

**CIHM/ICMH
Microfiche
Series.**

**CIHM/ICMH
Collection de
microfiches.**



Canadian Institute for Historical Microreproductions / Institut canadien de microreproductions historiques

© 1983

Technical and Bibliographic Notes/Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

- ☐ Coloured covers/
Couverture de couleur
- ☐ Covers damaged/
Couverture endommagée
- ☐ Covers restored and/or laminated/
Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/
Le titre de couverture manque
- ☐ Coloured maps/
Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/
Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/
Planches et/ou illustrations en couleur
- ☒ Bound with other material/
Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion
along interior margin/
La reliure serrée peut causer de l'ombre ou de la
distortion le long de la marge intérieure
- ☐ Blank leaves added during restoration may
appear within the text. Whenever possible, these
have been omitted from filming.
Il se peut que certaines pages blanches ajoutées
lors d'une restauration apparaissent dans le texte,
mais, lorsque cela était possible, ces pages n'ont
pas été filmées.
- ☐ Additional comments:/
Commentaires supplémentaires:

L'institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages/
Pages de couleur
- ☐ Pages damaged/
Pages endommagées
- ☐ Pages restored and/or laminated/
Pages restaurées et/ou pelliculées
- ☒ Pages discoloured, stained or foxed/
Pages décolorées, tachetées ou piquées
- ☐ Pages detached/
Pages détachées
- ☒ Showthrough/
Transparence
- ☐ Quality of print varies/
Qualité inégale de l'impression
- ☐ Includes supplementary material/
Comprend du matériel supplémentaire
- ☐ Only edition available/
Seule édition disponible
- ☐ Pages wholly or partially obscured by errata
slips, tissues, etc., have been refilmed to
ensure the best possible image/
Les pages totalement ou partiellement
obscurcies par un feuillet d'errata, une pelure,
etc., ont été filmées à nouveau de façon à
obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
						X					

The copy filmed here has been reproduced thanks to the generosity of:

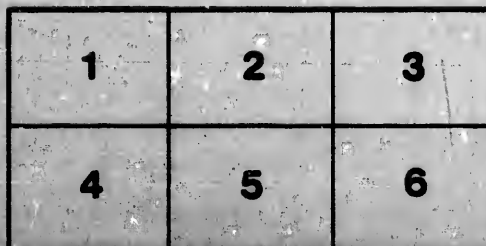
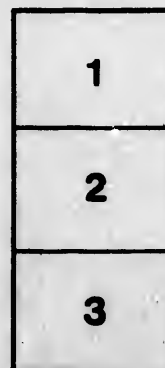
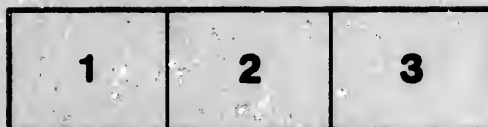
University of Alberta
Edmonton

The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol $\Rightarrow$ (meaning "CONTINUED"), or the symbol ∇ (meaning "END"), whichever applies.

Maps, plans, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:



L'exemplaire filmé fut reproduit grâce à la générosité de:

University of Alberta
Edmonton

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole $\Rightarrow$ signifie "A SUIVRE", le symbole ∇ signifie "FIN".

Les cartes, plans, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.

*Reprinted from the MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY,
Vol. LIV. No. 5.*

REMARKS UPON MR. STONE'S PROPOSED COR-
RECTIONS TO THE MEASURE OF TIME SINCE
1864.

BY

PROFESSOR SIMON NEWCOMB.

Remarks upon Mr. Stone's Proposed Corrections to the Measure of Time since 1864. By Professor Simon Newcomb.

In the December number of the *Monthly Notices* Mr. Stone presents a very able and elaborate statement of certain corrections which he claims should be applied to the adopted measure of time from and after the beginning of 1864, together with the resulting corrections to the tabular places of the Moon derived from Hansen's tables. The great importance of the question raised by Mr. Stone seems to make it only respectful to him that I should once more state the difficulty in the way of accepting his conclusions.

The following numbers are extracted from Mr. Stone's paper on page 4 of the *Monthly Notices* for November, which give the results of certain Radcliffe observations of the Moon, made in 1892:—

Date, 1892 January 6.

					m	s
Correction to be subtracted from M.T. for change of Sidereal						
Time at Mean Noon since 1864	...	...	...	...	41	51
Observed Right Ascension of the Moon	...	...	...	...	49	19.57
R.A. from Hansen's Tables for uncorrected Mean Times	...	...	...	...	20	93
Hansen minus observed uncorrected	...	...	...	...	+	1.36
Correction due to the change of unit in M.T.	...	...	...	...	-	1.46
Hansen minus observed corrected	...	...	...	...	-	0.10

In this and other papers it is claimed by Mr. Stone that the above correction of $41^s.51$ to the sidereal time of mean noon since 1864 has resulted from a progressive change, starting from the epoch 1864.0 and increasing uniformly at the rate of about $1^s.48$ annually. From this it follows that the tabular Right Ascensions of the Moon at transit over the meridian at Oxford, as computed from Hansen's Tables, should on the above date

receive a correction of $1^{\text{m}}.36$ in consequence of the alleged change in the sidereal time at mean noon.

The claim that this correction starts from zero about 1864^o, and increases uniformly at the rate of about $1^{\text{m}}.48$ annually, is based by Mr. Stone on the fact that that was the date when Le Verrier's tables were introduced into the *Nautical Almanac*, and when, in consequence, according to Mr. Stone's theory, the new measure of time began.

Now, to show my difficulty, let us suppose that the old tables of the Sun had been continued up to the end of the year 1891, and that in the year 1892 Le Verrier's Tables had for the first time been introduced. To make my meaning perfectly clear I shall call the case of actual introduction in 1864, case A; and the supposed case of introduction in the year 1892, case B. On Mr. Stone's theory, the time t should in case B be counted from 1892^o, and the correction therefore for 1892 January 6 would have been substantially zero.

But it is evident that the tabular numbers for the whole year 1892, and therefore for January 6, would have been exactly the same in case B as they are in case A; that is to say, if the solar ephemeris from Le Verrier's Tables had been computed for the first time for the year 1892, all the quantities taken from the tables and printed in the *Nautical Almanac* would have been the same as they actually are. To claim that they would have been different would imply that the results of making a computation from Le Verrier's Tables are not merely a function of the numbers contained in the tables, but of the time when they began to be used for the ephemeris of the *Nautical Almanac*. Were this doctrine true it might also be possible that the quantities taken out from a table of logarithms were different from year to year. As this cannot be the case it conclusively follows that all the numbers used in computing the tabular place of the Moon at transit over the meridian of Oxford on 1892 January 6 would be exactly the same in case B that they are in case A. Consequently the result would have been the same as Mr. Stone gives it for the uncorrected time; that is to say, we should have had—

	m	s
Observed Right Ascension of the Moon	49	19.57
R.A. from Hansen Tables for uncorrected M.T.		20.93
Hansen minus observed uncorrected		+ 1.36
Correction due to the change of unit in M.T.		0.00
Hansen minus observed corrected		+ 1.36

Thus Mr. Stone's theory and his method of applying it give a correction zero for 1894^o in case B, when in fact the numbers to be corrected are the same as they are in case A. From this conclusion I see no escape. From Mr. Stone's theory the use of the new unit of time would, in case B, have commenced in 1894.

Here t must be reckoned from 1894.0, and the correction must be zero. Thus his theory gives two inconsistent corrections to the same numbers.

. 5.
ust
to

