

**ORCHIDS OF THE SOUTHERN CONE (1830–2000) – PART III.
KARL FRIEDRICH REICHE’S *ORCHIDACEAE CHILENSIS*
AND A COMMENTARY ABOUT FRIEDRICH WILHELM LUDWIG
KRAENZLIN’S *ORCHIDACEARUM GENERA ET SPECIES* (VOL. 2, PART I)**

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ABSTRACT. Karl Reiche (1860–1929), a German botanist, arrived in Chile in 1889 as a professor at the Lyceum in the city of Constitución. He was attracted by the country’s climate and its traditional friendliness to German immigrants. A few years later, in 1897, Federico Philippi, Director of the Museo Nacional de Historia Natural, welcomed Reiche as the new Head of the Botanical Section, a position he held until 1910. During his 21 years in Chile, Reiche worked intensively on the Chilean flora and was a prolific writer. Besides six volumes of the *Estudios críticos de la Flora de Chile* (1896–1911), several editions of Reiche’s Plant Geography of Chile were published (1907, 1934–1937, 2013), a magnificent essay on Chiles’ Orchidaceae, *Orchidaceae Chilensis* (1910, reprint 2007), and several other minor works. On Reiche’s suggestion, The Museo Nacional engaged Friedrich Kraenzlin (1847–1934) to write a treatment of the orchids of the Southern Cone. It was published in 1904 as the second volume of *Orchidacearum Genera et Species*. This work was widely criticized by many botanists, including Reiche himself.

Keywords / Palabras clave: Karl Reiche, Friedrich Kraenzlin, Federico Philippi, Museo Nacional de Historia Natural de Chile, National Museum of Natural History of Chile, Orchidaceae.

“No product of those provided by the fertile Chilean soil to its enthusiastic investigators, seemed worthier to me to salute the country on the Centenary of its Independence than the Orchids, whose tender and showy flowers shine in its fields and mountains. The National Museum has understood that it was its duty to offer to the sons and daughters of this country a detailed study of these still little-known plants, to contribute, in turn, even modestly, to exalt the Chilean name.”

(Karl Reiche, in the introduction to his *Orchidaceae Chilensis*, 1910)

“One morning in 1897 at the Quinta Normal, Santiago: The Director of the Museo Nacional de Historia Natural, Federico Philippi welcomes the new German botanist responsible for taking the reins of the botanical section, Dr. Karl Reiche. He has been committed to maintain the National Herbarium, promoting exchanges, analyzing, increasing, and organizing the collections of the Herbarium” (Moreira Muñoz 2011).

Karl Friedrich Reiche (1860–1829) (Fig. 1), known in Chile as Carlos Reiche, was born in Dresden, the capital of the former German Kingdom of Saxony. Little is known about his early years except

that he went to the Gymnasium in Chemnitz where he participated in many excursions organized by his natural sciences professor. In 1882 he continued his studies in the nearby city of Leipzig, where he earned his doctorate in 1885.

In 1886, Reiche became a high school professor in Dresden. He remained there until 1889, when he received an offer by the Chilean government to teach mathematics, physics, natural sciences, and illustration at the recently founded lyceum in Constitución, in Chile’s central region of Maule (Fig. 2–3) (after Gunckel 1961). Reiche had applied without success for a position as a university professor in Dresden and



FIGURE 1. Karl Friedrich Reiche (1860–1929), in Ross, 1929: frontispiece.

was motivated to travel to South America, especially attracted by the rich diversity of the Chilean flora and the country's German-friendly population (Ross 1929).

From the moment he set foot on Chilean soil Reiche was drawn to the study of its local flora, to which he would dedicate the next twenty years of his life. He undertook numerous excursions throughout the country, not only collecting specimens but also conducting investigations for his future publications. Among others, Reiche went on botanical expeditions in 1896 to the rivers Manso and Palena (Fig. 4), in the south, and explored Caldera (Fig. 5), Paposo, and the Camarones and Vitor rivers in the north, several photographs of Chilean vegetation were taken during Reiche's excursions and published in 1904 in his *Grundzüge der Pflanzenverbreitung in Chile* (Fig. 6–7).

In 1897, Reiche moved to Santiago (Fig. 8) and took up the position as Director of the Botanical Section of the National Natural History Museum.

“Chilean botanical knowledge showed still many gaps, in spite of the great achievements of Claudio Gay and R. A. Philippi, this latter the father and mentor of the Museum's Director Federico Philippi” (Moreira Muñoz 2011).

Karl Reiche is considered as one of the foreign botanists to whom Chile is profoundly in debt for his botanical studies. He had studied the ample collections contained in the Museum, including those of Claudio Gay, Bertero, R. Philippi and his son Federico, working during more than 14 years to systematize, revise and add the necessary information that finally encompassed the six volumes of the *Flora de Chile*, published first as *Estudios Críticos de la Flora de Chile*, in the *Anales de la Universidad de Chile* and edited later as a separate text with the title *Flora de Chile* (Jaksic *et al.* 2012) (Fig. 9). Reiche published six volumes of this work between (1896–1911) with the help of F. Philippi and F. Johow, but it was never completed, since Reiche abruptly ended his work at the Museum in 1911, when he travelled to Mexico. Reiche's manuscripts on the Chilean monocotyledons, among them the Orchidaceae, were not included in the first six volumes of the unfinished *Flora*.

One of Reiche's professors during his time in Leipzig had been Karl George Oscar Drude (1852–1933) (Fig. 10), a German botanist and plant geographer, who would later write, together with countryman Heinrich Gustav Adolph Engler (1844–1930) (Fig. 11), the famous series of fifteen phytogeographical monographies entitled *Die Vegetation der Erde* ('The Vegetation of the Earth'), in collaboration with many outstanding experts. The work was published in Leipzig between 1896 and 1923.

When Reiche was already familiar with the Chilean flora, he was asked to author a book about Chilean plant geography for Drude and Engler's series *Die Vegetation der Erde* (= The vegetation of the earth).

Reiche completed the assignment, encompassing 222 pages with two maps and several photographs (*Vegetationsbilder*) (Fig. 12), which was published in 1907 as volume VIII of this series *Grundzüge der Pflanzenverbreitung in Chile* (Moreira Muñoz 2011). This was the first (and so far, the only) plant geography of Chile. This significant effort, which highlighted the Chilean flora in a renowned publication, was only translated into Spanish 30 years later in two volumes as



FIGURE 2. Panoramic view of Constitución, ca. 1900. In *Imágenes de Chile del 1900* (Plaza V. 2013).



FIGURE 3. Street in Constitución, ca. 1900. Unknown photographer.



FIGURE 4. Port of Raul Marín Balmaceda on the delta of the Palena River. Unknown photographer.



FIGURE 5. Harbor of Caldera, *ca.* 1900. Unknown photographer.



FIGURE 6. Specimens of *Araucaria imbricata* Pav. Near Tolhuaca. Photograph by Manuel Rivera. In Reiche 1907, Fig. 6.



FIGURE 7. Karl Reiche with surveying equipment on the lower course of the Corcovado River. Photograph by Paul Krüger. In Reiche 1907, Fig. 49.



FIGURE 8. Horse carriages waiting for passengers in front of Santiago's Central Station in 1890. Unknown photographer.

FLORA DE CHILE

TOMO PRIMERO

FAMILIAS 1-50

POR EL

DR. CÁRLOS REICHE

SANTIAGO DE CHILE
 IMPRENTA CERVANTES
 BANDERA, 73
 1896

Jeografía Botánica de Chile 1934–1937, thanks to G. Looser, a botanist and notable scientific communicator.

“Reiche’s long first-hand acquaintance with the Chilean flora makes this contribution a masterpiece, and all the more since fourteen years of effort had been spent with this volume in mind” (Cowles 1909). And Moreira Muñoz and Muñoz Schick added in 2013: “This work is a monument to its author and raises him to the level of his predecessors Claudio Gay and Rodolfo Amando Philippi. It is the fundamental work on which the most modern publications on the botany of Chile would later develop, such as the *Sinopsis de la Flora Chilena* of Carlos Muñoz Pizarro (1959) and the recent *Flora de Chile*, edited by the University of Concepción (1995)” (Moreira Muñoz & Muñoz Schick 2013).

The geographic distribution of the Chilean Orchidaceae is mentioned by Reiche in detail, with the general mention that there are no epiphytic orchids in the country and that terrestrial orchids are distributed in seven genera: *Altensteinia* Kunth, *Asarca* Lindl., *Bipinnula* Comm. ex Juss., *Chloraea* Lindl., *Habenaria* Willd., *Pogonia* Juss. (= *Codonorchis* Lindl.), and *Spiranthes* Rich. Orchids are mostly found in the region comprised between Chile’s central provinces in

FIGURE 9. Title page of Reiche’s *Flora de Chile*.

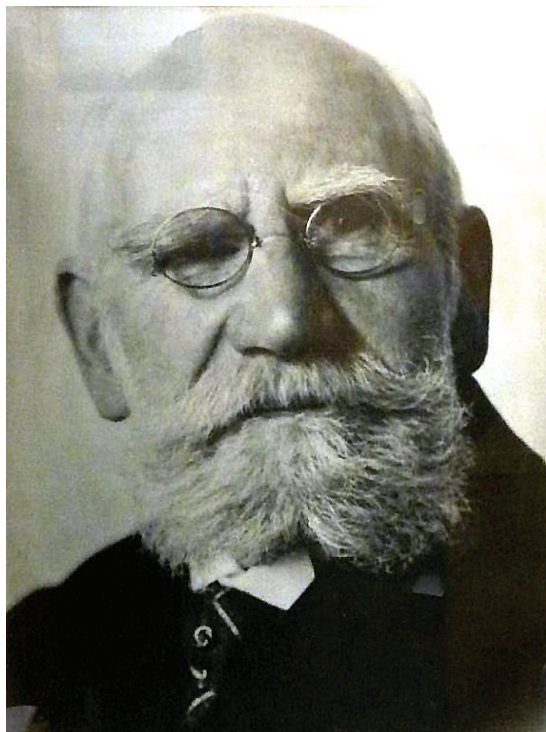


FIGURE 10. Karl Georg Oscar Drude (1853–1930). Unknown photographer.



FIGURE 11. Heinrich Gustav Adolph Engler (1844–1930). Unknown photographer.

the north (ca. 32°S), and Patagonia and the strait of Magellan in the south (Reiche 2007).

Both Drude and Engler would exert an important influence on Reiche's future work in Chile and Mexico. German botanists of the second half of the 19th century such as Oscar Drude established maps as an indispensable element of botanical observation (Güttler 2011) and Reiche would follow his former mentor closely during his later time in Chile. Reiche's interest in phytogeography became a fundamental part of his future publications (Reiche 1895a, 1895b, 1895c, 1898a, 1898b, 1903, 1907).

In 1911, after the death of Federico Philippi, Reiche had hope of being chosen to be the next director of the museum. However, the post was assigned to the professor of natural sciences Federico Fuentes. Disappointed, Reiche accepted an offer from the Mexican School of Higher Studies, as professor of botany and biology and as head of the Botanic Department of the "Instituto Médico Nacional" (Ross 1929). He returned to Germany in 1924 where he worked in Munich as a researcher at the

Staatssammlung museum. Aside from a brief return to Mexico in 1926 to complete his teaching and research, he remained in Munich and was named curator of the phanerogamic collections in the same museum (M) in 1928, the year before his death.

Reiche is commemorated in the epithet of the Hectorellaceae genus *Reicheella* Pax, as well as *Reichea* Kausel of the Myrtaceae.

KRAENZLIN'S *ORCHIDACEARUM GENERA ET SPECIES*
(volume 2, part 1, 1904)

Friedrich Wilhelm Ludwig Kraenzlin (1847–1934) (Fig. 13) was a well-known German botanist and orchidologist, closely connected to the Botanical Garden and Museum of Berlin, and with London's Natural History Museum. Kraenzlin studied chemistry and botany at Berlin and Königsberg, receiving his doctorate in 1867. He later worked as assistant to Wilhelm Hofmeister in Heidelberg and under Johannes von Hanstein at the University of Bonn. From 1872 to 1906 he was a professor and director of the botanical

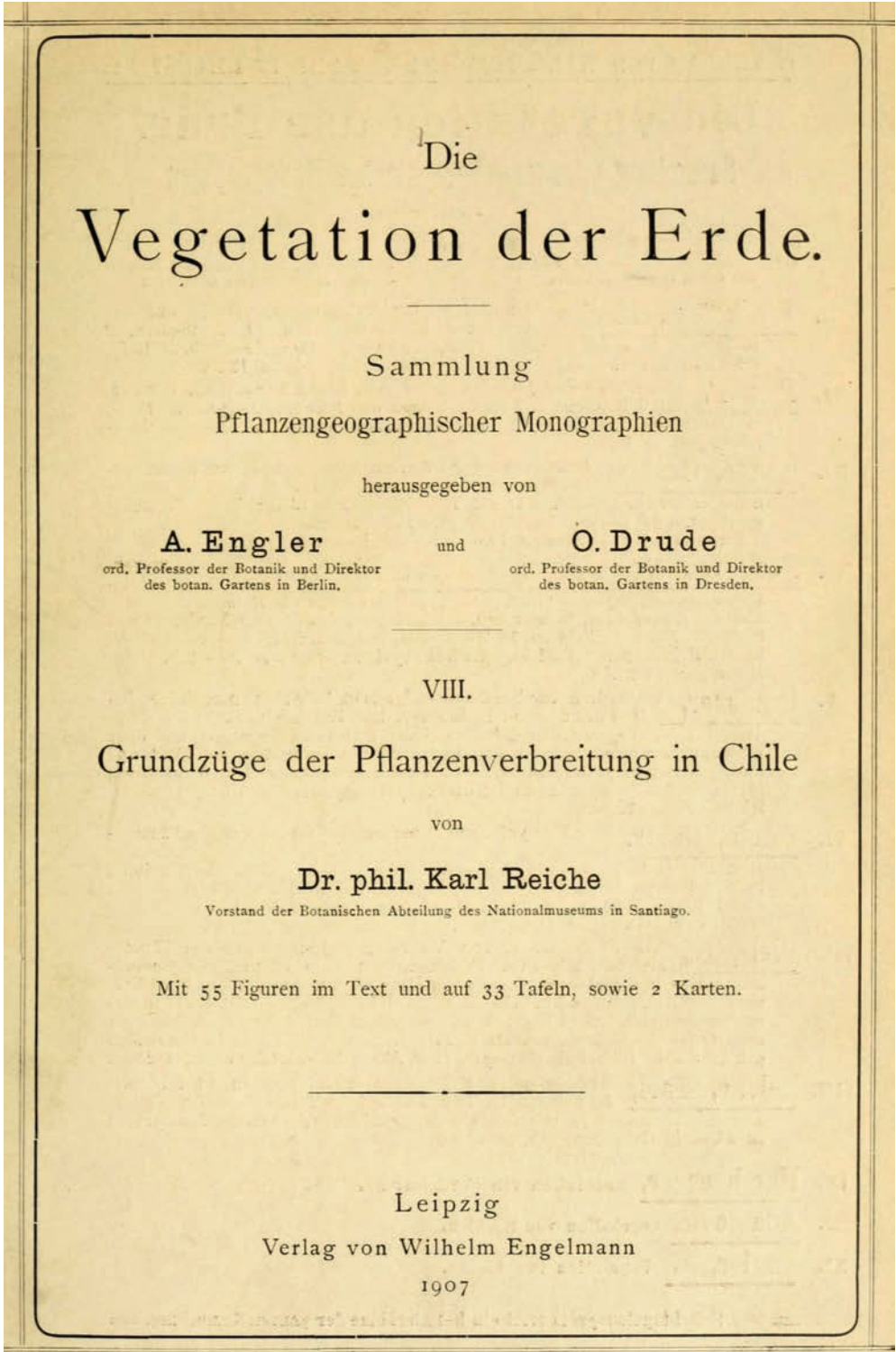


FIGURE 12. Title page of Reiche's *Grundzüge der Pflanzenverbreitung in Chile*.

garden at Heidelberg (Ossenbach & Jenny 2019). In the first edition of *Die Natürlichen Pflanzenfamilien* (= The natural families of plants), a work by Adolf Engler and Karl Prantl, Kraenzlin collaborated with Ernst Pfitzer in the treatment of Orchidaceae.

After the death of Heinrich G. Reichenbach in 1889, Kraenzlin continued with his work until the first years of the 20th century, when Rudolf Schlechter (1872–1925) took over as the leading orchidologist in the world until his own death.

In 1904, Kraenzlin published *Orchidacearum Genera et Species* (volume II, part I) (Fig. 14) which was his only direct involvement with the orchids of Chile and had its origin in an invitation from Chile's Natural History Museum. In Kraenzlin's words, "the author received from the Museo Nacional in S. Jago [sic] de Chile the commission to prepare a monograph on this group [Orchidaceae], as well as extraordinarily abundant and well-prepared material." (Kraenzlin 1897–1901, preliminary remarks to volume II). Kraenzlin limited this first part of the second volume to the Neottiinae, Chloraeae and the Monandrae, treating the genera *Asarca* Lindl., *Bipinnula* Commers., and *Chloraea* Lindl.

Kraenzlin illustrated his work with 16 plates, which show, with few exceptions, only the labellum of each species (Fig. 15). His illustrations were, however, often criticized, by Reiche among others. "Of even greater importance in the charges formulated against this book are that the labella do not always correspond to the respective illustrations. Although admitting that the contour of the labellum is sometimes variable, I will have to demonstrate that the same object, drawn by Kraenzlin, does not correspond to the illustration prepared by myself with help of the prism." (Reiche 1910). F.A.S. in 1970 views Kraenzlin's work again from a critical point of view, giving however the author the benefit of the doubt: "Kraenzlin's work was not undisputed at the time, also perhaps even at the turn of the century it had become clear that a monographic treatment of the orchids down to the species level was no longer an assignment to be undertaken by a single person" (FAS 1870).

Kraenzlin was in many regards a respectable botanist, his main weakness was therefore not a lack in preparation or general botanical knowledge, but perhaps simply the carelessness of his determinations. The

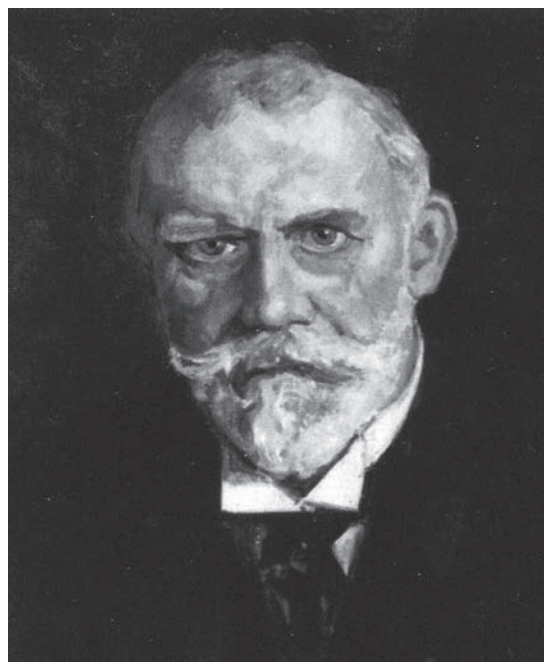


FIGURE 13. Friedrich Wilhelm Ludwig Kraenzlin (1847–1934). Courtesy of Rudolf Jenny.

condition imposed by the National Museum in Chile, that the publication should be ready as soon as possible, might have also played a negative role (Kraenzlin 1897–1901, preliminary remarks to volume II).

Rudolf Schlechter was perhaps his most severe critic. Writing to Oakes Ames on September 12, 1910, he gave his opinion on Kraenzlin's monograph of *Dendrobium*: "I am very curious to see what Kraenzlin's monograph of *Dendrobium* will be like; from what I see in the Berlin Herbarium in the way of his determinations there will be quite a lot of ridiculousness in it and this work will be the crown of foolishness in a man who really has not given a single usable work to science in spite of his long years of work. Sometimes it almost appears to me as if he is not actually determining his plants, but raffling them out." And Ames was equally critical. On December 4, 1910, he replied to Schlechter on the same subject: "I have just received Dr. Kraenzlin's monograph of *Dendrobium*. I have not yet put it to the test, but in several places, I have detected errors which are unpardonable and in every way avoidable" (Ossenbach & Jenny 2019).

Another reason to mistrust Kraenzlin's determinations is the fact that while Rodríguez *et al.* (2018) mention a total of 55 orchid species for Chile, Kraenzlin lists no less than 116 distinct species, among

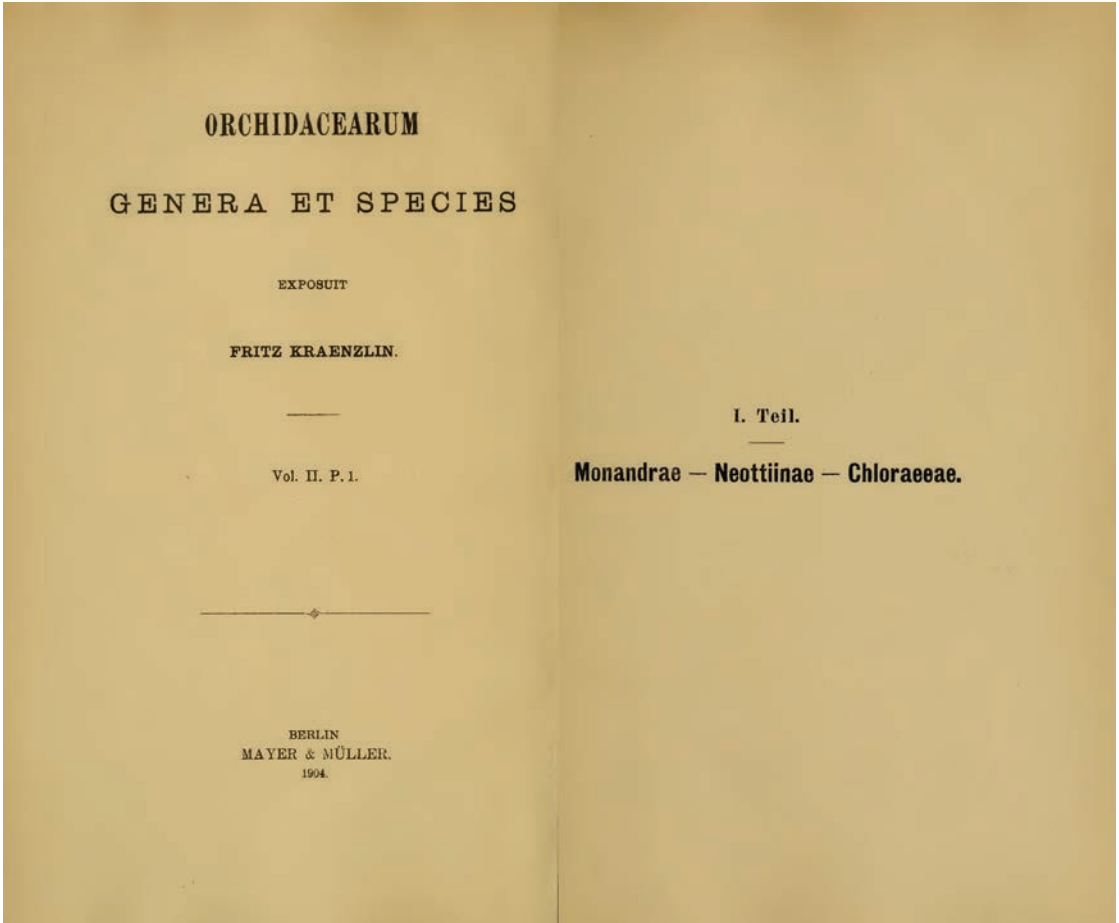


FIGURE 14. Title pages of Kraenzlin's work.

them 93 species of *Chloraea*! Table 1 lists therefore only those Chilean species which Kraenzlin considered to be new to science.

This list speaks for itself. From a total of 19 species described by Kraenzlin as new to science, only one is considered today a valid name. The rest consists of one unresolved name, and one that is found only in Argentina. The remaining 16 species were, without exception, synonyms of species described (before and after Kraenzlin) by Lindley, Poeppig, Reichenbach *filius*, R. Philippi, Correa, Hauman, and Garay and Ormerod.

Reiche's and F. Philippi's disappointment with Kraenzlin's work was so bitter, that it led Reiche to dedicate himself in depth to the orchids of Chile and to publish a few years later his own monograph on the Chilean species of Orchidaceae.

Reiche's explained his decision to publish *Orchidaceae Chilenses* (1910) describing the high hopes that had led to the National Museum's relation with Kraenzlin, and his disappointment with the results: "It is a fact, as deplorable as difficult to understand, that all publications related to the flora of Chile are deficient with respect to the orchids. Already in the first flora of Chile published by Claude Gay, the treatment of the Orchidaceae is one of the weakest. The same must be said about the most recent publication, my own *Geografía Botánica de Chile* (1907), which includes a most insufficient account of these plants. There are however few plant families which deserve such an evident neglect, since with approximately 75 species distributed in 3 genera, they play a significant role in the catalogue of the Chilean flora and the distribution of the country's vegetation.

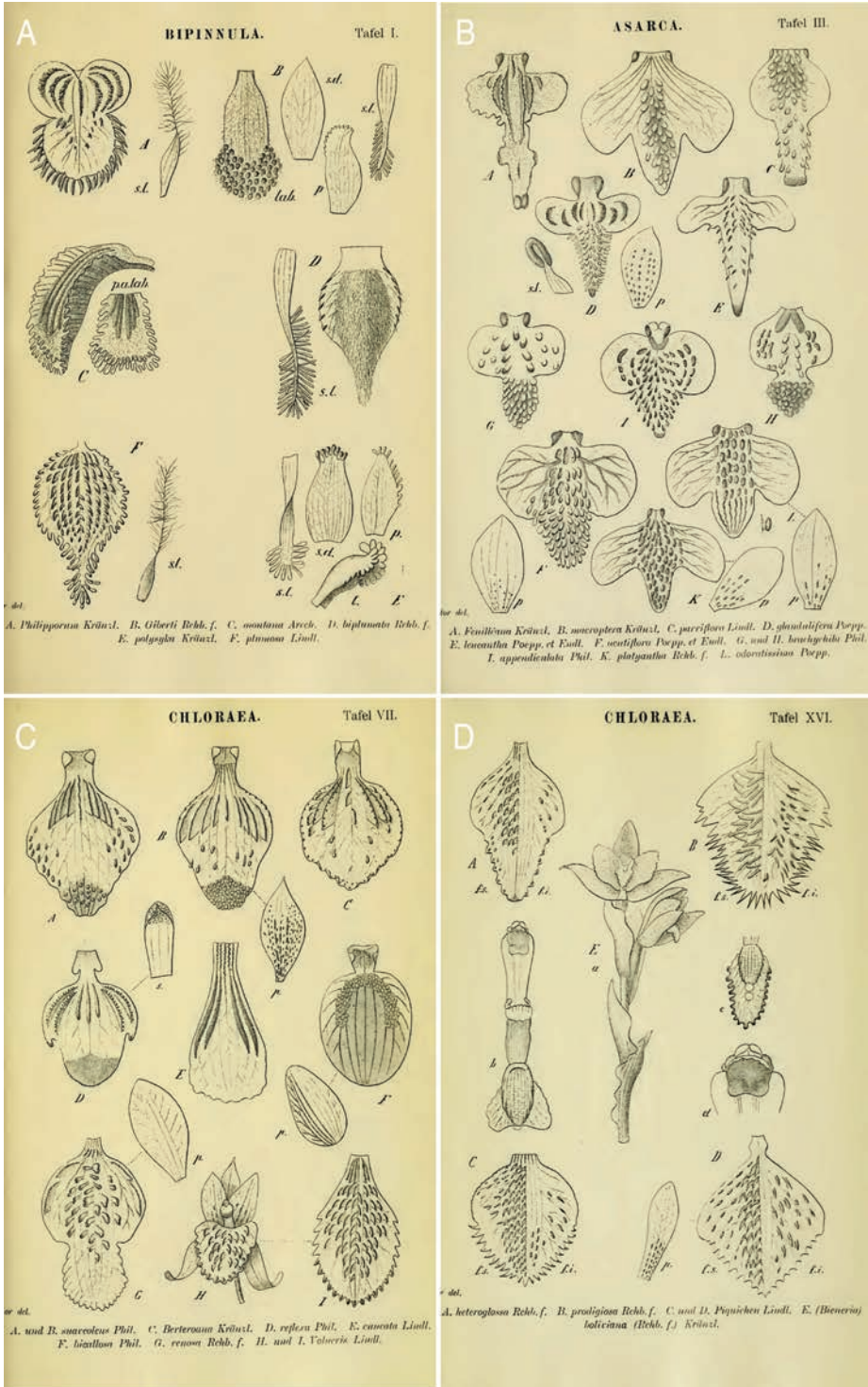


FIGURE 15. Plates in Kraenzlin's work (1897). A. Plate I (*Bipinnula*). B. Plate III (*Asarca*). C. Plate VII (*Chloraea*). D. Plate XVI (*Chloraea*).

TABLE 1. Chilean orchid species described by Friedrich Kraenzlin's in *Orchidacearum Genera et Species*, vol. II, part I which he considered to be new to science.

Name as given by F. Kraenzlin	Original collector (date)	Currently accepted name	Notes
I. <i>Chloraea</i> Lindl.	Type: Feuillée (1712–1714)	<i>Chloraea</i>	
<i>Chloraea berteriana</i> Kraenzl.	Bertero (?)	<i>Chloraea galeata</i> Lindl.	
<i>Chloraea boliviana</i> Kraenzl.	Cuming ex Rchb.f. (?)	<i>Bieneria boliviana</i> Rchb.f.	(*1)
<i>Chloraea cholilensis</i> Speg. & Kraenzl.	Spegazzini (?)	<i>Chloraea alpina</i> Poepp.	(*2)
<i>Chloraea grandis</i> Kraenzl.	(?)	<i>Chloraea bletiooides</i> Lindl.	
<i>Chloraea hemichloris</i> Kraenzl.	Neger, Spegazzini (?)	<i>Chloraea chrysochlora</i> Phil.	
<i>Chloraea hookeriana</i> Speg. et Kraenzl.	Spegazzini (?)	<i>Chloraea alpina</i> Poepp.	
<i>Chloraea johowiana</i> Kraenzl.	(?)	<i>Chloraea johowiana</i> Kraenzl.	(*1) (*4)
<i>Chloraea leucjiliflora</i> Kraenzl.	Antonio de Solís (?)	<i>Chloraea nudilabia</i> Poepp.	(*1)
<i>Chloraea liliacea</i> Kraenzl.	(?)	<i>Chloraea longipetala</i> Lindl.	
<i>Chloraea modesta</i> Kraenzl.	Philippi (?)	<i>Chloraea philippi</i> Rchb.f.	
<i>Chloraea praecincta</i> Speg. & Kraenzl.	Spegazzini (?)	<i>Chloraea praecincta</i> var. <i>intermedia</i> Hauman	(*3)
<i>Chloraea pseudocampes-tris</i> Kraenzl.	(?)	<i>Chloraea multiflora</i> Lindl.	
<i>Chloraea reicheana</i> Kraenzl.	(?)	<i>Chloraea longipetala</i> Lindl.	
<i>Chloraea stenantha</i> Kraenzl.	(?)	<i>Chloraea multiflora</i> Lindl.	
<i>Chloraea trachysepala</i> Kraenzl.	(?)	<i>Chloraea trachysepala</i> Kraenzl.	(*5) (Fig. 16)
II. <i>Asarca</i> Lindl.	Types: <i>Asarca</i> Pavón (1782–1783) (<i>Chloraea pavonii</i>) <i>Chloraea</i> Feuillée (1712–1714) <i>Gavilea</i> Poepp (1833)	<i>Chloraea</i> Lindl. and <i>Gavilea</i> Poepp.	
<i>Asarca feuilleana</i> Kraenzl.	(?)	<i>Gavilea venosa</i> (Lam.) Garay & Ormd.	
<i>Asarca macroptera</i> Kraenzl.	(?)	<i>Gavilea litoralis</i> (Phil.) M.N. Correa	
III. <i>Bipinnula</i> Comm. ex Juss.	Type: Commerson (1767–1768)	<i>Bipinnula</i> Comm. ex Juss.	
<i>Bipinnula philipporum</i> Kraenzl.	(?)	<i>Bipinnula plumosa</i> Lindl.	
<i>Bipinnula volkmanni</i> Kraenzl.	(?)	<i>Bipinnula volkmannii</i> Kraenzl.	(*6) (Fig. 17)

Notes: Rodríguez *et al.* (2018), as the most recent work on the flora of Chile, has been used as the main reference for the names of Kraenzlin's orchids as accepted today. Correa (1956, 1969), Novoa *et al.* (2006), Chemisquy (2012), and Bravo-Caballero *et al.* (2014) are indicated in the Literature section as other bibliographical references.

(*1): Only listed in the Tropicos database of the Missouri Botanical Garden (TROPICOS) and the International Plant Name Index (IPNI)

(*2) Carlo Luigi Spegazzini (1858-1926, Argentinian botanist.

(*3) Today only accepted for Argentina.

(*4) Unresolved name.

(*5) Considered a doubtful species by Correa (1969).

(*6) Kraenzlin's determination and name is valid today.



FIGURE 16. A variation of *Chloraea gaviu* Lindl. Photograph by Christian Romero.

The reason for this sad omission lies in the difficulty to describe these plants from dried herbarium specimens, and to recognize living specimens on the base of the materials in our museums. Only the cooperation between a resident researcher and a specialist related to the European museums could solve this problem.

Guided by these considerations, and having spent long years studying the local flora, in 1899 I proposed professor doctor F. Kraenzlin [Friedrich Wilhelm Ludwig Kraenzlin (1847–1934)], a reputed orchidologist from Berlin, to review the Chilean orchids based on herbarium specimens, while I personally would undertake the necessary complementary studies. The direction of the National Museum, in just appreciation of the evident necessity of such a work, had no objection to supply [Kraenzlin] with a vast collection, selected among the material that had accumulated in the Museum since 1850. This collection was enriched with drawings and watercolors from the skilled hands of R. Philippi and with ecological data resulting from my own studies.



FIGURE 17. *Bipinnula volkmannii* Kraenzl. Photograph by Diego Reyes Arellano.

As the result of the investigations on said material and a precedent work prepared by him during the years 1901 and 1902 based on specimens from Argentina and Uruguay, Kraenzlin published in Berlin in 1904 *Orchidacearum genera et species*. Vol. II p. I: *Monandrae, Neottiinae, Chloraeae*” (Reiche 1910).

Reiche explained: “Herewith [Kraenzlin’s publication] we had seemingly reached our desired goal of possessing a monograph on the Chilean orchids which would serve as a solid base for future studies” (Reiche 1910).

But Reiche’s and Philippi’s hopes soon turned into frustration. “Various attempts by Philippi and myself to classify the orchids during our expeditions with the help of this book led to a revision of Kraenzlin’s work which revealed so many errors in the analytical keys as well as in the geographical indications -without speaking of the horrendous spelling of the names of the localities- that with great sentiment we were left with serious doubts about the usefulness of this book [...].

It is equally interesting to observe that Kraenzlin's monographs on the orchids of the genus *Habenaria* (Kraenzlin 1892, 1897) again failed to provide a clear determination of the Chilean specimens.

On the other side, Dr. Kraenzlin's work has some undisputable merits, especially his arguments against the alleged synonymy of the genera *Asarca* and *Chloraea*, still proclaimed by Pfitzer (Pfitzer 1889) [Lindley, 1830–1840, had disputed the validity of *Asarca* on the basis on insufficient evidence to separate it from *Chloraea*. Correa (1956) and Chemisquy returned to Lindley's argument, transferring several species of *Asarca* back to *Chloraea* and a few others to *Gavilea*. Since then, it is widely accepted that *Asarca* is not valid as valid genus].

With this all but flattering results I began in 1907 a careful study of the orchids of Chile, expecting to describe them in the fifth volume of the *Flora de Chile*. I made in part use of course of Dr. Kraenzlin's work. But to avoid the errors of that author, I analyzed again all the vast material that had been revised by Kraenzlin [...]. The systematic part of this work [*Orchidaceae Chilenses*] is based on this research" (Reiche 1910).

KARL REICHE'S ORCHIDACEAE CHILENSES (1910)

Already in his early years in Chile Reiche had been attracted by the orchids of his adoptive country. A few types of new orchid species collected by Reiche are kept at the National Museum in Santiago, and other specimens at the Harvard University Herbaria, all dated between 1872 and 1897 (Muñoz Schick 1971): *Asarca cardioglossa* Phil. ex Reiche (Fig. 18–19), *Asarca grandulifera* var. *illapelina* Reiche, *Chloraea leptopetala* Phil. ex Reiche, and *Chloraea viridiflora* var. *reticulata* Phil. ex Reiche. One additional orchid species, *Asarca littoralis* was later described by Reiche based on *Chloraea littoralis* (Phil.).

Reiche's *Orchidaceae Chilenses* remained as the most reliable reference work on Chilean orchids for some fifty years. A total of 75 different species in seven genera from Chile were described. Most of the Chilean genera and species were not revised until many years later, by Correa (1956, 1969), Novoa *et al.* (2006), and Rodríguez *et al.* (2018). The number of accepted Chilean species dropped from Kraenzlin's 135, to 75 by Reiche, 53 by Novoa *et al.* (2006) and climbed slowly to 54 in Rodríguez *et al.* (2018) as shown in Table 2.

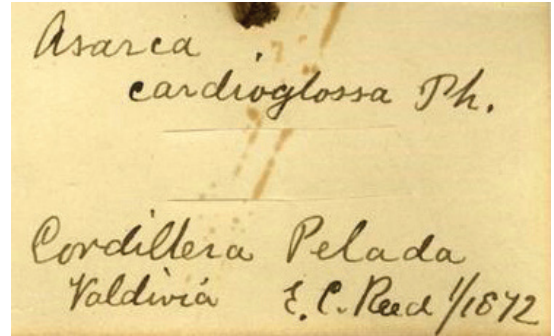


FIGURE 18. *Asarca* (= *Gavilea*) *cardioglossa* (Reiche) Mart. Specimen label at HUH 00217892.

This table is again an example of the well-known fact that while in the epiphytic world of tropical orchids dozens of new species are discovered and described every year, it often takes decades until a new species is found among the subtropical terrestrial orchids (Ossenbach & Jenny 2021).

Karl Reiche made a careful revision of all previous studies and herbarium specimens of Chilean orchids kept at the rich herbarium of the Natural History Museum. He went far back, to include orchids collected by Feuillée, Commerson, Bertero, Cuming, and those described by Gay and both father and son Philippi. But Reiche gave far more importance to the study of plants in the field. In his well-known work "*Método para el estudio de la flora de Chile*" (= Method for the study of the flora of Chile), published in 1894, he laid out the methods with which he had approached his study of the botany of Chile: "Whatever the purpose when studying the flora of a country, the fundamental problem will always be present and has to be approached immediately: the analysis and classification of the genera and species which are peculiar [to a particular region]. The method required for this purpose is to explore the country in all directions and in all seasons, to collect consciously whatever plants that can be found. As can be seen, this occupation demands more passion and interest than a thorough study of the botanical sciences. However, for the classification of all collected specimens, one needs not only a certain knowledge of the vegetal system and the morphology but have at hand the resources of libraries and museums" (Reiche 1894).

Reiche had to be particularly careful, since he was not an orchid specialist and his main interest was never the discovery of new species, but to bring order and



FIGURE 19. *Asarca* (=Gavilea) *cardioglossa* (Reiche) Martic. In Chemisquy 2012, fig. 6.

TABLE 2. Chilean orchid genera and species as accepted by different authors between 1904 and 2018. Names of genera and (in parenthesis) number of species.

Kraenzlin <i>Orchidacearum genera et species</i> (1904)	Reiche <i>Orchidaceae Chilenses</i> (1910)	Novoa <i>et al.</i> <i>Guía de campo de las orquídeas chilenas</i> (2006)	Rodríguez <i>et al.</i> <i>Catálogo de las plantas vasculares de Chile</i> (2018)
<i>Bipinnula</i> Commers. (8)	<i>Bipinnula</i> (3)	<i>Bipinnula</i> (5)	<i>Bipinnula</i> (5)
<i>Asarca</i> Lindl. (15)	<i>Asarca</i> (11)		
<i>Chloraea</i> Lindl. (93)	<i>Chloraea</i> (50)	<i>Chloraea</i> (31)	<i>Codonorchis</i> (1)
	<i>Altenstenia</i> Willd.: (1)		
	<i>Habenaria</i> Willd. (8)	<i>Habenaria</i> (1)	<i>Chloraea</i> (26)
	<i>Pogonia</i> Juss. (1)		
	<i>Spiranthes</i> L. (1)		<i>Habenaria</i> (1)
	<i>Codonorchis</i> Lindl. (3)	<i>Aa</i> Rchb.f. (1)	
		<i>Brachystele</i> Schltr. (1)	<i>Brachystele</i> (1)
		<i>Codonorchis</i> (1)	
		<i>Gavilea</i> Poepp. (13)	<i>Gavilea</i> (17)
			<i>Myrosmodes</i> Rchb.f. (1)
			<i>Ulantha</i> Hook. (2)
			<i>Correorchis</i> Szlach. (1)
Total: 3 genera with 116 species	Total: 8 genera with 78 species	Total: 7 genera with 53 species	Total: 9 genera with 55 species

clarify the endless synonymy produced during the last century (and brought to its climax by Kraenzlin in 1904) and which encompassed a large part of the orchids of Chile, from the genus to the species and varieties level. The final purpose of *Orchidaceae Chilenses* was to serve both as a monograph of this plant family in Chile, and as a field guide for future explorers of the rich Chilean flora.

Reiche's work was widely accepted by the botanical community, but perhaps the most important compliment was that of Rudolf Schlechter. In the introduction to his well-known series about the orchid floras of the South American Andean countries, he wrote: "Since not too long ago a very useful orchid flora of Chile was published by K. Reiche, I have decided not to go again into an enumeration of the orchids of this country, especially since nothing of importance can be added." (Schlechter 1919).

Although Reiche's importance in the history of Chilean botany can never be denied, he was not a particularly gifted illustrator. *Orchidaceae Chilenses*

shows several anatomic details of orchids, concentrating on lineal drawings of petals, sepals, and labella, and two plates at the end of the book with coloured illustrations of a total of 18 orchid flowers. The reprint in 2007 of Reiche's shows slightly improved lineal drawings (Fig. 20–21). The color illustrations illustrate the following orchid species: *Asarca sinuata* Lindl., *Chloraea ulantheidoides* Lindl., *Asarca odoratissima* Poepp. & Endl., *Chloraea galeata* Lindl., *Chloraea multiflora* Lindl., *Chloraea cylindrostachya* Poepp., *Chloraea fonckii* Phil., *Chloraea disoides* Lindl., *Chloraea grandiflora* Poepp., and *Chloraea nudilabia* Poepp. in Plate I (Fig. 20); and *Chloraea crispa* Lindl., *Chloraea cristata* Lindl., *Chloraea cygnaea* Phil., *Chloraea chrysantha* Poepp., *Spiranthes diuretica* (Willd.) Lindl., *Habenaria paucifolia* Lindl., *Bipinnula plumosa* Lindl., and *Pogonia lessonii* Rchb.f. in Plate II (Fig. 21).

Reiche is remembered in the following orchid names: *Chloraea reicheana* Kraenzl. (Fig. 22) and *Microstylis reichei* Schltr. (from Mexico).



FIGURE 20. Plate I of *Orchidaceae Chileses* (original). 1. *Asarca sinuata* Lindl. 2. *Chloraea ulanthoides* Lindl. 3. *Asarca odoratissima* Poepp. & Endl. 4. *Chloraea galeata* Lindl. 5. *Chloraea multiflora* Lindl. 6. *Chloraea cylindrostachya* Poepp. 7. *Chloraea fonckii* Phil. 8. *Chloraea disoides* Lindl. 9. *Chloraea grandiflora* Poepp. 10. *Chloraea nudilabia* Poepp.

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FIGURE 21. Plate II of *Orchidaceae Chilenses* (original). 1. *Chloraea crispa* Lindl. 2. *Chloraea cristata* Lindl. 3. *Chloraea cygnaea* Phil. 4. *Chloraea chrysantha* Poepp. 5. *Spiranthes diuretica* (Willd.) Lindl. 6. *Habenaria paucifolia* Lindl. 7. *Bipinnula plumose* Lindl. 8. *Pogonia lessonii* Rchb.f.

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FIGURE 22. *Chloraea reicheana* Kraenzl. as *Chloraea longipetala* Lindl. Photograph by Jason Hollinger.

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