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ÉMILE LÉPISSIER, A FRENCH ASTRONOMER OF MISFORTUNE WHO TAUGHT IN CHINA AND JAPAN

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Abstract: This paper presents the lifetime and achievements of a little-known French astronomer, Émile Lépissier, who contributed to the modernization of astronomy in China and Japan. He was recruited in 1854 by Paris Observatory as a Computer and later raised to an Astronome-adjoint. However, due to an unfair decision by the dictatorial Director, Le Verrier, Lépissier was forced to resign from the Observatory. Eventually he was dispatched to Beijing and taught French at the Tongwen Guan School from 1867 to early 1870. After leaving Beijing, Lépissier moved to Shanghai and in 1871 initiated one of the earliest French newspapers in China. But because of strong competition from another French newspaper, Lépissier had to abandon his publishing business in 1872. In that same year he landed in Yokohama, near Tokyo. Lépissier was then employed by the Japanese Government and began teaching mathematics and astronomy at a school that later evolved into the University of Tokyo. He also published an *Almanach pour l'Année 1873* for foreigners, helped organize curricula and subjects at the school and advised the Government to establish a modern astronomical observatory. In 1874 Lépissier formally began teaching astronomy as a professor, but just three months later a sudden serious illness prevented him from continuing to teach. As a result, he retired from the school and sailed for France. After returning to Paris he soon passed away in poverty. Although Lépissier may have been an unsuccessful astronomer who suffered multiple misfortunes, we must appreciate his role as one of the founders of the early modern educational systems of China and Japan.

Keywords: French astronomer, Émile Lépissier, Tongwen Guan School, Kaisei Gakko School

1 INTRODUCTION

During the 1820s and 1830s, the Chinese Government was annoyed by the rapid rise in the illegal import of opium from India, promoted by the colonial policy of the British Government. In 1839 the bureaucratic Governor Lin Zexu, as the Opium-regulation Minister of the Qing Dynasty, confiscated and burnt the opium on British cargo ships in the harbor at Guangdong, and in retaliation China was attacked by the British Navy (the so-called Opium War of 1840–1842). As a result, the Government of the Qing Dynasty was forced to sign the Treaty of Nanjing, a harsh treaty where China ceded the island of Hong Kong to Britain, opened five free trade ports, and paid a huge amount of compensation.

The defeat of the Chinese armed forces during the Opium War against much more advanced European military power sent strong shocks not only through the minds of the Chinese people but also those in surrounding Asian countries. They realized the importance of introducing modern Western science and technology into their countries. Thus, China and Japan invited many teachers and professors from Europe and the US in various fields and disciplines, to strengthen scientific and technological infrastructure and modernize their education systems. This paper presents the lifetime and achievements of a little-known French astronomer, Émile Lépissier (1826–1874), who contributed to the modernization of scientific education and astronomy in China and Japan during the late nineteenth cetury.[1]

2 PRE-MODERN ASTRONOMY IN CHINA AND JAPAN

As a background to the subsequent sections of this paper here we briefly overview the astronomical situation in China and Japan before Western teachers like Lépissier came and taught modern European astronomy. The Chinese and Japanese had different attitudes towards accepting Western astronomy during the seventeenth to nineteenth centuries.

To Western astronomers it would seem that the emergence of the Copernican heliocentric view of the Universe (called by some the Astronomical Revolution) as a substitute for geocentrism is regarded as one of the most striking developments in the history of astronomy. It is true that also in China and Japan the novel idea of a heliocentric Universe was accepted with great surprise (e.g. see Nakayama, 1972; Sivin, 1973). However, it is worth pointing out the contrast between the West and the East.

The impression of the first author of this paper is that the Western scientific approach had a greater impact on East Asian astronomers than Copernican heliocentrism. Here the 'scientific approach' means the method of better understanding nature by making observations, deriving theories and revising these on the basis of further observations, as practised in the West since ancient Greek times. On the other hand, in East Asia such a systematic and logical methodology had never occurred before, so Western astronomy had an immense impact.

In China, Matteo Ricci (Li Madou, 利瑪竇) entered the Royal Court of the Ming Dynasty in 1601 as the first European scholar and Christian missionary. He published a world map titled *Kunyu Wanguo Quantu* (坤輿万国全図) in 1602, the first such Chinese map to include the North and South American continents, and in 1607 he published *Jihe Yuanben* (幾何原本), a Chinese translation of Euclid's *Elements of Geometry*. Because of Ricci's profound scholarship and his effort to adapt to Chinese tradition and customs, he acquired trust and fame from high-ranking court scholars such as Xu Gunagqi (徐光啓) and Li Zhizao (李之藻). Since then, Adam Schall von Bell (Tang Rouwang, 湯若望) succeeded in the calendar reform named Shixian Li (時憲曆) in 1645 as the Court Astronomer of the Qing Dynasty, which was the last Chinese luni-solar calendar that totally took account of the outcomes from the Western astronomy (e.g. Needham and Wang, 1959). He was also nominated as the Director of the National Astronomical Observatory in 1646. In as early as 1615 Emmanuel Diaz (Yang MaNuo, 陽瑪諾) published *Tianwen Lue* (天問略), the first introduction to China of telescopic discoveries by Galileo. Ferdinand Verbiest (Nan Huairen, 南懐仁) contributed to enrich and modernize astronomical instruments at the Ancient Observatory in Beijing. Ignas Kögler (Dai Jinxian, 戴進賢) is well known by *Yixiang Kaocheng* (儀象考成) published in 1757, including an extensive star catalogue consisting of more than 3000 stars with stellar magnitudes and precessional rates, observed by him and Chinese colleagues. As is seen by the above achievements of the Western scholars, regarding astronomical studies, the Chinese people of the seventeenth to nineteenth centuries were heavily dependent upon the Jesuit missionaries, rather than making efforts by themselves.

On the other hand, in Japan the situation was different. Since the first encounter of the Japanese with European people in 1543, Spanish and Portuguese missionaries taught Western astronomy to the Japanese, with the intention of showing the superiority of European civilization as a means of spreading Christianity. However, this activity was hampered by the start of cruel oppression based on the *Sakuku* (seclusion) policy of the Tokugawa Shogunal Government during the 1620s and 1630s, and all of the Christian missionaries throughout Japan were either killed or expelled. Soon after, the importation of Chinese books written or translated by Christian missionaries in China was strictly prohibited as well. As a result, knowledge of Western astronomy was gradually forgotten by the Japanese, except for fundamental concepts such as the sphericity of the Earth and the basics of astronomical navigation.

During the 1720s through 1740s the eighth Shogun Tokugawa Yoshimune enthusiastically embraced calendar reform based on Western astronomy, because he recognized the superiority of the Chinese Shixian Li Calendar. Accepting a petition from his science advisers, in 1720 Yoshimune finally lifted the import ban on Chinese books irrelevant to Christianity. This gave Japanese astronomers a chance to study details of Western astronomy, such as the elliptic motion of the Sun and the Moon, through Chinese books written by the Europeans in Beijing. The Kansei Calendar officially in use from 1798 in Japan was the first realization of Yoshimune's long-cherished wish. Around 1800, the Dutch East India Company in Nagasaki brought a Western book on astronomy into Japan, the Dutch translation of *Astronomie* by the French astronomer J.J. Lalande (Débarbat, 2005; Nakayama, 1969).

This was an historic milestone for the Shogunal astronomers, who start learning Western astronomy, not through Chinese translations but with books written in European languages. By the end of the regime of the Shogunal Government in 1868, Japanese scholars managed by themselves to master the concept and framework of classical Western astronomy. It should be noted that no European scholars with professional knowledge of astronomy had visited Japan prior to the 1860s. This was in clear contrast to China, and this difference between China and Japan seems to have been reflected in the subsequent history of acceptance of modern Western astronomy.

3 LÉPISSIER IN FRANCE

Émile-Jean Lépissier was born in Paris in 1826 and graduated from the University of Paris with a Bachelor's degree in literature. He was recruited by Paris Observatory in 1854 as a Computer, and three years later became an Astronome-adjoint—a rank similar to an Associate Professor

(Véron, 2008). The reason he joined Paris Observatory was because he and Le Verrier, who was the Director of the Observatory at the time, used to be friends when both were tutors at the École Polytechnique de Paris, and later when Le Verrier taught astronomy at the same school (Lépissier, 2014). Between 1857 and 1862 Lépissier (1857; 1860; 1861) published several research papers about small Solar System bodies (Véron, 2008).

The most important part of his work was related to the determinations of longitudes under the leadership of Le Verrier. Émile Lépissier's field notebooks are preserved in the Archives of the Observatoire de Paris with those of many other observers. For Lépissier, the first one begins in 22 November 1854 and the last one ends in 18 September 1863. They are bundled into batches of five-by-five, except for the last ones, and their total number is 104. As an example, the cover of Lépissier's field notebook number 104 is shown in Figure 1, which contains, among other things, the longitude for Biarrits (nowadays Biarritz). There is also a register (Figure 2), with the reduction of the observed data, the title page bearing Lépissier's name the "Longitude de Paris-Biarrits-Madrid".

Under the leadership of the Director, Urbain Le Verrier, the astronomer who 'discovered' Neptune using only theoretical calculations (e.g., Lequeux, 2013), Lépissier went to Spain twice with the Director, for the total eclipse observation of 1860, and for the geodetic expedition to determine the longitude difference between Paris and Madrid in 1864 (Véron, 2008). Although the relationship between Le Verrier and Lépissier was good at the start, the situation deteriorated rapidly. During this period, Le Verrier had repeatedly written letters to the Minister of Education complaining about Lépissier's incompetence as an astronomer at the Observatory. Finally, in 1865 Le Verrier forced Lépissier to resign.

According to Lépissier, he was sacrificed as a 'scape goat' in order to cover up some unsuccessful aspects of the Spanish geodetic expedition so as not to damage Le Verrier's reputation (Véron, 2008). Lépissier may not have been biased in this viewpoint because in fact Le Verrier's cruel treatment of him was not exceptional; there were at least ten other victims of Le Verrier's dictatorial attitude at Paris Observatory. One example is Edouard Lucas, hired as Lépissier's substitute, who was also expelled by le Verrier but later became a famous mathematician in the field of number theory (Decaillot-Laulagnet, 1999). Other victims of Le Verrier's dictatorship were Charles André, Louis-Jules Gruey, Léon Sonrel, and even Félix Tisserand, who was later appointed Director of Paris Observatory, following Mouchez, and after Le Verrier (Véron, 2008). These facts clearly reveal Le Verrier's defective personality, as aptly expressed by the subtitle of the biography that James Lequeux (2013) wrote*: Magnificent and Detestable Astronomer*.

In the summer of 1866 Lépissier happened to meet a British Inspector of the Chinese Imperial Customs and Maritime Offices, who was in Paris on vacation and looking for a French language Professor for Tongwen Guan School (同文館) in Beijing. After an interview with the Inspector Lépissier (2014) agreed to accept this post. His salary in China was supposed to be paid by the Chinese Imperial Customs Office, because it was this organization that controlled the operations of the school.

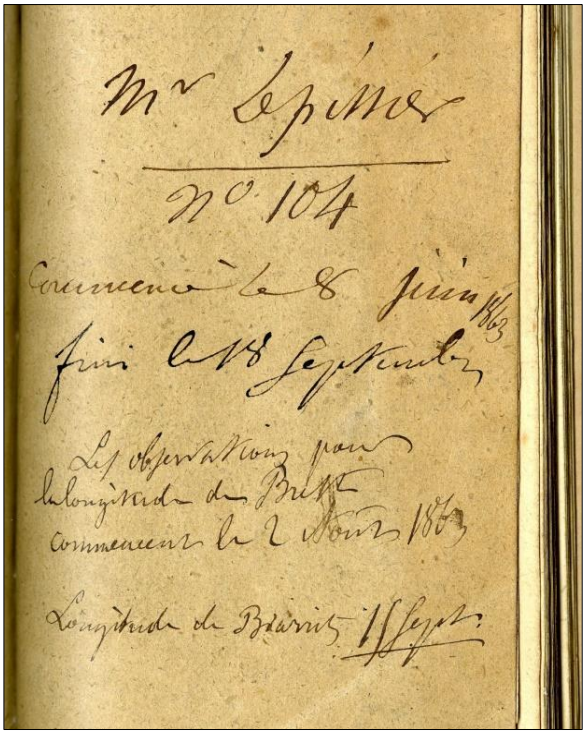
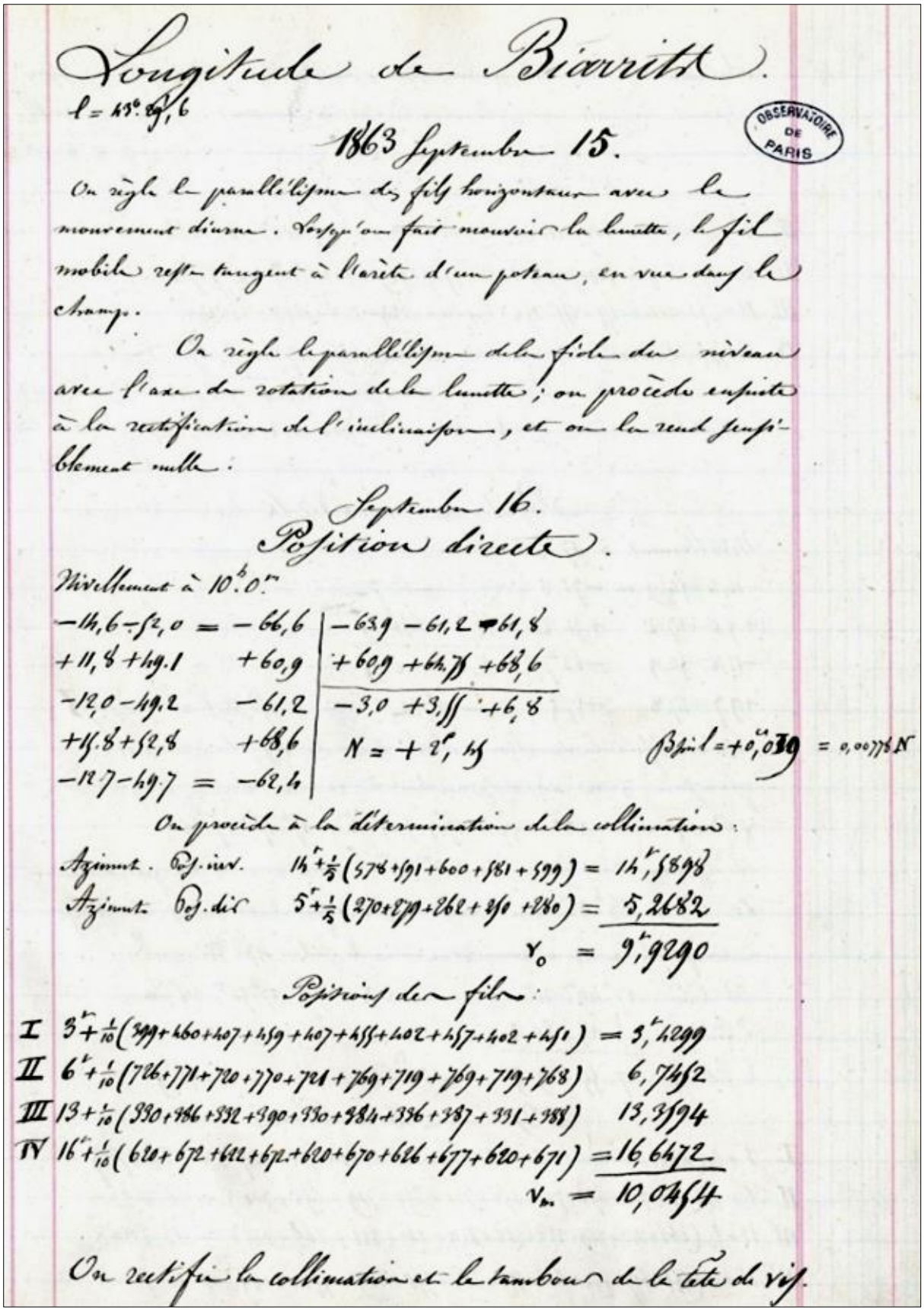


Figure 1: Cover page of Lépissier's last notebook of observations (Archives (F 14) at Paris Observatory. © courtesy: Bibliothèque de l'Observatoire de Paris).

Lépissier then wrote a letter to the Ministry of Education, expressing his appreciation to the Minister who had agreed that while in China Lépissier would make gratuitous astronomical and geodetic observations, and would also collect astronomical records made by ancient Chinese astronomers. However, Lépissier was somewhat disappointed when he found that all he had to do at Tongwen Guan School was teach French. He had hoped he would also be able to teach astronomy and even carry out astron-



Longitude de Biarritz.

$l = 43^{\circ}\ 29',6$

OBSERVATOIRE DE PARIS

1863 September 15.

On règle le parallélisme des fils horizontaux avec le mouvement diurne. Lorsqu'on fait mouvoir la lunette, le fil mobile reste tangent à l'arête d'un poteau, en vue dans le champ.

On règle le parallélisme de la fiole du niveau avec l'axe de rotation de la lunette; on procède ensuite à la rectification de l'inclinaison, et on la rend insensiblement nulle.

September 16.

Position directe.

Nivellement à $10^{h}.0^{m}$

$-14,6 - 52,0 = -66,6$	$-63,9$	$-61,2$	$+61,8$	
$+11,8 + 49,1 \quad +60,9$	$+60,9$	$+64,55$	$+68,6$	
$-12,0 - 49,2 \quad -61,2$	$-3,0$	$+3,35$	$+6,8$	
$+15,8 + 52,8 \quad +68,6$	$N = +2^{v},45$			$\beta_{fil} = +0^{v},0039 = 0,0078\,N$
$-12,7 - 49,7 = -62,4$				

On procède à la détermination de la collimation:

Azimut. Obj. inv. $\quad 14^{r} + \frac{1}{5}(578+591+600+581+599) = 14^{r},5898$

Azimut. Obj. dir. $\quad 5^{r} + \frac{1}{5}(270+279+282+290+280) = 5,2682$

$\gamma_0 = 9^{r},9290$

Position des fils:

I	$3^{r} + \frac{1}{10}(399+460+407+459+407+458+402+457+402+451)$	$= 3^{r},4299$
II	$6^{r} + \frac{1}{10}(726+771+720+770+721+769+719+769+719+768)$	$6,7452$
III	$13 + \frac{1}{10}(330+386+332+390+330+384+336+387+331+388)$	$13,3594$
IV	$16^{r} + \frac{1}{10}(620+672+622+672+620+670+626+677+620+671)$	$= 16,6472$
		$\gamma_m = 10,0454$

On rectifie la collimation et le tambour de la tête du vis.

Figure 2: First page of Lépissier's register (Archives (F 14) of Paris Observatory. © courtesy: Bibliothèque de l'Observatoire de Paris).

omical research. In October Lépissier (2014), his wife and his daughter embarked from London on a British clipper bound for Shanghai (see Figure 3).

4 LÉPISSIER IN CHINA

From 1867 Lépissier was employed as a Professor of French language at Tongwen Guan School in Beijing. More formally it is called Jingshi Dongwen Guan (京師同文館) School, to distinguish it from similar Government schools in other places such as at Shanghai and Guangdong. Tongwen Guan School in Beijing was basically a Foreign Language School established in 1862. It had originally offered three courses, in English, French, and German, but Russian and Japanese were added later.

This school also had several advanced courses on other topics, including astronomy, mathematics, engineering and international laws (Biggerstaff, 1961). It is noteworthy that in 1873 this School founded the earliest university press in China, to publish academic books. In 1902 Tongwen Guan School and other schools were reorganized, becoming Beijing University (Zhang, 2008).

Tongwen Guan School was divided into Departments for each language, and Lépissier belonged to the French Department. According to School documents, at that time Lépissier's name was written in Chinese characters as Li (李 Lé), Bi (璧 pi), Xie (諧 ssier). During his stay in Beijing, he contributed a research paper to a French journal about his observations of a transit of Mercury (Lépissier, 1868).

Although Lépissier eagerly coped with studying the Chinese language in an attempt to help his Chinese students understand French, these efforts were not rewarded (Lépissier, 2014). This was likely to have been due to the relatively small number of students who wanted to learn French seriously, as manifested by their very high percentage of absenteeism—some other foreign professors also encountered similar difficult situations.

In 1869 Lépissier described in a letter his plan to visit Shanxi Province with a sextant, probably in order to determine longitudes and latitudes of different places. But he was advised by his colleagues not to talk to the school officials about his astronomical studies in China (Lépissier, 2014). Because of this opposition to his intended scientific mission and the bad relationship with his students he increasingly felt discouraged and eventually became convinced that Beijing was not a place where he should pursue a career. Subsequently, Lépissier's employment was terminated by the President of Tongwen Guan School.

After his departure from the school in February 1870 Lépissier moved to Shanghai to find a job. The Lépissiers settled in the French concession, and their son, Émile-Laurent from Paris, could at last join the family.

In Shanghai, Émile Lépissier decided to switch his career from teaching to the publications business. His past experience in Paris may have helped him make this change, because before his departure for China he had regularly contributed articles to French newspapers such as *Le Monde Illustré* (Lépissier, 2014). His educational experience at the Tongwen Guan School might also have prompted him to make so drastic a change.

Figure 3: A photograph taken in Paris in about 1858 showing Émile-Jean Lépissier (center) with his son Émile-Laurent (left) and daughter Juliette (right) (courtesy: Bertrand Lépissier).

Lépissier negotiated to become an editor and a partner in the weekly newspaper *Le Nouvelliste de Shanghai,* the first French newspaper in Shanghai, which had been founded in December 1870. A contract between Émile Lépissier and the owner was signed, but because of strong resistance from the printer of the newspaper this contract was soon nullified.

Consequently, in March 1871 Lépissier started publishing his own weekly Shanghai newspaper, which he named *Le Progrès* (see Figure 4). This was the second-earliest French newspaper in China (Le Chatelier, 2009). The establishment of this opposing newspaper by Lépissier created fierce hostility from the owner of *Le Nouvelliste de Shanghai*. Moreover, Lépissier often used his newspaper to criticize the officials in the Municipal Council for the Shanghai international concessions, of which he was

Vol I. Shanghai, 28 [illegible] 1871. No. 2.

LE PROGRÈS.

JOURNAL DE L'EXTRÊME ORIENT.

ABONNEMENTS.

Les abonnements sont payables d'avance en espèces ou en un chèque sur une banque ou une maison de Shanghai.

Prix : $4 Par Trimestre.

Pour les ports de Chine et de l'Etranger desservis par des malles :

Frais de Poste en sus.

Tout abonnement se continue jusqu'à avis contraire. Le trimestre commencé est intégralement dû.

S'adresser pour tout ce qui concerne la Rédaction et l'Administration, à M. [illegible], Rédacteur-Gérant. Bureau : Rue [illegible] coin de la Rue du Consulat, à Shanghai.

Les manuscrits non publiés seront brûlés.

On rendra compte de tous les ouvrages, dont il sera déposé un exemplaire.

ANNONCES.

Les annonces sont reçues tous les jours, excepté le dimanche, au bureau du Journal, de 10 à 4 heures.

Prix des 10 Lignes et au-dessous.

Pour une insertion	$ 1
Pour un mois	2
Pour un trimestre	5
Pour un semestre	9
Pour un an	16

AVIS.

LES correspondances et communications, en n'importe quelle langue, seront accueillies de toutes parts avec le plus vif empressement.

Le Rédacteur-Gérant espère que les sympathies de ses compatriotes et des résidents de nationalité différente ne lui feront pas défaut, et que chacun voudra bien, par une souscription de $4 par trimestre, soutenir une feuille [illegible] claire. Ce Corps, dit municipal, se compose de neuf membres, dont huit seulement sont nommés obligatoirement par les résidents, qui les chargent de surveiller leurs intérêts. Quant au neuvième, il n'a nullement besoin d'être investi de cette quadruple publique, puisque de droit et sans élection, il fait partie du Corps Municipal. Et ce qu'il y a de curieux, c'est que ce neuvième est par sa position même, non-seulement un des membres [illegible] le moins d'intérêts matériels dans la Concession.

NOTICE.

MUNICIPAL ELECTIONS.

[illegible] Consul General for France, in accordance with the Municipal Council of the French Concession, begs to inform M. M. the Electors [illegible] the electoral list is and will be posted at the French Consulate-General and at the Municipal Hall from Monday 27th March, until the [illegible] the 31 inst., of which the day will be [illegible] du politesse chinoise, où il nous fut donné du Li Ta jen (S. E. Li.) à plein encensoir, s'enquirent du but de notre voyage. Nous leur répondîmes que nous venions recueillir des renseignements sur le forfait commis par les Chinois à l'égard de nos compatriotes. Les deux mandarins prirent congé, et cinq minutes après, nous recevions de M. Mendoza, consul d'Amérique, un billet ainsi conçu : "Le consul des Etats-Unis Cher Monsieur, S. E. Tcheng Hrô étant informé que vous vous trouvez à bord du

Figure 4: Part of the front page of the weekly newspaper *Le Progrès* founded by Émile Lépissier at Shanghai in 1871 (courtesy: Bertrand Lépissier).

himself also a member. These articles generated a lot of opposition from foreigners living in Shanghai (Lépissier, 2014).

As a result, Lépissier became bankrupt and publication of *Le Progrès* was suspended, the last issue being released on 23 January 1872 (and, ironically, *Le Nouvelliste de Shanghai* also stopped publication later this same year).

Although the specific reasons of their departure from Shanghai are unknown, the Lépissier family sailed for Japan towards the end of December 1871.

5 LÉPISSIER IN JAPAN

5.1 Lépissier in Yokohama

Émile Lépissier and his family stayed in Japan for two and a half years, from January of 1872 through June 1874. Table 1 summarizes his sojourn and activities in Japan in chronological order (Year and Date are the Gregorian calendar and the Meiji-era means the traditional Japanese era, which was abolished by law on 1 January 1873).

Lépissier landed at Yokohama near Tokyo on New Year day of 1872. In 1868 Japan had abandoned the *Sakoku* (seclusion) policy which lasted for 230 years, and Yokohama was one of the international ports that opened for foreign shipping. Figure 5 is a woodcut print of Yokohama drawn at this time. We can confirm Lépissier's arrival details in Yokohama through passenger listings published in a local newspaper (*The Japanese Weekly Mail*, 1872). Comparison of his landing date in Yokohama with the last issue date of *Le Progrès* (23 January 1872) suggests that in 1871 Lépissier probably made preparations for the family to move to Japan and that he probably also arranged for someone in Shanghai to help close down his newspaper business.

The new Meiji Government, which was established in 1868 by overthrowing the ancient Samurai regime, employed three foreign Professors of Astronomy during the Meiji era (1868–1912). Although Émile Lépissier was the first of these (the other two were from the US), so far very little was known about him, except for a short description in the official chronology of the Meiji Government.[2] However, Toshio Sato (2006) recently unearthed interesting new records about Lépissier among domestic historical documents, ranging from ones relating to the University of Tokyo through commercial newspapers, some of which will be cited individually in the following

Table 1: Émile Lépissier's sojourn and activities in Japan.

Year	Date	Meiji Era	Description
1872	1 January	M4.11.21	Arrives at Yokohama from Shanghai (on the *Costa Rica*)
		M5.1.14	Officially employed by the Japanese Government
		M5.2.1	Starts teaching algebra, geometry, mechanics, etc. at Kaisei Gakko School
		M5.3.29	Gives a lecture on Astronomy to the Meiji Emperor
	Autumn		Publishes *Almanac pour l'Année 1873* (6th year of the Meiji Period) in Yokohama
1873	1 January	M6.1.1	Meiji Calendrical Reform (M5.12.3 = M6.1.1 = 1873.1.1)
		M6, summer	Climbs Mt Fuji to measure the height of the summit
	October		Advises the Government to establish a modern astronomical observatory
1874	25 February	M7	Starts teaching an Astronomy class at Tokio Kaisei Gakko School (Imperial University of Tokio)
	April		Suddenly stops teaching, due to an unknown serious disease
	11 June		Officially retires from the Imperial University of Tokio
	17 June		Embarks on the French steamer *Menzaleh* bound for Hong Kong

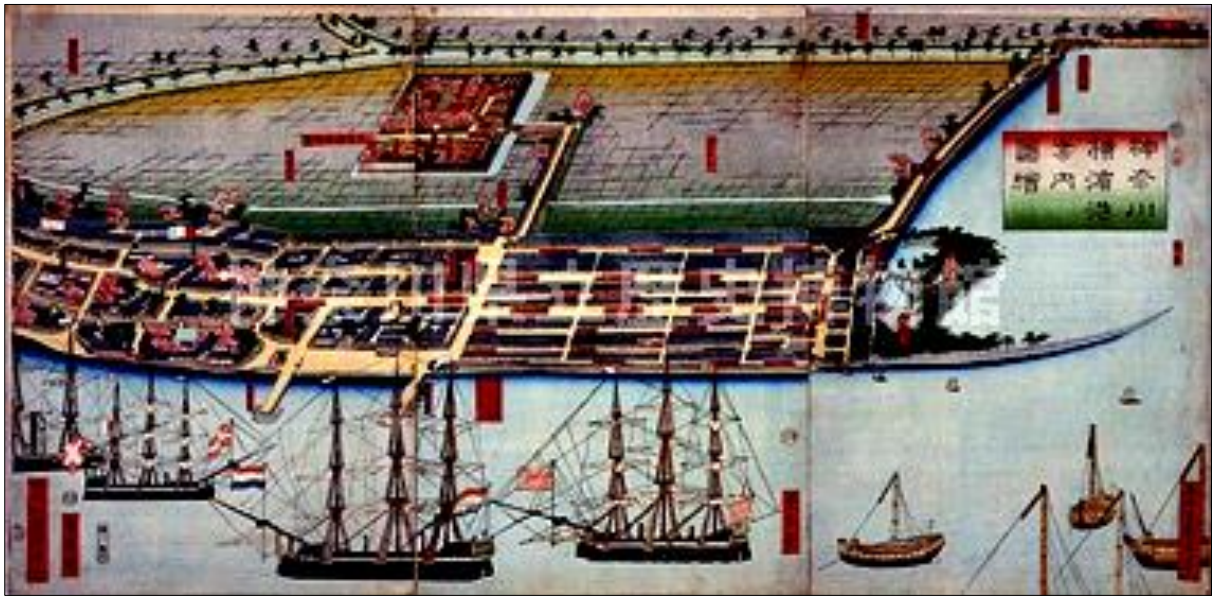


Figure 5: The port of Yokohama and the residential area under construction for foreign visitors around 1859 (courtesy: Yokohama City Museum).

pages. These findings by Sato are also reflected in Table 1.

According to Table 1, Émile Lépissier was officially employed by the Ministry of Education of the Meiji Government as a Professor of Mathematics, just two months after landing in Yokohama (National Archives of Japan, 1976: 721). This was exceptional, because it is unlikely that the conservative bureaucrats of the Meiji Government would have hired an unknown Frenchman who had just arrived in Japan. How could he succeed in being employed so promptly by the Japanese Government unless this was arranged beforehand?

A likely explanation is that from early 1871, while he was in Shanghai, Lépissier had developed a friendship with a Mr C. Levy, who published the daily French newspaper in Yokohama, *L'Echo du Japon*, which he had founded in 1870. This inference is supported by the fact that in autumn 1872 Levy published *Almanach pour l'Année 1873*, which was edited by Lépissier. This publication will be mentioned again later.

Prior to Lépissier's arrival in Japan, he and Levy had probably exchanged international news and information, and it is likely that Lépissier had already contacted the Japanese Government after Levy informed him that they were looking for a foreign Professor of Astronomy.

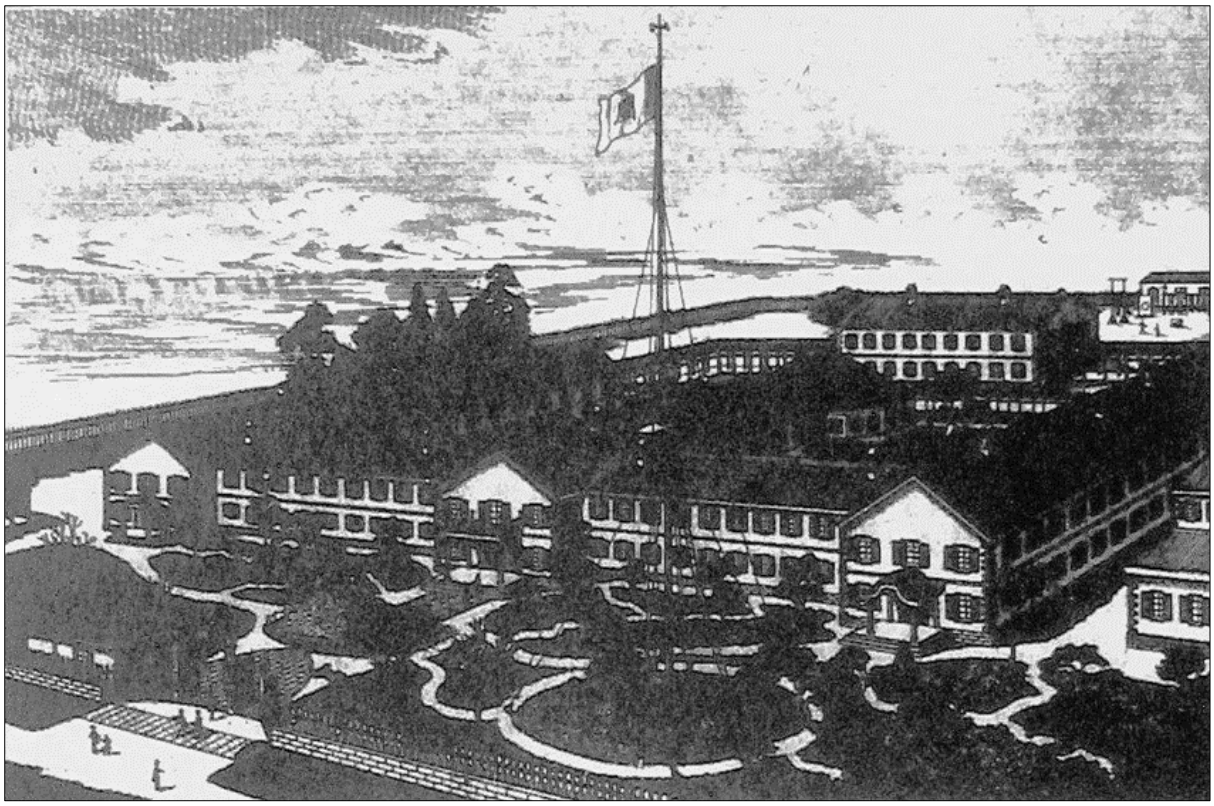


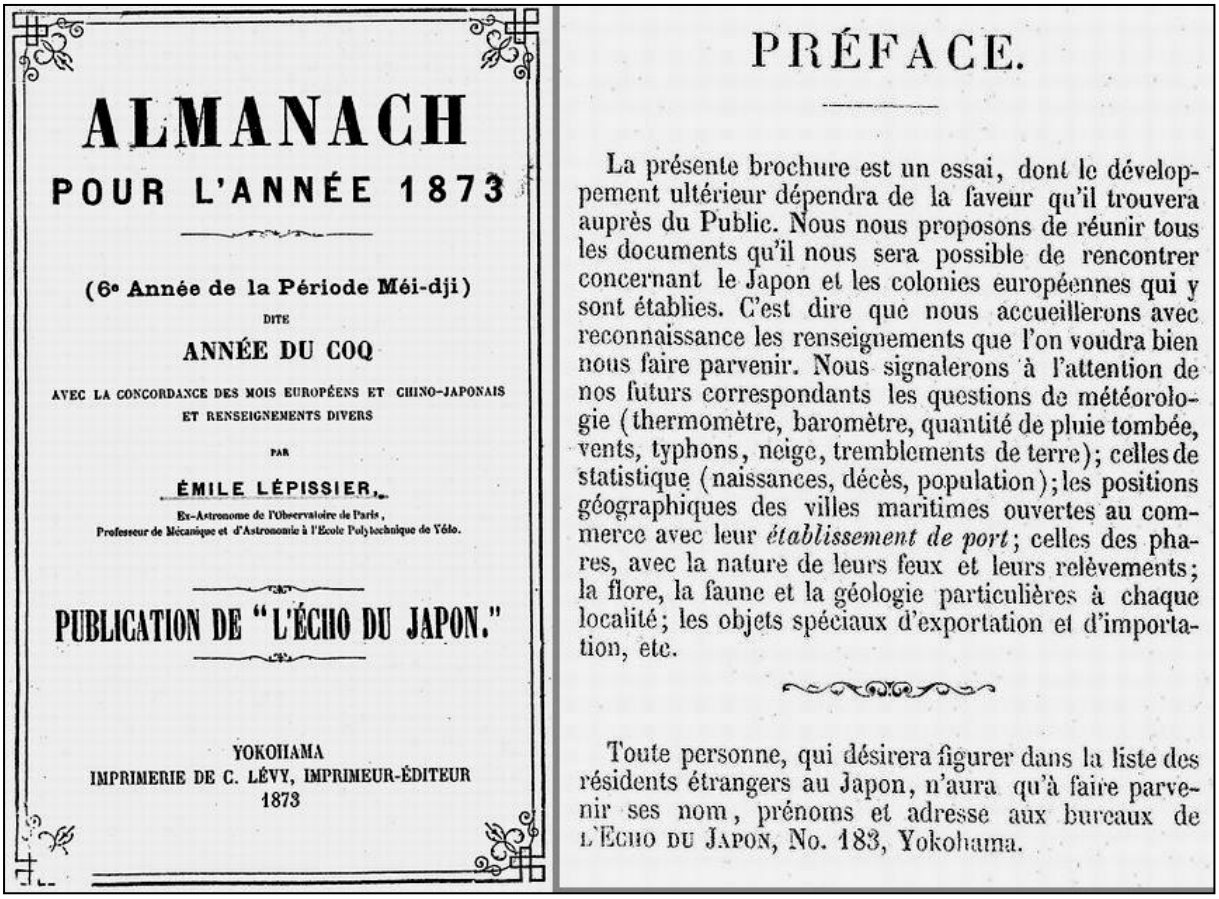
Figure 6: A drawing of the Tokio Kaisei Gakko School near to its foundation year of 1872. This school was a predecessor of the University of Tokio founded in 1877 (courtesy: University of Tokyo).

This speculation is strengthened by the fact that the Ministry of Education of the Meiji Government was a good client of Levy's company, which printed Governmental documents and publications (Polak, 2002), so Levy could very well have negotiated with the Meiji Government on Lépissier's behalf prior to his arrival. Since the undersea telegraph connection between Shanghai and London (via Japan and Far Eastern Russia) was established in mid-1871 (Lépissier 2014), Lépissier could easily have communicated with Levy.

5.2 Teaching Astronomy as a Professor at a School inTokyo

From the end of February 1872, Lépissier began teaching algebra, geometry and mechanics as a Professor of Mathematics using the French language, at the Tokio Kaisei Gakko School (see Table 1).[3] This school (also called simply Kaisei Gakko) was founded in downtown Tokyo in 1872 as one of the first advanced modern schools in Japan (Figure 6). In 1877 the school was reorganized into the University of Tokio (the predecessor of the current University of Tokyo). In May1872 Lépissier had the honor of giving a special lecture on astronomy in the presence of the Meiji Emperor. The theme of his lecture was introductory astronomy and the use of the telescope and prism in association with spectroscopy (Imperial Household Agency, 1969: 660–661).

In the late autumn of 1872, Lépissier published *Almanach pour l'Année 1873* for the newspaper company *L'Echo du Japon* located in Yokohama. This 25-page booklet (see Figure 7) was a special calendar, or a sort of concise astronomical ephemerides (now preserved at the National Diet Library of Japan), intended for use by traders and diplomats living in the foreign territory of Yokohama. Following an 8-page introduction that gave a general explanation of the calendar and the Japanese calendar reform of 1873, just announced by the Japanese Government, the almanac consisted of daily tables for each month that included astronomical phenomena of the planets, festival days of the Christian saints, and memorial days in world history (such as the birth date of James Watts in 1736, and the funeral date of the British Admiral Nelson in 1806). This shows that the calendar was prepared for foreigners living in Yokohama. A comparison of this almanac with the *Annuaires* of the Bureau of Longitudes for 1871–1875, which are believed to have been possessed by Lépissier (now preserved in the Komaba Library at the Uni-



ALMANACH

POUR L'ANNÉE 1873

(6e Année de la Période Méi-dji)

DITE

ANNÉE DU COQ

AVEC LA CONCORDANCE DES MOIS EUROPÉENS ET CHINO-JAPONAIS ET RENSEIGNEMENTS DIVERS

PAR

ÉMILE LÉPISSIER,

Ex-Astronome de l'Observatoire de Paris,
Professeur de Mécanique et d'Astronomie à l'École Polytechnique de Yédo.

PUBLICATION DE "L'ÉCHO DU JAPON."

YOKOHAMA
IMPRIMERIE DE C. LÉVY, IMPRIMEUR-ÉDITEUR
1873

PRÉFACE.

La présente brochure est un essai, dont le développement ultérieur dépendra de la faveur qu'il trouvera auprès du Public. Nous nous proposons de réunir tous les documents qu'il nous sera possible de rencontrer concernant le Japon et les colonies européennes qui y sont établies. C'est dire que nous accueillerons avec reconnaissance les renseignements que l'on voudra bien nous faire parvenir. Nous signalerons à l'attention de nos futurs correspondants les questions de météorologie (thermomètre, baromètre, quantité de pluie tombée, vents, typhons, neige, tremblements de terre); celles de statistique (naissances, décès, population); les positions géographiques des villes maritimes ouvertes au commerce avec leur *établissement de port*; celles des phares, avec la nature de leurs feux et leurs relèvements; la flore, la faune et la géologie particulières à chaque localité; les objets spéciaux d'exportation et d'importation, etc.

Toute personne, qui désirera figurer dans la liste des résidents étrangers au Japon, n'aura qu'à faire parvenir ses nom, prénoms et adresse aux bureaux de L'Écho du Japon, No. 183, Yokohama.

Figure 7: *Almanach pour l'Année* 1873, edited by Émile Lépissier (courtesy: National Diet Library of Japan).

versity of Tokyo), suggests that Lépissier probably extracted most of the festival days of the Christian saints from the *Annuaire*. Since Levy, as the owner of *L'Echo du Japon*, had already published several French books on Japanese history, culture and travel guides, the almanac compiled by the Lépissier fitted nicely into the company's publication policy. Although the reason why the almanac was not issued after 1874 is unknown, perhaps this was because the Japanese Government had decided to adopt the Gregorian Calendar from the first day of 1873. We refer to this as the Meiji Calendar Reform.

In October of 1873, Lépissier suggested to the Japanese Ministry of Education that the Government should establish a modern astronomical observatory. The idea was approved, but construction only occurred four years after Lépissier had left Japan. Nonetheless, this should be regarded as one of his astronomical legacies. This observatory (Figure 8) is the ancestor of the Tokyo Astronomical Observatory, which was founded in 1888 at Azabu, in downtown Tokyo.

From February 1874 Lépissier started teaching astronomy to a class of about 30 students, as a regular Professor at the Kaisei Gakko School. So Émile Lepissier was the first Professor of Astronomy in modern Japan. One can see in *The Calendar of the Tokio Kaisei Gakko of 1875* (the Annual Report of the School) the early status of the school in terms of organization, curricula and subjects, professors and students, its financial situation, etc. A page from the list of professors in the report is shown in Figure 9. We see that the name of E. Lépissier is listed from February 1872 to June 1874 as a Professor of Astronomy. Individual names of students in each class were also listed in this report. Note that this report was issued the year after Lépissier left Japan.

The Kaisei Gakko School was organized into three language Departments, English, French and German. Each Department offered two stage courses, a general course and an advanced course. During the first year of the three-year major, the language corresponding to each Department was primarily taught by native teachers. The special course, where students needed four years to graduate, was for advanced learning, depending on each specialty, such as engineering, mining, polytechnic sciences (mathematics,

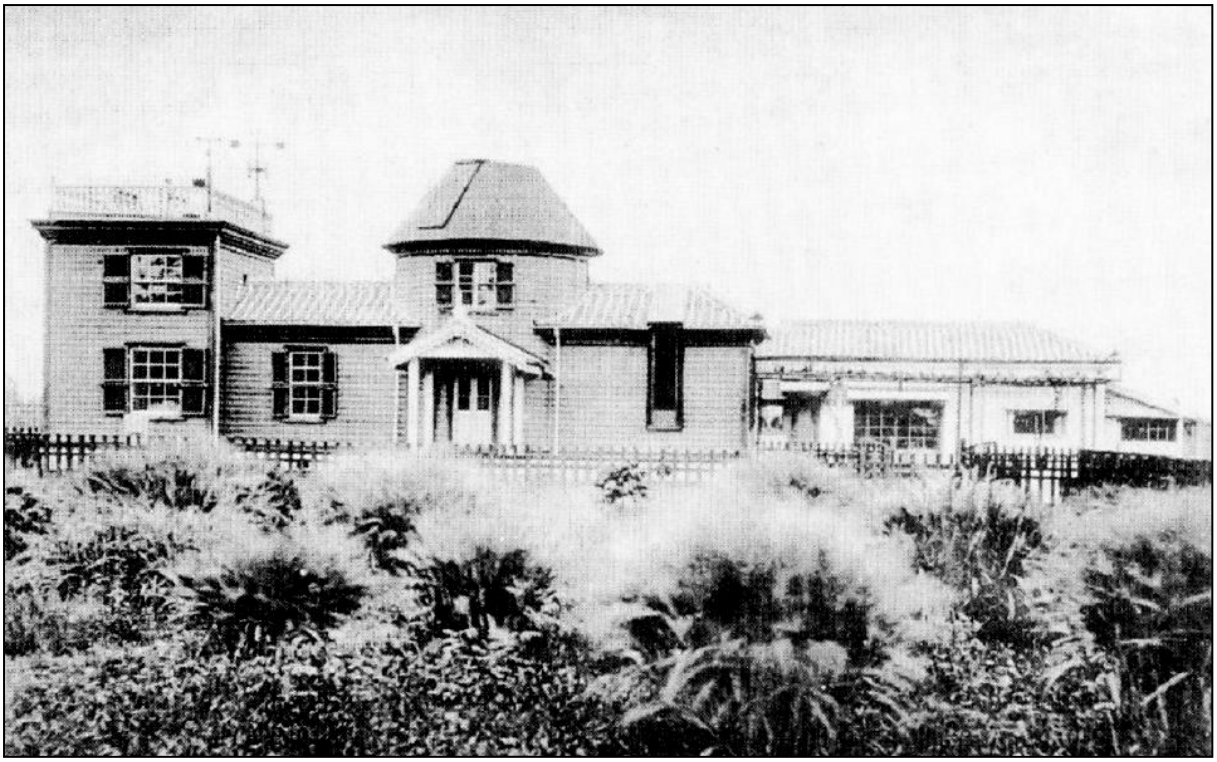


Figure 8: Astro-meteorological Observatory equipped with modern instruments, first constructed on the campus of the current University of Tokyo in 1874. The houses seen at the back were residences where foreign teachers like Lépissier lived (courtesy: National Astronomical Observatory of Japan).

LIST OF PROFESSORS

FROM THE DATE OF THE ORGANIZATION OF THE UNIVERSITY.

Began Service.	*Name.*	*Ended Service.*
March 1869,	Guido F. Verbeck, *Principal*	Sept. 1873
July 1870,	X. Maillot, *Physics and Chemistry*	Aug. 1874
May 1871,	Dr. Peter V. Veeder, *Physics*	.....
May 1871,	Erwin Knipping, *German*..	.....
Sept. 1871,	Horace Wilson, *Elementary Mathematics*	.....
Dec. 1871,	Carl Schenk, *German* ...	July 1875
Feb. 1872,	E. Lépissier, *Astronomy* ...	June 1874
Sept. 1872,	G. Fontaine, *French Literature*	April 1875
Oct. 1872,	William E. Griffis, *Chemistry*	July 1874
Oct. 1872,	Dr. D. B. McCartee, *Natural History, Political Economy and Latin*	.....

Figure 9: List of Professors at the Tokio Kaisei Gakko School prior to 1876 (after *The Calendar of the Tokio Kaisei Gakko of 1875*).

physics, astronomy, etc.). All of the lectures in these special subjects were given by the professors in their native languages.

Here let us compare the main educational characteristics of the Tongwen Guan School in China and the Kaisei Gakko School in Japan (Table 2). At a glance, one can notice similarities for each entry. In the past, the general understanding was that the early systems of higher education in China and Japan had evolved independently. In the case of Japan, it was believed that the educational system at the Kaisei Gakko School was established through the advice and recommendations of the hired foreign professors, and/or the knowledge and experience brought by Japanese students and diplomats who went to Europe during the 1860s and the early 1870s. However, Table 2 seems to suggest that there may also have been some influence from China, and this should be the target of future research.

5.3 The Expedition to Mount Fuji

In the summer of 1873 Émile Lépissier spent 10 days on Mt. Fuji. He was accompanied by a university colleague and one of his students, and they took two aneroid barometers and a thermometer with them so that they could measure the

Table 2: Comparison of the Tongwen Guan School (China) and the Kaisei Gakko School (Japan).

China	Japan
Tongwen Guan, 1862	Kaisei Gakko, 1874
Beijing University, 1902	University of Tokio, 1878
Foreign language class (3 years)	General course: Foreign language class (3 years)
English, French, Russian (German and Japanese)	English, French, German
Advanced class (5 years)	Special course (4 years)
Astronomy, Mathematics, Chemistry, Medical Sciences, Engineering, European History, and International Law	Chemical Technology; Engineering; Polytechnic Science (Astronomy, Mathematics, and Physics), Mining, and Law

height of this famous mountain. Lépissier (1873) explained that the reason he planned this expedition was because past estimates of Mt. Fuji's height had been made by a few foreign visitors to Japan, and their values largely differed from one another.

Lépissier measured atmospheric pressure and temperature at 30 places in the course of their travels, including at the summit of Mt. Fuji. And he calculated the altitude of this mountain above mean sea level by using a formula as a function of pressure and temperature given in a book on celestial mechanics written by the great French mathematician Pierre-Simon Laplace.

As a result, Lépissier obtained a value of 3519 m, which is about 5% lower than the modern determination (3776 m). He reported this result in a German academic journal.[4] Sato (2006: 550) found that Lépissier's expedition to Mt. Fuji was also discussed in a major Japanese commercial newspaper, *Tokio Nichi-nichi Shinbun* (1874).

Seven years later an American scientist, Thomas C. Mendenhall (1841–1924) who became a Professor of Physics at the University of Tokio, climbed Mt. Fuji along with his Japanese students, and they measured the gravity at the top using a pendulum with electric contacts and a chart recorder, and a chronometer. From his measurements Mendenhall (1881) calculated the mean density of the Earth, and the value that he obtained was regarded as one of the best at that time.

5.4 An Astronomer of Misfortune

In order to start the astronomy class at the Kaisei Gakko School, Lépissier worked hard organizing and preparing the curricula and subjects for his class. But only three months later, after the new semester of 1874 had begun, he suddenly became seriously ill and had to stop teaching in April 1874. Although a French textile engineer who had been at a local town near Tokyo temporally stepped in and taught the class, Lépissier did not recover. Eventually, the illness forced him to resign from the School, and in June he and his family left Japan on a French steamer, bound for Hong Kong and ultimately France (*The Japan Weekly Mail*, 1874). After Lépissier's resignation, the astronomy class was cancelled because no substitute teacher was readily available, and it was not until the arrival of the American physicist T.C. Mendenhall in 1878 that astronomy classes resumed at what by then had become the University of Tokyo.

After having overcome the difficulties at Paris and Beijing and the business failure at Shanghai, Émile Lépissier finally managed to acquire a reasonably stable position at the Tokyo Kaisei Gakko School, which seemed to allow him for the first time abroad to engage in astronomical education and research. However, sudden illness then mercilessly hampered these expectations.

In the beginning of October 1874, just 4 months after Lépessier had left Japan, a French astronomical expedition team led by Jules Janssen (1824–1907) and Félix Tisserand (1845–1896) arrived at Yokohama to observe the 9 December 1874 Venus transit (Figure 10). It was hoped that observations of this transit made worldwide would finally resolve the key question about the Earth–Sun distance, and the scale of the Solar System (e.g. see Dick et al., 1998).

While the bulk of the French team was stationed at Kompira Mountain near Nagasaki, Janssen sent two observers to Kobe, just in case of inclement weather on the mountain. But he need not have worried because favourable weather greeted those at both sites and everyone successfully observed the transit (see Débarbat and Launay, 2006).

The French, however, were not alone, for two other international expeditions also decided to observe the transit from Japan. The Mexicans sent an expedition to Yokohama, but the party then split in two, so they could observe from two different sites just 2 km apart. The weather was cooperative, and both groups successfully recorded the transit (see Allen, 2005).

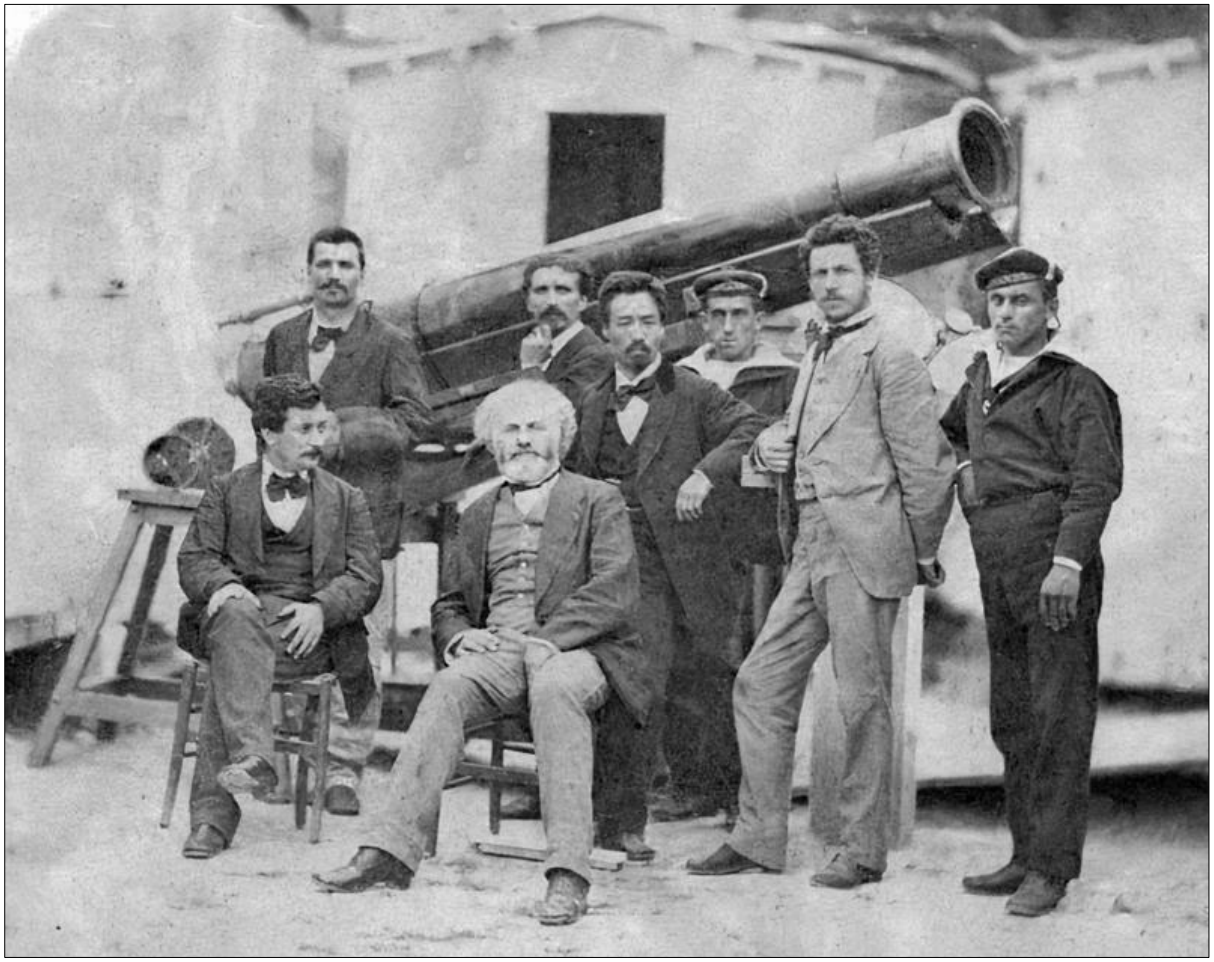


Figure 10: Members of the 1874 French Venus transit expedition to Japan. Seated (left to right) are Félix Tisserand and Jules Janssen. Standing third from the left is the Japanese Makoto Shimizu, who had been studying engineering at the École Centrale de Paris, but on the expedition would serve as a photographic technician. It is believed that this photograph was taken in Marseille prior to the expedition leaving for Japan (https://www.wikidata.org/wiki/Q101428109#/media/File:Comiss%C3%A3o_cient%C3%ADfica_francesa_do_tr%C3%A2nsito_de_Venus_de_1874_destinada_ao_Jap%C3%A3o.png).

Finally, the Americans also sent one of their eight 1874 transit of Venus expeditions to Japan. Their base also was Nagasaki, and they too, saw the transit (see Dick et al., 1998).

The focus of these overseas transit of Venus expeditions differed markedly from any known aspects of traditional Japanese astronomy, so they generated a great deal of interest among the Japanese scientific elite and even members of the general public. In their bid to become *au fait* with Western astronomy, Japanese astronomers learnt three important techniques in regard to practical astronomy (Saito and Shinozawa, 1972):

1) modern astronomical methods of accurately determining latitude and longitudes;
2) application of photography in astronomy; and
3) clock synchronization at different places using the telegraph.

Before Émile Lépessier left Japan, it is very likely that he would have been aware at the very least of the up-coming visit by the French transit team through the worldwide information network of *L'Echo du Japon*. And if he was healthy and could have met Janssen and Tisserand in Japan, his subsequent career would have been very different. Both Janssen and Tisserand had also been victims of Le Verrier's dictatorial attitude, but both recovered and went on to forge distinguished careers, ultimately serving as Directors of Meudon and Paris Observatories, respectively.

5.5 Lépissier's Possible Influence

After the last foreign Professor of Astronomy returned to the USA in 1884, Terao Hisashi (1855–1923; Figure 11) soon became the first Japanese Professor of Astronomy at the University of Tokyo and the Director of Tokyo Astronom-

ical Observatory. Terao was the first Japanese to study modern astronomy for four years at Paris Observatory and the University of Paris under the academic supervision of Félix Tisserand and Henri Poincaré (1854–1912), and he earned a Bachelor of Science degree there.

Terao had entered the Kaisei Gakko as a first grader in the general course of the French Department in September 1874. On the other hand, Émile Lépissier had resigned from the school three months earlier. So, there is no possibility that the two of them met. But it is very likely that Terao had a chance to take a look at the astronomical books and materials that Lépissier had left behind. For instance, as mentioned in Subsection 5.2, the *Annuaires* of the Bureau of Longitudes for several years starting from 1871 are preserved in a library at the University of Tokyo (Figure 12).

These annual books had been published by the Bureau of Longitudes in Paris since 1795 (its foundation year), and contained calendars, ephemerides of celestial bodies, celestial phenomena like solar and lunar eclipses, plus astronomical and various science data. It is certain that Lépissier took with him at least the version for 1873 and made use of it in compiling his *Almanach pour l'Année 1873*, because no one else at the School would need this specific publication.

It is also very likely that Terao had read those *Annuaires* during his stay at the Kaisei Gakko between 1874 and 1878. The Tokyo Astronomical Observatory (currently the National Astronomical Observatory of Japan) has published the *Rika Nenpyo* (*Chronological Science Tables*) since 1925, which was initiated by Terao. It now runs to 96 volumes as of 2023 (see Figure 13).[5] The first author of this paper used to work as the Editor of the *Rika Nenpyo* at the Observatory for several years, until 2005.

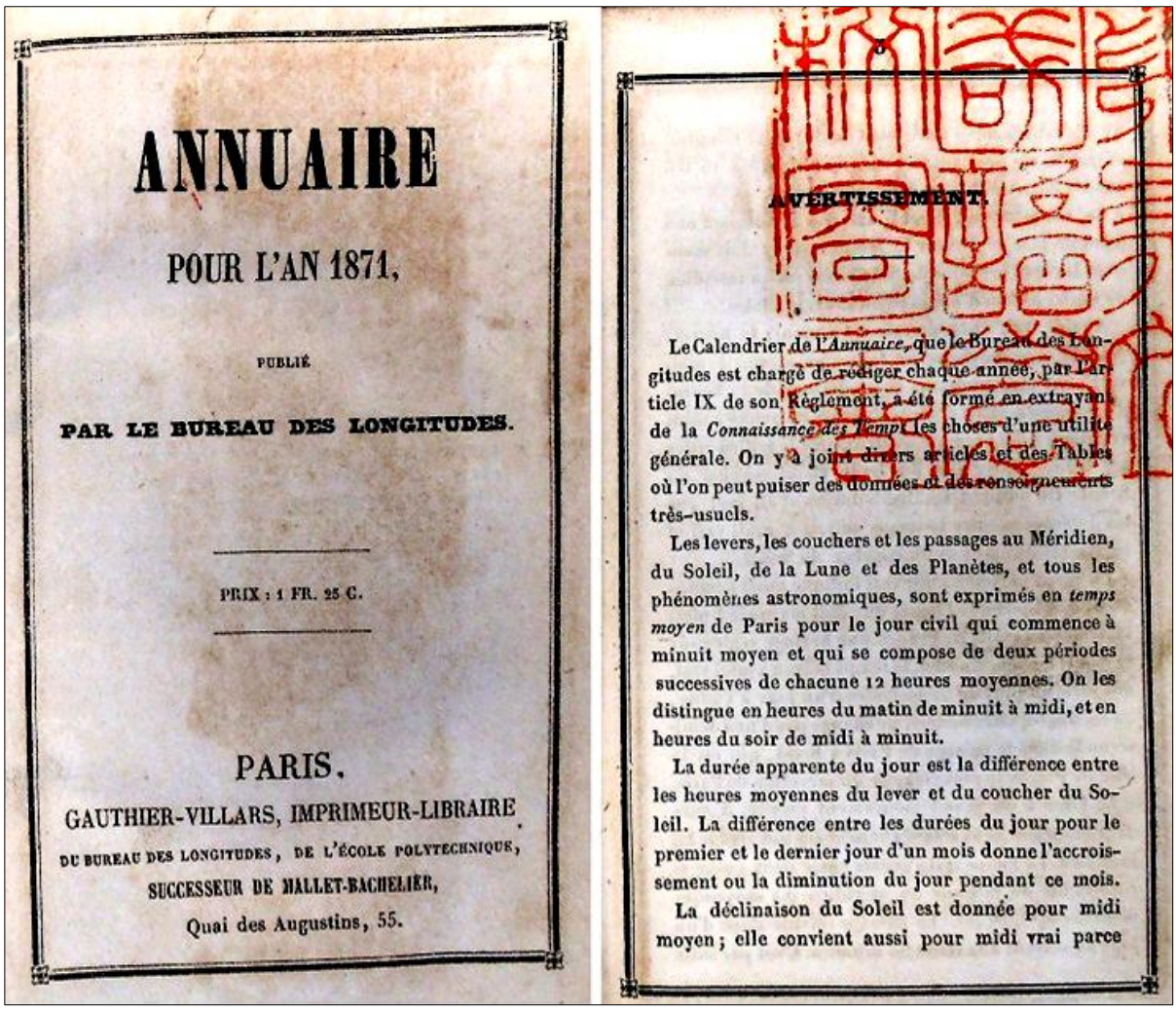
The *Rika Nenpyo* is basically a book (in Japanese) of astronomical ephemerides combined with science data, and resembles the *Annuaires …* of the Bureau of Longitudes in various respects. Thus, it had been assumed that the idea of the *Rika Nenpyo* came to Terao's mind when he saw the *Annuaires* at Paris Observatory (Nakamura, 2003). However, considering the close and almost simultaneous association of both Terao and Lépessier with the Kaisei Gakko School in the 1870s, we should consider another possibility: that the idea of the *Rika Nenpyo* gradually grew in Terao's mind throughout the 1870s and the 1880s, because convenient and useful data books like the *Annuaire* had never existed in Japan. If this was the case, then it should be regarded as direct evidence of Lépessier's legacy.

6 LÉPISSIER'S LAST DAYS IN PARIS

What became of Émile Lépessier after he left Japan on 17 June 1874? His fate was unknown to those at the Kaisei Gakko School (and subsequently at the University of Tokio), so groundless rumors and speculation were prevalent in Japan (Sato, 2006), like he had no children, or that he married a Japanese woman when he left Japan.

However, in 2013 the first author of this paper visited Paris, which provided an opportunity to investigate Lépessier's movements after he returned to France in 1874. With the help of staff at Paris Observatory, we found his death certifIcate at the National Archives of France. According to that document, Émile passed away in downtown Paris on 21 October 1874, at the age of 47. The death certificate was accompanied by signatures of the declaration by a certain astronomer from Paris Observatory, one of Lépessier's acquaintances, and the chief officer responsible for administration of the archives. This indicates that Émile Lépessier died just a few

Figure 11: Hisashi Terao, the first Professor of Astronomy at the University of Tokyo and the Director of Tokyo Astronomical Observatory. This oil painting was made by Kiyoteru Kuroda in 1909. Terao used to teach French language to Kuroda before Kuroda visited Paris in around 1884 to learn oil painting. Kuroda is now regarded as a leading pioneer of Western-style painting in Japan (courtesy: National Research Institute for Cultural Properties, Tokyo).



ANNUAIRE

POUR L'AN 1871,

PUBLIÉ

PAR LE BUREAU DES LONGITUDES.

PRIX : 1 FR. 25 C.

PARIS.

GAUTHIER-VILLARS, IMPRIMEUR-LIBRAIRE

DU BUREAU DES LONGITUDES, DE L'ÉCOLE POLYTECHNIQUE,

SUCCESSEUR DE MALLET-BACHELIER,

Quai des Augustins, 55.

AVERTISSEMENT.

Le Calendrier de l'*Annuaire*, que le Bureau des Longitudes est chargé de rédiger chaque année, par l'article IX de son Règlement, a été formé en extrayant de la *Connaissance des Temps* les choses d'une utilité générale. On y a joint divers articles et des Tables où l'on peut puiser des données et des renseignements très-usuels.

Les levers, les couchers et les passages au Méridien, du Soleil, de la Lune et des Planètes, et tous les phénomènes astronomiques, sont exprimés en *temps moyen* de Paris pour le jour civil qui commence à minuit moyen et qui se compose de deux périodes successives de chacune 12 heures moyennes. On les distingue en heures du matin de minuit à midi, et en heures du soir de midi à minuit.

La durée apparente du jour est la différence entre les heures moyennes du lever et du coucher du Soleil. La différence entre les durées du jour pour le premier et le dernier jour d'un mois donne l'accroissement ou la diminution du jour pendant ce mois.

La déclinaison du Soleil est donnée pour midi moyen; elle convient aussi pour midi vrai parce

Figure 12: The *Annuaire Pour l'An 1871* of the Bureau of Longitudes. The library stamp on the right-hand page shows that this was originally preserved at the French Department of the Kaisei Gakko School (courtesy: University of Tokyo).

months after he returned to France. He was buried in the cemetery at Montparnasse (Lépissier, 2014). The Board of Directors of the Relief Society of Friends of Science, whose Chairman was the famous French biochemist and medical scientist Louis Pasteur (1822–1895), decided to provide Émile Lépissier's wife and daughter with 600 francs as consolation to help alleviate their financial difficulties (Pasteur Vallery-Radot, 1939).

The aforementioned death certificate says nothing about the cause of Lépissier's death, but we suspect that it was caused by pulmonary tuberculosis. Our basis for this inference is that according to the report of a certain student who studied at and later taught at the University of Tokyo during the 1890s and through into the 1910s, one student out of six died from tuberculosis (TB) or was forced to abandon their studies during their planned 7-yr stay at the University, probably mainly because of unsanitary dormitory life (see The Alumni Association of the First High School, 1972). This is a stunning statistic, but in the second half of the nineteenth century TB was common throughout East and SE Asia and often was fatal (Poincaré, 1884). TB was highly contagious, and was a major killer worldwide, in an era when there was no ready cure. Nowadays it can be treated with antibiotic drugs. We believe that Émile Lépissier contracted TB while working at Kaisei Gakko School.

7 CONCLUDING REMARKS

As we have seen, Émile Lépissier's life seemed to have been dogged by ill luck. First there was his forced resignation from Paris Observatory; a less-than-satisfying teaching career at a school in Beijing; a failed newspaper publishing venture

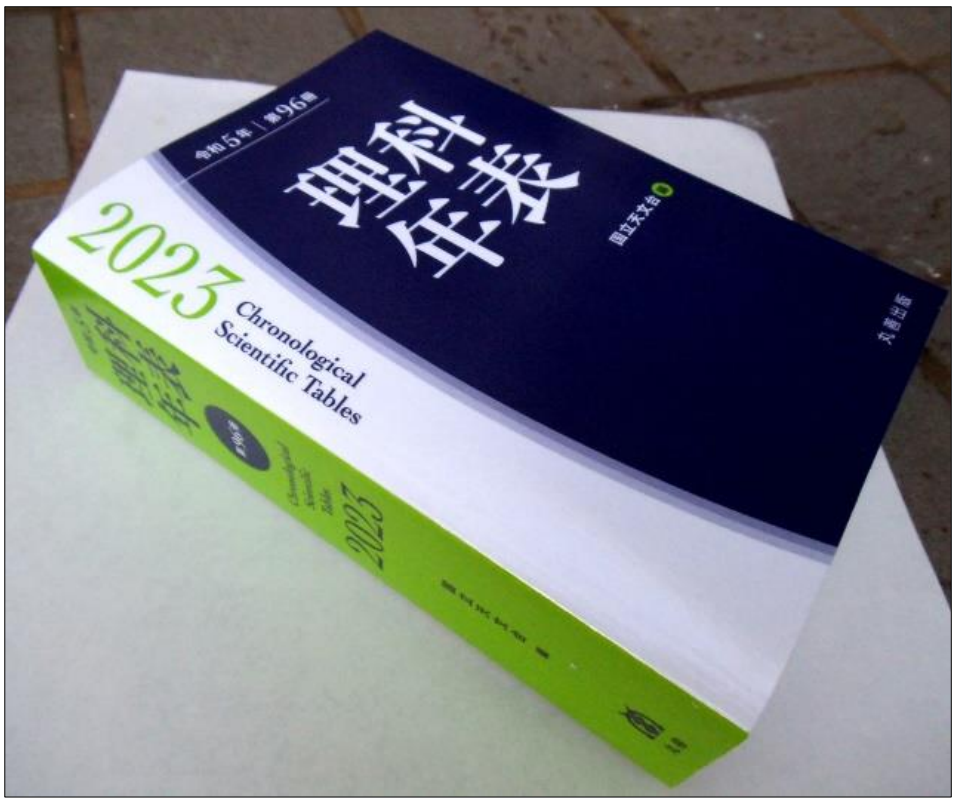


Figure 13: The *Rika Nenpyo* (meaning *Chronological Science Tables*) 2023, written by scientists from all over Japan and edited by the National Astronomical Observatory of Japan. This publication consists of a handy book, a desktop book and a digital version accessible by the Internet. The 2023 issue contains about 1170 pages. Data in the form of tables and graphs are collected from the fields of the calendar, astronomy, meteorology, physics, chemistry, earth sciences, biology, and earth environments. In particular, the digital version includes all the data covering for about a hundred years from the first volume of the *Rika Nenpyo* (courtesy: National Astronomical Observatory of Japan).[6]

in Shanghai; and finally—just when luck began smiling on him—that fatal illness that took his life and dashed all his dreams for a bright future.

But this should not blind us from seeing the positive aspects of his life, which Louis Pasteur presents in some detail (Pasteur Vallery-Radot, 1939). He describes Émile Lépissier's astronomical achievements during the 12 years he was at Paris Observatory, including the revision of Lalande's star catalogue (this is not mentioned in Véron, 2008), and observations and orbital calculations of some comets and asteroids (also refer to the first paragraph of Section 3). Louis Pasteur also quotes Maurice Loewy (1833–1907) who was one of Lépissier's colleagues at Paris Observatory and later (in 1896) became Director of the Observatory. Loewy spoke highly of Lépissier's 1863 longitude determinations around Brest, at the tip of the Brittany peninsula. In fact, later measurements in this region by US astronomers confirmed the precision of Lépissier's results.

One aspect that is mentioned in Pasteur Vallery-Radot (*ibid.*) but is not reported elsewhere in the literature is that Lépissier went to China and Japan partly to help found modern astronomical observatories in Beijing and Tokyo. As we have seen, he was successful in Tokyo.

So, any evaluation of Lépissier's achievements in astronomy must surely include the key role that he played as one of the pioneers of the nineteenth century Western astronomical education systems of China and Japan. We may also wonder what more he would have been able to achieve if that debilitating illness had not cut him down in the prime of life.

8 NOTES

1. This paper is a revised and expanded version of Japanese paper (Nakamura and Débarbat, 2016), which we published in *Ten-*

mon Geppou (*The Astronomical Herald*).

2. The Meiji Government, 1867–1881: *Dajo Ruiten* (Official classified records of the Meiji Government), Part 2 (Foreign employees), Digital Archives for the National Diet Library of Japan.
3. The Japanese Government began to change the spelling of the name of the capital of Japan from Tokio to Tokyo around the end of the 1870s on official printed materials, perhaps to provide a more natural pronunciation. By the twentieth century 'Tokio' had almost disappeared. In this paper, Tokio and Tokyo have the same meaning.
4. More correctly, the title of this paper "Aus dem Echo du Japon vom 26ten August, 1873" indicates that Lépissier had first reported his expedition of Mt. Fuji in *L'Echo du Japon* in August 1873 and then he again submitted the contents (in French) to *Mittheilungen der Deutschen Gesellschaft fur Natur- und Volkerkunde Ostasiens* (Lépissier, 1873).
5. In 1945 and 1946 the *Rike Nenpyo* was not published, because of World War II.
6. During the last 30 years there were discussions among the Japanese science community about publishing an English version of the *Rika Nenpyo*, but for various reasons this did not happen. Then in 2022 the National Astronomical Observatory of Japan (the publisher of *Rika Nenpyo*) and a Singapore book company (World Scientific Publishing) finally succeeded in publishing an international version of the *Handbook.* For detailed information about the book see: https://official.rikanenpyo.jp/posts/5905, and https://www.worldscientific.com/worldscibooks/10.1142/11218%20#t=aboutBook.

9 ACKNOWLEDGEMENTS

We wish to thank Mr Bertrand Lépissier, a descendant of Émile-Jean Lépissier, who kindly provided us with important information extracted from *The Biographical Notes of the Lépissier Family*, which he authored. We also are grateful to Dr Françoise Launay of the Paris Observatory, who was very helpful in searching the Internet for documents at the National Archives of France. Finally, we wish to thank Professor Wayne Orchiston for helping finalise this paper.

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A long-time member of the International Astronomical Union, Suzanne was President of IAU Commission 41 (History of Astronomy) from 1991 to 1994, and until relatively recent times was a regular attendee at the General Assemblies. She was also a stalwart of the Archives and the Historical Instruments Working Groups, and was even the lead author on the Historical Radio Astronomy Working Groups' first paper in a series on "Early French Radio Astronomy".

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