

• 科学技术史 •

## 19世纪中英科学网络中资金和信息的不对等流动

——以史温侯和达尔文、胡克的联系为例

**The Non-equivalent Exchange of Money and Information in 19th-century Sino-British Scientific Network:**

**Robert Swinhoe's Contact with Darwin and Hooker**

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**摘要:** 史温侯是十九世纪下半叶英国派驻中国的外交官。他在领事工作之余发现了大量鸟类和植物新物种, 使其成为鸟类和植物学家。史温侯在这两个学科领域和达尔文、约瑟夫·胡克等学者保持经常性联系, 这种联系是19世纪中英交流网络的一部分。分解介绍史温侯的多重身份——外交官、鸟类学家和植物学家, 发现动、植物研究团体的沟通是相互独立的, 即科学家只在自己擅长的领域内和外交官们产生联系。英国科学家和外交人员之间的交流网络以前者为中心: 科学家发出指令、获取信息和标本。

**关键词:** 达尔文 中英交流网络 罗伯特·史温侯 约瑟夫·胡克 信息交换

**Abstract:** Robert Swinhoe was a British diplomat working in China in the latter half of the nineteenth century. During his consular service, Swinhoe discovered a large number of new bird and plant species, resulting in his fame in ornithology and botany. On this ground, he kept regular contact with the members of these communities, such as Charles Darwin and Joseph Hooker. Their contacts were part of the Sino-British network. By separately introducing Swinhoe's multiple identities as diplomat, ornithologist and botanist, this article shows that the communication in each community was independent from each other that scientists contacted with diplomats individually about their familiar topics. The British scientists-diplomats network centered on the former, who sent out instructions and received information and specimens.

**Key Words:** Darwin; Sino-British network; Robert Swinhoe; Joseph Hooker; Information exchange

中图分类号: N0 文献标识码: A DOI:10.15994/j.1000-0763.2018.05.009

### Introduction

Robert Swinhoe (1836-1877), F.R.S, was acknowledged in all of Darwin's big books, from the *Origin of Species* (1859) until *The Expression of the Emotions in Man and Animals* (1872) (referred to as the Expression of Emotions hereafter). During

their half-a-century correspondence, Swinhoe kept on providing Darwin of specimens and information to test the latter's theories and thoughts. However, in reply to Darwin's query on expression, most of his answers did not meet the requirement. In studying human emotion, Darwin in 1867 sent out questionnaires to global informants, asking them to observe the native expression of emotions. The

收稿日期: 2017年12月18日

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query encourages detailed description by noting that “general remarks on expression are of little value”.

<sup>[1]</sup> However, in those replied letters, a large number of answers are simple ones, such as “yes” or “no”, without any detail. This result inspires me to consider possible constraint in Darwin’s information network. Among those informants, Robert Swinhoe was the only one living in China at that time. Hence their communication was part, and maybe characteristic, of the broader Sino-British network in the late nineteenth century. The previous scholarship on the network mostly concentrate on material exchange, e.g. specimens, and the contact within diplomats, <sup>[2]</sup>.

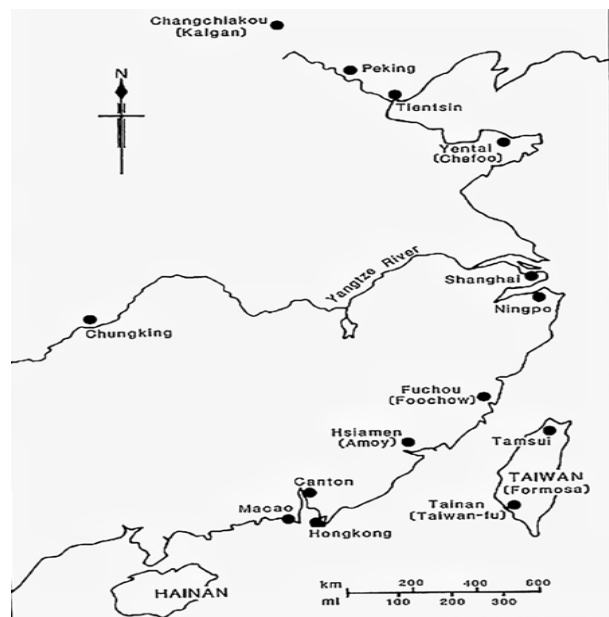
<sup>[3]</sup> while seldom of them focuses on the network of Darwin and the information exchange. Swinhoe’s multiple identities and extensive contacts with scientific members avail us an opportunity to examine the flow of information and money and to compare the networks between Darwin and Hooker. As major figures in their respective fields (zoology and botany) in Britain in the 19th century, Darwin and Joseph Hooker communicated frequently with informants around the globe who provided them with information and specimens. This paper will consider how the China-based Swinhoe made himself a valued member of both men’s correspondence networks. After introducing Swinhoe’s life and work, the paper examines his relationship with Darwin and Hooker in turn in Section 1. With an elemental analysis of the output and input of Swinhoe’s scientific research, Section 2 looks at, among other things, the role of funding in mediating both relationships. Finally, the paper will conclude with reflections on how the Swinhoe case can throw light more generally on the structure and functioning of the Sino-British scientific communication in the nineteenth century.

## 1. Robert Swinhoe’s three identities: Which Swinhoe did Darwin communicate with?

### 1.1 A diplomat in China

Robert Swinhoe was born in India, and moved

with his parents to England at five years old. <sup>[4]</sup> Just before finishing his first-year study at King’s College London, Swinhoe dropped out and enlisted in the British consular corps to China. After a short training in 1854, 18-year-old Swinhoe was sent to the new colony Hong Kong as a temporary interpreter. When formally appointed at Xiamen city (called Amoy at that time) in the next year, Swinhoe’s diplomatic career started.



**Fig. 1** Map of Swinhoe’s Routes in China <sup>[5]</sup> ([3], p.50)

During his service in Xiamen, Swinhoe visited Taiwan twice — in 1856 and 1858 respectively. In the second journey, Swinhoe interpreted on the HMS Inflexible sailing from Xiamen to Taiwan to look for missing soldiers. ([4], p.2) In 1860 he took part in the Second Opium War as the interpreter of General Napier. Swinhoe’s war diary was published in 1861 as the *Narrative of the North China Campaign of 1860* (referred to as the *Narrative* hereafter). The book also contains his observation on Chinese expressions. At the end of 1860, 24-year-old Swinhoe was appointed vice-consul in Taiwan, the first foreign diplomat there. His consular service in Taiwan had some groundbreaking achievements: he moved the British Consulate from Taiwan-fu (Tainan, the prefectural capital of Taiwan at that time while now is Taipei) to the northern port — Tamsui (see Fig. 1 above); and established the first tea trade line between Taiwan

and Britain. Due to illness, he left for London in May 1862.

Returning back in 1863, Swinhoe kept on exploring the other parts of Taiwan. Two years later, he was promoted to the principal Consul, transferred to Xiamen in 1866 and then to Ningbo (Ningpo at that time was an important trading center of celadon porcelain which was in great demand in Victorian England). That was why Darwin called him H.M. Consul in the credit lists of the Expression of Emotions. After an official exploration in Hainan, the second largest island in south China, Swinhoe's consular service shifted to the north. In early 1869 he joined an expedition along Yangtze River (or called Changjiang River, the longest river in China) to survey ship routes (see Fig. 1). After this journey, a sick leave overtook him again for 18 months. Mentioned in the letter to Darwin, his way back to England was via Japan and America through the Trans-American Railroad. ([5], p.45)

Returning back to Ningbo in China, Swinhoe suffered from paralysis and moved to Yantai in 1873, a northern port city. ([3], p.51) He finally retired in 1875 and resided in London. One year later, with Darwin's promotion, he was elected as Fellow of the Royal Society. On 28th October 1877, he died at home, 33 Carlyle Square, Chelsea, London. Swinhoe's routes in China are summarized in Table 1 below. The first column is the duration periods; the second column is his locations; while the third one remarks his consular work.

Fig. 1 above shows that Swinhoe's consular service in China was quite south intensive. Table 1 suggests that Taiwan marked his most important achievements, where he was appointed as principal Consul. Compared to the temporally continuous and geographically close services in the south — mainly in Taiwan and Xiamen, Swinhoe's activities in north China were scattered and distant to each other: in 1860 interpreting in the Second Opium War; in 1868 transferred to Beijing for several months; and finally from 1873 to 1875 resting at Yantai.

**Table 1 Swinhoe's routes in China** ([3], p.51)

Year	Place	Remark
1854	Hong Kong	Studying Chinese
1855-1860	Xiamen (Amoy)	With voyages to Taiwan in 1856 and 1858; military services in northern China from 1860 April to November
1861-1862.5	Taiwan	Appointed as the vice-consul here.
1862.9-late 1863	England	Sick leave
1864.2-1866.5	Taiwan	Promoted to Consul
1866.5-1867 end	Xiamen	
1868.1.29- 4	Hainan	Coal mines survey
1868.5-1869.9	Peking	
1869.3-7	Yangtze River	Expedition for ship lane
1869. 7-9	via Japan, America	Journey back to England.
1869.9-1871.4	England	Sick leave
1871.5-1873.2	Ningbo	Suffered from paralysis
1873.4-1875	Yantai	1875 winter in Shanghai and left from there
1875.10-1877.10.28	England	Address in London was 33 Carlyle Square, Chelsea

Alongside Swinhoe's consular service, his far-ranging and in-depth travels into China, particularly in Taiwan, had led to the discovery of many new species in both flora and fauna domains. These scientific findings helped to shape Swinhoe's other identities as an ornithologist and botanist, laying the ground for his contact with Darwin and Joseph Hooker respectively.

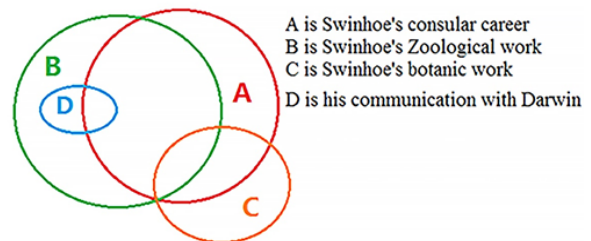
### 1.2 A well-known ornithologist

Soon after his initial arrival at China, Swinhoe began to study zoology. Both his consular career and zoological research peaked at Taiwan, where he discovered a number of new bird species. His research activities were conducted alongside his diplomatic service. For example, during his first trip to Taiwan in

1856, Swinhoe meanwhile made his first ornithological collection. Becoming immersed in that, the diplomat Swinhoe entered into zoological kingdom. Two years later, his first article “Remarks on the fauna of Amoy” was published on the journal of Zoologist in 1858. Along his second trip to Taiwan officially interpreting on the HMS, Swinhoe squeezed time to discover a large number of new species, founding his fame and status in zoology. ([4], p.2) Consequently, four years later he was elected a Fellow of the Zoological Society in London because his work by that time had supplemented 201 new birds of China (227 in his lifetime). Even when he was interpreting in the Second Opium War, he managed to take notes on ornithology at the hardest time. [6] The notes were published later on the Zoologist in 1861 as the “Notes on ornithology taken between Takoo and Peking, in the neighbourhood of the Peiho River, Province of Chelee, North China, from August to December, 1860”. According to Swinhoe’s Narrative (1861), the march between Takoo and Peking (see the article title above) was the hardest and busiest time for the British corps.

Swinhoe had gotten in touch with Darwin when he was a junior zoologist. Their earliest contact we know was about some bird-skin specimens sent from Swinhoe, accounted in Darwin’s memorandum with the date of December 1855. When working in China, Swinhoe kept on providing Darwin with animal specimens and observational evidence to verify the latter’s theories. Their communication contributed to Darwin’s thinking in the *Origin of Species* (1859), the *Variation under Domestication* (1868), the *Descent of Man* (1871) and finally the *Expression of Emotions* (1872). Swinhoe was acknowledged in all these books and received the first editions. For example, as acknowledged in the *Variation under Domestication*, Swinhoe had sent Darwin a dovecot-pigeon from Foochow with the letter on 12th Nov 1862, noting that some of his collections can confirm Darwin’s theory of species. Then, in September 1866 when Swinhoe worked at Xiamen, Darwin sent him a copy of the unpublished *Variation under Domestication*. Their contact, on Swinhoe’s side, ran through his zoological

study and mostly under the consular duty. They also corresponded when Swinhoe temporarily rested in England compiling his previous findings. Four letters were sent to Darwin during Swinhoe’s interim stays in London, mainly related to the *Descent of Man*.



**Fig. 2 Swinhoe’s Three Identities — Which Swinhoe Did Darwin Communicate with?**

From the early beginning, their communication was about zoology and mostly centered on Swinhoe’s ornithological study. As Fig. 2 above shows, the ornithologist role played a major role that they exchanged ideas, specimens and books within zoology and chiefly on ornithology. The ABD overlap embodies in the expressional topic that their communication on Chinese expression (D) was bound with both Swinhoe’s consular (A) and zoological life (B). For example, when Swinhoe interpreted in the war (A), he took notes on ornithology (B) and sent Darwin a copy of his Narrative (D), which also contains his observation on Chinese expressions. Another case was in 1868 during his official survey to Hainan (A), Swinhoe enriched his collection by “Fork-tailed Sunbird” and 21 kinds of mammal such as the “*Lepus hainanus Swinhoe*” [7] and published the first ornithological paper based on this island (B). In the meantime, he recorded the aborigines of Hainan-Li people’s custom and expressional habits, and informed Darwin of their nervous expression and easily getting frightened (D). [8] Even more common is the AB overlap that in the next year’s consular expedition along Yangtze River (A), Swinhoe found the “Yangtze giant softshell turtle” (B), also known as the “*Rafetus swinhoeii*” — Swinhoe sent it to John Edward Gray in 1873, who was the Keeper of Zoology at the British Museum in London.

In his whole life Swinhoe published over 120



papers and articles, documenting a vast number of birds, butterflies, moths and mammals. The bird collections number 3700, with most of them now stored at the Natural History of Liverpool Museum. ([4], p.2) Many species or subspecies were named after Swinhoe, among which the most well-known is the “Swinhoe’s pheasant” (*Lophura swinhoii*), because it was once considered as the most beautiful bird in the world. Swinhoe also named a subspecies (species at that time) after Darwin in 1872, the “*Pucrasia macrolopha darwini*”. ([5], p.45) With all these findings and achievements, and promoted by Darwin, Swinhoe was elected Fellow of the Royal Society in 1876. The last two letters from Swinhoe to Darwin were written on 14 Jan and 9 Feb 1874, sent from Carlyle Square 33 London. Both of them relate to promoting Swinhoe into the Royal Society. So, from the beginning to the end of their relationship, the ornithologist Swinhoe was “better-known” to Darwin than his other identities. His younger brother Charles Swinhoe (1836–1923) also became a naturalist, collecting birds in Afghanistan. ([4], p.2)

During his consular service in China, not only did Swinhoe collect specimens but he also sent live animals to England, some of them went to the London Zoo. For example, the first Pere David’s Deer in Europe was sent by Swinhoe from Taiwan. ([5], p.45) The incentive of doing so and the constraint in his scientific research will be figured out below with an introduction to his another role, a botanist.

### 1.3 A better-funded botanist

Fig. 2 in Section 1.2 above suggests that Darwin’s communication with Swinhoe (D) was outside Swinhoe’s botanic research (C), because in all their reserved correspondence there was no exchange on flora. Notwithstanding that, Swinhoe’s botanist role avails us an opportunity to examine the funding flow in the broader Sino-British network with other naturalists involved, such as the most famous British botanist in the nineteenth century, Joseph Hooker (1817-1911), and Swinhoe’s diplomatic colleague Henry Fletcher Hance (1827-1886). Swinhoe and Hance were the main informants of Hooker in China. Hance preceded

Swinhoe in south China and enlightened the latter’s interest in botany. Fig. 1 in Section 1.1 above shows that Swinhoe’s diplomat career and research in China were south centralized, so did Hance. Hance mainly worked at Hong Kong, Whampoa and his career ended at Xiamen as the acting consul. During his service in China, Hance administered Swinhoe’s work for most of the time. In contrast to Swinhoe’s preference to ornithology, Hance’s spare time was devoted to botanical study. Similar to Swinhoe, Hance’s naturalist achievements were more famous than his professional consular service. Unlike Swinhoe’s personal participation, Hance did not conduct fieldwork himself but build network connecting his colleagues in around 1840-50s. When new staff arrived at Hong Kong or Canton to learn Chinese, Hance encouraged them to study botany and send specimens to him for cataloguing. ([2], p.197) By doing so, he collected 22,437 kinds of plant specimens and gained reputation among these naturalists. Hance’s botanic study was published as the *Flora Honkongensis: A comus supplement to Mr. Benth’s description of the plants of Hongkong in 1827*. Many of his specimens went to Hooker, the Director of the Royal Botanic Gardens, Kew (Kew for short hereafter) at the time. In 1855 Hooker was appointed Assistant-Director of Kew, working under the Director, his father William Hooker (1785-1865). After 1865 he took over the directorship for twenty years. It was Joseph Hooker who kept regular contact with Swinhoe and Darwin. Darwin’s and Hooker’s contacts with those diplomats and naturalists, or namely their networks in China, are illustrated in Fig. 3 below. The yellow lines stand for Hooker’s contacts with those botanists in China, while the blue lines indicate Darwin’s network.

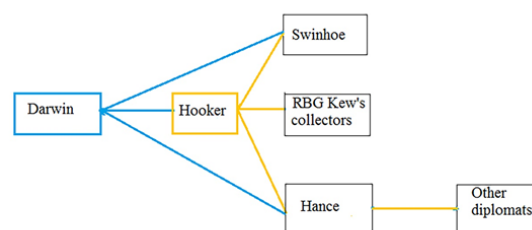


Fig. 3 Darwin’s and Hooker’s Networks in China

As the middle right line tells, apart from receiving from those diplomats (amateur naturalists), Hooker also sent Kew's official collectors to China, with Richard Oldham (1837-1864) as the last one. The right lines also stand for money's flow from Hooker to those collectors. The official collectors received fixed salary and small grants to cover necessary costs, while those diplomats, like Hance and Swinhoe, could sell their collections at negotiable prices and benefit from the quantity of specimens. The status of those official collectors was rarely as enviable as that of diplomatic naturalists, because they were employed in posts that were ill-paid and received dull administration. For example, Oldham and his predecessor Charles Wilford were both dismissed due to delay in sending specimens back to Britain. Their plight and conflicts with Hookers can be seen. ([2], p.129) When Swinhoe talked about money with Hooker, he usually insinuated to request rather than clearly marking a price. Reading Swinhoe's letters with Hooker, we can grasp that he often vacillated between the role of a noble scientist and the status of short of financial support, an epitome of those supernumerary naturalists. Such status and contact lasted after Swinhoe's retirement and even continued to his younger brother J. Swinhoe who at that time also worked for Hooker in China.<sup>[9]</sup> After asking Swinhoe about the climate and temperature in Shanghai, Hooker intended to send some seeds to plant there. Replying on 15 April 1874 at London, Swinhoe recommended his younger brother J. Swinhoe to take this job, and in the same letter he appealed to sell some plant specimens to Kew that were collected in northern China. Those diplomats, commonly lacking money for their exploration, had to cash their discovery along journey. Louis Fraser was the curator of the Museum of the Zoological Society of London at that time. In the 31 December 1867 letter to Hooker, Swinhoe explained that it was the captain who sold the plants to Louis Fraser that was supposed to be delivered to Hooker<sup>[10]</sup>—We can perceive Swinhoe's predicament in reply to Hooker's request. During at time, Hooker and Louis Fraser,

the conscientious directors of some national gardens and museums could offer the best help. In this sense, Hooker and other entitled scientists had played an important role, or say they could have played a more important role in supporting the inchoate colonial scientific research. However, a noteworthy fact is that those collectors were only paid for providing specimens rather than information. To unblock the lack of the latter, we would like to compare Hooker's network (the right lines) with the one of Darwin (the left lines), as shown in Fig. 3 above.

As aforementioned, the yellow lines indicate the flow of money, while the blue ones are only information and specimens. Why was the botanist Swinhoe better-funded compared to his ornithologist role? Among Swinhoe's heritage that is now stored at the Natural History of Liverpool Museum, there are a mass of bird specimens and a much smaller number of plants. It is because most of his plant collections had been sold before his death. Compared to the flora industry, Swinhoe's financial benefit from his bird collections was not proportional to its numbers and fame. This was partly due to Darwin's status that since he was not administrating any public organization, so was without duty and funding to purchase specimen. Thus his connection with Swinhoe, Hance and Hooker did not involve money. Swinhoe could sell his plants to Hooker and Fraser, but in fauna live animals were much more popular to trade than specimens, which was the incentive for Swinhoe's regularly sending animals to the London Zoo.

Swinhoe's consular service in China facilitated his pursuit and achievements in botany and zoology. His naturalist roles linked himself with Hooker and Darwin in their relevant fields. On the ground of zoology, Darwin got to know Swinhoe and later consulted him on Chinese expression of emotions. In other words, Darwin knew the ornithologist Swinhoe better than his other identities. Their communication was part of the broader Sino-British network in the late nineteenth century. Now we would like to examine the possible constraint in this network, especially on

information exchange.

## 2. British scientists-diplomats network in the late nineteenth century

### 2.1 An independent network

A careful reader may perceive from Fig. 3 above that the blue (zoological) and yellow (botanic) lines do not cross each other, indicating that their correspondence was independent. Firstly, the zoological and botanic lines do not cross, because the zoologists and botanists exchanged ideas and specimens respectively in their own circles. Darwin discussed with each group separately. His works were more popular in fauna than in flora researchers. In contrast to Swinhoe's complete reception and support to Darwinian evolution, Hance and other botanists expressed more doubts. ([2], p.72) It shows different understanding of Darwinian theories between the two circles.

Secondly, the botanic lines themselves do not cross, as do the zoological ones. Fa-ti Fan in his *British Naturalists in Qing China* (2004) intends to demonstrate an informational kingdom among the diplomats, who were also amateur naturalists. Nevertheless, the result turns out that their inside scientific exchange seldom concerned information or funding but concentrated on specimens. This is evidenced in Hooker's network with Swinhoe and Hance. Though as colleagues, they reported to Hooker separately and did not transfer funding from him. In handling Oldham's legacy, it was Swinhoe who appealed to Kew without ardent help or assistance from other botanists. In zoological circle connected with Darwin, the situation was almost the same. On 4 Aug 1868, Swinhoe in Peking wrote to Darwin that, there had been no response to the expressional query that was published by Swinhoe one year before on a Hong Kong journal, *Notes and Queries in China and Japan*. ([8], p.1) Interestingly, one month later Hance sent a letter to Darwin from Canton, south China, recommending the same journal. <sup>[11]</sup> However,

in these letters they did not mention each other, and Hance had no contribution to Darwin's query on expression. It shows that the scientific network among diplomats was very slack and independent in geographical connection, due to messaging limitation. Even within the same community, such as in botanists and ornithologists, there were seldom any cooperative papers, findings, or transfer of funding among them. How then were they connected? What kind of link did exist among them?

As mentioned above, Hance encouraged junior diplomats to study botany and send plants to him for cataloguing. The bottom yellow line in Fig. 3 suggests that, from right to left, those junior collectors sent specimens to Hance, the delegate of Hooker, and finally to Kew. It shows that these amateur botanists were mainly connected in time and grade sequence under their consular duty. The consuls who arrived earlier at legations often fostered the successors' scientific interest and built up network to connect them, as Hance did in botany. In zoologist community, Swinhoe had instructed H.F.W. Holt to collect and make bird specimen. ([2], p.74) Taken the two communities as a whole, we can see that their scientific research proceeded with consular progress, including the extending exploration scope of China and the move of consular offices. For instance, in 1869 expediting along Yangzi River, Swinhoe extended the ship lane upstream to Yichang, a new treaty port to install consular office. Later in 1880s, Augustine Henry botanized there and corresponded with Hance. ([2], p.76) Besides, William Hancock's survey in Tamsui and Hainan also followed Swinhoe's step there. In this sense, Swinhoe's routes in China (see Fig. 1 and Table 1 above) not only drew a map of consular and trade development but also epitomized the whole British diplomats' naturalist study. In summary, knowledge and skills of natural history were passed on to young diplomats from their predecessors (administrators). After assigned to new consular legations, their scientific research was not closely associated, leading to their independent contacts with

Britain-based scientists, such as Darwin and Hooker. Nonetheless, they still stepped on the same map of consular service in time sequence.

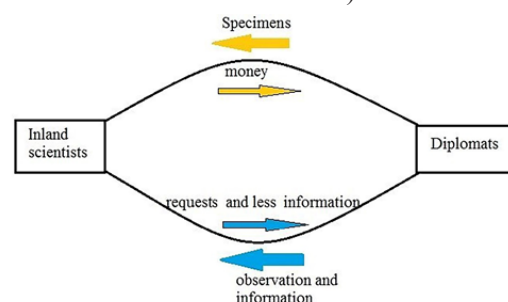
## 2.2 A nonequivalent network centered on Britain

Having characterized the connection among British diplomats in China, we would like to see their exchanges with those top domestic scientists, Darwin and Hooker. Was there any constraint in this Sino-British network that might affect Darwin's access to Chinese information? To answer this question, we need to summarize the output and input of Swinhoe's scientific research in connection with Britain. By inspecting how matters and messages flowed between them, we can identify the possible restrictions in both sides.

The input and output of Swinhoe's research, a summary of the above findings

The first item was specimen. The input to Swinhoe's specimens consisted of that, the majority was collected in his fieldwork (see Fig. 2 his fieldwork was conducted both on and off consular duty), and a few were received from his colleagues to catalogue — usually the providers were not financially repaid but only won the chance to name the species. The output of his specimens was to Darwin, Hooker, and the London Zoo, and so on. The second item was money. It flowed one-way from Britain to Swinhoe that he was paid by Hooker and the London Zoo for a small part of his collections. The last exchange was on information, including instruction and observation. Swinhoe exchanged ideas with Darwin and Hooker, and observed according to their requests. After examining the input and output of Swinhoe, Fig. 4 below demonstrates the three items' flow in the Sino-British network. The left side is those domestic scientists, e.g. Darwin and Hooker. The right side is the Swinhoe-like diplomats & amateur naturalists working in China. The top arrow stands for specimens' flow from diplomats to Britain. The second top arrow means that money was paid for their collections. Its smaller size and boundary compared to the larger

arrow of specimens shows that many specimens were left unpaid. The two arrows in the bottom symbolize the information exchange between them. Similarly, the size and boundary denote that the diplomats contributed much more to the scientists' work than return (see Section 1.2 the acknowledgements to Swinhoe in Darwin's serial books).



**Fig. 4 Three Matters' Flow in the Sino-British Network on Late-nineteenth-century Science: A Nonequivalent Network**

In summary, there were three flows in the Sino-British network in the late nineteenth century between domestic scientists and the diplomats: specimen, money and information. The first two of them (symbolized by the top arrows) were one-way that specimens were only from China to Britain while money was reverse. Another noteworthy fact is that the information exchange (the bottom arrows) was irrelevant to money that the diplomats were only paid for physical specimens while never for information and observation. More than that, the arrows (money and information) from domestic scientists to diplomats are much smaller in size than the reverse ones, showing that the payment and information flowing to diplomats were not equivalent to their work. That is, those diplomats were in passive position in this network, explained in two aspects. Firstly, although they were active in collecting specimens, however most of their fieldwork, collections and discoveries were not funded. Secondly, with the information flow, it was mostly from China to Britain, especially to those top scientists like Darwin and Hooker, who consulted diplomats individually. Their communication mainly served for the leading scientists' interest to gather data and verify their theories. In this respect, the scientists-



diplomats connection basically centered on the former. As aforementioned in Section 2.1, the scientific network within diplomats was very loose in that there was seldom cooperative finding inside the community, at least true in Swinhoe's case that he had no co-discovery, co-authored paper, or financial benefit with his colleagues. Thus, the overall scientific network centered on the domestic scientists, radiating to those diplomats independently.

### 3. Swinhoe's and Darwin's constraint: on the significance of Swinhoe's social position for his science and vice versa

Now we would like to discuss the possible constraint in the network. In the funding flow, the diplomats were not well-paid, because a regular market to trade collections had never existed. Thus, those amateur naturalists had to rely on the top scientists' casual bounties to get some inadequate returns. In the information flow, they could enjoy the communication with those prominent scientists. Inversely, this time it was the domestic scientists who faced the challenge that the transition of information was often delayed and indirect. Since diplomatic agents were not primarily responsible for scientific research, their official duty could hinder the diplomats from in-time response and financial claim to those scientists. A comparison between Darwin's and Hooker's networks finds that a delegate in China was helpful in organizing the scattered collectors. Apart from Kew's official collectors, Hance was the principal delegate of Hooker to associate with those amateur botanists. In this association, Hance could receive regular funding to guarantee Hooker's access to China's flora kingdom. It resulted in consistent supply of specimens and closer contact with the diplomat (and naturalist) community. Their success serves as a foil to the limitations in Darwin's network that, without a departmental position, there was no official grant for Darwin to sustain a fixed deputy in any distant country. His contacts with remote areas

were quite personal and independent, and could only benefit from volunteered help. This situation had affected his expressional investigation that, although detailed answers were encouraged, as written in each sent-out questionnaire, plenty of answers were still simply "yes" or "no" without any description.

Another possible constraint in the Sino-British network is that, since it centered on these domestic scientists, so the diplomats, and Darwin's other informants, were directed by the presumed hypothesis and framework of the center. Darwin's expressional study was originally one chapter of the *Descent of Man* (1871), but its content had largely exceeded the volume, so was published as a separate book in the next year.<sup>[12]</sup> In this research, Darwin aimed to include emotion into his evolutionary kingdom and show the universality among human races.<sup>[13]</sup> The questionnaire was specially designed for the second hypothesis to corroborate racial universality. As one part of the global survey on native expression, Swinhoe's investigation in China also should fit in Darwin's framework. There were two potential limitations in this framework. First, Swinhoe's observation was instructed by the questionnaire. Second, Darwin might have selected the positive answers that accord with his hypothesis. The impact of the above constraint will be examined in subsequent reports.

### Conclusion

By separately introducing Robert Swinhoe's three identities and activities in China, this essay finds that Swinhoe's naturalist findings on ornithology and botany were gained alongside his consular service. On the ground of his ornithological achievements, Swinhoe got in touch with Darwin. In the botanical community, he was better funded by Hooker. The story between the three fellows of Royal Society offers us a chance to examine the flow of money, information and specimens in the Sino-British network. A study of the correspondence reveals their "China networks" themselves to have been rather different in character,

with Hooker's being more formally organized and centered on his main deputy in China, Henry Hance, while Darwin's far more informal one was centered on himself. With an elemental analysis of the three flows, the scientists-diplomats connection is found non-equivalent in exchange that the diplomats were seldom paid for their intellectual job, and the Sino-British network basically centered on Britain whereby instructions were sent out and information and specimens were received. (The authors are grateful to the ardent help received from Gregory Radick at University of Leeds; Natural History Museum of UK and other relevant people and archives.)

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