarians. The *lacto-ovo-vegetarians*, as the term indicates, include dairy products and eggs in their diet, but exclude the *flesh of all animals*—meat, poultry, fish, and sea foods. *Pure vegetarians*, on the other hand, abstain from the use of all foods of animal origin for health reasons. *Vegans* also use no foods of animal origin, but this is because of their philosophy rather than for reasons of health. They try to avoid the use of other animal products, such as those made of leather, which require taking the life of an animal.

### And now...

From the dawn of recorded history some, for one reason or another, have followed a vegetarian regimen. Even though vegetarian diets often are followed as a necessity, particularly among the poor, the health benefits are evident if sufficient food is available. Using land to grow crops man can eat directly is much more efficient than raising food for animals, which, in turn, become "secondhand" food. Today's renewed interest in this way of life, the growing evidence of its superiority to ordinary diets, its obvious excellence in providing low cost foods for large, underdeveloped populations, should cause us to consider carefully the virtues of a non-flesh diet.

### REFERENCES

- <sup>1</sup> Genesis 1:29, Genesis 3:18
- <sup>2</sup> Genesis 9:3
- <sup>3</sup> Genesis 9:4
- <sup>4</sup> Genesis 7:2
- <sup>5</sup> Leviticus 11:1-28
- <sup>6</sup> Genesis 9:5
- <sup>7</sup> M. G. Hardinge and Hulda Crooks. Non-flesh dietaries. I. Historical background. *J. Amer. Dietet. Assoc.* 43:545, 1963.
- <sup>8</sup> A. Albu. *Die vegetarische diät*. Leipzig, Verlag von Georg Thieme, 1902.
- <sup>9</sup> W. Osler. *Aequanimitas*. Philadelphia, P. Blakiston's Son & Co., Inc., 1932.
- <sup>10</sup> D. E. Robinson. *The Story of Our Health Message. The Origin, Character, and Development of Health Education in the Seventh-day Adventist Church*. Nashville, Southern Publishing Association, 1943.
- <sup>11</sup> Hardinge and Crooks, *op cit.*, p. 548.
- <sup>12</sup> S. Lepkovsky. The bread problem in war and in peace. *Physiol. Rev.* 24:239, 1944.
- <sup>13</sup> M. Hindhede. The effect of food restriction during war on mortality in Copenhagen. *J.A.M.A.* 74:381, 1920.
- <sup>14</sup> Koshers of the Counterculture. *Time* 96:59-60+, Nov. 16, 1970.







*By studying  
man's make-up  
we can determine what  
"fuel"  
serves him best.*

# Is Man Designed to Eat Meat?

---

Down the long ages of history man has never lost interest in food. Neither has he ended his discussions as to the kind of food best suited to his digestive structure—his mouth, teeth, gullet, stomach, and intestines.

Just a look at man's mouth shows that the opening is too small for anything but relatively small pieces of food. Even these he cannot swallow whole, but must chew them fine and mix them with saliva before the ball of food will slide down the gullet, or esophagus. An attempt to swallow a large piece may cause it to lodge over the windpipe, or trachea, and so block the air from getting to the lungs. Individuals sometimes choke to death trying to down pieces of food, usually meat, too large to go through the gullet easily. Carnivorous animals such as the dog seem not to have to chew their food, but tear off chunks and swallow them almost immediately.

## **Digestive tracts compared**

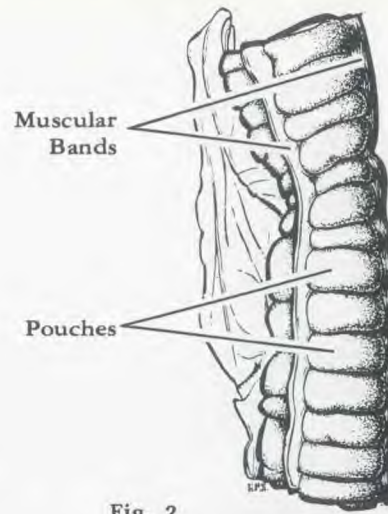
Dr. G. S. Huntington, of Columbia University, published a book<sup>1</sup> in 1903 that is a classic for the study of the digestive tracts of various animals and of man. It pictures, describes, and compares these structures one with another. He separates mammals into three classes on the basis of their digestive structures. At one end are the carnivores, or flesh-eating animals, whose stomachs are simple, small intestines relatively short, and large intestines very short, straight, and smooth.

At the other end are the herbivores (grass and herbage-eating animals). In these the stomach capacity is much larger and the parts sometimes quite complicated, such as the multiple stomachs of cattle. The small intestine is very long and the large gut is also long and smooth. In between these two the author places the omnivora, mostly primates, the small order to which man and monkeys belong. The diet of this group consists of plant foods with less bulk than grass, eaten with or without the





**Fig. 1**  
*Portion of bowel of a typical carnivore, showing the smooth, stove-pipe shape, with no bands or pouches.*



**Fig. 2**  
*Portion of human bowel, showing puckering caused by the three muscular bands which are shorter than the intestine itself.*

addition of some foods of animal origin. The omnivore's stomach is simple, the small intestine considerably longer than the carnivore's but much shorter than the herbivore's. But the large intestine, or colon, of this group is quite different from the other two. Dr. Huntington explains:

"Animals in which digestion is rapid and the usual food small in bulk and concentrated in its nutrient qualities, have relatively short intestines, while the canal is longer in forms subsisting on food which is bulky and which demands considerable time for its elaboration. Hence," he points out, "we find the relatively shortest intestine in carnivora, the longest in herbivora, while the canal in omnivora occupies an intermediate position in regard to its relative length."<sup>1</sup>

#### **Man is unique**

His intensive studies of the digestive tracts of animals and of man convinced Dr. Huntington that man is unique. The structure of his large intestine has few parallels in the animal kingdom. The human large intestine is about five feet long and it runs, not straight down like the carnivore's, but through the abdominal cavity like the letter U turned upside down. Concerning this unusual shape the author of the book says:

"The divisions of the human large intestine into ascending, transverse, and descending colon, sigmoid flexure and rectum are found only in primates, and here not uniformly."<sup>1</sup>

Unlike the smooth large intestine of other animals, "The human large intestine exhibits a very characteristic structure."<sup>1</sup> He describes it as a canal or tube banded lengthwise by three muscular ribbons shorter than the intestine itself. This shortness of the bands gathers the intestine into folds or pouches so that it is not smooth, but puckered.

"This arrangement of the intestines," he continues, "is found also in monkeys and certain rodents. In other mammals the large intestine is smooth and cylindrical."<sup>1</sup>

The accompanying drawings show the striking dif-

ference between the smooth, short, stove-pipe-shaped bowel of the typical carnivore (Fig. 1) and the moderately long (about five feet) pouched human bowel (Fig. 2), suited to the accommodation of food residues with more bulk than that contained in meat and much less than that in grass and heavy herbage.

In general, the diet of the carnivore—meat—is small in bulk and rich in nutrients. Being quickly digested by the animal, it requires only a short endgut, or colon, to provide a straight, smooth passageway for the rapid evacuation of any undigestible remnants, lest they putrify in the warm interior.

In contrast, the food of the herbivore is large in quantity and coarse in texture. Grass and fibrous herbage contain a great deal of indigestible material. This bulky food mass requires a more elaborate digestive apparatus to allow time for the process of digestion to break the material down and absorb the less-concentrated nutrients. In grass-eating animals, then, there is need for one or more stomachs, with sufficient capacity to hold large quantities of bulky food, where the process of digestion can be started. There is need also for a long small intestine where the main work of digestion and absorption of nutrients can take place. But since a certain amount of digestion and absorption is carried over into the large gut, it too must be of considerable length.

#### **An intermediate type**

The digestive organs of the carnivore and of the herbivore represent the two extreme models found in mammals. Those of the omnivore are adapted to an intermediate type of diet.

Omnivores do not graze like cattle nor browse the tips of tree branches and brush like deer. Neither are they equipped, like the carnivore, to grab fleeing prey and devour it as raw flesh and bone. Their characteristic diet consists of fruits; the less coarse vegetables; seeds such as cereal grains, legumes, oilseeds, and others; and nuts. When animal products are available and desired, the food choices may be enlarged to include such animal foods as milk, eggs, and/or the flesh of other creatures.



As Dr. Huntington studied the human digestive structure, he found no evidence of the carnivore. But he saw ample evidence, including man's teeth, that at one time "the forms composing the order or their immediate ancestors, were largely or entirely herbivorous."<sup>1</sup>

### Man designed to be a vegetarian

Thus the author of this remarkable book was convinced by his studies that man was designed to be a vegetarian.

As to man's teeth, to which Dr. Huntington refers as evidence of man's fitness to eat plant foods, Dr. W. S. Collens and his associate, research scientists at the well-known Maimonides Hospital in Brooklyn, agree that man's teeth support this view. They gave a report to the American Society for the Study of Arteriosclerosis in which they said:

"The dental structure of herbivorous animals consists of sharp cutting incisors, while the molars have a flat or nodular surface used for crushing and grinding food. This presupposes that such animals are phylogenetically constructed to live on vegetables, leaves, roots, fruits, nuts, and berries. On the other hand, the carnivore has a dental structure designed to provide him with the means of eating raw flesh. The canines are elongated, strong, and sharp-pointed. They are used for grasping and tearing flesh. The molars have a lateral edge which is sharp and, in approximating the jaws, are used for slicing flesh."<sup>2</sup>

Human teeth, obviously, are not suited for grasping, tearing, and slicing raw flesh. Dr. Collens continues:

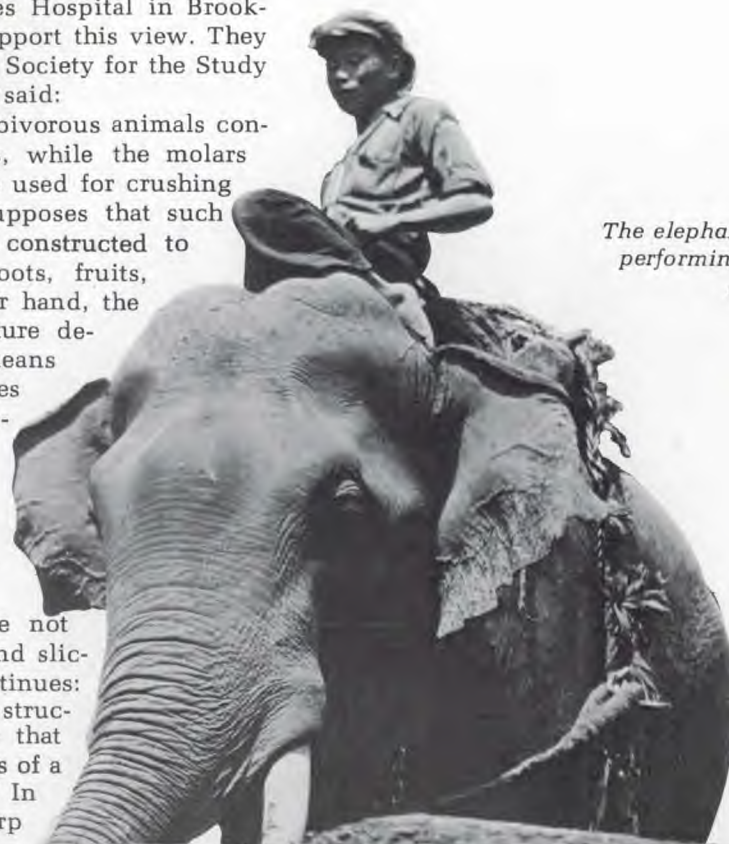
"Examination of the dental structure of modern man reveals that he possesses all of the features of a strictly herbivorous animal." In other words, man has the sharp

front teeth

with which to bite off pieces of food. He has the flat, nodular molars with which to grind it fine for swallowing, since he cannot swallow it in chunks. Dr. Collens concludes:

"While designed to subsist on vegetarian foods, he has perverted his dietary habits to accept the food of the carnivore. Herein may lie the basis for the high incidence of human atherosclerotic disease."<sup>2</sup>

Every creature must eat, and its digestive machinery is designed for the food best suited to its life and health. Man would do well to depend largely on the diet he is best equipped to digest—fruits, vegetables, seeds, and nuts. These he may supplement with some milk, or milk and a sparing use of eggs.



*The elephant is without peer in performing feats of strength—and he does it on a vegetarian diet!*

### REFERENCES

- <sup>1</sup> G. S. Huntington. *The Anatomy of the Human Peritoneum and Abdominal Cavity*. Philadelphia and New York. Lea Brothers, 1903, pp. 189-199.
- <sup>2</sup> W. S. Collens and G. B. Dobkin: Phylogenetic aspects of the cause of human atherosclerotic disease. *Circulation*, Suppl. II, 32:7, October, 1965.



*Plain  
answers to a good  
question.*

# Why Be a Vegetarian?



Considering the alternatives, a better question might be "Why *not* be a vegetarian?" A diet of fruits, grains, nuts, and vegetables plus a little milk furnishes all nutritional necessities without the dangers and problems of a diet composed largely of animal products.

## Disease Potential

### Heart attacks

One of the best scientific reasons for being a vegetarian today is the increased risk of hardening of the arteries and heart attack with the use of animal fats. Diets high in saturated fats and cholesterol, which are found so freely in animal foods, are among the major causes of elevated blood cholesterol. Some years ago a number of investigators studied the population of the entire city of Framingham in Massachusetts. In more than 5,000 people it was found that those with blood cholesterol\* over 260 mg. had four times the risk of heart attack as those with 200 mg. or less.

Due to the epidemic of one million heart attacks with 600,000 deaths each year in the United States, the U.S. Government created the Inter-Society Commission for Heart Disease Resources to prepare guidelines for the stemming of this disease. This group suggests that to keep serum cholesterol at proper levels, most people should derive less than 10 per cent of their total calories from saturated fats. The commission's report<sup>1</sup> has other extremely significant recommendations:

Avoid egg yolk, bacon, lard, suet.

Use grains, fruits, vegetables, legumes.

The yolk of the egg is the single highest source of cholesterol in the average American diet, as well as a source of considerable saturated fat. Eating even two eggs a day—in visible and/or invisible form (i.e., in prepared foods)—will seriously hamper dietary programs aimed at reducing serum cholesterol. Consequently the public should be encouraged to avoid eating egg yolk, and the food industry

\* This fatty substance is measured in thousandths of a gram, or milligrams, in every 100 cc., or milliliters, of blood.





should be persuaded to use as little egg yolk as possible in commercially prepared foods.

Cholesterol in the diet should be held to less than 300 mg. per day.

It is necessary therefore to encourage further development of high quality vegetable protein products.

It is further suggested that foods not necessarily high in saturated fat but high in cholesterol be used sparingly. These would include the organ meats, such as liver, and sea foods like shellfish.

If less than 10 per cent of our calories could be from saturated fats—or 30 grams (1 oz.) for an active adult man—there would not be much room for meat in the usual diet. A six-ounce steak may give you 26 grams of fat by itself, let alone the other items of the meal, or the other meals of the day. Vegetable foods contain some saturated fats but not in the quantities found in animal products. Exceptions would be coconut and hydrogenated fats as found in some margarines and in certain other products such as imitation whipped creams.

#### **Cancer**

Cancer from meat? Did you know that in a little over two pounds (1 kg.) of charcoal broiled steak there's as much benzopyrene (cancer-stimulating agent) as in the smoke from 600 cigarettes!<sup>2</sup> But benzopyrene from cigarette smoke is inhaled and in the steak it is eaten, so wouldn't that make a difference? It certainly might. However, when mice were fed benzopyrene they developed stomach tumors and leukemia, a blood or bone cancer.<sup>3</sup> Benzopyrene is a cancer-stimulating agent!

But you don't use charcoal-broiled steaks? Did you ever hear of methylcholanthrene, another cancer-stimulating agent? When the fat of meat is heated to a high temperature, as is frequently done when cooking meat, methylcholanthrene is formed. (This sub-



## FAT AND PROTEIN DIET

muscle fuel 0.6 gm %



maximum work time **60** min.

## MIXED DIET

muscle fuel 1.8 gm %



maximum work time **120** min.

stance is not formed from over-heating vegetable oils.) When given in large quantities to small animals they develop cancers. But what if you don't use it in large quantities? It was also given to mice in a single dose too small ever to cause cancer of itself. But when these animals were given a second cancer-stimulating agent in amounts too small to produce cancer alone, the mice *did* get cancer.<sup>4</sup> In other words, methylcholanthrene in a single small dose sensitizes animals to other cancer-producing agents, making them more likely to develop cancer.

Cancer is the second major killer next to heart disease in the United States. It is the second largest killer even of children. Could it be there are germs in meat that are transmitted to human beings? Cancer viruses *are* found in tumors of animals. Newborn mice developed breast tumors when fed the milk of their mothers which had breast tumors. Blood has been taken from human beings with leukemia and the viruses injected into small animals. The animals then develop not only leukemia but many other types of cancer—cancer of the breast, lungs, et cetera.<sup>5</sup>

There is no positive proof at present that the eating of animals with cancer will cause cancer in man. However, evidence which points in this direction continues to grow.

### Salmonellosis

Salmonellosis is a bacterial disease which causes nausea, vomiting, diarrhea, and other symptoms. The germ is found in animal foods of all types and may be transmitted from person to person. The National Academy of Sciences summarizes the hopelessness of doing away with this disease: "Reluctantly, we are forced to recognize the infeasibility of eradicating salmonellosis at this time."<sup>6</sup>

As long as we use animal products it is a losing battle. There is a great reservoir of salmonella in the domestic animals man uses for food. Fresh pork and poultry are likely to be contaminated when they

reach the kitchen of either the home or the restaurant. The problem is made worse because the way in which animals are slaughtered and handled frequently spreads the organisms from one carcass to another. During food handling the disease can also be spread to nonanimal products. Thousands of cases of salmonellosis are found each year in the United States. Fortunately death rarely occurs except in the aged and among infants.

### Trichinosis

In some countries trichinosis is enough reason for being a nonflesh eater. In the United States, fortunately, trichinosis is becoming less common. The National Center of Disease Control reports:

A recent autopsy study has shown that 4.3 per cent of 5,000 human diaphragms were infected with trichinae. This is a significant reduction from the 16.1 per cent prevalence found in similar studies conducted in 1931-42. Furthermore, the current study has shown that only 1.6 per cent of individuals less than 44 years of age were positive compared to 4.6 per cent for individuals 45 years or older.<sup>7</sup>

The small larvae of the trichinae first get into the intestinal tract. They then migrate to the most active muscles of the body, such as the calf muscle, the diaphragm, or the tongue. Rarely is the condition diagnosed even though aches and pains may occur. The trichinae are found only in the hog but beef eaters may possibly contact the organism from contaminated meat grinders. Even a knife used to cut pork may transfer trichinae if also used to cut beef.

### Meat inspection

But isn't meat inspected so we can know it is safe? There are not enough veterinarians to do the inspecting, so lay people are utilized—with very meager training. Often these lay inspectors are asked to examine each day as many as one thousand or more fowl and a hundred or more cattle!

How many human bodies could a pathologist



# HIGH CARBOHYDRATE DIET

muscle fuel 3.5 gm %



maximum work time **180** min.

Figure 1

examine in one day? Probably not more than three or four and then never without a microscopic examination. Obviously those who examine animals are supposed to do the impossible. They are expected to study large animals without even the benefit of a microscope.

And when cancer is found in the animals, what is done? It is removed; but what about the rest of the carcass? It is usually passed for food. Those who know something about the spread of cancers realize that the removal of a tumor does not necessarily remove all cancerous cells. The blood or lymphatic system already may have spread such cells to other parts of the body.

## Vegetarian Benefits

### Endurance

The ideal diet should not only minimize the dangers from disease but should give us the greatest "go power" or endurance possible. Some six hundred years before Christ the Babylonians captured many Jews. Among these captives was an extremely intelligent young man named Daniel. He and several associates made a special request of their captors that they be allowed a vegetarian diet. This request was granted only on the basis of a ten-day trial. It was reported that after ten days Daniel and his associates were in better apparent health than the other captives on the nonvegetarian diet.

No attempt was made so far as is known to compare by physiological tests those who use meat with those who do not until the early 1900's. At that time, the number of times vegetarian and nonvegetarian students could squeeze a grip meter with their right hands was compared.<sup>8</sup> The vegetarians won with an average of 69; the average for nonvegetarians was 38. After fatigue, the vegetarians recovered much more rapidly. In another, similar experiment, even the *maximum* record of the non-

vegetarians was barely more than *half* that of the vegetarians.<sup>9</sup>

Recently a Swedish scientist gave nine athletes the same endurance tests on a bicycle after they had been for three days on a particular diet. The diet was varied from one that was high in meat (i.e., protein) to one that was high in vegetables and grains (i.e., carbohydrates). Since the tests were done on the same athletes the differences in endurance could only be accounted for by the differences in the diet.

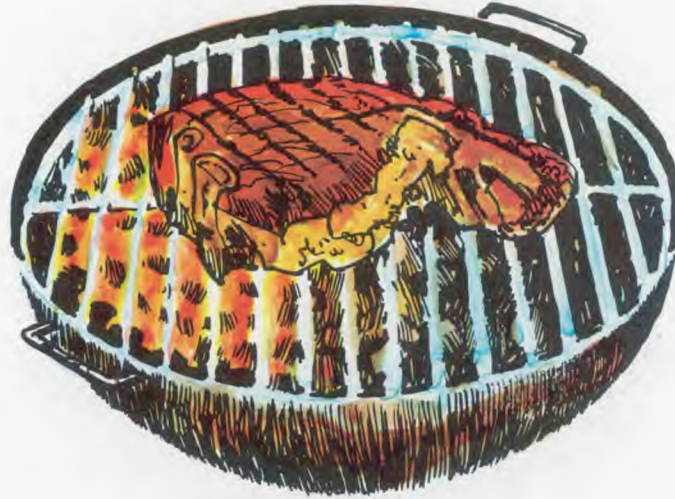
When the athletes were on a high fat and protein diet (high in meat content) their endurance on the



*Scientific research indicates that athletes on a vegetarian regimen have more endurance than athletes on a nonvegetarian diet.*



1 = 30 packs of cigarettes



bicycle was 57 minutes. When placed for three days on the so-called normal mixed diet (lower in meat, fat, and protein) they averaged 114 minutes. On the high carbohydrate diet (high in vegetables and grains) they averaged 167 minutes! Endurance was almost three times greater on the diet resembling more closely the vegetarian type. This was accounted for by the higher sugar (glycogen) content of the muscle resulting from the higher vegetable content of the diet. Figure 1 illustrates these results. This article was published in a paper to give the facts to athletes who wish to have great stamina and endurance. Why choose a diet that gives *you* anything less than the best?

#### Economics

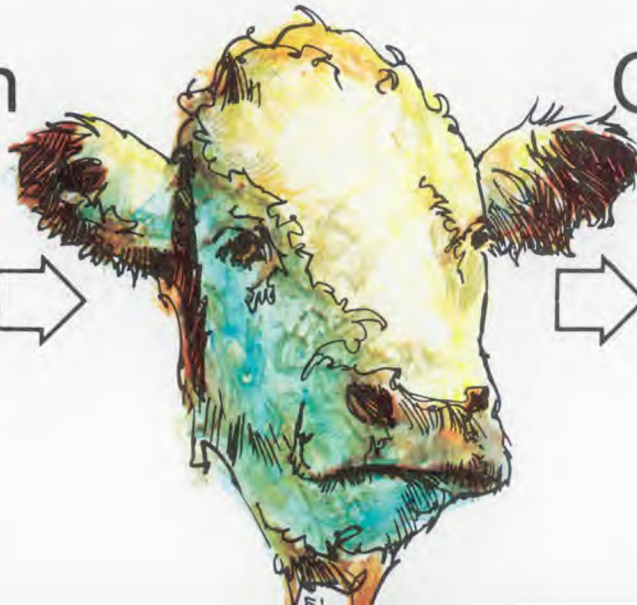
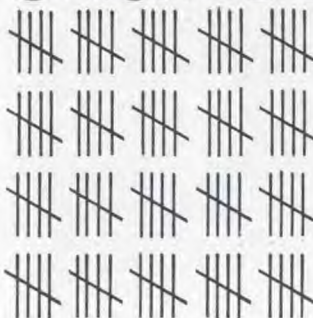
With the ever-increasing population in the world, animal food will of necessity be curtailed. At the present rate of population growth it has been estimated that seven hundred years from now people would be standing shoulder to shoulder on every foot of the earth's land surface.<sup>10</sup> From then on it

would be necessary to build apartment upon apartment with higher and higher buildings as they are already doing in New York City. In 7,000 years, our population would be expanding outward into space at the speed of light! Ridiculous? Perhaps. But it is a sobering fact that the population has actually outgrown its food supply in many areas of the world, with resulting famines.

But what has all this to do with a vegetarian diet? Much. Land used to produce food crops for human consumption feeds about fourteen times as many people as when it is used to grow food for animals which are in turn to be used for food. Plants will yield 800,000 calories per acre of land, but only 200,000 when these same plant foods are first fed to animals. Thus meat animals use approximately 600,000 calories from each acre's crop for themselves; they are wasteful of protein.

Let's break this down a bit. As Table 1 shows, of the *protein* food animals eat, one fourth is returned in milk, one eighth in pork, and one tenth in beef. Table 2 compares *calories* returned to us by food

Calories in



Calories out





**Table 1**

*Amounts of protein consumed by food animals compared with the amount they return as human food in milk, pork, or beef.*



**Table 2**

*Calories (food fuel) consumed by food animals compared with the calories they return as human food in milk, eggs, or beef.*



animals. Of the calories they consume, milk returns one sixth; eggs, one fourteenth; and beef, one twenty-fifth!

Some in the United States are not concerned, since our county is not overpopulated and food is not in short supply. But our birth rate is still almost twice our death rate. If this situation continues, food will be in short supply here also, just as it now is in some other countries.

## Conclusion

When one reviews the information available concerning the animal foods and notes the heart attack risk, the cancer potential, diseases such as salmonellosis and trichinosis, the lack of endurance, and the great waste of water, power, and agricultural land in the production of animal foods, it is no wonder so many are turning to a nonmeat diet.

If all that we know about nutrition were applied,

the improvement in the health of modern society would be as dramatic as that which resulted from the application of the germ theory.

## REFERENCES

- <sup>1</sup> Inter-Society Commission for Heart Disease Resources. *Report of Inter-Society Commission for Heart Disease Resources*. New York, Primary Prevention of the Atherosclerotic Diseases, 1970, p. A-57.
- <sup>2</sup> W. Lijinsky and P. Shubik. Benzo(a)pyrene and other polynuclear hydrocarbons in charcoal-broiled meat. *Science* 145:53, 55, 1964.
- <sup>3</sup> R. H. Rigdon, Jack Neal, and John Mack. Leukemia in mice fed benzo(a) pyrene. *Texas Reports on Bio. & Med.* 25:553-557, 1967.
- <sup>4</sup> J. M. Neiman. The sensitizing carcinogenic effect of small doses of carcinogen. *Europ. J. Cancer* 4:537-543, 1968.
- <sup>5</sup> J. T. Grace, E. A. Mirand, and D. T. Mount. Relationship of Viruses to Malignant Disease. *Arch. Int. Med.* 105:482-491, 1960. J. T. Grace, et al. *Canad. Cancer Conf.* 4:313-330, 1961.
- <sup>6</sup> *An Evaluation of the Salmonella Problem*, National Academy of Sciences. Washington, D.C., National Academy of Sciences, 1969.
- <sup>7</sup> *Trichinosis Surveillance, Annual Summary, 1968*. Atlanta, Georgia, National Communicable Disease Center, May, 1969.
- <sup>8</sup> A. Schouteden. *Ann. de Soc. Roy. Des Sciences Med. et Nat. de Bruxelles (Belgium)* I. 1904.
- <sup>9</sup> I. Fisher. *Yale Med. J.*, March, 1907, pp.
- <sup>10</sup> James Bonner. The population dilemma. *Bulletin* (Los Angeles County Medical Society), vol. 95, Jan. 21, 1965.



*This  
common question  
deserves a  
clear-cut  
answer.*

# Is a Nonflesh Diet Adequate?

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## **Current trends**

Today's awakening in vegetarianism is unique. In the past advocates of a meatless diet have tended to be mature men with a background of experience in philosophy, religion, or science. But our current phenomenal upsurge of interest in vegetarianism and healthful living is not spearheaded by gray-bearded philosophers or diploma-heavy men of science. Rather, young Americans of high school and college age are in the vanguard. All over the country students are joining the search for a simpler more natural way of life.

## **Zen macrobiotic diet**

But unfortunately, some of these young people lack sufficient knowledge of nutrition to select a well-balanced meatless diet. A few are even experimenting with extremes, such as the rigid Zen macrobiotic diet, which is a threat not only to health but to life itself.<sup>1</sup> The highest level of perfection of this bizarre diet consists in restricting one's food to cereals only, and this mainly rice, and the water intake to as little as possible. This unphysiological and dangerous program must not be confused with any reasonable vegetarian diet compounded of a variety of wholesome foods.

## **Young people are leading out**

The diet revolution is making an impact in many areas. Food service directors and dietitians are besieging vegetarian food factories for help in the know-how to provide the students with tasty, adequate, meatless meals.<sup>2</sup>

Even ivory-towered Yale University is reported as responding to the quest of youth for a more wholesome diet than that which conventional society offers.<sup>3</sup> Both Yale and the University of California at Santa Barbara are providing vegetarian cooking for those students who desire it. Longtime favorites like roast beef and mashed potatoes must now make room for





*The Mir and Rani of the fabled mountain kingdom of Hunza rule over a people renowned for their health and longevity.*

lentil and soybean patties, pinto bean goulash, and whole-grain products. Fresh, quick-cooked vegetables have taken the place of over-cooked, mushy ones poured out of a can. Fried foods are losing favor, and whole-grain bread is made of unbleached whole-grain flours without chemical additives.

But what about this diet revolution? Is a non-flesh diet adequate?

#### **Evidence from science**

Many studies of vegetarians, their food intakes and health, have been reported in recent years. Wherever an adequate food supply is available, the average vegetarian dietary presents no problem. In areas where the diet depends almost entirely on one kind of food, however, a better balance is needed. Thus, young children suffer from marasmus and kwashiorkor when taken off the breast and fed on thin cornmeal gruel or on mashed roots such as cassava, taro, or similar bulky, refined foods. These are low in protein and though relatively high in calories they lack some essential nutrients. In parts of Asia where white rice is the mainstay of the diet, beriberi is a problem among adults as well as among children. The cause is a lack of thiamin (vitamin B<sub>1</sub>) lost in the milling of the grain. But these grossly deficient diets are not to be compared with any reasonable practice of vegetarianism.

Evidence as to the adequacy of well selected vegetarian diets is beyond dispute. Scientists found that foods eaten by lacto-ovo-vegetarians were very similar to those used by nonvegetarians, except that they did not use meat.<sup>4</sup> The nonvegetarians had a much higher protein intake. No benefit could be shown from the larger intake of the nonvegetarians, even in the growth rate of adolescent boys and girls. The amount of protein in the blood was the same in all groups whether they used meat or not, but the vegetarians had the advantage of a lower blood cholesterol. Their diet also provided more unrefined

foods such as whole-grain bread and cereals and more fresh fruits and vegetables, which added a desirable amount of bulk to their diet. This was especially true of the pure vegetarians.

#### **Hunzas**

The longevity and remarkable health of the Hunzas is common knowledge. In 1964 Dr. Paul Dudley White, famous heart specialist, visited this small "roof of the world" principality and studied its people.<sup>5</sup> The diet, he noted, is spartan; the mainstays are fruits, nuts, vegetables, and grains (barley, wheat, millet), with a little milk from goats. Meat, primarily mutton, is eaten only once or twice a year.

Dr. White and an associate, Dr. Edward G. Toomey, studied twenty-five Hunza men believed to be 90 to 110 years old. Even at this advanced age they found "normal blood pressure, normal blood cholesterol levels, and normal electrocardiographic patterns."

#### **Okinawans**

During World War II an autopsy study of Okinawans showed similar results.<sup>6</sup> The native diet consisted mainly of plant foods. The low incidence of deficiency diseases and the natural longevity and fertility of these people led the investigators to conclude that the native diet, mainly nonflesh, was excellent.

#### **Otomi Indians**

The food pattern of the Otomi Indians of the high plateaus of Central Mexico has also been proven to be sound.<sup>7</sup> It consists mainly of tortillas (a thin, flat, unleavened cornbread), beans, peppers, and various local foods in each locality. Clinical study showed these people to be uncommonly healthy; none were overweight, and high blood pressure was a rarity.

#### **Norwegians**

In 1966 a comparative study of 116 healthy vegetarians and a comparable number of healthy nonvege-





No protein lack was evident among 7- to 9-year-old Appalachian girls fed diets in which cereal grains and legumes provided nearly all the protein.



Studies conducted in Norway showed no significant difference in the blood protein values of lacto-ovo-vegetarians and nonvegetarians.

tarians was reported from Oslo, Norway. Yale University participated in this study.<sup>8</sup>

The protein intake of the lacto-ovo-vegetarians was only a little less than that of the ordinary Norwegian diet, but a much larger proportion of it came from plant foods. The blood protein values of the two groups showed no significant differences.

The bread of the vegetarians contained more whole grain than did ordinary bread, and the diet was rich in complex carbohydrates (starch, pectin, fiber, and cellulose) and low in refined sugar. Thus it was higher in substances that tend to lower blood cholesterol (the complex carbohydrates and unsaturated fats) and lower in factors that have been found to raise the cholesterol level (saturated fats, dietary cholesterol, sucrose, and total calories). The intake of minerals and vitamins was high among the vegetarians due to the generous use of unrefined foods and of fresh fruits and vegetables. Fewer vegetarians than nonvegetarians were overweight.

#### British

Studies of British lactovegetarians (those who use milk, but not flesh foods) showed that their calcium intake is greater than that of the average nonvegetarian, perhaps due to the fact that muscle meat contains very little calcium.<sup>9</sup> Also, the bones of the vegetarians contained significantly more calcium than those of nonvegetarians of the same age.<sup>10</sup> At the approach of seventy, no further loss of bone minerals occurred in the vegetarians, while bones continued to weaken in the nonvegetarians.

#### Underdeveloped areas

A very convincing evidence that a flesh-free diet can supply basic needs is the tremendous population increase in countries where meat is scarce. It is in the underdeveloped regions, where the diet consists almost wholly of plant foods, that the human crop is so heavy. The high fertility rates of the world are not in

countries richly supplied with animal foods, but in Latin America, Africa, India, and the Middle East where the diet depends mainly on cereal grains and vegetables.<sup>11</sup>

#### Sherpas

Then there are the Sherpas, dwellers of the harsh, stony uplands of the eastern Himalayas, whose fabulous strength and endurance as carriers for Everest expeditions have been so highly extolled. In his autobiography, *Tigers of the Snows*,<sup>12</sup> Tenzing Norgay, famous Sherpa who accompanied Sir Edmund Hillary, first to set foot on top of the world's highest peak, says of his native diet: "Potatoes are our biggest crop and form the basis of much of our food, just as rice does for the Indians and Chinese."

Potatoes and barley, Tenzing Norgay says, grow up to 14,000 feet elevation and wheat to 10,000. From their flocks of sheep and goats and their herds of yak these people obtain milk and cheese with which to supplement their potato and cereal diet. Meat is seldom eaten, and the stricter Buddhists among them eat none.

#### Appalachia

An experiment just reported from the Department of Human Nutrition at the Virginia Polytechnic Institute, Blackburn, Virginia, found no protein lack in 7- to 9-year-old girls fed diets in which cereal grains and legumes provided nearly all the protein. The diets simulated those of low-income Southern families. Supplementation with several essential amino acids failed to improve the protein adequacy of the diet. The authors conclude that widespread fortification with amino acids is not justified.<sup>15</sup>

#### Nutritionists say

Many years ago Dr. V. E. McCollum, research scientist at Johns Hopkins University, concluded: "The lactovegetarian diet, or combination of vegetable





The bones of British lactovegetarians contain significantly more calcium than those of British nonvegetarians of the same age.



Clinical studies of the Otomi Indians of the high plateaus of Central Mexico show them to be uncommonly healthy.

foods and milk, is, however, easy to plan so as to be highly nutritious and to promote optimal health.”<sup>13</sup> Noted scientists around the world today support Dr. McCollum’s conclusion.

As Dr. Robert Harris said, at the time he was professor of biochemistry at the Massachusetts Institute of Technology:

Both the vegetarian type and the carnivorous type of diet can adequately feed mankind. The realization of this fact by those who struggle with the food problem of the world is of terrible importance. There is not sufficient land in the world to feed all mankind the animal protein diet now consumed in the United States. . . . People may prefer to eat diets rich in animal protein, but those diets are not necessary, and most people cannot afford them.<sup>14</sup>

### So...

What then is today’s answer to those who ask if a nonflesh diet can meet human nutritional needs? It is a clear “Yes.” Such a diet is wholly suitable for human nutrition on the highest level, not only for ordinary living but also during periods of stress as in pregnancy, breast-feeding, and growth of the young. It is also adequate, as the Sherpas have demonstrated, to prepare young men to endure the most severe stress that can be laid on the human body—extreme altitude, almost unbearable cold, supreme endurance, and elephantine strength.

A well-formulated lacto-ovo-vegetarian diet is adequate for every nutritional requirement. No longer need anyone fear the day when beefsteaks and pork chops may have to give way to plant proteins.

### REFERENCES

- <sup>1</sup> Council on Foods and Nutrition. Zen macrobiotic diets. *J.A.M.A.* 218: 397, 1971.
- <sup>2</sup> Vegetarianism is ‘in’ on campus. *Univ. Observer*, Thursday, November 18, 1971, p. 6.
- <sup>3</sup> Meatless meats invade Yale. *The Southwestern*, December, 1971. (Southwestern Union College)
- <sup>4</sup> M. G. Hardinge and F. J. Stare. Nutritional studies of vegetarians. 1. Nutritional, physical, and laboratory studies, and 2. Dietary and serum levels of cholesterol. *J. Clin. Nutr.* 2:78-82; 83-88, 1954.

- <sup>5</sup> E. G. Toomey and P. W. White. A brief survey of the health of aged Hunzas. *Amer. Heart J.* 68:842, 1964.
- <sup>6</sup> P. E. Steiner. Necropsies on Okinawans. Anatomic and pathologic observations. *Arch. Path.* 42:359, 1946.
- <sup>7</sup> R. K. Anderson, J. Calvo, W. D. Robinson, G. Serrano, and G. C. Payne. Nutrition appraisal in Mexico. *Amer. J. Pub. Health* 38:1126, 1948.
- <sup>8</sup> K. Kirkeby. Blood lipids, lipoproteins, and proteins in vegetarians. *Acta. Med. Scandinav.* Vol. 179, Supp. 443, 1966, pp. 56-60.
- <sup>9</sup> F. R. Ellis and P. Mumford. The nutritional status of vegans and vegetarians. *Proc. Nutr. Soc.* 26:205, 1967.
- <sup>10</sup> F. R. Ellis, S. Holesh, and J. W. Ellis. Incidence of osteoporosis in vegetarians and omnivores. *Amer. J. Clin. Nutr.* 25:555, 1972.
- <sup>11</sup> 72.6 million more people in 1970. *War on Hunger* 4:4, 1970.
- <sup>12</sup> T. Norgay and J. R. Ullman. *Tiger of the Snows*. New York: G. P. Putnam’s Sons, 1955, p. 14.
- <sup>13</sup> E. V. McCollum, Orent-Keils, and H. G. Day. *The Newer Knowledge of Nutrition*. New York: The MacMillan Co., 1939, p. 563.
- <sup>14</sup> R. S. Harris. Presented at the International Congress on Vitamins in Havana, Cuba, Jan. 25, 1952.
- <sup>15</sup> R. P. Abernathy, S. J. Ritchey, and J. C. Gorman. Lack of response to amino acid supplements by preadolescent girls. *Amer. J. Clin. Nutr.* 25: 980, 1972.







***Some  
new insights  
into the importance  
of plant  
foods.***

## Plant Foods and Your Diet

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We talk of animal foods and of plant foods, but in reality there could be no animals or animal foods without prior plant foods. Animal life is wholly dependent on plants for its primary food supply. The reason? Plants have the unique ability to manufacture food from the elements with the use of the sun's energy. Plants take carbon dioxide from the air, combine it with water, nitrogen, and minerals from the soil, and out of these simple substances make all our primary foods—sugars, starches, proteins, fats, and vitamins. No animal body can do this.

### **Protein requirement**

Many countries are struggling with the problem of an increasing population and a diminishing food supply. The greatest concern of some has been the provision of adequate protein. However, it is not likely that there will be a protein shortage as long as there is enough food such as grains, legumes, and vegetables to maintain the caloric or energy needs of the people. World War II taught us much about the value of plant proteins. A conclusion based on observation of population groups and on the results of experimental studies led nutritionists of the Harvard University School of Public Health, during the war years, to assure the American people:

As long as this country has access to a plentiful supply of calories and a variety of whole-grain cereals and legumes, it is most unlikely that impairment of health from protein deficiency will ever occur.<sup>1</sup>

And again, immediately after the war:

It is most unlikely that protein deficiency will develop in apparently healthy adults on a diet in which cereals and vegetables supply adequate calories.<sup>2</sup>

In other words, there is really no protein problem as long as one has enough of a reasonable variety of plant foods to maintain weight.







*The miracle foods of the future are apt to originate in a lowly soybean patch.*

### **Plant protein quality**

This question looms so large in the minds of many that we are dealing with it separately in a following section. Suffice it to say here that the quality of plant protein compares very favorably with that of animal origin.

### **Plant fats**

What about the fats that plants provide?

In 1952 the nutrition-conscious world was electrified with the report that a diet rich in vegetable oil lowered the high blood cholesterol of hospital patients.<sup>3</sup> This breakthrough received quick recognition, since it was already known that a high serum cholesterol is commonly associated with a high risk of death from coronary heart attack.

This early report has been verified in studies around the world. Countries whose intake of animal foods and animal fats is high head the list in death rates from coronary heart disease. In descending order per 100,000 population these are given as: Finland, Scotland, United States, Australia, Northern Ireland, and Canada.<sup>4</sup> Lowest on the list is Japan,

whose diet is mainly one of cereals, beans, vegetables, and fruits—foods low in animal fat and animal protein.

Dr. Ancel Keys, of the University of Minnesota, who has studied population groups around the world in an effort to throw light on the coronary heart disease problem, says:

We cannot ignore the vast amount of evidence that points to saturated fats in the diet as a major factor in the high frequency of coronary heart disease. We now know that the likelihood of future coronary heart disease rises steeply with the level of cholesterol in the blood. And we know that the level of cholesterol in the blood rises with the amount of saturated fat in the diet.<sup>5</sup>

### **Plant carbohydrates**

A real difference between plant and animal foods is the carbohydrate content. The carbohydrates include a whole cluster of important nutrients as well as nondigestible fiber. Among these are the sugars, starches, pectins, hemicelluloses, and celluloses. Plants are rich in these essential substances while the animal foods are practically devoid of them except for the sugar found in milk (lactose).





Sugars and starches are very much alike. In fact, plants make starch by linking simple sugar groups together. During digestion these links are broken and the starch falls apart to simple sugar again. That is why sugars and starches are able to serve the same purpose, but it takes a little longer to digest the starch and get it into the blood stream. That is as it should be. The slow release of glucose from the digestion of starch maintains the blood sugar at a proper level for several hours. The next meal replenishes the supply. Too much sugar triggers the body's safety mechanism to pour out more insulin to bring the level down. This may result in the sugar in the blood dropping too low and causing hypoglycemia (low blood sugar).

The carbohydrate in plants is stored chiefly in the form of starch. Cereal grains and root vegetables provide the major source of this energy material for all the peoples of the earth. In some countries carbohydrates, mostly starch, make up three fourths of the calories of the diet.<sup>6</sup> This class of foodstuffs is rightly called the "fuel of life."

In general, fresh vegetables have a varying amount

of carbohydrate, ranging from 3 per cent in lettuce to 17 per cent in Irish potatoes (sweet potatoes have 26 per cent), occurring mostly as starch. Dry grains contain about 70 per cent starch. The carbohydrate in fruits is mainly in the form of simple sugar. A common range is from 10 per cent in peaches to 22 per cent in bananas. The nondigestible parts of these foods provide bulk for bowel hygiene.

### Plant vitamins and minerals

Plant foods hold the banner in mineral and vitamin content.<sup>7</sup> Together with milk, leafy green vegetables were designated "protective foods" by nutritionist E. V. McCollum, of Johns Hopkins University, in 1918. Dr. McCollum's stated reason for this designation was that these foods "are the only foods so constituted as to make good the deficiencies of cereal grains, legume seeds, tubers, and muscle meats."<sup>8</sup>

The concentration of different vitamins and minerals varies with certain colors of fruits and vegetables and with certain portions of the plants. Vitamin A, in the form of carotene, tends to be high in dark green leaves, in yellow fruits, and in green and yellow vegetables.

Good sources of the B-vitamins are the legumes, nuts, and other seeds, but especially the germ and bran of the cereal grains. They are also well represented in green leafy vegetables along with the carotene and vitamin C. Whatever plant or portion of a plant is rich in vitamins, the same is usually also rich in minerals. So we find a whole spectrum of vitamins and minerals in fruits, green leafy vegetables, whole grains, legumes, and other seeds and nuts. Here also we find the minerals—iron, calcium, potassium, phosphorus, and a great variety of others.

What, then, is the role of plant foods? It is the primary role without which there can be no other roles. Upon the continued production of food by plants hinges the nutrition of all animal life. No animal body can originate or duplicate this marvel of food synthesis. All the animal kingdom can do is for animals to eat what the plants produce, disassemble it by digestion, then reassemble it into their own animal products—meat, milk, and eggs.

Plants offer the only solution (even if only temporary) to the growing threat of world hunger and starvation. Their role grows more important by the day.

### REFERENCES

- <sup>1</sup> F. J. Stare. Some medical aspects of protein foods. *Amer. J. Pub. Health* 33:1444, 1943.
- <sup>2</sup> D. M. Hegsted, A. G. Tsongas, D. B. Abbott, and F. J. Stare. Protein requirement of adults. *J. Lab. Clin. Med.* 31:261, 1946.
- <sup>3</sup> L. W. Kinsell, J. Bartridge, L. Boling, S. Margen, and G. Michaels. Dietary modification of serum cholesterol and phospholipid levels. *J. Clin. Endocrinol.* 12:909, 1952.
- <sup>4</sup> Report of the Inter-Society Commission for Heart Disease Resources. Primary prevention of the atherosclerotic diseases. *Circulation* 42: A-55 (July), 1970.
- <sup>5</sup> A. Keys and M. Keys. *Eat Well and Stay Well*. Garden City, N.Y. Doubleday, 1963, p. 4.
- <sup>6</sup> J. J. Groen, M. Balogh, M. Levy, and E. Yaren. Nutrition of the Bedouins in the Negev desert. *Amer. J. Clin. Nutr.* 14:37, 1964.
- <sup>7</sup> B. K. Watt and A. L. Merrill. *Composition of Foods—Raw, Processed, Prepared*. USDA Agriculture Handbook No. 8, 1963.
- <sup>8</sup> E. V. McCollum and N. Simmonds. *The Newer Knowledge of Nutrition*. New York: MacMillan, 1929, p. 133.



*Skeptics  
of a vegetarian  
diet always  
come up  
with this  
question . . .*

## But What About Protein?

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The question most frequently asked regarding vegetarian diets is, "But how about the protein?" People are concerned about both the *amount* and the *quality* of the protein.

### **Amount of protein in vegetarian diets**

Dr. Hardinge, of Loma Linda University, and Dr. Stare, of Harvard University, did the most complete studies of people who used different kinds of vegetarian diets.<sup>1</sup> Those who ate *no* animal products, called total vegetarians, and those who used milk and eggs, known as lacto-ovo-vegetarians, were actually eating *more* protein than was recommended by the Food and Nutrition Board of the National Research Council in Washington, D.C.<sup>2</sup> Men and women eating meat consumed even greater amounts. The results of these studies are given in Figure 1; they show that average vegetarian diets contain adequate amounts of protein.

Let's go a step further. Amino acids are the building blocks of protein. Our bodies can manufacture some of those we need, but certain others must be obtained "pre-fab" from our food. These are called *essential* because it is essential that they be present as such in our diet. Table 1 shows the amounts of these essential amino acids that the two groups of vegetarians were getting.<sup>3</sup> You can readily see that your amino acid needs<sup>4</sup> are easily surpassed by vegetarian diets! Of course, meat-containing diets also have many times the amounts of amino acids needed by the body.

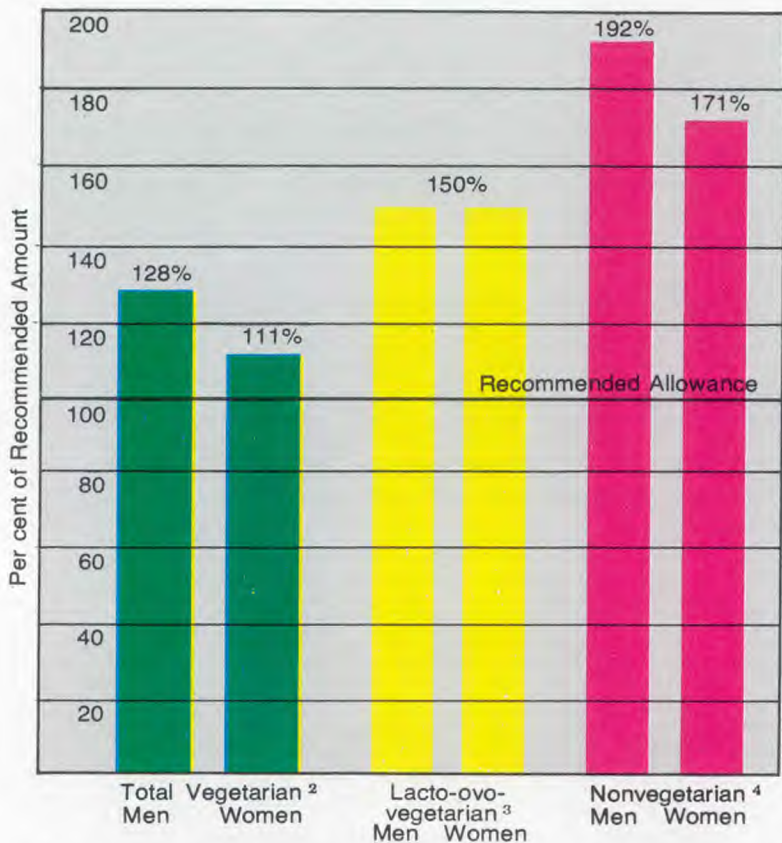
Dr. U. D. Register and his co-workers at Loma Linda University also compared ordinary diets containing meat and other animal products with those containing only plant proteins.<sup>5</sup> But in these studies the total protein in both diets was limited to approximately 60 grams. The results were the same—both the vegetarian and nonvegetarian diets far exceeded the body's needs. Therefore we can safely conclude that vegetarian diets are fully adequate as far as the protein and essential amino acids they provide are concerned.







Figure 1. The average daily protein intake of vegetarians and nonvegetarians was more than the recommended amounts of protein intake.<sup>1</sup>



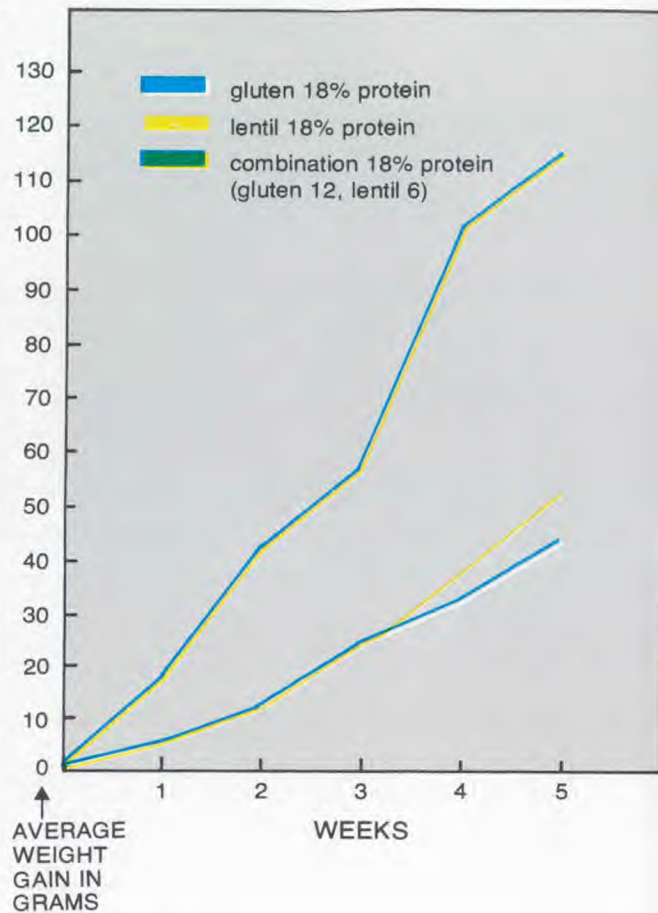
1. Food and Nutrition Board, National Research Council (2). The recommended allowance of 55 grams for women and 65 grams for men is deliberately set at twice the amount demonstrated to be adequate.
2. Uses no animal products.
3. Uses milk and eggs but no flesh foods.
4. All the protein intake values are averages found by Hardinge and Stare.<sup>1</sup>

How much protein do we actually need? Two separate groups of top-flight researchers in the field of nutrition, Dr. Hegsted and his associates at Harvard,<sup>6</sup> and Dr. Bricker and his fellow workers at University of Illinois,<sup>7</sup> have each found that about 30 grams of protein, or one ounce, is sufficient for an adult human. It made no difference whether this protein came from animal or plant sources—both were entirely adequate. Such information has led Dr. Hegsted to state that “it is most unlikely that protein deficiency will develop in healthy adults on a diet in which cereals and vegetables supply adequate calories.”<sup>6</sup>

#### Quality of protein—growth method

Experiments done elsewhere and at Loma Linda University show the tremendous advantage gained from

Figure 2. The supplementary value of lentils on wheat protein in diets fed to 5 rats per group during a 6-week period.

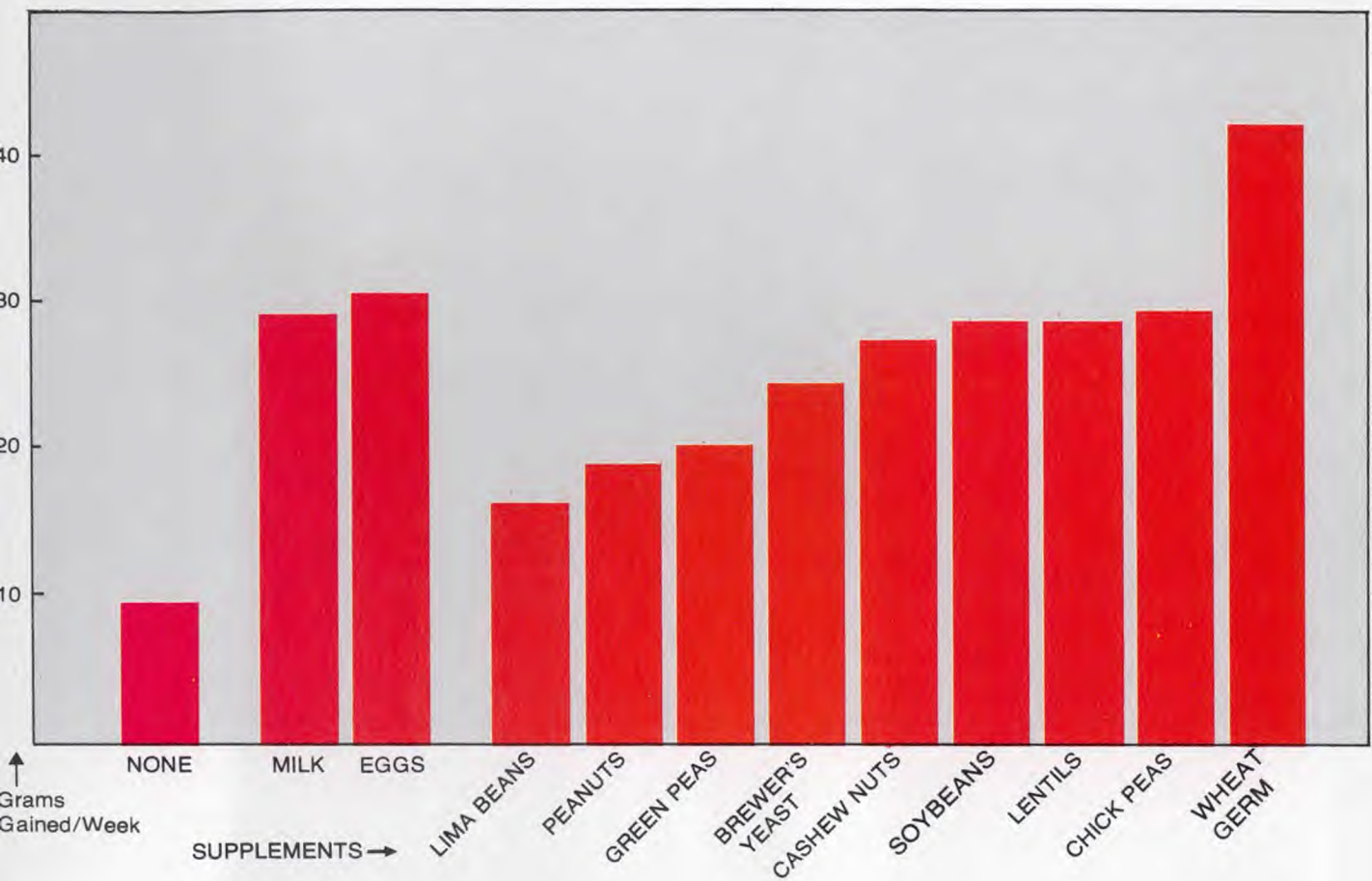


the use of two or more vegetable proteins combined as compared to the use of a single food. Figure 2 shows that even a single source of protein, such as from lentils or wheat, when fed as the *only* protein for long periods of time, will produce growth in animals. But when the two are eaten together, as we normally do, growth is superior to that of either one alone.<sup>7</sup> This combined effect is called *supplementation*.

Since wheat is a cereal widely used around the world, laboratory animals were fed many combinations of wheat gluten with various other proteins. Wheat was always two thirds of this protein mixture, and the total amount of protein was always the same.<sup>8</sup> Figure 3 shows the weight gains of the animals on these various food combinations. It is normal to see minor differences in growth in animal studies. Most



Figure 3. The average weight gained per week by each group of 5 rats fed for 6 weeks on diets containing 18 per cent protein. Two thirds of this protein was always wheat gluten, the other third was one of the foods listed below.



of the differences you see in Figure 3 may be ignored. Thus it is clear that there are many combinations totally of vegetable origin which produce growth response equivalent to that of animal foods. These facts are particularly important in areas of the world where animal proteins are scarce, very expensive, and out of reach of the poor and malnourished populations. By judicious combinations of plant foods, meals can be prepared that are adequate in *quality* as well as in *quantity* of protein.

Now, a step further. Because a single food or a combination of only two foods is seldom, if ever, eaten over a period of days, a complete *week's* diet was collected, containing a selection of grains, fruits, nuts, and vegetables as typically eaten by vegetarians at home. In order to test for protein quality we fed this food to experimental animals.

Figure 4 shows that the growth of animals was similar, whether or not the plant protein entrees were replaced with meat.<sup>9</sup>

In these experiments we also selected meals from one of the university student cafeterias. When beef replaced the usual vegetable entrees, the growth was no different from that of animals fed the vegetarian diet. We also determined the adequacy of the vegetarian diets in another university student cafeteria and in the university hospital. For some of the animals in each group, the usual vegetarian entrees were replaced by a meat mixture of beef, pork, fish, and fowl in amounts proportionate to the average consumption of these meats in the United States. In these experiments we again found that the quality of protein in the vegetarian diets was comparable to that in the meat-containing diets.



Figure 4. Growth of rats on vegetarian and meat entrees.

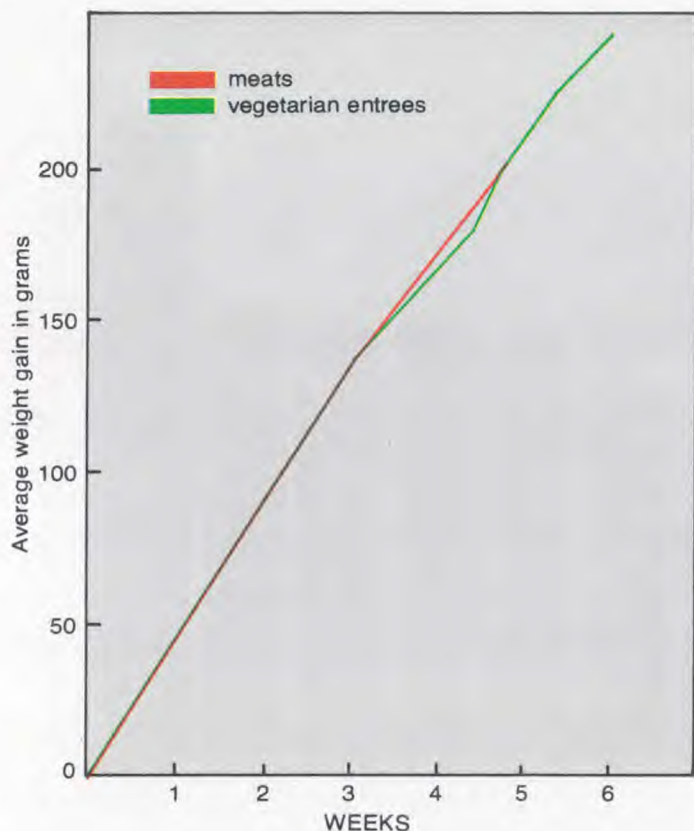


Table 1. The Average Daily Amino Acid Intake of Adult Vegetarians Was More Than the Minimum Requirement.

**AVERAGE INTAKES,<sup>1</sup>  
RELATION TO REQUIREMENT**

<sup>2</sup> Each number represents how manyfold greater the intake is over the requirement, i.e., 4 represents an intake 4 times greater than needed, as established by the U.S. Food and Nutrition Board.<sup>4</sup>

AMINO ACID	Lacto-ovo-vegetarian		Total Vegetarian	
	Men	Women	Men	Women
Tryptophan	5	6	4	6
Threonine	8	11	6	8
Isoleucine	8	10	6	7
Leucine	7	11	5	7
Lysine	7	10	5	6
Methionine+				
Cystine	3	5	2	4
Phenylalanine+				
Tyrosine	6	7	5	5
Valine	7	8	5	5

<sup>1</sup> Hardinge, Crooks, and Stare.<sup>3</sup>

So you can see that both students and patients get plenty of good quality protein on a vegetarian diet.

**Quality of protein—biological value method**

In the biological value method, the quality of protein is measured by the amount of protein retained by the body. Any value of 70 per cent or over indicates an excellent protein quality, adequate for even infant needs. A value of 60 per cent is adequate for adults.

We compared both single meals and an entire week's menus of vegetarian and meat-containing meals by this method.<sup>10</sup> Prepared vegetarian entrees, mixtures of beans and corn typical of Latin American combinations, and rice and beans as used in the Orient, with or without soybean milk or dairy milk, constituted the vegetarian entrees. The meat entrees included frankfurters or veal and milk. The results?

Whether individual meals or a week's food, whether vegetarian or meat entrees, all of the diets had a biological value of over 70, which is adequate even for infants. These results are demonstrated in Table 2.

Dr. Hegsted and his fellow scientists<sup>11</sup> have also found biological values ranging from 71 to 89 for meals composed of cereals, vegetables, and fruits.

**Conclusions**

It is no problem to obtain *enough* protein in ordinary vegetarian diets. More important, studies clearly show that either plant or animal proteins can adequately satisfy the requirements for *quality*. Research also shows that there are numerous ways of combining vegetable foods to provide this high quality of protein. Drs. Bressani and Béhar,<sup>12</sup> of the



Table 2.  
*The Biological Value of a Single Vegetarian Meal Containing Tomato Juice, Potato, Carrots, Broccoli, Bread, and a Cooky Was Similar With Plant Protein or Animal Entrees.*

Protein Source	Biological Value <sup>1</sup>
Vegetarian meal + vegetable entree <sup>2</sup> + cow's milk	74
Vegetarian meal + canned frankfurters + cow's milk	71
Vegetarian meal + beans and corn	75
Vegetarian meal + beans and rice	79

<sup>1</sup> Sanchez, et al.<sup>10</sup>

<sup>2</sup> Linketts (a product of Loma Linda Foods, Inc.) with added lysine.

Institute of Nutrition of Central America and Panama, ask the most significant question, "Can proteins of vegetable origin replace those of animal origin in human nutrition?" They then answer it, "From the nutritional point of view animal or vegetable proteins should not be differentiated."

#### REFERENCES

- <sup>1</sup> M. G. Hardinge and F. J. Stare. Nutritional studies of vegetarians. I. Nutritional, physical, and laboratory studies. *Amer. J. Clin. Nutr.* 2:73, 1954.
- <sup>2</sup> Food and Nutrition Board—National Research Council. *Recommended Dietary Allowance*, 7th ed. National Academy of Sciences Publication 1964, Washington, D.C., 1968.
- <sup>3</sup> M. G. Hardinge, H. Crooks, and F. J. Stare. Nutrition Studies of Vegetarians. V. Proteins and essential amino acids. *J. Amer. Dietet. Assoc.* 48:25, 1966.
- <sup>4</sup> Food and Nutrition Board—National Research Council. *Evaluation of Protein Nutrition*. National Academy of Sciences Publication 711, Washington, D.C., 1959.
- <sup>5</sup> U. D. Register, M. Inano, C. E. Thurston, I. B. Vyhmeister, P. W. Dyingler, J. W. Blankenship, and M. C. Horning. Nitrogen balance studies in human subjects on various diets. *Amer. J. Clin. Nutr.* 20:753, 1967.
- <sup>6</sup> D. M. Hegsted, A. G. Tsongas, D. B. Abbott, and F. J. Stare. Protein requirements of adults. *J. Lab. Clin. Med.* 31:261, 1946.
- <sup>7</sup> M. Bricker, H. H. Mitchell, and G. M. Kinsman. The protein requirements of adult human subjects in terms of the protein contained in individual foods and food combinations. *J. Nutr.* 30:269, 1945.
- <sup>8</sup> A. Sanchez, U. D. Register, G. G. Porter, and E. Lee. Plant proteins in relation to needs for protein and fat quality. *Indian J. Nutr. Dietet.* 9: in press, 1972.
- <sup>9</sup> A. Sanchez, G. G. Porter, and U. D. Register. Effect of entree on fat and protein quality of diets. *J. Amer. Dietet. Assoc.* 49:492, 1966.
- <sup>10</sup> A. Sanchez, J. A. Scharffenberg, and U. D. Register. Nutritive value of selected proteins and protein combinations. I. The biological value of proteins singly and in meal patterns with varying fat composition. *Amer. J. Clin. Nutr.* 13:243, 1963.
- <sup>11</sup> D. M. Hegsted, V. Kent, A. G. Tsongas, and F. J. Stare. A comparison of the nutritive value of the proteins in mixed diets for dogs, rats, and human beings. *J. Lab. Clin. Med.* 32:403, 1947.
- <sup>12</sup> R. Bressani and M. Behar. The use of plant protein foods in preventing malnutrition. Proceedings of the Sixth International Congress of Nutrition, Edinburgh, August 9 to 15, 1963. Edinburgh, E. & S. Livingstone, Ltd., 1964.



*You may never be a world champion, but here are some good health tips.*

# Still Skiing at Eighty-four!

A LIFE AND HEALTH Interview With Anders Haugen.

**Four times national ski champion!  
Three times world champion!**

Still skiing at eighty-four! Lithe, erect, slender, keen-minded, twinkly-eyed, and possessing a quick, contagious sense of humor—that's Anders Haugen. I wanted to find out what gives him such "go power," such strength and endurance. Energy in a young man is taken for granted, but when an octogenarian still loves the slopes, there's *got* to be a story behind it.







**Life and Health:** Mr. Haugen, where did your interest in skiing come from?

**Mr. Haugen:** Well, as the old saying goes, I was "born on skis," at Bö Telemark, Norway. My father was an army officer and a blacksmith by trade; mother was a *real* mother. We children skied as naturally as we walked—I can't remember learning to ski. We had to go to school on skis.

**Life and Health:** A tremendous advantage! How old were you when you came to this country? And what brought you here?

**Mr. Haugen:** I came in 1908 when I was 19. My two brothers and a sister were here, and I came to stay with them. High school behind me, I learned bricklaying, and this has been my trade all my life.

**Life and Health:** When did you begin skiing in the United States?

**Mr. Haugen:** I skied from 1909 in this country. I won national championships and set world records. I captained the first American Ski Team to the Olympics in 1924, and we beat the Norwegians. Until that time they had been supreme in this sport, but now they had competition. This was at Chamoinix, France. I have been elected to the Hall of Fame.

**Life and Health:** What is the longest jump you ever made?

**Mr. Haugen:** Well, the world's record I made was 214 feet, 2/3 of a block. That was in Dillon, Colorado, in 1920.

**Life and Health:** How does jumping today compare with jumping then?

**Mr. Haugen:** They have changed hills and the style





***“Before I learned to live healthfully, I’d eat any-  
time. Not anymore. Nothing between meals, and  
a vegetarian diet.”***

of jumping; they use wind tunnels now to test themselves out—they’ve changed the style altogether. They use much steeper hills, which just drop from them. We used much more speed.

**Life and Health:** How fast would you get going?

**Mr. Haugen:** It’s hard to tell—60, maybe 70 mph before jumping. You are slowed up when you are going through the air, so you don’t go as fast when you land as when you take off.

**Life and Health:** Were any others of your family good skiers?

**Mr. Haugen:** My brother Lars was seven times national champion! He won the national championship three times more than any other man.

**Life and Health:** You were the one who won four?

**Mr. Haugen:** Yes. We had fourteen championships between us. I had seven, three world records and four national; and he had seven national championships.

**Life and Health:** Where did you train?

**Mr. Haugen:** Chippewa Falls, Wisconsin, to begin with. Of course, we represented different clubs, and we trained every day during the winter. Even while sitting on the train we were working our ankles. We took walks in the morning and kept ourselves in good shape physically.

**Life and Health:** How far would you walk?

**Mr. Haugen:** Oh, that varied. Sometimes we would walk up to fifteen miles a day.

**Life and Health:** This intense training surely paid off! And now for the “sixty-four dollar question.” Since the fuel given any engine is the most important factor in its performance, we want to know what fuel you gave your body in those days.

**Mr. Haugen:** I have been a vegetarian for over sixty years.

**Life and Health:** Sixty years! How did it happen?

**Mr. Haugen:** A cousin of my father’s took me to a lecture in Minneapolis in 1911. I wasn’t interested in the lecture until the speaker compared meat, with its cancer and other diseases, with a nice basket of fruit.

He said, “*This* [the fruit] is what the Lord has prepared for us to live on.” And this is what struck up here [Mr. Haugen pointed to his head]. From that time on they didn’t have to coax me to go to the meetings. I went willingly. After my system got cleared up in nice shape, I won three more national championships and set two more world records. After my change in diet I competed in the Olympics, and made the two longest jumps.

**Life and Health:** Did you notice any changes in your health after you went on a vegetarian diet?

**Mr. Haugen:** The first thing I noticed was that my skin color or complexion improved. I felt stronger and had more wind. My brother who was seven times national champion used to have a cold all winter long. So I told him, “Lars, why don’t you quit eating meat, and you won’t have a cold all the time.” So he quit eating meat and he became my hardest competitor on the team.

**Life and Health:** Did you quit skiing after the Olympic match?

**Mr. Haugen:** Of course not! After I quit the competition, I performed in indoor sportsmen’s shows for about twenty years. I skied in Los Angeles six years on artificial stuff.

**Life and Health:** Does it ski the same?

**Mr. Haugen:** You couldn’t turn on it—you had to go straight ahead. We stopped on canvas. Pretty tricky and nearly did me up when I first tried it. I was the first one to ever try indoor skiing. Started it in 1933 in Minneapolis auditorium.

**Life and Health:** Tell us about your family—your wife and children.

**Mr. Haugen:** I married Mina Amundson when I was 29 and she was 24. She died recently. I couldn’t have gotten a better wife. I have two sons, six grandchildren, and two great-grandchildren. My boys are both good jumpers and they’re good all-round skiers. The oldest one is a minister in Oakland. The other one is a contractor in Loveland, Colorado. I’m supposed to go up north in a few days and go skiing with Einar. That’s my oldest boy.

**Life and Health:** You’ll stay on the level?

**Mr. Haugen:** No! I’ll head for the slopes!





*"We children skied as naturally as we walked—I can't remember learning to ski. We had to go to school on skis."*

**Life and Health:** Have you been back to Norway since you left?

**Mr. Haugen:** I plan to make a trip next spring, for I have four sisters over there. This will be my fifth trip. My wife and I made four trips—she was Minnesota-born, but talked Norwegian, so she got along just fine.

**Life and Health:** How do you manage now, without your wonderful wife?

**Mr. Haugen:** I live alone, grow and freeze my own fruit, and prepare my own meals. I walk three miles every morning.

**Life and Health:** What do you eat?

**Mr. Haugen:** Well, I have whole-grain cereal and bread, some vegetarian entree, and soy milk. Then I have vegetables of all kinds. My doctor asked me how I like my own cooking, and I told him I'm a pretty good cook, I can even boil water without scorching it!

**Life and Health:** What fruits do you grow?

**Mr. Haugen:** I have oranges, tangerines, apricots, peaches, and grapes. I have a big freezer and a smaller one just packed with food. None of it is for sale, but is given away to the boys, neighbors, and friends. I have about twenty trees. I also have a flower garden.

**Life and Health:** I enjoy gardening, too. Tell me, what do you think are the most important qualities for a ski jumper?

**Mr. Haugen:** Good health and intensive training. I don't smoke or use liquor. I try to eat good food and never to eat anything between meals, because it upsets my stomach and my whole system. Before I learned to live healthfully, I'd eat anytime. Not anymore. Nothing between meals, and a vegetarian diet. There's another skier that became a very strict vegetarian through my help and he's also in the Hall of Fame. His name is Henry Hall. He was on a television show a few months ago on "What's My Line?" I had the nicest compliment recently. I passed two boys who were going to school, and so I said, "You boys are pretty smart. How old am I?" One fellow says, "About 60?" and the other fellow says, "No, you're mistaken; about 65?" I laughed at them and said, "Eighty-four!" They just said, "No!"







*You don't  
have to wait for  
the foods  
of the future;  
they are already  
here!*

# Something New and Different

---

“Beef, lamb, chicken, and turkey” that never saw a ranch or a barnyard? Yes, indeed. And we're not talking about space-age products still on the drawing board; these fascinating foods are already on the market.

The story starts in a humble soybean patch, and is an amazing account of modern food technology. Our expanding world population made it necessary to develop foods to replace costly animal proteins. A much less expensive and new technology has emerged for the processing of plant proteins to yield palatable, nutritious, and novel products.

How has this been accomplished?

## **A new technology**

The idea is not new. Many possibilities have been open to research and experimentation. Algae and yeasts grown on industrial or metropolitan wastes, or “single cell” proteins grown on petroleum products or on sugar wastes have long been favorite projects. However, the flavor and the texture of these foods are their main drawback. We choose our food not only to get adequate nutrition but also to please our palates. And these above-mentioned foods, however nutritious, economical, and soil saving, fail to excite our imagination or our taste buds. Labels such as “synthetic” or “imitation” or “artificial” are met with suspicion, and interpreted as an attack on man's established food preferences and customs.

And peanut butter? That delicious spread without which children could not grow up? Excellent protein. But peanut butter alone is not the answer. Nuts and oil seeds are also rich in protein and are nutritious and palatable. Because these foods are generally high in fat, they should be eaten judiciously.

This leads us to the legumes, which have a higher protein content than any other vegetable food. They enrich the soil in which they grow with nitrogen, resulting in a double bonus—increased food yield and saving of soil. Beans, lentils, garbanzos, and peas have been staple foods since early times. And

they may, with appropriate technology, be the foods of the future.

## **Soybeans**

Among the legumes, soybeans have the highest protein quality and quantity. Versatile and nutritious soybeans have for centuries served the Oriental people as a source of meat, milk, and cheese. First introduced into the U.S.A. in 1804, they were used as cattle feed. In 1915, when cottonseeds were in short supply, soybeans came to prominence as an oil source. But now tasty ways to introduce soybeans as a food for humans have catapulted these beans to an important agricultural crop. In 1924 five million bushels were produced. In 1971 this figure reached more than one billion bushels. A recent (1968) survey indicated that the consumption of soy products increases at a rate of 5 to 7 per cent per year.

Soy products available today are the following:

- Full-fat soybean flour and grits. (40 per cent protein)
- Defatted soybean flour and grits (50 per cent protein)
- Soy protein concentrates (SPC) (60 per cent protein)
- Soy milk
- Isolated soy protein (ISP) (90 per cent protein)

What can be done with these basic soy products?

As fillers or as meat extenders or alternates, soy products are used for beverages, baby foods, bakery goods, and meat products. Textured vegetable proteins made by processing defatted soy flour and soy protein concentrates or isolated soy proteins may mimic almost any flavor and texture of animal or vegetable foods by proper manipulation.

The principal difference between full-fat and defatted soy flours is the greater proportion of carbohydrate and protein in the defatted flours. This is, of course, the result of the removal of fat from them. This is illustrated in the following table:



Table 1. Proximate Analysis of Soy Flour

Composition	Full-fat soy flour	Defatted soy flour
	per cent	per cent
Protein	41.0	50.5
Fat	20.5	1.5
Carbohydrates	25.2	34.2

The carbohydrate content of full-fat or defatted soy flour is about 30 per cent. Half of the carbohydrate is in the form of starch. The rest is composed of sucrose or cane sugar (8.2 per cent), stachyose (5.5 per cent), and raffinose (1.2 per cent), two sugars that the body is not able to digest. These sugars are responsible for the toasted flavor of heated soy flours. Stachyose and raffinose also cause flatulence (intestinal gas). Bacteria in the lower small intestine (ileum) and upper colon break down these sugars, releasing carbon dioxide and hydrogen gas, major components of the flatus. Soy protein concentrates and isolates are exempt from the problem because of prior removal of the carbohydrates.

There are many vitamins and minerals in soybeans and their products, such as the B-vitamins thiamine, riboflavin, and niacin.

Raw soybeans, as well as other beans, contain a substance that impairs the digestion of proteins in the intestine. Experimental animals fed on raw soybeans fail to grow normally. Soybeans should be heated as this destroys the active factors that alter the digestion and utilization of protein.

Textured vegetable proteins are promising protein sources for the present as well as the future. The name refers to the fibrous texture, which resembles meat products such as chicken, beef, turkey, pork, or lamb. Even "coconuts," "dried fruits," or "nuts" can be produced by proper manipulation of the fiber, the flavoring, and the coloring. The fibrous texture is produced by two different processes, namely, fiber spinning and thermoplastic extrusion.

### Spun fibers

As early as 1930, Ford Motor Company was developing a technique of spinning proteins for products used in the textile industry. Producing foods by this technique seemed promising to Robert H. Boyer. He worked on the project and by 1954 he was granted a patent for this useful tool. Subsequently, he licensed the soy spun-fiber technique to General Mills, to Worthington Foods, and also to Swift, and Ralston Purina.

Today a number of companies use the soy fiber spinning technique, much improved from its origi-

nal form, for food products which have found a rapidly expanding market.

What, in essence, is the spun-fiber technique?

Isolated soy proteins serve as the base for spun fibers. These isolated proteins (which may be processed from soy, peanut, cottonseed, sunflower, safflower, and other oil seeds) are really a modern version of old time soy curd (tofu), a kind of soy cheese made for years in the Orient from soy flour or soy flakes. Isolated soy protein is forced through spinnerets directly into a coagulating bath. The resulting fibers are stretched to obtain a more chewy and tough product, and are blended with fat, coloring, and flavoring. Egg albumen, a special protein, is added to make the product resemble meat in texture as well as in nutritional quality.

The resulting product is cooked and may be eaten at this stage, or it can be frozen, canned, or dried. The spun protein may be sliced, cubed, cut in chunks, ground to granules or bits, or molded into rolls. On a dry basis spun fiber contains about 60 per cent protein.

### Nutritional value of the spun-fiber soy protein

A team of scientists studied the nutritional value of spun-fiber soy proteins by feeding isolated soy protein foods to twelve people for twenty-four weeks. Although the spun fibers were the main protein source, two cups of skim milk were allowed daily. Throughout the entire time the people maintained excellent health. Their hemoglobin and blood proteins remained normal, and "nitrogen balance" was positive, which meant that they were eating adequate amounts of proteins. On the other hand, serum cholesterol and triglyceride (blood fat) values dropped, which meant that their risk of heart attack also decreased. These results have been confirmed by other studies.

In another experiment, a group of twenty-six students volunteered to eat their meals at the metabolic ward for four weeks. They then received recipes, menus, and supplies of soy protein foods to prepare at home. Many students stayed on this diet for as long as five months. All of the tests done on



### Companies that manufacture soy proteins

Company	Product Name	Product Form
Loma Linda Foods	Fibrotein and TVP. (Textured vegetable protein)	Dry and canned soy protein
Worthington Foods (Miles Laboratory)	Fibrotein	Dry, frozen, and canned soy protein
General Mills, Inc.	Bacos	Dry soy protein
	Bontrae	Frozen soy protein
Archer Daniels	T.V.P.	Dry soy protein
* A. E. Stanley Co.	Mira-Tex	
* Central Soya	Promosoy	
* Farm-Mar-Co	Ultra-Soy	
* H. B. Taylor Co.	Textra Soy	
* Ralston Purina	Edi-Pro	
* Swift and Co.	Texgran	

\* Companies that make several soy protein ingredients but do not market any as "finished" products to use in recipes.

these students gave normal results. The students preferred the foods that resembled beef or chicken rather than those that simulated ham or sea foods. They made but few complaints. Soy proteins are thus nutritious and acceptable and may serve as a major source of protein in human diets.

In children fed either with skim milk or spun fibers, protein nutrition was maintained and no ill effects were observed.

#### The thermoplastic extrusion process

The thermoplastic extrusion process differs from fiber spinning in that soybean flour or soybean concentrates are used instead of isolated proteins. This represents a considerable economic savings. Soy protein concentrates are obtained from defatted soy flour, and have a protein content of 70 per cent on a dry basis. Bland in flavor, they are replacing soy flour or flakes to manufacture textured vegetable proteins.

The soy flour or soybean concentrate used for processing textured vegetable proteins is mixed with water and flavoring and subjected to heat and pressure for a certain time. The mass is then forced or extruded through small holes in dies of differing sizes and shapes.

#### Advantages of textured vegetable protein

These products have many advantages such as their low cost, stability during storage, and a variety of appearances and textures. Textured vegetable proteins are a handy food on any pantry shelf. There is no cholesterol in soy meat unless some animal fat is added. Soy meats do not shrink, and the fat content is low compared to hamburgers. The chunks will retain their basic shape and texture. Also, dried textured vegetable proteins can be stored in tightly covered containers without deleterious effects.

Textured vegetable proteins are being used by the National School Lunch program in mixed dishes, such as hamburgers, Sloppy Joes, chili con carne, taco fillings, or meat sauce for spaghetti, in a proportion of up to 50 per cent of the meat without compromising the flavor or the nutritive value of the

dish. New techniques are eliminating the beany flavor.

Textured vegetable proteins are an economical source of protein that could serve the needs of large populations. The versatility of texture and flavor to accommodate to sophisticated or simple tastes are their greatest convenience. Their nutritive value is similar to that of animal products. New and palatable recipes should be developed using these products as a new line of protein foods without the stigma of imitation of some other popular foods or of being labeled as analogs or extenders. Textured vegetable proteins are finding a place of their own in the market at the present time and will find a more prominent one in the future.

Yes, there are good protein sources in the humble soybean patch!

#### BIBLIOGRAPHY

- R. Bressani, et al. Protein quality of a soybean. Protein textured food in experimental animals and children. *J. Nutr.* 93:349-359, 1967.
- W. J. Downey and R. J. Eiserle. Substitutes for natural flavors. *J. Agri. and Food Chem.* 18:983-987, 1970.
- Warren E. Hartman. Vegetarian protein foods. *Food Tech.* 20:39-40, 1966.
- R. L. Kellor. Flour and grits for use in food products. *J. Am. Oil Chem. Soc.* 48:481-483, 1971.
- S. D. Koury and R. Hodges. Soybean proteins for human diets? *J. Am. Diet. Assoc.* 52:480-484, 1968.
- E. W. Meyer. Oilseed protein concentrates and isolates. *J. Am. Oil Chem. Soc.* 48:484-488, 1971.
- G. C. Mustakas. Full fat and defatted soy flours for human nutrition. *J. Am. Oil Chem. Soc.* 48:815-818, 1971.
- A. D. Odell. Meat analogues—a new food concept. *The Cornell H.R.A. Quarterly* 7:20-24, August, 1966.
- J. T. Rackis, et al. Flavor and flatulence factors in soybean protein products. *J. Agr. Food Chem.* 18:977-981, 1970.
- J. Radosky, Jr. Soy products for the meat industry. *J. Agr. Food Chem.* 18:1005-1009, 1970.
- R. C. Theuer and H. P. Sarett. Nutritional adequacy of soy isolate infant formulas in rats: choline. *J. Agr. Food Chem.* 18:913-916, 1970.
- M. D. Wilding. Textured and shaped oilseed protein food products. *J. Am. Oil Chem. Soc.* 48:489-491, 1971.



*Sounds great,  
but how do I get  
started on  
a vegetarian  
regimen?*

## Now, How?



How do you actually plan a vegetarian diet? No trouble at all, once you understand what you are trying to do, and why. Your goal is to provide an adequate diet and one that tastes and looks good too.

Americans, perhaps more than any other people, are excessively preoccupied with what to eat, how much to eat, and when to eat it! Fortunately, however, you do not need to follow complicated rules and formulas in order to be properly nourished. On the other hand, you cannot afford to be careless or indifferent. Good nutrition results from eating a variety of ordinary unrefined foods in a sufficient amount to maintain your ideal weight.

### **Hold those goodies!**

One simple rule for a good diet is that the less refining and processing, within sensible limits, these ordinary foods are subjected to, the more nutritious they are—and usually tastier and less expensive. Foods used in their more natural and whole forms have retained most of their nutrients, including trace substances which are necessary for optimum health. They often have fewer calories per serving, too, and that adds up to easier weight control.

### **Balance the calories**

Today, however, more than one third of the calories in the typical American diet are from sugars and visible fats. Another 20 per cent come from bread and cereals, of which over 90 per cent are refined. By simply adding these figures you can see that more than one half of the calories that many eat are more or less from refined and processed foods. Dr. Margaret Ohlson recently pointed out:

Many Americans, particularly adult men, eat diets which are badly balanced because of the large intakes of muscle meat, sweets, and fats and almost complete omission of cereals except as refined flour entering into the preparation of sweet rolls or desserts. The vegetables and fruits used are limited in both amount and variety. (M. A. Ohlson. Dietary patterns and effect on nutrient intake. *World Rev. Nutr. and Dietet.* 10:13, 1969.)



As you begin thinking of how to plan a vegetarian diet, picture three classes of foods from which to choose, as indicated in the table on page 45.

### **Fruits and vegetables**

There is the wide assortment of fruits and vegetables that come in many different colors, shapes, textures, and flavors, packed with vitamins and minerals. The dark-green leafy and deep-yellow vegetables are especially rich sources of vitamin A. Citrus fruits, tomatoes, cabbage, cantaloupe, and strawberries are among the excellent vitamin C foods. Along with their unrefined starches and sugars, they contain protein too. Because of their high water content, the protein concentration is generally low, especially in the leafy and crisp ones. But for the number of calories they contain, most vegetables carry their share of protein. Then there are the fat-rich fruits—olives and avocados—which afford unsaturated fatty acids to help keep your cholesterol down and your blood sugar steady until the next meal. A vegetarian diet features plenty from this colorful, tasty group.

### **Cereal grains**

The second class is made up of the most abundant foodstuff in the world—cereal grains. Indeed, for many populations they represent the “staff of life.” When you choose a variety of cereals and breads in the unrefined form, you have available so much more nutrition than from the refined ones. We commonly think that milling removes only vitamins and minerals and does not affect the rest of the kernel. This is not true, for the protein in whole grain is definitely superior in both quality and quantity. Some of the best protein, along with a number of other nutrients, is found in the germ and bran which are removed from human foods and are used to enrich livestock feed. Isn't it strange that our animals are often better fed than we are? Whole-grain cereals and bread provide moderate amounts of protein, minerals, and B-vitamins and should be a substantial part of a vegetarian diet.

### **Protein-rich foods**

Then, in a third large and diverse class you will find a fascinating array of legumes (dried beans and peas, and the like), nuts, and oil-rich seeds, as well as animal foods including milk. These foods are the more concentrated sources of protein. Legumes, simply cooked and seasoned, make tasty dishes, or

they combine nicely with cereals and/or nuts, with or without milk and eggs.

### **Protein is no problem**

Proteins, especially plant proteins, supplement or complement each other. By this we mean that the amino acids of one seem to balance those of another.

### **Cereal-bean combinations**

For example, when you have whole grains in the same day's menu with legumes, the individual amino acids in the beans and those in the grain supplement each other very nicely. The result is a good supply of all the amino acids that you need. This combination can be in the form of a grain-legume dish, such as a lentil-rice loaf, oat-soy waffles, corn-lima bean succotash, or a bread which contains both bean and grain flours. Garbanzos served with cornbread for dinner make a tasty, nutritious combination. The peanut butter-whole wheat sandwich (peanuts really are legumes), a favorite of so many, provides a rich assortment of amino acids.

### **Nuts**

Nuts, you will remember, were listed as good protein sources too. Because of this and their generous amounts of unsaturated fatty acids, nuts make an excellent addition to your meals, contributing protein, fat, and a great deal of satiety (satisfaction). Just don't eat too many. One-fourth cup of shelled nutmeats is about right for an adult at any one meal.

### **Plant protein concentrates**

Then there are the frozen, canned, and dehydrated meat analogs (plant protein concentrates) available in an increasing number of markets. These commercially prepared proteins are not essential for a well-balanced vegetarian diet, and are more expensive than legumes. They are, however, tasty, convenient, and a welcome, nutritious choice of many vegetarians. Especially are they appreciated by persons who are just changing their diet and who miss the texture and flavor of animal proteins.

### **Dairy products**

Of course, nonfat and low-fat milk and milk products such as cottage cheese and eggs are excellent protein sources and provide vitamin B<sub>12</sub>. Don't overdo on the eggs—they contain large amounts of cholesterol. Two to four a week are plenty. From a safety stand-



point you will want to cook eggs thoroughly to avoid any possible transmission of disease.

### How to change to a vegetarian diet

Some people who have been on a heavy meat diet find it advisable to use increasingly smaller amounts of meat and increasingly larger amounts of other protein over a period of at least a week, or perhaps two. Changing over in this way often makes a smoother transition. A person on a heavy meat diet is accustomed to the stimulating effects of certain substances in the meat. When he does not have these, he may feel their loss and experience a let-down, just as when deprived suddenly of other drug stimulants. Such a person mistakenly attributes this feeling to lack of energy—which is really supplied by carbohydrates, not protein—and blames the lack of meat rather than the absence of the stimulants it contains.

### Variety is important

As with any well-planned diet, variety is the spice of life. Not in any one meal though. Our digestive apparatus functions more efficiently, giving us freedom from "indigestion," when we limit the number of dishes at any one meal but have a variety from meal to meal and from day to day.

Variety means a wide range of cereals, for example. Are you acquainted with millet? Or barley grits with currants and sunflower seeds used at breakfast? Thoroughly cooked whole-grain rye with chopped dates, and almond cream and sliced bananas on top? The more different kinds of fruits and vegetables one can use over a period of time, the better. Then, too, variety can be achieved by employing different methods of preparation. But if wide variety is not available to you, cheer up. You can select fewer foods which can be prepared in a variety of ways, and still achieve excellent nutrition and interest in your meals.

### The pure vegetarian diet

Now, how about you who prefer, for various reasons, to use a *pure* vegetarian diet? That is, one free of all products of animal origin, including milk, eggs, cheese, and other animal foods. Again, the important consideration is a varied diet of whole, unrefined foods as far as practical. Knowing food values is most helpful, too. For example, a group of foods which supply some of the nutrients usually obtained from milk, such as calcium and riboflavin, are the dark-green leafy vegetables including collards, kale, turnip, and mustard greens. A large serving, at least one cupful, should be a part of your menu three or four times a week. Cabbage, broccoli, and cauliflower contribute lesser amounts of calcium but more than other vegetables. Fair to good sources include legumes, particularly soybeans; some nuts, particularly almonds; and the dried fruits. It would really be important to check your diet to see how often you use these sources and how much you eat of them. A now-and-then use could not be counted on to replace the calcium and riboflavin in milk.

Since there is no practical plant source of vitamin

B<sub>12</sub>, you will need to use either a B<sub>12</sub> supplement or soy milk to which the vitamin has been added.

Fortunately, green leafy vegetables, dried fruits, and whole-grain cereals are also good sources of iron. When these foods are used generously in either a lacto-ovo-vegetarian diet (one which includes dairy products but not meat of any kind) or a pure vegetarian diet, the iron intake exceeds the recommendations of the Food and Nutrition Board.

### In a nutshell

Let's summarize: You can plan a sound vegetarian diet by choosing a variety of ordinary foods in as unrefined and unprocessed form as practical.

Use whole-grain cereals and breads. These provide a fair amount of protein and are rich in minerals and B-vitamins.

Use legumes of all kinds and vary these, if desired, with prepared plant protein concentrates made from grains, legumes, and nuts.

Use nuts, but with discretion. These are nature's most concentrated foods. They add richness and flavor, highly unsaturated fat, and minerals and vitamins.

Use fruits and vegetables plentifully. They are the least concentrated of nature's foods and are rich in minerals and vitamins, especially vitamins A and C. On a caloric basis they carry their share of protein too.

Low-fat dairy products, used in moderation, supplement a well-chosen vegetarian diet beyond any question of adequacy. With our present knowledge, pure vegetarians might consider including a source of vitamin B<sub>12</sub>.\*

### Try these ideas

These are the reasons and the methods. Now, let's plan some vegetarian menus. Fortunately, there are a number of ways to plan a good diet, and there is no single pattern which must be followed to ensure good nutrition. A three-meal-a-day program is not necessary either. In fact, if you are one of the many Americans who finds he (more often she) is continually confronted with the battle of keeping off extra pounds, you will find it a distinct advantage to go on a two-meal-a-day plan. The meal you skip, however, is *not* breakfast, but supper! In this plan the two meals are larger, usually not in variety but in size of servings. If anything is needed at the end of the day, fresh fruit or juice can generally be chosen.

Now for the menus. Here are some for two days. One includes, for each day, some milk and eggs and the other is the same menu adapted to a pure vegetarian diet.

\* B<sub>12</sub> is not an animal product but is made by a variety of microorganisms, the only currently known source of this vitamin. B<sub>12</sub> in drugstores has been obtained by culturing the organisms that produce it.



## Food Class

## Contributions

### Fruits and vegetables

Unrefined carbohydrates—natural sugars and starches  
 Rich sources of—vitamins, esp. A and C—minerals, iron and calcium, esp. in dark-green leafy vegetables

### Proteins—

legumes, oilseeds, nuts

Varying amount of protein  
 Oils, mainly unsaturated  
 Vitamins—esp. B-complex  
 Minerals—iron, phosphorus

### Unrefined cereal grains—

Wheat, oats, rice, corn, et cetera

Abundant source of carbohydrates—starches and indigestible fiber  
 Small to moderate amount of protein  
 Vitamins—esp. good sources of B-complex, vitamin E—in oil  
 Minerals—esp. iron and phosphorus

Plant protein concentrates

Protein

Vitamins and minerals dependent upon formulation

Milk and milk products

Protein, riboflavin, calcium, vitamin B<sub>12</sub>

Eggs

Protein, iron,  
 (Egg yolk—250 mg. cholesterol)  
 vitamin B<sub>12</sub>

## Menu Suggestions

### Day 1

### Day 2

Meal pattern	Lacto-ovo-vegetarian	Pure vegetarian	Lacto-ovo-vegetarian	Pure vegetarian
<i>Breakfast</i>				
Fruit	Grapefruit half	Grapefruit half	Whole orange	Whole orange
Whole-grain cereal and/or	Oatmeal/milk	Oatmeal/sliced bananas and slivered almonds	Brown rice/honey, milk	Brown rice/honey, soy milk
Breadstuff	W. W. raisin toast/margarine	same	Mixed grain toast/margarine	same
Protein food	Braised Prosage*	same	Lightly toasted cashew nuts	same
Beverage	Non-fat milk	Soy milk	Cereal coffee/low-fat milk	Cereal coffee/soy milk
<i>Main meal</i>				
Entree	Walnut loaf, brown gravy	Savory lentils	Baked soybeans	same
Vegetables	Baked potato/margarine Broccoli, lemon wedge	same	Parslied potatoes Carrot strips	same
Salad	Sliced avocado/cottage cheese	Sliced avocado/mandarin oranges and ripe olives	Tossed green salad/sliced hard-cooked eggs (few) Herb oil dressing	Tossed green salad/garbanzos (few) Herb oil dressing
Breadstuff, if needed	Wheat roll/margarine	same	Rye bread/margarine	same
Simple dessert	Melon slices	same Walnut halves	Pineapple juice	same
<i>Lunch or Supper</i>				
Protein dish	Split pea soup	same	Corn chowder	same, made with soy milk
Breadstuff	Cornbread/margarine	same	W.W. toast/apple butter	same
Fruits/vegetables	Fruit bowl	same	Small whole banana	same
Beverage	Low-fat milk	Soy milk	Non-fat milk	Soy milk

\*Commercial meat analogs



*Some taste-tested vegetarian recipes will be helpful in getting started, so a few are provided here. For 100 other attractive and highly nutritious vegetarian recipes, write to the following address inclosing 50 cents.*

Recipe Department  
LIFE AND HEALTH  
Washington, D.C. 20012

# Recipes

## Beeflike Stroganoff

- 1 1/2 pound soy meat, beef-like
- 2 tablespoons oil
- 1 onion
- 2 4-ounce cans button mushrooms (save liquid)
- 1/4 teaspoon marjoram
- 1 clove garlic, minced
- 1 cup water
- 1/4 cup tomato sauce
- 2 packets Loma Linda Gravy Quik\*  
or 4 tablespoons flour plus  
2 Savita\* soup cubes
- Mushroom liquid
- 2/3 cup evaporated milk
- 3 tablespoons lemon juice

1. Slice soy meat 1/2 inch thick and then cut in strips about 1 1/4 by 3/4 inch.
  2. Brown lightly in oil and set aside.
  3. Simmer for about 10 minutes the onion, mushrooms, marjoram, garlic, water, and tomato sauce mixture.
  4. Combine Gravy Quik (or flour and Savita) and mushroom liquid.
  5. Stir into onion mixture and cook, stirring constantly, until thick.
  6. Add soy meat and reheat.
  7. Combine evaporated milk and lemon juice.
  8. Just before serving stir in the milk and lemon juice mixture (1/2 cup of soy mayonnaise may be used instead).
  9. Serve over hot rice or noodles.
  10. Garnish with chopped parsley.
- 8 to 10 servings

## Eggplant A La Creole

- 1 large eggplant
- 2 tablespoons vegetable oil
- 1 onion, chopped
- 1 green pepper, chopped
- 3 tablespoons flour
- 1 teaspoon salt
- 3 large tomatoes or 3 cups stewed tomatoes

- 1 or 2 bay leaves (optional)
- 1 cup buttered crumbs

1. Cut eggplant in thick slices, peel, and then cut in 1-inch dices.
2. Cook in a small amount of salted water until just tender.
3. Drain and put into an oiled baking dish.
4. Heat oil in frying pan, and sauté the onion and green pepper.
5. Sprinkle over this the flour and the salt, and blend.
6. Add the tomatoes and bay leaf.
7. Stir gently and cook for a few minutes over a low fire.
8. Remove bay leaf.
9. Pour over the eggplant and cover all with a layer of buttered crumbs.
10. Bake in a moderate oven for 20 to 30 minutes.

NOTE: For more protein value, add 1 cup cubed or ground vegesteak to the sauce.

## Corn Tamale

- 1/2 cup chopped onion
- 2 tablespoons oil
- 2 tablespoons water
- 2 cups whole kernel corn
- 1/2 cup milk or soy milk
- 1 teaspoon salt
- 2 tablespoons soy sauce
- 2 cans tomatoes
- 3/4 cup corn meal
- 3 tablespoons soy flour
- 3/4 cup whole pitted olives

1. Sauté onion in oil.
  2. Mix water, tomatoes, corn, corn meal, milk, flour, salt, and 1/4 cup of olives.
  3. Stir well.
  4. Place in baking dish. Put the remaining 1/2 cup olives on top of the mixture.
  5. Bake at 350° for 1 hour or until well done.
- 8 to 10 servings



### Pecan Loaf

- 2 tablespoons oil
- 1 tablespoon onion
- 1 cup chopped celery
- 1 1/2 cups milk
- 1 teaspoon salt
- 1/2 cup chopped pecans
- 1 cup whole-wheat bread crumbs
- 1/4 cup chopped parsley
- 2 eggs

1. Heat the oil in a skillet.
  2. Add the onion and celery, and steam for a few minutes.
  3. Add the milk and salt.
  4. Add the pecans, soft bread crumbs, parsley, and beaten eggs.
  5. Bake in an oiled loaf pan in a moderate oven until set, about 1 hour.
- 4 to 6 servings

### Nut Croquettes

- 1 egg
- 1 cup milk
- 1 cup ground nutmeats
- 1 cup fine dry bread crumbs
- 1/4 teaspoon sage
- 1/4 teaspoon salt

1. Add the egg to the milk and beat slightly with a fork.
  2. Heat until it starts to thicken.
  3. Add the dry ingredients.
  4. Mix well, cool, and form into croquettes.
  5. Brown in a slightly oiled skillet over a low fire.
  6. Serve with or without sauce.
- 6 servings

### Stuffed Summer Squash

- 6 medium sized summer squash
  - 3 cups soft bread crumbs
  - 1/2 cup cottage cheese
  - 1/4 cup chopped parsley
  - 1 teaspoon salt
  - 2 eggs, beaten (optional)
1. Wash the squash and cut off ends. Do not peel.
  2. Steam until nearly done.
  3. Halve lengthwise and remove center pulp with a spoon.
  4. Combine the chopped pulp with the other ingredients. Fold lightly together.
  5. Fill the squash shells and dot with margarine.
  6. Bake in a shallow pan well oiled with olive (or other) oil in a moderate oven, 350°, for 30 minutes.
- 6 servings

### Cottage Cheese Soup

- 1 teaspoon celery seed
- 1 quart milk
- 1/4 cup oil
- 1 tablespoon minced onion
- 2 tablespoons flour
- 1 3/4 teaspoon salt
- 1/8 teaspoon paprika

- 2 cups cottage cheese
- 2 tablespoons minced pimiento
- Minced parsley or watercress

1. Put celery seed in milk, bring to scalding point and let stand for 15 minutes, then strain.
  2. Heat oil and simmer onion in it until soft but not brown.
  3. Blend in flour and gradually add milk and seasonings.
  4. Cook, stirring until thickened.
  5. Rub the cottage cheese through a sieve and add slowly to thickened milk.
  6. Stir until soup is hot, but not boiling.
  7. Add pimiento.
  8. Garnish with parsley or watercress.
- 6 servings

### Lentil-Rice-Tomato Soup

- 2 tablespoons oil
- 1 medium onion, chopped
- 1 cup dry lentils
- 1/2 cup natural rice, uncooked
- 4 cups water
- 1 can (#2) tomatoes
- 1/2 can tomato paste, or  
1 cup tomato purée
- Salt to taste
- Pinch of sweet basil

1. Sauté onion in the oil until golden (not brown).
2. Add lentils and rice; stir.
3. Add water; bring to a boil.
4. Cook on simmer until lentils and rice are done.
5. Add tomatoes, salt, and sweet basil.
6. Add water to make desired consistency.
7. Serve hot.

### Holiday Salad

- 2 red Delicious apples
- 1/2 cup grapes
- 1 large banana
- 2 tablespoons salad dressing or sour cream
- 1 tablespoon lemon juice
- Salt to taste
- 2 tablespoons brown sugar
- 1/2 cup chopped pecans

1. Dice apples.
  2. Remove seeds from grapes and cut in quarters.
  3. Chop banana.
  4. Mix together and add mixture of salad dressing, lemon juice, salt, and brown sugar.
  5. Mix well and sprinkle top with the pecans.
  6. Chill before servings.
- 4 servings

### Cashew Cream

1. Cover blades of liquefier with water.
  2. Feed cashew nuts into water slowly until thick as cream.
  3. Add two tablespoons honey and a little salt.
- NOTE: This makes a nice topping for desserts.



### Soy-Oat Waffles

- 1 cup soaked soybeans
- 1 2/3 cups water
- 1 1/4 cups rolled oats
- 1 tablespoon oil
- 1/2 teaspoon salt

1. Have waffle iron hot.
2. Combine all ingredients in blender and blend until very light and airy.
3. Pour into waffle iron.
4. Bake 15 to 20 minutes at medium setting. Do not open the iron before 15 minutes, and be very careful when you do.

### Granola

- 8 cups quick or regular rolled oats
- 1 cup sesame seeds
- 1 cup sunflower seeds (raw, unsalted)
- 1 cup wheat germ
- 1 cup nuts (sliced almonds or others)
- 1 cup coconut (dry or moist, shredded)
- 3/4 cup dark-brown sugar
- 2 teaspoons salt
- 1/2 cup oil
- 3/4 cup water
- 2 teaspoons vanilla

1. Mix above dry ingredients well in a large bowl.
2. Slowly add the liquid ingredients, very slowly "dribbling" them over the other ingredients and mixing well all the while. (It is nice to have someone help you with this).
3. Spread this mixture evenly into two flat baking pans.
4. Bake at 250° for 30-45 minutes until just light brown. Stir frequently as the edges brown quickly.
5. Place into sealed containers and use as cereal.

### Festive Apple Crisp

- 6 large tart apples
- 3/4 cup brown sugar or 1/2 cup honey
- 1 cup flour
- 1 cup quick oats
- 1/4 cup wheat germ
- 1/4 cup chopped nutmeats
- 2 tablespoons brown sugar
- 1/4 cup margarine or oil
- 1/4 teaspoon salt

1. Peel, if desired, and slice apples.
  2. Place in a flat baking dish and dot with margarine.
  3. Combine the remaining ingredients into a crumble crust mixture.
  4. Sprinkle over the prepared apples, pressing down gently.
  5. Bake in moderate oven, 350°, until apples are done and top of crust is a golden brown.
  6. Serve warm with thin cream or cold with a dab of nondairy whipped cream.
- 6 to 8 servings

NOTE: Any suitable fruit may be used instead of the apples. Try adding blueberries to tart apples, or sour cherries to mild apples. You may also substitute 1/2 cup coconut for the chopped nutmeats in the crumble crust.

### Fresh Fruit and Cottage Cheese Milk Shake

- 3/4 cup milk, thoroughly chilled or partly frozen
- 1 banana
- 1 fresh peach or other fresh fruit
- 2 pitted dates
- 1 teaspoon honey
- 1/4 cup cottage cheese

- Liquefy thoroughly in blender.  
2 servings

### Lemon Juice Ketchup

- 3 cups stewed tomatoes
- 1/2 3-ounce can tomato paste
- 1 cup applesauce
- 4 tablespoons brown sugar
- 1 1/2 teaspoons salt
- 1 teaspoon Vegex
- 1 medium onion, chopped
- 1 large stalk celery, diced
- 3 sprigs parsley, chopped
- 1 clove garlic, minced
- 1/2 pimiento, diced
- 1 bay leaf
- 1/2 teaspoon sweet basil
- 1/4 cup, or more, lemon juice

1. Place the first six ingredients in a heavy saucepan. Bring to a boil.
2. Lower heat, and let simmer while the vegetables are being prepared.
3. Add the chopped vegetables and all remaining ingredients except the lemon juice. Let simmer until the vegetables are crispy tender, if this is to be used as relish. If for ketchup, then simmer until vegetables are very tender.
4. Press through a sieve or whiz in liquefier.
5. When cool add the lemon juice.

NOTE: This may be canned, in which case the lemon juice is not added until the can is opened.

---

**The preceding recipes have been used with permission and adapted from personal files of homemakers, as well as from the following cookbooks:**

- An Apple a Day*. Los Angeles, Women's Auxiliary to the Alumni Association, Loma Linda University, School of Medicine, Loma Linda, CA, 1967.
- Black, Patricia Hall, and Ruth Little Carey. *Vegetarian Cookery*, 5 vols. Mountain View, CA, Pacific Press Publishing Association, 1971.
- \* Cottrell, Edyth Y. *Stretching the Food Dollar*. Kent, WA, Green State Printing, 1966.
- Prescriptions for Good Eating by CME Doctors' Wives*. Los Angeles, Women's Auxiliary to Alumni Association, College of Medical Evangelists, School of Medicine, n.d. (out of print).
- \* *Food for Life*. Provo, Utah, Rescue—Med Health Conditioning Program, n.d.
- Lambda Phi, compilers. *Faculty Fare*. La Sierra, California, Faculty Wives, 1966.
- \* Rosenvold, Doris, and Lloyd Rosenvold. *Rx Recipes*. Hope, Idaho, Hope Publications, 1963.
- Vollmer, Marion. *Food—Health and Efficiency*. Nashville, Southern Publishing Association, 1964.

\* Recipes from these books use no eggs or dairy products.



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# taste-tempters

For that special  
get-together!

## Other ways to enjoy *Loma Linda* **Linketts**

### SCALLOPED POTATOES WITH LINKETTS

2 large potatoes  
6 Loma Linda Linketts, sliced  
3 c. milk, hot  
2 Tbsp. onion flakes  
2 Tbsp. flour  
1 tsp. salt

**FILL** casserole with layers of thinly sliced potatoes and Linketts.

**SPRINKLE** each layer with flour, onion flakes and salt.

**POUR** hot milk over.

**BAKE** covered at 350° an hour or more until soft.

### LINKETTS SUPREME

1 small cabbage  
1 can tomato, celery or cheese soup  
5 Loma Linda Linketts  
2 c. cornbread batter  
**CUT** cabbage in quarters and steam until tender.  
**ADD** soup and place in flat casserole or baking dish.  
**SPLIT** Linketts lengthwise and cut into quarters. Brown in oil and scatter over cabbage.  
**SPREAD** cornbread batter over top and bake 20 minutes at 450°.

### LINKETT LENTIL CASSEROLE

2 c. lentils-cooked  
1 large tomato  
2 Tbsp. ea. onion, celery and parsley flakes  
4 Loma Linda Linketts  
**SPREAD** 1 cup of lentils in bottom of casserole.  
**COVER** lentils with tomato slices.  
**SPRINKLE** with dehydrated vegetables (or fresh).  
**TOP** with remaining lentils.  
**BAKE** 30 minutes at 350°.

### *Quick ways*

with Loma Linda Linketts

1. Serve Linketts in any of the ways shown in this illustration.
2. Top steamed potatoes with Loma Linda Linketts sliced into Loma Linda Smoky Bits Gravy Quik.
3. Garnish hearty split-pea soup with slices of Loma Linda Linketts.



QUALITY FOODS SINCE 1906