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Sources for Modern Botany in China during Qing Dynasty[1]

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The terminology of modern botany in Chinese texts is very different in books published during the nineteenth century and those published after. This fact cannot be explained when considering only the botanical literature in China. One must look at what happened in Japan since the beginning of the nineteenth century. Doing so, one realizes the mutual influences that Chinese and Japanese botanists have had on each other and, eventually, one cannot but aknowledge that the dramatic change which occured in Chinese botanical writings at the beginning of this century is mainly due to Chinese terms which are actually loanwords borrowed from the Japanese.

Keywords: botany, history, terminology, China, Japan.

Among the many books on plants written in China during the last dynasty, I have chosen to investigate what I think to be the "landmarks of botanical history" during this period.

Though *Bencao gangmu* (*Honzo komoku*) by Li Shizhen (Ri Jichin) has been published in 1596 during the Ming dynasty, 15 editions will occur during the Qing dynasty[2]. It is a book on Materia Medica but besides its medicinal purposes, it is also devoted-as Li Shizhen writes himself-to **gewu zhi xue**[3], "the study of investigation of things"; and through many studies which have been written on the work of Li Shizhen, one may appreciate the interest of this book for natural history[4]. Besides drugs from mineral, animal and human origins, more than one thousand plants appear in it, most of which are described and illustrated. The numerous and abundant quotations of these descriptions that are found later in very different texts on plants prove its importance as a reference for traditional botanical knowledge in China.

The four following books, *Guang qunfangpu*[5], *Tushu jicheng: Caomu dian*[6], *Cai fang suibi*[7] and *Zhiwu mingshi tukao*[8] share common features: they deal only with plants and are presented under an encyclopedic form. For every plant name quoted as an entry of the books, first are indicated lexicographical data (synonyms, sometimes etymology); then a description of the plant is given-using technical terminology mixed with analogical references to other supposedly known plants-as well as information on plant habitat and characteristics like the period of

flowering, of fructification. Besides this naturalistic aspect, we find technical information on medicinal and dietetic use or horticultural techniques, for instance, then, small anecdotes, poems and literary texts in prose. Another common feature of these various texts is that they are composed by quotations from various sources often beginning with the most ancient classical books and not significantly restricted at all to technical literature on plants.

About 1700 plant names are quoted in the first, 1800 in the second and 1714 in the illustrated part of *Zhiwu mingshi tukao*, 838 of which being dealt longer in the second part of this book *Zhiwu mingshi tukao changbian. Bencao gangmu, Caomudian* and *Zhiwu mingshi tukao* are illustrated. The pictures represent the whole plants without any emphasis on details.

The nature of these treatises may help to better understand the opinion about botany in China that a French Jesuit, Pierre Cibot, a missionary in China expressed. In 1773[9], he acknowledged the high quality of Chinese pharmacopea and medicine and he noticed that when investigating Nature, Chinese people were interested more in facts than in natural laws which would be organized within systems.

But when we turn to the following three books, the situation changes completely. Only ten years after the publication of *Zhiwu mingshi tukao*-for which Joseph Needham[10] pointed out: "Though written at such a recent date, this splendid and well-illustrated treatise was entirely traditional in character, and did not take any account of the advances in botany which had been made by Camerarius and Linnaeus"-notions of plant morphology and physiology corresponding to the standards of modern botany, and the principles of a natural system of classification were available in Chinese sources. New technical terms had been created by the well-known Chinese mathematician, Li Shanlan and the two missionaries, Alexander Williamson and Joseph Edkins, with whom he wrote *Zhiwuxue* "Botany". This book, an adaptation of different books of the English botanist John Lindley[11] was published in 1858. During the following forty years, up to the end of the Nineteenth-Century it seems that no new botanical book written by a Chinese scholar or a Westerner was published in China until the publication of *Zhiwu tushuo* in 1895 by John Fryer (Fu Lanya). This last book was a source for what is maybe the first text of modern botany written by a Chinese author, *Quanguo zhiwu gelüe* and published in 1898. The author, Ye Lan, using all the pictures of the previous book, introduces botany in rimes, which is usually an easy way to memorize didactic texts in China. The same year John Fryer published a second manual *Zhiwu xuzhi*. Eventually, even though modern botany was in China since 1858 onwards, it was only during the first two decades of our century that it became a real field of study-and specially taxonomy[12]-in Chinese universities.

Many external factors-such as the political situation, the emphasis on mathematics and other strategic subjects-may explain this delay but an internal one may have had as much importance: terminological adequacy.

The book *Zhiwuxue* gives a good description of the botanical science of the mid 19th century but the terminology is rather poor and new concepts are often

explained[13] without giving a specific terms for them in Chinese[14]. In the two treatises by John Fryer there is a more abundant botanical terminology. But the interesting fact is that the quick evolution of modern botany in China was accompanied by a great change in this original terminology and this change happened at a time when a great amount of new scientific terms appeared, borrowed from Japanese, creating the dramatic terminological shift witnessed by contemporary sinologists like the missionary Léon Wieger[15], S.J. who wrote in 1914:

> "Almost twenty years ago a scientific terminology in Chinese seemed to many people something that would never exist. These sceptical people had not realized that Chinese characters had an extraordinary aptitude to create any kind of terms. Neither did they had considered carefully what was already going on in Japan. It came one day that this so-called impossible thing happened to be realized, and at once. Using the best European or American models, Japanese people had built up their teaching manuals, using, as they usually did, Chinese characters. Taking back their property, Chinese people transcribed these whole manuals into Chinese language for the schools of the new era. Later on unceasing contributions increased this first stock."[16]

Could it be that this Japanese terminology created with Chinese characters was more easily adopted than the one created by Chinese scholars who were even working in cooperation with Western translators? The answer to this question is affirmative for botanical works of the 20th century. The fact is that except for a few terms first appearing in *Zhiwuxue*, like the name of botany itself[17] or the names for ovary, carpel, ovule and placenta, most of the vocabulary found in the three first modern botanical treatises in Chinese (viz. *Zhiwuxue, Zhiwu tushuo* and Zhiwu xu zhi) is no longer in use today and that the basic modern botanical descriptive terminology comes mostly from Japanese origin or was created in China later[18]. On the other hand, quite a few names for plant families which appeared first in the last **juan** of *Zhiwuxue* are still in use today and were adopted by Japanese botanists like the terms for Compositae (Asteraceae), Labiateae (Lamiaceae) and Zingiberaceae as well as the general terms for botanical family **ke** and genus **shu**.

Chinese materia medica and other books on plants have been systematically introduced to Japan since Tang dynasty and the problem of identification of plant names found in these texts interested many Japanese scholars. The first sino-japanese dictionary of names of drugs quoted in Chinese **bencao**, *Shinsen jikyô*, was written in 898 by a buddhist priest, Shô Jû[19]. But the interest for Chinese natural products did not prevent Japanese doctors from becoming interested in their own flora. On the contrary, they tried to find the original plants, animals or minerals in their own environment. In this way, besides new editions in original text of Chinese **bencao** sometimes not too long after their issue in China, there were also catalogues of natural products from various regions of Japan, original

commentaries about Chinese materia medica like the *Honzô kômoku keimô* (beginning of the publication in 1803) by Ono Ranzan-which is not a critical edition of *Bencao gangmu* but personal notes of the Japanese author about drugs quoted in the Chinese text.

Local **bencao** have also been published in Japan, the most famous being *Yamato honzô* (published in 1709) by Kaibara Ekiken. In these different kinds of texts, the reference to Chinese authors is obvious and Li Shizhen is often mentioned as a model. But the content of the books is far from a mere reproduction of this model. Besides this abundant literature about the practical use of plants, one text is particularly interesting for the problem of technical terminology because the purpose of its author, Hattori Hanchû, was to help the reader of bencao literature-and more specifically the book of Li Shizhen-to better understand the technical terms. In fact *Yakuho zusan*[20] appears to be the first treatise on descriptive terminology in Japan (1726-1727) and maybe in East-Asia. Various pictures of different parts of plants are commented upon and, in the last part of the text, quotations of original texts are explained by definitions or examples. Was this work too in advance for its time? It was not published but circulated only under manuscript form among scholars.

Anyway it is a proof of quite an original attitude towards the terminological problems found in ancient technical texts in Chinese: illustration closely linked to explanation of morphological characteristics of parts of plants and, on the other hand, obvious definition of some concepts which had presumably never been done before.

With the investigation of Western (Dutch) knowledge on animal and plants which began in 1741[21] through discussions between Japanese doctors, mainly Noro Genjo, and Dutch members of the mission from Deshima factorery to Edo, Japanese scholars began to be confronted with the problem of a new technical vocabulary and a new conception of knowledge about natural products. Progressively appeared Japanese scholars knowing not only both the ancient Chinese and Japanese texts on plants but also Western ones and it is obvious that they tried a kind of synthesis of these different traditions. It is striking that the first treatises written in Japan on modern botany, *Botanika kyô* by Udagawa Yôan in 1822, was in classical Chinese, in **kanbun** as was *Shokugaku keigen* by the same author published in 1833. Very few Dutch terms were directly borrowed phonetically. Generally a new term was created using Chinese characters in a new combination, like "pistil" **shinzui** then **shizui** or, "stamen" **hozui** then **yûzui** where **zui** which in former texts meant specifically "anther"[22] was borrowed but given the implicit new meaning of "sexual part of the flower".

On the other hand, as the "Dutch science" **rangaku**, became more and more important, the Dutch language was also well known by the Japanese scholars and so, besides these newly created terms in Chinese characters, original Dutch terms in syllabic-**kata kana**-transcription were often also indicated. One may notice that the different authors writing books on botany in Japan between 1822 and 1874 did many trials before agreeing on one term. For instance before adopting in 1874 the

Chinese term **shibô** from *Zhiwuxue*, for the ovary of the plant, no less than three different terms had been proposed since 1822 in Japan[23] for this organ.

Japanese botanists of the nineteenth-century wrote in classical Chinese or Japanese and in both cases, used Chinese characters for technical terms. They knew the new botanical science from the Dutch but had also a very good knowledge of Chinese texts of traditional botany. When they had to translate a new concept from modern botany they first tried to find if there was not a term from the old Chinese books which would fit. If so, they might adopt it like **routi** for catkin[24]. On the other hand they also combined existing characters to create a new term. Eventually in this trial and error process-including the Chinese proposals of *Zhiwuxue*-which went on during half a century, some terms remained as standards[25] and were adopted later on by Chinese botanists. This explains the great change we notice in the modern botanical terminology that is to be found in Chinese texts between the turn of the nineteenth-century and some twenty years later. To fill the gap and understand the making of modern botanical knowledge in China, it is necessary to consider, besides Chinese texts of the Qing Dynasty, the Japanese botanical literature of the same period.

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FOOTNOTES

1 A first version of this paper was read at the 6th International Conference on the History of Science in China, Cambridge, UK, 2-7 August 1990. I would like to thank Marta Hanson for her kind remarks and suggestions.
2 cf. Long Bojian, 1957
3 p. 34, in. Li Shizhen, 1975.
4 On this cf. for instance: LU Gwei-Djen, 1966; Métailié, 1989; Needham, 1986; Qian, 1984; Sivin, 1973; Unshuld, 1986.
5 Edited in 1708 under the editorship of Wang Hao.
6 320 *juan* among ten thousands of this great encyclopedia published in 1726 deal with plants under the title *caomu dian*.
7 Published in 1814 by Zha Bin.
8 Published in 1848 by Wu Qixun.
9 In a letter to Stehlin, cf. Dumoulin, M.P., p. 40.
10 In: Needham, 1970, p. 400.
11 Cf. Pan Jixing, 1984.
12 Haas, W.J. 1988.
13 On the description of this terminology, cf. Métailié, 1981.
14 An notorious exception are the four terms for ovary, carpel, ovule and placenta which were created by Li Shanlan and Williamson, adopted by Japanese botanists, and still in use in Chinese and Japanese.
15 In the preface to Taranzano, 1914.
16 Trad. auct.
17 Cf. Pan, 1984., Métailié, 1981, 1987, 1988.
18 Cf. for instance *Shokugaku yakusen* by Ono Motoyoshi, published in 1874 where many terms still in use figure already. For the example of terms related to the flower, cf. Métailié, 1987, p. 131.
19 Cf. Ueno, 1973, p. 221.
20 Several manuscripts of this text exist. One has been edited in 1979 in fac-simile.
21 Ueno, 1973, pp. 356 sq.
22 The meaning of "anther" is clear when one analyses the various terms used to describe the different parts of a flower, -for instance of lily or paeony-in ancient Chinese texts on ornemental plants for instance. It is obvious through the definition given by the Song writer Hong Xingzu (quoted by Tan Bi'an, 1956, p. 437) but, through the description of a plant in the chapter "Shi tu er", p. 3b of *Shi cao xiaoji* by the Qing author Cheng Yaotian (1804), we realise that it may also refer to the stamens of florets of Compositae. Actually, in Chinese texts before modern botany and the knowledge of the mechanism of the sexual function in plants, "rui" could be defined as "small part of yellow or red color at the top of a thin pole inside the petals of a flower".
23 In 1822 Udagawa Yôan had created *so* and in 1829, Ito Keisuke *jisso*. In 1835, Udagawa Yôan proposed another term: *ransô* and eventually Ono Motoyoshi introduced in 1874 *shibô*, still in use today. (Métailié, 1987).
24 In *Shokugaku keigen* by Udagawa Yôan. This term is already used by Li Shizhen to refer to the catkin of willow. (Métailié, 1990, p. 144).
25 As we may see in *Shokugaku yakusen*, the English-Chinese dictionary by Ono Motoyoshi.

Chinese characters

李時珍	Li Shizhen
格物之学	gewu zhi xue
本草綱目	Bencao gangmu
廣群芳譜	Guang qunfangpu
図書集成：草木典	Tushu jicheng: Caomu dian
採芳随筆	Cai fang suibi
植物名實図考	Zhiwu mingshi tukao
植物名實図考長編	Zhiwu mingshi tukao changbian
植物学	Zhiwuxue
植物図説	Zhiwu tushuo
傅蘭雅	Fu Lanya [Fryer]
全國植物歌畧	Quanguo zhiwu gelüe
植物須知	Zhiwu xuzhi
巻	juan
科	ke
屬	shu
本草	bencao
新撰字鏡	Shinsen jikyô
昌住	Shô Jû
本草綱目啓蒙	Honzô kômoku keimô
小野蘭山	Ono Ranzan
大和本草	Yamato honzô
貝原益軒	Kaibara Ekiken
服部範忠	Hattori Hanchû
薬圃図纂	Yakuho zusan
菩多尼訶経	Botanika kyô
宇田川榕菴	Udagawa Yôan
漢文	kanbun
植学啓原	Shokugaku keigen
心蕊	shinzui
雌蕊	shizui
鬚蕊	hozui
雄蕊	yûzui
蘭学	rangaku
子房	shibô
茎茎	routi

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Footnotes

7 查彬
8 吳其濬
22 釋荼, 二. 釋草小記.
23 礎, so; 實礎 jisso; 卵巢 ransō; 子房 shibō

清朝時代における近代植物学の源泉

Georges Métailié

要旨：現代中国の植物学文献における用語と、19世紀あるいはそれ以降の文献における用語とはたいへん異なっている。この理由は、中国の文献だけを対象にして考察を進めても解明することができない。19世紀初頭の日本で何が起こったかを見なければならないのである。研究の結果、日本と中国の植物学者は相互に影響を与え合っていたことが分かった。さらには、今世紀初頭の中国植物学の記述法に起こった劇的な変化は、日本語からの借用語によるものであることを認めざるをえないのである。