

Notes

1. Among the technologies rated high internationally at the time of this project were semiconductor manufacturing; optoelectronics, including optical fibres; composite materials, such as carbon fibres; ceramics; and antiheat materials. Some areas of biotechnology and fermentology were also rated high. Since 1985, the superconductor has come to attract much attention world-wide.
2. Mark Gayn, *Japan Diary* (Tokyo and Rutland, Vt., Tuttle, 1981), p. 1.
3. Arisawa Hiromi et al. (1967), vol. 2, p. 6. Much of the following discussion has relied on this source and on its companion volume, *Shōwa keizai shi* (History of the Japanese economy in the Showa period) (1980).
4. Regarding the “development” effect of Malayawata Steel, a cross-industry analysis by Professor Torii Yasuhiko of Keio University, Tokyo, is available in the October 1978 issue of *Tekkokai*. Our joint comparative studies of the Japanese steel-manufacturing technology transfers to Malaysia and Brazil remain to be published.
5. Hoshino Yoshiro, *Mohaya gijutsu nashi* (No more new technology) (Tokyo, Kappa Books, 1978), p. 15.
6. A chip consisting of fewer than 100 elements is usually called an SSI, one with more than 100 but fewer than 1,000 an MSI, and one with more than 1,000 an LSI. A chip consisting of more than 10,000 elements is called a super LSI or, more commonly, a VLSI.
7. No one can guarantee, however, that there will be no problem in the future. For some time to come, to be sure, an increase in employment in (or a movement of the labour force to) the tertiary sector is considered probable, but there are also views that an economy with an annual growth rate of less than 5 per cent will give rise to unemployment. Yet, one way technological innovation might be justified concerns the fact that Japan is now quickly becoming an ageing society. If the social burden to be borne by the younger generation is to be lessened, productivity must be increased.
8. The air pollution regulations in most European countries are less strict than in Japan, but as the problem of acid rain becomes more serious internationally, controls are being tightened.
9. Ministry of Agriculture and Commerce, ed., *Shokkō jijō* (The state of workers) (Tokyo, Government Printing Office, 1903).

10. The capability of automated machines is greater today than 10 years ago. This is especially true of sensors, which help enhance the precision of programming. But this does not mean that computerization and higher sensor efficiency compare favourably with the ability of a skilled worker, nor is there any reason in theory (technological or economic) why they should. Computerization may enhance a low-level skill and in some cases even replace it, but it cannot compare with high-level skills. Ironically, today's progress in micro-electronics may lead to a situation in which high-level skills will actually be prevented from being formed.
11. Tokyo and Kyoto imperial universities played key roles in meeting the needs of the state. In the early 1900s, the ratio of graduates of the imperial universities choosing positions in government service over the private sector was 55 to 45; in the 1920s, however, 3,238 of a total 5,025 graduates in one particular year went into the private sector, overturning the ratio to 65 to 35. The five major *zaibatsu* and the South Manchuria Railway Co., with its mining and iron-manufacturing departments, took the lion's share of the graduates.
 According to Uchida Hoshimi, in the 1910s, the Japanese government began, for the first time, to employ scientific and engineering personnel as officials to engage in "research and development." See Uchida Hoshimi, "Distribution of University-Graduate Engineers and Technologists in the 1920s," *Tokyo Keizai Daigaku Kaishi* (Bulletin of Tokyo University of Economics) 152 (September 1987).
 In response to the growing needs of the industrial and business worlds, the economics department of Tokyo Imperial University was separated from the Faculty of Law as the Faculty of Economics in 1919. In 1920, Keio and Waseda received official recognition as the first privately run universities in Japan; six other private universities were established soon after. In the same year, a commercial high school was upgraded to a college. In 1929, the Tokyo School of Technology became a national college, renamed the Tokyo Institute of Technology. It has had a leading role as an educational institution in technology and engineering.
12. A vivid report of this appears in Kume Kunitake, ed., *Tokumei zenken taishi Bei-Ō kairan jikki* (Account of the visit of the ambassador extraordinary and plenipotentiary to Europe and the United States), published in 1872/1873. See also Marlene J. Maya, "The Western Education of Kume Kunitake, 1871-76," *Monumenta Nipponica* 28, no. 1 (1973).
13. In agricultural technologies, intermediation refers to bridging the gap between the expertise and knowledge found in experimental stations and actual farming practices; intermediation in technology in general is much more far-reaching than this simple example.
14. In a machine-based industry, differences in skills affect factory performance less than in an industry dependent on simpler tools and instruments. A tendency toward uniformity characterizes modern technologies, but the problem of skill remains, though the nature of the problem has changed.
15. There are some of the opinion that, in the area of atomic energy technology in Japan, two opposing categories of engineer, theorists and experimentalists, are embroiled in a sort of tribal antagonism toward each other. If so, I am unable to determine whether it is because Japanese atomic energy technology has not yet attained independence or because such large technologies are bound to make polarization unavoidable. I would prefer to tentatively support the first view.
16. Observations in 1987 at several steel mills in north-eastern China revealed that generally no master plan for renewing technologies in the mill is present. Instead,

we found, for example, that a process in need of modernization was completely replaced by a set of equipment from abroad, even though the operational capacity of the new set far exceeded manufacturing capacity. More than half the new set's potential has therefore been left untapped. This kind of diseconomy is sometimes unavoidable when there is a dependence on foreign technology, but it is puzzling to find no plans for future adjustment and a seeming lack of awareness on the part of the mill's management of their need.

According to Japanese practice, technology development is in the hands of the chief engineer. In China, however, the culture of technology differs from the Japanese approach, and a native Chinese solution has yet to be found.

And probably for the same reason, there are no operational standards in Chinese industries. This is certain to be a barrier to the development of industrial technologies. Although technological levels are sufficiently high to produce locomotives domestically, they must be sent back to their place of manufacture for maintenance and repairs. This is because, with a lack of standardized processes and systems of operation, the technology remains with veteran workers.

17. With the explosive technological innovation that we see today, it often happens that the economic life of equipment will end before its theoretical life; so, while it may be of no further use in one country, it may well be useful in another, and the wise entrepreneur will keep an eye out for this kind of opportunity. Modern equipment will not operate efficiently in countries that experience frequent power failures or voltage changes. Proper operation would require home generators, rectifiers, etc., pushing up costs and lowering international competitiveness.
18. For an idea of how the people of this social stratum lived at the end of the nineteenth century, see the writings of Higuchi Ichiyo, one of the most prominent female writers of the Meiji period, who wrote about the difficulties of the young women of her time and who herself suffered poverty and an early death. In English, see Robert Lyons Deuly, *In the Shade of Spring Leaves—The Life and Writings of Higuchi Ichiyo, a Woman of Letters in Meiji Japan* (New Haven, Yale University Press, 1982). Refer especially to "Child's Play," "On the Last Day of the Year," and "Troubled Water."
19. For a vivid description of the people of this stratum and their lives in Tokyo before industrialization, see Matsubara Iwagoro's *Saiankoku no Tōkyō (Darkest Tokyo)* (Tokyo, Minyusha, 1893; reprint, Iwanami Shoten, 1988) (The English version is by F. Schroeder, *In Darkest Tokyo: Sketches of Humble Life in the Capital of Japan* [Yokohama, 1898]).
20. Yokoyama Gennosuke, *Nihon no kasō shakai* (Tokyo, Kyobunkan, 1899; reprint, Iwanami Shoten, 1949).
21. Sawsan al-Messiri, *Ibn al-balad—A concept of Egyptian identity* (Leiden, 1978).
22. Refer to Akimoto Ritsuro, *Gendai toshi no kenryoku kōzō* (Power structure in the contemporary city) (Tokyo, Aoki Shuppan, 1971).
23. These handbooks were technical manuals that reflected "the results of Japanese study of agriculture influenced, not by modern, Western science, but by Chinese agricultural studies such as the sixth-century *Qi min yao shu*." See Furushima Toshio, *Nōsho no jidai* (The age of agriculture books) (Tokyo, Nosangyoson Bunka Kyokai, 1980).
24. Refer, for example, to Nishioka Toranosuke, *Kinsei ni okeru ichi rōnō no shōgai* (The life of an old farmer in the modern age) (former title, *Rōnō Watanabe Fushō den* (The life of an old farmer, Fushoo) (Tokyo, Kodan Sha, 1978). The venerable Watanabe was born in 1793 in Akita Prefecture and died in 1856. He

- was a contemporary of the famous agricultural reformer Ninomiya Sontoku (1787–1856). Many other agricultural reformers were active in this period.
25. See Iinuma Jiro, *Nihon nōgyō no sai-hakken—Rekishi to fūdo kara* (The rediscovery of Japanese agriculture—From its history and climate) (Tokyo, NHK Books, 1975).
 26. See the survey report by Hatate Isao (1981).
 27. For a fuller treatment of this and related questions, see Toyoda Toshio, ed., *Vocational Education in the Industrialization of Japan* (Tokyo, United Nations University, 1987).
 28. There is an excellent study on foot-bellows iron making by Ohashi Shuji, *Bakumatsu Meiji seitetsu shi* (The history of iron manufacture at the end of the Tokugawa Era and Meiji) (Tokyo, Agnesu Sha, 1975). For an explanation of the manufacturing method, refer to the July 1984 issue of *Boisu* (Voice).
 29. More precisely, the funds came through the Yokohama Specie Bank (now the Bank of Tokyo). This money was from individual savings deposits at post offices throughout the nation; these savings accounts constituted the government's most important source of financing for industrial investment.
 30. Even today, in Kitakyushu, there is an organization for the recruitment of day-labourers.
 31. During the Sino-Japanese War, the Chinese armed forces, even the navy, had much better weapons (though they lacked a rapid-fire gun), but they were defeated in large part because of problems in supply and maintenance. A common problem at the initial stage of industrialization is a neglect of maintenance (parts supply and repairs) and management skills.
 32. See the recent study by Sugiyama Shinya, "Nihon sekitangyō no hatten to Ajia sekitan shijō" (Development of the Japanese mining industry and the Asian coal markets), *Gendai Keizai*, Spring 1982. See also the works by Kasuga Yutaka, one of our project participants: "Kan-ei Mi'ike Tankō to Mitsui Bussan" (The government-operated Mi'ike Coal-Mine and Mitsui & Co.), *Mitsui Bunko Ronso*, 1976, no. 10; "Mitsui Zaibatsu ni okeru sekitangyō no hatten kōzō" (Development structure of coal-mining in the Mitsui financial clique), *ibid.*, no. 11; "1910-nen-dai ni okeru Mitsui Kōzan no tenkai" (The development of Mitsui mines in the 1910s), *ibid.*, no. 12; and "Mitsui Tankō ni okeru 'gorika' no katei" (Process of 'rationalization' at the Mitsui Coal-Mine), *ibid.*, no. 14.
 33. On this system and the refining methods, see the works by Sasaki Junnosuke (1979, 1980).
 34. Regarding the *tomoko*, see Murakushi Nisaburo's "Tomoko kenkyū no kaiko to kadai—Nihon kōfu kumiai kenkyū josetsu no isseki to shite" (Retrospectives and tasks in studies of the *tomoko*—As a part of the introduction to the study of the miners' unions in Japan), *Keizai Shirin* 48, no. 3 (1980). See also Matsushima Shizuo's *Tomoko no shakaigaku-teki kōsatsu* (A sociological study of the *tomoko*) (Tokyo, Ochanomizu Shobo, 1978).
 35. Murakami Yasumasa and Hara Kazuhiko, *Gijutsu no shakai shi* (A social history of technology), vol. 4 (Tokyo, Yuhikaku, 1982), p. 51.
 36. On the other hand, coal-mining requires a technology for preventing gas explosions in the pits that of course is not necessary for metal mines.
 37. Murakami Yasumasa, Hara Kazuhiko (note 35 above). My description in this part is based on Hoshino Yoshiro, *Ashio Dōzan no gijutsu to keiei no rekishi* (History of Technological and Administrative Development in the Ashio Copper Mine) (Tokyo, United Nations University Press, 1982), HSDRJE-79J/UNUP-

- 403, and also Shoji Yoshiro and Sugai Masuro, *Tsūshi Ashio kōdoku jiken, 1877–1984* (A general history of poisoning incidents at Ashio Copper Mine) (Tokyo, Shin'yo Sha, 1984).
38. Inoue had gone to England in 1863 with Ito Hirobumi and others; he studied civil engineering and geology and returned to Japan in 1868, after which he joined the new government.
 39. The Shinkansen was opened in 1964 to connect the 515 kilometres from Tokyo to Osaka in a travel time of only 3 hours, unprecedented in the world. The line was later extended to Kitakyushu, and two other routes have since been added. The train operates at a maximum speed of 210 kilometres per hour and an average speed of 170 kilometres per hour. The most advanced technology has been adopted in several areas of operation, notably in the chassis, structure, signal system, and safety controls.
 40. It is important to note that the position of chairman of the Railway Council, the nucleus of railway policies, had been occupied by a vice-chief of the army general staff, and, moreover, two members of the council were also from the army. The private railway companies were obliged to co-operate with the military in times of an emergency. The military reserved the right to control nation-wide operation schedules and determine standards for major specifications for trains, stations, signalling systems, etc. In other words, in addition to the presence of economic and technological obstacles, there was the problem of the power of the military to shape railway policy to suit its particular needs.
 41. See Takeuchi (1979) for a detailed account of this.
 42. See Yonekawa Shin'ichi, "Bōsekigyō ni okeru kigyōseichō no kokusai hikaku" (International comparison of growth of enterprises in the textile industry), *Keizai Kenkyū* (Hitotsubashi University, Tokyo) (October 1978).
 43. See Izumi (1979a).
 44. See Yamamoto Shigemi, *Aa Nomugi Tōge* (Ah, Nomugi Pass) (Tokyo, Kadokawa Bunko, 1952); this work is based on interviews with over 300 elderly women who had once worked in the spinning mills. It was filmed and reportedly left a strong impression on viewers.
 45. Ministry of International Trade and Industry, "Industrial Statistics: Industry" (Tokyo, GPO, 1980).
 46. The surveys were conducted at the end of 1980 for Japan, in 1977 for the United States, and in 1980 for West Germany. In Japan, a medium-sized enterprise was defined as one with fewer than 300 employees; in the United States, fewer than 250; and in some European countries, fewer than 500.
 47. The OEM system was adopted in the food industry before the development of the machine industry, although there it is referred to as "packer and brand owner," that is, processor and distributor system.
 48. See Okumura (1973).
 49. *Human Resources for Economic Development* (Geneva, ILO, 1966), p. 5.
 50. Japanese students studying in England were advised by their professors there to transfer to German institutions to better understand the process of catching up. An intriguing twist to this was provided by Henry Dyer (1848–1918), a graduate of Glasgow University, who was invited to Japan to be the principal instructor in the College of Engineering of the Ministry of Industry, which had been established under the recommendation of Edmond Morell. Dyer returned to Britain, and, from his experiences training engineers in Japan, he promoted a major reform of engineering education in Britain. For more on the Dyer experiment,

- refer to Kita Masami of Soka University, “Kōbu Daigakkō to Gurasugo Daigaku” (The College of Works and Glasgow University) (*Shakai Keizai Shigaku* 46, no. 5).
51. See Sumiya Mikio, *Nihon shokugyō kunren hattatsu shi* (A history of the development of Japanese vocational training), 2 vols. (Tokyo, Nihon Rodo Kyokai, 1952) 1:216 ff.
 52. Nagai Michio, *Kindaika to kyōiku* (Modernization and education) (Tokyo, University of Tokyo Press, 1969) p. 102 ff.
 53. Morikawa Hidemasa, *Gijutsu-sha—Nihon kindai-ka no ninaite* (Engineers—The modernizers of Japan) (Tokyo, Nihon Keizai Shimbun Sha, 1975).
 54. Miyoshi Shinji, *Meiji no enjinia kyōiku: Nihon to Igrisus no chigai* (Engineering education in the Meiji period: Differences between Japan and England) (Tokyo, Chuo Koron Sha, 1983).
 55. On Tokyo Imperial University, see Nakayama Shigeru, *Teikoku daigaku no tanjō* (Birth of the imperial university) (Tokyo, Chuo Koron Sha, 1978).
 56. Regarding this dictionary, see the recent work by Takada Hiroshi, *Kotoba no umi e* (Towards the sea of words) (Tokyo, Shincho Sha, 1978).
 57. Hara Akira, “Zaikai” (Business circle), in *Kindai Nihon kenkyū nyūmon* (An introduction to the study of modern Japan) (Tokyo, University of Tokyo Press, 1977).
 58. Sakaguchi Akira, “Zaikai, seitō, kanryō” (Financial circles, political parties, and bureaucrats), in vol. 4 of *Nihon no kigyō to kokka* (Japanese enterprises and the state), ed. Morikawa Hidemasa (Tokyo, Nihon Keizai Shimbun Sha, 1976).
 59. Shishido Toshio, *Mitsubishi shōji no kenkyū* (A study of the Mitsubishi Trading Company) (Tokyo, Toyo Keizai Shimpō Sha, 1970), pp. 194–95.
 60. The institute’s formal name was the Institute of Physics and Chemical Research. This institute introduced new policies in organization and the administration of research that are still of use and recognized effectiveness today.
 61. Yokoyama Gennosuke, *Naichi zakkyō-go no Nihon* (Tokyo, Iwanami Shoten, 1954). See his preface.
 62. Arisawa Hiromi et al., eds., *Nihon sangyō hyakunen shi* (A 100-year history of Japanese industry), 2 vols. (Tokyo, Nihon Keizai Shimbun Sha, 1967), p. 141; Goto Shin’ichi, *Nihon kin’yū seido hattatsu shi* (History of the development of the Japanese financial system) (Tokyo, Kyoiku Sha, 1980), p. 11.
 63. See Kato Toshihiko, *Hompō ginkō shi ron* (History of Japanese banks) (Tokyo, University of Tokyo Press, 1957).
 64. See *Meiji zaiseishi* (History of Meiji financial policies), vol. 13 (Tokyo, Government Printing Office).
 65. The statement of purpose is from the government’s official policy at the time.
 66. Katsura Yoshio, *Sōgō shōsha no genryū: Suzuki Shōten* (Suzuki Shoten: Origin of a general trading company) (Tokyo, Nihon Keizai Shimbun Sha, 1977).
 67. Nissan Konzern, the predecessor of present-day Nissan Motors, was a “new *zaibatsu*,” in that it was not a family-owned, family-run business. Furthermore, unlike such *zaibatsu* as Mitsui, Mitsubishi, and Sumitomo, Nissan did not have its own bank, and, as a result, after the war, it suffered more from the dissolution of the *zaibatsu* than the others. Ayukawa Gisuke, the founder of Nissan, was a leading figure in the new heavy-industry complex in Japan. He was an engineer originally in the casting industry, finally diversifying into fishing and automobiles. In order to compete with the other *zaibatsu*, he established manufacturing in Manchuria. Ayukawa was of a new breed, but, his dependence on Manchuria and

his lack of a main bank for financial support eventually hurt him. The old *zaibatsu*, on the other hand, diversified their businesses, but only into areas or industries with which their existing businesses had some relation; in other words, they merely extended their existing activities.

Mitsui, for example, was careful to avoid any risks that could threaten the property of the Mitsui family.

68. Mishima Yasuo, "Mitsubishi Shōji—Zaibatsu-gata Shōsha no Keisei" (The Mitsubishi Corporation—The formation of a *zaibatsu*-type trading company), *Keieishigaku* 8, no. 9. See also Noda Kazuo et al., eds., *Kindai Nihon Keieishi no Kiso Chishiki* (Basic knowledge of modern Japanese management history) (Tokyo, Yuhikaku, 1981).
69. *Fortune* 102(3): 188–206.
70. These figures and those in the following pertaining to Mitsubishi are from the company's annual report of 1981.
71. The figures pertaining to Mitsui and Sumitomo corporations are from their respective annual reports of 1981.
72. Nakagawa Keiichiro, "Nihon no Kōgyōka Katei ni Okeru 'Soshiki Sareta Kigyōsha Katsudō'" (Organized entrepreneurial activities in the process of Japanese industrialization), *Keieishigaku* 2, no. 3.
73. Mishima Yasuo, "Sōgō shōsha—Sengo ni okeru kenkyū-shi" (General trading firms—A history of studies after the war), in vol. 3 of *Nihon keieishi kōza* (Tokyo, Nihon Keizai Shimbun Sha, 1976).
74. *Ibid.*
75. Nikko Research Center, ed., *Mitsubishi Shōji no kenkyū* (A study of Mitsubishi Corporation) (Tokyo, Toyo Keizai Shimpō Sha, 1980), p. 9.
76. See Mishima (1976).
77. Nikko Research Center, *Mitsubishi Shōji*, p. 23.
78. Misonoi Hitoshi, "Sōgō shōsha wa shayō dearu ka" (Is the general trading firm declining?), *Ekonomisto*, 28 May 1961.
79. Nikko Research Center, *Mitsubishi Shōji*, pp. 18–19.
80. Sato Seizaburo, "Meiji Ishin no saikentō" (Re-examination of the Meiji Restoration), in *Kindai Nihon kenkyū nyūmon* (An introduction to the study of modern Japan) (Tokyo, University of Tokyo Press, 1977).
81. This was published by the Ministry of Agriculture and Commerce in 1884.
82. There is an English translation of the work: *Tien-Kung K'ai-Wu: Chinese Technology in the Seventeenth Century*, by E-tu Zen Sun and Shiou-Chuan Sun (Pennsylvania State University Press, 1965). What is interesting is that this work (extant in Japan in various editions and copied versions) was not widely read in China and had even been lost at one time. It was brought back to China by returning scholars, and attracted a great deal of interest (Yabu'uchi 1969: 3).
83. See Yuasa (1984), vol. 2, p. 491.
84. See, for example, Hiroshige Toru, *Kagaku no shakai-shi—Kindai Nihon no kagaku taisei* (A social history of science—The structure of modern Japanese science) (Tokyo, Chuo Koron Sha, 1960); idem, *Kagaku to rekishi* (Science and history) (Tokyo, Misuzu Shobo, 1965); idem, *Kindai kagaku saikō* (Modern science reconsidered) (Tokyo, Asahi Shimbun Sha, 1979); Nakayama Shigeru, *Kagaku to shakai no gendai-shi* (Contemporary history of science and society) (Tokyo, Iwanami Shoten, 1981); Hiroshige Toru, Ito Shuntaro, and Murakami Yoichiro, *Shisō-shi no naka no kagaku* (Science in the history of thought) (Tokyo, Mokutaku Sha, 1975). This last work provides a concise summary of issues relating to the history of science.

85. See Okakura Koshiro, "Unesco kankoku to Kagakusha Kenshō" (Unesco recommendations and the Scientists' Charter), in Watanabe Naotsune and Igasaki Akio, eds., *Kagakusha Kenshō* (Scientists' Charter) (Tokyo, Keiso Shobo, 1980), p. 29; Yuasa Mitsutomo, *Nihon no kagaku-gijutsu hyakunen-shi* (A 100-year history of Japanese science and technology), 2 vols. (Tokyo, Chuo Koron Sha, 1984).
86. *Kagaku gijutsu no shi-teki tenkai* (A historical development of science and technology) (Tokyo, Government Printing Office, 1980), p. 42.
87. Murakami Nobuhiko, *Meiji jōsei-shi* (History of women in the Meiji period) (Tokyo, Kodan Sha, 1977), vol. 1, p. 53.
88. See Yokoyama (1949), pp. 236–38.
89. *Ibid.*, p. 239.
90. *Ibid.*
91. *Ibid.*, p.241.
92. Nakayama Ichiro, ed., *Chingin kihon chōsa* (Basic survey of wages) (Tokyo, Toyo Keizai Shimpō Sha, 1956).
93. See J. P. Aron's chapter on women spinners in his *La femme du XIX^e siècle* (Paris, 1980). There is a Japanese translation by Kataoka Yoshihiko et al., *Tsuyumichiura no joseishi* (Tokyo, Shinhyoron, 1984).
94. Shoji Yoko, "Home and Living," *Fujin hakusho* (White paper on women) (Tokyo, Sodo Sha, 1984), p. 51.
95. Shinozuka Eiko, *Nihon no joshi rōdō* (Female labour in Japan) (Tokyo, Toyo Keizai Shimpō Sha, 1982), p. 34.
96. For a fuller understanding of the problem provisionally addressed above, the reader may wish to refer to the following works (see Nakamura [1985]):
 - Kase Kazutoshi: "Nō-gyogyō ni okeru gijutsu kakushin to joshi rōdō" (Female labour and technological improvements in the agricultural and fishing industries)
 - Miyake Akimasa: "Toshi kasō no fujo rōdō" (The urban lower strata and female labour)
 - Nakamura Masanori: "Seishigyō ni okeru rōdōryoku no kōsei to rōshi kankei" (Labour relations and the composition of the work-force in the silk thread industry)
 - Nishinarita Yutaka: "Kōzan no gijutsu kakushin to joshi rōdō" (Female labour and improvements in mining technology)
 - Shiota Fukiko: "Sengo Nihon no gijutsu kakushin to joshi kōyō rōdō" (Female employment and technological improvements in post-war Japan)
97. Shukan-Asahi, ed., *Nedan no Meiji-Taishō-Shōwa fūzoku-shi* (A history of manners and customs in the Meiji, Taisho, and Showa periods, with special reference to prices) (Tokyo, Asahi Shimbun Sha, 1981).
98. *Watashi no jokō aishi* was written by Takai Toshio and published by Sodo Sha, Tokyo. Hayashi's work was first published by Chuo Koron Sha, Tokyo, in 1930. The latest edition is from Shincho Sha, Tokyo, 1979.
99. From her preface to *Ten no yamu* (Heaven is ill), ed. Ishimure Michiko (Tokyo, Asahi Shobo, 1974). See also her works *Kukai jōdo* (Bitter sea and paradise) (Tokyo, Kodan Sha, 1972) and *Tsubaki no umi no ki* (Camellia sea diary) (Tokyo, Asahi Shimbun Sha, 1980).
100. Harada Masazumi, *Minamata byō ni manabu tabi—Minamata byō no mae ni Minamata byō wa nakatta* (Journey in search of Minamata disease—There was no Minamata disease before its first occurrence) (Tokyo, Nihon Hyoron Sha, 1985), pp. 66–67, 144.

101. Shoji Yoshiro and Sugai Masuro, *Tsūshi Ashio kōdoku jiken, 1877–1984* (General history of pollution incidents at the Ashio Copper Mine, 1877–1984) (Tokyo, Shin'yo Sha, 1984).
102. The leader in the anti-pollution struggles was Tanaka Shozo (1841–1913), who fought for many years to bring about strict pollution control measures. He was defeated in his campaign, but regained recognition in the 1970s, at the time of renewed anti-pollution protests. See *Tanaka Shōzō zenshū* (The complete works of Tanaka Shozo), 18 volumes (Tokyo, Iwanami Shoten, 1977–80); see also, Kenneth Strong, *Ox Against the Storm: A Biography of Tanaka Shozo, Japan's Conservationist Pioneer* (Kent, Paul Norbury, 1977).
103. See Iijima Nobuko, *Kankyō mondai to higaisha undō* (Environmental problems and victims' protests) (Tokyo, Gakuyu Sha, 1984). See also her *Pollution Japan: Historical Chronology* (New York, Pergamon, 1980).