

Linear formulae are given by Couteau and van den Bos (*I.A.U. Inf. Cir.*, 3). Baize (*B.S.A.F.*, 68, 22) writes a note on how to compute a double star orbit, Dommange (*A. Obs. Belg.*, 3, VI, 41) gives an empirical method of improving the orbit of a visual binary, Muller (*I.A.U. Inf. Cir.*, 1-4) lists of double stars in need of re-measurement and of orbits planned, Rakowiecki (*Bull. Torun*, No. 12) formulae for computing the orbit and ephemeris of a visual binary and Vidal (*Urania*, 37, 70) a description of auxiliary apparatus for computing double star orbits.

Miscellaneous.—Ashbrook (*The Observatory*, 74, 213) has a note on hypothetical parallaxes of double stars, Strand (*A. J.*, 58, 229) on dynamical parallaxes from photographic observations, Duke (*A. J.*, 59, 184) on photographic blending of close binaries, Voûte (*J.O.*, 37, 113) on the use of the reversing prism in measurements of double stars, Wilson and Moore (*A. J.*, 59, 195) on an eyepiece interferometer for double star measurement. Hopmann gives a note on the magnitudes and colours of ADS 12345 (*Mitt. Wien*, 6, 93), photometry of 420 visual double stars (*Mitt. Wien*, 6, 105) and magnitudes and colours of visual double stars (*Mitt. Wien*, 6, 209).

Muller gives statistics of magnitude differences in visual double stars (*B.A.*, 18, 59), Wallenquist (*A. Uppsala*, 4, No. 2) a general catalogue of magnitude differences. Struve (*Sky & Tel.*, 13, 256 and 295) writes on spectra of visual double stars, Strand and Hall (*Ap. J.*, 120, 322) on visual binaries for the mass-luminosity relation, Deitch (*A. J. U.S.S.R.*, 30, 366) on the problem of the dark companion of 61 Cygni, Sharpless (*Ap. J.*, 119, 334) on multiple-star systems in emission nebulae and Wesselink (*M.N.*, 113, 505) on radial velocity observations and the parallax of α Centauri. Jonckheere has notes on double stars extracted from the Astrographic Catalogues (*J.O.*, 37, 31), the aim of double star measures (*The Observatory*, 73, 245) and a review of van Biesbroeck's latest series of double star measures (*The Observatory*, 74, 132). Jackson (*The Observatory*, 74, 77) writes on the measurement of double stars and Strand (*A. J.*, 59, 61) on the present status of double star astronomy.

W. H. VAN DEN BOS

COMETS (1954)

The twenty comets observed in 1954 included six new ones, and five periodic comets whose returns had been predicted. The two annual comets and seven of the discoveries of the previous year were also under observation.

The annual comet Schwassmann-Wachmann (1) was observed at Yerkes in February, March and May as a diffuse coma of magnitude 16.5-17. It was seen at Lick on March 4 and April 29, on which date the comet had a faint fan-shaped coma extending 0'.5 west of an 18th magnitude nucleus. Although no outbursts of light are indicated during the current year, plates taken at Sonneberg with the Schmidt camera reveal two outbursts (previously reported) on 40 plates taken up to 1953 May 20. Comet Oterma was observed at Yerkes (August 10) and at McDonald (October 24). It showed a faint narrow tail 40" long (magnitude 19) and a Palomar Sky Survey plate recorded the same appearance on August 30. Plates taken at Lick in July, August and September all show a nearly stellar nucleus of magnitude 17.5 with a faint slender tail 0'.5 long towards position angle 250°.

1953 a, Mrkos-Honda, was last seen at Lick on January 1.
(Observations 1953 April 12 to 1954 January 1)

1953 b, P/Brooks (2), was recorded on February 5 (magnitude 19, Van Biesbroeck) at McDonald.

(Observations 1953 June 18 to 1954 February 5)

1953 c, periodic comet Pons-Brooks, remained at about magnitude 11 during January and February, but showed another surge of brightness during March—the fourth such rise since discovery. It seems likely that this comet will provide much material for study. At Sonneberg 83 plates, including 70 with the Schmidt camera, were taken up to March 9; these include three pairs of plates taken with different colour filters, and three exposures with a 3-degree objective prism. A long series of visual photometric observations was also made by Max Beyer at Bergedorf. The general impression is given that the comet was less bright than was expected. It was last seen at Yerkes on April 23, when the magnitude was estimated at 6.4; a tail 30' long, pointing northwards, could be seen in spite of the low altitude. This description is confirmed by Beyer, but his magnitude estimate would make the comet brighter than this. A. Jones reported the comet in New Zealand on June 22, and the last measures appear to be those at Cordoba on September 4.

(Observations 1953 June 20 to 1954 September 4)

1953 d, periodic comet Reinmuth, was recovered in July and plates were taken at Lick and Yerkes. The comet was round, about 0'.2 in diameter, magnitude 17 to 18. A faint tail extension in position angle 20° was reported by Van Biesbroeck, on October 26. The last observation was made in November at Lick.

(Observations 1953 July 5 to 1954 November 25)

1953 f, periodic comet Encke, was seen on February 4–5 at McDonald as a small round nebulosity of magnitude 19. It was also reported in July by A. Jones and a position is given by Bruwer at Johannesburg on July 27 in *UAIC* 1480.

(Observations 1953 September 3 to 1954 July 27)

1953 g, Abell, was under almost continuous observation until September 16, when it was last seen at Cordoba. At the beginning of the year it was of magnitude 12.5 and it continued to grow brighter. In May, magnitude estimates vary from 9 to 11, and at Yerkes the comet was seen to have a coma 2' in diameter, and a complex tail structure. There was a well-defined narrow tail some 12' in length in position angle 64° (also mentioned by Beyer) and a shorter and much broader streamer towards 340° —almost at right angles to the first. The whole sector between the two tails was filled with material streaming from the nucleus. The same structure persisted into June, and is described in detail by Abell in *P.A.S.P.*, **66**, 253, 1954. The comet was photographed on June 30 with the 48-inch Schmidt camera at Palomar, its magnitude being estimated at about 6. The magnitude estimates at this time are, however, very discordant. The comet was subsequently seen in the southern hemisphere, particularly in New Zealand, Johannesburg, and Cordoba. At Sonneberg, 68 plates of this comet were taken up to May 27, including a number with colour filters, and some with the objective prism. Beyer has recorded another long series of visual estimates of brightness, and positions have been measured at many European observatories.

(Observations 1953 October 15 to 1954 September 16)

1953 h Pajdušáková had faded completely and was not found in spite of searches at Heidelberg, Bergedorf and Yerkes.

(*Observations 1953 December 3 to end of 1953 only*)

1953 i, periodic comet Finlay, was photographed on March 4 at Lick as a moderately condensed round nebulosity $0\cdot3$ in diameter, of magnitude 17. It was last seen by Van Biesbroeck at Yerkes on April 1.

(*Observations 1953 December 7 to 1954 April 1*)

1954 a, periodic comet Honda-Mrkos-Pajdušáková 1948 XII, was recovered by Van Biesbroeck on a pair of plates taken by Miss D. Jehoulet with a 5-inch Ross lens at McDonald Observatory on February 4. It was later learned that the comet had been located by T. Mitani at Kwasan on January 28. The elements of the 1948 orbit were uncertain and the unexpected fading of this comet after its previous perihelion passage made any estimate of its magnitude doubtful. Ephemerides based on various assumptions were published by Merton, and these led eventually to the recovery of this short-period comet. At the time of recovery, the poorly defined coma of diameter about $1'$ had a faint narrow tail that could be traced to a distance of $12'$ in position angle 75° . On February 8 the comet showed a similar appearance on a Lick photograph, but it had faded to magnitude 11.5 by February 20. When last seen at Lick on March 31 it was difficult to measure, having a weak nucleus in a round diffuse coma of diameter $0\cdot4$, magnitude 17. It was seen at Yerkes on April 1, but no trace of the comet was found on April 23, when it must have been fainter than magnitude 18.

(*Observations January 28 to April 1*)

1954 b, periodic comet Borrelly, which has not been seen since 1932, was recovered by Elizabeth Roemer at Lick on February 8, after several unsuccessful searches. The magnitude was estimated at 18.5, and the comet had a sharply defined coma with a distinct tail in a north-west direction. At McDonald, Van Biesbroeck recorded the comet on February 26 and March 2 as a round diffuse coma of magnitude 19. Two plates obtained at Lick on March 4 with a two hour exposure showed the comet as a slightly diffuse object of magnitude 19.5. No further measures have been reported.

(*Observations February 8 to March 4*)

1954 c, the first new comet of the year, was discovered by Robert G. Harrington on two photographs taken for the NGS-Palomar Sky Survey on June 24 with the 48-inch Schmidt camera. Following the discovery of a comet at this observatory, an attempt is made to obtain three further observations with the same telescope. On this occasion the observations of June 25, 26 and 28 were communicated to Cunningham at the Leuschner Observatory, and these form the basis of his preliminary orbit. The comet at discovery was a diffuse object of magnitude 19. Six further plates were taken at Lick by Miss Roemer, and it should therefore be possible to improve the initial elements. On July 31 the comet, of magnitude 18.5, had an almost stellar appearance, while the last observation on August 31 showed a diffuse coma of diameter $0\cdot2$ and magnitude 19.

(*Observations June 24 to August 31*)

1954 d was found on June 26 by L. Kresák at Skalnaté Pleso in the course of systematic searches with the 4-inch Somet-Binar binoculars. The comet was independently discovered by L. G. Peltier on June 29—the twelfth cometary discovery that he has made. It appeared as a large round nebulosity with an eccentrically placed nucleus of magnitude 8.4 (Beyer). It was photographed at Lick on June 30 and was also seen in the 36-inch refractor, but was so diffuse as to be more readily visible in the 4-inch finder than in the large telescope. In the early days of July observations of the comet were made at many centres, and all agree that the large diffuse coma of 10' or more in diameter was of about magnitude 9. The comet then seems to have faded rapidly; and although it was seen at Yerkes and Johannesburg, Bruwer reported it as diffuse and difficult on July 31. Three observations were made in August at Cordoba, and a Lick photograph on October 9 with a 5-minute exposure showed a round coma 1' in diameter with a poorly defined nucleus, magnitude 13. The last observation seems to be that of Kresák at Skalnaté Pleso on October 24, and no trace of the comet was found on October 29 (Skalnaté Pleso), October 30 (Greenwich), November 25, 29 and 1955 January 15 (Lick—the last with 70 minutes' exposure). (*Observations June 26 to October 24*)

1954 e, periodic comet Faye, was recovered by Van Biesbroeck on plates taken with the 24-inch reflector at Yerkes on July 25. It then presented an almost stellar image, slightly elongated, and of magnitude 17. A plate taken on July 1 at Lick also shows the comet with a nearly stellar coma and a faint tail 0.8' long in position angle 260°, magnitude 17.8. The comet grew somewhat brighter and reached magnitude 16 in August and 15 in November. On December 24 (Yerkes) it was of magnitude 14, and had a tail 45" long in position angle 65°. The comet was still under observation in 1955 January–February. (*Observations July 25 to end of year, continuing*)

1954 f was discovered by Miss Margaret Vozárová (now Mrs Kresáková) at Skalnaté Pleso on July 28 in the course of systematic searches. The comet was of magnitude 9.5 and had no visible tail or nucleus. It was observed at many places during the succeeding weeks, but seems to have faded rather rapidly. On August 2 it was photographed at Sonneberg and at Skalnaté Pleso, and then showed a narrow straight tail about 10' long directed *towards* the Sun (position angle 155°) with only a short prolongation in the opposite direction. Van Biesbroeck at Yerkes also recorded a slender tail 15' long in position angle 160° in August, and estimated the magnitude as about 9.5. Beyer followed it at Bergedorf until September 27, but it was not seen there on October 3. At Lick on September 30 it appeared as a round coma 0.2' in diameter, magnitude 16, and had a faint fan-shaped tail 0.7' long in position angle 60°. At McDonald, using the 82-inch reflector, Van Biesbroeck observed the comet on October 27; it was then of magnitude 16.5 and still showed a trace of tail in position angle 95°. The last observation appears to be a Lick photograph on December 18, when the comet appeared as a stellar coma of magnitude 18.5. (*Observations July 28 to December 18*)

1954 g, periodic comet Schwassmann-Wachmann (2), was recovered by H. M. Jeffers and Miss Roemer at Lick on July 28. It then appeared as a small nearly stellar coma of magnitude 18, but it became brighter in the next few

months and at the end of October (Lick) was of magnitude 16 with a faint fan-shaped tail 0'·5 long. It was still under observation at the end of the year, in a good position, and displayed a broad tail 1' long in position angle 280° .

(Observations July 28 to end of year, continuing)

1954 h was discovered by Walter Baade on two 48-inch Schmidt plates taken for him by George O. Abell at Palomar on July 31. The comet was then in Ursa Minor, and was a diffuse object of magnitude 15 with a short tail in position angle 135° . It had brightened to magnitude 15 by the end of November (Lick); on December 24 it was estimated at magnitude 13 (Yerkes) and still had a short broad tail. Since perihelion passage does not occur until 1955 August, this circumpolar comet may be expected to grow brighter and be observable over a long period.

(Observations July 31 to end of year, continuing)

1954 i was discovered by Van Biesbroeck on September 1 on a pair of plates taken with the 24-inch reflector at Yerkes. The plates were exposed in order to locate the minor planet 1953 GC; this object was not found, but the comet appeared in its place. It showed a small round coma, fairly well condensed, of magnitude 15, and it was moving quite slowly near the ecliptic. Some difficulty arose in determining the elements from the initial short arcs, but an orbit by Cunningham, using a 27-day arc, showed that this was another periodic comet with a small inclination and a period of 14 years. The comet was followed at Yerkes until November 28 (magnitude 18·5, small round coma 3" diameter), but a later photograph at Lick on 1955 January 15 shows a nearly stellar object of magnitude 19. The position agrees well with Cunningham's original orbit, but it is understood that revised elements give a period of 12·4 years. Further observations may be possible at the opposition of 1955 October.

(Observations September 1 to end of year, continuing)

1954 j is the return of periodic comet Wirtanen, 1947 XIII, and it was recovered by C. A. Wirtanen himself on a plate taken with the 20-inch astrograph at Lick on September 8. The faint image could not be confirmed until September 26, when measures of the diffuse image were made by Jeffers with the Crossley reflector. The recovery of this comet is particularly gratifying and arises from Merton's work on the 1948 orbit. Using Lick observations covering 54 days, he computed a new orbit which had a period $6\frac{1}{2}$ months shorter than that given originally by Cunningham. The comet would therefore be at perihelion in the autumn of 1954, and the application of approximate perturbations computed by W. E. Beart gave a value of $T=1954$ August 15. These values enabled ephemerides to be computed and led to the successful recovery of the comet within 1' of the predicted place. The comet was last recorded by Van Biesbroeck at McDonald on October 26 as an extremely diffuse coma 30" in diameter and magnitude 19, and also at Lick on October 28, where the images of magnitude 19·5 were difficult to measure. An exposure of two hours at Lick on 1955 January 27 failed to show the comet.

(Observations September 8 to October 28)

1954 k was discovered on the night of December 17–18 at Tonantzintla Observatory by Guillermo Haro, the Director of the Tonantzintla and Tacubaya Observatories, and Enrique Chavira, Assistant Astronomer. The Schmidt

camera (26-inch correcting plate, 32-inch mirror) was being used in the study of flare stars in the dark clouds in Taurus, and on each plate five exposures are given of 10 minutes each in order to detect rapid variations in brightness of any of the stars in the field. The discovery plate thus shows five images of the comet, and it was measured at Yerkes by Van Biesbroeck. It showed a well condensed coma 15" in diameter with a faint tail 30" long in position angle 200° , the magnitude being 15.5. The comet was observed at Lick and Yerkes early in 1955 and is likely to be under observation for some time.

(Observations December 17 to end of year, continuing)

Unsuccessful searches were made during the year at Lick, Yerkes, McDonald and other observatories for comets 1953 a, 1953 e, 1953 h, and for periodic comets Neujmin (2) and Olbers. The return of the last of these had been predicted by Rasmusen, but Van Biesbroeck failed to find it on October 4 with the 82-inch at McDonald, although stars down to magnitude 20 were recorded.

The numerical designation of comets (in order of perihelion passage) has recently been extended by the I.A.U. Bureau (*UAIC* 1490, 1493). The list that follows continues that given in *M.N.*, **114**, 366, 1954. The perihelion dates (*T*) are from orbits noted in these annual reports.

Comet	<i>T</i>	Name	Year and letter
1950 I	Jan. 19.3	Johnson	1949 a
II	June 6.4	P/d'Arrest	1950 a
III	July 15.7	P/Oterma	...
IV	July 22.7	P/Reinmuth (1)	1949 f
V	Aug. 23.8	P/Daniel	1950 d
VI	Oct. 23.6	P/Wolf (1)	1950 c
VII	Dec. 18.9	P/Arend-Rigaux	1951 b
1951 I	Jan. 15.0	Minkowski	1950 b
II	Jan. 30.5	Pajdušáková	1951 a
III	Mar. 16.2	P/Encke	1950 e
IV	May 9.4	P/Tuttle-Giacobini-Kresák	1951 f
V	May 26.9	P/Neujmin (3)	1951 g
VI	Sept. 8.7	P/Pons-Winnecke	1951 c
VII	Oct. 20.4	P/Kopff	1951 e
VIII	Oct. 25.5	P/Tempel (2)	1951 d
IX	Oct. 30.4	P/Harrington-Wilson	1952 a
X	Nov. 23.3	P/Arend	1951 j

The table giving the elements of cometary orbits is arranged very much as in previous reports. Comets are listed in order of perihelion date; the symbol P/ indicates a periodic comet, and *p* after the perihelion date that the elements were predicted ones. The perihelion date deduced from observations in such a case will be found in the notes appended.

Ref.	Comet	T (U.T.)	q	e
(1)	1930 III Wilk	1930 Mar. 28.7997	0.481809	0.992193
(2)	1930 VI P/Schw.-Wach. (3)	1930 June 14.1953	1.011426	0.672673
(3)	1932 V Peltier-Whipple	1932 Sept. 1.8571	1.037210	0.976549
(4)	1946 V P/Giacobini-Zinner	1946 Sept. 18.4991	0.995677	0.716677
(5)	1947 XIII P/Wirtanen	1947 Dec. 2.9305	1.634940	0.540492
(6)	1948 XI Eclipse Comet	1948 Oct. 27.4271	0.135420	0.999935
(7)	1950 VI P/Wolf (2)	1950 Oct. 23.6522	2.497584	0.396372
(8)	1954 b P/Borrelly	1953 June 8.7304	1.448467	0.604383
(9)	1954 c Harrington	1954 Jan. 18.8727	2.113315	1.0
(10)	1954 a P/Honda-Mrkos-P.	1954 Feb. 6.2p	0.55552	0.81520
(11)	1954 i P/Van Biesbroeck	1954 Feb. 11.7726	2.353287	0.597467
(12)	1953 c P/Pons-Brooks	1954 May 22.8905	0.773930	0.954802
(13)	1954 f Vozárová	1954 June 1.9343	0.677080	1.0
(14)	1953 g Abell	1954 July 7.3648	0.969964	1.0
(15)	1954 j P/Wirtanen	1954 Aug. 13.621p	1.625156	0.542106
(16)	1954 d Kresák-Peltier	1954 Aug. 29.6718	0.746437	1.0
(17)	1954 g P/Schw.-Wach. (2)	1955 Feb. 27.292p	2.150081	0.384536
(18)	1954 e P/Faye	1955 Mar. 3.582p	1.651866	0.565249
(19)	1954 h Baade	1955 Aug. 13.2109	3.870352	1.0
(20)	1954 k Haro-Chavira	1956 Feb. 4.2663	3.861266	1.0

REFERENCES AND NOTES TO TABLE OF ELEMENTS

- (1) Comet Wilk, 1930 III. G. Schrutka-Rechtenstamm, *Mitt. Univ.-Stern. Wien*, **6**, 175, 1953. Definitive, revised (differing from *UAIC* 1081) including perturbations Venus to Saturn; 174 observations arranged in 11 normal places, arc of 102 days.
- (2) Comet P/Schwassmann-Wachmann (3), 1930 VI. D. Kalnina, *Astr. Circ. (U.S.S.R.)*, No. 145, *UAIC* 1447.
- (3) Comet Peltier-Whipple, 1932 V. G. Schrutka-Rechtenstamm, *Mitt. Univ.-Stern. Wien*, **7**, 41, 1954. Definitive, 353 observations in 17 normal places, arc of 140 days. The mean of the three best sets of elements is given here.
- (4) Comet P/Giacobini-Zinner, 1946 V. C. Dinwoodie, *Handbook B.A.A.*, 1952. Revised orbit by differential correction of F. R. Cripps's elements, using selected 1946 observations.
- (5) Comet P/Wirtanen, 1947 XIII. G. Merton, *UAIC* 1474. Revised elements based on 9 observations, 54-day arc.
- (6) Eclipse Comet, 1948 XI. W. P. Hirst, *M.N.(A.S.S.A.)*, **13**, 33, 1954. Definitive, including perturbations Venus to Saturn, 120 observations in 27 normal places, arc of 146 days.
- (7) Comet Wolf (1), 1950 VI. M. Kamiński, *MS*. Definitive, representing all observations 1925 to 1951.
- (8) Comet Borrelly, 1954 b. M. Sumner, *MS*. New elements based on 10 observations over 24 days, with approximate perturbations 1932 to 1954.
- (9) Comet Harrington, 1954 c. L. E. Cunningham, *UAIC* 1464. Preliminary elements, arc of 3 days only.
- (10) Comet P/Honda-Mrkos-Pajdušáková, 1954 a. G. Merton, *UAIC* 1428. Predicted elements based on 1948 orbit with approximate perturbations by Jupiter and Saturn. Observations indicate $T = \text{Feb. } 5.087 \text{ U.T.}$
- (11) Comet P/Van Biesbroeck, 1954 i. L. E. Cunningham, *UAIC* 1478. Preliminary elements from 27-day arc.

Cometary Orbits

Period (years)	ω	Ω	i	Equinox	Epoch of Osculation	Ref.
485	$46^{\circ}9499$	$90^{\circ}2627$	$67^{\circ}1419$	1930.0	1930 Apr. 2.0	(1)
5.43	$192^{\circ}3189$	$76^{\circ}7814$	$17^{\circ}4036$	1930.0	1930 June 10.0	(2)
294	$38^{\circ}4715$	$344^{\circ}5130$	$71^{\circ}7120$	1932.0	1932 Aug. 19.0	(3)
6.59	$171^{\circ}8310$	$196^{\circ}2833$	$30^{\circ}7302$	1950.0	1946 Sept. 17.0	(4)
6.71	$343^{\circ}5184$	$86^{\circ}5099$	$13^{\circ}3562$	1950.0	...	(5)
...	$107^{\circ}2618$	$210^{\circ}3318$	$23^{\circ}1222$	1950.0	1948 Nov. 25.0	(6)
8.42	$161^{\circ}1456$	$203^{\circ}8793$	$27^{\circ}3162$	1950.0	1950 Oct. 6.0	(7)
7.01	$350^{\circ}7279$	$76^{\circ}2147$	$31^{\circ}1125$	1950.0	1954 Feb. 27.0	(8)
...	$4^{\circ}0200$	$293^{\circ}0229$	$136^{\circ}9208$	1954.0	...	(9)
5.21	$184^{\circ}117$	$233^{\circ}088$	$13^{\circ}197$	1950.0	...	(10)
14.1	$129^{\circ}9095$	$149^{\circ}3283$	$6^{\circ}8236$	1954.0	...	(11)
70.86	$199^{\circ}0233$	$255^{\circ}1913$	$74^{\circ}1782$	1950.0	1953 July 22.0	(12)
...	$357^{\circ}2280$	$122^{\circ}1855$	$116^{\circ}1581$	1954.0	...	(13)
...	$194^{\circ}4015$	$2^{\circ}3985$	$53^{\circ}2215$	1954.0	...	(14)
6.69	$343^{\circ}5189$	$86^{\circ}4854$	$13^{\circ}3772$	1950.0	1954 Aug. 14.0	(15)
...	$254^{\circ}7209$	$74^{\circ}9229$	$88^{\circ}5568$	1954.0	...	(16)
6.53	$357^{\circ}8555$	$126^{\circ}0080$	$3^{\circ}7250$	1950.0	1955 Feb. 22.0	(17)
7.41	$200^{\circ}5715$	$206^{\circ}3125$	$10^{\circ}5533$	1950.0	1955 Mar. 4.0	(18)
...	$144^{\circ}6537$	$264^{\circ}6960$	$100^{\circ}3908$	1954.0	...	(19)
...	$61^{\circ}4923$	$72^{\circ}2918$	$77^{\circ}9558$	1955.0	...	(20)

- (12) Comet P/Pons-Brooks, 1953 c. Peter Musen, *HAC* 1249. Elements from current observations (independent of prediction or previous apparition). Eight observations, arc of 293 days, including perturbations by Jupiter.
- (13) Comet Vozárová, 1954 f. I. Hasegawa, *UAIC* 1486. From 19 observations in 3 normal places, arc of 90 days.
- (14) Comet Abell, 1953 g. S. Kanda, *UAIC* 1478. From 8 observations in 3 normal places, arc of 248 days.
- (15) Comet P/Wirtanen, 1954 j. W. E. Beart, *MS*. Prediction from Merton's 1948 elements (ref. (5) above) with perturbations by Jupiter and Saturn. Observations indicate $T = \text{Aug. } 13.54 \text{ U.T.}$
- (16) Comet Kresák-Peltier, 1954 d. G. Merton, *B.A.A. Circular* 355. Preliminary elements, 6 observations, arc of 12 days.
- (17) Comet P/Schwassmann-Wachmann (2), 1954 g. C. Dinwoodie, *MS*. Corrected values of his prediction in *Handbook B.A.A.*, 1954. Observations indicate $T = \text{Feb. } 27.126 \text{ U.T.}$
- (18) Comet P/Faye, 1954 e. W. E. Beart, *Handbook B.A.A.*, 1954. Based on Cunningham's 1947 elements with perturbations by Jupiter and Saturn. Observations indicate $T = \text{March } 4.636 \text{ U.T.}$
- (19) Comet Baade, 1954 h. L. E. Cunningham, *UAIC* 1489. From 3 normal places, arc of 109 days.
- (20) Comet Haro-Chavira, 1954 k. L. E. Cunningham, *UAIC* 1489. Represents 6 observations, arc of 9 days.

ADDITIONAL NOTES

Individual Comets

- 1898 VII Coddington-Pauly. Erik Sinding: "The future orbit of Comet 1898 VII (Coddington-Pauly)", *Pub. Copenhagen Obs.*, No. 161, 1953.
- 1908 III Morehouse. P. Stumpff has a note on "Motion in the tail of Comet Morehouse" in *Mitt. der A.G.*, 1953, 17 (10), 1954.

- 1916 I P/Taylor. V. A. Bronshten : "Comet Taylor 1916 I", *Ast. Circ. (U.S.S.R.)*, No. 149, 1954. He suggests identity of the two parts of this comet with 1951 b (=1950 VII P/Arend-Rigaux) and 1952 a (=1951 IX P/Harrington-Wilson).
- 1925 II P/Schwassmann-Wachmann (1). N. Richter : "Outbursts of brightness of Comet 1925 II and their relation to the sun's activity", *Ast. Nach.*, **281**, 241, 1954. See also a note by the same author in *Mitt. der A.G.*, 1953, 16 (9), 1954.
- 1925 VII Shajn-Comas Solá. I. V. Galibina : "Determination of original orbit of Comet 1925 VII", *Bull. Inst. Theor. Astron.*, **5**, 412, 1953. He obtained $1/a = +0.0000662$, 1913 March 13, using integration of rectangular coordinates. M. Y. Shmakova : "Investigation of the form of the orbit of Comet 1925 VII (Shajn-Comas Solá)", *ibid.*, p. 420. She confirmed Galibina's work fairly closely back to 1919, by numerical integration of Lagrangian equations. Both started from Sakk and Kulikoff's definitive orbit for 1925.
- 1930 IV Beyer. M. A. Dirikis : "The determination of the original orbit of Comet 1930 IV Beyer", *A.Ž. (U.S.S.R.)*, **31**, 461, 1954. He found original $1/a = +0.0005$.
- 1950 VII P/Arend-Rigaux. See 1916 I above.
- 1951 IX P/Harrington-Wilson. See 1916 I above.
- 1952 b P/Grigg-Skjellerup. A. F. Jones : "Comet P/Grigg-Skjellerup", *Southern Stars*, **16**, 28, 1954. He gives magnitude estimates for the 1947 and 1952 apparitions.
- 1951 i Wilson-Harrington. A. F. Jones : "Comet Wilson-Harrington", *Southern Stars*, **16**, 56, 1954. Magnitude estimates.

General

- O. V. Dobrovolsk : "Electrostatic fields in the heads of comets", *A.Ž. (U.S.S.R.)*, **31**, 167, 1954.
- "Ionisation in comets"; *ibid.*, p. 324.
- A series of papers by this author appears in *Bull. Stalinabad Obs.*, Nos. 9, 10, 11, 1954 : these deal with the photometry, polarized light and illumination of comets, acceleration in tails of comets, and statistics of comets.
- I. Dominski at Poznan has carried the orbit of 1925 I Orkisz back to 1919 and finds the original orbit an ellipse in agreement with the work of E. Strömgren.
- M. Kamienski continues his exhaustive studies of P/Wolf (1) and his work on P/Halley, which he hopes to carry back to 2320 B.C.
- F. Kepinski continues his calculations on P/Kopff, with the assistance of M. Bielicki. The main part of this work, linking the six apparitions of this comet, has already been completed, but the close approach to Jupiter in 1954 (within 0.1 unit) will entail much laborious calculation.
- H. Hurnik (Poznan) has investigated the distribution of the perihelia of 451 comets, with conclusions that are in good agreement with those of S. Oppenheim, but which do not confirm those of M. Bourgeois.
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