

Are Buckwheat Greens Toxic?

by **Gilles Arbour**

Are Buckwheat Greens Toxic? The surprising answer is a clear and unequivocal YES. Due to the growing popularity of sprouts in general, and a widespread ignorance as to the toxic dangers posed by buckwheat greens specifically, many people are today suffering unnecessarily. In this article I will describe the toxic effects of ingesting buckwheat greens, and I will answer the question of why they are toxic to humans. I will also provide a brief synopsis of what is currently known about this phenomenon. And finally, I will recount my own anecdotal experience with buckwheat greens.

The basic problem with buckwheat greens is that they contain fagopyrin, a naturally occurring substance in the buckwheat plant. When ingested in sufficient quantity, fagopyrin is known to cause the skin of animals and people to become phototoxic, which is to say hypersensitive to sunlight. This condition, specifically known as fagopyrism, occurs when the ingested fagopyrin accumulates under the skin and is subsequently activated by sunlight, resulting in a toxic reaction within the skin. Typically, exposed areas of skin turn pink or red within minutes, and a strong burning sensation accompanies the reaction. Within a few hours the exposed areas usually appear to return to normal, however continue to remain ultra-sensitive to cold water, hot water and to friction. This sensitivity can last for days.

In addition to the burning sensation, people suffering from fagopyrism often complain of feeling a numb, fuzzy, buzzing impression when they scratch or inadvertently hit their hands on something. Sufferers also report that their hands feel painfully cold when placed in cold water or when in contact with a cold object, even if only for a few seconds. Some have had numbing, itching and tickling on the face, nose and ears after sun exposure causing a desire to scratch the skin, thus worsening the condition. The eyes may also become hypersensitive to light. If a large enough portion of the skin is exposed, one may experience dizziness. If a person is forced to remain in the sun for a long period of time, the skin may swell up and remain abnormal for up to several days.

Fagopyrin is not activated by ultraviolet light but reacts to a different portion of the sunlight spectrum. Therefore, the normal application of sunscreen offers no protection at all. Glass, which filters out ultraviolet rays, does not however filter out the reactive range relative to fagopyrin. This means that sunlight coming through home or car windows also causes a phototoxic reaction.

Unlike the shoots of the buckwheat plant, buckwheat groats, or seeds, are not generally problematic because they contain only trace quantities of fagopyrin. Buckwheat groats are commonly sold as kasha or are ground into buckwheat flour, which is used to make soba noodles and buckwheat pancakes. These foods have long been used as staples in many cultures and appear to be perfectly safe. The danger lies not in the grains, but in the mature green buckwheat plants that some animals may ingest, and in the young green shoots, which increasing numbers of health-conscious individuals are consuming. These foods contain large quantities of toxic fagopyrin.

The phenomenon of fagopyrism is already well known in the field of veterinary science, where it has been well documented that animals feeding excessively on buckwheat plants develop skin rashes and other symptoms. However, little or no research has yet been done regarding humans and fagopyrism. This is probably because buckwheat greens did not play a significant role in the human diet until very recently. No known cultures have relied on buckwheat greens as a staple. Given the growing popularity of juicing green foods however, along with eating sprouts and young shoots, many unsuspecting raw foodists and other health and nutrition enthusiasts have begun to suffer the effects of fagopyrism. Unfortunately, I am one of them, and my story is a perfect example of this growing problem.

My adventure began during the winter of 2002, when my wife and I attended a three-week program at a

popular raw food health center in Florida. I hasten to say that we thoroughly enjoyed the program, made new friends, soaked up information, took copious notes, and were hopeful that this new approach to diet and lifestyle would help us to improve the quality of our life and overall health in general.

Along with consuming raw food, one of the many things the center advocated was that we drink four glasses of green juice every day. This green juice was made from equal parts of cucumber, celery, sunflower greens and buckwheat greens. Following our three-week stay at the center, we remained on the raw food diet and faithfully drank our four daily glasses of green juice. A friend also chose to integrate the green juice into her daily food program. After several weeks, all three of us began to notice tingling in our hands and faces along with markedly increased sensitivity to the cold. Given that winter was at its peak where we live in Quebec, Canada, we thought that our new diet simply demanded a small adjustment period. Assuming that the natural green juice program was safe and healthy, we simply failed to make a connection between the toxic effects we were experiencing and the juice we were consuming. We thought that adding more fatty foods to our diet would help us with the cold and the unpleasant sensations would soon disappear. But they didn't.

Before long our symptoms worsened to the point where any exposed skin sunburned very easily. I, drinking the most juice, became so sensitive to the sun that after a few months I could not be exposed to sunlight for more than a few minutes at a time. The biggest mystery was that even inside my own home, I could not endure sunlight coming through the windows for more than three minutes. It made no difference whether I was inside or outside! Any activity that exposed me to the sun was threatening—even driving my car! If I tried to go anywhere during daylight hours, by the time I reached my destination my hands would be bright red and burning. To manage this, I had to actually put a towel over them while driving. My wife, who was also drinking the juice, though less of it, also felt overly sensitive to sunlight and was unable to stay in the cold without her face and hands itching. Our friend was also experiencing fuzzy, numbing sensations and exaggerated pain whenever she lightly bump her hands. She, too, felt that the sun was "too strong."

At the time, we did not have a clue that buckwheat could be the cause of our strange symptoms. When I mentioned our problems to leaders at the Florida health center, we were told, "strange things like that happen when people are starting the diet," and "these minor glitches will soon pass." I now believe that these problems eventually do go away for most people—but only when they give up the new diet, or at least stop drinking the green buckwheat juice.

Back in March 2002 however, still suffering in ignorance, I began to ask various health advisors and professionals about my symptoms. My medical doctor thought it might be lupus. Fortunately, the test came out negative. A naturopath's explanation was that it was "toxins coming out" and I was having a "healing crisis." He told me that enzymes in the raw foods were dislodging deep acidic residues which were then burning the skin. A second naturopathic doctor believed that something was "toxic in my body," but could not determine what it was. Yet another practitioner suggested that I was not "detoxing" rapidly enough, and said that I should add various supplements to my diet. None of this made much sense to me, and no one seemed to offer a clear solution.

My quest for an explanation lasted many months and was entirely fruitless. All the while, the three of us remained thoroughly baffled, and were even more confused by the fact that our skin sensitivity seemed to improve or diminish every once in a while—for no apparent reason. We kept telling ourselves, in the words of those at the Florida health center, "these minor glitches will pass." Now, as I think back, I realize that our better, less photo-sensitive days coincided with the times when we had run out of buckwheat greens and had left it out of the juice for a few days. But back then, in the winter of 2002, we mistakenly believed that others who were eating the same products were experiencing none of our symptoms. Only later did I discover that even though these folks were eating lots of raw food, their program did not include eating buckwheat greens regularly.

After reading that celery contains psoralens, which could cause skin sensitivity, I stopped consuming it. It

never occurred to me that another ingredient in the green juice could be the culprit. In an attempt to relieve our symptoms we altered our diet in several other ways. When I read about high chlorophyll food such as wheatgrass causing skin sensitivity, we cut that out. I read something similar regarding citrus fruits and cut them out as well. Alfalfa sprouts are said to contain caravanine, which is suspected of creating lupus-like symptoms, so that was also cut out. Someone suggested adding more cooked food to our diet so we tried that. We stopped eating nuts, seeds, avocados and quinoa. We drank more water, exercised and had massage therapy. Nothing worked!

During this time, I was regularly searching the Internet for answers. One day, frantically, I did yet another Google search using the words: "skin," "sun," "sensitive," and "burning." Solar eczema and/or solar urticaria kept coming up, even though it was described as a rather rare disease. Why would the three of us suddenly develop a rare disease? It did not make any sense. Online, I found a list of foods, herbal remedies, and medical drugs that cause photosensitivity in humans, but we had already eliminated all of the food products and none of us were taking any medical drugs. All roads led to dead ends; I was back at square one.

I thought back to the naturopath who believed that the condition was caused by eating raw food and the subsequent release of acids. Although his explanation simply was not credible, he had mentioned witnessing the same phenomenon with other people eating the same way we did. So I attempted another Google search using the keywords: "raw," "food," "skin," and "sun." The first link brought me to a message posted in May 2002. It read: " Since visiting a West Coast Health Institute a year ago, I have developed a skin sensitivity. My skin burns when exposed to the sun and is very sensitive to the cold. For example, if I wash my hands in cold tap water, it feels as if my hands have been in ice water for a long time. My skin is also sensitive to minor bumps. I have been to a team of specialists and had every test run. The doctors say it is something in my diet. I eat almost completely raw. My diet consists of sunflower and buckwheat sprouts, fenugreek sprouts, wheatgrass juice, and a variety of other green juices, seed cheese, a variety of nuts and seeds and plant fats. Please help! Has anyone out there had a similar reaction? I would appreciate any ideas."

I eventually had a telephone conversation with the author of the message. She had found the cause of her symptoms and did not suffer from it anymore. "It's the buckwheat greens," she said. While it seems painfully obvious now, with the information I have, it was the last thing I would have suspected at that time.

It turned out that she had gone through a process similar to mine for about a year. From the medical doctors, naturopathic doctors to the lupus test, and finally cutting out celery and other food products. Living in the southern part of the United States, it was almost impossible for her to avoid the sun, and she was rushed to the hospital once. In our case, since we were living in Quebec, most of our skin was covered during a large portion of the year so we never experienced the massive reaction that she did. She had contacted some of the top leaders in the raw food movement. They were unable to give her an answer. Then, somewhere in her research she found a note from David Wolfe, a prominent raw food advocate, which mentioned something toxic about buckwheat. She removed the buckwheat greens from her diet and improved rapidly. She said that within one week her symptoms were gone.

Following her suggestion we eliminated buckwheat greens from our diet, and within one month the numbing, fuzzy, buzzing feelings in the face and hands disappeared for both my wife and myself. The adverse reaction to cold or hot water was also gone. Reddening of the skin took longer to disappear completely but after two months that problem was gone.

After my telephone conversation, I searched once again with Google, using the words: "sun," "buckwheat," and "skin." A lot of information came up. Dozens of websites mention fagopyrism. Among the most interesting citations was from a message forum written by "Sproutcreek" in the year 2000:

Date: Thu, 27 Jan 2000

Subject: Re: Skin soreness and photosensitivity

Hi Greg, The "tingles"- skin burning easily from sun exposure and a numbness in the hands accompanied by exaggerated pain if you bang your hand, etc seems to be common among most people who eat too many buckwheat greens. It was common among staff and guests at Ann Wigmore's retreat when I worked there. It seemed like you couldn't eat (chew) enough to cause it, but when you juiced it or put large amounts in the blender you exceeded your tolerance level and these strange symptoms appeared. I haven't experienced it or heard of it with any other greens, but I did get the tingles myself along with most others from buckwheat. Do you eat buckwheat greens?

My comments: In January of 2000, some people were already aware of this. It even had a name: "the tingles"! I was surprised to read that it had been a known occurrence for so long. Why doesn't anybody talk about it?

There is abundant scientific information about fagopyrism in research material, including on the Internet. However, nearly all of the references are relative to veterinary health care because human consumption of the buckwheat plant is relatively new.

The dictionary on the Internet at <http://www.dictionarybarn.com/FAGOPYRISM.php> defines fagopyrism as "Photosensitization, mainly in cattle and sheep, caused by ingestion of buckwheat (*Fagopyrum esculentum*) and characterized by irritation of the skin, oedema, and a serous exudate."

It is mentioned in the IVIS document available on the Internet at www.ivis.org A Guide to Plant Poisoning of Animals in North America, A.P. Knight and R.G. Walter (Eds.) Publisher: Teton NewMedia, Jackson WY. ". . . Some plants contain compounds or pigments that once absorbed from the digestive system induce a direct effect on nonpigmented skin when it is exposed to light . . ."

"Primary photosensitization develops when animals eat plants containing polyphenolic pigments. These compounds are at highest concentration in the green plant and are readily absorbed from the gastrointestinal tract to circulate in the blood. In nonpigmented skin these compounds react with UV light [note: actually for buckwheat and St John's wort it reacts with another part of the sunlight spectrum—not the ultraviolet] to produce radiant energy that oxidizes essential amino acids in the skin's cells. The cells die in the photosensitization process, and the affected skin eventually sloughs off. Two plants associated historically with primary photosensitization are buckwheat (*Fagopyrum esculentum*), and St. John's wort (*Hypericum perforatum*). Both plants contain polyphenolic pigments capable of causing primary photosensitization."

"Clinical Signs of Photosensitization. Photophobia, excessive tearing, and swelling, redness, and increased sensitivity of nonpigmented skin initially characterize photosensitization in animals. Affected skin rapidly becomes reddened, painful, and raised above areas of adjacent pigmented skin. Serum often oozes through the affected skin to form crusts in the hair. After 2 to 3 weeks, the necrotic skin becomes dry and parchment-like, and the hair and white skin slough leaving ulcerated areas that may develop secondary bacterial infections."

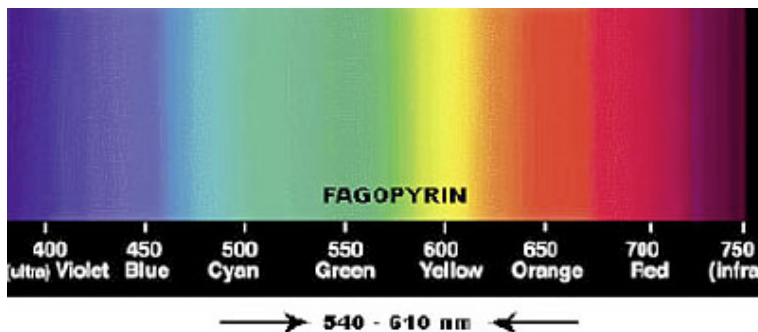
Just as indicated in the article, when we stopped eating the buckwheat greens, all symptoms disappeared. This confirms that buckwheat was indeed the culprit. Numerous other websites dedicated to veterinary health and medicine mention fagopyrism.

From The Identification Guide: Toxic Plants Compiled by Charlie Armour
http://www.personalponies.org/DOCS/Poisonous%20Plants_12-09-00.doc: (or
http://www.personalponies.org/DOCS/Poisonous%20Plants_12-09-00.pdf) "Buckwheat is cultivated as a crop for fodder and for the production of buckwheat honey. Eating entire plants, dried or fresh, has caused sensitivity to light in horses with exposed lightcolored skin. Exposure to the sun is necessary. This

plant is considered to be a primary photosensitizer . . ."

Toxic chemicals: Fagopyrin, probably a derivative of naphthodianthrone, is closely related to hypericin, which is found in St. John's wort. The absorption spectra of these chemicals is in the range of 540–610 nm"

THE SUNLIGHT- Wavelength in Nanometers



The absorption spectra is a very important factor in fagopyrism since, to my knowledge, only these two plants—buckwheat and St. John's wort—have pigments that will react to this range. Since these wavelengths are not filtered by glass, the phototoxic reaction will occur even through a window. This helps confirm that the photosensitivity is absolutely linked to the ingestion of buckwheat.

From the North Dakota State University NDSU Extension Service *Alternative Feeds for Ruminants AS-1182*, September 1999 <http://www.ext.nodak.edu/extpubs/ansci/livestoc/as1182.htm#BUCKWHEAT> "Buckwheat grain contains a compound called fagopyrin which can cause photosensitivity, eruptions on the skin, and itching behavior. Only white or light colored areas of the hide are affected. The animals apparently become photosensitive after consuming large amounts of buckwheat for an extended period of time."

This is particularly interesting since it indicates that an accumulation of fagopyrin is required to produce symptoms. This corresponds to my own observation that it took us approximately one month of consuming buckwheat greens on a regular basis before clearly defined symptoms began to appear.

The website from the College of veterinary medicine—Colorado State University http://www.vth.colostate.edu/poisonous_plants/report/report_detail_1.cfm?ID=318 adds a few points: "Animals with white skin are most severely affected. Black skinned animals are not affected except for showing photophobia if the eyes are not pigmented. Initially the non-pigmented skin becomes reddened, swollen and painful. Affected animals become very agitated when exposed to sunlight often trying to get under vehicles, buildings, trees to avoid the light.

Diagnosis: Photosensitization. Serum liver enzymes are usually normal, helping to differentiate primary photosensitization from secondary photosensitization resulting from severe liver failure."

All of the symptoms arising from the ingestion of buckwheat greens have other possible causes so it is essential to see your health care professional to make sure that there are no other underlying causes or conditions. The parameters of my liver functions were normal, confirming a primary photosensitization. This means that the photodynamic substance itself (fagopyrin) in the skin tissues was responsible for the reaction to sunlight.

From The School of Veterinary Medicine University of Wisconsin Madison Food Animal Ophthalmology Dec. 4, 2002 <http://www.vetmed.wisc.edu/Data/CourseMaterial/Miller/foodanimaloptha.pdf> This article mentions: ". . . some animals may develop blepharitis through direct solar irritation photosensitization following ingestion of photodynamic agents such as fagopyrin (buckwheat). Blepharitis is a condition that causes inflammation of the eyelids. Symptoms of blepharitis include a burning sensation, excessive tearing, itching, sensitivity to light (photophobia), red and swollen eyelids, redness of the eye, blurred vision, frothy tears and dry eye."

I believe that this is worth noting because our eyes felt extremely sensitive to sunlight, although we never developed any other symptoms of blepharitis.

From The Illini PorkNet:
<http://www.truill.uiuc.edu/porknet/paperDisplay.cfm?Type=paper&ContentID=84> Illini PorkNet. The Online Resource for the Pork Industry. Buckwheat as a Feed Ingredient in Swine Diets. Gilbert Hollis The article states: "When exposed to sunlight, pigs fed high levels of buckwheat develop peculiar eruptions and intense itching of the skin. This is caused by a photosensitizing agent in buckwheat known as fagopyrin. Only white or light-colored areas of the skin are affected, and they must be exposed to direct sunlight. If animals are kept indoors, they remain normal."

I find this text very significant because it implies that the fagopyrin develops its toxic attributes only if and when light skin is exposed to sunlight. Without light to trigger the reaction, the animals remain normal. This explains the fact that we felt normal except after exposing our skin to light.

The Canadian Government Biodiversity Information Facility website http://www.cbif.gc.ca/pls/pp/ppack.info?p_psn=231&p_type=all&p_sci=sci&p_x=px has the following notes on poisoning from Buckwheat: Buckwheat (*Fagopyrum esculentum*) is cultivated in Canada as a crop for fodder and for the production of buckwheat honey. Ingesting entire plants, dried or fresh, has caused photosensitization in animals with exposed or light-colored skin including cattle, goats, sheep, swine, and turkeys. Exposure to the sun is necessary. This plant is considered to be a primary photosensitizer, although jaundice has occurred concurrently, which indicates secondary involvement of the liver (Cooper and Johnson 1984, Cheeke and Schull 1985). Photosensitization has not occurred in humans (Blumstein 1936).

Little fagopyrin occurs in the seeds, but ingesting the entire plant, either green or dried, can cause serious photosensitization in livestock (Johnson 1989). This Canadian Government website has numerous references and goes on to list all of the buckwheat poisoning occurrences in various animals.

Note that the reference to humans is from 1936. Humans have been eating the innocuous seeds for a long time but only animals were eating the raw buckwheat plant in large quantities. However, with the expansion of the raw food movement and the use of buckwheat greens as a food source for people, some humans are now experiencing similar symptoms. The mention of a possible secondary involvement of the liver is worrisome but to my knowledge does not correlate with any human observation.

Even the FDA poisonous plants database showed 32 different references relating to buckwheat poisoning: <http://www.cfsan.fda.gov/~djw/pltx.cgi?QUERY=buckwheat> There are many other papers and Internet resources that further explore the effect of fagopyrin. The information provided above represents a good summary of what's available.

A natural food diet is certainly a good thing, and including a large portion of raw food also seems like a good idea. Most sprouts are harmless but powerful superfoods. Sunflower greens, broccoli sprouts, radish sprouts, fenugreek sprouts, etc. are all excellent products in reasonable quantities, but ingesting large quantities of these food products is still somewhat untested and should be done carefully.

I would like to make the disclaimer that I am not advising people to stop eating buckwheat. The Latin expression *dosis sola facit venenum* (the dose makes the poison) attributed to the ancient Romans could be applied here. A small quantity of buckwheat greens (or buckwheat lettuce as it is often called) in an individual diet could allow for healthy nutritional benefits without the negative effects of large amounts. Buckwheat does contain a large quantity of rutin, a member of a large group of phenolic secondary metabolites of plants that include more than 2,000 different known chemicals. Rutin is important because it strengthens capillaries and so helps people suffering from arteriosclerosis (the hardening of the arteries) or high blood pressure. Rutin is not found in beans or other grains such as rice, wheat, etc. but is contained in a fairly large quantity (4–6%) in buckwheat. Rutin belongs to a group of plant compounds called bioflavonoids that also include the important catechins of green tea and the polyphenols of red wine. Recent studies have shown that the bioflavonoids are powerful antioxidants which fight free radicals. Rutin is also found in the rind, pulp and skin of such fruits as lemons, grapefruits, oranges, lime, grapes, cherries, plums, peaches, apricots, apples, berries and vegetables such as green and yellow peppers, tomatoes, onions, broccoli, parsley and especially asparagus. It is also said to be found in bee propolis, green tea and black tea. (source: <http://www.acu-cell.com/bio.html>)

I've eaten buckwheat most of my life without any sun sensitivity problems. I ate buckwheat in pancakes as a child, and later in the form of kasha and soba noodles. However, while several Health Centers are suggesting daily green drinks that include a lot of buckwheat greens for long periods of time, I believe this is risky. At the very least, people with fair skin should be informed about potential phototoxicity. Even people with darker skin should be very careful with the unpigmented flesh around their eyes. Animals consuming large quantities of buckwheat plant have developed blepharitis, a painful inflammation of the conjunctive tissues of the eye. It seems possible that blepharitis could occur in people.

Based on the information above, I believe everyone should avoid the regular use of large quantities of buckwheat greens in their juices. It is relatively easy to find out if you are intoxicated with fagopyrin. N.T. Clare in *Photodynamic action and its pathological effects* states in 1956 that "no human cases have been reported, although it may easily be mistaken for sunburn. In this case fagopyrism may be distinguished by exposing the suspected skin to light filtered through plate glass which does not allow ultraviolet to pass through." This is a simple procedure. If you are in doubt, expose a small part of usually unexposed skin to the sun through a window and use a timer. If you do not get a reaction within fifteen minutes, most likely you are fine. A reaction would be a reddening or burning of the skin. If the reaction is very light you may barely notice it. If, a few hours later, the exposed skin is itching, abnormally sensitive to the cold or hot water or if you feel exaggerated pain when your skin is scratched or hit, you may have a problem with fagopyrism. If the symptoms disappear after removing buckwheat from your diet, this would confirm that it was causing the symptoms.

I believe that a lot of buckwheat greens eaters have these problems to some extent. A friend of mine recently told me that the sun had become much stronger and very unpleasant, probably because of the ozone layer. I think that the real cause of his discomfort is that he eats a lot of buckwheat greens. Another man says his hands have become very sensitive to the cold and he thinks he might have Raynaud's disease. But he also eats a lot of buckwheat lettuce. Another friend works outside in a field. She recently started to eat a lot of buckwheat greens that she grows herself and began to complain about burning sensations on her hands and strange feelings on her face, as if she had no skin anymore. When she stopped eating buckwheat greens, everything returned to normal. As this information circulates, I believe that many people will identify buckwheat as a possible cause of their symptoms.

I still eat a lot of sprouted foods myself. I believe that the center I visited on the East coast does very good work overall. I've witnessed many people improve their health considerably during the time I spent there. I've also seen that the leaders manifest a high degree of flexibility and open mindedness about modifying their approach when presented with new information. I'd love to return there myself to enjoy their facilities again sometime.

While I have been an enthusiastic natural food consumer and researcher for 35 years, I am not a medical

professional nor a scientist. This article is based on my experience and research and represents my opinion only. Please do not consider this article to be medical advice. I strongly urge you to consult your health care professional for any symptoms you may have. Be sure to get a blood test for your liver functions. If your liver function test results are normal then you probably suffer from primary phototoxicity, meaning that it is the photodynamic pigment itself in your skin that reacts to the sun and that you likely do not suffer from a functional disease. This is exceedingly good news since the solution is simple: just avoid the causative substance.

I have done this research in good faith to help myself and my friends with our problems and I believe these findings may be useful to others. This is why I am making this document available. I have nothing to gain from it personally. I am not associated or affiliated with any agency, school, company or organization that could benefit in any way from this information.

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This article, written in 2004, was posted on Mr Arbour's personal website until 2009.

As of 2010, it remains posted as a webpage of text at:

<http://www.townsendletter.com/Dec2004/buckwheat1204.htm>

And as a public service, as of 2013 it is also posted as a downloadable PDF at:

www.MarkBraunstein.Org