Measures of Position.

Greenwich Mean Solar Time.			Greenwich Sidereal Time.			Position-angle.	
h	m	s	h	m	s	°	'
11	17	4	2	43	54	229	34
11	44	45	3	11	39	228	8
12	15	30	3	42	29	226	21
12	39	36	4	6	39	226	27*

The satellite, once found, was an easy object at greatest elongation. It became very difficult before the last observations, as the definition was then much impaired. It bore a fair amount of illumination in the field, but the measures were taken in a dark field, the wires only being bright. The determination of the position-angle was much more difficult and less certain than that of the distance. *Mars* was observed through a dark glass, which was placed in front of the eye-piece and covered half the field. Power employed, 295.

Observer, Mr. Maunder.

Royal Observatory, Greenwich,
1880, Jan. 9.

The Greenwich Standard Right Ascensions.

By A. M. W. Downing, Esq.

The Greenwich Standard Right Ascensions now in use are based on a determination of the right ascensions of clock-stars in which only those observations were included where the group of clock-stars extended over 12 hours at least. These results would presumably be independent of the assumed places of the clock-stars, and may be considered as the best standard places of fundamental stars which can be obtained from the Greenwich observations in the years 1868 to 1876.

These right ascensions are given in the Introduction to the Greenwich Nine-Year Catalogue.

I have thought that it would be interesting and instructive to compare these Greenwich places with the right ascensions of the fundamental stars as given by some of the most eminent authorities, in order to show the differences that exist, not only in the adopted equinoxes of the several Catalogues, but also in the places of individual stars. For this purpose I have selected for comparison the Standard Catalogues published by Newcomb, by Gylden, and by Auwers. Newcomb's Catalogue is given in the volume of *Washington Observations* for 1870, Gylden's in the *Monthly Notices* for 1875, May, and Auwers' in the *Publication der Astronomischen Gesellschaft*, No. xiv.

* Rough bisection; satellite becoming very difficult to observe.

The comparison with Newcomb shows plainly enough, from the constancy of the differences all through, that the places in the two Catalogues are not affected by any appreciable error of a periodic character depending either on the right ascension or on the declination. The resulting mean correction to Newcomb is $-^s.029$; this, therefore, is the difference between the adopted equinoxes of the Catalogues. If this correction be applied, the individual results are found to agree very closely; the only cases of a correction exceeding $^s.02$ being α *Canis Minoris* $+^s.023$ (on account of its orbital motion, this star should perhaps be rejected altogether), α^2 *Libræ* $+^s.027$, and α *Lyre* $-^s.024$. In *Monthly Notices*, 1875, Suppl. Number, Professor Newcomb points out that the mean correction to his right ascensions from the Greenwich observations of the Sun, 1836–1870, is $-^s.028$, so that very little change seems to have taken place in the position of the Equinox as found from the more recent observations.

In the comparisons with Gylden and Auwers, I have only used the stars that are given by Newcomb, as these are sufficiently numerous to determine the difference between the adopted equinoxes, and the Greenwich places may safely be assumed to be sensibly free from periodic error; so that the places of many stars are unnecessary, it being no part of my present object to determine the periodic errors (if any such exist) of the other Catalogues. Gylden's right ascensions agree closely with Greenwich, the differences are nearly constant through the 24 hours, and the mean correction is $-^s.016$; when this is applied the only individual stars that stand out are β *Orionis* $-^s.024$, α^2 *Libræ* $+^s.030$, and β *Aquilæ* $+^s.026$. Auwers' *Catalog der Fundamental-Sterne* gives for mean correction $-^s.026$, and we then have for α *Arietis* the correction $-^s.021$, for α *Leonis* $+^s.025$, and for α *Lyre* $-^s.028$.

It appears then that the most important difference between the Greenwich right ascensions and the places furnished by these distinguished astronomers, with which they are compared, is a difference in the adopted equinoxes, and this is really the puzzling circumstance in all determinations of right ascension. By the exercise of a due amount of care in the methods of observation and of reduction it is possible, practically, to get rid of the errors affecting the relative right ascensions of stars; but it has hitherto been found impossible wholly to eliminate the errors which affect the absolute right ascensions. As an illustration of the difficulty in this matter, I may refer to the table on page 3 of the Introduction to the Greenwich Nine-Year Catalogue, from which it appears that the corrections to the assumed equinox from observations of the Sun ranged from $+^s.058$ in 1873 to $-^s.049$ in 1874, and the mean error of the resulting correction from the nine-years' observations is as much as $\pm^s.012$. The following results, extracted from Nyrén's *Das Äquinocetium für 1865.0*, in which that astronomer determines the equinox from the Pulkowa Observations of the Sun, 1861–1870, with his usual care and completeness, will also illustrate the difficulty of making a satisfactory determination.

Pulkowa (1865) — Greenwich (1836–70) =	^s +0.064
— Pulkowa (1845)	= +0.055
— Edinburgh	= +0.036
— Cambridge	= +0.030
— Paris	= +0.011
— Washington	= -0.002

This remarkable difference between Greenwich and Washington is also pointed out by Newcomb in the paper referred to above.

We must, I suppose, consider these discordances to arise from casual errors of observation. It is, however, much to be wished that more Observatories would co-operate in the work of continuous meridian observation of the Sun and principal stars, and especially valuable would be the results of observations made at stations where the Sun culminates at a considerable altitude when near the Equator.

Corrections to three selected Catalogues, derived from a Comparison with the Greenwich Standard Right Ascensions of Clock-Stars, based on 12-hour Groups.

Name of Star.	Newcomb (1872).		Gylden (1875).		Auwers (1875).	
	I. s	II. s	I. s	II. s	I. s	II. s
α Andromedæ	—0.34	—0.05	—0.07	+0.09	—0.34	—0.08
γ Pegasi	0.32	0.03	0.01	0.15	0.28	0.02
α Arietis	0.45	0.16	0.19	—0.03	0.47	0.21
α Ceti	0.47	0.18	0.34	0.18	0.35	0.09
α Tauri	0.26	+0.03	0.23	0.07	0.12	+0.14
β Orionis	0.20	0.09	0.40	0.24	0.16	0.10
β Tauri	0.26	0.03	0.22	0.06	0.18	0.08
α Orionis	0.27	0.02	0.36	0.20	0.18	0.08
α Canis Min.	0.06	0.23			0.06	0.20
β Geminorum	0.33	—0.04	0.34	0.18	0.33	—0.07
α Hydræ	0.18	+0.11	0.19	0.03	0.27	0.01
α Leonis	0.26	0.03	0.20	0.04	0.01	+0.25
β Leonis	0.12	0.17	0.09	+0.07	0.10	0.16
α Virginis	0.28	0.01	0.25	—0.09		
α Boötis	0.38	—0.09	0.12	+0.04	0.35	—0.09
α^2 Libræ	0.02	+0.27	+0.14	0.30		
α Coronæ	0.45	—0.16	—0.17	—0.01	0.36	0.10
α Serpentis	0.35	0.06	0.22	0.06	0.26	0.00
α Scorpii	0.27	+0.02	0.18	0.02		
α^1 Herculis	0.35	—0.06	0.20	0.04	0.34	—0.08

Name of Star.	Newcomb (1872).		Gylden (1873).		Auwers (1875).	
	I. s	II. s	I. s	II. s	I. s	II. s
δ Ophiuchi	·036	·007	·026	·010	·042	·016
ϵ Lyrae	·053	·024	·011	+·005	·054	·028
γ Aquilæ	·038	·009	·010	·006	·027	·001
α Aquilæ	·036	·007	·018	--·002	·027	·001
β Aquilæ	·025	+·004	-·010	+·026	·013	+·013
α^2 Capricorni	·018	·011	-·005	·011		
α Aquarii	·026	·003	·006	·010	·028	-·002
α Piscis Aust.	·027	·002				
α Pegasi	-·023	+·006	-·001	+·015	-·015	+·011

The numbers under the columns headed I are the actual differences between the Catalogue places, those under the columns headed II are the differences when a constant correction of $-^s\cdot029$ is applied to Newcomb, $-^s\cdot016$ to Gylden, and $-^s\cdot026$ to Auwers.

1879, Jan. 8.

On the Effects of "Personality" on the Tabular Errors of the Moon. By E. Dunkin, F.R.S.

In Mr. Neison's interesting Paper on the effects of personality on the Greenwich tabular errors of the Moon (*Monthly Notices*, vol. xl. pp. 75-80) there are one or two points having reference to some expressions and deductions of mine contained in a Paper inserted in vol. xxix. of the *Monthly Notices*, on which I think I ought to make a few remarks, principally, however, in the way of explanation. The subject has for many years been one of considerable interest to me, since, in fact, the year 1848, when the remarkable personal equation in observing the limbs of the Moon between Mr. H. Breen and myself was first noticed.

The first point to which I wish to call attention is the paragraph in Mr. Neison's Paper in which he states that "it appeared that Mr. Dunkin had based his investigation on the assumption that 'the mean tabular errors are assumed to be constant throughout the mean lunation.' It is now known that this assumption is not a permissible one, for the tabular errors are not constant throughout the mean lunation, but that, owing to imperfections in the theory, they are systematically different before and after full Moon." Through a fault of my own in the construction of the sentence, Mr. Neison has been led unfortunately to misunderstand my meaning in the above quotation, for the information I intended to convey to the reader was, "provided the (relative) mean tabular errors are assumed to be constant