

# A DECADE OF COMETS

A STUDY OF 33 COMETS DISCOVERED BY  
AMATEUR ASTRONOMERS

BETWEEN

1975

1984

BY DON NACHHOLZ



MARK STURTEVANT

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## PART 2: THE INDIVIDUAL COMETS

### INTRODUCTION

Following is a synopsis of each of the 33 comets found by amateur astronomers between January 1975 and December 1984. Specific areas for each discovery are explored, along with additional information, where possible. Here is a brief explanation of the data presented.

### THE HEADINGS

**Identifying Number:** Each comet studied is given a number in order of discovery.

**The provisional label:** The year of discovery is included, then there is a lowercase letter giving the order of discovery or recovery during the year. This is issued by the International Astronomical Union.

**The Roman Numeral designation:** This gives the year of perihelion passage (when the comet is closest the Sun) followed by a Roman Numeral showing the order of this passage compared to other comets of that same year.

**The name of the comet:** "Periodic" is used if the comet's orbital period is under 200 years. The names used are those of the discoverers, including those of the Comet 1978n which was originally found in 1881.

### THE DISCOVERY DATA

**The discovery date, in Universal Time.** This is usually taken from the International Astronomical Union's Circulars, and reported to three significant digits, where possible. In the cases of multiple discoveries, all the discovery times are listed.

**The distance from the comet to the sun at the time of discovery, in astronomical units.** One astronomical unit (AU) is 92.9 million miles.

**The distance from the comet to the earth at the time of discovery, in astronomical units.**

**The discovery position in Right Ascension and Declination, using 1950.0 coordinates.** Right Ascension (RA) is similar to longitude on the earth. It is presented in "Hours" and "Minutes". There are 24 hours around the sky and 60 minutes in each hour. Declination (Dec) is similar to latitude. It is measured in degrees (denoted in this study by a "d"), and minutes of arc, (denoted by a "'"). There are 90 degrees from the celestial equator to each pole, declinations south of the equator are "-". There are 60 minutes in each degree.

Here the position reported by the discoverer is used. If more than one discoverer is involved, and the finds are within a short period of time, then the position given is the most accurate of the positions reported.

The ecliptic coordinates in longitude and latitude of the comet at the time of discovery. This is presented in degrees, first the longitude, then the latitude.

Sky: This indicates whether the comet was found in the morning or evening sky. "Morning sky" denotes the comet's Right Ascension was within the twelve hours (RA) preceeding (west of) the Sun's Right Ascension. "Evening sky" means the comet was in the area twelve hours following (east of) the sun.

Elongation: The sun-earth-comet angle, or the number of degrees the comet appeared to be from the Sun as seen from Earth at the time of discovery.

Motion: The speed and direction of motion of the comet at the time of discovery. This is found by determining the positions of the comet seven days before and after the discovery date and taking the daily and hourly average. The exceptions are with fast-moving comets. Comet 1983d needed only one days travel for this calculation, while Comet 1984i used three days of positions.

Magnitude: The discovery magnitude. This is the total integrated magnitude of the coma (head) of the comet, a large figure means the comet is faint, a small figure means it's brighter. Magnitude is not easy to determine, the discoverer will usually report it to the nearest whole number, we want it to the nearest tenth. Moreover, the discoverer is not always prepared to make an accurate estimate, in some cases two discoverers' estimates will differ by more than one magnitude. The magnitude used here is derived from early estimates, mathematical formulae, and the discoverer's comments.

Mag./day: This indicates the brightness change of the comet during the 14 days centered on the day of discovery. This assumes that it follows the magnitude formula, but, as we shall see, comets do not always behave. A negative value means the comet was brightening, a positive value means it was dimming.

Azimuth and Altitude: The location of the comet in the discoverer's local sky at the time of discovery is given. This has been calculated from the discoverer's geographical coordinates, the comet's R.A. and Dec., and the date and time. For azimuth: 0d = North, 90d = East, etc. For altitude: 0d is at the horizon and 90d is at the zenith. Atmospheric refraction is not taken into account. If there is more than one discoverer, then all their positions are given.

The difference in minutes between discovery time and Astronomical Twilight, which is defined as the moment when the Sun is 18 degrees below the discoverer's horizon. In the cases of multiple discovery, times are given for each observer.

The Moon phase at the time of discovery.

#### ORBITAL ELEMENTS

These are usually computed by Dr. Brian Marsden of the Central Bureau for Astronomical Telegrams at the Smithsonian Astrophysical Observatory.

Perihelion date: The Universal Time of the moment when the comet is closest the sun.

Perihelion distance: The distance (in Astronomical Units), of the comet from the sun when the comet is at perihelion.

Eccentricity: The shape of the orbit. A figure of "0" indicates a circular orbit, a "1" is a parabola. Greater than one is a hyperbola.

Orbital period in years, if known.

Argument of the Perihelion: The angle, in degrees, from the point where the comet passes upward through the earth's plane, to its perihelion point. This is measured in the same direction as the comet's motion.

Ascending Node: The point in the comet's orbit where it passes upward through the earth's plane.

Inclination, or "tilt", of the orbit. If the inclination is greater than 90 degrees, the comet is in a retrograde orbit.

"L" value: The longitude of the comet's perihelion in degrees, as seen from the sun.

"B" value: The latitude of the comet's perihelion in degrees, as seen from the sun.

#### OTHER DATA

Absolute magnitude: The brightness of the comet if it were one Astronomical Unit from both the earth and the sun. This, along with the "n" mentioned below, is usually calculated by such comet computers as Daniel Green, Charles Morris, John Bortle, and Joe Marcus, with minor corrections made to more nearly match the comet's brightness near discovery. This is done because many comets will change in absolute magnitude while under observation, we are concerned with the figures at the time of the comet's discovery.

"n" value: This is used to show the degree of change in the comet's brightness as it moves toward or away from the sun. A large figure indicates the comet's brightness varies greatly with its distance to the sun, a small number means there is little change. The "n" is assumed to be 4.0 unless extended observations show otherwise.

Discovery Probability #1: This percentage is derived from Table II of a study conducted by Dr. Edgar Everhart. It is entitled "Intrinsic Distributions of Cometary Perihelia and Magnitudes", and is printed in the ASTRONOMICAL JOURNAL, (Vol. 72, No. 8) Oct, 1967. This particular number is based only on the comet's absolute magnitude and perihelion distance. Dr. Everhart developed his table from determining discovery probabilities for 21,120 hypothetical comets.

Discovery Probability #2: This is the discovery probability of the comet in its actual orbit, then assuming the ascending node had shifted by 90, 180, and 270 degrees. Each of the four orbits is evaluated for the chance of discovery using

present-day standards in both the Northern and Southern Hemispheres. Moon position is ignored, and the comet is assumed to follow the normal brightness laws, using the known absolute magnitude and "n" values for that comet. The maximum chance for each orbit is 100%, each is divided by four and added together for the total probability.

Holetschek angle: This is the difference between the heliocentric angle of the earth and that of the comet when it is at perihelion. Holetschek, in 1891, determined that when this angle is more than 90 degrees, the chance of discovery is less than when the angle is less than 90 degrees.

#### THE DISCOVERER, THE DISCOVERY AND THE COMET

What follows is a number of paragraphs describing the circumstances concerning the discovery. This information comes from a wide variety of magazine articles, newspaper clippings, and personal correspondence. Here are some additional notes to keep in mind while reading these sections.

The day of the week is in local time, the date is in universal time.

The position of the comet in the sky as seen from various latitudes is also stated.

The question of: "could this comet have been found earlier?" is also explored. The possible reasons that the comet wasn't discovered sooner than it was are discussed.

One factor of the comet's orbit, the ascending node, is changed by 90d, 180d and 270d, and the possible discovery circumstances are explored.

Sources: Listed are some of the sources for the information presented. The International Astrophysical Observatory Circulars issued by the Central Bureau for Astronomical Telegrams are helpful for discovery details. Often this is augmented by my personal correspondence with the comet discoverer himself. Orbital data are usually found in the "Catalogue of Cometary Orbits" by Dr. Brian Marsden. Magnitude estimates often come from the IAU Circulars, THE INTERNATIONAL COMET QUARTERLY, and THE COMET NEWS SERVICE, all of which made this study possible. The magnitude parameters are often found in the sources listed above, or in the book "Comets", edited by Laurel Wilkening, in the section "Comet Head Photometry: Past, Present and Future" by David D. Meisel and Charles S. Morris. Often the magnitude formula, variable and debatable in itself, is for the complete observation period. I will often make a minor adjustment to fit the more narrow discovery period. Where formula is not available and the comet acted "normal", I will assume that "n" = 4 and match the absolute magnitude to the comet's discovery brightness.

## PART 2: THE INDIVIDUAL COMETS

#1) 1975a = 1975 I

Periodic Comet Boethin

Disc.: Jan. 4.521, 1975.

Dis. to Sun: 1.04 AU. Dis. to Earth: 1.14 AU.

RA: 23h 00.9m Dec.: -5d13'. Ecl. pos.: 334.8d; +0.9d.

Evening sky. 61d from Sun. Motion: 1.0 deg/day = 2.5'/hr ENE.

Mag.: 11.0. Mag/day = 0.00.

Azu: 257d. Alt: 21d. 97 min. after Ast. Twi.

Moon phase: Last Quarter.

Peri: Jan. 5.63, 1975 at 1.09 AU. E. = 0.779. A/P = 11.13d

Orbital Period = 11.05 yrs.

A/N = 26.97d. Incl = 5.92d. L = 038.0d. B = +01.1d.

A/M = 10.3. N = 4.0. Disc. Prob. #1 = 0.8%. #2 = 40%.

Holetschek angle = 67d.

The first comet we'll examine was discovered by the Reverend Leo Boethin, a native of Germany who was assigned to the northern providence of Arba, the Philippines. From here he doesn't just hunt and observe comets but he also takes weather observations and makes meteor counts. This was his first confirmed comet discovery--in 1973 he observed a 9.5 magnitude object in the constellation Crater but it faded to magnitude 13 in three days and could not be confirmed.

This discovery, occurring Jan. 4, was almost lost, because the airmail letter sent to the Smithsonian Astrophysical Observatory in Cambridge, Mass. did not arrive for ten days and by then the moon was too bright for the comet to be observed. During that time Mr. Boethin had gotten eight positions for the comet, he then picked it up again Jan. 29. Soon the SAO had confirmed the discovery. Charles Scovill saw it on Feb. 4, John Bortle observed it on Feb. 9.

The comet was discovered by Mr. Boethin after twenty minutes of vertical sweeps on Saturday evening, Jan. 4, 1975. He was using an 8-inch (20-cm) reflector when he spotted the object in the constellation Aquarius. The comet was moving eastward, parallel to the ecliptic, holding a constant elongation. It appeared very diffuse and had a diameter of 3'. On the day of discovery the moon was at last quarter, in the morning sky. From 40 degrees N. latitude the comet was 35 degrees above the western horizon at astronomical twilight, while from -40d latitude it was only 9 degrees high.

Leo Boethin, an experienced observer of comets, reported the discovery magnitude (mag) as 12.3 and 12.0 on Jan 5, 7, 8, 9, 10, 14, and 16. However, here I use 11.0 as the discovery magnitude. Reasons for this are: 1) a 12 magnitude comet is difficult to discover with an 8" telescope, especially when only 25' SE from a 6.2 mag. star and about 15' E. from 9.2 and 9.3 mag. stars. 2) The comet was later observed by Boethin when a 25%-lit moon was in the sky, not far from the comet. This implies the brighter magnitude. 3) A diffuse object is usually underestimated in brightness. 4) It fits the formula based on later observations.

Could the comet have been discovered earlier? If the comet behaved according to "normal" comet rules, it was at mag. 11.0 for three days prior to discovery, and could have been found then. In mid-December, 1974, the comet was about 62 degrees from the sun and mag. 11.2, and not difficult to see. A full eight weeks before discovery (Nov. 9), the comet was at mag. 12.2 and two degrees south of M 75 -it was too faint before that time to expect discovery. So it seems that at least for a month before discovery the comet could have been found. So why wasn't it spotted earlier?

It seems as though faintness prevented early and multiple discoveries. A diffuse object at mag. 11 is very difficult to see. On Jan. 12, John Bortle swept over it and failed to pick it up due to it's faintness. After discovery the comet grew fainter. It appears that if Mr. Boethin had not found this comet, it would have gone undiscovered. With an orbital period of 11.0 years, this comet will be visible to us again.

What if the ascending node had changed by 90 degrees? Then the comet would have brightened at 0.5 mag/10 days and been discoverable at mag. 10.7 in Canis Minor at 110 degrees from the sun in the morning sky in early Nov. 1974. It would have then brightened to mag. 8.9 as it moved slowly toward the sun.

If the ascending node differed by 180d, the comet would have never gotten brighter than mag. 11.9, this would have been when it is in the morning sky, 35 degrees from the sun.

And if the A/N had increased by 270d, the comet would have been on the far side of the sun and not been brighter than mag. 12.2 when more than 12 degrees from the sun. So of the four instances, the comet was discovered at one, could have been easily discovered at another, and would have probably been unseen at the last two.

Sources: Discovery: IUA Cir. 2745, 2748, 2749 (Dr Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: Charles Morris. Discovery details: "International Comet Quarterly" (ICQ) Apr. 1981, p. 63.

#2) 1975d = 1975 V

Comet Bradfield

Disc.: Mar. 12.45, 1975.

Dis. to Sun: 1.27 AU. Dis. to Earth: 2.03 AU.

RA: 01h 06.0m Dec.: -22d05'. Ecl. pos.: 005.4d; -26.6d.

Evening sky. 30d from Sun. Motion: 0.8 deg/day = 2.0'/hr E.

Mag.: 9.3. Mag/day = -0.03.

Azu: 250d. Alt: 09d. About 16 min. after Ast. Twi.

Moon phase: New Moon.

Peri: Apr. 4.58, 1975 at 1.22 AU. E. = 1.001. A/P = 264.13d.

A/N = 157.21d. Incl = 55.25d. L = 057.0d. B = -54.8d.

A/M = 6.7. N = 4.0. Disc. Prob. #1 = 36%. #2 = 60%.

Holetschek angle = 137d.



## PART 2: THE INDIVIDUAL COMETS (1975d)

Our second comet was discovered by William Bradfield of Dernancourt, near Adelaide, South Australia. William was born in New Zealand, but has lived in Australia for over 25 years. By day he is a research scientist in charge of the rocket propulsion group for the Dept. of Defense's Weapons Systems Research Lab. By night he sweeps for comets, using a refractor with a six-inch (15-cm) portrait lens as an objective. It has a focal length of 33 inches, making it f/5.5. An Erfle eyepiece gives him a 2.2 degree field of view at 26x. He found his first comet in March 1972 and his second in Feb. 1974; this, his third discovery, took 145 search hours since his previous find.

Comet 1975 V was found Wed. evening, March 12, the day of new moon, at mag. 9.3. It was 30 degrees east of the sun in the evening sky in the constellation Cetus. This position is ten degrees south of the predicted path for comets of the Kreutz sungrazing family, a region often swept by comet hunters. From Bradfield's location the comet was only 9 degrees above the horizon. From 40d N. latitude the comet was already 12 degrees below the horizon at astronomical twilight.

As early as Feb. 1, the comet could have been discovered by Southern Hemisphere observers. It was a 10.5 magnitude object low in the western sky after sunset. For those in the Northern latitudes the comet hung only a few degrees above the southwestern horizon after sunset each night, brightening during Feb. by 0.8 magnitude to 9.7. It would have been difficult for Northern observers, but rather easy for Southern Hemisphere hunters to find for about five weeks before discovery. So why wasn't it found earlier?

A combination of faintness and closeness to the sun helped to hide this comet as it hovered near declination  $-23^{\circ}$  and  $28^{\circ}$  from the sun during the five weeks prior to discovery. After discovery the comet moved northward and brightened slightly.

What if the ascending node had been increased by 90d? Then the comet could have been discovered at mag. 10.4 in Taurus, moving SSW, at an elongation of about 170d in early Dec. 1974. It would have then become mag. 8.0 in March, 1975, becoming a good evening sky object.

If the A/N differed by 180d, the comet would have been discoverable in the morning sky in early Jan. 1975, at mag. 10.5 as it moved SSE. It would have brightened to mag. 7.8, deep in the S. Hemisphere by mid-March.

If the A/N had increased by another 90d the comet would have been discoverable at about 35 degrees from the sun at about  $-40^{\circ}$  declination in the morning sky in early Feb. 1975. It would have moved slowly N. to mag. 8.9 at no more than 40 degrees from the sun, making it a possible but not probable discovery. So of the four cases we've examined, the comet was discovered in one, would have been found in two more, and might have been discovered in the last case.

Sources: Discovery: IUA Cir. 2759 (Dr Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: Charles Morris.

## PART 2: THE INDIVIDUAL COMETS (1975h)

#3) 1975h = 1975 IX

Comet Kobayashi-Berger-Milon

Disc.: 1) Jul. 2.709 2) Jul. 5.340 and 3) Jul. 7.354, 1975.  
 Dis. to Sun: 1.46 AU. Dis. to Earth: 0.56 AU.  
 RA: 21h 47.0m Dec.: -07d24'. Ecl. pos.: 330.7d; +18.3d.  
 Morning sky. 133d from Sun. Motion: 1.3 deg/day = 3.3'/hr NNW.  
 Mag.: 7.6. Mag/day = -0.14.  
 Azu: 158d/128d/152d. Alt: 44d/34d/41d.  
 52/173/45 min. before Ast. Twi.  
 Moon phase: Two days after Last Quarter.  
 Peri: Sep. 5.33, 1975 at 0.43 AU. E. = 1.000. A/P = 116.97d.  
 A/N = 295.65d. Incl = 80.78d. L = 098.2d. B = +61.6d.  
 A/M = 7.3. N = 3.8. Disc. Prob. #1 = 32%. #2 = 100%.  
 Holetschek angle = 116d.

This mid-summer comet was first seen by Toru Kobayashi of Imadate, near Fukui, Japan on Thursday morning, July 2, 1975. This was his first named comet discovery, but he had independently found Comet 1970m five years before. He was using a 6-inch (15-cm) rich-field telescope at 30 power. He had swept 117 hours to find this. At that time the comet was at magnitude 7.6, 134 degrees from the sun in the morning sky, in the constellation Aquarius. It was seven degrees SE of the globular cluster M 2 and appeared diffuse and about 8' in diameter. From most latitudes the comet was above the horizon for nearly all night.

Co-discoveries followed. At Henry Coe State Park, near San Jose, California, a star party was being held on the evening of July 4. Doug Berger of Union City, Calif., was using his homemade 8", f/7 reflector to find M 2 after Debbie Moore had found it in her 3" scope. Instead of finding the cluster, though, he found the comet. It was examined by other members of the group before he informed nearby Lick Observatory of the find. Finally, two nights later, Dennis Milon was observing with a 4" Fecker Celester reflector from a parking area on Mt. Washburn at 8,752', in Yellowstone National Park in Wyoming. He looked at M 2 and saw the comet in the same field of view, some 0.5 degrees to the E. of the cluster.

According to Dr. Marsden of the Smithsonian Astrophysical Observatory, there were as many as 50 independent discoveries of the comet, including one a few hours before Berger's find, and at least three more before Milon's find. These observers, however, did not report the comet promptly and therefore did not get credited with the discovery. Kazimeras Cernis of the USSR, who was later to find two comets covered in our study, also found this comet on July 18 using 75 mm binoculars.

The comet continued to brighten, becoming a naked-eye object in the evening sky in early August. It also displayed a tail up to seven degrees long.

Could this comet have been found earlier? It seems so. For three days before Kobayashi's discovery this part of the sky was moonless and the comet could have been picked up. The moon was in the area for the days before that, and in late June (the 23rd) the moon was full. So in mid-June the morning sky was dark and moonless. The comet was at RA: 22h 04m, Dec: -20d on June 12, and

## PART 2: THE INDIVIDUAL COMETS (1975h)

mag. 10.0. Two weeks before that (May 29) it was nearly four degrees further south and at mag. 11.1. Before that time, as we get into mid-May, the comet is fainter than mag. 11.8 and we should not expect discovery. For one month, then, from late May through late June the comet brightened from mag. 11.1 to 8.5 and could have been discovered but wasn't. Why wasn't it seen sooner?

There seems to be two reasons why it was not detected for over a month. First, the comet was not in the usual comet hunting grounds—it was far from the sun and comet hunters normally do not sweep this region. Secondly, it was in a rather barren part of the sky, casual observers would not normally be looking in this area. Indeed, it was not discovered by some until it was confused for M 2 or seen in the same field as it. We should also consider the possibility that the comet brightened rapidly before discovery.

What if the ascending node had changed by 90d? We then find the comet becoming visible near the Pleiades in the first week of July in the morning sky, 45 degrees from the sun at mag. 10.3. It would then brighten to mag. 4.4 by September.

If the ascending node had changed by 180d, the comet would have traveled between the sun and us, moving rapidly southward, emerging from the sun's rays in mid-Sept. at about mag. 3, in the southern morning sky.

If the A/N had changed by yet another 90d, the comet would have been found in the evening sky at tenth mag., in Leo. So, in three ascending nodes the comet would have been found in the morning sky, in one case it would have been in the evening sky.

Sources: Discovery: IUA Cir. 2797 (Dr Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: Charles Morris and Daniel Green.

#4) 1975j = 1975 XII

Comet Mori-Sato-Fujikawa

Disc.: 1) Oct. 5.743 2) Oct. 5.757 and 3) Oct. 5.792, 1975.  
 Dis. to Sun: 1.94 AU. Dis. to Earth: 2.13 AU.  
 RA: 08h 20.0m Dec.: +03d00'. Ecl. pos.: 126.5d; -15.6d.  
 Morning sky. 65d from Sun. Motion: 0.6 deg/day = 1.5'/hr SSE.  
 Mag.: 10.7. Mag/day = -0.04.  
 Azu: 101d/106d/114d. Alt: 20d/26d/34d. (#3 are ests.)  
 97/65/21 min. before Ast. Twi.  
 Moon phase: New Moon.  
 Peri: Dec. 25.88, 1975 at 1.60 AU. E. = 0.997. A/P = 246.25d.  
 Orbital Period = 15,775.98 years  
 A/N = 277.98d. Incl = 91.61d. L = 094.3d. B = -66.2d.  
 A/M = 6.7. N = 3.3. Disc. Prob. #1 = 22%. #2 = 80%.  
 Holetschek angle = 1d.

## PART 2: THE INDIVIDUAL COMETS (1975j)

The first of two discoveries on the same day, this comet was found on Monday morning, Oct. 5, 1975 by Hiroaki Mori, Yasuo Sato and Shigehisa Fujikawa of Japan. This was Mori's first named comet discovery, Sato's third and Fujikawa's third. Mori was using 20x120 binoculars, Sato used a 6-inch (15 cm) reflector at 25x and Fujikawa, searching about 500 hours since his previous find, used a 6.2-inch (16 cm) reflector at 23x.

At the time of discovery the comet was 65 degrees from the sun in the morning sky. The comet appeared small, about 2' in diameter, and very diffuse. As seen from the earth the comet appeared just outside the boundaries of the Milky Way, in the constellation Hydra. The moon was new on that morning. From -40d latitude the comet was at 25 degrees altitude in the NNE at morning astronomical twilight. From the equator the comet was 47 degrees high. Following discovery the comet continued moving south, brightening to mag. 8.3.

The sky had been moon-free for about five days; during that time the comet would have been discoverable. Prior to that the comet was fainter and closer to the sun. Three weeks before discovery the comet was at RA: 08hr 02m, Dec: +13d 56', 51 degrees from the sun and mag. 11.4. One would not expect amateur discovery before that time because of the comet's faintness, small size and diffuse appearance.

What if the ascending node had changed by 90d? Then the comet would have been near the sun until emerging in late November 1975 at mag. 10 in the southern morning sky near Dec.: -45d. Discovery chances would have been high.

If the A/N had differed by 180d, the comet would have slowly brightened in the evening sky as its elongation decreased. It would have then traveled S. of the sun before re-emerging into the southern morning sky, staying in the 10.0-10.5 magnitude range for roughly four months. It would have been most favorably placed in December at about 40 degrees south of the sun at Dec.: -60d and mag. 10. The overall chances of discovery would have been good.

If the A/N had changed by 90d more, the comet could have been discovered deep in the southern sky, nearly opposite the sun at around mag. 10.2 in early Sept. It then would have slowly made it's way into the evening southern sky, brightening by 1.0 magnitude. So of the four instances discussed, the comet was discovered in one, and would have been found in three more.

Sources: Discovery: IUA Cir. 2847 (Dr Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: "N" by Daniel Green, A/M dimmed by 1.0 to more closely match disc. mag.

## PART 2: THE INDIVIDUAL COMETS (1975k)

#5) 1975k = 1975 X

Comet Suzuki-Saigusa-Mori

Disc.: 1) Oct. 5.778 2) Oct. 5.792 and 3) Oct. 5.792, 1975.  
 Dis. to Sun: 0.86 AU. Dis. to Earth: 0.95 AU.  
 RA: 11h 11.0m Dec.: +43d42'. Ecl. pos.: 149.1d; +34.7d.  
 Morning sky. 52d from Sun. Motion: 0.1 deg/day = 0.3'/hr ESE.  
 Mag.: 8.8. Mag/day = -0.10.  
 Azu: 050d/052d/051d. Alt: 20d/23d/22d. (#1 & 2 are ests.)  
 41/21/27 min. before Ast. Twi. (#1 & 2 are ests.)  
 Moon phase: New Moon.  
 Peri: Oct. 15.36 1975 at 0.84 AU. E. = 0.986. A/P = 152.02d.  
 Orbital Period = 446.26 yrs.  
 A/N = 216.11d. Incl = 118.24d. L = 050.2d. B = +24.4d.  
 A/M = 9.6. N = 4.0. Disc. Prob. #1 = 6%. #2 = 70%.  
 Holetschek angle = 29d.

This was the second comet found on the morning of Monday, Oct. 5, 1975. The discoverers were Shigenori Suzuki (his second named discovery), Yoshikaza Saigusa (his first) and Hiroaki Mori (his second, he had found his first only 70 minutes before!). Suzuki used a 5.8" (14 cm) reflector at 22x, Saigusa used a 6" (15 cm) reflector at 27x, and Mori again employed his 20x120 binoculars. All the discoverers are from Japan.

The comet was located 52 degrees from the sun in the morning sky, in Ursa Major, at magnitude 8.8 and brightening at 0.1 mag./day. It appeared diffuse with some condensation, about 3' in diameter, and within a week some observers were reporting a tail. The moon was new on that morning. From -40d latitude the comet was still 30 degrees below the horizon at astronomical twilight. From the equator it was only 3 degrees above the horizon. The comet passed within 10 million miles of Earth on Oct. 15, became a naked-eye object with a tail, and we now know it's orbital period to be 446 years.

During the four days prior to discovery, the moon was out of the sky and the comet would have been close to its discovery position and mag. 9.2, an easy object. For the week prior to this the moon was in the morning sky, but 21 days before discovery the comet was at mag. 10.6 and 40 degrees from the sun, not a difficult object in the moonless predawn sky. Before that time, however, the comet was closer to the sun and fainter, making it hard to find. We should not expect an earlier discovery of the comet since it was brightening rather rapidly and fairly close to the sun in the moonless mornings before early Oct. 1975.

If the ascending node had changed by 90d the comet would have passed 26 degrees north of the sun in late Sept. 1975 as it went from the evening to the morning sky. It would have stayed near the sun until late Oct. when, at mag. 9.7 and 36 degrees from the sun, and at a declination of about 5d N., discovery would have been probable.

If the ascending node changed by 180d, the comet's lone chance for discovery would have been in the evening sky in mid-Sept., 45 degrees from the sun at declination +25 at about mag. 10.4. It would have brightened, then grow

## PART 2: THE INDIVIDUAL COMETS (1975k)

fainter as it neared the sun, emerging months later in the morning southern sky too faint to find.

If the A/N had changed by still another 90d, the comet would have been an easy discovery in the mid-Sept morning sky, 60 degrees from the sun at mag. 9.3 and near declination +60d. So of the four possible ascending nodes, the comet had a good chance of being discovered in three and a fair chance in the fourth instance.

Sources: Discovery: IUA Cir. 2847 (Dr Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: A/M estimates ranged from 9.3 - 13.8, I chose 9.6. "N" estimates ranged from -0.5 to 26.4, I chose 4.0.

#6) 1975p = 1975 XI

Comet Bradfield

Disc.: Nov. 11.74, 1975.

Dis. to Sun: 1.11 AU. Dis. to Earth: 1.26 AU.

RA: 10h 56.5m Dec.: -37d41'. Ecl. pos.: 181.8d; -40.3d.

Morning sky. 58d from Sun. Motion: 1.5 deg/day = 3.8'/hr SE.

Mag.: 9.7. Mag/day = -0.09.

Azu: 115d. Alt: 36d. 11 min. before Ast. Twi.

Moon phase: Two days after First Quarter.

Peri: Dec. 21.18, 1975 at 0.22 AU. E. = 1.000. A/P = 358.10d.

A/N = 270.61d. Incl = 70.63d. L = 270.0d. B = -01.8d.

A/M = 9.1. N = 2.9. Disc. Prob. #1 = 9%. #2 = 85%.

Holetschek angle = 179d.

William Bradfield of Australia discovered his second comet of 1975 (and his fourth up to this point) on Wednesday morning, Nov. 11. This was 106 search hours since his previous discovery eight months before. He was using his 6-inch (15-cm), f/5.5 refractor.

The comet was in the morning sky, in Antlia, 57 degrees from the sun, and right on the predicted path for comets from the Kreutz sungrazing family. It appeared 9.7 mag., diffuse and 3' in diameter. The moon was two days after first quarter. From 40d N. latitude the comet was only 5 degrees above the SSE horizon at astronomical twilight. From the equator it was 32 degrees high. Following discovery, the comet continued brightening, it moved southward, it then turned northward and passed near the sun in mid-December at mag. 2.2. It developed both a tail and an anti-tail. Then it entered the morning sky at mag. 5, fading to mag. 10 by the end of Jan., 1976.

Could the comet had been discovered earlier? The moon had been out of the sky for about ten days prior to Nov. 11, during that time the comet brightened from mag. 10.9 to 9.7 and held an elongation of about 60 degrees as it moved south from declination -25d to -37d. Prior to full moon (Oct. 20) the comet was fainter than mag. 11.5 and basically undiscoverable. Yet, for the first ten days of Nov. the comet remained undiscovered, this is mainly due to its southernly declination, its diffuseness, and the fact that other comets were also visible and being observed in these morning hours.

If the ascending node had changed by 90d, the comet would have raced northward near the sun, and would have been discovered either south of the sun in the evening sky in early December, 1975, or north of the sun in the morning sky in early Jan., 1976.

If the A/N had changed by 180d, the comet could have been found due south of the sun in late-November at an elongation of about 33 degrees and a magnitude of roughly 9.4. If it was missed then, it would have been easily visible north of the sun six weeks later, mag. six at 25 degrees elongation.

If the A/N had changed by another 90d, the comet would have been an easy 9.5 mag. object near the South Pole in early November. It then would have moved to the evening southern sky and mag. 5 within five weeks. So in all four ascending nodes this comet would have been easily discoverable.

Sources: Discovery: IUA Cir. 2866 (Dr Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: Charles Morris.

#7) 1975q = 1976 I

Comet Sato

Disc.: Dec. 5.760, 1975.

Dis. to Sun: 1.02 AU. Dis. to Earth: 0.55 AU.

RA: 12h 14.0m Dec.: +19d15'. Ecl. pos.: 174.7d; +20.4d.

Morning sky. 78d from Sun. Motion: 1.4 deg/day = 3.5'/hr S.

Mag.: 9.8. Mag/day = -0.14.

Azu: 093d. Alt: 38d. 112 min. before Ast. Twi.

Moon phase: Two days after New Moon.

Peri: Jan. 3.92, 1976 at 0.86 AU. E. = 1.001. A/P = 215.47d.

A/N = 280.80d. Incl = 93.95d. L = 098.0d. B = -35.4d.

A/M = 11.0. N = 4.0. Disc. Prob. #1 = 1%. #2 = 30%.

Holetschek angle = 5d.

This comet was found by Yasou Sato of Japan on Saturday morning, Dec. 5, 1975. This is Sato's fourth named comet discovery, he had found his previous comet only two months before. Sato again used his 6" (15 cm) reflector at 25x.

The comet was 78 degrees from the sun in the morning sky, near M 85, in Coma Berenices. The comet appeared diffuse and had some condensation, and was about 4' in diameter. Several days later a short tail was seen. The moon was two days after new phase. From -40d latitude the comet was one degree below the horizon at astronomical twilight. From the equator it was 45 degrees high.

The comet could have been found for about a week prior to Dec. 5, as the moon had just left the area. The previous moon-free period was in mid-November, when the comet was at position 12h 05m, +38d and mag. 12.2, much too faint to be detected. So the discovery window is narrowed down to the week prior to discovery.

## PART 2: THE INDIVIDUAL COMETS (1975g)

During that week there were two good reasons it wasn't found. First, it was entering the Coma Berenices region, where many galaxies are visible--most comet hunters avoid this part of the sky. Secondly, there were other comets being observed, this takes the time of the comet hunter and prevents full coverage of the morning sky.

Twelve hours before discovery I swept near this area with a 10", f/3.8 reflector, however, I stopped about five degrees short of the position of the comet because of dewing as a fog bank was forming. I halted searching about four sweeps from the undiscovered comet.

It was later reported (IAU Cir. 2906) that S. Utsunomiya of Japan observed it on Nov. 30.847 at mag. 9.5 -10, with a coma diameter of 4'-5'. This is five days before Sato saw it.

Following discovery the comet continued moving south and brightening, as it approached to within 25 million miles of the earth. It displayed a tail and became as bright as mag. 8.0.

If the ascending node had changed by 90d, the comet would have probably remained undiscovered, as it would have brightened only to mag. 10.8, and then only in the southern evening sky at elongations of 42 to 47d in early Jan. 1976.

If the A/N had shifted by 180d, the comet would probably have not been discovered, as it would have been fainter than mag. 12.0 except when it was within 45 degrees of the sun, then brightening up to mag. 11.8.

If the A/N had shifted by another 90d, the comet would have been brightest (mag. 10.9) in the southern, evening sky and would probably have not been discovered. So of the four instances, the comet was discoverable in only one.

Sources: Discovery: IUA Cir. 2882 (Zdenek Sekanina). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: "N" = 4 assumed. A/M = 11.0 to fit mag. estimates shortly after discovery.



## PART 2: THE INDIVIDUAL COMETS (1976a)

#8) 1976a = 1976 IV

Comet Bradfield

Disc.: Feb. 19.49, 1976.

Dis. to Sun: 0.86 AU. Dis. to Earth: 0.79 AU.

RA: 01h 55.0m Dec.: -33d17'. Ecl. pos.: 010.9d; -41.7d.

Evening sky. 56d from Sun. Motion: 1.0 deg/day = 2.5'/hr ENE.

Mag.: 9.4. Mag/day = -0.06.

Azu: 248d. Alt: 29d. 42 min. after Ast. Twi.

Moon phase: Four days past Full.

Peri: Feb. 24.64, 1976 at 0.85 AU. E. = 0.994. A/P = 313.00d.

Orbital Period = 1,603.46 yrs.

A/N = 160.09d. Incl = 46.84d. L = 123.8d. B = -32.2d.

A/M = 10.8. N = 5.3. Disc. Prob. #1 = 1%. #2 = 25%.

Holetschek angle = 31d.

William Bradfield discovered this, his fifth comet, on Thursday evening, Feb. 19, 1976, 57 hours of hunting and three months after his previous discovery. He was using his 6", f/5.5 refractor at 26 power. The comet was at mag. 9.4, 56 degrees from the sun, in the constellation Fornax. For 40d N. latitude the comet was 4 degrees above the SSW at evening astronomical twilight. From the equator it was 30 degrees high. The moon was four days past full, having just cleared out of the evening sky.

Could the comet have been found earlier? On Feb. 1, with no moon in the sky, the comet was at RA: 1hr 00m, Dec.: -39d, and 55 degrees from the sun at mag. 10.7. From northern latitudes it would have been only a few degrees above the horizon at astronomical twilight, but in the Southern Hemisphere it was higher in the sky and more easily visible. Twenty days before that (Jan. 11) the comet was at RA: 23h 55m, Dec.: -42d at mag. 12.3, too faint to expect discovery. Therefore, it was discoverable during late Jan. and early Feb. when it was brightening from mag. 11.0 to 9.8, but during the last week the moon was also in the sky. So although it could have been found, it would not have been an easy discovery.

If the ascending node had changed by 90d, the comet would have been easiest visible in the morning sky in late Feb., 50 degrees from (and south of) the sun, at mag. 9.8. Discovery chances would have been fair.

With an A/N of 340d, the comet would have stayed fainter than mag. 11.0 with small elongations and would have remained undiscovered.

With an additional shift of 90d, the comet would also have been missed, it's brightest being mag. 10.8 at 30 degrees from the sun in the evening sky. So of the four ascending nodes the comet was undiscoverable in two.

Sources: Discovery: IUA Cir. 2914 (Dr. Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: "N" = 5.3 from Morris, A/M dimmed by 0.2 mag. to fit early observations.

## PART 2: THE INDIVIDUAL COMETS (1976d)

#9) 1976d = 1976 V

Comet Bradfield

Disc.: Mar. 3.778, 1976.

Dis. to Sun: 0.69 AU. Dis. to Earth: 0.66 AU.

RA: 21h 30.1m Dec.: -47d02'. Ecl. pos.: 303.9d; -29.7d.

Morning sky. 44d from Sun. Motion: 3.2 deg/day = 8.0'/hr ESE.

Mag.: 8.8. Mag/day = -0.05.

Azu: 136d. Alt: 18d. 25 min. before Ast. Twi.

Moon phase: Three days past New.

Peri: Feb. 25.06, 1976 at 0.68 AU. E. = 1.000. A/P = 221.76d.

A/N = 69.49d. Incl = 147.78d. L = 212.4d. B = -20.8d.

A/M = 11.3. N = 4.0. Disc. Prob. #1 = 1%. #2 = 50%.

Holetschek angle = 57d.

William Bradfield found this comet only nine search hours after his previous find. At the time of discovery, another comet was being widely observed—Comet West (1976 VI). It was just entering the morning sky and displayed a wide, long tail.

Joe Marcus points out that with this discovery Bradfield had found six comets in the past four years, five in the last two, four in the last year, three in the last four months, and two in the last month. For all of these discoveries he used his 6-inch (15-cm), f/5.5 refractor, and together they took 883 hours of comet hunting.

At discovery the comet was magnitude 8.8, 44 degrees from the sun, in the constellation Grus and moving rapidly. From 40d N. Latitude the comet was still 26 degrees below the horizon at morning astronomical twilight. At the equator it was accordingly 2 degrees above the horizon. The moon was three days past new.

Could the comet have been found earlier? For the week previous the comet was fainter by 0.5 mag. and 20 degrees WNW of its discovery position. It could have been found during this week. For the ten days prior to this, however, the moon was bright and in the morning sky. Before the full moon of Feb. 15 the comet was fainter than mag. 10.1 and closer than 36d from the sun, a difficult object. Additionally, if it had not been found by the end of March, it would have probably gone undiscovered because by March 31 it was mag. 11.1 and 60d from the sun. So the moonless "discovery window" extended from only Feb. 25 through Mar. 12.

If the ascending node had shifted by 90d, the comet would have probably been undiscovered, brightening to mag. 10.6 in the southern morning sky. It's elongation ranged from 15d to 80d.

With an A/N shift of another 90d, the comet would have been easily discoverable in the evening, northern sky, but for only a few weeks as it's elongation closed from 95d through 60d. And with an ascending node of 339d, the comet would have rapidly moved from the morning sky to the evening sky, south of the sun. For six weeks it would have been brighter than mag. 10.3, elongations of 30d to 60d would have made it a possible discovery. So of the four possible ascending nodes the comet was found in one, would not have been

## PART 2: THE INDIVIDUAL COMETS (1976d)

found in another, and possible in two more.

Sources: Discovery: IUA Cir. 2923 (Dr. Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: "N" = 4 assumed. A/M = 11.3 to fit early observations.

#10) 1977m = 1977 XIV

Comet Kohler

Disc.: Sept. 4.208, 1977.

Dis. to Sun: 1.49 AU. Dis. to Earth: 1.56 AU.

RA: 15h 24.0m Dec.: +30 00'. Ecl. pos.: 217.3d; +46.2d.

Evening sky. 68d from Sun. Motion: 0.5 deg/day = 1.3'/hr SE.

Mag.: 9.5. Mag/day = -0.05.

Azu: 281d. Alt: 36d. 55 min. after Ast. Twi.

Moon Phase: One day before Last Quarter.

Peri: Nov. 10.57, 1977 at 0.99 AU. E. = 0.999. A/P = 163.48d.

Orbital Period = 103,345.48 years.

A/N = 181.82d. Incl = 48.72d. L = 350.8d. B = +12.3d.

A/M = 6.7. N = 4.3. Disc. Prob. #1 = 40%. #2 = 80%.

Holetschek angle = 57d.

Exactly 18 months (a surprisingly long time) passed from the last amateur discovery until this one. Also, this was the first comet to be discovered by an American amateur specifically looking for one in nine years. It was found by 48-year-old Merlin Kohler of Quincy, California. On the evening of Saturday, Sept. 3, (Labor Day Weekend), he was observing deep-sky objects in Capricorn with his 8-inch (20-cm), Schmidt-Cassegrain telescope. Mr. Kohler continues: "just before I left my observing site for the evening, I made a few scans to the west, in what I considered a favorable altitude, using a 20mm Erfle at 100x. I picked the comet up south and west of "B" Corona Borealis." He adds: "Finding comet 1977m was not an accident, just good fortune. Scanning for comets with my Dynamax 8 was a rather long shot, but it's all I have." Merlin Kohler, who works as an electronics technician for the Dept. of Agriculture, was the first person to receive the Tuthill Award of \$250. It's given to any American amateur who officially discovers a comet by visual means. (The award has since been expanded to include Canadian amateurs.)

The comet was mag. 9.5 and 3' in diameter at discovery. As seen from the equator, the comet was 41 degrees above the horizon at evening astronomical twilight, from -40d latitude it was 11 degrees high. William Bradfield had swept near this area, but missed it by about 2 degrees on Sept. 3. It was later learned that Michel Verdenet, a variable star observer, independently discovered the comet Sept. 2, but he did not report it. Comet Kohler later brightened to mag. seven as it raced through the evening sky.

Could the comet have been found earlier? If it behaved normally, it was brighter than magnitude 11.0 for more than a month. During early August the comet was brightening from mag. 11.0 to 10.5 as it moved ESE about four degrees in central Bootes. Between Aug. 19 and Aug. 31 the moon was interfering in the evening sky. After the moon left the evening sky the comet was mag. 9.7 and near it's discovery position.

## PART 2: THE INDIVIDUAL COMETS (1977m)

While on vacation in Yuma, Arizona I swept over the comet on Aug. 17, using a 10" reflector (f/3.8) at 36x. At that time it should have been mag. 10.4. I did observe galaxies M 101, 5866, 5907 and globular cluster 5466, but not the comet. Perhaps it was fainter than magnitude 10.4, and brightened rapidly shortly before discovery.

If the ascending node had changed by 90d, the comet would have been an easy discovery in the northern polar region in mid-Aug, 1977. It would have then brightened to mag. 5.5 in the morning sky three months later. With another A/N shift of 90d the comet would again be an easy object, this time in the mid-northern declinations in the morning sky, attaining mag. 7.9 by mid-November. With another A/N shift of 90d the comet would have been difficult to find, ranging from mag. 11.1 and 34 degrees from the sun in the evening sky to mag. 7.9 at 18 degrees from the sun three months later. So of the four tested orbits, the comet was easily found in one, could have been found in two more, and would probably have been missed in the last.

Sources: Discovery: IUA Cir. 3103 (Dr. Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: Many to chose from. I determined the present parameters to best fit magnitudes near discovery. Discovery details: "Comet News Service" 77-3.

#11) 1978c = 1978 VII

Comet Bradfield

Disc.: Feb. 4.755, 1978.  
 Dis. to Sun: 1.06 AU. Dis. to Earth: 1.42 AU.  
 RA: 18h 21.2m Dec.: -49d56'. Ecl. pos.: 272.8d; -26.9d.  
 Morning sky. 48d from Sun. Motion: 1.6 deg/day = 4.0'/hr ENE.  
 Mag.: 8.0. Mag/day = -0.08.  
 Azu: 134.d Alt: 26d. 22 min. before Ast. Twi.  
 Moon phase: Three days before New Moon.  
 Peri: Mar. 17.69, 1978 at 0.44 AU. E. = 1.000. A/P = 48.71d.  
 A/N = 259.79d. Incl = 51.09d. L = 295.4d. B = +35.8d.  
 A/M = 07.1. N = 2.9. Disc. Prob. #1 = 33%. #2 = 90%.  
 Holetschek angle = 119d.

It was 23 months and 360 search hours since William Bradfield had found his last comet. For this discovery he once again used his 6-inch (15-cm) refractor at 26 power to find this object, which was mag. 8.0, and 48 degrees from the sun on Saturday morning, Feb. 4. It was in the constellation Telescopium and appeared diffuse with condensation and about 2' in diameter.

From 40d N. latitude the comet was still 13 degrees below the horizon at astronomical twilight. From the equator the comet was 15 degrees above the horizon. David Seargent of The Entrance, New South Wales, Australia, swept to within 3 degrees of this comet, almost discovering it the day after Bradfield. He was hindered, however, by a line of low clouds.

## PART 2: THE INDIVIDUAL COMETS (1978c)

Could the comet have been found earlier? It seems so. On Dec. 3, 1977 the comet was near RA: 13hr 00m, Dec: - 48d and mag. 11.5, 49 degrees from the sun. It was not far from the expected path of any comet from the Kreutz Sungrazer group, this area is usually carefully swept by some comet hunters. A week later it passed two degrees south of the globular cluster Omega Centauri at mag. 11.2. Its elongation and declination remained the same as it moved eastward and brightened at roughly 0.4 mag./week. On discovery morning, the moon had just cleared out of the morning sky (the previous day) so it was picked up near the beginning of this particular "lunar window". There are no easy answers as to why it was discoverable but not found for over six weeks...the possibility remains that it brightened rapidly shortly before discovery.

What if the ascending node had changed by 90d? Then the comet would have rushed toward the sun from the southern evening sky, mag. 11.3 at 35 degrees elongation with both decreasing, with its main chance of discovery being in the mid-northern declinations in the evening sky during Apr. 1978. Then the comet would have dimmed from mag. 5.7 to mag. 8.0 while elongation increased from 32 to 58 degrees. Chances for detection would have been high.

If the A/N had changed by another 90d, the comet would have been easily discoverable in the evening southern sky as it brightened from mag. 10.0 to 5.8 as elongation decreased from 65 to 31 degrees during Jan. and Feb. 1978. With a shift of the A/N of another 90d the comet would be easily discoverable in the morning southern sky during Dec. 1977. So in all four cases the comet would have been easily discoverable.

Sources: Discovery: IUA Cir. 3170 (Dr. Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: Charles Morris.

#12) 1978f = 1978 XXI

Comet Meier

Disc.: Apr. 27.08, 1978.  
 Dis. to Sun: 3.01 AU. Dis. to Earth: 3.19 AU.  
 RA: 07h 18.7m Dec.: +53d47'. Ecl. pos.: 103.4d; +31.3d.  
 Evening sky. 71d from Sun. Motion: 0.3 deg/day = 0.8'/hr SE.  
 Mag.: 10.4. Mag/day = -0.03.  
 Azu: 304d. Alt: 53d. 6 min. before Ast. Twi.  
 Moon phase: Five days after full moon.  
 Peri: Nov. 11.41, 1978 at 1.14 AU. E. = 1.001. A/P = 231.40d.  
 A/N = 348.65d. Incl = 43.76d. L = 210.8d. B = -32.7d.  
 A/M = 00.0. N = 6.6. Disc. Prob. #1 = 100%. #2 = 100%.  
 Holetschek angle = 162d.

In the past, amateurs had used small telescopes for comet hunting, with this discovery began the recognized use of large telescopes to successfully

hunt comets. The discoverer was Rolf Meier of Ottawa, Canada, a 24 year-old electronics engineer. He conducted some comet searches in 1972 through 1974, but began systematic searches in 1975. Comet Meier 1978f was found after 50 hours spread out over three years.

The telescope used is a 16-inch (41-cm), f/5 reflector, used in conjunction with a wide-angle Erfle eyepiece giving 56x and a field of 1.25 degrees. The scope is mounted equatorially, Rolf sweeps along a constant declination, at the end of each sweep he shifts the declination and, with almost no overlap, goes in the opposite direction. The telescope is owned by the Royal Astronomical Society of Canada and is located at its Indian River Observatory, 35 miles west of the city. This was the first comet to be discovered from Canada, and Rolf Meier was the first Canadian amateur to discover a comet.

At the time of discovery, Wednesday evening, Apr. 26, the comet was in the constellation Lynx, mag. 10.4 and 71 degrees from the sun. It appeared diffuse with condensation, and 2' in diameter. Comet Meier was over 3 AU from the sun, a very far distance for discovery. It also has the brightest absolute magnitude of any comet we'll study. The moon had been out of the sky for two evenings. From the equator the comet was 30 degrees above the horizon at evening astronomical twilight, at -40d latitude the comet was 6 degrees below. Following discovery the comet was visible for more than a year.

Could the comet have been found sooner? It was rather slow moving, and it brightened slowly too, typical of comets found in the evening sky. One month before discovery it was mag. 11.2 and at RA: 6h 58m, Dec: +61d, 93 degrees from the sun. It could have been discovered, but it would have been a difficult object. Moreover, poor weather in the Northern Hemisphere limited searches, especially in an area so far from the sun. Then moonlight interfered between April 15 and 24. So the week of discovery seems to be the first reasonable chance for finding it.

If the ascending node had changed by 90 degrees, the comet would have easily been discovered, either in the morning sky, far from the sun at mag. 11-10, or as it made its way toward the sun in the evening sky in May 1978 at mid-northern declinations. With another 90d shift in the A/N the comet would be discoverable in the morning sky, about 75 degrees from the sun at mag. 10, in early May, 1978. With a final shift of 90d, the comet would again be discoverable, at an elongation of 40 degrees from the sun at mag. 8.0 and again at mid-northern declinations. So in all four cases the comet was an easy discovery.

Sources: Discovery: IAU Cir. 3214 (Dr. Brian Marsden). Orbital Elements: "Catalogue of Cometary Orbits", by Dr. Brian Marsden. Magnitude Formula: Charles Morris, A/M brightened by 0.2 to match estimates near discovery.