

# A few remarks on the subject of the Shoku Nihongi and the solar eclipses recorded therein

by

J. B. SNELLEN, Tôkyô

The Shoku Nihongi is a work in forty kwan or volumes, dealing with events from the first year of the Emperor Mommu (697) till the tenth year of Enryaku (791). It is a continuation—as the name indicates—of the Nihongi, Chronicles of Japan from the earliest times to A.D. 697, and consists, like the former work, of detached passages linked together by chronological sequence. Whereas we are informed by the Kônin Shiki that the Nihongi was completed and laid before the Empress Gemmyô in A.D. 720 by Prince Toneri and Yasumaro Futo no Ason, the Ruiju Kokushi and Nihon Kôki shed light on the genesis and the time of submitting of the Shoku Nihongi.

The famous statesman and scholar, Sugawara no Michizane (845–903), has compiled, by Imperial order, a historical work in 205 kwan, containing historical matter from the Rikkokushi and other works, arranged according to subjects, of which the 147th kwan has a note on the Shoku Nihongi:

On Kichû of the 8th month of Enryaku 13 (794), the historical work, undertaken by Imperial order, was submitted by the Udaijin Tsuginawa. It was laid before the Emperor, accompanied by an address.... (This address Michizane gives in full, but I give only the essentials, omitting the usual eulogy of the model Emperors of China and the reigning Sovereign)....” Tsuginawa<sup>1</sup>, Mamichi<sup>2</sup>, Yasuto<sup>3</sup> and others have undertaken the work, made careful investigations, and made the connection with the previous work.... From Mommu Tennô till Shômu Tennô the records and comments are not obscure and the merits

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- 1) Abbreviation for: Udaijin Jû-ni-i, ken Ken-gyô Kwôtaishi no fu, chû-yei no taishô Fujiwara no Ason Tsuginawa, approximately translated: Minister of the Right, praeceptor of the Prince Imperial, general of the central guards, Fujiwara no Ason Tsuginawa, of the Junior grade of the second court-rank.
  - 2) Abbreviation for: Shô go i jô, gyô mimbu no taifu, ken Kwôtaishi no gakushi, Sahyôyei no suke, Iyo no kami Sugeno Mamichi, approximately translated: Director on the Board of Popular Affairs (Mimbushô), teacher of the Prince Imperial, second in command of the guards of the left, Iyo no kami Sugeno Mamichi, of the Senior grade of the fifth court-rank, upper-sub-division.
  - 3) Abbreviation for: Shônagon Jû go i ge, ken jijû no shu, uhyôyei no suke, gyô Tamba no suke, Akishinu no Ason Yasuto, approximately translated: Little Councillor, chief gentleman-in-waiting, second in command of the guards of the right, vice-governor of Tamba, of the Junior grade of the fifth court-rank, lower sub-division; Akishinu no Ason Yasuto.

(of the Emperors, S.) are recorded. But during the period from Hôji (757-764) till Hôki (770-781) there was among other things the Emperor who was suspended (Junnin Tennô) and the chronicled events were only kept in files. When Kônin Tennô succeeded (in 770)... Natari<sup>1</sup>, Ôkawa<sup>2</sup> and others received orders to edit them. The result was 20 kwan, but they were not well finished, therefore we (Tsuginawa c.s.) again received orders to deliberate and to study them. We weeded out the superfluous and kept only what was necessary. We filled in what had been omitted, corrected absurdities and the differences (with the earlier and later histories, S.) at beginning and end.

Since seasonal festivals are sufficiently known, and not all Imperial Edicts serve educational purposes, we do not list either of them completely. When Envoys from foreign countries came to Court and an Imperial utterance was given which was not only complimentary, but at the same time instructive, meant to further good and to blame evil, it was kept for further reference. This is now done in 14 kwan, and a connection with the earlier history is made."

This passage in the Ruiju Kokushi makes it clear that the 14 kwan from Hôji till Hôki were submitted in the 8th month of the 13th year of Enryaku (794).

In the 5th kwan of the Nihon Kôki there is an entry about the other volumes of the Shoku Nihongi:

"On this day (the 13th of the 2nd month of the 16th year of Enryaku, 797), Mamichi, Yasuto, Kotowo<sup>3</sup> and others who had been instructed to select the Shoku Nihongi, reported that they had completed their task and said:

From Hôji 2 (758) till Enryaku 10 (791), 34 years, there are 20 kwan, which have been submitted to Your Majesty before. But from the first year of Mommu Tennô (697) till the first year of Hôji (757), 61 years, there existed 30 kwan under an older arrangement, but this was too verbose, and there were omissions. Therefore the former Emperor (Kônin, S.) instructed Natari, Mifune<sup>4</sup> and Nagatsugu<sup>5</sup> to rewrite them and to make them succeeded to the Nihongi. They did not make a success of it and produced 29 kwan, and they had completely lost the files of Hôji 1. We therefore made investigations, asked

- 1) Abbreviation for: Chûnagon, Jusammi, ken gyô hyôbu no kyô, Ishikawa no Ason Natari, approximately translated: Middle Councillor, Minister of the Board of War, Ishikawa no Ason Natari, of the Junior grade of the third court-rank.
- 2) Abbreviation for: Kazue no kami, Jû go i ge, Kamitsukenû no Kimi Ôkawa, approximately translated: Governor of Kazue, Kamitsukenû no Kimi Ôkawa, of the Junior grade of the fifth court-rank, lower sub-division.
- 3) Abbreviation for Ge jû go i ge daigeki ken Hitachi no shôjô Nakashima no Sukune Kotowo, approximately translated: Secretary of the Council of State and of Hitachi, Nakashima no Sukune Kotowo of the junior grade of the fifth rank, lower sub-division, for an official not of the court.
- 4) Abbreviation for: Gyôbu no kyô, Jû shi i ge, Ômi no Mabito Mifune, approximately translated: Minister of the Board of Justice, Ômi no Mabito Mifune, of the Junior grade of the fourth court-rank, lower sub-division.
- 5) Abbreviation for: Gyôbu no taifu, jû go i jô, Takima no Mabito Nagatsugu, approximately translated: Director on the Board of Justice, Takima no Mabito Nagatsugu, of the junior grade of the fifth court-rank, upper sub-division.

officials and elderly people, bound old records in chronological order, filled in lacunae, and embodied all that was worth preserving.

Details and superfluous things we left out and so we have produced 20 kwan. So that together with the other volumes we have now 40 kwan. The work has taken seven years.... We had as our object to show the virtues of former Emperors, to throw light on what is good, to blame what is bad."

These two records seem to indicate that the first 20 kwan of the Shoku Nihongi, covering a period of 61 years, got their final shape in 797, after having been revised and condensed twice. From kwan 21 till kwan 34 was revised and condensed once and the last 6 kwan went unrevised.

The editors of the first 20 kwan did not deal with contemporary history, but with a period, the end of which was 40 years in the past. The editors of kwan 21-34 dealt with a period which still lived in the memories of elderly people, whereas the last six kwan may be styled as history of the — then — present time.

As might be expected, the revising and condensing process has not made the first 20 kwan any more interesting. Broadly speaking the entries are briefer than in the second half.

A frequent recurring entry in the Shoku Nihongi, as well as in the other volumes of the Rikkokushi, is the mentioning of solar (less often of lunar) eclipses<sup>1</sup>.

The first record of a solar eclipse occurs in the 22nd kwan of the Nihongi during the reign of Suiko Tennô: 36th year, 3rd month. Boshin (*second* day of the month) the sun was *completely* obscured. This corresponds with the 10th of the 4th month of the year 628 of the Julian calendar.

Likewise the first eclipse of the moon is also recorded in the Nihongi, in the 24th kwan, during the reign of Kwôgyoku Tennô: 2nd year, 5th month, Otsuyu (the fifteenth of the month) the moon was obscured. This corresponds with the total eclipse of the moon of the 8th of the 6th month of the year 643.

In the old histories records are always brief. From Seiwa Tennô (859-876) they become more circumstantial, giving the time, proportion of darkening, &c. In many cases there are records of eclipses which evidently have not been observed, but were calculated and reported to the Court.

In Tôkyô an eclipse of the sun is visible about once every three years, an eclipse of the moon about twice during the same period. But on account of weather-conditions actual observation is much rarer than that. Until 1600 all records were made in the vicinity of Kyôto. Approximately seventy solar

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1) For what follows I am indebted to an article by Mr. Ogura Sinkiti in Vol. IX, Nos. 3, 4, 5 & 6 of the Temmon Geppô or Astronomical Herald, entitled "Wagakuni kodai no nichigesshoku kiroku" and to an article by Mr. S. Kanda, Rigakushi, of the Astronomical Observatory of Tôkyô, in Vol. XXIV, No. 12 of the same publication, entitled "Rikkokushi jidai no hompô no temmon kiroku". To Prof. K. Hayatome of the Imperial University, head of the Astronomical Observatory, who kindly drew my attention to the above-mentioned articles, and to Mr. Kanda, my sincere thanks are hereby given.

eclipses occur in two hundred years, perhaps twice as many eclipses of the moon. Taking bad weather into consideration and the fact that in many cases only a very small portion of the sun is darkened, it is certainly strange that till about 1200 so many eclipses of the sun have been recorded. Records of lunar eclipses on the other hand are extremely scarce. In the Nihongi there are records of seven solar and only two lunar eclipses. In the Shoku Nihongi there are seventy-two records of solar eclipses and none of lunar eclipses. Perhaps in those times people held the primitive view that night was provided for slumbering and not for gazing at the skies. From 1300 the records become extraordinarily infrequent until the Tokugawa-period, when there came again peace over the country and arts, sciences and letters started to flourish again and astronomy once more engaged the attention of specialists. From that time on there are many records.

The fact that in the time of Suiko Tennô solar and lunar eclipses began to receive attention is perhaps accounted for by the fact that during her reign Chinese calendars were imported, that studies were made according to Chinese methods and that the recording of eclipses was nothing but a following of Chinese examples.

Comparing the Japanese records of eclipses with those in other countries it must be confessed that they are extremely new. In China there are many old records of eclipses. The oldest one in China appears in the Shou king, a lunar eclipse of 2128 B.C. (which ought to be, according to some scholars, an eclipse of the sun).

Particulars about the calculation of eclipses do not fall within the scope of this article, but the different calendars which have been in use in Japan ought to be mentioned briefly:

			<i>Year of adoption:</i>	<i>According to the Western calendar:</i>
太	古	曆	6th year of Jitô Tennô.....	692
元	嘉	曆	1st year of Mommu Tennô.....	697
儀	鳳	曆	Tempyô Shôhō 8, under Junnin Tennô..	764
大	衍	曆	Ten'an 2, under Montoku Tennô.....	858
五	紀	曆	Jôgwan 4, under Seiwa Tennô .....	862
宣	明	曆	Jôkyô 1, under Reigan Tennô.....	1684
貞	享	曆	Hôreki 1, under Momozono Tennô.....	1754
寶	曆	曆	Kôkaku Tenno, Kwansei 9 .....	1797
寬	政	曆	Jinkô Tennô, Tempô 13 .....	1842
天	保	曆	Gregorian calendar Meiji Tennô, Meiji 5 .....	1872

The eclipse of the 10th of the 4th month of 628, Nihongi 22nd kwan, Suiko Tennô 36th year, 3rd month, 2nd day, is, as has been said before, the oldest record of an eclipse of the sun in Japan. The first thing which strikes the eye is the fact that the eclipse occurred on the 2nd day of the month. Possibility

of an eclipse of the sun is limited to three hours before or after new moon. How then is it possible for an eclipse to occur on the 2nd day of the month? In order to determine the beginning of the month, the moment was chosen when sun and moon had the same longitude. Accordingly the time from new moon to new moon was twenty-nine days and a fraction, an invariable unit. But in reality the time from new moon till new moon is not at all invariable and the difference between the latter, the synodical month, and the former, from the same longitude till again the same longitude, can even reach half a day. In this case the moment of new moon according to the latter reasoning was 9<sup>h</sup> 53<sup>m</sup> a.m. of the 10th of the 4th month, true time in Asuka (from the Canon der Finsternisse by Oppolzer), but the moment the moon had the same longitude as the sun was 11<sup>h</sup> 35<sup>m</sup> p.m. of the same day. There is no mistake that Boshin of the 3rd month is the 2nd. But then the moment of new moon has been on the second, and it is not strange that there was an eclipse of the sun on the second. Since the calendar of Kwansei the moment of new moon has been taken as the first of the moon. The record was made at Asuka, the capital at the time, at 34°28' northern latitude and 125°50' eastern longitude.

Calculations according to different methods give the following results:

	Maximum	Proportion obscured
Hansen .....	9 <sup>h</sup> 19 <sup>m</sup> a.m.	0.89
Oppolzer .....	9 <sup>h</sup> 22 <sup>m</sup> a.m.	0.92
Ginzel .....	9 <sup>h</sup> 27 <sup>m</sup> a.m.	0.92
Cowell .....	9 <sup>h</sup> 29 <sup>m</sup> a.m.	0.95
Newcomb .....	9 <sup>h</sup> 29 <sup>m</sup> a.m.	0.92
Radau .....	9 <sup>h</sup> 29 <sup>m</sup> a.m.	0.92

Although these calculations give some differences, it is evident that this was a spectacular eclipse. The record has it that the sun was completely obscured, but this is not quite true as we have seen. The lane of totality started in the Malay peninsula, went over the Chinese Sea, passed to the East of Japan, went through Alaska and ended in the Hudson-Bay.

The second record of an eclipse of the sun appears in the 23rd kwan of the Nihongi, the 8th year of Jomei Tennô, the first of the 8th month. But at that time there was nowhere on earth an eclipse of the sun and this must have been a mistake.

The next one is also in the 23rd kwan, the 9th year of Jomei Tennô, the first of the 3rd month corresponding with the 1st of the 4th month, 637. The lane of totality of this eclipse began in West-China, went over the South of Korea, through Hokkaidô, Chishima, Alaska and ended in North-America. At the capital it ought to have begun at 7<sup>h</sup> 07<sup>m</sup> a.m., reached its maximum at 8<sup>h</sup> 18<sup>m</sup> and ended at 9<sup>h</sup> 29<sup>m</sup>. The maximum obscuration was 0.93. This eclipse too must have been a considerable one in the Home provinces and attracted great attention.

The fourth appears in the 29th kwan, the 9th year of Temmu Tennô, 11th

month, 1st day, corresponding with the 27th day of the 11th month of 680. This eclipse began at 10<sup>h</sup> 24<sup>m</sup> a.m., its maximum occurred at 12<sup>h</sup> 24<sup>m</sup> p.m. and ended at 2<sup>h</sup> 16<sup>m</sup> p.m. The maximum obscuration was 0,87. The central lane of this eclipse began in Central Siberia, went over Manchuria, the vicinity of Vladivostok, crossed the Japan Sea, over North Japan, ending in the middle of the Pacific. Happening about noon this eclipse would have attracted considerable attention if the weather was favourable.

The next seven eclipses are also recorded in the Nihongi, the entries as usual extremely brief, either 有日食 or 有日蝕之. They are given here in tabulated form, the time according to the Julian calendar and according to the Japanese record, the Emperor and particulars. The remark *invisible* means that although there may have been an eclipse in other places on earth, it was not visible in the vicinity of the capital (in Yamato).

Julian calendar:			Kwan:	Emperor:	In Shoku-Nihongi:			Particulars:
Year	month	day			Year	month	day	
681	11	16		Temmu	10	10	1	A.M.
691	10	27		Jitô	5	10	1	Invisible
693	4	11		"	7	3	1	"
693	10	5		"	7	9	1	Evening
694	3	31		"	8	3	1	Invisible
694	9	25		"	8	9	1	"
696	8	4		"	10	7	1	"

The next seventy-two eclipses of the sun are recorded in the Shoku Nihongi. The entries are again extraordinarily brief.

The table needs no explanation. *No eclipse* means that at the time nowhere on earth there was an eclipse of the sun, so that the record is erroneous. *E* means that although the eclipse was invisible in the Home provinces, it may have been visible elsewhere in Japan, Shikoku or Kyûshû.

Julian calendar:			Kwan:	Emperor:	In Shoku Nihongi:			Particulars:	
Year	month	day			Nengô	Year	month	day	
698	8	12		Mommu	—	2	7	1	No eclipse
698	12	8		"	—	2	11	1	Invisible
699	11	27		"	—	3	11	1	" E
701	5	13		"	Taihô	1	4	1	Big. Evening.
702	9	26		"	"	2	9	1	Invisible
704	3	10		"	Keiun	1	2	1	"
706	7	15		"	"	3	6	1	"
707	1	9		"	"	3	12	1	P.M.
707	7	4		"	"	4	6	1	Big. A.M.
707	12	29		"	"	4	12	1	Invisible E
708	12	17		Gemmyô	Wadô	1	11	1	" "
709	5	14		"	"	2	4	1	"
709	11	6		"	"	2	10	1	"
710	5	3		"	"	3	4	1	"
710	10	27		"	"	3	10	1	"
711	4	23		"	"	4	4	1	"

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Julian calendar:			Kwan: Emperor:		In Shoku Nihongi:			Particulars:	
Year	month	day			Nengô	Year	month	day	
711	10	17	5	„	„	5	9	1	Invisible
713	3	1	6	„	„	6	2	1	„
714	2	19	6	„	„	7	2	1	P.M.
715	8	4	6	„	Reiki	1	7	1	Noon
715	12	31	7	Genshō	„	1	12	1	Invisible
716	12	19	7	„	„	2	11	1	„
717	12	8	7	„	Yôrô	1	11	1	„
718	6	3	8	„	„	2	5	1	„
719	5	24	8	„	„	3	5	1	„
720	10	6	8	„	„	4	9	1	„
722	3	22	9	„	„	6	3	1	Morning
724	7	25	9	Shōmu	Jinki	1	7	1	Invisible E
726	1	8	9	„	„	2	12	1	„
727	5	25	10	„	„	4	5	1	„
728	5	14	10	„	„	5	4	1	A.M.
729	10	27	10	„	Tempyō	1	10	1	Big. A.M.
730	10	16	10	„	„	2	9	1	Invisible
731	3	13	11	„	„	3	2	1	Small. Morning.
732	3	1	11	„	„	4	2	1	Invisible
733	8	14	11	„	„	5	7	1	„ E
734	12	30	11	„	„	6	12	1	Big. Noon.
735	12	19	12	„	„	7	11	1	Invisible
736	6	14	12	„	„	8	5	1	Small. Morning.
737	6	3	12	„	„	9	5	1	Invisible
738	10	18	13	„	„	10	9	1	„ E
739	10	7	13	„	„	11	9	1	„
741	3	22	14	„	„	13	3	1	Invisible E
742	8	5	14	„	„	14	7	1	Big. A.M.
743	7	26	15	„	„	15	7	1	Invisible E
747	11	7	17	„	„	19	10	1	„
749	3	23	17	„	Tempyō Shōhō	1	3	1	„
751	8	26	18	Kōken	„	3	8	1	„
753	1	9	18	„	„	4	12	1	„
756	10	26	19	„	„	8	10	1	„
759	4	2	22	Junnin	Tempyō Hōji	3	3	1	„
760	8	15	23	„	„	4	7	1	„
761	8	5	23	„	„	5	7	1	Big Noon.
762	1	30	24	„	„	6	1	2(!)	A.M.
765	10	19	26	Shōtoku	Tempyō Jingo	1	9	1	No eclipse
766	11	7	27	„	„	2	10	1	Invisible
767	4	3	28	„	Jingo Keiun	1	3	2	Invisible
768	3	23	29	„	„	2	3	1	Big. P.M.
768	9	16	29	„	„	2	8	1	Invisible
769	9	5	30	„	„	3	8	1	Big. A.M.
770	8	25	30	„	Hōki	1	8	1	Invisible
772	1	10	31	Kōnin	„	2	12	1	„
772	7	5	32	„	„	3	6	1	„
773	6	25	32	„	„	4	6	1	Morning
775	10	29	33	„	„	6	10	1	Invisible E
776	4	23	34	„	„	7	4	1	Small. Morning.

Julian calendar:			kwan:	Emperor:	In Shoku-Nihongi:			Particulars:	
Year	month	day			Nengô	Year	month	day	
777	4	12	34	„	„	8	2	1	Invisible
778	8	27	35	„	„	9	8	1	„
779	8	16	35	„	„	10	7	1	„
783	11	29	37	Kwammu	Enryaku	2	11	1	Noon.
789	1	31	40	„	„	8	1	1	„
791	7	6	40	„	„	10	6	1	Small. P.M.

Conclusions from the foregoing: The seventy-two entries in the Shoku Nihongi correspond in seventy cases with eclipses recorded in Oppolzer's Canon der Finsternisse. Of these seventy eclipses only twenty one were visible in the Home provinces, and nine more elsewhere in Japan, by which is meant Honshû, Shikoku and Kyûshû. The other forty were invisible in Japan. There is a remote possibility of reports of eclipses elsewhere reaching Japan if they had been observed in neighbouring countries but no stretch of imagination can make it plausible that messages about eclipses in the vicinity of the South Pole or in Greenland were delivered at the Court of the Emperor of Japan. It is much more likely that the entries about eclipses are the effect of reports by the Court-astronomers that an eclipse was going to happen. There was indeed a regulation—V. art. Onyôryô of the Shokuinryô—that they had to report secretly, direct to the Emperor, without even showing to the minister of the Nakatsukasa-shô, if they had premonitions of extraordinary events. Invisible eclipses however were not to be reported, but as we have seen, they figure largely in the histories. Perhaps this is a result of the methods of calculation being too rough, and many eclipses may have been reported in the expectation that they would really become visible. Looking over the list, we find the eclipses in the first twenty kwan, the work, it will be remembered, of the committee of Mamichi c.s., quite nicely arranged, perhaps a trifle too nicely, every year or every other year, at times more than one, two, or even three in one year. During the period from 697 to 756, 60 years, there are records of 48 eclipses, which is altogether too much to have been observed. The committee of Tsuginawa c.s. which was responsible for the fourteen kwan from 757 till 781, 24 years, records 19 eclipses. During the last ten years three eclipses are reported, two of which occurred at noon; there is a possibility of their having been observed.

However it may be, our respect for the credibility of the Shoku Nihongi is not shattered by this little excursion in celestial spheres.