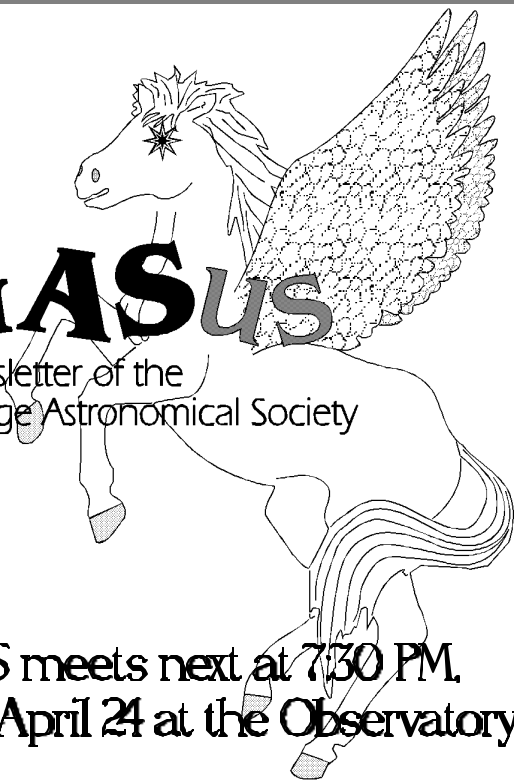


1996 APRIL Issue #65

the
PeGASus
Newsletter of the
The Prince George Astronomical Society



The PGAS meets next at 7:30 PM,
Wednesday, April 24 at the Observatory..

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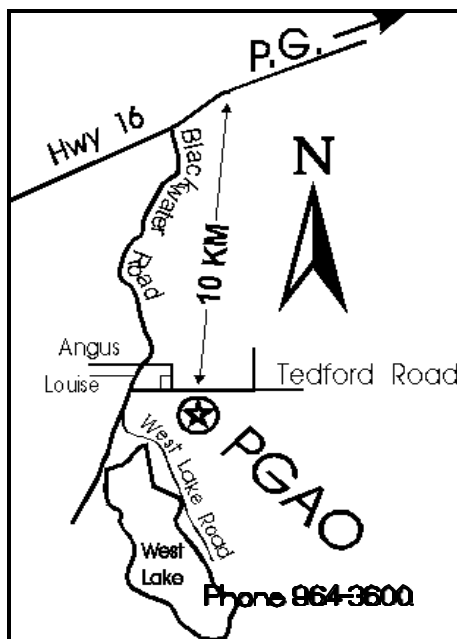


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Send correspondence to
The PGAS
3330 - 22nd Avenue
Prince George, BC, V2N 1P8
or
aaquist@cnc.bc.ca
phone: 964-9626
fax: 561-5816



**Prince George
Astronomical Society
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Jon Bowen
563-9869

Vice President
Bob Nelson
562-2131/563-6928

Secretary
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562-8113

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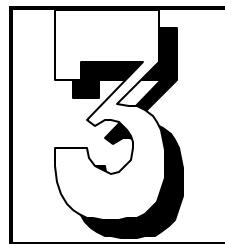
Promotional
Jennifer Whitman

Building
Mike Hansen

PeGASus Editor
Orla Aaquist

Editorial

by Orla Aaquist



It is not possible to give ourselves too much credit for the huge success we had with comet Hyakutake. As an active member of our club, I was proud of the way we handled this event, and the week long flu I received as payment for the long hours I spent at the observatory on Friday and Sunday night was worth the success we had. All members who came out to the observatory to help out deserve a special thanks, unfortunately I don't think that anyone bothered to keep track of who came, but you know who you are.

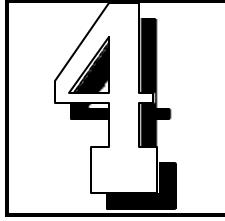
And now for this week's diatribe:

I was wondering what makes science so difficult for some people. Is it because science is difficult or is it because people are stupid? Well, in an editorial like this, I would not dare say that people are stupid, so it must be that science is difficult.

Science is difficult because there are a lot of things in the world which can be explained with science, and it takes a lot of time to figure out those explanations. Many of the explanations are related, so if you don't know basic chemistry, for example, then it will be difficult for you to immediately appreciate why hydrogen is a good chemical fuel yet is not used to propel our cars; you may also be confused between hydrogen as a chemical fuel and hydrogen as a nuclear fuel if your nuclear physics is a bit rusty. For the most part, people do not have the time think about the details of how and why things work, or even to sort out the explanations provided by scientists. Moreover, it is a well known fact that you don't need to know how most things work in order to use them. Take cars and alcohol, for example.

Scientific explanations are not difficult to understand, for scientists. But to non-scientists, the explanations seem complex. If you have spent a great deal of your life thinking about something, then many aspects of it becomes simple. Selling a house is a simple task to a real estate agent, but it is not so simple to the average homeowner. If it was simple, then real estate agents would not survive.

So, just because you don't understand science doesn't mean you are stupid. It just means that you haven't spent a great deal of your life thinking or caring about it. Surprising to some scientists, there are things to think about other than science; however, I have no idea what they are.



Coming Events

If you are involved with any astronomical or otherwise scientific activity on behalf of the PGAS, please list the activity here.

- April 19 -Friday night observing.
April 20 -Astronomy Day, 7:00 PM at the Observatory
-solar viewing, videos and hot chocolate until sunset followed by celestial sites through the observatory telescopes. Meet your fellow PGAS members. Bring a friend or two.
April 21 -Lyrid meteors peak
April 24 -PGAS meeting at observatory.
April 26 -Friday night observing.
May 3 -Friday night observing.
May 10 -Friday night observing.
May 17 -Friday night observing.
May 24 -Friday night observing.
May 29 -PGAS meeting at observatory.
May 31 -Friday night observing. This is the last observing session for the season. Observing starts up again on August 2.
June 19 -Galilean satellites dance across Jupiter
June 22 -PGAS picnic at Observatory?
June 27 -RASC General Assembly in Edmonton
June 29/30 -PGAS participation with Canada Day?

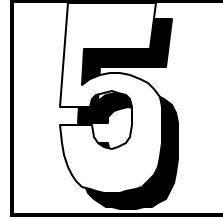
Announcements

Anyone wanting to help with Astronomy Day should call Jennifer Whitman at 962-7665.

Please welcome **Thereca Bramble** (562-8108) of Prince George to the PGAS. If you are going observing, give Thereca a call and invite her along.

The Night Sky

by Alan Whitman

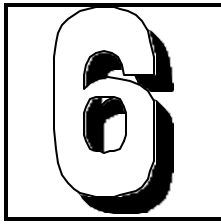


Mercury has a reputation as being hard to see. Usually it is, but it will actually be quite prominent low in evening twilight for about two weeks around the time that you receive this newsletter. Its greatest elongation from the sun, 20 degrees, is on April 23rd when it will be magnitude 0. Look low in the WNW, steeply lower right of Venus. The Pleiades are halfway between Mercury and Venus.

Mercury rushes through its phases, going from a 74% illuminated gibbous disk April 12th to a much more interesting 33% illuminated crescent by the 24th. Pick it up as early as you can while it is still well above the horizon or else the little 8" crescent disk will be only a boiling blob. If the digital setting circles on the big telescope are operating properly, search for Mercury around sunset or even earlier, when it is still high enough for fairly good seeing. (First get a good focus, using the moon).

On May 4th Venus is at its greatest brilliancy (mag -4.5) and is also at its northernmost declination this century (+27.8 deg). As it moves in between the earth and sun, it also becomes a crescent, much larger and more easily seen than Mercury's. Its phase changes more slowly, decreasing from 34% illuminated on April 26th to 24% May 8th, 16% May 16th, and only 9% on May 24th. By the time that it is a 16% sliver, it will be a giant 45" in diameter. The crescent should then be visible even in binoculars if you prop your elbows rigidly and look early in the evening when Venus is higher in the sky.

Jupiter rises at 1 AM PDT by the end of April. Watch the eclipses of its satellites but don't expect to see delicate festoons in its cloud belts this observing season--its abysmal location in Sagittarius at declination -22 deg will prevent that. The eclipses are at their best now, near quadrature, as they occur farthest from Jupiter's disk. When Ganymede and Callisto are eclipsed near quadrature, both the disappearance and the reappearance are visible. See *The Observer's Handbook* for eclipse predictions; it was also the source for most of the data on the inner planets' phases.



Hyakutake Good PR for PGAS

We got some good PR during the recent passage of comet Hyakutake. I think that all club members who participated with the event deserve a pat on the back.

Here it is, from the local media.

Monday, March 25, picture caption, page 13 of PG Citizen: Comet Hyakutake shimmers in all its glory as it streams across the night sky Saturday. The comet will be readily visible to the naked eye until Thursday or Friday. This photo was taken by Jon Bowen of the Prince George Astronomical Society with a 50 mm lens and high speed black and white film with an eight-minute exposure.

Monday, March 25, article on page 13 of PG Citizen (Comet good news for local star gazers, by David Heyman, Citizen staff): Throughout history, comets have often been seen as harbingers of doom. But the members of the Prince George Astronomical Society say they could use a few more, thank you very much. Ever since comet Hyakutake began its sweep across the night sky last week, attendance at the club's observatory near Blackwater Road has skyrocketed. "It's beyond our wildest expectations," beams club member Al Whitman who says about 300 people turned out Friday night, followed by 500 more Saturday night. "We've never had more than 100 in any single night before this. It's amazing how it seems to have captured the public's imagination."

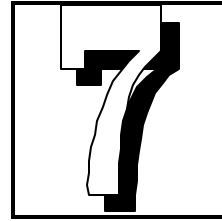
And those who've made the trip have been rewarded with clear skies, and a breathtakingly beautiful view. "When the comet's head was directly overhead at three a.m. (Saturday), the tail stretched a third of the way to the south horizon," says Whitman.

The observatory was well prepared for the occasion. Nine telescopes, including the big 24-incher, were lined up on the weekend for amateurs and members alike. Whitman says although the big telescope allows viewers to see jets of gas escaping from the comet, he feels it actually provides too close a view. He says the smaller telescopes, or binoculars are better for other details.

The observatory isn't the only place to see the comet clearly. Anybody who simply takes a pair of binoculars out anywhere in the country will be able to see Hyakutake in all its glory. Whitman says the comet can be seen close to the Big Dipper constellation. "The comet is nearly as bright as the second star in the sky, but it definitely isn't a star. It's a big, hairy fuzzball."

Bob Frith, another society member, says Prince George star-gazers haven't been as lucky with the weather for past meteorological

events like eclipses and meteor showers. "We've had perfectly clear skies (both Friday and Saturday nights)," he says. "This is definitely the nicest comet to come along in a long, time. It's quite different when you get out of the city lights."



The observatory is not open tonight or Tuesday night but will be open again Wednesday night. It's run by volunteers whom Whitman says have had very little sleep the last few nights. Hyakutake will still be visible to the end of the week, but the prime viewing hours come later and later in the evening. This is partly because of the movement of the comet, but also because the moon is getting fuller and fuller, thus brighter and brighter and it's progressively washing out Hyakutake's glistening tail with its light.

Tuesday, March 26, Citizen Editorial (Roy Nagel), *Comet watch a big success:* Comet Hyakutake wasn't the only bright spot over Prince George this week. The Prince George Astronomical Society transformed this celestial wonder into a local event over the weekend, giving hundreds a unique glimpse of the comet and its tail.

PGAS president Jon Bowen and the other club members who set up and aimed dozens of telescopes for free viewing deserve the community's special thanks. The crowds at the PGAS's observatory were treated with hot chocolate and warm hospitality from veteran star gazers and comet watchers alike.

Braving freezing temperature and chilling winds, the PGAS volunteers answered endless questions about stars, meteorites and Northern Lights. Throughout it all they showed how contagious the enthusiasm for star watching can be.

School District 57 and the Fraser-Fort George Regional Museum also helped by donating telescopes to the PGAS for the event. The local observatory is a great resource and something that should generate pride across the community.

Although Hyakutake is 15.3 million kilometers away, the efforts of the Prince George Astronomical Society made the comet's flight seem just a little bit closer.

The PGAS wish to extend their thanks to all the local media (newspapers, radio stations and TV stations) for helping us advertise this event and making it such a huge success.

Photographs of the comet taken by PGAS members are available at the following frame shops:

Berbun Art and Framing
Klassic Art and Framing
Creative Art and Framing
Direct Art Inc.

Three black and white and 2 colour images are being sold in 5x7, 8x10, 11x14, and 16x20 inch formats.

The costs for each photograph are:

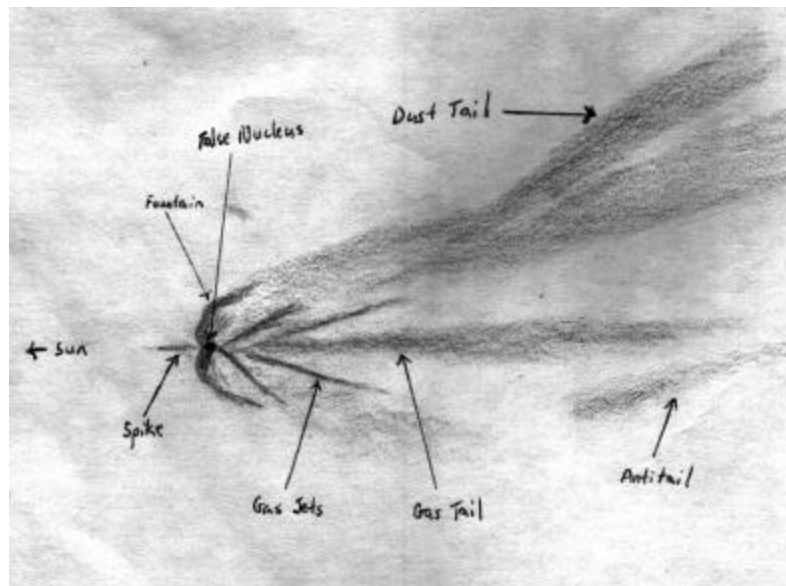
\$15 8 x 10
\$20 11 x 14
\$40 16 x 20

Also available is a set of all 5 images in 5x7 format for \$25.

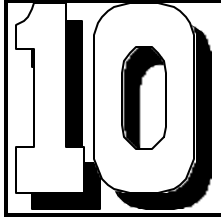
For further details, call Brian Potts at 562-8113.

Comet Hyakutake (1996 B2)

drawing by Alan Whitman



Comet Hyakutake (1996 B2), March 27, 1996 at 11 U.T. 4" f4 RFT at 16X (inner coma details much the same with a 24" at 120X on March 28 at 05 U.T.). Two streamers either side of the concentration in the tail were extremely difficult, low contrast features. Coma bluish except that the central concentration, the fan-shaped structure



What's in the Guest Book?

by Mathew Burke

The Guest book was started on Sept. 1, 1993 and it finally filled up with signatures on March 23, 1996. When I noticed that it was full I got curious about just how many people signed the book, where our guests came from, and what their comments were about us. So I took the book home and started counting signatures and this is what I found out.

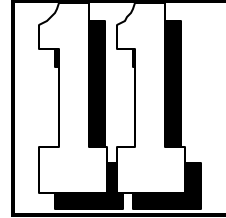
Numbers: Over a 2.5 year period we had about 609 people sign our guest book. I say about because some signatures are for groups of people (such as cubs, girl guide packs, and families). If there was a signature for a group, I assumed 10 people. If the signature was for a family I assumed 4 people. On average, 7.16 people signed the guest book per visit over the entire 2.5 year period. In 1993, the average number of signatures per visit was 5.62, in 1994 it was 4.62, in 1995 it was 8.05, and the 1996 count to date is 34.67 signatures per visit. Our guests came from 40 different cities, 5 countries, and 7 provinces. Interestingly enough, there were no signatures from the United States. 87% of our guests came from Prince George, and 3.3% came from Vanderhoof. The rest of the 9.7% is distributed more or less evenly among all the other cities. The vast majority of the cities were located in British Columbia.

Where From: So, where did our guests come from? The five Countries are: Canada, England, Australia, Africa, and Ireland. The seven Provinces are: British Columbia, Alberta, Saskatchewan, Manitoba, Quebec, Ontario, and New Brunswick.

Most interesting comments: Almost all of our guests were star struck! Out of all the comments I found only one "bad" comment. The following comments were extracted from the Guest Book:

- * Laurie from Prince George signed, "Great Show".
- * A kindergarten class signed, "Awesome keep up the good work!".
- * Tom from Calgary signed, "Thanks for your Hospitality!".

- * Rob from White Rock BC signed, "Great work!!!".
- * Dave & family from Prince George signed, "Thanks it was fun".
- * Robin from Westwood School signed, "Film was awesome, the rest was informative"
- * An unknown person from Westwood School signed, "It was very interesting", then he crossed out the "interesting" and replaced it with "bad".
- * Nechako Brownie Group signed, "Thanks so much!".
- * Scott from Prince George signed, "Loved it!".
- * Tania from Prince George signed, "Keep up the good work & good luck in the future".
- * Unknown person from Africa signed, "Thanks from the help in star gazing!".
- * Pete & Barb from Vanderhoof signed, "B's Birthday! Saw so many wonderful things!".
- * Susanne & Garrod from Prince George signed, "Wow".
- * Lara from Prince George signed, "Cool".
- * Karrie from Prince George signed, "Very Cool!!".
- * May from Prince George signed, "Beautiful! Thank you!".
- * Allison from Prince George signed, "Great view, loved the comet".



The most unusual signature went to a person from Prince George who signed as "Jock strap Jr.". Maybe it was his brother that signed for him...?

Conclusions: It is clear from the guest book that visitors to the Observatory are having a good time and are impressed with what we are doing. There may be a trend of more people coming out per night than before. We have had people from all over the world visit our Observatory. Most of our guests came from Prince George but many came from cities all over BC. I feel that anyone who has volunteered their time putting on tours at the Observatory should give themselves a pat on the back for a job well done! Over the years people have enjoyed coming out, and we are only getting better!



Great Comet Hyakutake -- A Journal

by Alan Whitman

March 15th at 12 UT: My first view of this wonder was through the closed kitchen window when I checked to see if the sky was clear--there it was, a bright and prominent fuzzy blob between Alpha and Beta Librae! Outside a 10 cm RFT (Astrosca) revealed a faint 2 deg tail at 16X. The coma was already magnitude 3.7, brighter than forecast by 0.8 mag (very promising) with a bright central condensation. Comet Hyakutake already nearly matched Comet Halley at its best in 1986.

March 18th at 0715 UT: The coma (head) had brightened to mag 3.

March 22nd at 07 UT: A striking bluish coma of magnitude 0.7, a condensed starlike core itself brighter than 3rd magnitude, and a faint straight naked-eye tail 12 degrees long in superb wilderness skies. While fainter than Arcturus, the great comet was the most noticeable object in the eastern sky. The comet's motion was detectable with the naked eye during the evening. [The coma magnitude estimate was by comparison with mag 0.0 Arcturus, mag 1.0 Spica, and a mag 1.8 Big Dipper star without my glasses--my uncorrected myopic eyes make both the coma and stars swell up to be one degree diameter disks.]

March 23rd at 09 UT: The mag 0.5 blue coma made a nice contrast as it passed orange Izar; the unaided eye could detect motion in 15 minutes when Hyakutake was closest to the star. I made the naked eye tail 14 degrees long but keen-eyed Jim Failes, a very talented observer, said 20 degrees. Jim also called attention to the gold colour of the false nucleus and the 3' spike extending from it. Reba Bierman pointed out a stubby 20' triangular anti-tail at a 120 degree angle to the main tail in a 10 cm RFT; Jennifer Whitman saw this bump on the coma with her unaided eye. This was the only night that this feature was seen but at least one Internet photo confirmed it.

Three hundred visitors used binoculars and six telescopes at the club's observatory!

March 24th at 07 UT: 500 visitors to the Prince George Astronomical Observatory used 9 telescopes, from the 0.6 metre in the dome to small RFTs, plus binoculars. We also saw family groups with binoculars looking skyward from rural roads, a rare sight indeed! This evening the comet's tail was 25 degrees long with the unaided eye and substantially brighter than last night; the bluish coma was mag 0.3. In the 0.6 metre at 120X, the gold spike, extending tailward from the false nucleus, fanned very slightly while a half-circle of light a few arc minutes in radius lead the false

nucleus.

11 UT: The 25' naked eye coma swelled to a degree across in a 10 cm RFT at 16X. Through the RFT, three very low contrast streamers diverged from the tail, two near the head and one farther along the tail. The false nucleus was mag 2.4.



Pendant from its fuzzy head near the zenith, the great comet's tail hung a third of the way to the south horizon! The tail, now grown to 32 degrees long when plotted on Norton's star atlas, surprisingly could be traced farther with the naked eye than in either 7x50 binoculars or the RFT! In this respect, the faintest extremities of the tail proved to be like the challenging zodiacal band, another exclusively naked eye low contrast object. (The fainter zodiacal band lies between the faint Gegenschein and the easily seen zodiacal light).

March 25th at 09 UT: On this, the night of closest approach, Hyakutake's head and tail stretched 56 degrees! When the head lay between Alpha and Iota Draconis, near the star Struve 1882, the searchlight tail shone directly over Eta Ursa Majoris all the way to Rho Virginis. The coma had brightened to mag 0.1, in comparison with mag 0.0 Arcturus and Vega, but the false nucleus had faded slightly to mag 2.5. Telescopically, the false nucleus whizzed by field stars!

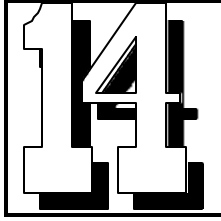
Another 300 comet-seekers visited the observatory, making a weekend total of 1100. The comet had become an event. The Prince George Citizen even wrote a laudatory editorial on the club's astronomy popularization.

March 26th at 05 UT: Partly cloudy skies still allowed the coma's naked eye motion by orange Kochab to be watched.

March 27th at 06 UT: The naked eye tail stretched 31 degrees in bright moonlight (first quarter today) from the mag 0 head near Polaris.

11 UT: The attached sketch (see pages 8 & 9 of this newsletter) was made after moonset with an Astroscan at 16X. The RFT showed two streamers, a concentration in the main tail, the blue coma with a parabolic bow shock, and a golden yellow false nucleus, fan, and spike. The sketch gave me a sense of déjà vu -- I've seen a very similar one sometime but can't find it. Perhaps Comet Brooks in 1911? Tonight the tail was 31 deg with either the RFT or the unaided eye.

March 28th to 31st about 05 UT: A dry northerly flow had now produced mainly clear skies for ten consecutive evenings of comet-viewing at the finest part of the apparition. On the tenth evening, with the comet speeding away from earth, the naked eye coma had faded to mag 1.8 but 10 degrees of faint tail were still visible despite the light from the gibbous 11-day-old moon. How rapidly we became jaded -- a 10 degree tail was no longer exciting!



AstroSurfing

Details of the Science News posted here are available on the astronomy forum on the [Prince George Free-Net](#).

Astronomers have at last directly seen details on the surface of the solar system's farthest known planet from pictures sent back by the European Space Agency's Faint Object Camera aboard NASA's Hubble Space Telescope. Hubble's snapshots of nearly the entire surface of Pluto, taken as the planet rotated through a 6.4-day period, show that Pluto is a complex object, with more large-scale contrast than any planet, except Earth.

The first x-ray hologram with atomic resolution has been made by scientists at the Research Institute for Solid State Physics in Budapest, Hungary. Some of the x-rays strike strontium atoms, and part of this x-ray wave scatters from other atoms, while part emerges unscattered. The interference of the two waves can be monitored in a solid-state detector at many angles. The ensuing hologram provides a direct three-dimensional image of the strontium atoms in the crystal.

A new form of ice has been predicted to form at high pressures. Ice has more solid forms than any other simple substance, with 10 known crystalline structures. Using molecular dynamics simulations, a German-French-Italian team has now predicted that "Ice XI" forms between 3 and 4 Megabars of pressure at room temperature.

In the late heavy bombardment (LHB) epoch, a span of about 200 million years some 4 billion years ago, the Moon sustained many large impacts. Some astronomers believe that the projectiles responsible may have pestered Mercury, Venus, Earth, and Mars as well. Others assert that the LHB phenomenon was unique to the Earth-Moon system or that it did not happen at all, at least not so suddenly. Now, a group of scientists at the University of Manchester (UK) has dated a rock found here on Earth but which is believed to have been a meteorite originating at Mars. The 4-billion-year age of the object, determined by isotope dating, is much older than previously studied Martian meteorites. The antiquity of the rock, say the researchers, provides evidence for a widespread LHB effect.

U.S. Navy Commander Kenneth D. Bowersox and Scott J. "Doc" Horowitz, Ph.D. (Lt. Colonel, USAF) have been named to command and pilot, respectively, the second Space Shuttle mission to service the Hubble Space Telescope scheduled for early next year.

Scientists continuing to analyze information returned by the Galileo atmospheric probe that plunged into Jupiter last December report more surprises about the giant gas planet. Most significantly, the ratio of the elements that make up 99 percent of the Jovian atmosphere -- helium and hydrogen -- now closely matches that found in the Sun, suggesting that Jupiter's bulk composition has not changed since the planet formed several

billion years ago.

A team of scientists believes they have discovered a chain of impact craters in the central African country of Chad that suggests ancient Earth may have been hit by a large, fragmented comet or asteroid similar to the Shoemaker-Levy 9 comet that slammed into Jupiter in 1994.



The offices of *Sky and Telescope* were swamped with reports and pictures of Comet Hyakutake. Typical was the call from Alan Whitman of British Columbia. Early on March 21st he says Comet Hyakutake had a striking blue coma of magnitude 0.7, a condensed starlike core itself brighter than 3rd magnitude, and a naked-eye tail 12 degrees long.

Geologists are now certain that that a large crater lies buried under the lower half of Chesapeake Bay. It was first suspected in 1992, based drilling samples that contained disturbed rock and boulders. Now there's no doubt that the crater is real -- and big.

Metallic hydrogen has been achieved at Livermore in a sample of fluid hydrogen. Squeezing hydrogen atoms until they surrender their electrons has been tried ever since Eugene Wigner predicted in 1935 that hydrogen would metallize at sufficiently high pressure. Solid hydrogen has been crushed in diamond anvil presses up to pressures up to 2.5 Mbar, but without making hydrogen metallic. Therefore William Nellis at Livermore was somewhat surprised when he succeeded at lesser pressures with fluid hydrogen. (see *Physical Review Letters*, 11 March 1996).

Atomic force microscopes (AFM) can directly measure the forces at the nanoscopic level. For instance, scientists at the Naval Research Lab have measured the force between two complementary strands of DNA. The NRL researchers Gil Lee, and David Baselt) now hope to use a device based on AFM technology to detect biomolecules.

A high-tech equivalent of a message in a bottle will carry the signatures of thousands of vicarious space explorers when it is launched aboard the Cassini mission to Saturn in 1997. The digital signatures will be loaded onto a CD-ROM or other digital media, and then mounted onto the Cassini spacecraft during its final assembly at NASA's Kennedy Space Center, FL.

A team of U.S. and German astrophysicists have made the first ever detection of X-rays coming from a comet. The discovery of a strong radiation signal -- about 100 times brighter than even the most optimistic predictions -- was made March 27, 1996, during observations of comet Hyakutake using Germany's orbiting ROSAT satellite. In the image, the X-rays from the comet seem to come from a crescent-shaped region on the sunward side of Comet Hyakutake.

NeuroLab, dedicated to research on the nervous system and behavior, is scheduled for launch on the Space Shuttle Columbia in early 1998. The mission is a joint venture of six space agencies and seven U.S. research agencies.

Interstellar dust particles entering earth's atmosphere have been detected by astronomers in New Zealand. Their radar scanner not only spots the tiny objects (tens of microns in size) but also determines the meteoroid velocities. Those with speeds of more than 100 km/sec (about 1% of the sample), well above the solar escape velocity of 73 km/sec, are believed to

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