

國立台灣大學圖書館



1190279

DICTIONARY
OF
SCIENTIFIC BIOGRAPHY

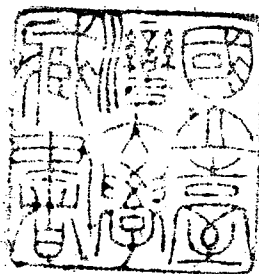
CHARLES COULSTON GILLISPIE

Princeton University

EDITOR IN CHIEF

Volume VIII

JONATHAN HOMER LANE - PIERRE JOSEPH MACQUER



CHARLES SCRIBNER'S SONS · NEW YORK

COPYRIGHT © 1973 AMERICAN COUNCIL OF LEARNED SOCIETIES

This book published simultaneously in the
United States of America and in Canada—
Copyright under the Berne Convention

All rights reserved. No part of this book
may be reproduced in any form without the
permission of Charles Scribner's Sons.

1 3 5 7 9 11 13 15 17 19 MD/C 20 18 16 14 12 10 8 6 4 2

Printed in the United States of America
Library of Congress Catalog Card Number 69-18090
SBN 684-10119-X (cloth)

von *Quadraten* (Bonn, 1886). He also published in many German and foreign journals, especially the *Journal für die reine und angewandte Mathematik* (from 1869). There is a bibliography in Poggendorff, IV, 897.

A biographical article is H. Kortum, "Rudolf Lipschitz," in *Jahresberichte der Deutschen Mathematiker-Vereinigung*, 15 (1906), 56-59.

BRUNO SCHOENEBERG

LISBOA, JOÃO DE (*b.* Portugal; *d.* Indian Ocean, before 1526), *navigation*.

It has been claimed that Lisboa, a Portuguese pilot, accompanied Vasco da Gama on the voyage on which the route to the Indies was discovered (1497-1499). While this claim is probably false, there are documents proving that he navigated the coast of Brazil (at an unknown date), that he participated in an expedition to the fortress of Azamor in northern Africa (1513), and that he sailed to the Indies at least three times: in 1506, as pilot of the fleet led by Tristão da Cunha; in 1518, in the squadron of Diogo Lopes de Sequeira; and in the squadron commanded by Filipe de Castro in 1525. The last fleet had a difficult crossing from Madagascar to the Curia-Muria Isles; and it is likely that Lisboa, then advanced in age, did not survive this arduous passage.

In the course of his first documented visit to the Indies, Lisboa and the pilot Pêro Anes carried out observations to determine the magnetic declination with the aid of the constellations Ursa Minor and the Southern Cross. The method is set forth in the *Tratado da agulha de marear*, a small book written by Lisboa in 1514. It contains the first description of the nautical "dip" compass and the first presentation of a method for measuring the magnetic declination. Present knowledge of the text derives from copies that are incomplete and faulty but numerous enough to allow one, through comparison, to determine its complete and correct form. The treatise consists of an introduction and ten chapters. The first three are concerned with the construction of the compass, the following three with the observation of the magnetic declination with the aid of stars, and the seventh with the method of magnetizing the needle. In the last three chapters Lisboa presents a theory without any experimental support; he assumes that the declination of the compass undergoes variations proportional to the longitude and is convinced that this "law" can enable sailors to determine this coordinate.

BIBLIOGRAPHY

Portions of João de Lisboa's treatise can be found in the following MSS:

"Livro de marinharia," attributed to Lisboa himself (but completed about 1550, well after his death), in the National Library, Lisbon. The text was published by Brito Rebelo (Lisbon, 1903).

"Livro de marinharia" by Bernardo Fernandes, in the Vatican Library, Codex Borg. lat. 153. An ed. was published by Fontoura da Costa (Lisbon, 1940).

"Livro de marinharia" by André Pires in the Bibliothèque Nationale, Paris, MS portugais, 40. Published by L. de Albuquerque (Coimbra, 1963).

"Livro de marinharia" by Gaspar Moreira, in the Bibliothèque Nationale, Paris, still unpublished.

"Rotero de navegación," written in Portuguese despite the title, in the library of the Academia Real de la Historia, Madrid, Cortes 30-2165. This compilation is anonymous and is unpublished.

LUÍS DE ALBUQUERQUE

LI SHIH-CHEN¹ (*tsu* Tung-pi,² *hao* P'in-hu³) (*b.* Wa-hsiao-pa,⁴ near Chichow [now Hupeh province], China, 1518; *d.* autumn 1593), *pharmacology*.

Li Shih-chen was the son of Li Yen-wen,⁵ the educated and comparatively successful offspring of several generations of medical practitioners who, as was common in China, also practiced pharmacy. The father was at one time a medical officer of lower rank in the Imperial Medical Academy and, at another time, a client in the house of the philosopher and administrator Ku Wen.⁶ He wrote five treatises, no longer extant, on diagnosis, smallpox, sphygmology, ginseng, and the *Artemisia* of Hupeh.

Li Shih-chen was bright and inquisitive about nature in his youth. His father encouraged him to prepare for the civil service examinations. At fourteen he passed the preliminary examinations but, despite three attempts, was unable to advance further. Thus ineligible for a bureaucratic career, he obtained his father's permission to devote himself to medicine. His education was, typically, not institutional but combined clinical experience in his father's practice and study of the literature of theoretical medicine, therapeutics, and materia medica. Li's skill as a physician won him considerable renown in his lifetime and even official posts in medical administration—which provided him access to rare drugs and books—for two short periods. He wrote at least twelve books, which, in addition to medical works, include a treatise on the rules of prosody and a collection of poetry and short prose writings. Reports also mention writings of unknown scope, size, and title on astrology, geomancy, and divination.

Li's greatest work, known to every educated Chinese even today as the culmination of the pharma-

cognostic tradition, is the *Pen-ts'ao kang mu* ("Systematic Pharmacopoeia"). At about the age of thirty Li assumed the enormous task of producing a comprehensive and up-to-date encyclopedia of pharmaceutical natural history, taking into account the need for correcting the many mistakes of identification, classification, and evaluation in the previously standard Sung dynasty series of pharmacognostic treatises, which begins with T'ang Shen-wei's *Ching shih cheng lei pei chi pen-ts'ao* ("Pharmacopoeia for Every Emergency, With Classifications Verified From the Classics and Histories," drafted in 1082-1083) and reaches its apogee in Chang Ts'un-hui's *Ch'ung hsiu Cheng-ho ching shih cheng lei pei yung pen-ts'ao* ("Revised Pharmacopoeia of the Cheng-ho Reign Period for Every Use . . .," 1249), which incorporates part of the brilliant collection of critical notes of K'ou Tsung-shih, *Pen-ts'ao yen i* ("Dilatations Upon the Pharmacopoeias," 1116). By Li's time many new substances, some of them imported, had been introduced into therapeutic use. Lacking the imperial patronage usual for works of this magnitude, Li over a span of thirty years incorporated in three successive drafts the contributions of over 800 books; and, from 1556, traveled widely in major drug-producing provinces (Honan, Kiangsu, Anhwei), collecting specimens and studying the natural occurrences of minerals, plants, and animals. After completion of the final draft in 1587 he visited Nanking to arrange for publication. When, in 1590, an agreement with a printer was concluded, Li's eminent literary friend Wang Shih-chen⁷ wrote a preface in which he praised Li for his lucidity as "a scholar unique south of the Great Bear." The first printed edition (the so-called Chin-ling xylograph) did not appear until 1596, after Li's death.

That the *Pen-ts'ao kang mu* is far more than a pharmacopoeia is immediately evident from its introduction. There Li affirms his intention of discussing everything that has been recorded about the simples under discussion, whether strictly concerned with medical practice or not; thus the book became a comprehensive treatise on mineralogy, metallurgy, botany, and zoology. His critical approach to the factual record led him to cite previous accounts with clear ascription and in chronological order. In both of these respects he follows well-established precedent. The catholicity of Li's book goes back to the beginning of the pharmacognostic tradition in China, and his citations of early literature follow the lead of T'ang Shen-wei. Neither author is extremely accurate in quoting, and critical historians of science do not rely upon them for citations from early works.

The articles on drugs in the body of the book are arranged in a taxonomic order based on that of T'ang Shen-wei but somewhat more systematic. This classification is far from rigorous; the rubrics indifferently reflect habitat, physical characteristics, and use. Nevertheless it is more detailed, and based less on purely verbal criteria, than any which preceded it. As in modern practice, the earliest name given in the literature to any drug is made the basis for classification; and varieties are subgrouped into families, which correspond in a very rough way to the Linnaean genera. The *t'ung*⁸ trees, for instance, are characterized by specific differences, and names which correspond to varieties are meticulously distinguished from mere synonyms. Location of a particular item depends both upon its morphology (a *yin* feature, because static) and its qualitatively defined energy (a *yang* feature, because dynamic). In principle the latter is defined largely in terms of physiological action, according to a conceptual scheme closer to that of Renaissance medicine than to that of modern pharmacodynamics.

Li's most obvious modification of T'ang Shen-wei's taxonomy, as this outline of the *Pen-ts'ao kang mu*'s rubrics shows, is rearrangement according to a hierarchy of being from the inorganic world to man (compare Aristotle's *scala naturae*):

1. The substances corresponding to the Five Phases (*wu hsing*,⁹ sometimes misleadingly translated "five elements"). The Five Phases, which in every field of traditional science were used analytically to represent divisions of generalized dynamic processes (or, to a lesser extent, of static configurations), were named for wood, fire, earth, metal, and water. Although in this section Li gives special consideration to the namesakes of the Phases, every medical substance was understood to correspond to one of the five as part of the definition of its specific energy. Actually only four of the five substances are represented here; wood, which never needed so abstract a rationale for inclusion in the *materia medica*, is treated separately in section 8.

Natural varieties of water, both celestial and terrestrial

Natural varieties of fire

Natural varieties of earth (including clay, ink, and ash)

Natural varieties of metal (including ores and corrosion products)

2. Jades (including coral and quartzes)

3. Inorganic substances

Minerals

Salt and salt derivatives

cognostic tradition, is the *Pen-ts'ao kang mu* ("Systematic Pharmacopoeia"). At about the age of thirty Li assumed the enormous task of producing a comprehensive and up-to-date encyclopedia of pharmaceutical natural history, taking into account the need for correcting the many mistakes of identification, classification, and evaluation in the previously standard Sung dynasty series of pharmacognostic treatises, which begins with T'ang Shen-wei's *Ching shih cheng lei pei chi pen-ts'ao* ("Pharmacopoeia for Every Emergency, With Classifications Verified From the Classics and Histories," drafted in 1082-1083) and reaches its apogee in Chang Ts'un-hui's *Ch'ung hsiu Cheng-ho ching shih cheng lei pei yung pen-ts'ao* ("Revised Pharmacopoeia of the Cheng-ho Reign Period for Every Use . . .," 1249), which incorporates part of the brilliant collection of critical notes of K'ou Tsung-shih, *Pen-ts'ao yen i* ("Dilatations Upon the Pharmacopoeias," 1116). By Li's time many new substances, some of them imported, had been introduced into therapeutic use. Lacking the imperial patronage usual for works of this magnitude, Li over a span of thirty years incorporated in three successive drafts the contributions of over 800 books; and, from 1556, traveled widely in major drug-producing provinces (Honan, Kiangsu, Anhwei), collecting specimens and studying the natural occurrences of minerals, plants, and animals. After completion of the final draft in 1587 he visited Nanking to arrange for publication. When, in 1590, an agreement with a printer was concluded, Li's eminent literary friend Wang Shih-chen⁷ wrote a preface in which he praised Li for his lucidity as "a scholar unique south of the Great Bear." The first printed edition (the so-called Chin-ling xylograph) did not appear until 1596, after Li's death.

That the *Pen-ts'ao kang mu* is far more than a pharmacopoeia is immediately evident from its introduction. There Li affirms his intention of discussing everything that has been recorded about the simples under discussion, whether strictly concerned with medical practice or not; thus the book became a comprehensive treatise on mineralogy, metallurgy, botany, and zoology. His critical approach to the factual record led him to cite previous accounts with clear ascription and in chronological order. In both of these respects he follows well-established precedent. The catholicity of Li's book goes back to the beginning of the pharmacognostic tradition in China, and his citations of early literature follow the lead of T'ang Shen-wei. Neither author is extremely accurate in quoting, and critical historians of science do not rely upon them for citations from early works.

The articles on drugs in the body of the book are arranged in a taxonomic order based on that of T'ang Shen-wei but somewhat more systematic. This classification is far from rigorous; the rubrics indifferently reflect habitat, physical characteristics, and use. Nevertheless it is more detailed, and based less on purely verbal criteria, than any which preceded it. As in modern practice, the earliest name given in the literature to any drug is made the basis for classification; and varieties are subgrouped into families, which correspond in a very rough way to the Linnaean genera. The *t'ung*⁸ trees, for instance, are characterized by specific differences, and names which correspond to varieties are meticulously distinguished from mere synonyms. Location of a particular item depends both upon its morphology (a *yin* feature, because static) and its qualitatively defined energy (a *yang* feature, because dynamic). In principle the latter is defined largely in terms of physiological action, according to a conceptual scheme closer to that of Renaissance medicine than to that of modern pharmacodynamics.

Li's most obvious modification of T'ang Shen-wei's taxonomy, as this outline of the *Pen-ts'ao kang mu*'s rubrics shows, is rearrangement according to a hierarchy of being from the inorganic world to man (compare Aristotle's *scala naturae*):

1. The substances corresponding to the Five Phases (*wu hsing*,⁹ sometimes misleadingly translated "five elements"). The Five Phases, which in every field of traditional science were used analytically to represent divisions of generalized dynamic processes (or, to a lesser extent, of static configurations), were named for wood, fire, earth, metal, and water. Although in this section Li gives special consideration to the namesakes of the Phases, every medical substance was understood to correspond to one of the five as part of the definition of its specific energy. Actually only four of the five substances are represented here; wood, which never needed so abstract a rationale for inclusion in the materia medica, is treated separately in section 8.

Natural varieties of water, both celestial and terrestrial

Natural varieties of fire

Natural varieties of earth (including clay, ink, and ash)

Natural varieties of metal (including ores and corrosion products)

2. Jades (including coral and quartzes)

3. Inorganic substances

Minerals

Salt and salt derivatives

4. Herbs
 - Mountain herbs
 - Aromatic herbs
 - Moist herbs
 - Toxic herbs
 - Creeping herbs
 - Aquatic herbs
 - Herbs of stony habitat
 - Mosses
5. Grains
 - Hemp, wheat, rice
 - Millet
 - Legumes
 - Fermented grains
6. Vegetables
 - Aromatic vegetables
 - Soft and slippery vegetables
 - Ground vegetables (gourds, eggplant, and such)
 - Aquatic vegetables
 - Fungi
7. Fruit
 - Classic edible fruits
 - Mountain fruits
 - Fruits of foreign origin
 - Spices
 - Ground fruits (melons, grapes, sugarcane, and such)
 - Aquatic fruits
8. Arboreal drugs
 - Aromatic woods
 - Woods from trees
 - Woods from shrubs
 - Parasitic plants (including amber)
 - Canes (including bamboo)
 - Miscellaneous woods
9. Furnishings and implements
 - Cloth and clothing
 - Articles of use (from paper to privy buckets)
10. Insects and insect products
 - Oviparous insects
 - Insects engendered by transformation
 - Insects born of moisture (including frogs)
11. Scaly creatures and their products
 - Dragons
 - Snakes
 - Fish
 - Fish without scales (including eels)
12. Creatures with shells
 - Turtles and tortoises
 - Oysters and clams
13. Birds
 - Aquatic birds
 - Plains birds

- Forest birds
- Mountain birds
- 14. Animals
 - Domestic animals
 - Wild animals
 - Rodents
 - Parasites and prodigious beasts (including apes)
- 15. Man (including hair, meat, bone, and assorted secretions and excrements)

In addition to this basic taxonomic arrangement, Li incorporated in his preliminary chapters a second classification according to diseases cured. This had been done often by earlier writers, but Li's carefully appended notes on the physiological functions of each drug with respect to each disease (phrased in the abstract terminology of rational medicine) were his own innovation. There is elsewhere in his treatise a more condensed classification according to the theoretical variables of physiological action, without reference to specific disease, probably generalized from a much more partial schema of Ch'en Ts'ang-ch'i¹⁰ (early eighth century). Finally, Li noted in each major entry, for drugs which had appeared in the first classic of materia medica, the *Shen-nung pen-ts'ao* ("Canonic Pharmacopoeia," attributed to the legendary emperor Shen-nung, probably first century), where the substance belonged in the tripartite order of that book—whether it was assigned to the lower class, which merely cured disease; the middle class, which maintained health; or the higher class, which conferred immortality. These rubrics were still functional as secondary divisions in the *Pen-ts'ao p'in hui ching yao* ("Classified Essential Pharmacopoeia"), compiled for use in the imperial palace less than a century earlier, but apparently had only antiquarian interest for Li Shih-chen.

The internal arrangement of the articles is also a step forward in terms of system. The general name of the substance is followed by an etymologic explanation of variant names (*shih ming*¹¹); corrections of errors in earlier pharmacopoeias (*cheng wu*¹²); a pastiche of quotations, with Li's own comments added, about the habitat, varieties, and qualities of the substance, with tests for the genuine article (*chi chieh*¹³); instructions for processing and storing the drug (*hsiu chih*¹⁴); a specification of the physiological activity of the drug and of diseases cured (*chu chih*¹⁵); a statement of essential energetic qualities in terms of sapidity (correlated with the Five Phases), warming or cooling activity, and toxicity (*ch'i wei*¹⁶); quotations which account for these qualities theoretically (*fa ming*¹⁷); and a number of prescriptions in which the drug is employed (*fu fang*¹⁸).

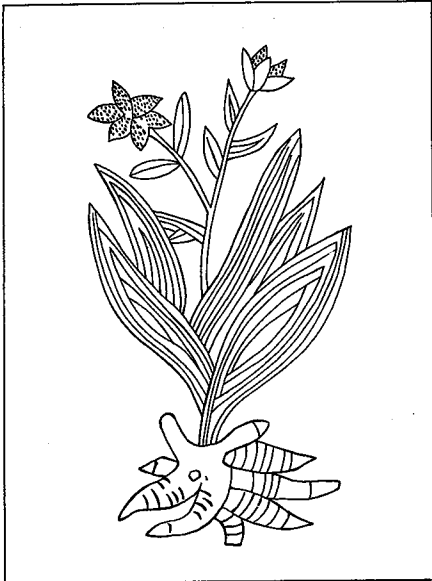


FIGURE 1

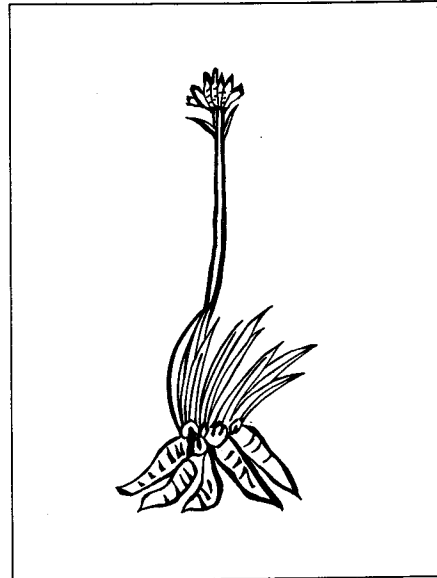


FIGURE 2



FIGURE 3



FIGURE 4

Some representative illustrations from various editions and a predecessor of *Pen-ts'ao kang mu*. The root most commonly sold by Chinese druggists as *she kan* is that of *Belamcanda chinensis*, the blackberry lily or leopard flower; but some classical authorities on materia medica, among them Li Shih-chen, tended to confuse this plant with various Iris species, especially *Iris tectorum maxim*. The latter, ordinarily called *yuan wei*, is still found on the market in Szechuan province as *she kan*.

FIGURE 1. Reproduced from the 1929 Wuchang reproduction of the 1302 edition of the *Ta-kuan pen-ts'ao* (see Bibliography II, item 5).

FIGURE 2. From the first printed edition of *Pen-ts'ao kang mu* (1596).

FIGURE 3. From the 1640 edition of *Pen-ts'ao kang mu* as reproduced in 1712 by the Edo Karahonya Seibei, Tokyo. The branching of the blossoms unambiguously suggests the blackberry lily, although in other respects the limning is defective.

FIGURE 4. From the 1885 Anui edition and a good likeness of an iris. Because this illustration was copied from *Chih wu ming shih t'u k'ao*, a compilation oriented toward botanical philology rather than medical therapy, it is uninformative about the appearance of the root, the part used in medicine.

One finds in the *Pen-ts'ao p'in hui ching yao* an even more systematic scheme of presentation, but this book had no important influence in Chinese medicine. Li never saw this manuscript; and it was not printed until 1936. Its framework, while clearly superior for concise presentation of factual information, did not provide for the depth of critical discussion unique to Li's treatise.

The systematic order used in this imperial pharmacopoeia of 1505 is set out here as a summary of the most fully elaborated parameters of Chinese pharmacognosy.

1. Name of substance
2. Specification of toxicity (an indication of potency)
3. Curative properties (a concise description quoted from or patterned after that of earlier compendiums)
4. Variant names (*ming*¹⁹)
5. Description of plant (for botanicals) (*miao*²⁰)
6. Habitat (*ti*²¹)
7. Times of growth and gathering (*shih*²²)
8. Processing and storage procedures (*shou*²³)
9. Part (or physical state in which) used (*yung*²⁴)
10. Physical characteristics of part, form, or type used (generally comparative) (*chih*²⁵)
11. Color (five possibilities, corresponding to the five phases) (*se*²⁶)
12. Sapidity (five possibilities) (*wei*²⁷)
13. Nature (nine possibilities) (*hsing*²⁸)
14. Strength of configurational energy (*ch'i*), *yin-yang* activity (*ch'i*²⁹)
15. Odor (five possibilities) (*hsiu*³⁰)
16. Physiological action (*chu*³¹)
17. Circulation subsystems affected (*hsing*³²)
18. Ancillary action of other drugs (*chu*³³)
19. Antagonistic substances (*fan*³⁴)
20. Preparation for ingestion (that is, prescriptions) (*chih*³⁵)
21. Specific diseases cured (*chih*³⁶)
22. Use in combination with other drugs to cure specific diseases (*ho chih*³⁷)
23. Conditions in which administration is prohibited, limits on dosage (*chin*³⁸)
24. Substitutes for the drug in question, or its use as a substitute for other drugs (*tai*³⁹)
25. Dietary prohibitions when the drug is taken (*chi*⁴⁰)
26. Poisons neutralized (*chieh*⁴¹)
27. Adulterants (*yen*⁴²)

The fifty-two chapters of *Pen-ts'ao kang mu* contain 1,892 entries, of which 275 are mineral and 444 animal. (Another 921 substances were added two centuries

later in the supplement, *Pen-ts'ao kang mu shih-i*.) Li himself introduced 374 substances into the literature and credited thirty-nine more, not previously recorded, to doctors of the preceding four centuries. Of the 11,096 prescriptions included, 8,161 were recorded or created by Li.

The more than 1,100 illustrations in the first edition (see Figure 2) are not, in general, up to the level of those in the Sung series of pharmacopoeias which began five centuries earlier. Lu Gwei-djen has compared Li's illustrations, on the whole, to those in late fifteenth-century European herbals (such as Arnald of Villanova), and those of the Sung compilations to those of the sixteenth-century Occident (such as Fuchs); but in many cases Li's leave little to be desired in terms of accuracy of identification. There were two major revisions of the illustrations, one for the printing of 1640 (Figure 3) and the other for the Anhwei edition of 1885 (Figure 4). The latter, from which the pictures in most modern reprints are descended, borrows considerably from Wu Ch'i-chün's⁴³ fastidiously illustrated botanical compendium *Chih wu ming shih t'u k'ao*⁴⁴ ("Illustrated Investigations of the Names and Identities of Plants," 1848). Thus, in addition to an overall increase in delicacy there are many improvements in precision.

Although it is impossible to specify the first European influence of the *Pen-ts'ao kang mu*, we know that a copy was taken by Portuguese or Dutch traders to Japan, where about 1607 it came into the possession of the shogun Ieyasu and his scholarly secretary Hayashi Dōshun. The first of many Japanese editions appeared in 1637. In 1783 there was an immensely influential Japanese translation, amply annotated, by the great naturalist Ono Ranzan.

Europeans first learned of China's botanical riches in the Polish Jesuit Michael Boym's *Flora sinensis* (Vienna, 1656), which describes twenty-two plants in detail. About forty years later the physician G. E. Rumpf, deputy governor of Amboina, sent to Holland a copy of the first edition of *Pen-ts'ao kang mu*, which subsequently was long preserved in Germany. In 1735 J. B. du Halde cited *Pen-ts'ao kang mu* extensively as part of the general account of China in his *Description géographique, historique . . . de l'empire de la Chine et de la Tartarie chinoise*. The extracts from earlier pharmacopoeias, abridged from the introduction to *Pen-ts'ao kang mu*, made it clear to European readers that Li's compilation belonged to a long and cumulative tradition. Du Halde also provided French renderings of the table of contents, Li's systematic account of the principles and types of prescriptions, and about fifteen articles on simples of special interest, including ginseng, tea, musk, and rhubarb.

Because du Halde was soon translated into English (1736, 1741), we can be reasonably confident that Li's method of classification, reflected in his table of contents, was known to the great seventeenth-century taxonomists and to Linnaeus. Linnaeus also knew indirectly of the work on Chinese plants grown in the Philippines carried out by the Jesuit Georg Josef Kamel, after whom he named the genus *Camellia*.

Considering the greater lapse of time, it is not surprising that Li Shih-chen's influence on Charles Darwin is much more easily documented. In *Variation of Animals and Plants Under Domestication* (London, 1868; I, 247), Darwin notes that seven breeds of fowls "including what we should now call jumpers or creepers, and likewise fowls with black feathers, bones and flesh" are described in a "Chinese Encyclopaedia published in 1596." In his account of goldfish he cites "an old Chinese work" to the effect that "fish with vermilion scales were first raised in confinement during the Sung dynasty (which commenced in A.D. 960) and now they are cultivated in families everywhere for the sake of ornament"—a literal rendition from *Pen-ts'ao kang mu*, chüan 44. The sinologist W. F. Meyers was led by Darwin's book to make a study published in China as "Gold Fish Cultivation" (*Notes and Queries on China and Japan*, 2 [1868], 123–124). Meyers in turn was quoted in Darwin's account of the secondary sexual characteristics of fishes in *The Descent of Man* (London, 1881; p. 343). Thus was Li Shih-chen's work woven into the fabric of modern science.

BIBLIOGRAPHY

I. LI SHIH-CHEN. The major documents for the life of Li Shih-chen are the many pertinent remarks in *Pen-ts'ao kang mu* and the document (*shu*⁴⁶) composed by his son Li Chien-yuan⁴⁶ to accompany the presentation of the book to the government. The latter is printed as part of the front matter of most editions of *Pen-ts'ao kang mu*. The "official" life in *Ming shih*⁴⁷ ("Standard History of the Ming Period"), Po-na ed., ch. 299, pp. 19b–20a, is derived from the latter. Other early biographical sketches, such as that in Ku Ching-hsing's⁴⁸ collected works, *Pai mao t'ang chi*⁴⁸, ch. 38; and that found in the collected prose of the great historiographer Chang Hsueh-ch'eng,⁵⁰ *Chang shih i shu*,⁵¹ Chia yeh t'ang ed. (1922), ch. 25, pp. 44a–47a, are considerably less reliable.

The most notable modern studies of Li Shih-chen and his work are Chang Hui-chien,⁵² *Li Shih-chen* (Shanghai, 1954), a severely positivistic popular account, also published in English (Peking, 1956); Lu Gwei-djen, "China's Greatest Naturalist, a Brief Biography of Li Shih-chen," in *Physis*, 8, no. 4 (1966), 383–392, the most authoritative to date; Alfred Mosig and Gottfried Schramm, *Der Arz-*

neipflanzen- und Drogenschatz Chinas und die Bedeutung des Pen-ts'ao Kang-mu als Standardwerk der chinesischen Materia Medica, supp. to *Pharmazie*, no. 4 (1955), a rather slovenly jaunt through traditional pharmacology; Ts'ai Ching-feng,⁵³ "Shih lun Li Shih-chen chi ch'i tsai k'o-hsueh shang ti ch'eng-chiu"⁵⁴ ("An Essay on Li Shih-chen and His Scientific Achievements"), in *K'o-hsueh-shih chi-k'an*, 7 (1964), 63–80; Watanabe Kōzō,⁵⁵ "Ri Ji-chin no Honzo komoku to sono hampon"⁵⁶ ("Li Shih-chen's *Pen-ts'ao kang mu* and Its Editions"), in *Tōyōshi kenkyū*, 12, no. 4 (1953), 333–357, which details Japanese as well as Chinese printed eds.; and the important series of evaluative essays by Japanese specialists which constitutes pp. 147–325 of Yabuuchi Kiyoshi⁵⁷ and Yoshida Mitsukuni,⁵⁸ eds., *Min-Shin jidai no kagaku gijutsu shi*⁵⁹ ("History of Science and Technology in the Ming and Ch'ing Periods"; Kyoto, 1970).

To this day there has not been a complete translation into a Western language of even one article of *Pen-ts'ao kang mu*. A great deal of material on botanicals has been summarized in E. V. Bretschneider, *Botanicon sinicum. Notes on Chinese Botany From Native and Western Sources*, 16 (1881), 25 (1893), and 29 (1895) of the *Journal of the North China Branch of the Royal Asiatic Society*; reprinted at London (1882–1895) and Tokyo (1937). An index to other treatises on Chinese simples is Bernard E. Read, *Chinese Medicinal Plants From the Pen Ts'ao Kang Mu . . . 1596*, 3rd ed. (Peking, 1936). On animal drugs see B. E. Read, *Chinese Materia Medica* (Peking, 1931–1941); for a detailed list of fascicles see J. Needham et al., *Science and Civilisation in China* (Cambridge, 1959), III, 784–785. B. E. Read and C. Pak, *A Compendium of Minerals and Stones Used in Chinese Medicine From the Pen Ts'ao Kang Mu . . . [of] Li Shih-Chen . . . 1597 A.D.* (2nd ed., Peking, 1936), is not a translation but a raw juxtaposition of data from heterogeneous sources. Its historical usefulness is therefore somewhat limited, although its general accuracy is high. For complete and literal translations of all prescriptions given in *Pen-ts'ao kang mu* for a number of medicinal substances see William C. Cooper and N. Sivin, "Man as a Medicine. Pharmacological and Ritual Aspects of Traditional Therapy Using Drugs Derived From the Human Body," in S. Nakayama and N. Sivin, eds., *Chinese Science*; M.I.T. East Asian Science Series, I (Cambridge, Mass., 1972).

II. LANDMARKS OF THE PHARMACOGNOSTIC TRADITION. This list of basic works is provided for the reader not only because of their pertinence to the development of materia medica but also because they are essential to the historical study of botany, zoology, mineralogy, and natural history in China. The selection encompasses only a few of the many works belonging to what might be called the main line of development of the pharmacognostic tradition, as well as examples of intrinsically important but less influential or more specialized books on materia medica. The "main line" is defined most objectively as the series of pharmacopoeias spanning the millennium and a half from *Shen nung pen-ts'ao* to *Pen-ts'ao kang mu*, each of which largely incorporates, amplifies, and improves

upon its predecessors. This succession has been sketched by Okanishi Tameto⁶⁶ in his preface to *Hsin hsiu pen-ts'ao*; and a much fuller flow chart is provided by Kimura Kōichi⁸¹ in his explanatory essay appended to the reprint cited under *Ching shih cheng lei pei chi pen-ts'ao*. Other bibliographical sources are noted in part III.

1. *Shen nung pen-ts'ao ching*⁶⁰ ("Canonic Pharmacopoeia of the Emperor Shen-nung"; the last word of the title is often omitted in citations).

Anonymous and almost certainly compiled in the first or second century, this work covers 365 medicinal substances in tripartite arrangement (as noted above). It is no longer extant but is quoted fully in later pharmacopoeias because of its canonical status. Of the seven published reconstructions, that by Sung Hsing-yen and Sun P'ing-i⁶¹ (ca. 1800, many reliable editions) is superior, although far from thorough in its use of sources.

2. *Pen-ts'ao ching chi chu*⁶² ("Canonic Pharmacopoeia [of Shen-nung] With Collected Commentaries").

An annotated version of *Shen nung pen-ts'ao ching* compiled by the physician and Taoist magus T'ao Hung-ching, probably shortly after 500. The number of medically active substances was doubled; and detailed descriptions of drugs and notes on their gathering, preparation, and use were added. A copy of a MS of the preface dated 718 was published under the title *Pen-ts'ao ching chi chu ts'an chüan*⁶³ in the *Chi shih an* collection (*Chi shih an ts'ung-shu*⁶⁴) of 1917 and was reprinted at Peking in 1955. The 1849-1852 Mori manuscript reconstruction of the complete text has been supplemented and reproduced by Okanishi Tameto⁶⁵ (Osaka, 1972).

3. *Hsin hsiu pen-ts'ao*⁶⁶ ("New Pharmacopoeia").

Compiled under imperial sponsorship by Su Ching and others, and completed in 659. Compared with the previous item, on which it was based, the number of substances included in this book was not much increased. Coverage was revised to take into account the wider resources of a reunited China, and illustrations were provided. Classification was by mineral, vegetable, or animal origin, in only seven categories (and one more containing drugs no longer in use), with the threefold system of the earlier pharmacopoeias retained for subdivisions.

Slightly over half of the text is preserved in four fragments, which have been used in the preparation of a definitive reconstruction of the whole text with variorum notes by Okanishi Tameto, *Ch'ung chi hsin hsiu pen-ts'ao*⁶⁷ (Ch'ing-t'an, Taiwan, 1964).

4. *Shih liao pen-ts'ao*⁶⁸ ("Dietary Pharmacopoeia").

Compiled by Meng Shen,⁶⁹ probably shortly after 700, and expanded by Chang Ting (between 720 and 740[?]) to include 227 substances of value in dietary hygiene for both health and illness. According to Nakao Manzō,⁷⁰ Chang changed the title from *Pu yang fang*⁷¹ ("Restorative and Tonic Prescriptions"); see "Tonkō sekishitsu hakken Shokuryō honzō zankan kō"⁷² ("Study of a Fragment of the *Shih liao pen-ts'ao* Discovered in a Tun-huang Grotto"), in *Shanghai shizen kagaku kenkyūsho ihō* (Shanghai), 1, no. 3 (Feb. 1930), 9-18. *Shih liao pen-ts'ao* is perhaps the most important and most often cited book in the tradition

of dietary regulation and therapy, which goes back to the beginnings of pharmacology in China.

The manuscript fragment just mentioned was found in northwest China in 1907; written in 933, it comprises about a tenth of the original book. Nakao published it as "Shokuryō honzō no kōsatsu"⁷³ ("A Study of the *Shih liao pen-ts'ao*"), *ibid.*, pp. 79-216, repr. as *Tun-huang shih shih ku pen-ts'ao ts'an chüan*⁷⁴ ("Fragment of an Ancient Pharmacopoeia From a Tun-huang Grotto"; Shanghai, 1937; repr. Taipei, 1970).

5. *Ching shih cheng lei pei chi pen-ts'ao*⁷⁵ ("Pharmacopoeia for Every Emergency, With Classifications Verified From the Classics and Histories").

Compiled by T'ang Shen-wei,⁷⁶ this work was drafted in 1082-1083 and, after conflation with the *Ch'ung kuang pu-chu pen-ts'ao*⁷⁷ ("Reamplified Pharmacopoeia With Added Commentary"; 1092) of Ch'en Ch'eng⁷⁸ was printed in 1108 under the title *Ching shih cheng lei Ta-kuan pen-ts'ao*⁷⁹ (usually abbreviated as *Ta-kuan pen-ts'ao*; Ta-kuan is the name of the reign period in which it was published). This book contains more than twice as many substances (ca. 1,750) as *Hsin hsiu pen-ts'ao*. The principle of classification was unchanged, but the number of rubrics was slightly increased. The series which this book begins comprises more than forty printed revisions and recensions in China, Japan, and Korea. See Watanabe Kōzō, "Tō Shimbi no Keishi shōrui bikkyū honzō to sono hampon"⁸⁰ ("On the Series Descended From T'ang Shen-wei's *Ching shih cheng lei pei chi pen-ts'ao*, and Its Editions"), in *Tōhō gakuho* (Kyoto), 21 (1952), 160-206.

The earliest extant printed edition of the *Ta-kuan pen-ts'ao* is that of 1195, which had been further augmented by appending the *Pen-ts'ao yen i*. The recent reduced reprint with an index and a valuable historical introduction, *Ching shih cheng lei Ta-kuan pen-ts'ao*, Kimura Kōichi and Yoshizaki Masao,⁸¹ eds. (Tokyo, 1970), is based on a 1904 repro. of the ed. of 1215.

6. *Pen-ts'ao yen i*⁸² ("Dilatations Upon the Pharmacopoeias").

A collection of critical notes on 472 medical substances by K'ou Tsung-shih, printed in 1119. The original title was apparently *Pen-ts'ao kuang i*,⁸³ but the necessity to avoid a taboo on use of the personal name of Emperor Ning-tsung (1195-1201) led to the minor change in wording. This work, which made influential contributions to pharmacological theory, takes *Hsin hsiu pen-ts'ao* as its point of departure. K'ou, a minor medical official, did not have access to *Ching shih cheng lei pei chi pen-ts'ao* or its early successors. Submission of his work to the central government led to his promotion but not to imperial sponsorship of the book's publication.

The earliest surviving version was printed in 1195. A critical text based on surviving editions and citations was published at Peking in 1937 (repr. 1957).

7. *Ch'ung hsiu Cheng-ho ching shih cheng lei pei yung pen-ts'ao*⁸⁴ ("Revised Pharmacopoeia of the Cheng-ho Reign Period for Every Use, With Classifications Verified From the Classics and Histories").

This is a revision by Chang Ts'un-hui,⁸⁵ printed in 1249,

of the *Cheng-ho hsin hsiu ching shih cheng lei pei yung pen-ts'ao* ("Pharmacopoeia of the Cheng-ho Reign Period . . ."), which had been published under imperial auspices by Ts'ao Hsiao-chung⁸⁶ and others in 1116. Aside from minor discrepancies in content from *Ching shih cheng lei pei chi pen-ts'ao* (the net increase is only two substances), the major difference is that in this book the contents of *Pen-ts'ao yen i* are distributed among the articles to which they are related.

The exceptional usefulness of this member of the *Cheng lei pen-ts'ao* series results largely from the existence of the printed edition of 1249, which has been photographically reproduced in a widely distributed edition (Peking, 1957). The earlier edition in the Ssu pu ts'ung k'an collection (Shanghai, 1929), represented as based on the 1249 ed., is actually a reprint of the version of 1468.

8. *Chiu huang pen-ts'ao* ("Famine Relief Pharmacopoeia").

By Chu Hsiao,⁸⁷ fifth son of the Ming Emperor T'ai-tsu, preface dated 1406. Includes 440 substances which could be used to sustain life in time of famine, with illustrations and systematic notes on habitat, preparation, and ingestion. For a detailed description and historical appreciation see Lu Gwei-djen and Joseph Needham, "The Esculentist Movement in Mediaeval Chinese Botany; Studies on Wild (Emergency) Food Plants," in *Archives internationales d'histoire des sciences*, 21 (1968), 226-248; and Amano Motonosuke,⁸⁸ "Mindai ni okeru kyūkō sakumotsu chojutsu kō,"⁸⁹ ("A Study of the Writing of Works on Famine Relief in the Ming Period"), in *Tōyō gakuho*, 47, no. 1 (1964), 32-59.

The oldest extant printed edition is the xylograph 2nd ed. of 1525 (facs. repr., Shanghai, 1959). The most accessible edition is *Nung cheng ch'üan shu*⁹⁰ ("Complete Writings on Agricultural Administration"; completed 1628; repr. Peking, 1956), chüan 46-59. Later separate versions of *Chiu huang pen-ts'ao* (1837, 1856; Japan, 1718) are extracts from this agricultural handbook.

9. *Pen-ts'ao p'in hui ching yao*⁹¹ ("Classified Essential Pharmacopoeia").

Compiled by a board including Liu Wen-t'ai⁹² and others in 1505 but not printed until 1936, probably because of the death of its patron, Emperor Hsiao-tsung, soon after its completion. Since the MS was kept in the imperial palace, its historic influence was negligible. This is a work of great sophistication, on the scale of *Pen-ts'ao kang mu*, but based more narrowly on written sources.

The whereabouts of the MS are now unknown. While still in the palace library, it was published in a typeset edition under the title *Tien pan*⁹³ *pen-ts'ao p'in hui ching yao* (Shanghai, 1937). This included a supplement of 1701 (which incorporated material from *Pen-ts'ao kang mu*) but did not reproduce the fine color illustrations of the MS. On the illustrations see Giuliani Bertuccioli, "A Note on Two Ming Manuscripts of the Pên-Ts'ao P'in-Hui Ching-Yao," in *Journal of Oriental Studies*, 3 (1956), 63-68.

10. *Pen-ts'ao kang mu*⁹⁴ ("Systematic Pharmacopoeia"). Of the many available editions, the most convenient for

scholarly use is the 2-vol. reprint (Peking, 1957) of the Anhwei recension of 1885. It adds not only variorum notes but also indexes of drug names and synonyms. The *Pen-ts'ao kang mu* and Chao Hsueh-min's⁹⁵ useful supplement, *Pen-ts'ao kang mu shih i*⁹⁶ ("Gleanings for the *Pen-ts'ao kang mu*"; compiled and revised between 1760 and 1803 or later, first printed 1871), are available in a punctuated typeset edition with index according to the four-corner system (Shanghai, 1954-1955).

III. IMPORTANT REFERENCE TOOLS FOR THE HISTORY OF PHARMACOGNOSY. The standard descriptive guide to the extant pharmacopoeias of China and to Japanese pharmacopoeias in the Chinese tradition is Lung Po-chien,⁹⁷ *Hsien ts'un pen-ts'ao shu lu*⁹⁸ ("Bibliography of Extant Pharmacopoeias"; Peking, 1957). An invaluable pastiche of bibliographical data, prefaces and colophons, critical discussions, and analytic information is provided for the entire Chinese medical literature, extant or lost, up to the late thirteenth century in Okanishi Tameto, *Sung i-ch'ien i chi k'ao*⁹⁹ ("Studies of Medical Books Through the Sung Period"; Peking, 1958), which devotes nearly 200 pages to the classics of pharmacognosy. Less detailed information of a similar kind is provided for later works as well in Tamba Mototane¹⁰⁰ (*nom de plume* of Taki Gen'in¹⁰¹), *Chung-kuo i chi k'ao*¹⁰² ("Studies of Chinese Medical Books"; Peking, 1956). Liou Ho and Claudius Roux, *Aperçu bibliographique sur les anciens traités chinois de botanique, d'agriculture, de sériciculture et de fungiculture* (Lyons, 1927), reflects very limited study.

There is no reliable general historical study of Chinese materia medica in any Western language. Pierre Huard and Ming Wong, "Évolution de la matière médicale chinoise," in *Janus*, 47 (1958), reviews the main pharmacopoeias, but because of carelessness and excessive reliance on uncritical modern Chinese secondary sources this article must be used with caution. The historical data in vol. I of Bretschneider's book (cited above), because less ambitious, is perhaps more useful. Needham *et al.*, *Science and Civilisation in China*, VI, can be expected to fill this gap.

In Chinese there is as yet nothing on medicine in general to replace Ch'en Pang-hsien,¹⁰³ *Chung-kuo i-hsueh shih*¹⁰⁴ ("History of Chinese Medicine"; Shanghai, 1920), almost completely bibliographical in approach; and there is no monograph on the history of materia medica. In Japanese the survey of Liao Wen-jen,¹⁰⁵ *Shina chūsei igaku shi*¹⁰⁶ ("History of Medieval Chinese Medicine"; Kyoto, 1932), is similar in style and value to that of Ch'en; and scholarship on Chinese pharmacognosy is scattered through a great many articles on special subjects. Among the most informative of these is Okanishi, "Chūgoku honzō no dentō to Kin-Gen no honzō,"¹⁰⁷ ("The Chinese Pharmacognostic Tradition and the Pharmacopoeias of the Chin and Yuan Periods"), in Yabuuchi, ed., *Sō-Gen jidai no kagaku gijutsushi*¹⁰⁸ ("History of Science and Technology in the Sung and Yuan Periods"; Kyoto, 1967), pp. 171-210.

The major guides to the secondary literature of Chinese medicine, and thus of materia medica, are Chi Hung and

Wu Kuan-kuo,¹⁰⁹ *Chung-wen i-hsueh wen-hsien fen-lei so-yin*¹¹⁰ ("Classified Index of Medical Contributions in Chinese"; Peking, 1958), esp. pp. 8–14 on history; A. R. Ghani, *Chinese Medicine and Indigenous Medicinal Plants*, Pansdoc Bibliography no. 396 (Karachi, 1965), a random collection of citations; and Medical History Research Subcommittee, Shanghai Municipal Research Committee on Chinese Materia Medica, ed., *Chung-wen i-shih lun-wen*

*so-yin*¹¹¹ ("Index to Articles in Chinese on the History of Medicine"), 3 vols. (Shanghai, 1957–1958).

This article is, with some additions and omissions and a new bibliography, adapted with permission from the study of Lu Gwei-djen noted above. The aid of Miyasita Saburō, librarian for Takeda Chemical Industries, Osaka, Japan, especially in procuring the illustrations, is gratefully acknowledged.

N. SIVIN

NOTES

- | | | | |
|---------|--------------------|--------------------------|--------------------|
| 1. 李時珍 | 32. 行 | 科学技術史 | 84. 重修政和新修 |
| 2. 東壁 | 33. 助 | 60. 神農本草經 | 經史證類備用 |
| 3. 瀕湖 | 34. 反 | 61. 孫星衍, 孫馮翼 | 本草 |
| 4. 瓦硝霸 | 35. 製 | 62. 本草經集注 | 85. 張存惠 |
| 5. 李言聞 | 36. 治 | 63. 殘卷 | 86. 曹孝忠 |
| 6. 顧問 | 37. 合治 | 64. 吉石盒叢書 | 87. 朱櫛 |
| 7. 王世貞 | 38. 禁 | 65. 岡西爲人 | 88. 天野元之助 |
| 8. 桐 | 39. 代 | 66. 新修本草 | 89. 明代における救荒作物著述考 |
| 9. 五行 | 40. 忌 | 67. 重輯新脩本草 | 90. 農政全書 |
| 10. 陳藏器 | 41. 解 | 68. 食療本草 | 91. 本草品彙精要 |
| 11. 釋名 | 42. 贖 | 69. 孟詵 | 92. 劉文泰 |
| 12. 正誤 | 43. 吳其濬 | 70. 中尾万三 | 93. 殿板 |
| 13. 集解 | 44. 植物名實圖考 | 71. 補養方 | 94. 本草綱目 |
| 14. 脩治 | 45. 疏 | 72. 敦煌石室發見食療本草 | 95. 趙學敏 |
| 15. 主治 | 46. 李建元 | 殘卷考 | 96. 拾遺 |
| 16. 氣味 | 47. 明史 | 73. 食療本草の考察 | 97. 龍伯堅 |
| 17. 發明 | 48. 顧景星 | 74. 敦煌石室古本草殘卷 | 98. 現存本草書錄 |
| 18. 附方 | 49. 白茅堂集 | 75. 經史證類備急本草 | 99. 宋以前醫籍考 |
| 19. 名 | 50. 章學誠 | 76. 唐慎微 | 100. 丹波元胤 |
| 20. 苗 | 51. 章氏遺書 | 77. 重廣補注本草 | 101. 多紀元胤 |
| 21. 地 | 52. 張懋釗 | 78. 陳承 | 102. 中國醫籍考 |
| 22. 時 | 53. 蔡景峯 | 79. 經史證類大觀本草 | 103. 陳邦賢 |
| 23. 收 | 54. 試論李時珍及其在科學上的成就 | 80. 唐慎微の經史證類備急本草の系統とその版本 | 104. 中國醫學史 |
| 24. 用 | | 81. 木村康一, 吉崎正雄 | 105. 廖溫仁 |
| 25. 質 | | 82. 本草衍義 | 106. 支那中世醫學史 |
| 26. 色 | 55. 渡邊幸三 | 83. 廣義 | 107. 中国本草の伝統と金元の本草 |
| 27. 味 | 56. 李時珍の本草綱目とその版本 | | 108. 宋元時代の科学技術史 |
| 28. 性 | | | 109. 吉鴻, 吳觀國 |
| 29. 氣 | 57. 藪内清 | | 110. 中文醫學文獻分類索引 |
| 30. 臭 | 58. 吉田光邦 | | 111. 中文醫史論文索引 |
| 31. 主 | 59. 明清時代の | | |

LISSAJOUS, JULES ANTOINE (b. Versailles France, 4 March 1822; d. Plombières, France 24 June 1880), *physics*.

Lissajous developed an optical method for studying vibration and was generally interested in the physics of wave motion. "Lissajous figures" are the curves in the xy plane generated by the functions $y = a \sin(w_1 t + q_1)$ and $x = b \sin(w_2 t + q_2)$, where w_1 and w_2 are small integers. The curves are today easily produced on an oscilloscope screen; but Lissajous obtained them in the context of acoustics, from the superposition of the vibrations of tuning forks. He entered the École Normale Supérieure in 1841 and received the *agrégé* in 1847. He then became professor

of physics at the Lycée Saint-Louis. In 1850 he presented his thesis, *Sur la position des noeuds dans les lames qui vibrent transversalement*, to the Faculty of Sciences. In 1874 he became rector of the academy of Chambéry and, in the following year, of the academy of Besançon. Lissajous was a candidate for the physics section of the Paris Academy in 1873 but was only elected corresponding member in 1879. In 1873 he received the Lacaze Prize, primarily for his work on the optical observation of vibration.

Like some other physicists of the time, Lissajous was interested in demonstrations of vibration that did not depend on the sense of hearing. Most of his experiments involved visual manifestations of vibra-