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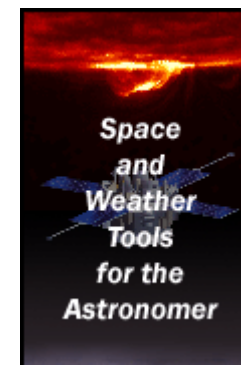
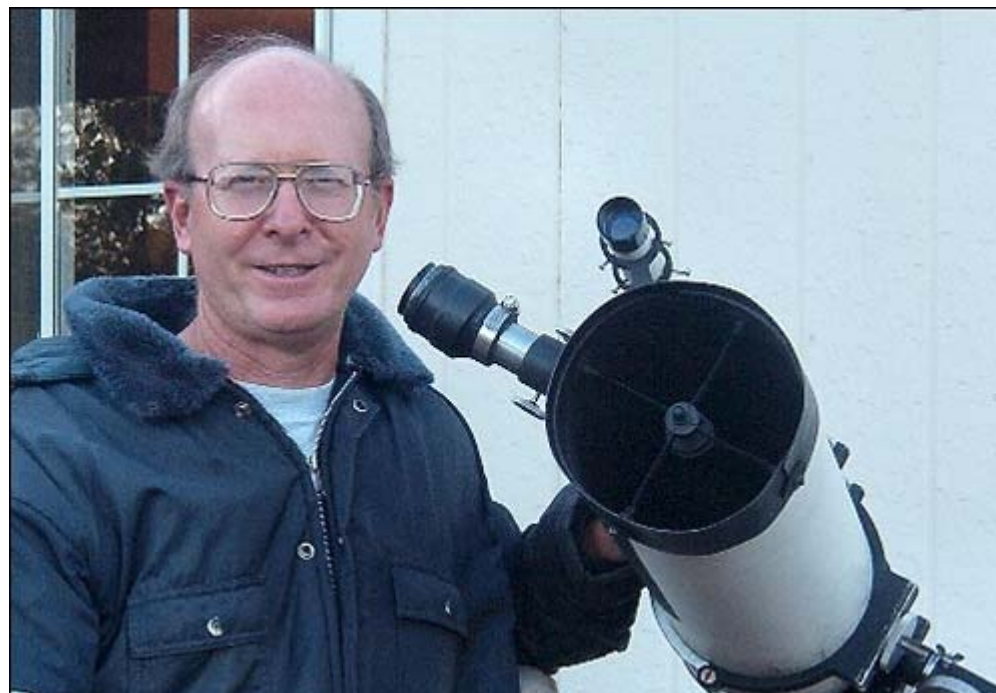
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Finding Comet Machholz (C/2004 Q2)

Be on the lookout for the tenth Comet Machholz.

Don Machholz




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Don Machholz poses on his deck with the telescope that helped him bag his tenth comet. *Mark Machholz*

September 20, 2004

When I awoke at 3:20 A.M. on Friday, August 27, 2004, I knew what I wanted to do and why I was getting out of bed three hours before normal. This was a morning for comet hunting — from, of all places, my back deck.

This is rare. I have a homemade observatory 100 feet from my house, and I use it for most of my comet hunting. An unmounted 5-inch homemade refractor, with which I have found one comet, sits in a corner. The observatory also houses my homemade 5-inch binoculars (a four-comet veteran) and my 10-inch reflector (another four comets), both of which were pressed into service earlier in the month to cover much of the morning sky.

But this morning I planned to cover the southern sky using a different instrument on my back deck. The telescope for today's session was a 6-inch, f/8, Criterion Dynascope reflector. I bought it for Christmas in 1968 — with a little help from my folks. The scope has very good optics and the main mirror still has its original coating. It's the only telescope I own with a clock drive, and I bring it to all the public and private star parties I attend each year.

I had been out two mornings ago, covering the first half of my target area. Now, I was back for more.

I was using a 2-inch outside-diameter eyepiece, which I adapted to fit over the scope's original eyepiece holder. This gave me a field of view of about 1.8° at a magnification of 35x. This scope/eyepiece combination is very comfortable for me. I often use it to show M24 at dark-site star parties, and sometimes observers say it was the best thing they saw that night. I also used this setup for a Messier Marathon — finding all 110 Messier objects from memory in the course of a single night — last spring from the Southern California desert.

I began at 3:35 A.M., picking up in the southern sky where I had left off. I looked through the eyepiece with my right eye, an eye patch over my left, and slowly swept southward to the horizon. At the end of each sweep, I raised the telescope to the beginning position, moved it slightly east, and swept again.

At 4:12 A.M. I picked up a rather small, faint, fuzzy object.

There are a lot of galaxies in this area — the Fornax-Eridanus border — and I picked up a few: NGC 1316, 1398, 1395, 1399, and 1404. I also came across planetary nebula NGC 1360. (Once, in 1977, I even reported it as a possible new comet). All of these objects look like faint



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comets, so I confirmed their identity by checking them against the Atlas of the Heavens, which shows most of the galaxies and nebulae that I would normally pick up while comet hunting.

At 4:12 A.M. I picked up a rather small, faint, fuzzy object. I looked closely to see if it was a double star or a small grouping of stars that simply appeared fuzzy. It was not. I then grabbed my star map to see if there were any known galaxies or nebulae in the area. It took me a couple minutes to determine exactly where I was on the star map, but it showed nothing in the area.

A more detailed star atlas, Uranometria 2000, sat in my observatory. Followed by our dog, Shadow, I retrieved it and examined my target area. Again, the charts showed nothing I could mistake for a comet in that part of the sky. I marked the location on the map with the date and time and made a drawing of the area showing the location of the comet in relation to the surrounding stars. I drew the view I had in the telescope, with south at top. If it was a comet, it should move in an hour's time, so this detailed drawing would help me determine both the comet's rate and direction of travel.

An even more-detailed star atlas was on the computer in my house. Shadow and I — the dog follows me everywhere — went inside. I turned on the computer, and opened a program called *TheSky*. It showed a couple of very faint (magnitude 15) stars in the area, too faint for me to see.

At any given time, a few previously discovered comets can be found in the sky; perhaps this was one of them. I went to Seiichi Yoshida's web page (www.aerith.net) and checked his list of such comets. Once more, nothing in the area.

By now it was 4:37 A.M. I had first seen the object 25 minutes ago and had only 40 more minutes until morning twilight would interfere with my view. So I went out to the observatory and uncovered the 10-inch reflector. I quickly found the comet's location and put in an eyepiece giving me 64x. I could see the object was fuzzy and round, and I made a mental note of where it was in relation to nearby stars. Had it moved a bit? I also examined the comet with my 5-inch binoculars; the comet was visible in them but difficult to see.



Gianluca Masi, Franco Mallia, and Roger Wilcox imaged C/2004 Q2 on September 11. They took 10 1-minute exposures using the SoTIE 14" f/7 telescope at Las Campanas, Chile, and combined the images digitally. *Gianluca Masi et al.* [[larger image](#)]

I then went back into the house and tried to wake up the family. My sons were too sleepy, and while my wife came out to the deck with me, she had trouble making out this particular faint, fuzzy object.

I went back to the house — it was time to write up a report for the Harvard-Smithsonian Astrophysical Observatory's Central Bureau for Astronomical Telegrams (CBAT), the clearinghouse for new comet discoveries.

I also visited [Harvard's Sky Coverage Plots](#) web site to see if automated search programs had

covered this part of the sky — they hadn't. During the past few years, an increasing number of large, government-sponsored telescopes have been patrolling the sky for asteroids and comets that may one day pose a threat to Earth. In the course of these nightly automated searches, these instruments pick up many of the comets that amateurs normally would find. The comets are named after the programs that find them: LINEAR, NEAT, LONEOS, Spacewatch, Catalina. They search areas away from the Sun and plot the locations they have searched on this web site. With the advent of such programs, many amateurs have ceased visual comet hunting. Some have turned to using CCDs attached to their telescopes, covering a small area of the sky with each image but penetrating to very faint objects.

All told, I have logged 7,047.25 observing hours since I began hunting comets.

To me, this is trying to beat the automated searches at their own game. I've continued my visual comet hunting nonstop, searching for at least an hour per month each month since I began, on January 1, 1975. I've logged up to 553 hours in some years, but presently, I'm searching about 100 hours per year, tailoring my searches to parts of the sky most likely to yield comets. This is based on a lot of factors, including knowing where the automated searches have been.

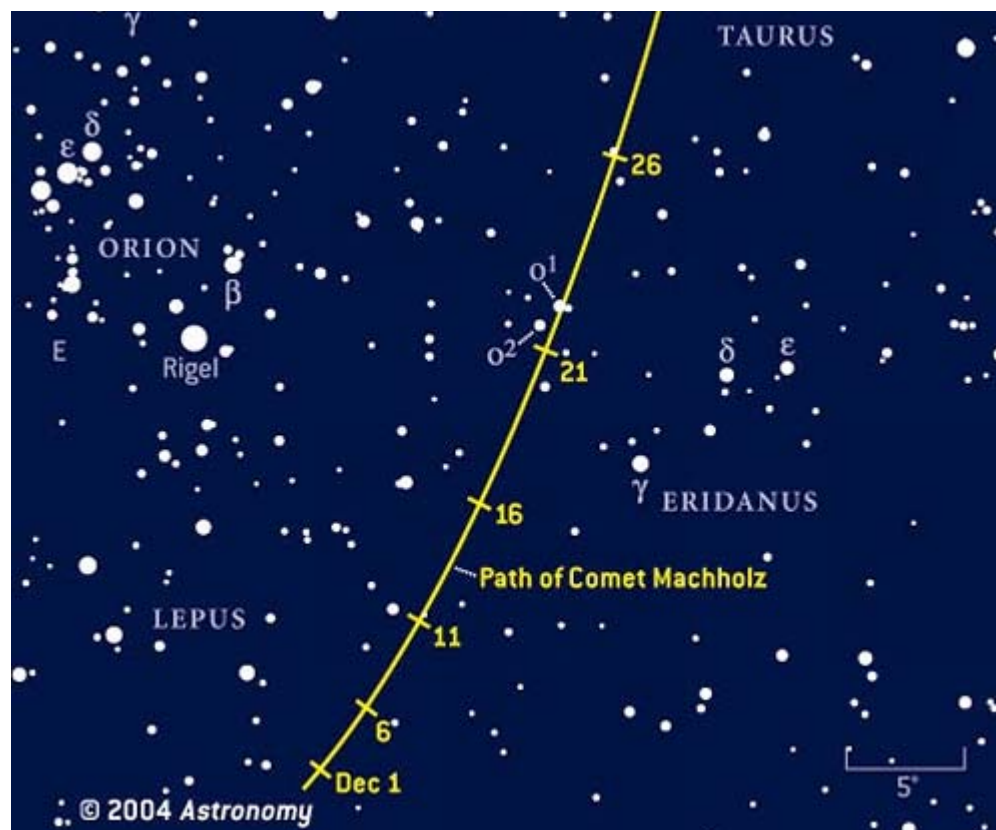
Shortly after 5:00 A.M. I was out at the 10-inch telescope, estimating the comet's brightness, size, and shape. It had no tail. It also showed some movement toward the east, and perhaps, it appeared to me, slightly to the north. I later learned that its actual motion was 20' — one-third of a degree — per day to the east and slightly south. So in one hour's time, it had moved less than an arcminute, a very small amount. When twilight overpowered the comet, I went inside to report my find.

All told, I have logged 7,047.25 observing hours since I began hunting comets. It had been 10 years — and 1,458.25 hours of searching — since finding my last comet, my ninth. (I can't count my independent discovery of Comet de Vico [122P/de Vico] on September 18, 1995, because it doesn't carry my name.) I assembled the e-mail, sent it to CBAT, and then faxed them the same message — just in case. A follow-up phone call confirmed the message had been received.

Then I got ready to go to my job as a research and development technician at Coherent, a laser and optics company. Six hours later, I heard from Dan Green at CBAT that what I found was indeed a comet, confirmed in images taken by Robert McNaught and Gordon Garradd, and given an official designation: C/2004 Q2.

The next day, after determining that the object was not a recovery of a "lost" comet, CBAT added "Machholz" to it.





The new Comet Machholz courses through Lepus, Eridanus, and Taurus in December, brightening from magnitude 6 to magnitude 4 during the month. On January 7, 2005, the comet's tail brushes the famous Pleiades cluster — a fine binocular or telescopic sight. *Roen Kelly*

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