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KING RAMA IV, SIR HARRY ORD AND THE TOTAL SOLAR ECLIPSE OF 18 AUGUST 1868: POWER, POLITICS AND ASTRONOMY

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Abstract: The August 1868 total solar eclipse was a watershed event in astronomical history and through spectroscopic and photographic analyses led to major breakthroughs in solar physics. This eclipse was observed from Aden, India, Siam and the Dutch East Indies.

Apart from the scientific accomplishments, this eclipse also played an important diplomatic role in Siam, where the English and the French had colonial aspirations. Sir Harry Ord was the Governor of the British Straits Settlements, based in Singapore. In this paper we look at his involvement in King Rama IV's eclipse campaign, and the way in which his presence was part of the King's tactic to counter French and British colonial aspirations. We also see that King Rama IV used the 1868 eclipse as a vehicle to show the Thai people the superiority of Western scientific astronomy over traditional Siamese astrology.

Keywords: 18 August 1868 solar eclipse, Siam, Wha-koa, King Rama IV, Sir Harry Ord, power, politics, colonialism

1 INTRODUCTION

The total solar eclipse of 18 August 1868 has been described as a 'watershed event' in international astronomy and solar physics (Orchiston and Orchiston, 2017: 314). The path of totality (Figure 1) extended from Aden in the Arabian Peninsula, across peninsular India, Siam (present-day Thailand), the southern tip of Cochinchina (now Vietnam), the island of Borneo, various islands further east in the Dutch East Indies (now Indonesia), through the extreme southern part of New Guinea, and on to the New Hebrides. With a maximum duration of 6 m 50 s (just east of Siam in the Gulf of Thailand), this was one of the longest solar eclipses on record. British, French, German and local Indian and Dutch expeditions were sited in Aden, across India, in southern Siam, at the point where the eclipse path entered Borneo, and on an islet in the Dutch East Indies (e.g., see Launay, 2012; 2021; Mumpuni et al., 2017; Nath, 2013; Orchiston and Orchiston, 2019; 2021; Orchiston et al., 2017a; 2017b; 2019; Soonthornthum and Orchiston, 2021; Venkateswaran, 2021). Because of its long duration, and the fact that it occurred at just the right time in history—when photography, spectroscopy and polarisation studies were being applied to astronomy (e.g., see Cottam and Orchiston, 2015; Hearnshaw, 2009; Hughes, 2013)—astronomers were able to establish the basic chemical composition of prominences, the chromosphere and the corona, and to determine that light from the corona was polarised. Meanwhile, during totality Norman Pogson, Director of Madras Observatory

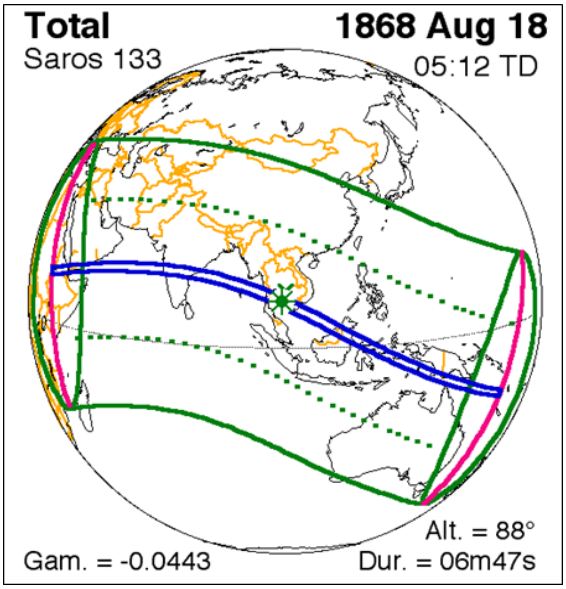


Figure 1: A map showing the path of totality in blue of the solar eclipse of 18 August 1868. A partial eclipse was visible between the two green lines, while the two pink lines mark the end points of the eclipse (after Espenak and Meeus, 2006).

Figure 2: A map showing Wha-koa (the red bull's eye) and the path of totality of the 1868 eclipse across Siam, or present-day Thailand (map modification: Wayne Orchiston).

> … was the first to notice an unidentified spectral line that later was shown to be due to a new element (Nath, 2013). This was aptly named helium by [Jules] Janssen and Norman Lockyer. (Kochhar and Orchiston, 2017: 739).

This eclipse led to a major breakthrough in science (see Meadows, 1970).

While the most important scientific results derived from India (e,g., see Launay, 2021), Siam had a part to play. The principal scientific investigation there was carried out by a French expedition comprising astronomers from Marseilles and Paris Observatories, based at the site of Wha-koa in southern Siam (see Figure 2). It has been researched by Orchiston and Orchiston (2017). However, the host of the French team was King Rama IV, who had a private passion for astronomy, and he also had an observing camp nearby. Arguably, his most distinguished guest was Sir Harry Ord from Singapore, the British Governor of the Straits Settlements. But Sir Harry was no astronomer, so at first glance his presence would appear puzzling. In this paper, after providing relevant background details, we review observations of the eclipse made by King Rama IV and Sir Harry Ord and explain why the King decided to invite Sir Harry to Siam at this time.[1]

Figure 3: King Rama IV, and in the background the Royal Clock Tower at the Royal Palace in Bangkok (after Saiberjra, 2006: 16).

2 KING RAMA IV AND THE 1868 SOLAR ECLIPSE

2.1 King Rama IV – A Biographical Sketch

King Rama IV (Figure 3; Moffat, 1961; Saibejra, 2006; Soonthornthum and Orchiston, 2021) was born on 18 October 1804 and known as Prince Mongkut. When he was 20 years of age, as was the custom for Royal princes, he entered the monkhood, but just 15 days later his father died. Although he had first claim on the throne, it was one of his stepbrothers—the son of his father and a royal concubine—who was older and more experienced in affairs of state, who was proclaimed as King Rama III (with Prince Mongkut's blessing).

Prince Mongkut decided to remain a monk, and he spent the next 17 years familiarizing himself with the intricacies of Buddhism and

> … studying various subjects, both religious and worldly—and especially science and mathematics. He established a new branch of Buddhism, Dhammayut, which had a stricter practice. He made pilgrimages to several cities in Northern Thailand, including Pitsanulok, Sawankhalok and Sukhothai, where he had the opportunity to learn about the lives of his people before he became King. He also discovered many valuable historical documents, and visited archeological sites in Siam. (Soonthornthum and Orchiston, 2021: 255).

During the reign of Prince Mongkut's father a number of Western missionaries came to live in Bangkok. Among them were French-born Catholic priest Bishop Jean-Baptiste Pallegoix (1805–1862; Pallegoix, 1977), who arrived in 1829, and the American medical missionaries Dr Dan Beach Bradley (1804–1873; Lord, 1969), Reverend Dr Jesse Caswell (1809–1848; Bradley, 1966) and Dr Samuel Reynolds House (1817–1899), who arrived in 1835, 1845 and 1847, respectively.

Prince Mongkut learnt astronomy, chemis-

try, geography, French and Latin from Bishop Pallegoix and English first from Dr Bradley and later from Dr Caswell. The Prince

> …. also joined several scientific discussion sessions with Dr Caswell (e.g., about evidence that the Earth was spherical), and he also attended scientific and medical lectures and demonstrations organized by Dr Samuel Reynolds House … (Soonthornthum and Orchiston, 2021: 260).

While still a Prince, Mongkut also studied astronomy using traditional Siamese and Mon astronomical texts, and once he became King Rama IV, in 1851, following the death of King Rama III, he had increasing access to Western books on astronomy. He found the British *Nautical Almanac* an indispensable tool, but arguably one of the most authoritative of the text books at his disposal was the Sixth Edition of Sir John Herschel's *Outlines of Astronomy*, which was published in 1859.

King Rama IV was no mere armchair astronomer, for he made sextant observations of the Sun and selected stars from different localities in Siam in order to determine their latitudes and longitudes.

He also liked to observe rarer astronomical objects and events, such as solar and lunar eclipses, and impressive naked-eye comets, and he used comets (in particular) to try and educate his people and allay their fears and superstitions inherited through Buddhism. For example, when Donati's Comet (C/1858 L1 Donati) graced the Siamese sky in September and October 1858 King Rama IV issued the following public announcement, with a Thai title that meant "Do Not Panic with the Appearance of the Comet":

> On Saturday 10th Month 10th Day of the Waning Moon, the Naichop Kotchasin Songbat Khwa [the 'Right Keeper of the Elephant'] saw this comet. Then on Thursday 10th Month 15th Day of the Waning Moon, many royal family members and noblemen also saw it. King Rama IV saw it and said that it had appeared once during the reign of King Rama II … So, the people should not panic. (cited in Soonthornthum and Orchiston, 2021: 273).

2.2 King Rama IV's Eclipse Calculations

Even before he became King Rama IV, Prince Mongkut had honed his ability to compute eclipse ephemerides. Thus, after the British Governor of Hong Kong, Sir John Bowering (1792–1872), visited Siam in April 1855, he reported:

> I have now before me a curious tract of forty pages, printed at Bangkok in 1850, and which consists of a series of communications from the present King … to the Bangkok Calendar. They give the calculations of the eclipses of the year; and the prince says he prints them, that his foreign friends "may know that he can project and calculate eclipses of the sun and moon, occultations of planets, and some fixed stars of first and second magnitude …" (Bowring, 1857: 443–444).

Gislén and Eade (2021: 649) have studied original Southeast Asian solar eclipse calculations and discovered that they

> … have some interesting features. It turns out that they use the *Âryabhaṭa* traditional [Indian] parameters for the Sun, and for the Moon an improved version of the *Âryabhaṭa* canon that was introduced in a canon *Grahacaranibandhanasaṃgraha* (Billard, 1971; Haridatta, 1954) dated around 100 CE. These computations also have their own ways of handling the parallax problem in solar eclipses and for the Thai calculations, an original, very rough method of calculating the duration of the eclipses (Gislén and Eade, 2001), possibly being inherited from ancient times. The Thai solar eclipse calculation above is not particularly good, it does not predict a total eclipse, the reason being that the calculation uses a sidereal longitude for the Sun when calculating the parallax.

Undoubtedly, the most important eclipse that King Rama IV ever calculated the details of was the total solar eclipse of 18 August 1868, where he used Western, Mon and Siamese sources to provide the following prediction:

> The total solar eclipse will be visible on Tuesday 18th August 1868 with the center line at Wha Kor district in Prachuap Kiri Khan province. The path of the total solar eclipse visible in Siam is 130 lida to 140 lida [i.e. around 240–260 km]. The total eclipse in Siam will be visible from Pranburi District, Prachuap Kirikhan province to Chumporn province [approximately 230 km. long]. (Division of Literature …, 1999: 283; our English translation).

By good fortune, Figure 4 is a Chiang Mai manuscript (Anonymous, 1868) that outlines the calculations required for the 18 August 1868 total solar eclipse. Gislén and Eade (2019: 467) show that

> The calculation follows exactly the traditional calculation scheme for a solar eclipse with the 63 steps given by Wisandarunkorn (1997: 190–204). The calculation in the manuscript is shown as a series of numbers accompanied by a Thai technical label that in most cases has a Sanskrit or Pali origin.

Gislén and Eade (2019) provide a detailed analysis of the calculations in an Appendix in their paper.

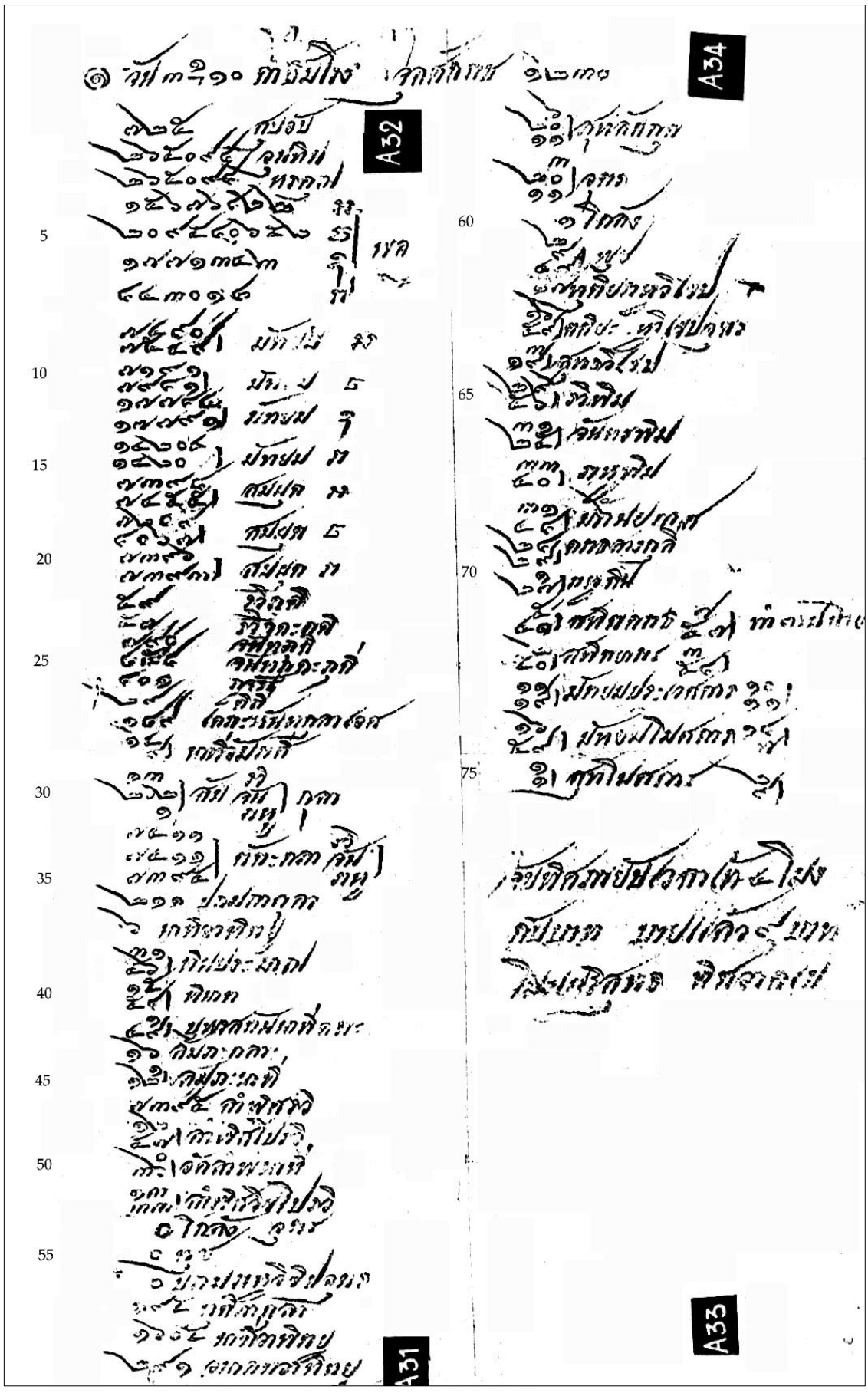


Figure 4: A traditional Thai calculation for the total solar eclipse of 18 August 1868 (after Anonymous, 1868).

2.3 King Rama IV's Observations of the Eclipse

King Rama IV determined to conduct observations of the 18 August 1868 eclipse from Whakoa in southern Siam, on the Gulf of Thailand, but he also

> … realized that if he was to successfully host Western astronomers [from France] intent on observing the … eclipse … then he needed to supply them with a reliable time service that met international standards. (Orchiston and Orchiston, 2021).

Accordingly, in 1868 he established a standardised national time service in Siam, based on 'Bangkok Standard Time', which used the Royal Observatory at Greenwich in England as the 'Zero Meridian'. The Grand Palace in Bangkok where the Royal Clock Tower shown in Figure 3 was erected, was thought to be 100° E of Greenwich. The Royal Clock Tower served as the prime meridian for Siam, and was 6.7 hours ahead of Greenwich. As Soonthornthum and Orchiston (2021: 270) have pointed out,

> … Siam was the first country in the world to [establish a national time service] … followed soon after, on 2 November 1868, by New Zealand (King, 1902). Siam and New Zealand were the pioneers, long before other countries around the world …

In order to observe the eclipse from Whakoa, King Rama IV arranged to make a 15-day excursion. He was away from Bangkok from 7 to 21 August. Amongst others, he was accompanied by his son, Prince Chulalongkorn (see Figure 5) who, although only 15 years of age, had already inherited an interest in astronomy from his father.

Luckily, fortune smiled on southern Siam on 18 August 1868, Wha-koa experienced clear skies, and the King, his Royal entourage and his invited guests, all saw a remarkable celestial spectacle. Here is a contemporary account of what became known nationally as 'The King of Siam's Eclipse':

> 10.06 am: This was first contact according to King Rama IV's calculation and prediction, but the sky was very cloudy and first contact could not be observed.
>
> 10.46 am: The clouds gradually dispersed. The Sun was visible, and a partial eclipse was seen. The King performed a Royal consecration rite.
>
> 11.25 am: The Sun's light became very 'soft', similar to the Full Moon at night.
>
> 11.30 am: The Moon blocked the Sun's light down to one-twelfth. Some stars were now visible in the sky. There was a big chatter from the crowd.

Figure 5: King Rama IV and his son, Prince Chulalongkorn (courtesy: National Archives, Bangkok).

> 11.36 am: Totality was seen. A big prominence was visible on the east side of the eclipsed Sun.
>
> 11.43 am: A strip of a seesaw-like pattern was seen at the south-western edge of the Sun.
>
> 1.09 pm: The fourth contact, the end of the total solar eclipse. Siam people called this moment 'Mokkhaborisut' (Immaculatelly Freed). (Division of Literature …, 1999: 309–315; our English translation).

One of the successes of the eclipse expedition was the photograph taken at totality (Figure 6) by Luang Akani Naruemitr (1830–1891),

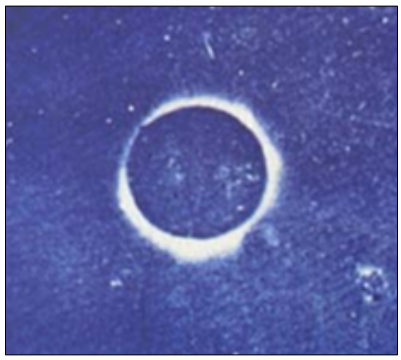


Figure 6: Photograph taken during totality (courtesy: National Archives, Bangkok.

who later adopted the name Francis Chit and became the official Court Photographer during the reign of King Rama V.

Obviously, King Rama IV was overjoyed by the success of his 1868 solar eclipse campaign, but this event had a most unfortunate consequence that he could not have foreseen: the swampy land at the eclipse camp was riddled with mosquitoes, and many of the eclipse-watchers—including King Rama IV and his son—contracted malaria. While Prince Chulalongkorn recovered, his father did not. He died on 1 October 1868, just two and half weeks before his 64th birthday.

Figure 7: Sir Harry Ord, during the period when he was Governor of Western Australia (courtesy: Government House, Western Australia).

It is ironic that King Rama IV paid the ultimate price for his devotion to astronomy, but it is fortunate that his son, as King Rama V, was able to indulge his own interest in astronomy. Just seven years later, he invited British astronomers to Siam to observe the 6 April 1875 total solar eclipse from a site near Petchaburi (Euarchukiati, 2021a), and he also organized a Royal Eclipse Drawing Competition in Bangkok (Euarchukiati, 2021b).

3 SIR HARRY ORD AND THE 1868 SOLAR ECLIPSE

3.1 Sir Harry Ord – A Biographical Sketch

Britain's Harry Saint George Ord was a very different person to King Rama IV, although some might say that he hankered for the trappings of royalty. Born in North Cray, Kent, on 17 June 1819, he was trained at the Royal Military Academy (Woolwich) and became a 'career soldier and diplomat'.

After serving in the Royal Engineers (1837–1856) and fighting in the Crimean War (1854), Ord served as Commissioner of the Gold Coast (in West Africa) during 1855–1856, then as Com-missioner at the Courts of Paris and The Hague in 1856–1857.

Then came the first of his senior colonial appointments, as the Governor of Dominica in 1857–1861, followed by Governor of Bermuda (1861–1864). He then was Special Commissioner to West Africa, from 1864 to 1867, before becoming the first Governor of the Straits Settlements from 1867 to 1873—which is the focus of this paper. Knighted in 1868, Sir Harry's last colonial appointment was as Governor of Western Australia (1877–1880). He then retired to England to pursue his interest in zoology and died suddenly from a heart attack on 20 August 1885 (two months after his 66th birthday) while in Homburg, Germany.

Back on 28 June 1846, Harry Ord had married Julia Graham, daughter of Admiral James Carpenter, and they had three sons.

3.2 Governor of the Straits Settlements

Prior to 1867, the independent British settlements of Penang, Malacca and Singapore on the Malayan Peninsula were administered from British India. Then the Colonial Office in London decided to form a separate Crown colony, the Straits Settlements, and selected Harry Ord as the first Governor, with his headquarters in Singapore (Koh, 2006).

Harry St. George Ord, Esquire, "… Colonel in the Army, Lieutenant-Colonel of the Royal Engineers, and Companion of the Order of the Bath …" (Buckley, 1984: 787) arrived in Singapore on 16 March 1867 with a reputation in England as a capable administrator who would solve or at least ameliorate the political, social and economic woes of the Straits Settlements.

Yet from the start Ord alienated himself from many by insisting on being addressed as 'His Excellency', and he soon was seen as

> … masterful and overbearing, and extravagant in his views of what was due to the dignity of his office. He did not seek advice, and did not accept it when it was tendered. (Nunn, 1991: 94).

Ord and his Government became increasingly unpopular:

> Led by an unbridled and vituperative press, nurtured by the frustrations of the gentlemen of commerce—put out less by alleged

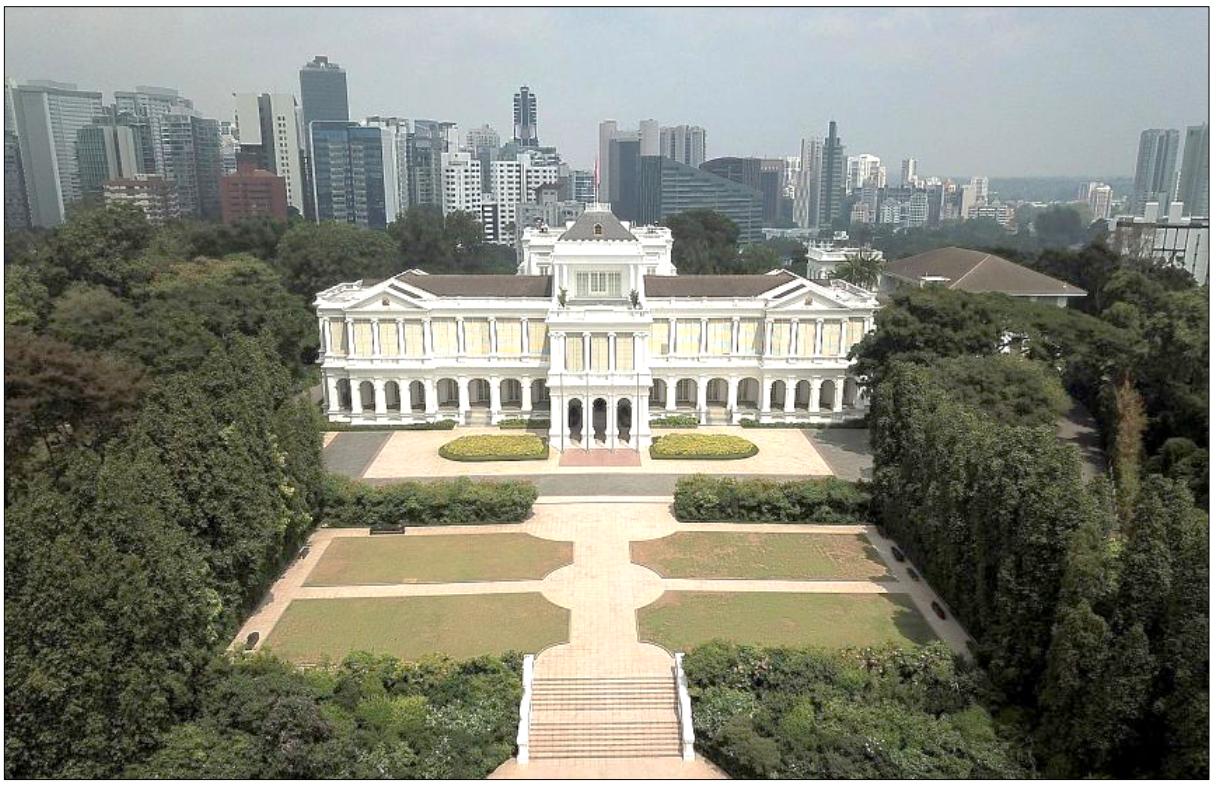


Figure 8: The new Government House of Sir Harry Ord (https://www.straitstimes.com/singapore/a-peek-inside-the-istana).

> depression (Singapore's trade figures rose steadily throughout this period) than by the curtailment of profitable areas of investment inherent in Peninsular unrest—and inflamed always by Ord's own ungovernable brusqueness, it took issue with him on innumerable points of domestic policy, as well as on the central problem of the Malay States. (Moore and Moore, 1969: 351).

The aforementioned 'Malay States' were a special problem, with a virtual civil war raging in northern Malaya, as two Chinese factions fought for control of the lucrative tin mines in the region. One group was supported by the local Malayan Sultan and the other by residents of Penang. Although there were thousands of injuries and deaths, Ord and his administration did nothing (Braddell, 1991), and it was left to Ord's successor to try and resolve this major issue.

Yet as Moore and Moore (1969: 351) stress, it is unfair to blame all of the problems of the Straits Settlements on Ord, because "… he stood between the death of the old policy and the genesis of a new one." As such he must have realized that popularity stood for nought.

It remains for us to review one of Ord's crowning achievements, even though at the time—as might be expected—it drew criticism from many, who saw it as yet another reflection on his 'delusions of grandeur'. We refer to the construction of a new Government House, which was erected, at enormous cost, between 1867 and 1869. Apparently, Ord was dissatisfied with the standard of the existing Government House, which prompted him to authorize construction of what later (in 1959) became known as 'the Istana' (see Figure 8),[2] "… a property befitting the importance of Singapore … set on 106 acres (42 ha) of land from what had been C.R. Prinsep's nutmeg estate." (Corfield and Corfield, 2006). As might be expected, reactions at the time were mixed, but not all were negative. For example, on 24 April 1869 the *Straits Times* newspaper announced:

> Far better to have a handsome memorial of extravagance to stare us in the face than a memory of folly, in a half-finished, or even badly finished work. Laying all prejudices aside moreover … It must be admitted that the building is a handsome one—the handsomest in a long way in the Settlement and one which will be an ornament to the place long after those who fought for and against it have passed away. (*ibid.*).

Sir Harry Ord certainly would have seen the new Government House as a residence befitting a Governor of his regal calibre!

3.3 Sir Harry Ord's Observations of the Eclipse

3.3.1 The Eclipse Camp

Apparently, it was Henry Alabaster (1836–1884), the Acting British Consul in Bangkok,

Figure 9: The two houses erected for Sir Harry Ord's party, in their compound, close to the beach (after Ord, 1868: [Plate 4]).

who suggested to King Rama IV that he invite Sir Harry Ord—the region's leading British resident—to join him in Siam and observe the 18 August 1868 solar eclipse (Ord, 1868). But this was as much a political decision as an astronomical one since Sir Harry had never professed any passion for astronomy, and besides, there was no guarantee that tropical southern Siam would exhibit clear skies on the vital day.

Nonetheless, an invitation was dispatched and gratefully accepted, and on 16 August—just two days shy of the eclipse—the Colonial Steamer *Pei-Ho* anchored off the eclipse site with Singapore's first ever party of committed eclipse chasers.

While the French astronomers were based at 'Wha-koa' (Orchiston and Orchiston, 2017), King Rama IV had his eclipse camp set up a little further north, near a village that Sir Harry Ord (1868: 1) referred to as 'Whae-Whan'. This village was situated

> … within Siamese territory on the East Coast of the Malay Peninsula, in Lat: 11° 38′ N and Long: 99° 39′ East, and almost at the foot of the Mountain Kow Luan, 4,236 feet high. (*ibid.*).

The King's eclipse camp was located beside the beach. Originally the site had been covered in jungle, which was cleared to make way for a three-storey temporary palace for the King and an assortment of single-storey houses for his Royal Entourage from Bangkok and his distinguished local and international guests. These houses

> … were all raised three feet above the level of the ground, [and] they were built almost exclusively of split bamboos and covered with the ordinary thatch of the country "Attap" or dried palm leaves … (Ord, 1868: 3).

The houses that King Rama IV's construction team had erected for Sir Harry Ord's party were impressive on all counts. The main house

> … was about 140 feet long and 50 feet wide, and consisted of two separate buildings, the larger had on the level of the ground a saloon capable of dining 40 or 50 people, and on either side, raised about 3 feet, a range of small rooms, 12 in all, for the occupation of the members of the Governor's suite. At the further end was a small building containing two bed rooms and dressing rooms, the verandah forming a convenient sitting room in which visitors were received. This part of the house was boarded and floored with wood, the other being entirely of split bamboos. (Ord, 1868: 6).

The two houses are shown in Figure 9.

Furthermore, King Rama IV spared no effort in making sure that Sir Harry Ord's stay in Siam would be memorable. For example, he arranged for a French chef, aided by an Italian and numerous Siamese assistants, to provide the best possible food and drink, and

> Singapore and Bangkok had been ransacked to procure all the delicacies attainable in this climate, and excellent cooking with various wines, and plenty of ice left nothing to be desired in this respect (*ibid.*).

Sir Harry Ord's party and Henry Alabaster, his wife, and other distinguished guests from Bangkok "… certainly never anticipated finding such luxurious accommodation in a Siamese jungle." (*ibid.*).

3.3.2 Observations of the Eclipse

Eclipse day dawned cloudy, with even a little rain, and there seemed little chance, if any, of viewing the eclipse, which was expected to begin mid-morning.

However, to the surprise of all, slowly the clouds cleared, and the partially eclipsed Sun became visible. Sir Harry Ord's party had access to two small telescopes, a 2.75-inch refractor and a 3.25-inch reflector, plus binoculars and a clock (Ord, 1868: 8). Major McNair of the Royal Artillery tracked the eclipse with one of the telescopes, noting sunspots present and their locations, while Sir Harry Ord used binoculars to observe prominences and note their form and position (Ord, 1868: 8–9).

The Singapore party also had access to the following meteorological instruments: "… a delicate mountain barometer, two excellent aneroid barometers, [and] three thermometers of various constructions …" (*ibid.*). Captain Moysey of the Royal Engineers was charged with taking meteorological observations throughout the eclipse, including temperature measurements of sea water, while others in the party "… undertook to notice the general effects produced by the Eclipse on the sky, the sea, and the surrounding country." (Ord, 1868: 9).

Sir Harry Ord (*ibid.*) reported in his booklet that

> … at 11h. 20m., the whole face of the sky had become darker, and objects at a distance were fainter in outline, the sea had changed from a warm green tint to a dark purple, and the ships at a distance of three miles from the shore were very indistinct, the thermometer now registered 6° lower in temperature, and the coolness of the air was perceptible to all. At 11h. 25m. the darkness was more intense, the distant objects on the land could scarcely be discerned, and trees in the immediate neighbourhood of the house were as black masses, while here and there stars came into sight in the zenith, the ships at sea had disappeared from view. At the time of the complete obscuration of the Sun which took place at 11h. 30m., the darkness was so considerable that at a distance of a few feet a person's features were undiscernible, and all sense of distance appeared to be lost, the thermometers could not be read without a light being held close to them, and the face of the sky was studded with stars as in deep twilight.

When totality occurred, Major McNair was looking out for Baily's Beads, but saw no sign of them. Meanwhile, Sir Harry Ord (1868: 10)

> … noticed that as the Sun became covered and the corona of light round the moon appeared a regular protuberance of a brilliant crimson color started forth at A in the annexed diagram, almost in the line of the moon's diameter as viewed from the South.

Three prominences were clearly visible, and they are shown in Figure 10. The most prominent of these, marked 'B', was termed 'The Great Horn' by astronomers in India (see Orchiston et al., 2017a) and was calculated to be between about 130,000 and 145,000 km in height (Mumpuni et al., 2017: 363; Orchiston et al., 2017: 786).

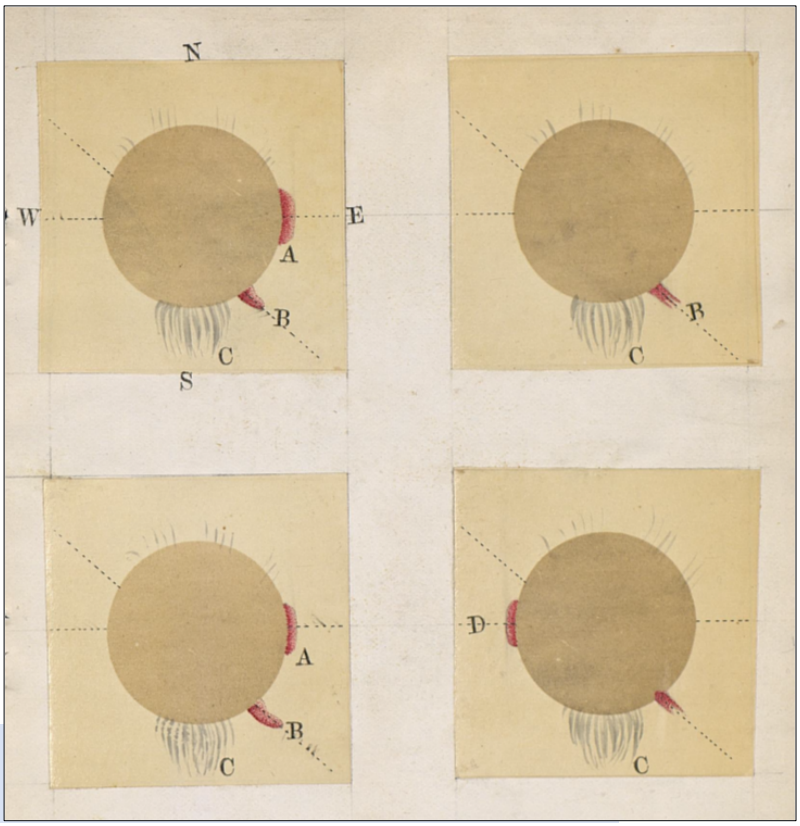
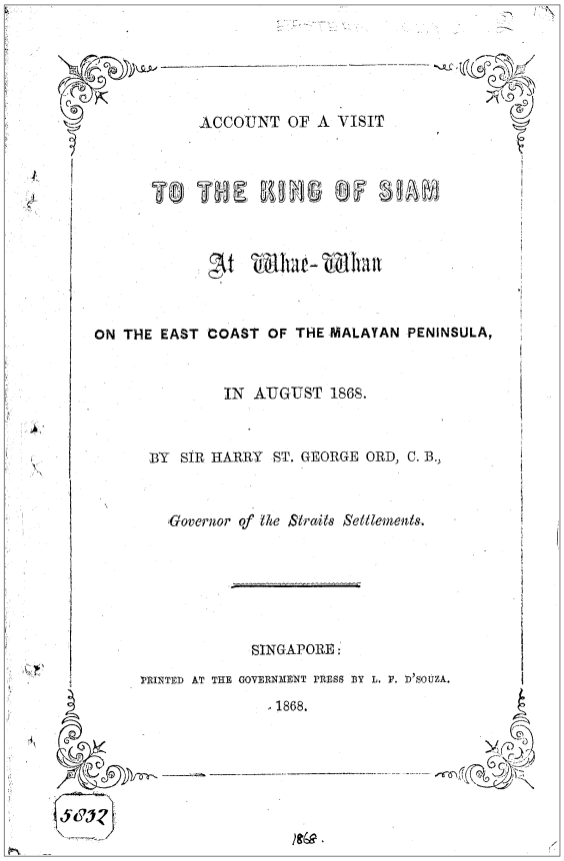


Figure 10: Drawings of the eclipse showing the three prominences, A, B and D (adapted from Ord, 1868: [Plate IX]).

Totality at the Siam eclipse site lasted 6 minutes and 45 seconds, close to the maximum for this eclipse (indicated by the green marker in Figure 2), and then this splendid event was over. Notwithstanding the inclement weather at daybreak, to the surprise of all the eclipse observations had been a success.

Late that same afternoon, King Rama IV decided on short notice to visit Sir Harry Ord's residence. After seating himself between Sir Harry and Lady Ord, the King proved to be


ACCOUNT OF A VISIT

TO THE KING OF SIAM

At Whae-Whan

ON THE EAST COAST OF THE MALAYAN PENINSULA,

IN AUGUST 1868.

BY SIR HARRY ST. GEORGE ORD, C. B.,

Governor of the Straits Settlements.

SINGAPORE:

PRINTED AT THE GOVERNMENT PRESS BY L. F. D'SOUZA.

1868.

5032

1868.

Figure 11: Title page of Sir Harry Ord's illustrated 1868 booklet about his visit to Siam and the 18 August 1868 total solar eclipse (Ord, 1868).

> … in a very good humour, his calculations of the time of the eclipse having proved extremely correct, (report said more so than those of the European observers) … [and he] talked a good deal, chiefly in English, expressing a hope that His Excellency was pleased with his visit and found every thing that he required. (Ord, 1868: 12).

The following day Sir Harry and Lady Ord visited King Rama IV's palace, and the King

> … held a long communication in English with the Governor, in which he repeated his expression of the pleasure it had been to him to make the acquaintance of His Excellency and Lady Ord, and his hope that the most friendly relations would always exist between the two Governments. (Ord, 1868: 14).

The King also talked about wishing to visit Singapore, so on this occasion he was operating more in 'diplomatic mode' than 'astronomical mode'! More on this strategy in Section 4.1.

3.3.3 The Eclipse Booklet

As we have seen, Sir Harry Ord was no astronomer, but he was a successful experienced diplomat and he realized that he could score political points by highlighting his personal involvement in King Rama IV's eclipse campaign. He was, after all, the most senior British representative at 'Whae-Whan', and he saw it as significant that the King chose to balance his Western links by inviting not just French astronomers but also a senior British diplomat, and one from Singapore to boot, not from India or even from Mother England.

Sir Harry's response to this unique opportunity was to publish a booklet, containing 23-pages of thoroughly readable text, along with a one-page table, and 12 pages of photographs (some of which are presented in this paper). The cover of this booklet is shown in Figure 11. We can be sure that this booklet was the shining light of his 1868 Annual Report to the Colonial Office, and while it contributes nothing of note to astronomical science, what it does do is detail Sir Harry's total involvement in his one and only solar eclipse expedition. When placed in a socio-political context, this has great value —as we shall see in Section 4.1, below.

4 DISCUSSION

4.1 Power, Politics and the Wha-koa Eclipse

Till now we have focused on the astronomical aspects of the 1868 solar eclipse, but Aubin (2010) has pointed out that there are also important non-astronomical aspects that warrant investigation.

For example, he suggests

> … that King Rama IV used the eclipse both for domestic and international political ends. On the one hand he exploited the eclipse to consolidate his authority within Siam by demonstrating the superiority of Western science—in this case astronomy—over local long-entrenched astrology and superstition, although he still had to find a way of balancing his Western astronomical knowledge and interests against his inherited Thai astrological commitments and obligations (see Cook 1993). (Orchiston and Orchiston, 2017: 312–313).

King Rama IV achieved this, and his eclipse expedition is now celebrated within Thailand. Moreover, it

> … now stands for the establishment of mod-

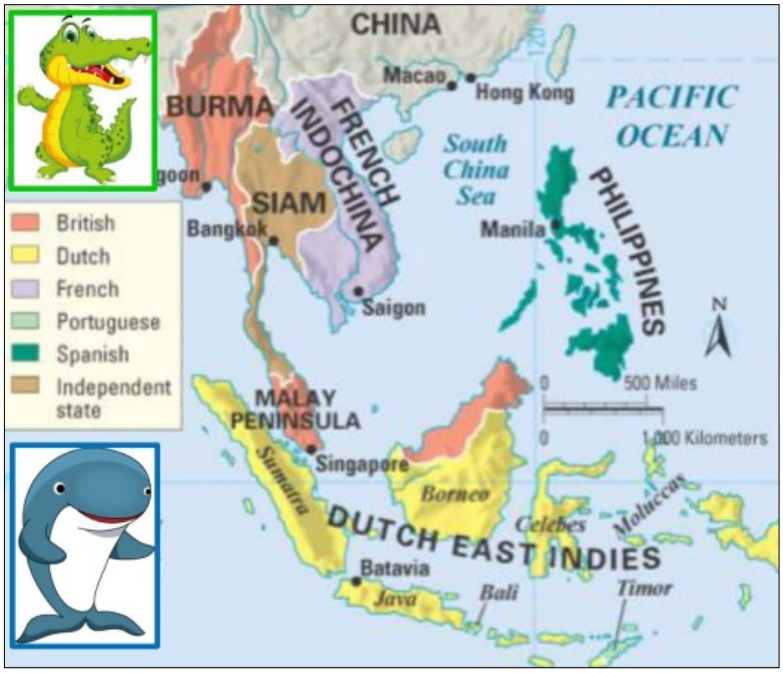


Figure 12: Map showing mid-nineteenth century Siam bordered by British and French colonies to the west, north, east and south, and the obvious threats imposed by France (the crocodile) and Britain (the whale) (after Orchiston and Vahia, 2021: 12).

> ern science, which by and large followed western norms and applied western technology, but remained respectful towards traditional belief systems. (Aubin, 2010: 89).

As a result, King Rama IV is now acknowledged and revered as the 'Father of Thai Science' (see Saibejra, 2006; Soonthornthum and Orchiston, 2021).

But there is another tantalizing non-astronomical dimension to the 18 August 1868 total solar eclipse: of how King Rama IV used it as a tool to defuse the colonial aspirations that Britain and France entertained towards his beloved Siam. He

> … saw Siam as an 'appetizing morsel' in an 'inter-colonial sandwich', with British colonies to the west (present-day India, Sri Lanka, Bangladesh and Myanmar) and French counterparts (present-day Laos, Cambodia and Vietnam) to the east. (Orchiston and Orchiston, 2017: 313).

When France forced independent Cambodia to accept its 'protection' in 1863 this caused a dilemma in Bangkok (Tuck, 1995), and King Rama IV is reported to have asked:

> Since we are now being constantly abused by the French because we will not allow ourselves to be placed under their domination like the Cambodians, it is for us to decide what we are going to do; whether to swim up-river to make friends with the crocodile [the French] or to swim out to sea and hang on to the whale [the British] … (Moffat, 1968: 124).

This scenario, and the obvious colonial threats are clearly illustrated in Figure 12.

In 1868 King Rama IV adopted a time-honored strategy used successfully by sovereign nations intent on maintaining their autonomy:

> To show the value and richness of their own knowledge traditions, they attempted to channel the symbolic power of eclipses in a manner more flexible than that of westerners. In syncretistic fashion they mustered the strength of both endogenous and occidental knowledge traditions. In their view solar eclipses were an ideal terrain for seducing Europeans into believing in *both* their ability to adapt to modern science *and* the value of traditional knowledge. Such demonstrations played a key role in the defense of Thailand's political independence. (Aubin, 2010: 91).

In the end King Rama IV decided to adopt both strategies simultaneously:

> … he would invite the French to base their eclipse camp on Siamese territory, near his own observing site, and at the same time encourage British diplomats and others of importance to join his own eclipse entourage … (Orchiston and Orchiston, 2017: 314).

In this context, King Rama IV saw Sir Harry Ord as a 'key player' in the thorny issue of Siam's independence, not to mention the political future of the Malayan Peninsula.

Figure 13: Photograph showing British, French and Siamese vessels anchored off the eclipse camps in August 1868 (after Ord, 1868: [Plate 5].

Meanwhile, on eclipse day the following vessels were anchored off the eclipse camps: the *Grasshopper*, *Pei-Ho* and *Satellite* representing Britain; the *Frelon* and *Sarthe* representing France; and the Royal Yacht, the *Chow Phya*, *Impregnable*, *Siam Supporter*, and "… several Gun-boats and other vessels." representing Siam (Ord, 1868: 2). Most, if not all, of these vessels are included in Figure 13, a photograph that appeared in Sir Harry Ord's booklet. We see representatives of the British, French and Siamese navies all anchored together, with Siamese vessels far out-numbering those of the two European rivals. King Rama IV's message to these two colonial powers was clear: Siam *was* an independent nation and it intended to remain so.

5 CONCLUDING REMARKS

The total solar eclipse of 18 August 1868 has a special place in the annals of astronomy and the history of solar physics, with important scientific observations made from India and Siam that threw important new light on the nature of prominences, the chromosphere and the corona.

The Siam-based observations were made by the Director of Marseille Observatory Édouard Stephan (1837–1923) and Paris Observatory's Georges-Antoine-Pons Rayet (1839–1906) and François-Félix Tisserand (1845–1896). Biographical sketches of all three are presented in Orchiston and Orchiston (2017: 294–297). Their eclipse camp (see Figure 14) was based at Wha-koa, just south of the site where King Rama IV and Sir Harry Ord were located. Important information was provided on the prominences viewed during the eclipse, and Rayet (who was an authority on stellar spectroscopy) saw "… nine brilliant [emission] lines …" (Stephan, 1869: 30), more than those reported by any of the observers in India (Launay, 2021). As is now well known, one of these lines subsequently was assigned to a new element, helium (Nath, 2013).

Apart from its contribution to science, this eclipse also played two key non-astronomical roles in Siam, both promoted by King Rama IV. Because of his intimate knowledge of and observational experience in astronomy, the King realized that a visually appealing event such as a total solar eclipse could be a very effective tool in teaching his people and his Court astrologers the correct scientific explanation for such an event. In traditional Siamese culture—as elsewhere in mainland and island Southeast Asia—it was thought that a solar eclipse occurred when a demon, *Rahu*, devoured the Sun (see Figure 15) (Gislen and Eade, 2019). King Rama IV's attempts to introduce the correct scientific explanations for spectacular astronomical objects and events had begun in 1857 with the annular solar eclipse of that year and with comet C/1858 L1 Donati. For details of his interpretation of these, and of later comets, see Soonthornthum and Orchiston, 2021: 272–274.

But even more importantly, because of its international ramifications, was the way that King Rama IV used the 18 August 1868 solar eclipse as a means to try and neutralize British

Figure 14: Photograph by Rayet of the French eclipse camp, showing instrument huts and the 40-cm (left) and 20-cm (right) reflecting telescopes set up outdoors (courtesy: Archives, Observatoire de Marseille, 132 J 84).

and French colonial aspirations vis-à-vis Siam. We can do no better in ending this paper than to quote Aubin (2010: 89): "… the eclipse expedition of 1868 was—and remains—one of the king's shrewdest political acts."

6 NOTES

1. This paper is based on a paper with the same title and by the same authors that was presented at the second conference of the Southeast Asian Astronomy Network's History and Heritage Working Group in Mandalay, Myanmar, in November 2017.
2. Note that 'Istana' means 'palace' in the Malay language.

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Figure 15: Thai amulet showing *Rahu* eating the Sun (Gislén Collection).

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