

Kwan Koriba: Botanist and Soldier

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*There is no nationality in the
field of science*
Kwan Koriba

*It was the best of times,
it was the worst of times.*

Charles Dickens
A Tale of Two Cities, Book I, Chapter I

Abstract

Kwan Koriba (1887–1957), a noted Japanese botanist, educator and academic administrator was given the rank of Brigadier General and appointed Director of the Singapore Botanic Gardens from December 1942 to August 1945 during the World War II occupation. As Director he performed his duties exceptionally well, carried out first rate scientific research and treated his British colleagues with compassion and understanding. After the war Prof. Koriba was appointed to be the president of Hirotsuki National University.

Introduction

Dickens wrote a novel about a noble deed during times of strife and upheaval. This is a true tale of noble deeds during a time of war. The deeds are those of Prof. (and for a period) Brigadier General Kwan Koriba who was Director of the Singapore Botanic Gardens from December 1942 until late August 1945.

When I was a graduate student at the University of Southern California (1960–1965) my first Department Chairman was Prof. John L. Mohr. John was a marine biologist and we did not have much in common scientifically (except that in the Summer of 1962 I worked as his data collector for him on Arlis II, an ice island near the North Pole), but I took his course on the History of Biology. This was easily the best course I ever took because John was an erudite and interesting teacher who taught us to appreciate scientific integrity and scientists who held to their principles even at a very high personal cost.

My last Chairman at USC before I left for UCI was Prof. Paul Saunders. He was a biochemist whose research centred on poisons produced by marine animals. Shortly before becoming Chairman he visited the Pacific to collect toxins and the animals which produce them. Paul gave a seminar shortly after becoming Chairman and never tired of telling us about his trips and the places he visited. One of these was Singapore and he told us about the city, the harsh Japanese occupation (he was there 10–12 years after the end of the war), and (for my sake) the Botanic Gardens, their orchids and their war-time Japanese Director (whose name Paul had forgotten) who was a very kind and well liked man. Paul's accounts stimulated my interest in the Director since he seemed to be like the principled universal men of science in John Mohr's lectures.

In 1969, approximately 15 years after taking John's course and a decade following Paul's account, I visited Singapore for the first time. Before going to the Botanic Gardens I went to the Botany Department of the University of Singapore to meet Prof. A.N. Rao who already had (and still has) an impressive reputation as an orchid anatomist. He introduced me to Prof. P.N. 'Danny' Avadhani. We spent a

very pleasant day together and the visit led to what is now a 30-year friendship and scientific collaboration carried out during summer and sabbatical leave visits to Singapore.

Rao and Danny took me to the Botanic Gardens where I saw on a wall the photographs of all previous directors including those of H.N. Ridley who died at the age of 101 and is primarily responsible for the introduction of rubber trees into Malaya; R.E. Holttum who lived through the war in the Gardens and in writing a book on the Orchids of Malaya wrote one of the best orchid floras ever written, and the war-time Japanese Director Prof. Kwan Koriba (Fig. 1). His picture was (and still is) there despite the fact that he was imposed on the Gardens by an occupation force. I asked for more details about Prof. Koriba, but the only answers were that he was a good director and a kind man.



Fig. 1. Professor Koriba in a field near Hirosaki. This photograph was taken by Professor Shigeo Chiba, then a student at Hirosaki University on September 26, 1957. A copy, taken to Singapore in 1971 by Professor Chiba, is now displayed among the photographs of other former Directors of the Singapore Botanic Gardens (courtesy Prof. Shigeo Chiba).

In the introduction to his book on the Orchids of Malaya Holttum wrote: "The main part of the work for the preparation of this book was carried out during the Japanese occupation of Singapore. . . . The fact that I was able to undertake the work in the years 1943–1944 was due to the courtesy of Dr. Kwan Koriba, who was sent to Singapore by the Japanese Government to take charge of the Botanic Gardens

here. I wish to express grateful thanks to Prof. Koriba, for the courtesy with which he allowed me complete freedom to continue my studies, and for much personal kindness during that period" (Holtum 1964, the first edition of his book was published in 1953).

On initiating the Orchid Biology series I decided to follow the example of the Annual Reviews of Plant Physiology and to invite eminent orchidologists past retirement age to write the first chapter in each volume. My first choice for volume I was Prof. Holtum who was kind enough to accept the invitation. He wrote in this chapter that with "... the Japanese occupation of Singapore came Professor H. Tanakadate who said 'I conserve cultural institutions' and asked me to remain in charge of the Gardens. I did so, but was formally relieved of my charge after about ten months, when Professor K. Koriba, a distinguished plant physiologist, came as Director. He permitted me and Mr. Corner to continue our botanical studies. It was then that I began to write a systematic account of the orchids of the Malay peninsula ..." (Holtum 1977).

Holtum's statements, especially the first one, kept me wondering whether Koriba was ever interested in orchids. My inquiries always elicited a negative answer and I was told that he worked on forest trees. As it turns out these answers were incorrect. When Dr. L.P. Nyman, Dr. R. Ernst and I decided to write a review on resupination we surveyed the literature and found that most of it was by German workers. However two often cited papers were by a K. Koriba (Koriba 1913, 1914). I did not know whether this was merely a coincidence or if the author was Prof. Kwan Koriba. The question was not resolved even after I obtained copies of the papers. These papers dealt with resupination, but Prof. Koriba's presumed interest, at least while he was in Singapore, were forest trees and their phyllotaxis. At that time I could see no obvious connection between phyllotaxis and resupination. In an effort to obtain additional information I wrote Prof. Holtum. He replied suggesting that I should consult E.J.H. Corner's book *The Marquis — A Tale of Syonan-to* and also write Prof. Akinori Ueyama at Kyoto University. Corner's book proved to be very interesting and to contain information on Prof. Koriba, but did not resolve the puzzle.

I wrote Prof. Ueyama. His reply was delayed for a week or two due to ill health, but it answered my question. The K. Koriba who wrote these papers was indeed a Prof. Kwan Koriba. These papers dealt not only with resupination *per se*, but also with the placement and subsequent positioning of flower buds on the stems of *Spiranthes australis* — a subject not far removed from phyllotaxis. I was pleased to find that Prof. Koriba was interested in orchids after all and wrote Prof. Ueyama several times asking for biographical information, photographs and any other details he might have. Prof. Ueyama was patient, kind, gracious and generous. He sent me photographs, copies of Koriba's papers, all the information he had and translated parts of a posthumous collection of Koriba's writings.

I also obtained copies of several obituaries (Anonymous 1947; Asida 1943; Ashida 1958; Holtum 1958). Two of them (Asida 1943; Ashida 1958) listed a third paper on orchids by Koriba, a contribution dealing with *Taeniophyllum* (Koriba 1926). From Koriba's obituaries I learned that in his final years he was President of Hiro-saki University (Fig. 2). I wrote to the current President Prof. Shuji Tono requesting more information and received a very kind reply from Prof. Shigeo Chiba, one of the last students to hear Prof. Koriba lecture at Hirosaki University in 1956 (S. Chiba, Hirosaki University, personal communication), who sent me biographical information and several photographs. Finally, almost 25 years after Paul Saunders mentioned the war-time Director of the Singapore Botanical Gardens I had enough information to write about Professor Kwan Koriba.



Fig. 2. An official photograph of Professor Kwan Koriba as President of Hirosaki University. This photograph taken on September 6 1957 (according to Prof. Shigeo Chiba) marks Prof. Koriba's 75th birthday, 26 September 1957 (courtesy Prof. Akinori Ueyama and Prof. Shigeo Chiba; each supplied me with a copy).

Outline of Koriba's Career

In one of his letters Professor Ueyama Akinori translated for me an outline of Koriba's life and career which was published first in a posthumous collection of his works. Prof. Ueyama (1927–) stated in his letter that he did not know much about Prof. Koriba who was "grandfather" Professor to him "... because [the] late Prof. Hamada [1910–1981] was his student ..." This outline is presented below with minor modifications in language and additions based on information from several sources (Asida 1943, 1958; Holttum 1958; S. Chiba, personal communication).

1882 (*Meiji* 15th year) September 6, 7:00 pm, Koriba was born at Aomori-city, in the North of Honshu, North East Area of Japan, the 4th child and 2nd son of Naoyo Koriba "... a 'Samurai' of the feudatory at the north end of Honshu ..." As a boy he was educated in the Middle School of the neighbouring city of Hirosaki (Holttum 1958). His interest in plants was aroused by one of his teachers a plant

pathologist named Naoharu Hiratsuka. His mother Kumi was also interested in plants (Asida 1943).

1903 (*Meiji* 36th year) September. Entered Tokyo Imperial University College of Science, Department of Botany.

1907 (*Meiji* 40th year), Koriba, 25 years old, graduated from the University with an undergraduate degree. Thesis: *Über die individuelle Verschiedenheit in der Entwicklung einiger fortwachsenden Pflanzen mit besonderer Rücksicht auf die Aussenbedingungen*. *J. Coll. Sci., Imp. Univ. Tokyo* 27(3): 1–86 (1909). His Professor was Manabu Miyoshi (Asida 1943).

1907 (*Meiji* 40th year), entered graduate course at the University of Tokyo.

1912 [*Meiji* 45 = *Taisho* 1 (*Meiji-Tenno* passed away and the era in the Japanese calendar was changed to *Taisho-Tenno*), December 10th, Koriba, 30 years old, obtained *Rigaku-Hakushi* (Dr. of Science, Tokyo University). Dissertation: *Mechanisch-physiologische Studien über die Drehung der Spiranthese-Ähne*. *J. Coll. Sci. Tokyo Imp. Univ.* 36(3): 1–179 + 7 plates (published March 30, 1914).

1913 (*Taisho* 2), 31 years old, appointed lecturer at the College of Agriculture, Tohoku Imperial University, Sapporo.

1915 (*Taisho* 4), 33 years old, appointed Professor of Botany at the same University.

1917 (*Taisho* 6), December 28, appointed one of the designers of a New Institute and a Department of Botany which he inaugurated at the College of Science, Kyoto Imperial University.

1918 (*Taisho* 8), March 21, became overseas research scientist for the Japanese Government and visited the USA, UK, France, Italy and Sweden. During this trip he had the good fortune of meeting Professor W. Pfeffer just before his death. Koriba also attended Pfeffer's funeral and laid a wreath in the name of the botanists of Japan (Asida 1943).

1920 (*Taisho* 9), August 8, returned via the port of Kobe. August 20, appointed Professor at the Botany Department, College of Science Kyoto Imperial University.

1921 (*Taisho* 10), Koriba, 39 years old, was one of the designers of a New College of Agriculture at Kyoto Imperial University.

1921 (*Taisho* 10), appointed Director of the Botanical Gardens, Kyoto Prefecture and held the post until October 1928.

1921 (*Taisho* 10), he visited Ponape Island (Ashida 1958).

1924 (*Taisho* 13), Koriba was appointed member of the National Research Council of Japan (Asida 1943).

1926 (*Taisho* 15), Koriba attended the Third Pan-Pacific Science Congress in Japan and presented a paper on *Taeniophyllum* (Asida 1943).

1929 [(*Showa* 4) *Taisho-Tenno* died in 1927 and a new Majesty, *Hirohito-tenno* assumed the throne, he was very interested in biology], April–July, Koriba 47 years old, visited and did research in Java during a Pan Pacific Congress. Prof. Akinori Ueyama wrote me that he learned from Holttum in 1976 at Kew that Prof. K. Koriba first met Prof. R.E. Holttum, then Director of the Singapore Botanic Gardens, at this meeting. On the same line Ueyama added “1925(?)” without an explanation.

1932 (*Showa* 7), 21 June to January 13, 1933, Koriba 50 years old, was appointed Overseas Scientist for the Japanese Government and visited Germany, Belgium, the Netherlands, UK, France, South America (Brasil, Argentina, etc) and the USA before returning to Kyoto. These visits may have started in 1931 (Ashida 1958). I can not help but wonder whether these and his previous international travels gave Koriba a good feeling for scientists of other nationalities. If so these feelings could be partially responsible for his kindness in Singapore. At the same time I am sure that the major reason for his attitude in Singapore must have been his personality and character.

1940 (*Showa* 15), 17 August–21 September, Koriba, 58 years old visits Manchuria, Mongolia and Central China.

1942 (*Showa* 17), Koriba reached the age of 60 *kanreki* in Japanese and retired on 26 September. On 22 December he arrived in Shonon-to (Prof. Ueyama used this spelling and not Syonan-to like Prof. Corner) as supreme cultural advisor in what was then an occupied area.

1943 (*Showa* 18), 15 April, Koriba was appointed as Director of the Singapore Botanic Gardens where, Prof. Ueyama writes, he "... co-studied with Holttum, Corner, etc."

1944 (*Showa* 19), 15 December, Koriba was given the additional post of Director of the Singapore Museum.

1945 (*Showa* 20), Japan surrendered, Koriba left the Gardens in late August according to Prof. Corner who kept Koriba's research notes and a draft of a paper which was eventually published in the Gardens Bulletin, Singapore (Koriba 1958).

1946 (*Showa* 21), the 64 year-old Koriba left Singapore on 26 January and arrived in Kyoto on 13 February.

1948 (*Showa* 23), at the age of 66 Koriba became Professor Emeritus at Kyoto University. According to one report (Ashida 1958) Koriba spent 1946–1954 reading and writing. He published two books during that period (Holttum 1958).

1954 (*Showa* 29), 1 February, Koriba, age 72, was appointed President of Hirosaki National University in his native prefecture of Aomori. Prof. Ueyama thinks that he accepted the position as a means of returning to his birth area. His assumption is accurate as indicated by a letter (dated 27 March 1954) from Koriba to Corner: "... This year I was elected to the President of the Hirosaki University.... As Hirosaki is my native prefecture (Aomori) I could not deny the request, though I get fairly old."

1956 (*Showa* 31), 3 May, the Aomori-ken Biological Society was formed and Prof. Koriba, a founding member, became its first president (S. Chiba, personal communication).

1957 (*Showa* 32), 14 December, Prof. Kwan Koriba passed away (*fuki* in Japanese, meaning "no return" or "died" according to Prof. Ueyama) at the age of 75 in the bathroom of his official residence. Another report (Ashida 1958) gives the date of his death as December 15, 1957. His funeral was held on 21 December 1957 (S. Chiba, personal communication).

1958, Koriba's paper on the periodicity of tree growth in the tropics was published posthumously in the Singapore Botanic Gardens' *Gardens' Bulletin* Volume 17, No. 1, pages 11–81.

1958, a volume commemorating Prof. K. Koriba edited by Prof. Joji Ashida was published in Japanese (S. Chiba, personal communication).

1983, 23 October, Prof. E.J.H. Corner visited Hirosaki University and put flowers on Prof. Koriba's grave (Chiba 1984).

The Botanist and Orchidologist

Young Koriba developed an interest in ecology and morphology. The writer of one obituary (Ashida 1958) attributed this to the fact that he lived in the mountains. At the Imperial University in Tokyo Koriba devoted attention to physiology because he felt that ecology and morphology can be explained in physiological terms (Ashida 1958). For this reason his early research was on the effects of ecological and physiological factors on morphology. He utilized his considerable knowledge of physics for this work, his orchid research and the observations on trees in Singapore (Holttum 1958). His work with *Spiranthes* is an extension of this interest.

Koriba referred to *Spiranthes sinensis* (Fig. 3; Table 1), the subject of his doctoral dissertation (Koriba 1914), as *Spiranthes australis*. This is not surprising at all since this species has many synonyms perhaps due to its very wide distribution which includes Japan, Taiwan, Philippines, Indo-Malaya (Pakistan, Himalayas, etc), Afghanistan, Thailand, Indochina, China, Korea, Malaysia, Australasia (New Guinea, Australia, New Zealand, Tasmania, etc) and parts of the Middle East (Gagnepain and Guillaumin 1933; Holtum 1964; Garay and Sweet 1974; Lin 1976; Rechinger 1978; Seidenfaden 1978). The plants are terrestrial and very variable in form and size.

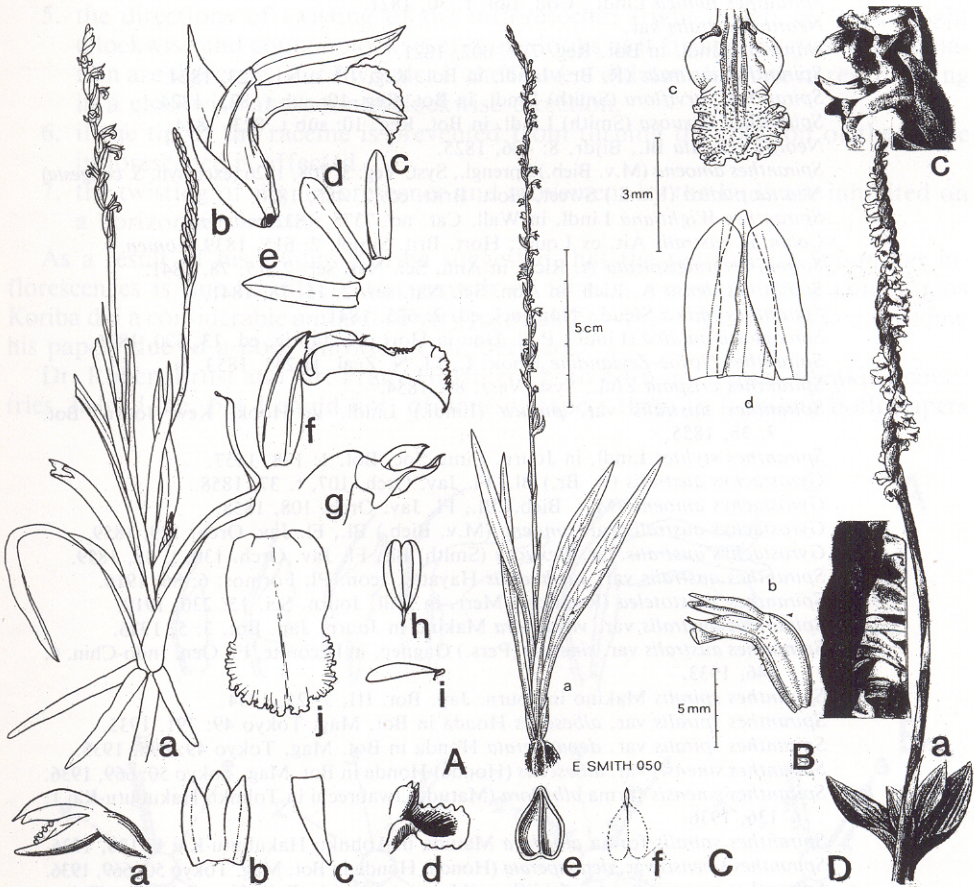


Fig. 3. *Spiranthes sinensis*. **A.** Specimen from Taiwan; a, whole plant with two inflorescences; b, flower with bract; c, lateral petal; d, dorsal sepal, e, lateral sepal; f, labellum and gynostemium; g, gynostemium; h, pollinia; i, pollinium; j, labellum. **B.** Example from Taiwan; a, whole plant; b, flower; c, labellum; d, petals and dorsal sepal. **C.** Plant from Indochina; a, side view of flower, $\times 4$; hood formed by two lateral petals and the dorsal sepal, $\times 6$; c, lateral sepal $\times 6$; d, labellum and gynostemium $\times 6$; e, anther $\times 10$; f, pollinia $\times 10$. **D.** Representative from Italy; a, leaves and inflorescence; b, the spiral on the stem of the inflorescence; c, flowers on side (bottom) and 45° (top) view, (sources: **A.**, Lin 1976; **B.**, Seidenfaden 1978; **C.**, Gagnepain and Guillaumin 1933; **D.**, Alessandrini 1985).

Table 1
Nomenclature of *Spiranthes sinensis* (*S. australis*)

Spiranthes sinensis (Pers.) Ames, Orch. 2: 53, 1908; Masamune in Sci. Kep. Kanazawa Univ. 9: 126, 1964.

Basionym: *Neottia sinensis* Pers., Syn. 2: 511, 1807.

Syn.: *Ophrys spiralis* Georgi, Reise 1: 232, 1775.

Aristotelea spirals Loui., Fl. Cochinch. ed. 1, 2: 522, 1790.

Epidendrum Aristoelea Raeusch., Nomencl. ed. 3, 265, 1797.

Neottia australis R. Br. Prodr. Fl. Nov. Holl. 319, 1810.

Neottia flexuosa Smith in Rees, Cyclop. 24: Neottia no. 9, 1813.

Neottia parviflora Smith in Rees, Cyclop. 24: Neottia no. 10, 1813, not Blume.

Neottia amoena M.v. Bieb., Fl. Taur. Cauc. 3: 606, 1819.

Spiranthes pudica Lindl., Coll. Bot. t. 30, 1821.

Neottia australis var.

chinensis Lindl. in Bot. Reg. 7: t. 602, 1821.

Spiranthes australis (R. Br.) Lindl. in Bot. Reg. 10: sub t. 823, 1824.

Spiranthes parviflora (Smith) Lindl. in Bot. Reg. 10: sub t. 823, 1824.

Spiranthes flexuosa (Smith) Lindl. in Bot. Reg. 10: sub t. 823, 1824.

Neottia crispata Bl., Bijdr. 8: 406, 1825.

Spiranthes amoena (M.v. Bieb.) Sprengl., Syst. Veg. 3: 708, 1826 (excl. syn. *S. congesta*)

Neottia pudica (Lindl.) Sweet, Hort. Britt. ed. 2, 485, 1830.

Spiranthes Wightiana Lindl. in Wall. Cat. no. 7378, 1832, *nomen*.

Calanthe australis Ait. ex Loud., Hort. Brit. Suppl. 2: 615, 1839, *nomen*.

Spiranthes longispicata A. Rich. in Ann. Sci. Nat. ser. 2, 15: 78, 1841.

Spiranthes densa A. Rich. in Ann. Sci. Nat. ser. 2, 15: 78, 1841.

Spiranthes indica Steud., Nomencl. ed. 2: 625, 1841.

Sarcoglottis pudica (Lindl.) P.N. Don in Hort. Cantabrig. ed. 13, 590, 1845.

Spiranthes Novae-Zeylandiae Hook. f., Fl. N. Zeal. 1: 243, 1853.

Spiranthes crispata Zoll., Syst. Verz. 89, 1854.

Spiranthes australis var. *pudica* (Lindl.) Lindl. in Hook. Kew Journ. Bot. 7: 38, 1855.

Spiranthes stylites Lindl. in Journ. Linn. Soc. Bot. 1: 178, 1857.

Gyrostachys australis (R. Br.) Bl., Fl. Jav. Orch. 107, t. 37, 1858.

Gyrostachys amoena (M.v. Bieb.) Bl., Fl. Jav. Orch. 108, 1858.

Gyrostachys australis var. *amoena* (M.v. Bieb.) Bl., Fl. Jav. Orch. 129, 1859.

Gyrostachys australis var. *flexuosa* (Smith) Bl., Fl. Jav. Orch. 130, t. 38, 1859.

Spiranthes australis var. *suishaensis* Hayata., Icon. Pl. Formos. 6: 86, 1916.

Spiranthes Aristotelea (Raeusch.) Merr. in Phil. Journ. Sci. 15: 230, 1919.

Spiranthes australis var. *viridiflora* Makino in Journ. Jap. Bot. 3: 5, 1926.

Spiranthes australis var. *sinensis* (Pers.) Gagnep. in Lecomte, Fl. Gen. Indo-Chin. 6: 546, 1933.

Spiranthes spiralis Makino in Journ. Jap. Bot. III, 7: 25, 1934.

Spiranthes spiralis var. *albescens* Honda in Bot. Mag. Tokyo 49: 791, 1935.

Spiranthes spiralis var. *depauperata* Honda in Bot. Mag. Tokyo 49: 698, 1935.

Spiranthes sinensis var. *albescens* (Honda) Honda in Bot. Mag. Tokyo 50: 669, 1936.

Spiranthes sinensis forma *albiflora* (Matuda) Iwabrechi in Tohoku Hakubutu-Kai 1: 136, 1936.

Spiranthes spiralis forma *albiflora* Matuda in Tohoku Hakubutu-Kai 1: 136, 1936.

Spiranthes sinensis var. *depauperata* (Honda) Honda in Bot. Mag. Tokyo 50: 669, 1936.

Spiranthes sinensis forma *viridiflora* (Makino) Ohwi in Bull. Nat. Sci. Mus. Tokyo 33: 69, 1953.

Spiranthes sinensis subsp. *australis* (R. Br.) Kitamura in Act. Phytotax. Geobot. 21: 23, 1964.

Spiranthes lancea var. *chinensis* (Lindl.) Hatusima in Journ. Geobot. 16: 80, 1968.

Spiranthes sinensis var. *amoena* (M.v. Bieb.) Hara in Journ. Jap. Bot. 44: 59, 1969.

The spiral arrangement of *Spiranthes* flowers, their position on the inflorescence and orientation relative to the ground drew the attention of botanists at least 60 years before Koriba studied the phenomenon. Koriba was the first to study these phenomena in detail. He carried out numerous observations and reported them in great detail in an extremely long German language paper published in Japan and a shorter one in a German journal (Koriba 1913, 1914). What he found was that

1. while the flowers open the axis of the inflorescence twists and this causes the spiral appearance of the raceme.
2. this torsion is limited to the axis of the inflorescence.
3. the growth of the inflorescence influences the turning.
4. flowers change their position (Fig. 4) and undergo resupination either from left to right or right to left.
5. the directions of twisting of the inflorescence [right to left or left to right (clockwise and counterclockwise) if one looks at it from above] and resupination are the same. But I wonder if the flowers did not alternate in resupinating in a clockwise and counterclockwise direction.
6. if the tip of the raceme is prevented from turning the rotation of the entire inflorescence is affected.
7. the twisting of the inflorescence and movement by the buds are inhibited on a horizontal clinostat.

As a result of his studies Koriba suggested that the twisting of *Spiranthes* inflorescences is due to differential growth of tissues. To reach these conclusions Koriba did a considerable amount of very painstaking work. I found it difficult reading his papers due to a poor knowledge of German.

Dr. Robert Ernst and Dr. Franz Hoffman, both born in German speaking countries, helped me, but I could not, of course, expect them to translate both papers

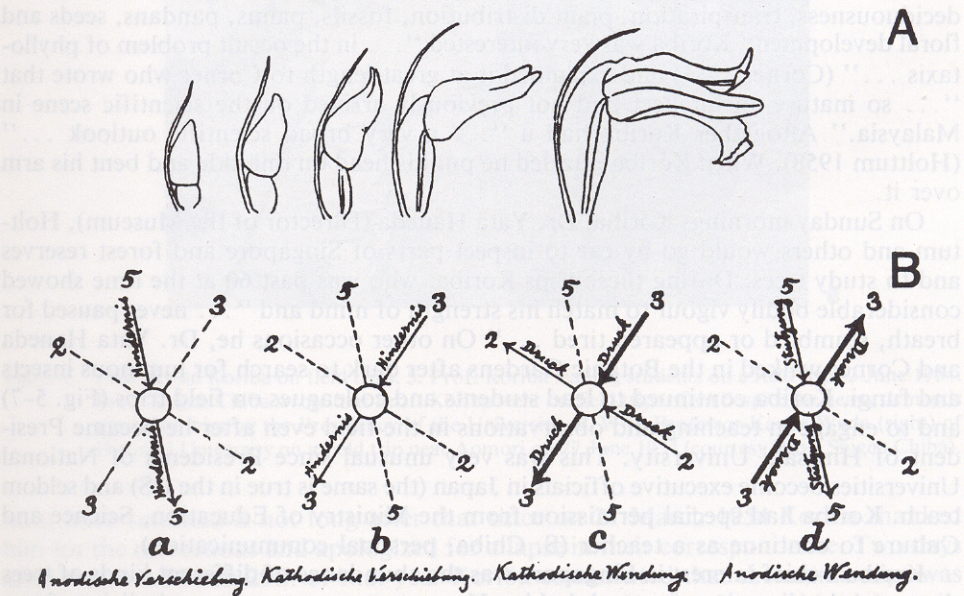


Fig. 4. Development and positioning of *Spiranthes sinensis* flowers (A) and (B) directions of twisting of the floral axis and torsion of flowers (Koriba; 1914, Prof. Akinori Ueyama was kind enough to provide a copy of this paper).

in their entirety and this is the reason for the sketchy summary presented here. Be all this as it may, Koriba's dissertation explains his subsequent interest in phyllotaxy. The jump between the arrangement of flowers on an inflorescence and the position of buds on a stem is not all that big.

In addition to studying the twisting of *Spiranthes* inflorescences Koriba also compared the process with resupination by flowers of *Orchis aristata*, *Malaxis paludosa*, and four species of *Platanthera*. These comparisons are a clear indication that he was aware of the general nature of the phenomenon. Most subsequent reviews and research papers on resupination cite Koriba's work which is indicative of scientific importance.

Koriba's work with orchids was not limited to *Spiranthes*. He was also interested in *Taeniophyllum aphyllum* or kumo-lan, the spider orchid, a Japanese shootless species. He described the position of its roots and noted that they are dorsiventral (Koriba 1926).

Another phenomenon studied by Koriba was the effect of light on the development and morphology of the roots. During his observations Koriba carried out a simple yet clever experiment: "... when the growing apical portion of the hypocotyl is cut off, the rest can regenerate a new hypocotyl with the germinal point, whereas the root has no such capability" (Koriba 1926).

Vegetation and succession on volcanoes, high mountains and dunes were among other interests pursued by Koriba and he published several papers on these subjects (Ashida 1958). He also worked on the Podostemonaceae and the fossil *Hydrodictyon*. In 1927 he suggested that morphogenesis and differentiation should be explained on the basis of plant hormones and vitamins. This is remarkable since the first plant hormone, auxin, was discovered in 1926 by Prof. F.W. Went in Utrecht. Starting in 1931 Koriba was interested in phytoclimatology and between 1936 and 1942 worked on evaporation and transpiration.

While in Singapore Koriba studied or discussed buds, trees, phyllotaxis, deciduousness, transpiration, plant distribution, fossils, palms, pandans, seeds and floral development. Koriba was very interested "... in the occult problem of phyllotaxis ..." (Corner 1981) and explained it at great length to Corner who wrote that "... so mature an intellect had not previously arrived on the scientific scene in Malaysia." Altogether Koriba had a "... a very broad scientific outlook ..." (Holtum 1958). When Koriba puzzled he put his head on one side and bent his arm over it.

On Sunday mornings Koriba, Dr. Yata Haneda (Director of the Museum), Holtum and others would go by car to inspect parts of Singapore and forest reserves and to study trees. During these trips Koriba, who was past 60 at the time showed considerable bodily vigour to match his strength of mind and "... never paused for breath, stumbled or appeared tired ..." On other occasions he, Dr. Yata Haneda and Corner walked in the Botanic Gardens after dark to search for luminous insects and fungi. Koriba continued to lead students and colleagues on field trips (Fig. 5-7) and to engage in teaching and observations in the field even after he became President of Hirosaki University. This was very unusual since Presidents of National Universities become executive officials in Japan (the same is true in the US) and seldom teach. Koriba had special permission from the Ministry of Education, Science and Culture to continue as a teacher (S. Chiba, personal communication).

Koriba's chief interest in Singapore was the abundance of different kinds of trees there and the diversity of growth habits. He wrote a paper on the periodicity of tree growth there (Koriba 1958), but after the Japanese surrender in 1945 he left the manuscript in Singapore as the Gardens' property. In due time the manuscript was returned to him and on 27 June 1953 he sent it to Corner for corrections. Corner



Fig. 5-6. Prof. Kwan Koriba on field trips. 5. Prof. Koriba leading students on a field trip, 2 June 1954. Prof. Shigeo Chiba wrote that Prof. Koriba went on field trips often despite the heavy demands placed on him by the Presidency of the University. 6. With Professor Kanzo Wada (right) of Hirosaki University on a field trip near Aomori on 27 June 1954 (courtesy Prof. Shigeo Chiba).

must have returned it not long after that since on 27 March 1954 Koriba thanked him for the corrections and apologized for a lapse in their correspondence. Two days after that, on March 29th of that year Koriba commented that the manuscript was too long and complained about not having enough time to do anything about it. More than three years later, on 19 July 1957 he wrote Corner that according to H.M. Burkill, Director of the Botanic Gardens at that time, the manuscript had gone to the printer. Koriba read and corrected the galley proofs in his office as President

Prof. K. Koriba



at Mt. Iwaki

Sept. 26, '57

Shigeo Chiba

Fig. 7. Professor Kwan Koriba at Mount Iwaki on 26 September 1957 (courtesy Prof. Shigeo Chiba).

of Hirosaki University with Professor Zyun Nakazawa shortly before his death (S. Chiba, personal communication). The paper was published in 1958, but Koriba never saw it. It is fitting I think that his last work was published in the Bulletin of the Gardens he directed, obviously loved and took pains to save.

In 1951 Koriba published a book on plant forms in which he discussed morphology from the viewpoints of organization, development and function. A year later he published a comprehensive book on plant physiology and ecology (Ashida 1958). He also planned to write a book on plant evolution. His notes reveal that in this book he intended to approach the topic through a synthesis of morphology, physiology, ecology and genetics. Few people could have done that and unfortunately Koriba never had a chance to write that book.

The Director

To fully appreciate Koriba's behaviour it must be placed in context and compared with that of the Japanese occupation forces in Singapore. The Japanese entered Singapore (or Syonan, Light of the South as they called it) on the morning after General Arthur Percival surrendered the city unconditionally to General Tomoyuki Yamashita (then called the Tiger of Malaysia and hanged for his war crimes after the war as the only Japanese war criminal whose sentence was either not commuted by General Douglas McArthur or who was not given the privilege of a more honourable execution by a firing squad). Most of the population stayed indoors on that day and stores were boarded up. Only the Singapore Cold Storage food store

was open (this store, now modernized, still exists; its major contribution to orchidology was the extensive use of the Cold Storage Creameries Magnolia brand milk and cream bottles as culture flasks for orchid seed cultures). The Japanese assembled the European population on the next morning and decided who was to be interned. On February 17th they assembled the Indian and Malay regiments and urged them to renounce the British crown and transfer their allegiance to the Emperor of Japan. A few did. Most did not and eighty Malay officers were executed for their refusal to renounce the crown.

The next step for the Japanese was to stop the looting and then they made sure the waterworks, gas and electricity workers would report to work. After that they drowned or machine gunned large numbers of Chinese. Massacres continued for most of the first week. The number of victims is estimated to have been between 5,000 and 25,000. Mass killings stopped after the first two weeks. Beatings, torture, arrests, degradation and some killings continued. Brutality was common. Those arrested often did not know why. Diseases, hunger, food shortages and malnutrition were part of daily life.

Japan surrendered formally on 15 August 1945, but the official announcement was made in Singapore only on the 21st. British warships arrived on September 5th and on the 12th of that month five Japanese generals and two admirals went up the steps of the municipal building and surrendered formally to Admiral Lord Louis Mountbatten, Supreme Allied Commander in South East Asia. The very same Union Jack which came down in 1942 (and remained hidden during the occupation) was hoisted over the city. This meant that the nightmare was over for most Singaporeans (for more details about the Japanese occupation of Singapore see Turnbull 1977 from which I summarized information for this short account). But, "... in the interest of science, one must distinguish carefully between the 'Japanese' of popular conception and the Japanese men of science who in Malaya, at least, endeavoured to serve science with impartiality" (Corner 1946).

Koriba, a Japanese man of science, arrived in Singapore in December 1942, almost a year after the surrender, and took charge of the Botanic Gardens and the forest reserves. He had just retired from the Chair of Botany and as Dean of the Science Faculty at Kyoto University. Professor E.J.H. Corner who had close contacts with Koriba both during the occupation and after the war has suggested that the prospect of tropical research must have appealed to the botanist, traveller, explorer, naturalist and philosopher in Koriba (Corner 1981). He was in good health on his retirement and had "... a remarkable flow of spirits. His retirement from the professorship meant the start ... [of] ... a still greater field of activity ..." (Asida 1943) which included a major research project (Koriba 1957), botanical excursions throughout Singapore and scientific discussion with other botanists (Corner 1981).

On arriving at the Gardens Koriba first learned about the workings of the office. Having done so he delegated the task to clerks. He also learned about the Library, Herbarium and scientific policies "... for he wished to continue along the same lines" (Corner 1981). Koriba was given the rank of Brigadier General, but wore his uniform only on ceremonial occasions (Holtum 1958) and detached the sword except when required to wear it by official circumstances. He was also given a revolver and shown how to use it. However he left the gun on his desk where no one else touched it either. Koriba simply devoted himself to his administrative duties at the Gardens and to botanical studies (Holtum 1958).

As Director of the Botanic Gardens Koriba was dependent on the military for funds and various supplies and made every effort to secure whatever amenities were possible for the staff. Even under the military rule Koriba "... was on the side of Nature and science ..." (Ashida 1958) and took "... energetic action to prevent

encroachment on the Nature Reserves of Singapore in which he took great interest" (Holttum 1958). He also took great pains to maintain the Herbarium and Library intact (Holttum 1958). As a result Koriba was well liked by his staff and workers. When Garden wages were very low in 1944, staff and labourers could get better pay working for the military, but they did not leave the man they called "*orang yang baik sakali*" (the perfect gentleman). Nor did they pilfer the cigarettes he left on his desk when going home at 3:30 pm daily with a handkerchief full of books and a briefcase loaded with notes. Koriba found a unique use for cigarette packages in that he made cards from them. He used these cards to make notes for future books. Notes on such cards and an incomplete manuscript on plant physiology, ecology and evolution remained in the Hirosaki University President's Office following Koriba's death (S. Chiba, personal communication).

Prof. Koriba's intervention saved the lives of those who remained in the Gardens. Holttum and Corner resumed their work. Much less fortunate were 49 other members of the staff, including J.C. Nauen, Assistant Curator of the Gardens from 1935 to 1939 and in charge of the Waterfall Gardens in Penang between 1939 and 1941. They were sent to work on the Siam-Burma Railway where 22 of them lost their lives and Nauen died as a result of blood poisoning in October 1943 (Anonymous 1947; Tinsley 1983). When the food shortages in Singapore became acute Koriba or Dr. Yata Haneda, Director of the Museum invited Corner and Holttum for lunch after the Sunday excursions to make sure they had at least one good meal a week. One can imagine Koriba at these lunches by looking at a photograph of him taken in November 1956 (Fig. 8). During these lunches or at other times Koriba never spoke of the war (Corner 1981).

Probably as a result of such actions confidence in Koriba never waned (Corner 1981) and in turn he stayed in Singapore to the very end even though he could have left earlier. His last message to Prof. Corner at that time was dated 28 August 1945 and read in part (Corner 1981):

"Dear Dr. Corner,

I leave now the Gardens . . . I regret very much that the Gardens and the Forest Reserves were disformed and contaminated lately, though it was inevitable for me at present. . . .

Hoping that the Gardens will flourish forever!

Best regards to Dr. Holttum. . . .

Kwan Koriba"

On 29 September 1957 shortly before his death he wrote to Corner from Hirosaki: "I feel urgent necessity to preserve natural forests of the tropical regions." Koriba clearly had a special relationship with Corner (Fig. 9). I think that theirs was a warm relationship between two people who liked and admired each other as people and scientists. Corner described it best by writing (Chiba 1984a, 1984b):

"In the footsteps of Kwan Koriba

his one-time enemy

his adopted son

his admirer

E.J.H. Corner

Em. Professor of Tropical Botany

University of Cambridge

23 Oct. 1983"

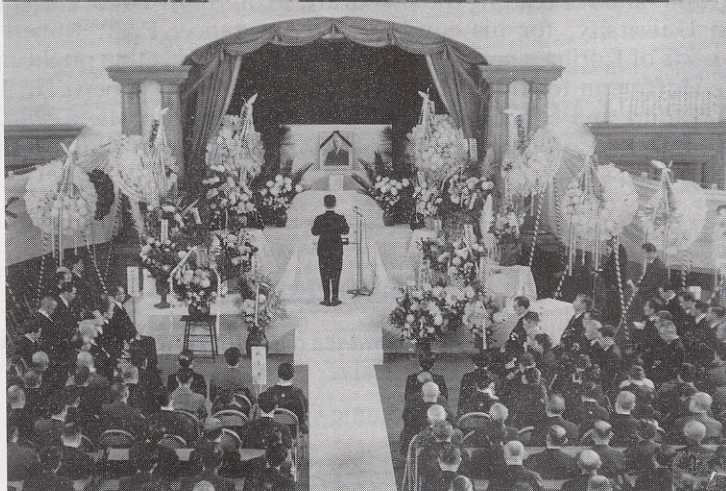
Koriba died ten weeks after his last letter to Corner. His funeral was held in University Hall, Hirosaki University on December 21 1957 (Fig. 10), and the "... beloved son of Mt. Hakkoda" is interred in the family graveyard which "faces Mt. Hakkoda, on the slopes of which the great botanist was brought up" (Ashida 1958).



8



9



10

Fig. 8-10. The last years and the aftermath. 8. Prof. Koriba at meal time in November 1956. 9. Professor E.J.H. Corner and Mrs. Helga Corner in front of Prof. Koriba's photograph (which is displayed among the photographs of other Presidents of Hirosaki University) in October 1983. 10. Funeral rites for Prof. Kwan Koriba held on 21 December 1957 in University Hall, Hirosaki University (courtesy Prof. Shigeo Chiba).

Prof. Koriba's life was devoted to science and education and he had the ability to inspire all those who came into contact with him (Ashida 1958). "He was a man that commanded respect by his simplicity of life and unfailing devotion to duty, his very broad scientific outlook, and also by his sympathetic understanding of human nature, an understanding that transcended racial boundaries, even in times of war and of privation" (Holttum 1958).

In one of his letters to me Prof. Ueyama wrote: "I always think: We must become humanist[s] through the hard training of Academic study. I learned this from Holttum, Corner and Koriba in Kew and Kyoto." Prof. Ueyama's thought is noble and I keep thinking that under the circumstances in Singapore during the Japanese occupation the lesson in humanism was taught by a devoted and great teacher, the Perfect Gentleman, Brigadier General Professor Kwan Koriba, one of the illustrious Directors of the Botanic Gardens.

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Materials and Methods

Sand was loaded onto a fine sieve and washed continuously with tap water to rid soluble salts, alkali, clay and other colloidal materials. Sand free of fine particles was washed several times with 1N HCl to remove adsorbed ions of alkali and rinsed with deionised water to remove all residual acid. Plastic pots, approximately 20 cm in diameter and 25 cm deep, were packed with the treated sand.

Twelve ten-year-old *Hibiscus* plants about 1 m tall were selected. The root systems were washed carefully and washed free of all soil contaminants. After rinsing with deionised water, they were transplanted into the pots of sand. The potted plants were kept in the shade for a few days before being exposed to full sun in an