TABLE 2 DATA ON PLATES

Group	Plate Center α	Plate Center δ	Epochs of Plates	
	h m	°		
1	0 12	43	1908 Dec. 22	1924 Oct. 31
2	0 10	38	1907 Aug. 30	1924 Oct. 25
3	0 35	40	1910 July 8	1924 Oct. 27
4	1 39	57	1904 Oct. 2	1924 Dec. 26
5	2 2	35	1904 Oct. 28	1924 Nov. 18
6	2 7	58	1904 Sept. 15	1924 Oct. 31
7	4 9	50	1904 Oct. 2	1924 Dec. 24
8	4 25	19	1905 Sept. 8	1924 Dec. 27
9	3 50	40	1904 Nov. 1	1925 Jan. 14
10	5 30	10	1906 Jan. 25	1925 Feb. 13
11	14 40	+ 28	1904 Apr. 16	1925 May 14
12	7 5	− 12	1905 Feb. 26	1925 Feb. 13
13	6 6	+ 25	1904 Oct. 13	1925 Feb. 16
14	5 45	+ 32	1905 Mar. 31	1925 Feb. 17
15	6 9	+ 12	1905 Feb. 23	1925 Mar. 14
16	9 17	+ 17	1906 Nov. 24	1925 Mar. 19
17	17 36	− 13	1908 June 29	1925 June 18

as 0″.40, and brighter than 13.0 magnitude, within the areas examined, have been detected. For fainter stars the uncertainty of detection increases. An exposure of one hour under good conditions with the 10 in. BRUCE objective has been found sufficient to show stars of the 16th magnitude. The average length of exposure of the plates examined is 2 hours, so that motions of stars as faint as the 15th magnitude, near the center of the field, are not difficult to detect.

In order to increase the certainty of detection of the larger proper-motions, especially near the edge of the plate, where the images are astigmatic, a red filter is found useful. This is interposed in the path of the beam from one of the plates, and the blinking lever adjusted so that the observer sees both plates at the same time. When the adjustment is correct, it will be found that all objects common to the two plates are dark on a slightly reddish background, and that all other objects appear either red or blue. An object on the plate covered by the red filter will appear blue, while an object on the other plate will be red. Accordingly, with this method, search for stars of large proper-motion, and for variables and novae, consists in a search for colored images. Now it happens that when the proper-motion is very large, and the time interval between the plates also large, detection of the star by the blink method becomes difficult, for the blink characteristic, a slashing motion across the retina, becomes lost, being replaced by the milder physiological phenomenon associated with variables and novæ. Thus, PROFESSOR BARNARD, when he found the star of very large proper-motion in OPHIUCHUS, now bearing his name, thought at first that he was dealing with a variable star, the two images being so far apart that their connection was not apparent. In the case of another experienced blink observer, a proper-motion nearly as large was entirely missed on a first examination of the plate. It would seem that in such cases as these the color method would be useful. A further field of usefulness would be in detection of differences in structure and position of spectral lines.

In making exposures on plates of this large size, trouble was experienced with poor focusing, which was found to be due to variation in the amount of the concave bending of the plate, variations as great as 2 mm. being measured. This difficulty was overcome by the insertion of a micrometer screw in the back of the plateholder. This is set at a reading corresponding to the thickness of the plate, which is quickly and easily measured in a red light by means of a graduated V-slot, made in a brass plate. Each plate is thus forced up to such a position that its coated surface may be made either plane or concave by a fixed amount, as desired. A slight concavity, to extend the field of good definition, is deemed preferable. Since the coated surface of photographic plates is always concave, due to the powerful contracting force of the gelatine in drying, perfect uniformity of focal setting is secured.

In Table I the co-ordinates of the proper-motion star are given for the epoch 1925, referred to the equinox of 1875. The magnitudes are in general photographic, and are merely estimates. As a check, data with respect to an identifying star are given in columns 6 to 8. The differentials in columns 7 and 8 are the co-ordinates of the proper-motion star with respect to the identifying star. Table II is self explanatory.

Attention should be called to Nos. 3 and 4 in Table 1. These stars form a wide double, of separation 30″. They show motion in opposite directions, perpendicular to the line joining them, the fainter star showing the larger motion. The motions indicated, however, are so small that they need confirmation. If correct, the possibility of a physical system is suggested. Check plates for confirmation are being secured with the 40-inch telescope.

Yerkes Observatory,
July 2, 1925.

NEW VARIABLE STARS,

BY FRANK E. ROSS.

The variable stars listed below, believed to be new, have been detected by the writer from a comparison of plates taken by E. E. BARNARD with those recently secured by the writer. The plates were obtained with the BRUCE photographic telescope of the Yerkes Observatory. The fields were secured in duplicate, with 10-inch and 6-inch lenses, so that photographic defects are eliminated. The Zeiss Blink Comparator was used for detection. From the rich store of plates with this instrument left by BARNARD, it is possible to follow the history of many of these variables. It will be noted that the last 20 in the list, Nos. 18 to 37, are in the same region of the sky, on a single plate. This region contains the long-period variable RT Serpentis, independently discovered by WOLF in 1917 and by BARNARD in 1919. It is quite likely that many of these variables are of similar nature.

The magnitudes given are only rough estimates. The character of the light-variation in each case will be determined from further observations.

No.	Equinox 1875 α	Equinox 1875 δ	Mag.	Date	Mag.	Date
	h m s	° ′				
1	0 11 10	+ 44 27.3	<15	1908 Dec. 22	13.5	1924 Oct. 31
2	3 45 53	+ 48 13.6	12	1904 Sept. 16	14	1924 Dec. 24
3	3 49 19	+ 43 48.4	<15	1904 Nov. 1	12.5	1925 Jan. 14
4	3 54 1	+ 42 29.5	11	1904 Nov. 1	15	1925 Jan. 14
5	4 2 0	+ 53 48.7	<15	1904 Sept. 16	12.5	1924 Dec. 24
6	5 36 24	+ 8 40.4	10	1906 Jan. 25	13	1925 Feb. 13
7	5 36 58	+ 8 5.6	14	1906 Jan. 25	12	1925 Feb. 13
8	5 37 25	+ 10 15.7	11	1906 Jan. 25	15	1925 Feb. 13
9	5 37 45	+ 6 48.6	<15	1906 Jan. 25	11	1925 Feb. 13
10	7 28 14	− 10 33.2	<13	1905 Feb. 26	10	1925 Feb. 13
11	6 11 56	+ 25 46.6	<15	1904 Oct. 13	13	1925 Feb. 16
12	6 16 19	+ 25 5.5	15	1904 Oct. 13	13	1925 Feb. 16
13	6 17 20	+ 24 59.1	<15	1904 Oct. 13	12	1925 Feb. 16
14	5 47 55	+ 32 7.9	12	1905 Mar. 31	<15	1925 Feb. 17
15	5 56 23	+ 13 44.2	<15	1905 Feb. 23	11	1925 Mar. 14
16	5 57 6	+ 8 14.8	11	1905 Feb. 23	10	1925 Mar. 14
17	6 12 12	+ 15 45.7	<15	1905 Feb. 23	13	1925 Mar. 14
18	17 16 5	− 12 45.1	13	1908 June 29	<15	1925 June 18
19	17 16 7	− 12 41.0	12	1911 May 1	15	1925 June 18
20	17 18 36	− 14 7.7	<15	1908 June 29	11	1925 June 18
21	17 19 1	− 14 9.5	13	1911 May 1	<15	1925 June 18
22	17 19 39	− 15 18.6	<15	1911 May 1	13	1925 June 18
23	17 19 40	− 14 28.7	<15	1908 June 29	14	1925 June 18
24	17 25 41	− 14 31.8	14	1908 June 29	<15	1925 June 18
25	17 28 32	− 14 37.6	14	1908 June 29	<15	1925 June 18
26	17 29 52	− 15 1.7	14	1908 June 29	<15	1925 June 18
27	17 31 52	− 15 2.7	12	1908 June 29	15	1925 June 18
28	17 32 35	− 13 9.4	15	1908 June 29	13	1925 June 18
29	17 32 53	− 14 50.0	14	1911 May 1	<15	1925 June 18
30	17 33 21	− 12 2.8	14	1908 June 29	<15	1925 June 18
31	17 34 33	− 16 43.1	<15	1908 June 29	12	1925 June 18
32	17 36 18	− 9 56.1	13	1908 June 29	<15	1925 June 18
33	17 37 4	− 14 2.4	13	1908 June 29	15	1925 June 18
34	17 38 35	− 13 45.4	<15	1908 June 29	14	1925 June 18
35	17 38 37	− 16 3.9	12	1908 June 29	<15	1925 June 18
36	17 40 1	− 13 37.3	14	1911 May 1	<15	1925 June 18
37	17 48 30	− 13 35.4	15	1908 June 29	12	1925 June 18

Yerkes Observatory,
July 6, 1925.