Comet P/1998 W2 (Hergenrother)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 11 23.13		C	18.2	FA	91.4	L	5		0.17		16.2s	69	SCO01
1998 11 23.14		c	21.0	FA	91.4	L	5						SCO01
1998 11 23.44		C	17.7	GA	60.0	Y	6	a240	0.3		0.6m	71	NAK01
1998 11 24.08		C	18.0	FA	91.4	L	5		0.15		40.8s	78	SCO01
1998 11 24.08		c	21.6	FA	91.4	L	5						SCO01
1998 12 19.07		C	18.2	FA	91.4	L	5		0.12		26.4s	77	SCO01
1998 12 19.07		c	21.6	FA	91.4	L	5						SCO01
1999 01 13.45		C	18.0	GA	60.0	Y	6	a240	0.3			60	NAK01

Comet P/1998 X1 (ODAS)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 20.84		C	17.9	TJ	18.0	L	6	a 60	0.35				YOS04
1998 12 21.74		C	18.7	GA	60.0	Y	6	a240	0.35				NAK01
1998 12 24.80		C	18.5	GA	60.0	Y	6	a240	0.3		0.9m	292	NAK01
1998 12 26.79		C	18.1	TJ	18.0	L	6	a120	0.25				YOS04
1999 01 21.76		C	18.5	GA	60.0	Y	6	a240	0.25		0.7m	306	NAK01
1999 01 22.77		C	18.2	TJ	18.0	L	6	a120	0.3				YOS04
1999 01 26.78		C	18.3	GA	60.0	Y	6	a240	0.3		0.7m	294	NAK01

Comet P/1998 Y1 (LINEAR)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1998 12 25.67		C	16.1	TJ	18.0	L	6	a 60	0.55				YOS04
1998 12 26.66		C	16.6	GA	60.0	Y	6	a240	0.5				NAK01
1998 12 26.66		C	16.7	TJ	18.0	L	6	a120	0.45				YOS04
1998 12 28.75		C	16.5	GA	60.0	Y	6	a240	0.6				NAK01
1998 12 29.19	!	J	16.6	SC	25.4	T	5	a 60	0.25	s3			ROQ
1999 01 05.67	1	C[	17.6	TJ	18.0	L	6	a180					YOS04
1999 01 10.51		C	17.3	TJ	18.0	L	6	a240	0.3				YOS04
1999 01 21.56		C	17.8	GA	60.0	Y	6	a120	0.3				NAK01

Comet P/1998 Y2 (Li)

DATE (UT)	N	MM	MAG.	RF	AP.	T	F/	PWR	COMA	DC	TAIL	PA	OBS.
1999 01 03.45		C	16.0	TJ	18.0	L	6	a 60	0.4				YOS04
1999 01 06.75		S[	14.5	HS	44.0	L	5	156					HAS02
1999 01 10.47		C	16.2	TJ	18.0	L	6	a 60	0.45				YOS04
1999 01 10.79		S	14.4	HS	35	L	5	207	0.7	3/			HOR02
1999 01 12.78		S	14.4:	HS	35	L	5	207	0.7	3			HOR02
1999 01 13.51		C	16.0	GA	60.0	Y	6	a120	0.55				NAK01
1999 01 14.12		J	16.3	SC	25.4	T	5	a 60	0.27	s5			ROQ
1999 01 21.46		C	16.3	GA	60.0	Y	6	a120	0.45			125	NAK01

Φ Φ Φ

Book Review

Solar System Astronomy in America: Communities, Patronage, and Interdisciplinary Research, 1920-1960, by Ronald E. Doel (Cambridge University Press), 280 + xxii pages; $59.95 hardbound, 1996 [ISBN 0-521-41573-X].

This scholarly book covers a period that represented a relative lull in solar-system studies in the United States; the entire history of astronomy up to and including the 19th century had included the moon and sun, the planets and their satellites, and comets and meteors as a very major and even predominant part of the field of astronomy, but the new astrophysics of the late-19th century and early-20th century had caused planetary and cometary studies to subside considerably. This book, then, concentrates on only about a dozen or so astronomers who worked extensively on solar-system astronomy in the period 1920-1960.

Though Doel writes on the study of planets and their formation, the moon, and meteors and meteorites, I shall concentrate this review on that section of the book in Chapter 4 (covering the years 1950-1955) that discusses the origin of comets — for which Gerard P. Kuiper, Fred L. Whipple, and Jan H. Oort are highlighted. Oort came out with extensive papers on a "cloud" of comets out to 50,000 AU from the sun at about the same time (1949-1950) that Whipple published his dirty-snowball models. This was to inaugurate the modern era of comet research. But Kuiper is perceived today

as having much to do with cosmogony studies, including that pertaining to the origins of comets. People frequently refer to the hundred-or-so trans-Neptunian objects (all but Pluto having been discovered in this present decade) as being "Kuiper-belt" objects — but is this really appropriate?

Of course, readers are likely to be now aware that K. E. Edgeworth preceded Kuiper by almost a full decade, with a paper in the *Journal of the British Astronomical Association* (**53**, 186), in speculating on a region of comets beyond Neptune: "It may be inferred that the outer region of the solar system, beyond the orbits of the planets, is occupied by a very large number of comparatively small bodies." Edgeworth (1949, *MNRAS* **109**, 600) gradually developed his thoughts on solar-system formation into a *Monthly Notices* paper (submitted in early June 1949 and published immediately), which included the following prominently in its abstract: "In the region outside the orbit of Neptune the [residue of] material [from the condensing solar nebula] would also be highly attenuated, and here again condensations would be small and numerous, but the progress of evolution was slower, and the region is probably populated by a very large number of small clusters. Wandering clusters make their appearance from time to time as comets." (Note that this was just prior to Fred Whipple's publication of his "dirty snowball" theory for cometary nuclei, and the loose "sandbank" model was still widely held among astronomers.) Later (page 609), Edgeworth remarked that "it is not unreasonable to suppose that this outer region [beyond Neptune] . . . is in fact a vast reservoir of potential comets." Meanwhile, though Edgeworth had published over seven years in highly-visible astronomical publications on the possibility of innumerable comets being located currently in a region just beyond Neptune, Kuiper's first published words on such a possibility did not appear until 1950-1951, and fleeting reference to Edgeworth did not appear in Kuiper's writings until 1953 (when he referred to the 1949 paper, briefly dismissing it as resembling a paper by Schmidt in 1944).

I add this information here because Doel does not mention Edgeworth at all in his book, and this would seem to be somewhat of a glaring omission in properly placing the context of these astronomical developments in the history of American planetary science (especially since Doel discusses the impact of Oort in depth). After all, astronomers in one country did not work in isolation from the work done elsewhere; the *Monthly Notices* of the Royal Astronomical Society would have to rank in the world's top three or four of the most widely-read professional astronomical journals in 1950, and it is odd to think that Kuiper would not have been aware of what had been published in the *Monthly Notices* (or even the *Journal* of the B.A.A.). In fact, it seems odd that Kuiper seemed to take great pains to state that he wrote his chapter for J. A. Hynek's 1951 *Astrophysics: A Topical Symposium* in November 1949, as if the timing were highly important;[1] and sure enough, Kuiper has references in his Hynek chapter to (and discussion of) papers published in 1950 by Oort and Whipple, so he evidently had time to change his contribution for Hynek's book considerably in 1950 — and there was opportunity to cite Edgeworth, though we may never know if Kuiper's failure to do so was part of a habitual pattern of improper or even unethical work, as portrayed by Doel in his controversy with Urey, or due to an amazing ignorance of Edgeworth's two papers. Indeed, Doel begins his book with the very public controversy that occurred between Kuiper and Harold C. Urey in the 1950s, in which Doel notes that Urey was "furious with Kuiper for what [Urey] regarded — not without justification — as a pattern of misleading citations to [Urey's] work". According to Doel (p. 142), "Urey seriously considered leveling a charge of plagiarism against Kuiper", and Urey complained to a third party that "Kuiper in his writings minimizes the work of other people in the field by referring to minor things they do with pinpointed references, and then includes their important work at other places without references, so that the reader infers it is his own work" (p. 144).

Much of the widespread reference to a "Kuiper belt" by astronomers in recent years has been by those who probably have not read all the literature by Edgeworth, Kuiper, Fred Whipple, Al Cameron, and others during the 1940s, 1950s, and 1960s on the matter of comets or planetesimals in a region beyond Neptune.[2] This is most unfortunate, because Kuiper does not appear to be the astronomer who most deserves to have his name associated with these trans-Neptunian objects, for which several distinct dynamical groups already appear to be evident (meaning that any single term may be inappropriate for all of the TNOs). Kuiper mainly spoke of this region as being a region of comet formation and existence early in the solar system, whereas the other three authors all specifically spoke of such a belt as *currently* being likely to still include a great many comets.[3] Kuiper did briefly speculate on the possibility of "one or more small planets, like Ceres" beyond $r = 38$ AU, and on "remnants" of a circular ring of comets being probably still left beyond $r = 50$ AU, but he thought that Pluto would have swept away objects that we now have found with semi-major axes 30-40 AU.[4]

In reality, on-going studies by numerous individuals gradually gave way to this picture — not the least of which was early thinking on the formation of the outer solar system by Whipple (1948, *Scientific American* **178**, 34) — and a

---

[1] Kuiper 1951, *Proc. Nat. Acad. Sci. U.S.A.* **37**, 14 (f.n. 5); Kuiper 1956, *JRASC* **50**, 115.

[2] I suspect that a major reason for this problem originates with Julio Fernández' highly-cited 1980 paper (*MNRAS* **192**, 481), in which Kuiper is given credit for "[pointing] out that such a belt would be the remnant of the outermost parts of the solar nebula". It appears that Fernández did not look very deeply into the literature on this matter. However, Fernández also deserves much of the credit for developing detailed studies in the 1980s for looking at how comets may have formed in the regions outward from Uranus, thereby re-focusing attention on the matter.

[3] In addition to Edgeworth's two papers cited above, see A. G. W. Cameron 1962, *Icarus* **1**, 67, and 1962, *Sky Tel.* **23**, 244; and F. L. Whipple 1964, *Proc. Nat. Acad. Sci.* **51**, 711 and **52**, 583. In 1972 [in *The Motion, Evolution of Orbits, and Origin of Comets*, ed. by G. A. Chebotarev *et al.* (Dordrecht: D. Reidel), p. 407], Whipple reminded astronomers that "because we still do not know whether such a comet belt exists, I hope that you will keep its possibility in mind". Even late in his life, Kuiper (1974, *Cel. Mech.* **9**, 324 and 346) did not seem to advocate the need for a current belt of objects, rather discussing such a region as a source for the original construction of comets.

[4] in *Astrophysics: A Topical Symposium*, ed. by J. A. Hynek (New York: McGraw-Hill), pp. 400-401. Also Kuiper 1951, *Proc. Nat. Acad. Sci.* **37**, 13. Even several years later, Kuiper (1956, *JRASC* **50**, 116) still spoke of a trans-Neptunian region of comets chiefly in terms of early-solar-system history.

the trans-Neptunian comet-disk theme. Whipple himself, in writing about the developments of models for a comet belt beyond Neptune in our 1985 book *The Mystery of Comets*, does not mention Kuiper at all (and says that the idea of a comet belt was a natural assumption to fall out of the work of Öpik, Oort, and the work of other contemporaries on comets including himself).

Yet Kuiper certainly did have some interesting ideas on comet formation, not really discussed by Doel; for example, he spoke of comets being formed in the primordial solar nebula throughout the heliocentric distances of the four giant jovian planets, the differing distances giving rise "to different genetic groups: solar-nebula comets, Neptune comets, Uranus comets, etc.", as Kuiper stated in a 1953 paper, involving varying "processes and time scales relevant to the shedding of these bodies [such that] some differences in composition are likely to exist between these groups [of comets], particularly in the carbon content",[5] though Urey's influence (via theoretical chemical models) may have been a factor here, too. I was interested to read of Doel's account regarding how Kuiper tried to visually determine the diameter of Pluto with the Palomar 200-inch reflector to see if its mass was large enough to sweep out a broad region of comets between $r = 30$ and 38 AU.

I was disappointed to see some significant typographical errors in Doel's book. For example, on page 126, he says that the Perseid meteor stream is associated with Halley's comet, and he attributes a 1950 *Sky and Telescope* article on "Pluto's Diameter" to Kuiper (page 258), when in fact it was an anonymous article evidently written by the magazine's staff (and the proper reference is to *Sky Tel.* **9**, 290, *not* **10**, 50).

But overall, *Solar System Astronomy in America* is an interesting read and shows a great deal of research by the author into original manuscripts and letters as well as published papers. — *D. W. E. Green*

Φ Φ Φ

DESIGNATIONS OF RECENT COMETS

Listed below, for handy reference, are the last 20 comets to have been given designations in the new system. The name, preceded by a star (⋆) if the comet was a new discovery (compared to a recovery from predictions of a previously-known short-period comet) or a # if a re-discovery of a lost comet. Also given are such values as the orbital period (in years) for periodic comets, date of perihelion, T (month/date/year), and the perihelion distance (q, in AU). Four-digit numbers in the last column indicate the *IAU Circular* (4-digit number) containing the discovery/recovery or permanent-number announcement.

Not included below are numerous recently-discovered comets observed only with the ESA/NASA Solar and Heliospheric Observatory (SOHO) spacecraft — and seen only close to the sun with the SOHO instruments — that are presumed to be Kreutz sungrazers that are no longer in existence (see lists and references in October 1997 *ICQ*, p. 286, and July 1998 *ICQ*, p. 160). [This list updates that in the October 1998 issue, p. 227.]

	New-Style Designation	*P*	*T*	*q*	*IAUC*
⋆	C/1998 P1 (Williams)		10/17/98	1.15	6986
⋆	C/1998 Q1 (LINEAR)		6/29/98	1.58	6995
⋆	P/1998 QP_{54} (LONEOS-Tucker)	8.6	10/6/98	1.88	7012
⋆	P/1998 S1 (LINEAR-Mueller)	9.1	11/2/98	2.55	7031
⋆	C/1998 T1 (LINEAR)		6/25/99	1.47	7026
⋆	C/1998 U1 (LINEAR)		5/2/98	4.0	7033
⋆	P/1998 U2 (Mueller)	8.7	10/20/98	2.02	7035
⋆	P/1998 U3 (Jäger)	14.9	3/10/99	2.13	7038
⋆	P/1998 U4 (Spahr)	13.2	2/27/99	3.84	7042
⋆	C/1998 U5 (LINEAR)		12/21/98	1.24	7044
⋆	P/1998 VS_{24} (LINEAR)	9.6	11/2/98	3.41	7071
⋆	P/1998 W1 (Spahr)	6.6	1/17/99	1.73	7052
⋆	P/1998 W2 (Hergenrother)	7.0	12/5/98	1.42	7057
⋆	C/1998 W3 (LINEAR)		10/6/98	4.9	7063
#	139P/1998 WG_{22} (Väisälä-Oterma)	9.5	9/27/98	3.4	7064
⋆	P/1998 X1 (ODAS)	6.8	7/20/98	1.98	7067
#	140P/1998 X2 (Bowell-Skiff)	16.2	5/14/99	1.97	7076
⋆	P/1998 Y1 (LINEAR)	108	11/21/98	1.75	7072
⋆	P/1998 Y2 (Li)	15.1	12/17/98	2.52	7075
⋆	C/1999 A1 (Tilbrook)		1/29/99	0.73	7084

[5] G. P. Kuiper 1953, *Proc. Nat. Acad. Sci.* **39**, 1156.