

## MEDICINAL MUSHROOMS



Step 1. Place fresh kefir grains in a container of fresh milk.



Step 2. Leave covered at room temperature for 24 hours.



Step 3. Pour through a sieve to retain grains.



Step 4. Place kefir grains into a container of fresh milk.



Step 5. Pour kefir beverage into a glass.



Step 6. Chill for better flavor.

### *Renewed Interest in Kefir, the Ancient Elixir of Longevity*

by Elinoar Shavit

Kefir is an Old World food that has been attributed with exceptional health promoting and curative properties since the beginning of recorded history. It is a tangy, slightly fizzy (about 1% alcohol), fermented milk beverage that looks a little like yogurt. It is rich in protein, calcium, vitamin B12, niacin, and folic acid.<sup>9</sup> Kefir and yogurt were popular at the turn of the 20th century, when scientists first studied claims about their contribution to better health and increased longevity. The current rise in popularity of these fermented beverages around the world has sparked new research into claims about their curative properties and their mechanisms of action.<sup>21</sup> Much emphasis has been placed on research providing manufacturers of fermented milk products with the evidence needed to support their claims about the health-promoting properties of their products.<sup>11</sup> Many people have been told by their physicians, at one time or another, to eat yogurt after taking a course of antibiotics in order to help restore the microflora in their digestive system. Claims that consuming fermented milk foods can boost the immune system, alleviate symp-

toms of diarrhea and chronic constipation, and lower the risk of colon cancer have been popular, along with the perception that commercial yogurt and kefir are inferior to those fermented at home from natural starters. While anecdotal accounts to support such claims abound, they are usually tossed aside as unsubstantiated. What most people are not aware of is that these and other claims about the health promoting and therapeutic properties of fermented milk products have been validated by sound, evidence-based, scientific research. Much of the scientific data, including the studies discussed in this article, are available online.

While kefir is believed to have originated in the northern Caucasus, similar fermented milk products are found in other parts of Europe, the Middle East, and Asia. A beverage similar to kefir that shares kefir's properties is found in Tibet, where it is known as the Tibetan Yogurt Mushroom, or "tara."<sup>3</sup> The name kefir is believed derived from the Turkish word "kef," a word still used in Middle Eastern languages to refer to "pleasure" or "good feeling."<sup>4</sup> Kefir grains can ferment any fresh mammalian milk, but

they can also be used to ferment soy, rice, or almond milks. These grains are a living ecosystem and as long they are “fed” regularly, the grains can be preserved indefinitely.<sup>11</sup>

Like yogurt, kefir is a probiotic food, containing lactic acid bacteria. Probiotic (“life promoting”) foods contain live microorganisms that can survive in the digestive tract where they confer a health benefit on the host.<sup>7,18</sup> The main contribution of probiotic foods is in alleviating symptoms of ailments associated with the digestive and immune systems.<sup>6</sup> The lactic acid bacteria in fermented milk products convert the lactose in milk to lactic acid. The conversion process lowers the pH in the fermenting milk, which inhibits the growth of spoilage bacteria and gives these fermented milk foods a longer shelf life.<sup>8</sup> Unlike yogurt, kefir is fermented by “grains,” which look like small clusters of off-white gelatinous nodules. Each grain is a dynamic living ecosystem containing symbiotic consortia of bacteria and yeasts held together by a matrix of proteins, lipids, and polysaccharides. This symbiosis is responsible for kefir’s tangy taste and stringy “mouthfeel,” and accounts for many of its health promoting and medicinal properties. In recent years, commercially produced kefir and other fermented milk products have become popular around the world, especially among health-conscious consumers.<sup>4,11</sup>



*Kefir grains.*

The composition of microorganisms in kefir is both complex and highly variable. A large number of different bacteria and yeasts has been isolated and identified from kefir. Even though different batches of kefir may differ from one another in their microorganisms, some species of microorganisms are always present. Most are among the lactobacilli, streptococci, *Acetobacter*, *Leuconostoc* and yeasts like *Zygosaccharomyces*, *Candida lambica*, *C. krusei*, and *Saccharomyces*. Some of these microorganisms have even been named after kefir, like *Lactobacillus kefir*, *L. parakefir*, and the yeast *Candida kefir*.<sup>4,9</sup> A water-soluble polysaccharide gel called kefiran has

been isolated from kefir. It is important in forming the gelatinous matrix that holds together the consortia of microorganisms in the kefir grains. Kefiran has been studied extensively and has demonstrated anti-inflammatory and immunomodulating properties in animal and human trials. It has also demonstrated antibacterial and anti-mycotic properties.<sup>3,10,13</sup>

Kefir has been a favorite beverage in Russia since its introduction in the early 1900s, and it was used in former Soviet Union hospitals to treat conditions such as digestive disorders, cancer, tuberculosis, and even atherosclerosis. It became popular as a result of the excitement surrounding the fledgling research into the health benefits of fermented milk products and their lactic acid bacteria (LAB). Dr. Elie Metchnikoff, a Russian immunologist who received the Nobel Prize in 1908 for discovering phagocytosis, was intrigued by the exceptional longevity exhibited by populations in Bulgaria and the northern Caucasus. Fermented milk products were the staple of the diet of these populations, and Dr. Metchnikoff theorized that the lactic acid bacteria (LAB) in the fermented milk were responsible for these populations’ exceptional health and longevity.<sup>24</sup> He believed that there was a connection between disease and the microorganisms in the digestive system, and theorized that bacteria in the fermented milk products consumed by these populations competed with the harmful microorganisms in their digestive tract.<sup>12,24</sup> His studies regarding the contribution of LAB to the functions of the digestive and immune systems may have laid the foundations for the field of probiotics.<sup>18</sup> Dr. Metchnikoff was particularly impressed by *Lactobacillus delbrueckii* subsp. *bulgaricus*, which he considered a good example of “beneficial bacteria.”<sup>15</sup> Dr. Metchnikoff’s book, *The Prolongation of Life*, was published in 1907. His research and theories about the curative properties of LAB and the health promoting properties of fermented milk containing these bacteria were well received by the European scientific community. Physicians in Paris prescribed these foods to their patients suffering from tuberculosis and ailments of the digestive system. Consuming fermented milk products for their medicinal properties became a fashion of the day.

The exciting possibility that these “beneficial bacteria” may hold the cure for many diseases, including tuberculosis, prompted the All Russian Physicians’ Society to obtain kefir for their own patients. Obtaining the coveted kefir grains for Russia turned out to be a story so fascinating it could have been borrowed from the pages of *The Arabian Nights*.

The tribes of the northern Caucasus have produced kefir for hundreds of years. They jealously guarded both their kefir grains and the method of fermenting the beverage. These tribes believed that the grains were given to them by the Prophet Muhammad, who blessed them with exceptional health-promoting properties. As a result, the tribes were forbidden to share the grains or the method of preparing kefir with outsiders.<sup>23</sup>

Realizing the possible hurdles involved in the mission, the All Russian Physicians' Society decided to commission the Blandov brothers to obtain the coveted kefir grains from the Muslim tribes. The Blandovs were powerful businessmen who owned the famed "Moscow Dairy" and operated cheese-making factories in the Caucasus town of Kislovodsk. The tribesmen refused to sell any kefir grains to the Blandov brothers, so the Blandovs decided to take a different approach. They sent a beautiful employee, Irina Sakharova, to the court of the tribal prince Bek-Mirza Barchorov, to charm the kefir grains out of him. The prince was enthralled by Irina but refused to give her the sacred kefir grains. Irina left empty-handed. On her way back, the prince sent his tribesmen to kidnap her and return her to his court. He offered to marry her, but Irina refused. The Blandov brothers managed to rescue her before a forced marriage could take place. They supported her all the way to the Czar's court, where Irina brought forth her grievance against Bek-Mirza Barchorov. The prince offered to compensate Irina with gold and jewels, but she refused his offer, insisting on kefir grains instead. The prince refused to break the tribal law, but Irina prevailed and the prince was instructed to compensate her with a large amount of kefir grains.

In 1908 Irina Sakharova brought the first bottles of kefir (produced by the Blandov brothers) to Moscow. Kefir was first used by physicians to treat their patients, but soon the public discovered it, making kefir the most popular fermented milk beverage in Russia to date. In 1973, at the age of 85, Irina Sakharova received a letter from the Minister of the Food Industry of the former Soviet Union officially thanking her for her heroic role in providing the Russian people with kefir.<sup>23</sup>

In 1920, L. F. Rettger demonstrated that Metchnikoff's "Bulgarian Bacillus" (*L. delbrueckii* subsp. *bulgaricus*) did not survive in the human digestive system. Lactic acid bacteria must survive in the digestive system after they are consumed in order to produce any beneficial effects.<sup>18</sup> People continued to drink kefir even after Rettger's findings were published, because they enjoyed kefir's refreshing taste, but the popularity of consuming fermented milk products for their medicinal properties was greatly diminished.<sup>22</sup> Since then, it has been shown that *Lactobacillus delbrueckii* subsp. *bulgaricus* consumed in fermented milk products like yogurt and kefir do survive the passage through the upper gastrointestinal tract. In the past few years, research has led to a better understanding of the properties of probiotics and the manner in which they modulate internal flora and affect the physiology of the digestive system. Probiotics have been effective in the treatment of people with inadequate lactose digestion, as they convert the lactose in the milk to lactic acid, rendering the milk they ferment almost lactose-free.<sup>5,21</sup> Research has shown that probiotics can contribute to the general health of their host by resisting colonization of the digestive system by harmful microorganisms, contributing to the nutrition of the host, and affecting immunomodulation.

<sup>11</sup> Some studies have already produced results offering enough evidence to warrant the use of probiotic foods like kefir in the treatment of gastrointestinal disturbances.<sup>19</sup> One example is diarrhea, which can be caused by a variety of conditions. Probiotics help in preventing diarrhea and in reducing its duration. This includes conditions like infant's diarrhea, IBS, colitis, Crohn's disease, gastroenteritis, and traveler's diarrhea.<sup>6</sup> At the same time, consuming kefir has shown good results in alleviating the symptoms of constipation in patients suffering from chronic constipation.<sup>12</sup> Probiotics have been particularly effective in reestablishing intestinal microflora in patients who have taken a course of antibiotics ("antibiotic" is the opposite of "probiotic").<sup>23</sup> Kefir has demonstrated efficacy against *Helicobacter pylori* (associated with gastritis, peptic ulcers, and gastric cancer), against *Bacillus cereus* (responsible for foodborne diseases), against *Salmonella typhimurium*, *Listeria monocytogenes*, and against the yeast *Candida albicans*.<sup>8,14</sup>

A number of studies have shown that by suppressing the growth of bacteria that convert pro-carcinogens into carcinogens in the digestive system, kefir and other probiotic foods may have preventative effects against cancer.<sup>2,14</sup> Lower rates of colon cancer have been observed in populations consuming large quantities of fermented dairy products.<sup>1</sup> Kefir has shown anti-mutagenic effects (by decreasing 2-glucuronidase) that may lower the risk of colon cancer and play a role in the prevention of the disease. Long time consumers of kefir may reduce their risk of developing colon cancer.<sup>1,25</sup> Probiotics found in kefir have stimulating effects on the immune system by improving phagocytosis and by increasing the numbers of T-lymphocytes and NK cells. They also have an indirect effect on the immune system by forming bioactive peptides in the process of fermentation.<sup>6,21</sup> On the basis of these findings, many foods are now enriched with probiotics, and they are even added to animal feed.

Consuming kefir and probiotic foods has been found effective in reducing the symptoms of food allergies<sup>16</sup> and lowering blood sugar levels, blood lipid levels, and high blood pressure.<sup>4,12</sup> In animal studies, kefir demonstrated a significant lowering effect on levels of LDL cholesterol, and on blood pressure (due to a peptide produced during fermentation that has ACE-inhibiting properties and can be used as an anti-hypertensive agent). In humans the consumption of kefir by hypertensive patients led to a recorded lowering of the systolic and the diastolic blood pressures and of heart rate, suggesting that probiotic foods could play a role in the prevention of certain heart diseases.<sup>3,20</sup>

As impressive as some of the results are, many variables may influence them. The variability of the microflora (different strains, milk used for fermentation, state of the microflora: fresh, heated, dried, etc.) is one such problem. In addition, there could be any number of potential biases/confounding factors affecting trials in human subjects (population studied, age of patients, doses and administration time, etc.). Even so, and keeping in mind the ab-

sence of documented adverse effects of consumption of lactic acid bacteria by healthy people, the results indicate that lactic acid bacteria can be useful in the treatment and prevention of certain diseases, especially those associated with the digestive and immune systems. It is important to note, however, that individuals respond to the same food in different ways, and therefore could potentially respond differently to the same probiotic food. Kefir is now commercially manufactured all over the world. With much available research on this subject, health professionals can now guide consumers toward the desired beneficial effects of safely consuming probiotics.<sup>11,17,19,20</sup>

Scientific research of the beneficial properties of lactic acid bacteria has shifted towards understanding the mechanisms of LAB effects and discovering new ones. Emphasis has been put on the survival and colonization capabilities of LAB in the digestive system, because this information is crucial to commercial manufacturing of LAB rich foods. This will provide manufacturers with the evidence needed to back their claims about the health-promoting properties of their products. Due to standardization issues arising from the fact that different kefir batches will have differ-



ent microorganisms or different numbers of the same microorganisms, it has been too complicated to produce commercial kefir from kefir grains. Commercial kefir is therefore manufactured from a starter. Kefir produced commercially from starters has a different taste, smell, and texture. The spectrum of beneficial microorganism present in commercial kefir is far more limited than in kefir made from grains. Most of the store-bought, bottled kefirs do not contain live yeasts, which changes the nature of their fermentation and consequently their microflora, the secondary compounds they produce, and their properties.<sup>11</sup>

To enjoy more of its probiotic properties, people may have to culture their own kefir from starter grains. Kefir grains, instructions for making kefir, and recipes for kefir beverages and cheeses are advertised online. Since well-tended kefir grains are potentially everlasting, the living ecosystem in your kefir grains may be the very same one that traveled in a shaky goat-skin bag tied to the back of a horse hundreds of years ago, fermenting milk for a north Caucasian prince.

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