

# Space Science Projects at NASA: Tall, Grande, or Vente?

**With Dr. Bruce Margon**

**May 22, 2007**

**Doors open at 6:45 p.m.**

**Concord Police Association Facility 5060 Avila Road, Concord**

*How does our government make decisions about financing NASA's space projects? Should NASA be doing small, medium, or large projects?*



Given that NASA is a tiny fraction of the federal budget, the level of public interest in its activities and even its management decisions is remarkable. Projects such as the Hubble Space Telescope are not just a scientific triumph, but also

have become cultural icons. But superimposed on these wonderful successes is a growing controversy between Congress, NASA, the scientific and industrial communities, and the

public over how NASA expends its resources. The tension today over how NASA should invest, particularly in science projects, is at the highest level in decades.

Join us May 22, as Dr. Bruce Margon, a former co-investigator on the Hubble Space Telescope project, describes some of the controversies, and reviews how NASA came to be in this position.

Dr. Margon is currently Vice Chancellor for Research at the University of California, Santa Cruz. Previous to his arrival at Santa Cruz in 2006, he was the Associate Director for Science at the Space Telescope Science Institute in Baltimore, MD (the center that operates the science program of the Hubble Space Telescope). Margon has served on and chaired numerous scientific advisory committees on space science for NASA. He is the author of more than two hundred research papers in professional journals, and also a frequent contributor on astronomical topics to the popular press, including Scientific American and Sky and Telescope.

## Upcoming Programs:

**June 26:** Dr. Chris McKay, NASA Ames: Latest results from Titan: still unraveling the puzzles from the Huygens Probe

**July 24:** Dr. Jeffrey Moore: New Horizons Mission to Pluto and Beyond

## Spring and Summer Double Stars *By Steve Jacobs*

As many of you know, I have a fondness for double stars and at star-parties I will usually be looking at a double star. Double and multiple stars are excellent objects for small telescopes, especially refractors. I especially enjoy the color differences or unusual pairings.



The definition of a "true" binary or multiple star system is a pair or several stars gravitationally bound together and orbiting around a common center of gravity. The important point here is the orbiting around a common center of gravity (otherwise all stars in a cluster or a galaxy, for that matter, would be a multiple star system). A few definitions are necessary: visual

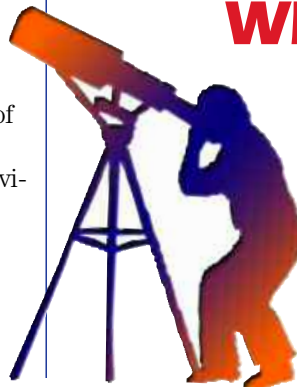
binaries can be separated visually with a telescope; spectroscopic binaries cannot be seen visually but can be distinguished by spectroscopy (two stars have different spectrographs because of different elements in their chromospheres or because of the Doppler effect); and optical binaries are stars along the same

*(continued on page 4)*

## What's Up

*by Jim Head*

One of the most rewarding experiences in life is hearing that "wow" at the telescope, or seeing the wide open eyes and dropping jaws when visitors are presented with some of the awesome aspects of our past, *(continued on page 8)*



# President's Corner

## Leslie C. Peltier

By Nick Tsakoyias

On evenings when I have spare time and I'm not in my backyard stargazing with my telescope, I find myself reading. Usually books related to astronomy or history and once in a while some literature. Just recently I finished reading Leslie C. Peltier's book: Starlight Nights, first published in 1965. It's his autobiography about the adventures he encountered in being a lifelong stargazer.

### Who was Leslie C. Peltier?

He was an amateur astronomer, who in his lifetime discovered visually, 12 comets, 6 novas, and logged in more than 132,000 variable-star observations, all with just modest sized refractors (though at one time, later in his stargazing career he did acquire a 12" Clark

While reading Starlight Nights, I found a kindred spirit in Mr. Leslie Peltier. The first object that he looked at with his new 2" refractor was the star Vega in the constellation Lyra. The first time I looked through a telescope was up at Mt. Diablo during a Public night, and it was through Jim Scala's 5" Takahashi refractor. Can you guess what object Jim had his scope on? Well, I'll tell you, it was Vega, and being new to stargazing I found the view to be beautiful and I still do. I found it interesting that Mr. Peltier's stargazing journey and mine basically started the exact same way. As with many things in his book I find myself somewhat doing the same things and having the same curiosity as he did. Yet to achieve what he did, takes a lot of dedication and passion, that's something which I do not have, though I do have the enthusiasm for astronomy and stargazing it would not be enough to even come close to what Mr. Peltier accomplished. He is a model for which I believe myself and any other amateur astronomers would love to emulate.

Leslie Peltier has inspired many amateur astronomers over the years, most notably renowned astronomer David H. Levy, who has himself discovered many comets. Most famous comet being comet Shoemaker-Levy 9, that slammed into Jupiter in July 1994. Mr. Levy has written the forward to Starlight

Nights, in which he writes how that book inspired him to begin in earnest his search for comets. That was back in 1966, that same year was also the year that Mr. Levy started his communication via letters to Mr. Peltier, who encourage him in his quest. Mr. Levy finally met Mr. Peltier in 1974, and found him to be a humble and modest gentleman, ever so giving in his counsel and experience.

Anyone who is interested in stargazing and or in astronomy, would do well in reading Leslie C. Peltier's Book Starlight Nights. It captures the very essence of the amateur astronomer,



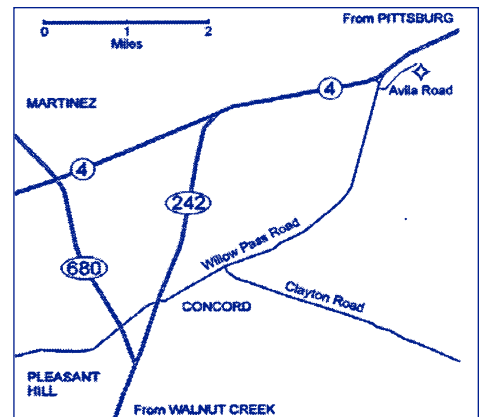
refractor). He was born in 1900, in the small farm town of Delphos, Ohio, at a time before most homes even had electricity. Leslie started observing at the age of fourteen with a 2" refractor, which he christened "The Strawberry Spyglass" he bought it with money he made picking strawberries from his family's farm. He was blessed with having extremely dark skies, which in my opinion next to having quality optics in your telescope is the most important thing to have when observing through a telescope.

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MDAS meetings are held on the fourth Tuesday every month, except on the third Tuesday in November and December. Refreshments and conversation are at 6:45 p.m. What's Up? at 7:15 p.m. Speaker at 8:00 p.m. The Concord Police Association Facility at 5060 Avila Road is at the top of the hill east of Willow Pass Road, just south of Highway 4. Everyone is invited.

Please consider receiving the *Diablo Moonwatch* by email instead of the Postal Service. Saving in printing and postage is more than \$5.00 per member. You will receive your issue sooner, view it in color, and if you wish can be printed as well on your own printer. Please send a request by email to [inquiries@mdas.net](mailto:inquiries@mdas.net).

their passion, curiosity, dedication and love for the cosmos. Mr. Peltier's book is an astronomy guide book, a guide book for the astronomer's soul.

# Astronomers Find First Earth-like Planet in Habitable Zone

From ESO News

## The Dwarf Carried Other Worlds Too!

Astronomers have discovered the most Earth-like planet outside our Solar System to date, an exoplanet with a radius only 50% larger than the Earth and capable of having liquid water. Using the ESO 3.6-m telescope, a team of Swiss, French and Portuguese scientists discovered a super-Earth about 5 times the mass of the Earth that orbits a red dwarf, already known to harbour a Neptune-mass planet. The astronomers have also strong evidence for the presence of a third planet with a mass about 8 Earth masses.

## The Planetary System Around Gliese 581

This exoplanet - as astronomers call planets around a star other than the Sun - is the smallest ever found up to now [1] and it completes a full orbit in 13 days. It is 14 times closer to its star than the Earth is from the Sun. However, given that its host star, the red dwarf Gliese 581 [2], is smaller and colder than the Sun - and thus less luminous - the planet nevertheless lies in the habitable zone, the region around a star where water could be liquid! The planet's name is Gliese 581 c.

"We have estimated that the mean temperature of this super-Earth lies between 0 and 40 degrees Celsius, and water would thus be liquid," explains Stéphane Udry, from the Geneva Observatory (Switzerland) and lead-author of the paper reporting the result. "Moreover, its radius should be only 1.5 times the Earth's radius, and models



The star Gliese 581

"Liquid water is critical to life as we know it," avows Xavier Delfosse, a member of the team from Grenoble University (France). "Because of its temperature and relative proximity, this planet will most probably be a very important target of the future space missions dedicated to the search for extra-terrestrial life. On the treasure map of the Universe, one would be tempted to mark this planet with an X."

The host star, Gliese 581, is among the 100 closest stars to us, located only 20.5 light-years away in the constellation Libra ("the Scales"). It has a mass of only one third the mass of the Sun. Such red dwarfs are intrinsically at least 50 times fainter than the Sun and are the most common stars in our Galaxy:

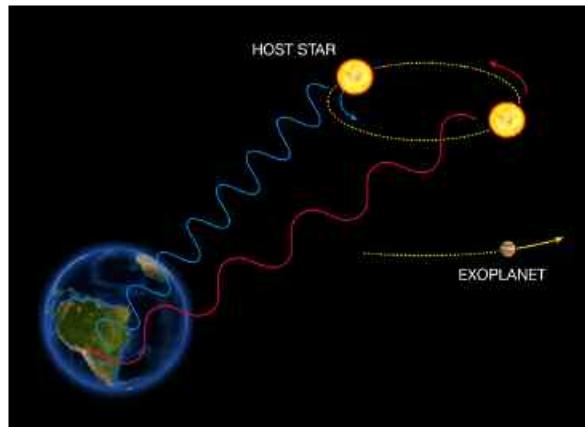
predict that the planet should be either rocky - like our Earth - or fully covered with oceans," he adds.

among the 100 closest stars to the Sun, 80 belong to this class.

"Red dwarfs are ideal targets for the search for low-mass planets where water could be liquid. Because such dwarfs emit less light, the habitable zone is much closer to them than it is around the Sun," emphasizes Xavier Bonfils, a co-worker from Lisbon University. Planets lying in this zone are then more easily detected with the radial-velocity method [3], the most successful in detecting exoplanets.

## Velocity Variations of Gl 581

Two years ago, the same team of astronomers already found a planet around Gliese 581. With a mass of 15 Earth-masses, i.e. similar to that of Neptune, it orbits its host star in 5.4 days. At the time, the astronomers had already seen hints of another planet. They therefore obtained a new set of measurements and found the new super-Earth, but also clear indications for another one, an 8



Earth-mass planet completing an orbit in 84 days. The planetary system surrounding Gliese 581 contains thus no fewer than 3 planets of 15 Earth masses or less, and as such is a quite remarkable system.

(continued on page 4)

## IMPORTANT REMINDER

Just a reminder to all MDAS members, when driving up or down Mt. Diablo State park for a Public Astronomy Event or a Society Night please obey the speed limit on the mountain which is 25 MPH. Not only will you get a speeding ticket if caught by the rangers it is also unsafe to exceed that limit, being that the mountain has a very winding road and exceeding that speed may cause a serious accident to yourself and others including wildlife. Thank you, Nicholas Tsakoyias, MDAS President

## First Earth-like Planet in Habitable Zone continued from page 3

### High Accuracy Radial Velocity for Planetary Searcher

The discovery was made thanks to HARPS (High Accuracy Radial Velocity for Planetary Searcher), perhaps the most precise spectrograph in the world. Located on the ESO 3.6-m telescope at La Silla, Chile, HARPS is able to measure velocities with a precision better than one metre per second (or 3.6 km/h)! HARPS is one of the most successful instruments for detecting exoplanets and holds already several recent

records, including the discovery of another 'Trio of Neptunes'.

The detected velocity variations are between 2 and 3 metres per second, corresponding to about 9 km/h! That's the speed of a person walking briskly. Such tiny signals could not have been distinguished from 'simple noise' by most of today's available spectrographs.

"HARPS is a unique planet hunting machine," says Michel Mayor, from Geneva Observatory, and HARPS

Principal Investigator. "Given the incredible precision of HARPS, we have focused our effort on low-mass planets. And we can say without doubt that HARPS has been very successful: out of the 13 known planets with a mass below 20 Earth masses, 11 were discovered with HARPS!"

HARPS is also very efficient in finding planetary systems, where tiny signals have to be uncovered. The two systems known to have three low mass planets - HD 69830 and Gl 581 - were discovered by HARPS.

## Spring and Summer Double Stars continued from page 1

line of sight but not necessarily gravitationally bound or even close to each other in space. So how do astronomers know if a multiple star system is a true binary (either visual or spectroscopic)? If the pair is close enough together, the orbits can be determined visually. If the pair is too far apart to be able to determine orbits visually then they can be grouped by their proper motion. If two stars appear to be close in space and have the same proper motion, then they are probably related.

Because true binaries are orbiting their orientation and separation can change (i.e. Castor of Gemini is slowly widening from its closest separation of 2 arc sec.). In fact, Castor has a third visual component 60" away at magnitude 9. Each of the components of Castor is a spectroscopic binary; therefore, it is a sextuple star system. A description of some of the spring binary stars can be found in the May edition of Sky & Telescope.

Some of these multiple stars can be observed at low power even with 8 or 10-power binoculars. Many tight doubles require high magnification and therefore good seeing. Seeing of course is the steadiness of the atmosphere (why stars twinkle).

Transparency (haze) and brightness (moon or light pollution) are less of an issue (other than being able to find the stars). Being able to split very tight doubles is limited by aperture (diameter of front element or primary mirror).

The limit of angular resolution (ability to separate closely paired stars) can be described by Dawes Limit measured in arc-seconds = 4.56/D, where D is diameter in inches. Therefore, a 4" refractor would be able to split stars 1.1 arc-seconds apart. The difference in magnitude

(brightness) will also limit which stars can be split. A bright primary star may make a dim secondary star difficult to separate or even see.



### Try to observe some of the following double or multiple stars.

STAR	RA hr min	DEC	MAG. A	MAG. B/C	SEP.	COMMON NAME	COMMENTS:
Eta Cas	00 40	57° 49'	3.5	7.2	12"		white and red
Gamma And	02 04	42° 21'	2.3	5.1	10"	Almach	yellowish and bluish
Iota Cnc	08 47	28° 46'	4.5	6.5	31"		yellow and blue
Gamma Leo	10 20	19° 51'	2.5	3.5	4.4"	Algieba	unequal white
Xi Uma	11 18	31° 32'	4.5	5	2.9"		white and yellowish white
Gamma Vir	12 42	-01° 28'	3.5	3.5	3.6"		white & yellowish, equal brightness
Alph CVn	12 56	38° 19'	2.9	5.6	20"	Cor Caroli	very bright, blue and yellow
Zeta Uma	13 24	54° 55'	2.4	4	14"	Mizar	white and greenish or yellowish white
Pi Boo	14 41	16° 25'	4.9	5.8	5.6"		bluish and orangish
Xi Boo	14 51	19° 07'	4.7	6.8	7.2"		white and yellowish
Beta Sco	16 05	-19° 48'	2.6	4.9	14"	Graffis	white and orange
Alpha Her	17 15	14° 24'	3	5.4	4.6"	RasAlgethi	orange and blue or green
Epsilon1 Lyr Epsilon2 Lyr	18 44	39° 40'	5.4 5.1	6.5 5.3	2.7" 2.3"		Double double components white, 208" between pairs
Beta Cyg	19 31	27° 57'	3.1	5.1	34"	Albiero	gold and blue
Gamma Del	20 47	16° 08'	4.3	5.1	10"		yellow pair with slightly different tints

# Solar System Notebook

# Size Matters

By Jim Scala

Three planets are currently available for observing. Saturn graces the evening sky and is past the meridian at sunset, Venus is high in the early evening and its brightness dominates the sky. Jupiter dominates the low southern sky at about 2:30 AM and is not very well placed for observation. These three planets provide an interesting contrast in size and as the observing season progresses Venus will actually become larger than Jupiter. I have included an image of each planet in the same field of view, so you can see this size comparison as it appears in the telescope. Let's start with Venus.



Image one, Venus on April 26, 2007 at 2:00 PM PDT. The disk of Venus is 16 arc seconds and the field of view (FOV) is 2 arc minutes 12 arc seconds (2'12").

We are looking back at Venus which is gaining on us fast and will reach greatest elongation on June 9th when it's at an equal angular distance from us and the sun. After June 9th it will close on us and pass between us and the Sun on August 18th. When it passes between us and the Sun it will subtend almost 58 arc seconds (58") which is larger than Jupiter can ever become at its closest opposition. Although Venus passes close to the Sun in August it will be quite easy to observe the entire time and makes quite a daytime observing spectacle.

Now we move to Jupiter which is next from the Sun.



Image two, Jupiter on May 6, 2007 at 3:00 AM PDT. Jupiter's disk is just about 44" in diameter and the FOV is 2'12" for comparison to Images one and three.

If 2007 holds a disappointment for observers, Jupiter is it! Due to the plane of Earth's and Jupiter's orbit and the fact that opposition is on June 5th, the planet is at low declination of -22° and we can only observe it through high air mass. However, we have our share of good nights in the bay area when even high air mass objects in the southern sky steady up and much detail can be observed. However, even when Jupiter is poorly placed for observation its four Galilean moons can



Image three Saturn on May 5, 2007 at 8:00 PM PDT. Saturn's disk here is about the same size as Venus (17") in Image one and the distance between the ring tips (45") are the same as the diameter of Jupiter in image two. In every image the FOV is 2'12" in width, so the comparisons are compatible.

be observed and their movement into and out of eclipses are easily observed. Saturn is next from the Sun.

We have sped past Saturn and if you look closely at Image three you'll notice the large shadow on the planet on the rings just near the lower left of the planet. This shadow will now get smaller as Saturn slowly gets nearer the Sun from our perspective; it disappears at superior conjunction.

## Now is the time to start thinking about the Martian opposition in December.

When Mars reaches its closest approach to Earth on December 19th it will be about the same size as the disk of Saturn in image three. At 17" Mars' disk will not be easy, but it will be high in the sky and Fall-Winter often brings the best seeing in the bay area. However, planetary observing takes a trained eye which is another way for saying, "It takes practice." The only way to practice is to observe detail on extended objects; that means observing the moon and planets under high magnification with the objective of seeing the finest detail possible.

## 2007 Public Program

Month	Date	Month	Date
May	19	July	21
June	9	August	18
		September	15
		October	13

## 2007 Society Nights

Month	Date	Moon Phase
May	12	
June	16	
July	14	New
August	11	
September	8	
October		
November	3	
November	10	New
December	1	
December	8	

# Maximize this Great Hobby: Eat to Maintain Healthy Eyes

By Jim Scala

Nature has spent about four billion years perfecting our eyes, the most marvelous optical instruments known. In fact, there's evidence that our eye-brain combination like chloroplasts use quantum mechanics to convert light striking the retina into an image we can see and remember and visualize again later. Doesn't anything so marvelous deserve a little effort to keep it working in top order?

## Visual problems you should try and avoid or at least delay.

By age 60, over 22 percent will have strong evidence of cataracts, clouding of the eye lens. A slightly smaller number, but not necessarily the same people will have developed "low" vision, and a smaller albeit different group exhibits early signs of macular degeneration. These problems started by age forty in those people proving that prevention should have begun in youth.

## Cataracts:

The eye lens slowly becomes cloudy and eventually opaque like waxed paper. Cataracts involve oxidation of the transparent lens proteins and are usually caused and accelerated by ultraviolet light. So, a preventive step is to wear UV blocking sunglasses in the sun. However, cataract development is accelerated by smoke, smoking, and volatile solvents, so avoidance is a no-brainer. The most important factor in cataract development is inadequate amounts and correct varieties of vegetables and fruits. More, cataracts are strongly correlated with serious overweight.

## Low vision:

Things simply look dimmer and contrast on extended objects is markedly reduced. Low vision means you could lose over one magnitude and can't see details on planets or other extended objects. Low vision develops when the eye retina, a very highly

specialized extension of brain tissue, becomes increasingly less sensitive. In effect the retina is your brain's window on the world and it functions like an ultra sensitive natural CCD chip.

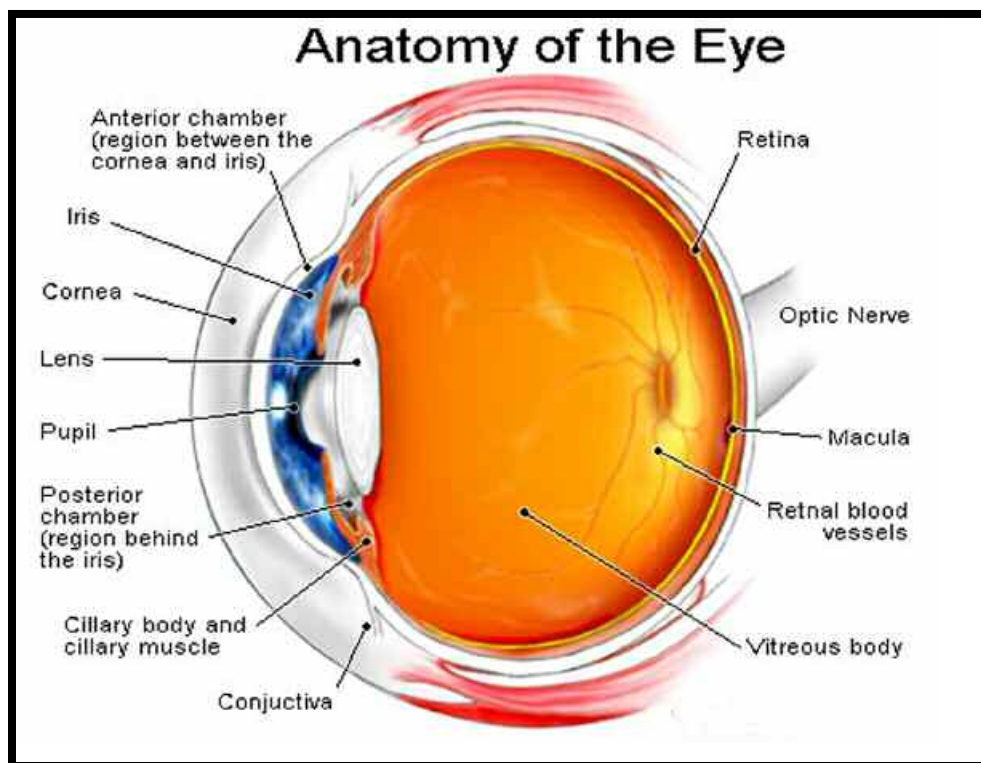
## Macular degeneration:

The macula, a small area on the retina that allows the brain to focus the eye lens without us even knowing it's being done. When it degenerates, focusing ability slowly declines and finally everything is out of focus because its function is gone. Low vision and macular degeneration are complicated and made worse by high blood pressure and high blood sugar. Again, both are completely preventable by diet and lifestyle. Does personal responsibility come into play here?

## Demographic Evidence Tells the Cataract Story

Over four decades ago, scientists noticed that cataract development correlated with geographic location, lifestyle, and food habits. Cataracts occur most where the sun is brightest and the upper atmosphere ozone the lowest. In short, ultraviolet light hitting the eye lens is the general root cause. So, as ozone holes expand, cataracts will increase disproportionately in those areas. In addition, people whose diets are poorest in vegetables, fruits and grains have the highest rates of cataracts everywhere.

Our eye lens contains 35 to 50 times the concentration of antioxidant vitamins and the bioflavonoids lutein and zeaxanthine compared to normal blood levels. This antioxidant composition confirms and helps us understand the epidemiological findings. In addition it raises the obvious question, "Why would your body expend the energy to maintain such high antioxidant levels in the eye lens if they didn't have important survival value?" So, the eye's composition itself indicates that protection against oxidation is essential, and the "protectors" are



A cross section of the human eye showing the locations of the most common eye problems that have very clear dietary relationships.

obtained from fruits, vegetables and grains. In short, preventing cataracts requires good dietary habits. Who's responsible for what you eat?

### **Follow your Mom's advice; eat your veggies!**

"Eat your vegetables!" said mom! Nutritionists advise at least four and preferably five servings of vegetable daily, including at least one leafy (e.g., spinach) and one cruciferous (e.g., broccoli). Similarly they recommend three; preferable four fruits, and some whole grains. Ideally your vegetables would include collard greens and kale, but since they aren't generally available, one serving of spinach and one other leafy vegetable is essential. Fruit should include at least an orange or a glass of full pulp orange juice for its bioflavonoids. Cataract's correlation with overweight involves metabolic byproducts of fat that accompany overweight and produce oxidative substances. Keeping your weight down is important to every aspect of health and your eyes simply fit the general pattern. Whose responsibility is this?

While no studies have proved that a pill providing antioxidants prevents cataracts, studies indicate that a daily multiple vitamin-mineral supplement like a "Centrum" daily can't hurt. Consider that our per capita daily expenditure for soft drinks exceeds a dollar and only about 10 percent of us eat a balanced diet, so, the cost of a daily multiple vitamin supplement is cheap. However, it can't substitute for eating vegetables, fruits and grains.

### **Macular Degeneration and Low Vision**

Our genetics have a role in everything and macular degeneration and low vision are not excepted. Genetics aside, dietary factors have an essential role here as well. Think of the retina (including the macula) as brain tissue, and the diet-related evidence starts falling into place. One major chemical component of brain tissue is the omega-3 oil, docosahexaenoic acid, DHA, for short. DHA is a delicate fatty acid that's easily oxidized and is protected by the antioxidants. DHA is obtained from fish, nuts that come from trees, and your body can make it from flax oil and fatty acids in canola oil.

Indeed, DHA, when seriously short through poor dietary habits, increases the risk of macular degeneration and low vision. A serious and prolonged vitamin-E deficiency; DHAs protector has a similar effect. So, the good news is that we have a handle on several significant, interrelated causative factors. The bad news is that clinical research proves that when low vision is diet caused, it takes



two years to be fully restored when these substances are supplied to make up the deficit. Worse, normalcy is only achieved when the condition hasn't passed a critical point beyond which full recovery is impossible.

One last point about macular degeneration is that the mineral zinc is involved, providing another reason for a good varied diet. However, don't conclude that if a little zinc is good, more is better because it's not. Indeed, excessive Zinc can lead to other health problems, so stick with the multi-vitamin supplement and don't mess with mega doses of anything else. A good, well balanced diet is an absolutely essential part of prevention.

### **Fish oil is essential; supplements can help.**

DHA is one of three omega-3 oils that are essential for health. We can obtain these oils directly from cold water, blue skinned finfish, such as tuna, salmon and other oily fish. The only

readily available indirect vegetable source is flax seed oil, some nuts, such as walnuts, and a few oils, such as canola oil, are helpful. A tablespoon of flax oil on some high-fiber whole grain cereal eaten with soy milk to increase antioxidants is an inexpensive, daily plan supported by a very large body of research. Many experts; especially those in neuroscience research recommend a daily supplement of Omega-3 oils. These are widely available as fish oil supplements. If you use a fish oil supplement I recommend the enteric coated kind for no aftertaste and three one gram capsules daily are more than enough.

### **It's About Antioxidants**

When we say damage is caused by oxidation, we could use the modern buzzwords, free radicals. Free radicals are nature's cost of breathing oxygen and our cost for living in a society dependent on chemicals. However, nature has anticipated the problem and provides an abundance of protective antioxidants in fruits, vegetables, grains, and cereals which are rich in the antioxidants that we need for healthy eyes.

### **"Always have color on your plate" is sage advice.**

An "old wives tale" I traced to the 15th century advises always having color from vegetables on your plate. Though it focused on cancer prevention, it also guaranteed adequate vitamin A, which is made on demand by your body from beta-carotene. Vitamin A is essential for general tissue health, night vision, and healthy eye tissue, especially the cornea. At last count there were over 360 recognized carotenoids all of which have antioxidant power and no one knows how they function to maintain good health. Research proves that they work together synergistically to protect tissues; especially eye tissues from oxidizing damage.

### **Prevention is always best.**

Modern medicine works miracles, but prevention is still the best medicine and food is the vehicle of its practice. Establish the simple eating habits I described here and you will be doing much to maintain healthy vision and enjoying the challenges this great hobby always has in store.

## Outreach: Upcoming Events

**May 18,** *Jim Head*  
John Muir Elementary School  
Starparty—Martinez

**May 19,**  
Public Night, also hosting Cub Scout  
Pack 302—Mt. Diablo

**May 25,**  
Walnut Acres Elementary School  
(Doug Grebe) Starparty—Walnut Creek

**May 29,**  
Joaquin Moraga Intermediate School  
(Joel Goodman) Starparty—Moraga

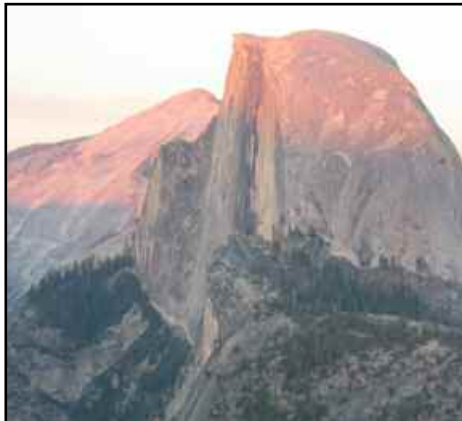
Send an email to  
[outreachinfo@mdas.net](mailto:outreachinfo@mdas.net) if you can help  
or attend any of these events.

**Thanks!**

# M D A S

## YOSEMITE STAR PARTY

### JULY 20—21 2007



FOR MORE INFORMATION: PLEASE EMAIL [INQUIRIES@MDAS.NET](mailto:INQUIRIES@MDAS.NET)



## Remember?

*By Mike Harms*

This photo was taken at a club star party 10 years ago in 1997, when the comet Hale Bopp was passing through the inner solar system.

## What's Up *by Jim Head (continued from page 1)*

present, and future. Volunteers of the Mt. Diablo Astronomical Society have done an amazing job showing parts of the Universe to over 3000 students, scout groups, and families in the last year. Our club is fortunate to have an observatory and a warming room on Mt. Diablo, and with support from NASA, JPL, and the Astronomical Society of the Pacific's Nightsky kits, we are going to have another exciting year. Come to the meeting May 22nd to learn about the activities and programs we are planning.

**Diablo Moonwatch**

**May 2007**

**Mount Diablo Astronomical Society**  
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