SWIFT'S COMET.

The comet discovered by Swift on the 10th of October last, has again attracted general attention from the announcement by Mr. Chandler in *Special Circular No.* 7, to SCIENCE OBSERVER, that it seems to be identical with Comet III., 1869 (Tempel), and from the announcement by the Astronomer Royal to the Smithsonian Institution, of a comet discovered by Lohse, at Lord Lindsay's observatory, Dun Echt, November 7, which proves to be an independent discovery of the same object. It has already been followed for nearly a month by astronomers in America, and its elements were computed by Mr. Chandler as accurately as possible from the data at hand.

The following observations made by Prof. Eastman with the Transit Circle of the Naval Observatory, Washington, together with the resulting elements and ephemeris computed by Mr. Upton, have been kindly furnished for publication.

COMET, SWIFT, 1880.

Observations made with the Transit Circle at the Naval Observatory, Washington, D. C.:

	R. A. H.	M.	S.	DECL.		
October 25	21	50	8.74	+ 28°	29′	4″.9
November 1	22	12	33.12	35°	32′	48″.1
" 7	22	45	6.26	42°	26′	8″.3

ELEMENTS.

T=1880. Nov. 8.00411, Wash. M. T.

π= 42° 2′ 13″
Ω=295 48 23 } Mean Eq. 1880.0.
ι= 7 22 16

log. q=0.04220.

COMPUTATION OF MIDDLE PLACE.

	OBS.	COMP.
$d\lambda \cos\beta$ =		— 15″
$d\beta$ =		+ 4″

EPHEMERIS. WASHINGTON—MEAN MIDNIGHT.

DATE.	R. A. H.	M.	S.	DECL.			Intensity of Light.
1880—November 16	0	13	15	+ 52°	8′.7		1.11
" 20	1	7	41	54	31.2		1.08
" 24	2	5	44	54	59.6		0.99
" 28	2	59	22	53	38.8		0.86
December 2	3	43	26	51	2.5		0.72
" 6	4	17	21	47	50.5		0.58

In order to show the remarkable accordance with the elements of III., 1869, we give the elements of this latter comet as published by Dr. Bruhns, Astron. Nach. 1788:

COMET III., 1869.

T = 1869, Nov. 20. 85426. Berlin, M. T.

π = 41° 17′ 12″.5
Ω = 292° 40′ 28″.8 } Mean Eq. 1870.0
ι = 6° 55′ 0″.0

log. q. = 0.042416.

Assuming the two to be identical, and the comet to move in an eclipse having a period of 12 days less than 11 years, we shall have—

Semi-major axis = 4.93589
Eccentricity = 0.7767.

The intensity of light on November 7 is taken as unity. On this scale the intensity on October 10, when the comet was discovered, was 0.36. It reaches a maximum brightness about November 16, and it is probable that observations can be continued till near the end of the year, before the comet becomes too faint.

It presents an ill-defined disc, several minutes in diameter, but owing to the brightness of the moon, it can be seen for the next week, only with the larger instruments. If the identity of these two comets is finally established, and there seems to be no reasonable doubt of it now, a recomputation of the elements, embodying all the reliable observations made in 1869, will be very desirable, and will doubtless soon be undertaken. W. C. W.

WASHINGTON, *Nov.* 15, 1880.

THE NEW PERIODIC COMET.

This comet, discovered by me at midnight of October 10–11, is destined, from present indications, to become one of considerable celebrity, notwithstanding it will not be visible to the naked eye. The computation of the elements of its orbit reveals the fact that they are almost identical with those of Comet III., 1869, and hence it becomes what in astronomical language is called a periodic comet. This will have a period of not over 11, and probably only 5½ years, in which case it must have returned unobserved to perihelion about the middle of the year 1875. In either case it will be a periodic comet of short period.

I am indebted to the kindness of Prof. S. C. Chandler, Jr., of Boston, for the following set of elements, which, however, owing to the inexact determinations of the three positions used for their computation, must, of course, be considered only as approximations. They are, no doubt, near enough to the truth to establish the fact that Comet IV., 1880, is a return of Comet III., 1869, for it is almost an impossibility for two different comets to come into our system possessing physical characteristics so similar, and having elements so nearly alike. I copy both sets of elements for comparison:

Per. passage.	Comet III., 1869. Nov. 20.854.	Comet IV., 1880. Nov. 7.714.
	° ′ ″	° ′
Lon. per	41 17 12.5	41 41
Lon. node	292 40 28.8	295 25.4
ι	6 55 0	7 21.7
Log. q	0.042416	0.04262
Motion.	Direct.	Direct.

If the above supposition regarding the identity of the two comets be true, it will add another to the list of periodic comets, bringing the number up to eleven. Their names are as follows:

Name.	Period.
Halley's	76.75 years.
Encke's	3.30 "
Winnecke's	5.54 "
Brorsen's	5.58 "
Biela's	6.61 "
D'Arrest's	6.64 "
Tempel's (1867)	6.00 "
Tempel's (1873)	5.16 "
Faye's	7.44 "
Tuttle's	13.66 "

From the above list I have rejected Dé Vico's comet, which should not have been placed there, as the supposed periodicity has never been verified by an observed return.

There can be but little doubt that to this list should be added comet I, 1880, commonly called the great South American comet, with elements and general appearance almost identical with the great comet of 1843, one of the most remarkable comets mentioned in history. It was seen in the daytime, close to the sun's limb, glowing like a coal of fire. Of all known comets, it has made the nearest approach to the sun. It was truly said of it: "It exhausted its head in the manufacture of its tail," for it was nearly all tail.

As an evidence of the advance which cometary astronomy has made in our times, it may be stated that up to 1822 one only, (Halley's) periodic comet, was known. The number of such is doubtless very great, in fact computation makes the number several hundred, but until

verified by actual returns to perihelion, the question of periodicity cannot be affirmed with positiveness. Every few years a new one is added to the list, but during the centuries and milleniums which are to come, the number must swell to thousands.

Prof. Chandler is computing a new set of elements from more trustworthy data, but, as the comet is running well with those first published, the new set will probably differ but little from the first. The discovery of this comet was immediately cabled to Europe, and I have received official announcement that the cablegram was duly received, but it seems that it was not discovered there until November 7, when, not knowing but it might possibly he a new one, it was cabled here as such.

It has never, to my knowledge, been published in this country, that the Vienna Academy has rescinded its offer of prizes for the discovery of comets; therefore I expect no gold medal for the discovery of this, but your readers may be surprised, perhaps pleased, to learn that Mr. H. H. Warner, the well-known medicine man, who is building the new observatory for my use, gave me his check for $500 for its discovery. This, together with the three gold medals awarded me by the Imperial Academy of Sciences of Vienna, is a partial remuneration for the labor and the unknown suffering endured from cold and want of sleep during the many years I have followed comet seeking in the open air, with no protection from the piercing winds of our northern winters.

The following are a few positions of the comet from Chandler's ephemeris for Washington midnight.

	h. m. s.	° ′
November 20.....	1 9 18	Dec. + 54 3
24.....	2 6 19	54 25
28.....	2 58 39	53 3

LEWIS SWIFT.

ROCHESTER, *Nov.* 17, 1880.

COMET E 1880.

This comet, discovered by Mr. Swift on October 10th, proves to be an interesting object. An orbit has been computed by Mr. Winslow Upton, of the Naval Observatory, from the observation made here by Professor Eastman, and there can be no doubt that this is a return of the comet discovered by Mr. Tempel, November 27, 1869, since the elements of the two orbits are very nearly alike. The periodic time of this comet is therefore nearly eleven years, and its mean distances from the sun is a little less than that of Jupiter. A. HALL.

WASHINGTON, *Nov.* 11, 1880.

ASTRONOMICAL NOTES.

THE corrections employed in reducing the double star observations of M. Otto Struve, given in Vol. IX., of the Poulkova observations were only provisional. Since the publication of that volume definitive corrections have been computed by M. Dubiago, and the corrected results are now published as an appendix.

AT the meeting of the American Association this Summer, Professor Stone gave a description of the continuation of Argelander's *Durchmusterung* now in progress at the Cincinnati Observatory. The zone will extend from 23° to 31° south declination. A four inch equatorial is employed.

PART III of the *Astronomical Papers prepared for the use of the American Ephemeris and Nautical Almanac* is devoted to Master Michelson's determination of the velocity of light. A minute description of the apparatus employed is given, together with the determination of the errors to which the observations were subject. In the latter part of the work several objections to the plan followed by Foucault are considered.

VOL. VI, of the *Annales de l'Observatoire de Moscow* contains an interesting series of observations of Jupiter made during the opposition of 1879. Nearly forty drawings are given, twenty-seven of which were made at times when the large red spot was visible.

AN attempt to photograph stellar spectra was made by Drs. Huggins and Miller, as long ago as 1863, but not with the best of success. Dr. Huggins has published in the last volume of the Philosophical Transactions, the results of a recent, and this time successful, attempt, and at the end of the paper has given a map of the spectra of several of the stars observed. These are α Lyrae, Sirius, η Ursae Majoris, α Virginis, α Aquilae, α Cygni, and Arcturus. With the exception of the latter these are all white stars and were observed on account of the remarkable circumstance of the absence of the K line in one of the earlier photographs of Sirius. "The photographs present a spectrum of twelve very strong lines. Beyond these lines a strong continuous spectrum can be traced as far as S, but without any further indication of lines. The least refrangible of these lines is co-incident with the line (ζ) of hydrogen near G. The next line in order of greater refrangibility agrees in position with h of the solar spectrum. The thirdl ine is H, K, if present at all, is thin and inconspicuous. The nine lines which follow do not appear to be co-incident with any of the stronger lines of the solar spectrum." The symmetry of arrangement of these lines is such as to suggest that they are the spectrum of a single substance, perhaps hydrogen.

The spectrum of Arcturus is very different from that of the other stars named, but quite similar to that of the sun. The spectrum is crowded with a vast number of fine lines, and in further contrast with the class of white stars the line K is very broad and winged and more intense than H. Beyond K the lines are broader and more intense and arranged more or less in groups with fine lines between. Although the crowding continues as far as the spectrum can be seen on the plate the position and arrangement of the lines beyond H is quite different from those in the solar spectrum.

Photographs of the spectra of Venus, Mars and Jupiter were also taken, but these showed no modification whatever of the solar light. In the case of the moon most of the photographs presented differences in the relative intensity of the ultra violet region, but nothing that could be taken as evidence of the existence of a lunar atmosphere. O. S.

Prof. C. A. Young, of Princeton, has been fortunate enough to obtain one of the finest large-crown glass discs ever cast. It is of French manufacture, 22 inches in diameter and without a flaw. Alvan Clark & Sons are finishing it for the new Princeton refractor.

Dr. B. A. Gould, Director of the Cordoba Observatory, Argentine Republic, was in Boston, November 3, on a visit to this country and returns to Cordoba on the steamer of the 27th November. His address is 110 Marlboro street, Boston.

Dr. Elkin, whose work on the Parallax of α Centauri has been previously noticed, is spending a few weeks in Washington. He expects to leave shortly for the Cape of Good Hope, where he will continue his investigations upon the Parallax, using for that purpose Lord Lindsay's four-inch Heliometer, which he is to take out with him.

W. C. W.