Catalog of Comets

C/1900 B1 (Giacobini)
1900 I = 1900a

Discovered: 1900 January 31.79 ($\Delta = 1.58$ AU, $r = 1.84$ AU, Elong. $= 88^\circ$)
Last seen: 1900 August 18.34 ($\Delta = 1.44$ AU, $r = 2.06$ AU, Elong. $= 113^\circ$)
Closest to the Earth: 1900 July 24 (1.1599 AU)
Calculated path: ERI (Disc), CET (Feb. 7), PSC (Mar. 7), ARI (Mar. 29), PSC (Apr. 10), AND (Jun. 13), LAC (Jul. 9), CYG (Jul. 16), LYR (Aug. 3), HER (Aug. 16)

M. Giacobini (Nice Observatory, France) discovered this comet on 1900 January 31.79, at a position of $\alpha = 2^{\rm h}\ 57.7^{\rm m}$, $\delta = -7^\circ\ 55'$. He described it as "an irregular nebulosity, slightly lengthened in the direction opposite to the sun." The coma was at least 1.5′ across and exhibited an elongated nucleus of magnitude 13. The comet was confirmed by S. Javelle (Nice, France) on February 3.79. He gave the magnitude as 13.

P. Chofardet (Besançon, France) observed the comet on February 16 and 21. He described it as round, about 1′ across, with a central nucleus of magnitude 13. On the 17th, C. D. Perrine (Lick Observatory, California, USA) estimated the magnitude as 10.5–11. He added that the coma was nearly round and 2′ across, with "a faint nucleus of about the 13th magnitude." That same night, Javelle gave the magnitude of the nuclear condensation as 13. E. Marchetti (Pula, Yugoslavia) observed the comet with the 15-cm refractor on the 20th and said it was extremely faint and small. H. A. Kobold (Strasbourg, France) saw the comet on the 21st and said it was 1′ in diameter, with a condensation of magnitude 11–12. M. F. J. C. Wolf and F. C. A. Schwassmann (Königstuhl Observatory, Heidelberg, Germany) photographed the comet on the 21st. They estimated its magnitude as 12 and noted the beginnings of a tail toward the northeast. C. Rambaud and F. Sy (Alger, now al-Jazâ'ir, Algeria) observed with a 32-cm refractor on the 21st, 22nd, and 23rd. They described the comet as round and faint, with a diameter about 1′. On the 22nd, A. Abetti (Arcetri, Italy) described the comet as a small nebulosity comparable to a star of magnitude as 11–12, and Perrine estimated it as 10.5–11. J. Palisa (Vienna, Austria) and Perrine both noted the "nucleus" was magnitude 13, while Perrine added that the coma was nearly round and 2′ across. That same night, Marchetti said the comet appeared as an extremely faint nebulosity of indistinct shape. On the 23rd, Abetti said the comet appeared equal in brightness to a star of magnitude 12. He added

that it was a very difficult object and almost indistinguishable from the sky background. Marchetti said the comet was "difficult to see. . .." He added that a light was visible now and then within the coma, which he suspected might be a nucleus of magnitude 10–11. G. Bigourdan (Paris, France) saw the comet with the 31-cm refractor on the 24th. He said it looked like a nebula of class II–III or III, and was round and centrally condensed, but without a tail. There was a stellar nucleus within the condensation and the coma was 50″ across. On February 27, F. Cohn (Königsberg, now Kaliningrad, Russia) said the comet appeared vague, but that there was "in the middle a little condensed nebulosity about 1′ to 2′ across."

On March 1, Perrine estimated the magnitude as 10.5–11. He added that the coma was nearly round and 2′ across, with "a faint nucleus of about the 13th magnitude." Abetti described the comet as faint in a 28-cm refractor (124×) on the 3rd. The final observation of the comet before it was lost in the sun's glare was obtained by Perrine on March 24.

The comet passed just over 4° from the sun on April 17. The first person to spot the comet as it exited the sun's glare was R. G. Aitken (Lick Observatory), who observed it with the 91-cm refractor on May 26. On June 1, Marchetti estimated the magnitude as 10. He said the comet was then low over the eastern horizon and appeared round, with an occasionally visible nucleus. H. A. Kobold (Strasbourg, France) saw the comet on June 22 and estimated the magnitude as 10.5. He described the comet as a fairly faint, centrally condensed nebulosity, about 1.5′ across. The magnitude of the condensation was given as 11.5. On the 24th, Abetti said the comet appeared like a faint nebulous spot of indistinct shape but near 1′ across. There was also a central condensation. Aitken observed the comet on the 25th, 27th, and 29th, and noted it was "seen without trouble" with the 9-cm finder. On the 26th, Abetti said the comet was faint and difficult to observe with the 28-cm refractor. He said the brightness was close to that of a 13.0-magnitude star, and close to the limit of his telescope. Marchetti observed with the 15-cm refractor and said the comet was occasionally well seen and exhibited a nucleus. On June 29, Marchetti described the comet as "very faint," while Kobold observed with the 46-cm refractor and said the comet was faint, about 1′ across, with a tiny central condensation.

On July 1, Abetti said the comet was near the limit of the 28-cm refractor, while on the 2nd he noted it was very difficult to see because of its nearness to a 10th-magnitude star. Kobold observed the comet with the 46-cm refractor on the 17th and described it as a faint nebulosity with a condensation of magnitude 12. He found it essentially unchanged on the 20th, but noted it was round, with a central condensation. On the 23rd, Kobold found the comet to be small, round, and faint, with little central condensation, while Aitken said the 91-cm refractor revealed the comet shining like a star of magnitude 12 or 13. During July 24, 26, and 31, Kobold said the comet was small and very faint, with an occasionally visible nucleus of magnitude 14.

The comet was last detected on August 18.34, when Perrine gave the position as $\alpha = 18^{h}\ 12.8^{m}$, $\delta = +28^{\circ}\ 14'$.

The first orbit was calculated by Giacobini using positions from January 31, February 3 and 6. He determined a parabolic orbit with a perihelion date of 1900 April 28.70. As additional positions became available, orbits were calculated by H. J. A. Perrotin, A. Berberich, and Perrine which eventually established the perihelion date as April 29.4.

The orbit was reinvestigated several decades later by G. van Biesbroeck (1972) and Z. Sekanina (1978). They both determined hyperbolic orbits with a perihelion date of April 29.41. Van Biesbroeck used 95 positions obtained between January 31 and August 18, and computed an eccentricity of 1.000024. Sekanina took 32 positions obtained between February 3 and August 18, and determined an eccentricity of 1.001058. Sekanina's orbit is given below. B. G. Marsden, Sekanina, and E. Everhart (1978) took this orbit and calculated the original and future orbits. The original orbit proved to be elliptical with a period of about 2.3 million years, while the future orbit was hyperbolic with an eccentricity of 1.000961.

T	ω	Ω (2000.0)	i	q	e
1900 Apr. 29.4108 (TT)	24.4095	41.7943	146.4486	1.331529	1.001058

ABSOLUTE MAGNITUDE: $H_{10} = 8.0$ (V1964)
FULL MOON: Jan. 15, Feb. 14, Mar. 16, Apr. 15, May 14, Jun. 13, Jul. 12, Aug. 10
SOURCES: M. Giacobini, *HCOB*, No. 60 (1900 Feb. 1); M. Giacobini, *AN*, **151** (1900 Feb. 2), p. 307; S. Javelle, *HCOB*, No. 61 (1900 Feb. 4); S. Javelle, *AN*, **151** (1900 Feb. 8), p. 355; H. J. A. Perrotin and M. Giacobini, *CR*, **130** (1900 Feb. 19), pp. 469–70; S. Javelle and M. Giacobini, *AN*, **151** (1900 Feb. 20), p. 401; H. A. Kobold, *AN*, **152** (1900 Feb. 26), p. 31; G. Bigourdan and P. Chofardet, *CR*, **130** (1900 Feb. 26), pp. 553–4; P. Chofardet, E. Marchetti, A. Berberich, J. Palisa, and C. D. Perrine, *AN*, **152** (1900 Mar. 1), pp. 45–8; C. Rambaud and F. Sy, *CR*, **130** (1900 Mar. 5), pp. 641–2; M. F. J. C. Wolf and F. C. A. Schwassmann, *AN*, **152** (1900 Mar. 6), p. 63; F. Cohn, *AN*, **152** (1900 Mar. 12), p. 79; C. D. Perrine, *AJ*, **20** (1900 Mar. 21), p. 180; C. D. Perrine, *AJ*, **21** (1900 May 29), p. 16; E. Marchetti, *AN*, **152** (1900 Jun. 2), p. 291; E. Marchetti, *AN*, **152** (1900 Jun. 18), pp. 357–60; A. Abetti, *AN*, **153** (1900 Jul. 30), pp. 103–6; R. G. Aitken, *AJ*, **21** (1900 Nov. 5), p. 30; C. D. Perrine, *AJ*, **21** (1901 Mar. 8), p. 112; E. Marchetti, *AN*, **155** (1901 May 13), pp. 257–62; H. A. Kobold, *AN*, **156** (1901 Jul. 2), pp. 91–4; V1964, p. 65; G. van Biesbroeck, *QJRAS*, **13** (1972 Sep.), pp. 428–9, 434; B. G. Marsden, Z. Sekanina, and E. Everhart, *AJ*, **83** (1978 Jan.), pp. 66, 68.

C/1900 O1 (Borrelly–Brooks)
1900 II = 1900b

Discovered: 1900 July 24.02 ($\Delta = 0.47$ AU, $r = 1.03$ AU, Elong. $= 78^{\circ}$)
Last seen: 1900 December 23.1 ($\Delta = 2.01$ AU, $r = 2.38$ AU, Elong. $= 99^{\circ}$)
Closest to the Earth: 1900 July 31 (0.4390 AU)
Calculated path: ARI (Disc), PER (Jul. 30), CAS (Aug. 8), CAM (Aug. 11), CAS (Aug. 13), CAM (Aug. 15), CEP (Aug. 19), CAM (Aug. 22), CEP (Aug. 23),

CAM (Aug. 26), UMi (Sep. 9), DRA (Nov. 18), UMi (Dec. 2), DRA (Dec. 16), UMi (Dec. 20)

A. L. N. Borrelly (Marseille Observatory, France) discovered this comet on 1900 July 24.02, at a position of $\alpha = 2^{h}\ 43.3^{m}$, $\delta = +11^{\circ}\ 51'$. He estimated the nuclear magnitude as 9.5, and said the comet exhibited a short tail. W. R. Brooks (Hobart College, Geneva, New York, USA) independently discovered the comet on July 24.25. He said the comet exhibited a stellar nucleus and a tail, and looked like "a great naked eye comet in miniature." Both men stated the comet was moving northward.

Numerous confirmations were made on July 25. H. A. Kobold (Strasbourg, France) observed with the 46 cm refractor and estimated the magnitude as 8. He said the nucleus was magnitude 9, while the "parabolic envelope and tail" extended toward PA 250°. The nucleus was pear-shaped, with the long axis oriented in line with the tail axis. G. Bigourdan (Paris, France) said the comet was easy to see in the 6-cm finder, but could not be distinguished with the naked eye. The 31-cm refractor revealed a slightly diffuse nucleus 3–4″ across, which was possibly elongated. This "nucleus" was surrounded by a rather faint, diffuse nebulosity about 1.5′ in diameter. Bigourdan added that the very diffuse tail extended 5′, and possibly 7′, in PA 244.2°.

Many observers saw the comet on July 26. The total magnitude was estimated as 5 through a refractor by F. W. Ristenpart (Kiel, Germany), 6.5 through a finder by J. Holetschek (Vienna, Austria), 7–8 through a 28-cm refractor by A. Abetti (Arcetri, Italy), and 6–7 through a 15-cm refractor by E. Marchetti and R. Höhl (Pula, Yugoslavia). Holetschek said the tail extended 30′ in the 15-cm refractor. Marchetti and Höhl said the nucleus was magnitude 8, and noted a bright tail. Abetti said there was a central stellar nucleus and a tail extending into the third quadrant. W. Schur (Göttingen, Germany) said the comet was "rather bright." J. Palisa (Vienna) observed with a 69-cm refractor and said the nucleus was stellar and about magnitude 9, while the tail was 10′ long. E. Millosevich (Rome, Italy) said the nucleus was stellar and magnitude 7–8, while the tail extended about 25′ toward about PA 225°. A. Sallet (Besançon, France) said the nucleus was magnitude 8 or 9 and located within the center of the coma, while a tail extended 10–12′ toward the west-southwest. A. A. Nijland (Utrecht, The Netherlands) observed with a 7.5-cm finder (22×) and said the tail extended 10′ in PA 238.5°. F. Schwab (Kremsmünster, Austria) said the nucleus was magnitude 8, while the tail extended in PA 244°.

The comet was also well observed on July 27. Holetschek and Nijland gave the total magnitude as 6.8 and 6.9, respectively. The nucleus was described as central and stellar by Abetti, while Nijland estimated its magnitude as 10. Holetschek said the 15-cm refractor showed a coma 2–3′ across. The tail length was given as 15–20′ by Nijland, while he added that it extended in PA 241.0°. Brooks saw "two branching wisps or streamers . . . issuing from either side of the coma, and making an angle of about thirty degrees with

the principal tail. The northern streamer was the more prominent of the two." Two hours later Brooks noted that the two streamers were no longer visible.

During the remainder of July, the number of physical descriptions decreased. The total magnitude was estimated as 6.5 by Holetschek on the 28th and 7.0 by Nijland on the 30th. Nijland was using a 7.5-cm finder (22×). Abetti still noted a central stellar nucleus on the 28th, while Holetschek recorded a nuclear condensation of magnitude 8. Nijland gave the nuclear magnitude as 10 on the 29th and 9.5 on the 30th. Holetschek gave the coma diameter as 3′ on the 28th and 29th, the tail length as 15–60′ on the 28th and 8–30′ on the 29th. Nijland said the tail extended 25′ in PA 244.8° on the 29th. F. Cohn (Königsberg, now Kaliningrad, Russia) said a distinct tail extended 12′ in PA 251° on the 30th. Kobold observed with the 46-cm refractor on the 31st and said the tail extended 15′ in PA 250°. On the 28th, Brooks said there was no trace of the two streamers seen early on the previous morning. He added that the nucleus was "remarkably sharp and well-defined, but seemed elongated or pear-shaped." E. E. Barnard (Yerkes Observatory, Wisconsin, USA) observed with the 102-cm refractor on the 30th and described the comet as very bright, with a bright, yellowish nucleus which was "elongated nearly in the direction of the tail." The coma was estimated as 30′ across, while the tail was 1° long in the finder. On the 31st, Barnard found the comet "very much brighter" than when observed on the 30th.

The comet was increasing its distance from Earth as August began, and, following the 3rd, it was also moving away from the sun. On August 1, Holetschek observed with a seeker and gave the magnitude as 6.6–6.7, while Nijland estimated it through binoculars as 7.0. J. Guillaume (Lyon, France) added that the comet was visible to the naked eye as a star of magnitude 6–7. Holetschek said the coma was 3′ across in the 15-cm refractor. The central condensation was generally estimated as between magnitude 8 and 9 by P. Chofardet (Besançon), Holetschek, K. Graff (Berlin, Germany), and Guillaume. Guillaume added that a stellar nucleus had a magnitude of 9.5–10. Nijland said the tail extended 25′ toward PA 249.3°, while Guillaume said it extended 20–25′ in PA 247°, with traces to 40′. On the 2nd, Guillaume said the comet seemed slightly fainter to the naked eye than on the previous morning. Chofardet, Graff, and Schwab indicated the central condensation had a magnitude of 8–9. Chofardet said the tail was 10–12′ long, while Guillaume noted it extended toward PA 250°. Barnard said the comet appeared fainter in the finder of the refractor on the 5th than at the end of July. He added that the nucleus "was not so definite and the head not so well developed." The nucleus was also described as "smaller and paler," with a magnitude near 10. Nijland estimated the magnitude as 7.1 using binoculars on the 6th, while Barnard remarked that the comet seemed "very much fainter." Barnard added that the nuclear magnitude was about 12. On August 7, Holetschek gave the total magnitude as 6.5, the

condensation magnitude as 9, the coma diameter as 2.5′, and the tail length as 30′. On the 8th, the total magnitude was given as 6.4 by Holetschek and 7.2 by Nijland. Holetschek said the coma was more than 2′ across, while the nuclear condensation was magnitude 9. Barnard said the nucleus was not stellar and was about magnitude 10, while Graff determined the nuclear magnitude as between 9.5 and 9.7. Nijland noted the tail extended 20′ toward PA 250.0°.

Observers reported interference from moonlight around mid-August, but the comet continued to be studied. On the 10th, the magnitude was given as 7 by Holetschek and 8 by Abetti. Abetti said the coma was 0.5′ across. Nijland said the tail extended in PA 256.1°. A. Scheller (Hamburg, Germany) saw the comet with the 26-cm refractor (127×) on the 11th and said the coma was about 1.5′ across, with a distinct nucleus of magnitude 9, and a short tail. Holetschek saw the comet on the 12th and gave the total magnitude as 7.2, the condensation magnitude as 9, and the tail length as 8′. Nijland said the tail extended in PA 259.1° on the 13th and PA 261.7° on the 14th. On the 15th, Nijland gave the total magnitude as 7.5, while Graff gave the nuclear magnitude as 10.2. K. H. Struve (Königsberg, now Kaliningrad, Russia) observed with a 33-cm refractor and said the comet's "fine nucleus" was about magnitude 11, while the tail was small, but easy to see. The final day of interference from moonlight came on August 16. The total magnitude was determined as 7.2 by Holetschek, Nijland, and S. L. Veenstra (Utrecht). The coma was estimated as 2′ across by Holetschek, while the nuclear magnitude was given as 10.2–10.4 by Graff. Several measures of the tail were obtained by Nijland. The 7-cm comet seeker (17×) revealed a length of 40–45′, while the 7-cm finder (22×) revealed the tail was extending toward about 265°.

The comet steadily faded during the remainder of August. Although excellent magnitude estimates were made by Holetschek, Nijland, and Veenstra, those of Holetschek were the most complete and are given here. Using a seeker, Holetschek gave the magnitude as 7.4 on August 17, 7.7 on the 19th, 7.5 on the 20th, 7.8 on the 21st, 7.9 on the 22nd, 7.8 on the 23rd, 8.0 on the 25th, 8.2 on the 26th and 27th, 8.3 on the 30th, and 8.5 on the 31st. Although the "nucleus" was reported by several observers, the observations of Graff seemed to have been best. He gave the "nuclear" magnitude as 10.3 on August 17, 10.2 on the 18th, 9.8 on the 19th, and 10.5–10.7 on the 22nd. Holetschek, using the 15-cm refractor, provided the only regular estimates of the coma diameter. He gave the diameter as 2′ on the 17th and 21st, 1.5′ on the 22nd, and 1′ on the 31st. The tail was observed by several astronomers during this period, but Holetschek's 15-cm refractor and Struve's 33-cm refractor revealed far less that did the 7.4-cm comet seeker (17×) used by Nijland and Veenstra. Nijland said the tail extended toward PA 269.3° on the 17th. Veenstra said it extended 36′ toward PA 272.7° on the 18th. Nijland noted it pointing toward PA 304.2° on the 23rd. Nijland gave the length as 72′ on the 24th. Nijland said the tail extended 83′ toward PA 349.9° on the

26th. Veenstra found the tail extending 100′ toward PA 349.6° on the 27th. On August 28, Nijland said the tail extended 78′ toward PA 11.8°, while on the 29th he noted it extended 90′ toward PA 23.0°. Veenstra reported the tail extended 78′ toward PA 25.8° on the 30th. Nijland noted the tail extending 50′ toward PA 23.5° on the 31st. Also important was that fact that Struve said the tail was 1–2′ wide on the 24th and about 2′ wide at a point 5′ from the coma on the 31st. The comet passed about 4° from the north celestial pole on August 26.

The best series of total magnitude estimates during September came from Holetschek, who continued to use the seeker. He gave the magnitude as 8.7 on the 3rd, 9.2 on the 14th and 15th, 9.3 on the 16th, 9.2 on the 17th, 9.5 on the 19th, 22nd, and 23rd, 9.7 on the 25th, and 10 on the 30th. Although Holetschek estimated the magnitude of the nucleus throughout the month with the 15-cm refractor, it was obvious that he was still catching a large amount of the condensation. Graff did not provide estimates of the "nuclear" magnitude with a large instrument, but Kobold did report the nucleus was magnitude 11 in the 46-cm refractor on September 18. The only estimates of the coma diameter came from Holetschek on September 27 and 30, when the 15-cm refractor revealed it was about 1.5′ across. Details on the comet's tail were again provided by several observers, with Nijland and Veenstra furnishing a fairly consistent series throughout the month. Nijland said the tail extended toward PA 33.9° on the 4th. Veenstra said it extended toward PA 45.0° on the 6th and 58.6° on the 14th. Nijland said the tail extended toward PA 42.8° on the 16th and 45.7° on the 23rd. There were few estimates of the tail length during the month, with Holetschek noting it was 12′ long on the 3rd and 10′ long on the 14th, while Schwab said it was 2′ long on the 16th. Holetschek simply described the comet as short and faint in the 15-cm refractor from September 15 to the 22nd. Struve reported on September 23 that the condensation had become less distinct in the 33-cm refractor.

Throughout October, Holetschek continued to estimate the magnitude of the comet using the seeker. He gave values of 10.3 on the 1st, 10 on the 2nd, 10.5 on the 5th, 10.8 on the 13th, 10.7 on the 16th, and 11.8 on the 24th and 28th. Also during October, Kobold gave the magnitude as 11 on the 15th, while Schur gave it as 11.5 on the 17th. Kobold added that a tail was still visible in the 46-cm refractor. R. R. E. Schorr (Hamburg Observatory, Bergedorf, Germany) observed with the 26-cm refractor (127×) on the 17th and described the comet as "faint, about 30″ across, with a faint eccentric condensation."

The comet was last detected on December 23.1, when R. G. Aitken (Lick Observatory, California, USA) spotted it with the 91-cm refractor after an unusual stretch of unfavorable weather. Although it was very close to its predicted position, a precise measure could not be made because it "was blotted out by rising fog." He estimated the magnitude as about 15.

The first parabolic orbits were independently calculated by G. J. Fayet and J. P. Möller. Fayet used positions obtained during the period July 24–27, and determined the perihelion date as 1900 August 3.50, while Möller used positions from July 25, 26, and 27, and gave the perihelion date as August 3.76. Further orbits by A. Scheller, A. Wedemeyer, C. D. Perrine, and S. K. Winther during the next few weeks established the perihelion date as August 3.7.

M. S. de Mello e Simas (1903) reduced about 400 positions obtained between July 24 and October 27 to eight Normal places. He then computed a hyperbolic orbit with a perihelion date of August 3.70 and an eccentricity of 1.000416. Perturbations by Venus to Saturn were applied. J. M. Poor (1903) reduced about 280 positions spanning the period of visibility to eight Normal places. He calculated a hyperbolic orbit with a perihelion date of August 3.70 and an eccentricity of 1.000329. Poor also demonstrated that, during the year prior to reaching perihelion, the eccentricity actually increased, as on 1899 June 4 it was 1.000133. Simas' orbit is given below. B. G. Marsden, Z. Sekanina, and E. Everhart (1978) took Simas' orbit and determined that the original orbit was elliptical with a period of 66 thousand years, while the future orbit was hyperbolic with an eccentricity of 1.00057.

T	ω	Ω (2000.0)	i	q	e
1900 Aug. 3.7005 (UT)	12.4225	329.4136	62.5342	1.014835	1.000410

ABSOLUTE MAGNITUDE: $H_{10} = 8.2$ (V1964), $H_0 = 8.64$, $n = 2.7$ (Kronk)
FULL MOON: Jul. 12, Aug. 10, Sep. 9, Oct. 8, Nov. 6
SOURCES: W. R. Brooks, *HCOB*, No. 70 (1900 Jul. 24); A. L. N. Borrelly and W. R. Brooks, *AN*, **153** (1900 Jul. 25), pp. 91–2; F. W. Ristenpart and J. P. Möller, *AN*, **153** (1900 Jul. 30), pp. 105–7; G. Bigourdan and G. J. Fayet, *CR*, **131** (1900 Jul. 30), pp. 326–8; W. R. Brooks and J. P. Möller, *The Observatory*, **23** (1900 Aug.), p. 323; G. J. Fayet, A. Scheller, A. Wedemeyer, W. Schur, E. Millosevich, M. Ernst, and F. Cohn, *AN*, **153** (1900 Aug. 6), pp. 121–4; A. L. N. Borrelly and J. Guillaume, *CR*, **131** (1900 Aug. 6), pp. 372–5; C. D. Perrine, *HCOB*, No. 72 (1900 Aug. 8); A. Sallet, P. Chofardet, and C. D. Perrine, *AN*, **153** (1900 Aug. 13), pp. 137–9; S. K. Winther, *AN*, **153** (1900 Aug. 15), p. 191; A. Scheller and A. Wedemeyer, *AN*, **153** (1900 Aug. 27), pp. 221–4; E. Marchetti and R. Höhl, *AN*, **153** (1900 Sep. 1), pp. 239–40; H. A. Kobold and W. Schur, *AN*, **153** (1900 Oct. 25), pp. 415–16; W. R. Brooks, *MNRAS*, **60** (1900 Supplement), pp. 609–11; R. G. Aitken, *AJ*, **21** (1901 Feb. 5), p. 80; O. Knopf, *AN*, **154** (1901 Feb. 28), pp. 365–72; J. Holetschek, *AN*, **155** (1901 May 13), pp. 267–70; J. Palisa, A. A. Nijland, and S. L. Veenstra, *AN*, **155** (1901 Jun. 3), pp. 343–4, 361–4; R. R. E. Schorr and A. Scheller, *AN*, **156** (1901 Jun. 22), pp. 51–8; H. A. Kobold, *AN*, **156** (1901 Jul. 2), pp. 91–4; K. Graff, *AN*, **157** (1901 Oct. 30), p. 23; F. Schwab and K. H. Struve, *AN*, **157** (1902 Jan. 7), pp. 267–70; M. S. de Mello e Simas, *AAB*, **1**, No. 4 (1903), p. 16; J. M. Poor, *AJ*, **23** (1903 Oct. 31), pp. 183–8; M. S. de Mello e Simas, *AJB*, **5** (1904), pp. 174, 188–9; E. E. Barnard, *AJ*, **41** (1931 Dec. 15), pp. 146, 150; V1964, p. 65.

21P/1900 Y1 (Giacobini–Zinner)
1900 III = 1900c

Discovered: 1900 December 20.81 ($\Delta = 0.89$ AU, $r = 0.99$ AU, Elong. = 64°)
Last seen: 1901 February 16.18 ($\Delta = 1.35$ AU, $r = 1.47$ AU, Elong. = 75°)
Closest to the Earth: 1900 December 14 (0.8801 AU)
Calculated path: AQR (Disc), CET (Jan. 2), ERI (Feb. 7)

M. Giacobini (Nice Observatory, France) discovered this comet on 1900 December 20.81, at a position of $\alpha = 22^h\ 32.0^m$, $\delta = -22°\ 00'$. He gave the daily motion as $+1°\ 30'$ in α and $+8'$ in δ.

E. Marchetti (Pula, Yugoslavia) observed the comet with a 15-cm refractor on December 24 and estimated the magnitude as 11.0. He said it was very small and "appeared similar to a diffuse star." There was also a weak central condensation. A. Abetti (Arcetri, Italy) observed the comet on the 24th and 25th, and described it as like an 11th–12th magnitude star surrounded by a faint nebula. R. G. Aitken (Lick Observatory, California, USA) observed the comet with the 30-cm refractor on December 25 and 27. He described it as faint and small, with an irregular outline. There was also "a condensation slightly preceding and south of the center." P. Chofardet (Besançon, France) observed the comet in moonlight on the 25th and described it as a round nebulosity 40–50″ across, which contained a stellar nucleus of magnitude 12. He said there was no tail. On the 26th, S. Javelle (Nice Observatory) estimated the magnitude as 10.5, while Abetti said the comet was excessively difficult to observe because of light from a nearly first quarter moon. R. T. A. Innes (Royal Observatory, Cape of Good Hope, South Africa) observed with the 46-cm refractor on the 27th and said the comet appeared as a "faint nebulous object 1′ in diameter but elongated." Aitken observed the comet with the 91-cm refractor on December 29. He estimated the total magnitude as 11 and noted a nucleus of magnitude 15. There was also a "short, fan-shaped extension in the north following quadrant."

The comet attained its most southerly declination of –23° on 1901 January 2. On the 10th, W. Valentiner (Königstuhl Observatory, Heidelberg, Germany) observed the comet with a 30-cm refractor under hazy skies and described it as very faint. On January 11, Abetti observed with a 28-cm refractor and said the comet was difficult to observe, but he could occasionally see a stellar nucleus of magnitude 13. On January 12, Abetti observed with a 28-cm refractor and described the comet as faint, with a point-like nucleus of magnitude 13.

The comet was last detected on February 16.18, when Aitken described it as very faint in the 91-cm refractor. He gave the position as $\alpha = 3^h\ 10.2^m$, $\delta = -14°\ 44'$. He carefully searched for the comet with the 91-cm refractor on March 8, but failed to see any trace of the comet.

The first parabolic orbits were calculated by H. C. F. Kreutz and J. Möller. They took positions from December 24, 26, and 29, and determined the perihelion date as 1900 December 3.12. A short time later, Aitken took three

positions from December 25, 27, and 29, and calculated a parabolic orbit with a perihelion date of December 1.91.

The first elliptical orbit was calculated by H. J. A. Perrotin, using positions spanning the period December 24–February 11. The result was a perihelion date of November 28.67 and a period of 6.76 years.

W. Abold and S. Scharbe (1907) calculated a definitive orbit. Taking positions spanning the entire period of visibility, they reduced them to nine Normal places, and determined an elliptical orbit. They gave the perihelion date as November 28.53 and the period as 6.52 years. A preliminary set of elements was calculated by R. H. Curtiss and C. G. Dall (1913). Although the orbit was very similar to that calculated by Abold and Scharbe, they gave the period as 8.16 years.

The comet was accidentally rediscovered in 1913 by E. Zinner. Astronomers quickly linked the two objects. Later, orbits using multiple apparitions and planetary perturbations were calculated by D. K. Yeomans (1971, 1972, 1986) and Y. V. Evdokimov (1972). These revealed a perihelion date of November 28.5 and a period of 6.46 years. Evdokimov showed that the comet had passed 0.19 AU from Jupiter on 1898 October 27. Yeomans' 1986 orbit is given below. Yeomans (1971, 1972) determined nongravitational terms of $A_1 = +0.05043$ and $A_2 = +0.011340$, using positions from 1900–46, and terms of $A_1 = +0.03172$ and $A_2 = +0.011537$, using positions from 1900–26. B. G. Marsden (1986) gave nongravitational terms of $A_1 = +0.10$ and $A_2 = +0.0349$.

T	ω	Ω (2000.0)	i	q	e
1900 Nov. 28.4965 (TT)	171.0457	198.1360	29.8295	0.931516	0.731570

ABSOLUTE MAGNITUDE: $H_{10} = 10.8$ (V1964)
FULL MOON: Dec. 6, Jan. 4, Feb. 3
SOURCES: M. Giacobini, *HCOB*, No. 74 (1900 Dec. 23); M. Giacobini, E. Marchetti, S. Javelle, H. C. F. Kreutz, and J. Möller, *AN*, **154** (1900 Dec. 31), pp. 161, 163; M. Giacobini and R. G. Aitken, *AJ*, **21** (1901 Jan. 8), p. 72; A. Abetti and R. G. Aitken, *AN*, **154** (1901 Jan. 17), pp. 193, 195; E. Marchetti, P. Chofardet, and W. Valentiner, *AN*, **154** (1901 Jan. 25), p. 207; R. G. Aitken, *AJ*, **21** (1901 Mar. 30), p. 120; A. Abetti, *AN*, **155** (1901 Jun. 10), p. 383; R. T. A. Innes, *AN*, **156** (1901 Oct. 3), p. 331; H. J. A. Perrotin, *CR*, **133** (1901 Oct. 14), pp. 580–2; W. Abold and S. Scharbe, *AJB*, **8** (1907), pp. 492, 520–1; R. H. Curtiss and C. G. Dall, *PlicO*, **7** (1913), pp. 41–5; V1964, p. 65; D. K. Yeomans, *AJ*, **76** (1971 Feb.), pp. 85–6; Y. V. Evdokimov and D. K. Yeomans, *IAUS*, No. 45 (1972), pp. 177, 182–3, 185; B. G. Marsden, *CCO*, 5th ed. (1986), pp. 65; D. K. Yeomans, *QJRAS*, **27** (1986 Mar.), p. 116.

C/1901 G1 (Great Comet)

Discovered: 1901 April 12.4 ($\Delta = 1.33$ AU, $r = 0.47$ AU, Elong. $= 16°$)
Last seen: 1901 June 14.71 ($\Delta = 2.12$ AU, $r = 1.31$ AU, Elong. $= 28°$)
Closest to the Earth: 1901 April 30 (0.8299 AU)