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Autor: Dowe, John L. / Appelhans, Marc S. / Bräuchler, Christian
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Part I

Introduction

Hermann Wendland (11 October 1825–12 January 1903), then court gardener of the Royal Gardens of Herrenhausen near Hanover (Fig. 1), undertook a botanical expedition to Central America from December 1856 to August 1857 under the auspices of Georg V, King of Hanover. The primary aims of the expedition were to collect living plants and other propagating materials for the Royal Gardens as well as specimens for the Herrenhausen herbarium. Wendland was among a few European botanical collectors who were active in Central America in the decades of the mid-nineteenth century. By this time, the great gardens and botanical institutions of Europe had established exotic plant collections to enhance their prestige and scientific knowledge, and the exploration of foreign countries resulted in an accelerated stream of new species to horticulture and to science. Accompanying this was an increase in taxonomic research of the new floras. There were usually integrated facets of scientific, political and commercial imperatives involved in the expeditionary ventures to foreign lands by European countries.

The most significant scientific collectors who immediately preceded or were contemporaries of Wendland in Central America included George Ure Skinner (fl. 1831–67), Emmanuel von Friedrichsthal (fl. 1839–40), Józef von Warszewicz (fl. 1845–50), Anders Sandøe Ørsted (fl. 1846–48), Moritz Wagner (fl. 1852–55), Karl Ritter von Scherzer (fl. 1852–55), Alexander von Frantzius (fl. 1853–77), Karl Hoffmann (fl. 1854–59), Philipp J.J. Valentini (fl. 1854–72) and Julián Carmiol (fl. 1854–85) (HEMSLEY, 1888; OSSENBACH, 2009; HILJE, 2013).

Recent assessments of Wendland's activities and collections in Central America have been presented (GRAYUM et al., 2004; GRAYUM, 2006; OSSENBACH, 2007, 2009; DOWE, 2019; DOWE et al., 2019), and highlight the importance of Wendland's plant collections as type materials and especially those at GOET, where the former Herrenhausen herbarium has been accommodated since 1969 (WAGENITZ, 1972). However, the ultimate fate of Wendland's collections from Central America has only been sparsely documented, although the chronology of the taxonomic research on them can be traced with considerable precision through the literature. With digitization of Wendland's Central American collections at GOET, it became apparent that there were inconsistencies and contradictions in the typification of many of the names based on the collections. This contribution presents Wendland's Central American collections as a single body of work and we investigate the status of all known specimens with the aim of resolving taxonomic and nomenclatural issues.

The Wendlands of Herrenhausen

Hermann Wendland was the third member of the Wendland family to act in the role of court gardener at Herrenhausen. He was preceded by his father Heinrich Ludolph Wendland (1792–1869) and, before him, his grandfather Johann Christoph Wendland (1755–1828), thus creating one of the unique dynasties in European botany and horticulture (KNOLL, 2005a; PETERS, 2013; SCHWERIN, 2013; RETTICH, 2016). The botanical work of Heinrich and Johann primarily involved the description of new species based on plants cultivated at Herrenhausen, mainly originating in temperate and subtropical places (DOWE et al., 2019), whilst Hermann's interest was clearly with tropical flora and which he was able to study first-hand during the Central American expedition. In addition to his taxonomic expertise, he was a consummate horticulturist, and established at Herrenhausen some of the world's largest plant collections featuring palms, orchids, aroids, cyclanths and bromeliads. The most significant were the palms with the collection becoming the largest in the world and, because of their physical size and height, were displayed in the tallest heated glass-house in the world (DOWE & SCHLUMPBERGER, 2018; DOWE, 2019). Wendland's taxonomic work on palms was greatly facilitated by the living collection at Herrenhausen, and many species were described from cultivated specimens including species grown from living plants and seeds that were collected by Wendland during his Central American expedition.

Expedition to Central America

When Wendland traveled to Central America in 1856, he was already a recognized specialist in a number of tropical plant families because of his involvement with both the living collections at Herrenhausen and research through the herbarium and library for which Wendland had been responsible for since 1853 (PALM, 2010). Prior to the expedition, he had developed an interest in the Central American flora and described new palm species in *Chamaedorea* Willd., *Geonoma* Willd. and *Reinhardtia* Liebm. from both cultivated plants and specimens collected earlier and deposited at Herrenhausen (WENDLAND, 1852a–c, 1853a–f, 1854a, 1856). His interest in bromeliads resulted in the description of two species, *Billbergia viridiflora* H. Wendl. and *Tillandsia erubescens* H. Wendl. [= *T. ionantha* Planch.] (WENDLAND, 1854b), both of which were described from plants in cultivation at Herrenhausen. Although he had also taken an interest in orchids, he had only described *Trichopilia albida* H. Wendl. up to the time of the expedition (WENDLAND, 1851). This was also described from a cultivated plant. Other species in most of these families were subsequently described throughout his career, although the palms became his predominant speciality with about 550 names eventually associated with Wendland as author during his career (DOWE, 2019). Wendland is credited with establishing more currently accepted palm genera than any other botanist (TOMLINSON, 1989; DOWE, 2019).



Fig. 1. – Hermann Wendland (1825–1903), possibly early 1860s. [Cat. P90.128844] [© Collection of the Belgian Federal State, on permanent loan to the Botanic Garden Meise]

To establish his expedition to Central America on an official diplomatic basis, Wendland visited London to organize his passport through the Hanoverian embassy, allowing for disembarkation in Guatemala. His passport was issued on 15 November 1856 and it is of interest to note that his personal description included the following details: 29 years old, 5' 9" tall, medium build, oval face, blue eyes, brown hair, brown beard and damaged teeth (KGBH, 2021a). According to information held in the Königliches Hausarchiv der Welfen, the cost of Wendland's expedition was approximately 3,000 Reichsthaler (H. Rettich, pers. comm.). This converts to an estimated 75,000 Euros in modern currency value.

The funding of Wendland's expedition was provided by the Hanoverian Royal family, seemingly under the direct auspices of King Georg V. There are no known explicit records about Georg V's motivation to finance Wendland's journey to Central America, but it appears that there was an expectation that income or recompense would be derived from the sale, or exchange, of

rare or unusual plants that Wendland had collected, and that were distributed or sold through Herrenhausen Gardens. This is indicated by a series of three letters (MALORTIE, 1855–1860). In the first, from Baron Ernst von Malortie (Oberhofmarschall, i.e. Chief Minister of Hanover) to Wendland in October 1859, in which Wendland is instructed to present a synopsis of the benefit that resulted from the exchange of plants collected in Costa Rica with other gardens. It needed a second letter from the King, dated 23 July 1860, with a reminder to make Wendland respond with a third letter that included a list of 21 gardens and individuals involved with receiving Costa Rican plants, amounting to 227 species received in exchange, with an estimated value of 1,680 Reichsthaler. In addition to the gardens, such as Schönbrunn, Berlin, St. Petersburg and Kew among others, individual recipients of plants included, for example, Józef von Warszewicz in Krakau, Wilhelm Lauche in Potsdam, Antoine Chantin in Paris and horticultural firms such as the Veitch Nursery in London, Louis van Houtte in Ghent and Haage in Erfurt. Although Wendland later wrote in a letter to Ludwig Möller (see below) that he sold *Anthurium scherzerianum* Schott to the Veitch Nursery, the list of plant exchanges indicates that they recompensed the received anthuriums (and maybe other species) with plants. It is not known if the King was satisfied with the outcome of the expedition.

There are no known official reports documenting Wendland's Central American expedition or his botanical collections. However, his travel experiences were published as a series of letters written to his family, firstly in the newspaper *Hannoversche Zeitung* (WENDLAND, 1857a–d) and soon after in the horticultural periodical *Hamburger Garten- und Blumenzeitung* (WENDLAND, 1857e–i). The translation presented in Part II is of the letters that were published in *Hamburger Garten- und Blumenzeitung* which, apart from a few minor changes, are similar to those published in *Hannoversche Zeitung*. The letters have been annotated to provide both historical and plant collection context.

Wendland departed Southampton by steamship on 17 November 1856. He passed through the Caribbean in early December (Saint Thomas on 2 December and Jamaica on 6 December) and arrived in Belize on 12 December. He traveled on to Guatemala arriving on 14 December. He spent from then to 7 February 1857 in Guatemala, where he made his first plant collections on 17 December. From there, he traversed overland through El Salvador, 8 February to 6 March, and from there, by-passing Nicaragua, sailed on to Costa Rica arriving on 9 March. It is there where he spent the remainder of his time before departing for Europe in mid-August from San Juan del Norte in Nicaragua and returning via Southampton and Hamburg to Herrenhausen by 20 September 1857 (HGBZ, 1857; WENDLAND, 1857a–i; KNOLL, 2005b).

Wendland's correspondence recounts the activities of an engaged traveler, dealing mainly with day-to-day personal

encounters and incidents, weather, food and travel conditions. Although the botanical observations he included were very broad in descriptive terms, they provide insights into how Wendland collected herbarium specimens and prepared living plants for dispatch to Germany. Notifications in journals and periodicals, mainly as a running commentary, were published about Wendland's departure, proposed itinerary and eventual return to Herrenhausen, but these add little to a further understanding of his botanical activities (KOCH, 1857; MOHL & SCHLECHTENDAL, 1857; OTTO, 1857). Crucially, the most direct sources of information about his itinerary and places visited are his field-collection labels, many of which have survived and accompany the herbarium specimens (Fig. 2).

Botanical results of the expedition

There is some evidence that Wendland originally proposed to publish the botanical results of the expedition in collaboration with Prof. Friedrich Gottlieb Bartling (1798–1875) in Göttingen (ANON., 1857a). However, this never eventuated. For determination of some collections, Wendland sent specimens to George Bentham and William and Joseph Hooker at Kew (PETERS, 2013; SCHWERIN, 2013).

Wendland's specimens, mainly as duplicates or living plants, were distributed to botanists and gardens where specialist taxonomists were based; several served as original material (Fig. 3). *Araceae* were studied and described by Heinrich Wilhelm Schott (1794–1865) at the Imperial Gardens at Schönbrunn Palace near Vienna (SCHOTT, 1858, 1860, 1861, 1864, 1865); *Orchidaceae* by Heinrich Gustav Reichenbach (1824–1889) at Leipzig and Hamburg (REICHENBACH, 1863, 1865, 1866, 1874); *Gesneriaceae* by Johannes von Hanstein (1822–1880) at the Berlin Botanical Garden (HANSTEIN, 1865); and *Melastomataceae* by Alfred Cogniaux (1841–1916), who worked with specimens in his private herbarium in Belgium (COGNIAUX, 1891a, b). New species in *Arecaceae* were described by Wendland himself and his horticultural colleague at Herrenhausen, Georg Schaedler, as well as Richard Spruce (1817–1893) and William Botting Hemsley (1843–1924), who were based at Kew Gardens (WENDLAND, 1858, 1859; REGEL, 1869; ANDRÉ, 1871; SPRUCE, 1871; SCHAEDTLER, 1875a–f; HEMSLEY, 1885). After Wendland's death in 1903, more new species of palms were described from his Central American specimens by Udo Dammer (1860–1920) and Max Burret (1863–1964), both of Berlin Herbarium, incorporating notes that Wendland had made in unpublished manuscripts and specimen annotations (DAMMER, 1904, 1905; BURRET, 1930, 1934).

Pteridophytes and bryophytes were also collected by Wendland and his interest in the domain was mainly related to their potential as horticultural subjects, rather than the discovery of novel taxonomic entities. He wrote that “The ferns that I have here are splendid, and therefore not without value; they are not very big, but will soon grow into beautiful specimens as

soon as they have arrived safely over there with a bit of luck” (WENDLAND, 1857g: 363). At Paso de El Desengaño, Costa Rica, WENDLAND (1857h: 512) provided a brief summary of the fern collections, writing that he had observed “splendid ferns, both tree-like and creeping, of the latter there are beautiful forms from the genera *Trichomanes* L. and *Hymenophyllum* Sm., splendid lycopodias and selaginellas”. Of the c. 23 known collections of pteridophytes made by Wendland, nine were described as new species or subspecies mostly by KUHN (1869) and HIERONYMUS (1901, 1904). The bryophytes were only sparingly collected, and two of which were described as new species by MÜLLER (1858, 1859).

Wendland's specimens were extensively cited in a variety of floristic accounts through the late nineteenth century (POLAKOWSKY, 1879; HEMSLEY, 1882a–f; DURAND & PITTIER, 1892; TONDUZ, 1895a, b). However, it is most likely that many of the citations were second-hand and that individual authors did not examine specimens but only referenced previous treatments. Primary assessments of Wendland's itinerary in Central America and summaries of his collections have been provided by HEMSLEY (1888), TONDUZ (1895a, b), GRAYUM et al. (2004), KNOLL (2005b), OSSENBACH (2005, 2007, 2009), GRAYUM (2006), SCHWERIN (2013), DAUPHIN (2019) and DOWE (2019).

Wendland's Central American collections were more or less kept as a distinct collection in the Herrenhausen herbarium (REINER-DREHWALD et al., 2022). The reason for this is that Wendland prepared his herbarium sheets in a larger format compared to the herbarium of his father and grandfather and it was therefore not possible to merge them into the existing collection. The whole Herrenhausen herbarium was donated to GOET in 1969 and is kept as a separate collection there (WAGENITZ, 1972).

All type specimens that have been identified among the Herrenhausen specimens have recently been moved to the general type herbarium. The current digitization project of the pteridophytes at GOET has revealed that additional specimens had been moved from the Herrenhausen collection to the general herbarium at GOET in previous years. The digitization of all Wendland's Central American specimens has been completed as part of the project (REINER-DREHWALD et al., 2022).

Other natural history collections

As well as plants, Wendland collected natural history specimens. For example, it was reported in the eighth annual report of the *Natural History Society of Hanover* that Wendland donated specimens of a squirrel (*Sciurus aestuans* L.), the skull of an otter, various reptiles and even a juvenile shark (ANON., 1858a). Wendland also mentioned that he collected “some bugs and birds on the side” (WENDLAND, 1857g: 365). In this regard, he reported shooting macaws and that he was “thinking of bringing the bird's hide to Hanover” (WENDLAND, 1857i: 546). Indeed, it was also noted in the eighth annual report that Wendland collected and returned about “60 specimens

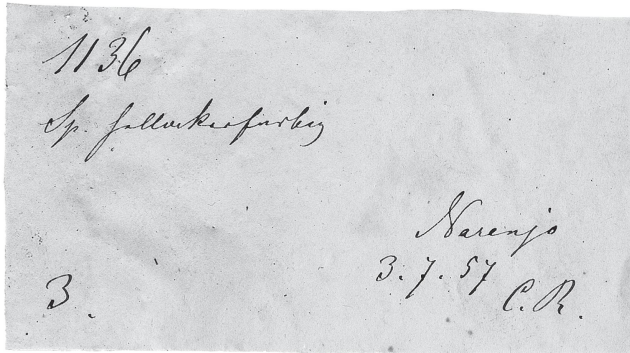


Fig. 2 – Typical field collection label by Wendland from Central America, with a sequence number, brief description, location and date. [Wendland 1136, GOET000252] [© Universität Göttingen]

of birds, among them a particularly beautiful hawk, as well as beautiful Cassicus-, Tanagra-, Muscicapa-, Trogon-, Psittacus-, Picus-, Turdus-, Loxia-, Ramphastos-, Pteroglossus species etc.” (ANON., 1858a: 406).

In his expedition reports, Wendland repeatedly mentioned that he collected these specimens for “our museum”. At the time this was the Naturhistorische Gesellschaft [Natural History Society] that later became part of the Provinzialmuseum. Today this is the Niedersächsisches Landesmuseum where at least part of Wendland’s zoological collections, including stuffed and mounted birds, are still present (C. Schilling & K. Schuster, pers. comm.). However, it is beyond the scope of this current work to attempt to locate and document zoological specimens in any detail.

Wendland’s horticultural collections

Information about the horticultural potential of plants collected by Wendland appeared not long after his return to Herrenhausen in 1857. KOCH & FINTELMANN (1859) provided a summary of the collections, writing that Wendland had returned with living examples of palms, cyclanths, ferns, *Costus* L., aroids, bromeliads, heliconias, *Smilax* L., amaryllids, melastomas, *Warszewiczia pulcherrima* Klotzsch [= *W. coccinea* (Vahl) Klotzsch], solanums, *Rubiaceae*, *Scrophulariaceae*, scutellarias, begonias and pipers. Many of the species names used by Koch and Fintelmann are not known to have been used by Wendland on herbarium specimen labels or in his expedition reports, thus suggesting that he made collections of living plants that were not systematically recorded but were gathered mainly to add to the living collections at Herrenhausen for horticultural reasons.

The kinds of propagating materials collected by Wendland included living plants as well as corms, tubers, seeds and cuttings. For example, he wrote that he sent “seeds and ferns home in abundance” (WENDLAND, 1857f: 280). Near Turrialba, he wrote that he “found five carludovicas, palms, one cycad, maybe *Zamia skinneri* [a misidentification for *Z. neurophyllidia* D.W. Stev. as *Z. skinneri* Warsz. ex. A. Dietr. is restricted to Panama] and a lot of beautiful foliage plants among other

things. I collected seeds from most of them, otherwise also trunks, stalks, rhizomes and the like”, and that he had collected “pretty little trunks of two of the most magnificent tree ferns here, and I hope I will succeed in keeping them alive so that I can enjoy them later on” (WENDLAND, 1857g: 361–362).

SCHWERIN (2013) suggested that many plants did not survive the sea journey and that only 80 to 90 species arrived alive. This included 21 species of orchids (but see different estimates below). In addition, about 170 different seeds were returned and sown, including 28 species of palms.

Among the significant live collections that Wendland made was the aroid *Anthurium scherzerianum* (flamingo flower; Fig. 4 → p. 33), a species that had previously been collected only as dried specimens by the Austrian explorer Carl von Scherzer in Costa Rica during 1852–53. Wendland recognized the plant’s horticultural value and presented it during several exhibitions (see letter below). He actively propagated and distributed the species to other gardens, and sold plants to nurseries. The many hybrids and cultivars of *A. scherzerianum* are today among the world’s most widely grown ornamental indoor plants (SHEELA, 2008).

The collection location of *Anthurium scherzerianum* originally cited by Scherzer was “Guatemala”, which was loosely used to include the entire Central American region, excepting Panama, in the mid-nineteenth century. The species was formally described shortly after Wendland’s departure from Germany by SCHOTT (1857). One of the first announcements about its introduction to horticulture was provided by ANON. (1862: 670) who wrote:

Anthurium scherzerianum, a pretty little stove herb, from Guatemala and Costa Rica, which was shown the other day at Kensington by Mr. Wendland, gardener to the King of Hanover.

MORREN (1868: 164) provided an early history of its introduction to Europe, and wrote that it was “found in Costa Rica by Mr H. Wendland who introduced it to Herrenhausen, near Hanover, from where it was sent to Kew and it quickly spread throughout Europe”. Although Wendland did not mention this plant or the circumstances under which he encountered it in any of his expedition reports, he later provided a factual account of the discovery in a handwritten letter in 1874 to Ludwig Möller who later published it in its entirety as a faithful reproduction in *Möllers Deutsche Gärtner-Zeitung* (MÖLLER, 1903: 48). The letter reads:

The story of Anthur. Scherz. is as follows.

Wagner and Scherzer traveled in Costa Rica, Nicaragua, Guatemala etc. in the beginning of the 1850’s. Their travelogue was the main reason why I decided to travel to Guatemala and Costa Rica. Scherzer first found the

Anthur. that is discussed here, sending dried specimens to Schott, who described and published it in the autumn of 1857.

I collected the plant on May 10, 1857 when descending (Costa Rica) on the transition from [Paso de El] Desengaño to the Sarapiquí River at a height of 5–7000 feet above the sea [Fig. 5 → p. 34]. When I first became aware of it, I took the red spathes of the plant, which grows in the tops of the trees to be *Sophranitis* flowers, because I could not recognize it from the distance and did not think it was an aroid. After a long search I found it flourishing on a dry branch lying on the ground and I finally realized that it was an aroid. I had not before in my whole life nor afterwards, ever had a happier day than on that day. I brought living plants with me to Schott's or rather the Schönbrunn collection, with the condition that they should not be distributed, until I gave permission to do so. The honorable Mr. Schott truly kept his word. Schott regrets that he was not able to give this plant my name since he had published it already under Scherzer's name.

I exhibited my first plant in Hamburg, I believe in 1862, Karlsruhe, Frankfurt & London and sold my first 12 plants to Veitch, but kept the strongest. Later on, Anth. Scherz. was distributed in England by, I think, Germans. Scherzer deserves credit for finding Anth. Scherz. first, while I deserve credit for introducing it first.

Yours respectfully,
Herm. Wendland

Another ornamental plant brought into cultivation by Wendland was *Warszewiczia pulcherrima* [= *W. coccinea*], a species of *Rubiaceae* then sought after because of the appeal created by its original description and reports by travelers (KLOTZSCH, 1853). Wendland returned with living plants that were grown in Herrenhausen (ANON., 1857a; KOCH & FINTELMANN, 1859), although the long-term fate of the plants is not known. See Part II for Wendland's report and more on finding and collecting this species.

The decorative and now widely grown ginger *Costus malortieanus* H. Wendl. was another that was first collected by Wendland in Costa Rica and introduced into cultivation. This species was described by Wendland from plants that were grown at Herrenhausen. See the treatment of *Costaceae* for additional details on this species.

Wendland also collected a significant number of living orchids, primarily to grow at Herrenhausen and to distribute to other botanical gardens and commercial nurseries. There is debate concerning the actual number of living orchids that he returned to Herrenhausen as records are inconclusive and may be interpreted differently. For example, SCHWERIN (2013) quoted the number 21 whilst JENNY (1995) estimated the number at 134

species. SAUNDERS & REICHENBACH (1869) described and illustrated a selection of those species being cultivated in European collections, and some were noted as having been collected by Wendland in Central America. Nevertheless, Wendland's collections of live orchids from Central America were returned successfully to Herrenhausen where they were possibly grown in what was to become known as the Costa Rica House (JENNY, 1995) (details below). Alternatively, they may have been grown in the orchid house, which was built in 1844 and enlarged and improved in 1851 (WENDLAND, 1852d). His Central American expedition laid the foundation for a significant expansion of the orchid collection and it became one of the major foci of Herrenhausen (SCHLUMBERGER, 2016). Under Wendland's management, the orchid collection grew significantly and later on was described by Reichenbach as the richest in botanical species that had ever been formed (ANON., 1903: 58).

Another decorative species that was first collected by Wendland and soon introduced to horticulture was the climbing species *Solanum wendlandii* Hook. f. This species remains well-known in horticulture in warm temperate and tropical areas, and now goes under vernacular names such as Costa Rican Nightshade and Paradise Vine among others. See the treatment of *Solanaceae* for more details on this species.

To maintain the living collections from Central America at Herrenhausen, Wendland established the Costa Rica House (Fig. 6 → p. 35). The house was not a new structure, but one that had been used for many years for growing pineapples. RETTICH (2006) placed the house in an area known as Treibquartier in the Berggarten, which was formerly a sprouting garden associated with the gardens used to supply the royal court, but later held specimens that formed the basis of the collection of exotic plants (SCHWERIN, 2018). To permit the growth of tropical plants, the house was heated. It is assumed that the Costa Rica House could be visited in the company of a gardener like other greenhouses in the Berggarten (WENDLAND, 1852d), but that it primarily was a collection house in which to grow the newly imported cuttings, rhizomes, seedlings, etc. It is of interest to note that WENDLAND (1852d: iv), in his guide to the gardens, presented the regulations for a garden visit consisting of four points, one of which was: "Entrance to the greenhouses without the company of a gardener is strongly forbidden".

Carl W.E. Fink (1814–1890) was commissioned to produce drawings of unusual or rare plants for Herrenhausen between 1856 and 1866, at the rate of 10–12 annually. He completed an album of 131 drawings of Central American plants. These were to be prepared as lithographs and to be published with accompanying text. There were negotiations with the lithographic institute of Klindworth in Hanover, who produced a set of proofs (KGBH, 2021b). However, the project remained uncompleted and the fate and whereabouts of most drawings and proofs are not known.

At least one illustration survives of Central American plants by Fink and shows a significant collection of palms, many of which can be recognized as Central American species (DOWE & SCHLUMBERGER, 2022). Rather than a view of the interior of the Costa Rica House, it appears to be an idealized landscape as there is too much depth with the palms in the background. The file of the Königliche Gartenbibliothek gives the title of the drawing as *Tropenlandschaft mit Palmen* [Tropical landscape with palms], without any reference to a glass house. In practical terms, the low height of the Costa Rica House would have restricted the growth of tall palms, but it was certainly suitable for smaller plants, such as aroids and orchids, for which ceiling height was not a limiting factor. It has been reported that the living orchid collection was kept in the Costa Rica House (JENNY, 1995). The house survived into the twentieth century and presently there are similarly sized greenhouses at the same place.

Methodology

As a first point toward resolution of the Wendland specimens, we examined the protologues and assessed the type status for the names associated with Wendland's collections by access to the most relevant and/or recent treatments. Nomenclatural interpretations follow TURLAND et al. (2018). Current plant names are according to TROPICOS (2022). German and other foreign texts have, where appropriate, been translated to English. Localities have been updated to modern spelling and usage, apart from original citations (usually presented here in quotation marks) where the older spellings and arrangements are retained. Ecological details provided on the labels were omitted. This work is arranged by plant group and then by family, genera, species, etc. in alphabetical order.

Original material

One significant aspect to consider in relation to the typification of names based on Wendland specimens is the destruction of his specimens in the Berlin (B) and Vienna (W) herbaria during World War II. All specimens of *Araceae* in Schott's herbarium at W, *Gesneriaceae* specimens in Hanstein's herbarium and most *Arecaceae* specimens studied by Dammer and Burret at B, were destroyed. When the holotype has been lost or destroyed, TURLAND et al. (2018: ICN Art. 9.11 and 9.12 [hereafter as ICN]) rule that a lectotype may be designated from among the remaining original material, if such exist. In this regard, duplicates of the specimens distributed by Wendland were potentially held by himself at Herrenhausen (now GOET). Further discussion on the status of specimens is presented in the notes for each family.

All original material that was identified among the Herrenhausen specimens was moved to the separate type herbarium. A number of specimens also were moved to the general herbarium where single specimens from Wendland's

expedition to Central America can be found in many families. This probably took place shortly after the collection was donated to GOET and the specimens were mounted on new sheets. Further discussion on this matter is also presented in the notes for each family.

Cultivated specimens

Many plants collected by Wendland as living examples entered into horticulture and became widely cultivated. In many cases, Wendland did not collect herbarium specimens in the wild at the time of initial collection (or if he did, they have not survived) and new species were subsequently described from cultivated plants or specimens taken from cultivated plants. Many of those specimens are here accepted as original material.

The typification of plants described from cultivated species presents a number of problems in Wendland's case. For example, palms in the genus *Geonoma* were described from specimens held at K by SPRUCE (1871). The specimens were taken from plants cultivated at Herrenhausen and must be accepted as holotypes. However, there are also wild collected specimens, which in strict terms are not type materials although they are the original collections. These matters are discussed further in the paragraphs preceding the treatment of *Arecaceae*.

Multi-part specimens in GOET and K

According to ICN Art. 8.3, "multiple preparations from a single gathering that are not clearly labeled as being part of a single specimen are duplicates, irrespective of whether the source was one individual or more than one". Several specimens at GOET and K are multi-part specimens, i.e. a single specimen mounted on multiple sheets. The specimens in GOET were incorporated from the Herrenhausen herbarium as unmounted specimens formerly stored in sheets of newspaper. Some of the specimens were mounted on two or more sheets as there was consistently too much material for a single sheet. To record that the specimen was spread across more than one sheet, there is either the remark "2. Bogen" or "sheet 2" [etc.], or the remark "Abschrift" (copy of the original label), so they are clearly labeled as being part of the same specimen. The multi-part specimens at K have the word "bis" (twice or doubled) or "sheet 2" on the label of the second sheet, thus indicating that the specimen is held on two sheets with a type cover saying "2 sheets". In the treatments presented here, they are denoted for example as 2- 3- 4-part [etc.] specimen. In summary, the specimens mounted on several herbarium sheets and cross-labeled accordingly (even barcoded individually) are treated as multi-part specimens.

Concluding remarks

The surviving specimens gathered by Wendland in Central America can be accounted for physically in a number of ways. First, the known surviving collector numbers on specimen labels range from the lowest 3 to the highest 1276. Potentially,

the highest number indicates the total number of specimens that he collected in Central America (assuming that he numbered every collection). However, the actual number of known numbered specimens is about 790, which means that about 490 numbers have been lost for various reasons. Second, the actual number of extant specimens collected by Wendland in various herbaria is about 1,280.

These represent about 540 distinct gatherings. Wendland's travel outcomes are associated with the publication of 185 names. Original material is found in 30 plant families in the following groups: Bryophytes (2 families), Lycophytes (1), Ferns (7), and Angiosperms (20). Figure 3 shows the number of collections per family with those that served as original material. The most represented families include *Orchidaceae* (70), *Araceae* (32), *Arecaceae* (29), *Gesneriaceae* (16), and *Melastomataceae* (8). Of the 185 names associated with Wendland's material, 50 names are represented by a holotype, and 67 lectotypes and 5 neotypes have been published by previous authors. Fifty-one (51) new lectotypes and 5 neotypes have been designated below. Typification remains unresolved for 7 names. More information

on individual families precedes the taxonomic treatment for each family.

All currently accepted taxa in the text are presented in boldface, and synonyms are in italics. It is beyond the scope of this work to include additional homotypic or heterotypic synonyms, but otherwise a few are included if relevant to the correct identity of the taxon. All specimens at GOET and W were personally examined, whilst those at AMES, B, BM, BR, C, CR, F, HAL, INT, K, L, LE, M, MO, NY, P, PC, SI and US were viewed on either JSTOR Global Plants website [<https://plants.jstor.org>], Harvard University Herbaria [<http://huh.harvard.edu/pages/oakes-ames-orchid-herbarium-ames>], Kew Herbarium Catalogue [<http://apps.kew.org/herbcat/navigator.do>], JACQ [<https://jacq.org>] or Smithsonian Institution [<https://collections.nmnh.si.edu/search/botany>]. If specimens were not personally seen or viewed online, they were verified by curators, managers and other staff of the herbaria. Where relevant, notes are provided about the typification of each taxon, particularly if the lectotype is designated for the first time, or if earlier lectotypifications need clarification or correction.

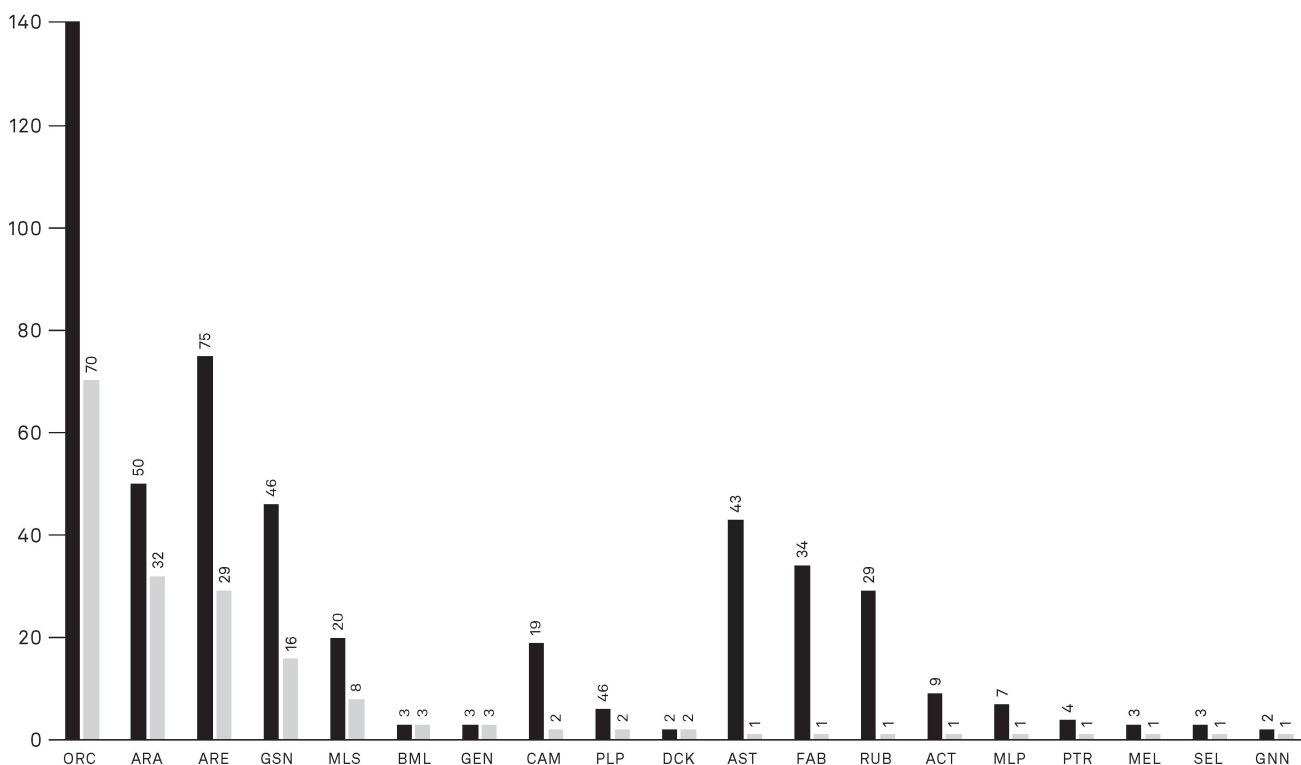


Fig. 3. – Number of collections per family (dark columns) with those that served as original material treated in this work (light columns). Families represented by a single Wendland collection are not shown.

[Abbreviations: ACT = *Acanthaceae*; ARA = *Araceae*; ARE = *Arecaceae*; AST = *Asteraceae*; BML = *Bromeliaceae*; CAM = *Campanulaceae*; DCK = *Dicksoniaceae*; FAB = *Fabaceae*; GEN = *Gentianaceae*; GSN = *Gesneriaceae*; GNN = *Gunneraceae*; MLP = *Malpighiaceae*; MLS = *Melastomataceae*; MEL = *Meliaceae*; ORC = *Orchidaceae*; PLP = *Polypodiaceae*; PTR = *Pteridaceae*; RUB = *Rubiaceae*; SEL = *Selaginellaceae*]