In this issue...

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Green Water: Myths, Facts, Theories

2004 Water Gardening & Pond Expo & Sale to be held April 18th

Susan Yetter will present "Echoes of Ecosystems - Interpretive Plantings Beyond the Pond Edge." Susan is a nationally published ornamental grass specialist who has been an instructor with the Denver Botanic Gardens certification program for more than a decade. Her business, Papa Piedra and Mama Tierra, specializes in rock projects, including retaining walls and pathways.

Three one-hour seminars will be held in classroom "C", in the DBG main building, lower level.

Three pond product vendors and landscape and pond companies will show and sell pond products and landscape and pond companies will show and sell in combination with seven seminars during the four-hour event, to be held in Mitchell Hall at DBG, Noon-4 pm.

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### Officers & Committee Chairs

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<tr>
<th>Position</th>
<th>Name</th>
<th>Phone</th>
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<tbody>
<tr>
<td>President</td>
<td>Cyndie Thomas</td>
<td>303.755.1885</td>
</tr>
<tr>
<td>Vice President</td>
<td>Duff Kerr</td>
<td>303.871.0336</td>
</tr>
<tr>
<td>Secretary</td>
<td>Bill Powell</td>
<td>303.355.8098</td>
</tr>
<tr>
<td>Treasurer</td>
<td>Gail Goldberg</td>
<td>303.329.6624</td>
</tr>
<tr>
<td>Programs</td>
<td>Rebecca Nash</td>
<td>303.766.2863</td>
</tr>
<tr>
<td>Members-at-Large</td>
<td>“Moe” Belisle</td>
<td>303.744.0745</td>
</tr>
<tr>
<td></td>
<td>Lowell Coon</td>
<td>303.427.8532</td>
</tr>
<tr>
<td></td>
<td>Chuck Hunt</td>
<td>303.399.9729</td>
</tr>
<tr>
<td></td>
<td>Ken Lange</td>
<td>303.393.8410</td>
</tr>
</tbody>
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**Newsletter/Membership Database**

<table>
<thead>
<tr>
<th>Name</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael Thomas</td>
<td>303.755.1885</td>
</tr>
<tr>
<td><a href="mailto:michael.thomas@comcast.net">michael.thomas@comcast.net</a></td>
<td></td>
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**Volunteer Coordinator**

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<th>Name</th>
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<tr>
<td>Lowell Coon</td>
<td>303.427.8532</td>
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**Upcoming Events**

--- CWGS will appear...at the new Denver Flower, Plant and Landscaping Show and Sale at the Convention Center, April 2-4. If you are interested in sharing your knowledge for a short time at the CWGS information booth, or would like to help build the booth and/or take it down, contact Cyndie Thomas, 303-755-1885. Free tickets will be available for those who volunteer.

--- Coming in December 2004...an exclusive CWGS calendar featuring YOUR photographs. The photos that appear in the calendar will be selected by the CWGS Board, and all photos submitted will be put on the CWGS website. Send your pictures in digital format to: michael.thomas@comcast.net

If you don’t have a digital camera, we can scan photos and convert them to digital format. All photos become property of CWGS.

--- Work for Spring start-up has started at Denver Botanic Gardens. If you want an opportunity for “hands-on” learning, this is one you won’t want to pass up. Work time is on Sunday mornings. To obtain start times and more information, contact Lowell Coon, CWGS Volunteer Coordinator, (303) 427-8532.

--- Rose Swenby and Cyndie Thomas will present “Ponds and Water Conservation” on behalf of CWGS at Tagawa Garden Center, 7711 S. Parker Rd., on Saturday, May 22, 1-2:30 p.m. Good tips on conserving water with a pond.

--- Rose Swenby and Cyndie Thomas will present “Ponds and Water Conservation” on behalf of CWGS at Tagawa Garden Center, 7711 S. Parker Rd., on Saturday, May 22, 1-2:30 p.m. Good tips on conserving water with a pond.
As you begin to do your spring clean-up, remember the CWGS sale in June. We can use any plants and fish you have decided to dispose of. We will remind you again before the sale, and we can even arrange to pick up your items, if necessary. If possible, all plants should be properly labeled for maximum saleability. For more information, contact Cyndie Thomas, Plant Sale Chair, at 303-755-1885.

Market Place
CWGS Members - use this space to TRADE or DONATE water garden plants and supplies. Let us know what you have too much of, don't need anymore, or would like to have. We'll put your request in the next issue. michael.thomas@comcast.net

Alpine Koi & Homescapes
Water Garden Center
* Quality Pond Supplies
* Large Selection of Aquatic Plants
* Show Quality Japanese Koi * Domestic Koi * Goldfish
* Pond Maintenance Service
* Wild Bird Food, Feeders & Houses
* Wall, Tabletop & Bonsai Fountains
* Unique Yard Accessories
* Gift Certificates & MORE!
2715 E. Mulberry (Mulberry & Summit View)
Fort Collins, CO 80524
970-224-3663
* Mon-Sat 10-6
* Summer Hours: Mon-Sat 10-6 Sunday Noon-5

Green Water: Myths, Facts, Theories
by Norm Meck
Although it is sometimes called an algae bloom, normally the names it is called are unprintable. For some, it seems to happen every Spring (also sometimes in the Fall). For others, it is almost a way of life. A limited number of pond keepers have never or rarely experienced this "wonder" of nature. It is said that the Koi thrive in it, but you cannot see them to tell if they are thriving or not. You have heard many reasons why your water turns green and tried assorted mechanical wizardry and various chemical concoctions to clear it, (which may or may not have been harmful to your Koi), but it is still green.

There is a lot of "snake oil" out on the market to clear green water. The basic ecological relationships within even a small pond are extremely complex and the more knowledge one acquires about these relationships, the more one realizes how much is not known.

First of all, what is it? Green water is caused by an excessively large number of tiny organisms in the water. Called phytoplankton, these minute plants are part of the algae family that has thousands of distinct species found in water (and ice) throughout the world. These organisms are very small, with the most common ones found in our ponds being around 15 microns (0.0006 inches) in diameter. All pond water contains large numbers of different kinds of these plants and other microorganisms. Water that appears to be crystal clear just doesn't have as many. Although there are many different species of organisms in any pond, I have found there are a very limited number of species that predominate. We will lump the most predominant into two categories and ignore the rest. The first category contains the single- (or few-) celled plants responsible for the algae blooms, which I will refer to as bloom algae. The second category will be called string algae, and consists of the multi-celled, filamentous plants that grow on the walls of the pond (and thrive on the waterfalls).

There are three ways of controlling unwanted plants, i.e. weeds, just as in your garden. They can be: starved of the necessities for life to prevent them from multiplying; removed; or outright killed. Our problem is to find a way to do one or more of these without harming our Koi (and any desired plants) that are sharing this environment. Let's review the common myths and check out the facts.

Continued on next page
Green Water: Myths, Facts, Theories

**MYTH:** Perhaps the most controversial myths involve starving the algae of the necessary life.

**FACT:** Algae have specific requirements for growth just as any other plant. *Liebig's Law of the Minimum,* states that “growth proceeds only as rapidly as the least available necessity of life allows.” If we can remove or reduce one or more of the required items, algae cannot flourish. Unfortunately, each species of algae has slightly different nutrient and environmental requirements. Besides the primaries of sunlight, suitable temperature, pH, and salinity ranges, all are known to need elemental Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorus, Iron, Calcium, Magnesium, Copper, Manganese, Zinc, and Molybdenum. In most cases, each of these elements are required to be in an inorganic form.

Many of these are also requirements of the Koi so we can’t mess around with them very much. Some of the required elements have minimum concentration values that are very small. Even if we were successful in removing a critical element, a light rainstorm or even a windy day can add more than is necessary back into the pond. Don’t forget, we also go out and throw food into the pond a couple times a day. Often, an attempt to control one element will change the concentrations sufficiently to cause a different species of algae to thrive. Here are two widely believed myths that involve Liebig’s Law of the Minimum.

**MYTH:** Providing shade over the pond will prevent an algae bloom.

**FACT:** It is true that algae needs light to grow and reproduce. But what is interesting is the small amount of light that is actually required. Controlled experiments using reduction in sunlight of 90% still show significant algae growth. There have been positive results reported of completely covering a pond suffering from green water with an opaque plastic cover for 5-10 days. I’m not too sure what the Koi think about this, but it is obviously not an acceptable permanent solution. I do recommend providing shade over a pond, but more for temperature stability than for algae control.

Now let’s look at the myths involved with removal of these weeds.

**MYTH:** A mechanical filter system will remove bloom algae from the pond water.

**FACT:** It is impractical to remove these weeds by mechanical means. They are so tiny that they will pass through any feasible mechanical filtration devices if it wasn’t even there. If the filter was fine enough to capture the bloom algae, it would plug up in minutes with the other, much larger, particulate matter in the water.

**MYTH:** A flocculent treatment of the pond water will clump the algae together into large enough sizes that the filter will remove them.

**FACT:** Flocculents only have a very weak effect on the living algae cells but can be effective in causing some organic waste and inorganic particles to clump. Further, most flocculents are alum based whose principal component is aluminum. There are no known studies of the long term effects of aluminum on Koi.

**MYTH:** A major water change will clear the bloom algae.

“Water Gardening Options... Getting Started” will provide those just planning a water feature with an overview of all the possibilities. This seminar is being presented by Jim Wullshleger of Aquascape Design – Nursery Pro. Jim has 30 years of water gardening experience and has worked in various facets of the field; He has owned and/or managed successful garden centers in Nebraska and Colorado. He worked for Tetra Secondnature/TetraPond, and AquaMat prior to joining Aquascape Design-Nursery Pro in 2003. Jim has spoken in almost every state west of the Mississippi River on water gardening.

“Technology in Water Gardening - Advances in Pond Design and Maintenance” will be presented by Scott Eddy of RMAN.com. In business since 1988, his company offers digital landscape design, construction and installation of ponds, fountains and lighting display projects.

2004 Expo & Sale to be held April 18th

Four shorter seminars will be held in the pavilion in Mitchell Hall. They will include: “Carnivorous Plants for the Container or Bog Garden” by John Bayard, CWGS; “Keeping a Healthy Pond,” Paul & Rose Swenby, APR Landscape Co.; “Streams and Waterfalls,” Scott Eddy, Rman.com, and “Choosing Fish for the Pond,” Ray & Kathy Smith, Koi Lagoon.

Pause and view more water gardening and landscape ideas in a looped show on the main stage. Behind-the-scenes tours of DBG will also be given.

CWGS will be selling Lotus for $20 each. Care & information will also be available, along with Pondtabbs for fertilizing all aquatic plants. Tickets for the drawing on the “Frog Fantasy” quilt will be available for $1 each, or 6 for $5. Several door prize drawings will also be held.

**Seminar Schedule**

12 noon - 1:00 pm - Technology in Water Gardening - Advancement in Pond Design and Maintenance - Scott Eddy
1:30 - 2:30 pm - Water Gardening Options... Getting Started - Jim Wullshleger
3:00 - 4:00 pm - Echoes of Eco-systems - Interpretive Plantings Beyond the Pond Edge - Susan Yetter

**Mini-Seminar Schedule**

12 noon - 12:30 pm - Carnivorous Plants for the Container or Bog Garden - John Bayard, CWGS
1:00 - 1:30 pm - Keeping a Healthy Pond - Paul & Rose Swenby, APR Landscape Co.
2:00 - 2:30 pm - Streams and Waterfalls - Scott Eddy, Rman.com
3:00 - 3:30 pm - Choosing Fish for the Pond - Ray & Kathy Smith, Koi Lagoon
CWGS Newsletter gets facelift, again

by Michael Thomas
Newsletter Editor

Readers last month noticed a change in the appearance of The Water Garden. Comments heard since then have been favorable. The old format had been in use, with minor variations, for over 10 years, because that covers the time period I last edited this publication.

I can assure you we didn’t change for the sake of change, but had some good reasons, mostly having to do with production processes and changes in technology. In short, computers and desktop publishing can do things today that couldn’t be done efficiently, or inexpensively, in the past.

With this issue, The Water Garden has a new look, again. I hope you like it, too. Several people who saw it during production did, especially when we were able to hold on to many of the elements of last month’s new design.

The format change this issue was unintended, but made necessary by several goals undertaken by CWGS this year. One of those goals included a special color supplement in the May edition providing information on marginal plants, a wide variety of plants that can be used in a variety of ways.

Another goal was to reduce operating expenses in these times of drought and financial ups and downs. CWGS was battling monthly with its printer over the cost of publication. The special issue in May also created a price showdown that finally pushed the CWGS Board to make a major decision.

CWGS has purchased a heavy-duty color laser printer and, beginning with this issue, will attempt to do all its printing and publication in-house. Color was always extremely expensive in printing because it complicates the processing and adds labor, but this is one area where computers have really had an impact.

Also with this issue goes out another plea to CWGS members - if you want to share your knowledge, I’m always on the lookout for writers. Stories about all aspects of water gardening are in demand. If you want to share plants, or whatever, with members, use the new Marketplace to put in a quick request and see what happens.

If you run a small business, an inexpensive ad in The Water Garden will reach over 250 homes and businesses (a targeted market) all over the country. Participate in CWGS - don’t just JOIN! That’s the FUN part of membership.

Continued on next page
cytoplasm. This builds up pressure within the cell until it equalizes the pressure; if not for the rigidity of the cell wall, the cell would burst. When an algae cell dies, the cell wall structure can no longer support the pressure of the water entering the cell and the cell bursts. The now exposed cytoplasm is quite sticky and has a natural tendency to adhere to anything it might come in contact with. The internal surfaces of the bio-filter media are a natural trapping location for these cells and, combined with the oxygen-rich water, a healthy environment is provided for the growth of heterotroph bacterial colonies to decompose the dead cells.

A waste product of the decomposition process of the cell walls is an antibiotic that is toxic to algae. The presence of this antibiotic in the water causes other algae cells to die, the heterotroph bacterial colony increases in size as more “food” becomes available, and as more antibiotic is produced, more algae dies. If the limiting factor is the amount of “food” for the heterotroph bacteria, the water has relatively few remaining algae cells and, combined with the oxygen-rich water, a healthy environment is provided for the growth of heterotroph bacterial colonies to decompose the dead cells.

In the Spring, as the water temperature increases, the algae become active at a much faster rate. The result is an algae bloom. Dead algae cells are most often trapped in the filter media. The outer portions of this layer isolate the underlying_regions from oxygen and the decomposition (antibiotic production) process proceeds more slowly than if the material was spread out over a larger area. This is why multiple biologic filters should be run in parallel as opposed to series for maximum effect. Approximately one square inch of traditional filter cross section flow area is appropriate for each gallon of water in a Koi pond. Bubble bead or similar type filters do not generally have sufficient internal surface area to support the heterotroph colonies necessary for antibiotic production. They do an excellent job of capturing the dead algae and other solids, however. During the frequent backwashing processes, the dead algae and much of the heterotroph bacterial colonies are removed from the system giving insufficient time for the antibiotic to be produced. This is why ponds using these filters almost always require an ultraviolet system to handle the green water problem. A properly sized UV system will do a good job on eradicating the bloom algae. It will not affect the string algae, only the phytoplankton that actually pass through the unit. There are also some indications that the UV radiation destroys or at least weakens any antibiotic action.

Trina Jacobson
Bud and Debbi Kiebler
Neil and Carla Littlefield
Cathy Marley
John and Arlyn Martens
Irmal Miller
David and Donna Nelson
Werner and Nancy Neupert
Mike and Vickie Pervich
Les Petrasch
Chuck and Mary Purdy
Gary and Judy Reid
Mark and Judy Richards
LuNelle Piggle
Joseph and Melissa Shopnitz
Carol Tuttle
Marvin and Marty Umholtz
Patricia Weiss-Taylor
James and Marilyn Wilson
New Members
John and Laura Martin