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Abstract

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The origin and identification of the 28 specimens of *Cactaceae* in the Willdenow herbarium in Berlin (B-W) are discussed. The eight Humboldt & Bonpland specimens from South America constitute the most important part of the collection, including five isotypes. Further, rather poorly documented specimens are of uncertain, presumably Caribbean or Central American origin or from a horticultural source. A detailed list arranged according to B-W numbers is given in tabular form. No specimens typifying *Cactaceae* names published by Willdenow in 1813 were located, but notes on some of these names, in particular on *Cactus multangularis,* are added. An index to Willdenow herbarium names of *Cactaceae* and current identifications is provided.

Introduction

The Willdenow Herbarium at Berlin-Dahlem (B-W), acquired in 1818 and hitherto preserved intact, contains 23 name folders of *Cactaceae* with a total of 28 sheets, all under the generic name *Cactus* (Hiepko 1972). Only a few of the sheets contain first-hand data on collector, collection number and locality. None is dated. After Willdenow's death in 1812, most were annotated by D. F. L. von Schlechtendal (son of D. F. K. von Schlechtendal) in the lower right corner of the sheet with the source of the material, indicating the person from whom Willdenow had allegedly received the material (Hiepko 1972, 1987). The rather fragmentary nature and documentation of the material are comparable to those of other early herbarium collections, which in succulent plants tend to be notoriously poor.

Compared to the total of 29 species of *Cactaceae* recognized by Willdenow (1799), the number of 23 taxa represented in the herbarium is considerable. Ten years later, 18 species were cultivated in the Royal Botanic Garden Berlin (Willdenow 1809). According to Willdenow (1813: 29-35), 44 *Cactus* species were cultivated in the garden in 1812. A rapid increase both of known taxa and of species cultivated in Berlin occurred in subsequent years. Link (1822) listed 68 living *Cactaceae* for the garden, all under the genus name *Cactus*. Five years later, no less than 117 species in eight genera were in cultivation in the Berlin garden (Anonymous 1827 in Link & Otto 1827).

Early monographers including Schumann (1897-98) appear to have paid little attention to the Willdenow *Cactaceae* material. At least it remained without annotations. At a first glance, this is surprising because the Willdenow collection would be expected to contain specimens typifying Willdenow names. However, none of the 23 *Cactaceae* names at B-W coincide with the 20 names that can be attributed to Willdenow (1813). Britton & Rose (1919-23) neither made reference to material extant or missing at B-W, even though Rose is known to have visited Berlin (Britton & Rose 1919). It is uncertain whether these monographers studied the Willdenow material. Other historical collections at major herbaria, e.g., at K, M and MA, contain such annotations by Schumann and by Rose on at least some specimens of *Pereskia*, *Maihuenia* and *Opuntia* (Leuenberger 1986, 1997, Leuenberger & Eggli 2002). The Humboldt & Bonpland collection at Paris (P-Bonpl) was studied by Rose (Britton & Rose 1919).

The specimens in the Willdenow herbarium

Cactaceae specimens at B-W with source annotations added by Schlechtendal on the sheets are said to be from Humboldt & Bonpland (8), Bouché (6), Krausse (4), Eyserbeck (1), "ex horto Patavino" (1) and Hort. Bot. Berol. (1). One sheet *(Cactus opuntia)* says only "frequens in hortis" without stating the actual source.

Humboldt & Bonpland specimens. – Specimens collected by Humboldt & Bonpland between 1799 and 1802 in Venezuela, Colombia, Ecuador and Peru constitute the most important part of the collection. Eight specimens can be attributed to Humboldt & Bonpland, who were in fact the first collectors to use a consistent numbering system for the greater part of their collections (Rankin Rodríguez & Greuter 2002, Lack 2003, 2004a-b). Five specimens at B-W bear at least a number in Bonpland's hand on the sheet, complemented by "(Humboldt)" written by Schlechtendal. Three can only be identified as Humboldt & Bonpland specimens by the name and handwriting (of Bonpland), interpreted and annotated as "Humboldt" by Schlechtendal in the lower right corner of the sheet. Five represent isotype specimens, one is a doubtful isotype specimen. The Humboldt & Bonpland material has been discussed separately in more detail in a comparison with the Humboldt & Bonpland specimens at Paris (Leuenberger 2002a). The list of *Cactaceae* cultivated in the Berlin garden (Willdenow 1813) does not contain taxa that undoubtedly could be attributed to material grown from seeds collected by Humboldt & Bonpland. Nor is such an introduction supported by a critical analysis of the cultivated cacti treated by Pfeiffer (1837b) (Leuenberger, unpublished). Seed introductions by Humboldt have been reported for other families by Moheit (1993) and Lack (2003, 2004a-b), the latter with references to earlier authors.

Bouché specimens. – The Bouché material is certainly of horticultural origin. According to the biographies of the French refugee family Bouché by Wittmack (1882) and Wimmer (1994), it can refer to either the Berlin nurserymen Jean David Bouché (1747-1819) or one of his sons. Known as a promoter of the cultivation of bulbous plants and other exotics, Jean David Bouché installed glasshouses with flower displays and coffee tables. The glasshouses became a fashionable meeting place for people interested in ornamental plants, including the nobility and the Prussian Kings Friedrich Wilhelm II and Friedrich Wilhelm III. In 1812, the youngest son, Peter Friedrich (1785-1856) took over the enterprise and sought to serve also arts and science e.g., by providing herbarium material to university students and professors (Wittmack 1882: 168, Wimmer 1994: 45). Peter Karl Bouché (1783-1856), who later operated the nursery together with his brother, was in his free time an active student of botany with Willdenow (Wimmer 1994: 46). He became institutional gardener at the Royal Horticultural School and is author of many *Canna* names. Thus, one of these three Bouché's may have given the *Cactaceae* material to Willdenow. The botanically best known member of the family was Peter Karl Bouché's son Carl David Bouché (1809-1881), inspector (technical director) of the Royal Botanic Garden Berlin from 1843 to 1881, author of many *Ficus* names (Zepernick & Timler 1979, Stafleu & Mennega 1993).

The best sample is a specimen of *Cactus spinosissimus,* a juvenile plant identified here as *Consolea spinosissima* following Areces Mallea (2001).

Krausse specimens. – The origin of the four Krausse specimens remains enigmatic. Urban (1916) did not mention a collector with this name. The identification of the specimens to *Epiphyllum phyllanthus* (Central America to northern South America)*, Harrisia* sp. (mainly Caribbean), *Hylocereus undatus* (Mexico, also widely cultivated) and *Selenicereus* cf. *grandiflorus* (Caribbean and Mexico) does not give any particular clues, and the specimens could as well be from a cultivated source. Krausse was not listed as collector by Lasègue (1845). The *Harrisia* specimen is of good quality and can probably be identified to species once a critical revision of the Caribbean species of this genus is available. The oldest names are *Harrisia divaricata* (Lam.) Backeb. (excluded on account of the flower characters, see Mottram 2002) and *Harrisia eriophora* (Pfeiff.) Britton, but *H. fragrans* Britton & Rose*, H. fernowii* Britton and *H. nashii* Britton could be considered as well. Species delimitation is currently based mainly on fruit characters and geographical origin, and identification of the specimen is thus not possible. Several taxa treated by Pfeiffer (1837b) mostly with known or supposed geographical origin under *Cereus repandus* Hort. Berol., *C. subrepandus* Haw., *C. eriophorus* Hort. Berol., *C. undatus* Hort. Berol.*, C. divergens* Hort. Berol. and C. *divaricatus* hort. all belong to *Harrisia* from the Caribbean and demonstrate the early introduction of these plants, yet poorly represented in herbaria and with still unsettled taxonomy.

Cactus triangularis (B-W 9434) is remarkable because of the annotation on the folder – *"Cactus triqueter"* in the hand of D. F. K. von Schlechtendal, explained "(d. Schlechtendal p.)" below in the hand of his son, D. F. L. von Schlechtendal. The sheet also bears both names in the upper right corner. The relatively complete material (stem with aerial roots, flower) is attributed to Krausse, but its connection with the protologue of *Cactus triqueter* Willd. (1813) is not entirely clear. This name was based on living material, only stem characters were mentioned, and no source is mentioned in Willdenow's protologue edited by Schlechtendal in Willdenow (1813). The annotation in the herbarium by Schlechtendal, even if possibly made in the context of his editorial work, is not necessarily more than a tentative identification, and the specimen would remain highly doubtful if interpreted as type of the name. The specimen can be clearly identified as *Hylocereus undatus* (Haw.) Britton & Rose due to the horny margin of the ribs. Fortunately, *Cactus triqueter* Willd. is illegitimate because of *Cactus triqueter* Haw. (Haworth 1803), basionym of *Cereus triqueter* (Haw.) Haw. According to the description, this is a different taxon mentioned by Britton & Rose (1923: 282) under *Hylocereus trigonus* (Haw.) Safford.

Other material. – Eyserbeck was mentioned by Urban (1916: 414) as collector providing material of some "70 spp. mostly from the East and West Indies" ("meist aus Ost- und Westindien"). The specimen is *Pereskia aculeata* and can therefore assumed to be of Caribbean origin.

It is remarkable that only one sheet in the Willdenow herbarium (*"Cactus tetragonus",* an unidentifiable, depauperate *Cereus* seedling with densely spaced areoles) is explicitly annotated as originating from the Royal Botanic Garden Berlin. In another case, B-W 9424-1 & 2, *Cactus heptagonus,* the blue folder containing two sheets has a label "Seidel. W." glued inside the folder, indicating that Willdenow received one or both specimens from Seidel. This probably refers to Traugott Seidel, who was a "Royal and academic gardener" at the Royal Botanic Garden Berlin 1801-1805, according to Zepernick & Timler (1979). The flowers and the rib count agree best with a *Cereus* from SE South America for which Ritter (1979) took up the oldest name *C. alacriportanus* Pfeiff. Though it was based on a seedling, the description matches well seedling plants grown from seeds from the area, and I follow Ritter (1979) in accepting this name and treat it as separate from *C. hildmannianus* K. Schum.

Unfortunately, no comparison can be made with other early herbarium material of *Cactaceae* from the living collection due to the almost complete destruction of *Cactaceae* in the general herbarium in 1943 (Werdermann 1949, Hiepko 1978, 1987). Only very few herbarium specimens, but substantial parts of the spirit material including numerous types of *Cactaceae,* were saved (Leuenberger 1978, 1979).

Current identification of the Cactaceae at B-W. – Identification of the specimens in the Willdenow herbarium to species is not possible in every case. This is mainly due to incomplete material combined with lack of data of origin, a basic problem in most historical cactus herbaria. For the assessment of the fragmentary material and its identification, specimens prepared from cultivated material and deposited in the garden herbarium at Berlin-Dahlem in recent years were helpful.

Label data, nature of the material, current identification by the author, and relevant synonyms where appropriate, are given in Table 1. An index of Willdenow's herbarium names and of current specimen identifications is provided in Table 3.

Notes on Willdenow's *Cactaceae* names of 1813

Willdenow's "Enumeratio plantarum Horti Regii Berolinensis supplementum post mortem autoris editum", was edited and published in 1813 posthumously by Willdenow's friend D. F. K. von Schlechtendal, explicitly from Willdenow's unaltered notes and fragments left in summer 1812. The foreword is signed without initials only "v. Schlechtendal". Recognizing the importance of the living material, Schlechtendal in a footnote on p. v in the introduction stressed that nothing serves better to rectify ("berichtigen") the specific characterizations of plants than the examination of living specimens of similar species side by side. He stated that the "subsequent characterization of the *Cactus* species" had resulted thereby (Schlechtendal in Willdenow 1813). The *Cactaceae* are treated all under the genus *Cactus,* arranged in eight infrageneric groups. Written in traditional Linnean style, the treatment has unfortunate drawbacks for interpretation of the names and their correct application and consideration for priority, then and still today: the lack of details of origin and of voucher specimens as well as the lack of illustrations. The unfinished treatment is in two unequal parts, starting with a list of 25 names and continuing with a systematic treatment containing short diagnoses for 43 species (including 24 of the names of the mentioned list). A comparison of both parts indicates that a total of 44 species (names) were extant in the garden. Names are binary without author citation. Literature citations, synonyms and indications of origin are given in only very few cases. The species recognized as new are not explicit. They were distinguished neither by author citations nor in any other way.

According to Index Kewensis (1997), 21 of these names have been attributed to Willdenow (1813), one is a new combination *(Cactus elatior),* six are later homonyms. Some details on the status and application could be expected in early sources with horticultural connection. Link (1822) attributed only 18 of them to Willdenow. He treated all under *Cactus,* adding Haworth's names in other genera *(Cereus, Epiphyllum, Opuntia)* as synonyms, rarely with question marks and with few notes.

Candolle (1828) abandoned the monogeneric treatment of the family. He accepted seven genera, citing 18 of the names attributed to Willdenow as synonyms. Seven can be considered as basionyms.

Pfeiffer (1837a) also mentioned 18 names of Willdenow, 10 of them under accepted taxa with authorship attributed to Haworth. In the German version of this book, which is of particular interest here as it is limited to the *Cactaceae* cultivated in larger collections, Pfeiffer (1837b) omitted nearly all *Cactus* names of Willdenow (1813). The only exception is *Cactus abnormis,* which is listed as a synonym of *Cereus peruvianus* var. *monstrosus* DC.

Reasons for the omission of names are explained in the introduction, where Pfeiffer stated that he omitted names of species not currently in collections. He also stated that he accepted the oldest or the most appropriate name (Pfeiffer 1837b: iv, v). Thus he did not respect priority in every case. Although a primary source of data for pinning down Willdenow's names based on live material, Pfeiffer's treatment is not therefore helpful.

Förster (1846) and Rümpler (1886) index the Willdenow names with author citation, but add no concise data helping to resolve the interpretation of the names. Perhaps as a consequence, and in a more critical approach, Schumann considered only 10 of the new Willdenow names in his comprehensive monograph (Schumann 1897-98). Only three *(Cactus brasiliensis, C. triacanthos*,

Table 1. *Cactaceae* in the Willdenow Herbarium Berlin-Dahlem (B-W) sorted by number.

B-W no.	Name on folder (by Willdenow) Name on sheet (upper right corner, by D. F. L. von Schlechtendal) Source (as annotated by D. F. L. von Schlechtendal) Name on label (if present) Collector and number Locality Material	Current identification (by the author) Relevant nomenclatural or taxonomic synonyms Type status, where appropriate
9421-1	*Cactus mamillaris* *C. mamillaris* Bouché — — — two stems	***Mammilaria mammillaris*** (L.) H. Karst.
9422-1	*Cactus cylindricus* *C. cylindricus* Bouché — — — stem with leaves	***Austrocylindropuntia cylindrica*** (Lam.) Backeb. ≡ *Opuntia cylindrica* (Lam.) DC.
9423-1	*Cactus endecagonus* *C. endecagonus* Humboldt — — — flower only	***Cleistocactus sepium*** (Kunth) F.A.C. Weber ≡ *Borzicactus sepium* (Kunth) Britton & Rose Isotype (?) of *Cactus sepium* Kunth
9424-1	*Cactus heptagonus* *C. heptagonus* inside on blue folder: “Seidel, W.” — — — 2 flowers, 1 pistil	***Cereus alacriportanus*** Pfeiff.
9424-2	*Cactus heptagonus* *C. heptagonus* inside on blue folder: “Seidel, W.” — — — 1 flower	***Cereus alacriportanus*** Pfeiff.
9425-1	*Cactus quadrialatus* *C. quadrialatus* Ex horto Patavino — — stem	***Disocactus speciosus*** (Cav.) Barthlott ≡ *Heliocereus speciosus* (Cav.) Britton & Rose
9426-1	*Cactus tetragonus* *C. tetragonus* Hort. Bot. Berol. — — — stem (juv.)	***Cereus*** sp.

9427-1	*Cactus repandus* *C. repandus* Krausse — — — stem, flower	***Harrisia*** sp.
9428-1	*Cactis grandiflorus* *C. grandiflorus* Krausse — — — flower	***Selenicereus grandiflorus*** (L.) Britton & Rose cf.
9429-1	*Cactus icosagonus* *C. icosagonus* Humboldt — — — flower and flower bud	***Cleistocactus icosagonus*** (Kunth) F. A. C. Weber ≡ *Borzicactus icosagonus* (Kunth) Britton & Rose Isotype of *Cactus icosagonus* Kunth
9430-1	*Cactus flagelliformis* *C. flagelliformis* Bouché — — — stems and flowers	***Disocactus flagelliformis*** (L.) Barthlott ≡ *Aporocactus flagelliformis* (L.) Lem.
9431-1	*Cactus pilosus* *C. pilosus* Humboldt "*Cactus* sp. nov." "(Humboldt)" 1249 "... Cumana, in lignis putri... Caripe") juvenile stems with roots	***Rhipsalis baccifera*** (J. S. Muell.) Stearn = *Cactus caripensis* Kunth Isotype of *Cactus caripensis* Kunth
9432-1	*Cactus pendulus* *C. pendulus* — — — — stems	***Rhipsalis baccifera*** (J. S. Muell.) Stearn = *Cactus pendulus* Sw.
9432-2	*Cactus pendulus* *C. pendulus* — — — — stems	***Rhipsalis baccifera*** (J. S. Muell.) Stearn = *Cactus pendulus* Sw.
9432-3	*Cactus pendulus* *C. pendulus* — — — — stems	***Rhipsalis baccifera*** (J. S. Muell.) Stearn = *Cactus pendulus* Sw.

9432-4	*Cactus pendulus* *C. pendulus* Humboldt *Cactus?* "(Humboldt)" 1538 — 4 stems	***Rhipsalis baccifera*** (J. S. Muell.) Stearn = *Cactus pendulus Sw.*
9433-1	*Cactus variabilis* *C. variabilis* Humboldt *Cactus* (*variabilis* added by Willdenow) "(Humboldt)" 3494 — 4 stems	***Rhipsalis micrantha*** (Kunth) DC. ≡ *Cactus micranthus* Kunth Isotype of *Cactus micranthus* Kunth
9434-1	*Cactus triangularis – Cactus triqueter* *C. triangularis – triqueter* Krausse — — — stem and flower	***Hylocereus undatus*** (Haw.) Britton & Rose
9435-1	*Cactus opuntia* *C. opuntia* frequens in hortis — — — stems and flower	***Opuntia humifusa*** (Raf.) Raf.
9436-1	*Cactus ficus-indica* *C. ficus-indica* Bouché — — — stem	***Opuntia ficus-indica*** (L.) Mill. ≡ *Cactus ficus-indica* L.
9437-1	*Cactus tuna* *C. tuna* Bouché — — — stem	***Opuntia dillenii*** (Ker Gawl.) Haw.
9438-1	*Cactus curassavicus* *C. curassavicus* Bouché — — — stems	***Opuntia repens*** Bello (or *O. taylori* Britton & Rose, if this is a distinct species)
9439-1	*Cactus spinosissimus* *C. spinosissimus* Bouché — — — stem	***Consolea spinosissima*** (Mill.) Lem. ≡ *Opuntia spinosissima* Mill.

9440-1	*Cactus phyllanthus* *C. phyllanthus* Krausse — — — stem	***Epiphyllum phyllanthus*** (L.) Haw. ≡ *Cactus phyllanthus* L.
9440-2	*Cactus phyllanthus* *C. phyllanthus* — *Cactus phyllanthus* "(Humboldt)" 1445 — — stem	***Pseudorhipsalis amazonica*** (K. Schum.) Ralf Bauer = *Disocactus amazonicus* (K. Schum.) D. R. Hunt ≡ *Wittia amazonica* K. Schum. = *Wittia panamensis* Britton & Rose
9441-1	*Cactus horridus* *C. horridus* Humboldt *Cactus* "(Humboldt)" 3594 — 3 twigs, one leaf	***Pereskia horrida*** DC. = *Pereskia humboldtii* Britton & Rose = *Cactus horridus* Kunth [non Salisb.] Isotype of *Cactus horridus* Kunth
9442-1	*Cactus bleo* *C. bleo* Humboldt — — — one leaf, one petaloid	***Pereskia bleo*** (Kunth) DC. ≡ *Cactus bleo* Kunth Isotype of *Cactus bleo* Kunth
94431	*Cactus pereskia* *C. pereskia* Eyserbeck — — — stem, leaves	***Pereskia aculeata*** Mill. = *C. pereskia* L.

C. strictus) are basionyms of names accepted by Schumann *(Opuntia brasiliensis, O. triacantha*, and *Pilocereus strictus)*. Britton & Rose (1919-23) listed 20 of Willdenow's *Cactaceae* names. Only *Opuntia brasiliensis,* and *O. triacantha* are accepted names today (Hunt 1999). The rest are synonyms or illegitimate names, few remain doubtful. *O. monacantha* Haw. was not based on *Cactus monacanthus* Willd., as the latter name was included by Haworth (1819) only as a synonym with a question mark (Leuenberger 2002b). *Cereus multangularis* Haw. was already recognized as probably different from *Cactus multangularis* Willd. by Schumann (1897), who mentioned the latter name only as a synonym with a question mark.

A tentative list of modern identifications for the *Cactus* names published by Willdenow (1813) is provided in Table 2.

A number of names continue to be controversial. New evidence is presented here for few of them. A detailed analysis of all of them was not attempted and can be expected to be of little taxonomic reward. Rowley (1999) published illustrations of undated paintings of plants in the Salm-Dyck collection, some possibly dating back to 1805 (see p. 5 fig. 7) and therefore of interest. Being contemporaneous with Willdenow, they may be considered as fairly authentic. Three paintings may well be suitable as neotype illustrations for Willdenow names:

Table 2. An annotated list of *Cactus* names in Willdenow, Enum. Hort. Berol. Suppl., 1818 (no specimens present at B-W).

Name	Author (inferred)	Page	Current name
C. abnormi	Willd.	31	*Cereus sp.* 'Monstrosus' (*Cereus hildmannianus* 'Monstrosus' according to Rowley 1999)
C. alatus	Willd. [non Swartz (1788)]	35	*Disocactus phyllanthoides* (DC.) Barthlott
C. brasiliensis	Willd.	33	*Brasiliopuntia brasiliensis* (Willd.) A. Berger
C. coronatus	Willd. [non Lamarck (1785)]	30	dubious (*Mammillaria coronaria* Haw. according to Candolle 1828 and Pfeiffer 1837a)
C. decumanus	Willd.	84	*Opuntia* sp. (probably *O. ficus-indica*) (referred by Candolle 1828 and Pfeiffer 1837a, 1837b to *O. decumana Haw.*)
C. elatior	(Mill.) Willd.	84	*Opuntia elatior* Mill.
C. elongatus	Willd.	34	*Opuntia* sp. (probably *O. ficus-indica*) (listed by Candolle 1828 and subsequent authors as synonym of *O. decumana Haw.*)
C. fasciculatus	Willd.	33	*Rhipsalis baccifera* (J. S. Muell.) Stearn
C. ferox	Willd.	35	*Consolea moniliformis* cf. (or *Opuntia polyacantha*? see Pfeiffer 1837b: 177)
C. foliosus	Willd.	35	*Opuntia pusilla* (Haw.) Haw. (?)
C. monacanthos	Willd.	33	*Opuntia monacantha* Haw.
C. multangularis	Willd.	33	*Weberbauerocereus johnsonii* F. Ritter (1962b, 1981) not *Haageocereus multangularis* (Haw.) F. Ritter (1981)
C. peruvianus	Willd. [non L. (1753)]	32	*Stenocereus griseus* (Haw.) Buxb. (according to Rowley 1999)
C. prismaticus	Willd.	32	(dubious) listed by Pfeiffer 1837a as synonym of *Cereus pentagonus* Haw.
C. reptans	Willd.	33	*Selenicereus* sp. (?) listed by Pfeiffer 1837a as synonym of *Cereus pentagonus* Haw.
C. royenii	L.	32	*Pilosocereus royenii* (L.) Byles & G. D. Rowley
C. stellatus	Willd.	30	*Mammillaria prolifera* (Mill.) Haw.
C. strictus	Willd. [non Haw. (1803)]	32	*Pilosocereus royenii* (L.) Byles & G. D. Rowley (?)
C. triacanthos	Willd.	34	*Opuntia triacantha* (Willd.) Sweet
C. triqueter	Willd. [non Haw. (1803)]	33	*Hylocereus undatus* (Haw.) Britton & Rose (*H. trigonus* according to Rowley 1999)
C. tuberculatus	Willd.	34	*Opuntia* sp. (referred by Pfeiffer 1837a: 151, 1837b: 168) to *Opuntia tuberculata* Haw. and noted to be similar to *O. monacantha* Haw. but spineless

(1) *Cactus abnormis* Willd. (Rowley 10, t. 7), identified as *Cereus hildmannianus* K. Schum. 'Monstrosus' by Rowley.

(2) *Cactus pendulus* Willd. (Rowley 19, t. 26), identified as *Rhipsalis baccifera* (J. S. Muell.) Stearn.

(3) The third one, *Cactus multangularis* Willd. (1999: 15, t. 19), identified by Rowley as *Haageocereus multangularis* (Willd.) F. Ritter is more complicated and particularly intriguing. Ritter (1981) based the name explicitly on *Cereus multangularis* Haw., not *Cactus multangularis* Willd. Schumann (1897) used *Cereus multangularis* Haw. for a different taxon including *Cereus limensis* Salm-Dyck, i.e., also for a *Haageocereus,* which seems correct, considering the treatment of Pfeiffer (1837b), where a basally branched plant is described.

Ritter (1981: 1400) used *Haageocereus multangularis* as combination based solely on Haworth's description, not on the illustrations of Haworth or Salm-Dyck. He used the name in a wide sense for a species including *H. chosicensis,* i.e., like Schumann, for more coarsely-spined plants

with fewer ribs than the one illustrated on the painting from the Salm-Dyck collection. The finely yellow-spined plant illustrated by Salm-Dyck (reproduced by Rowley 1999: 15, t. 19), presumably the most representative for Willdenow's name, is not identical to that illustrated by Haworth, reproduced by Britton & Rose (1923: 279, fig. 255) as *Binghamia multangularis* (Willd.) Britton & Rose.

A comparison was made with comparable and reasonably representative live material of *Haageocereus* (particularly *H. multangularis* and varieties in the sense of Ritter 1981) and *Weberbauerocereus (W. johnsonii, W. winterianus),* all grown at Berlin-Dahlem from seed originally collected by Friedrich Ritter in Peru and distributed through the Winter nursery in 1960 (Winter 1960). A selection is shown in Fig. 2-4.

The Salm-Dyck painting in my opinion matches best with immature plants of *Weberbauerocereus johnsonii* F. Ritter, a species described from Peru, Prov. Cajamarca, Zangal (Ritter 1962b, 1981, Eggli & al. 1996) (see Fig. 1, 2). Arakaki (2003) has just recently included this name in the synonymy of *W. winterianus* F. Ritter, a taxon described one month earlier from the neighbouring Prov. Libertad (Ritter 1962a). The plants grown under the latter name at Berlin-Dahlem have slightly shorter spines but also fit well with Salm-Dyck's plant (Fig. 3). Otherwise similar, yellow-spined specimens identified by Ritter as *Haageocereus multangularis,* including unpublished varieties, differ in lower rib count, areole and spine dimensions (Fig. 4).

The new interpretation of Salm-Dyck's painting calls for an explanation of the possible origin of Willdenow's (and Salm-Dyck's) plant. The distribution of *Weberbauerocereus johnsonii* along the limits of the provinces of Cajamarca, Hualgayoc and Contumazá includes the area visited by Humboldt & Bonpland, who were in Hualgayoc and Cajamarca from 10 to 18 September 1802 (Faak 1990). Unfortunately, there is no direct evidence for or record of such seed accessions of *Cactaceae* in Berlin received from Humboldt from Peru. It is known from correspondence between Humboldt and Willdenow in 1801 (from Cuba) and in 1804 (from Mexico), that Humboldt sent seed samples of many plants to Willdenow (Fiedler & Leitner 2000, Lack 2003, 2004a-b, Moheit 1993), but no reliable records of cacti exist so far. Nor is such an introduction supported by a critical analysis of the cacti cultivated in Germany in the first decades of the 19th century listed by Pfeiffer (1837b) (Leuenberger, unpublished). As to Salm-Dyck's plant of *Cactus multangularis,* it can only be established that Salm-Dyck received it between 1800 and 1805, well before the earliest known contacts between Humboldt and Salm-Dyck (letters dated c. 1848, according to I. Schwarz, pers. comm.). According to Rowley (pers. comm.) the name is not in Salm-Dyck's notebook "A" for 1800, but it is listed in notebook "C" for 1805.

Technically, the Willdenow name has to be considered for priority. The protologue, however, is not sufficient for identification, as in many old names of *Cactaceae.* Neotypification with the plate would be possible but in this case may still be debatable compared to other, less controversial cases (Taylor 2003). Arguments against the use of the name for a *Weberbauerocereus* are:

1) a well established name would have to be replaced,

2) the older name would remain disputable because it is based on an illustration lacking diagnostic flower and fruit characters,

3) confusion is inevitably caused by *Haageocereus multangularis* (Haw.) F. Ritter, due to Ritter's different use of the same epithet, based on *Cereus multangularis* Haw.

To avoid further confusion in the already highly complicated state of taxonomy and nomenclature of Peruvian columnar cacti, *Cactus multangularis* should therefore, as already proposed by Werdermann (1937) and Buxbaum (1973) be avoided and is best rejected.

In three further plates of plants annotated by Salm-Dyck (though not exclusively) with Willdenow names (*Cactus eburneus* hort. Dyck = *C. peruvianus* Willd., *C. fasciculatus* and *C. triqueter)* the probable connection with Willdenow is not so straightforward and here it does not affect priority of names. The respective identifications given by Rowley are *Stenocereus griseus*, *Rhipsalis baccifera* and *Hylocereus trigonus* (see also Table 2).

Besides *Cactus multangularis,* the following names, not discussed in detail here but apparently untypifiable, remain dubious: *Cactus coronatus, C. decumanus, C. elongatus, C. prismaticus* and *C. tuberculatus.* The approach of Schumann (1897-98) to ignore – or in modern terms – to reject the last four of these still unresolved Willdenow names was probably far-sighted.

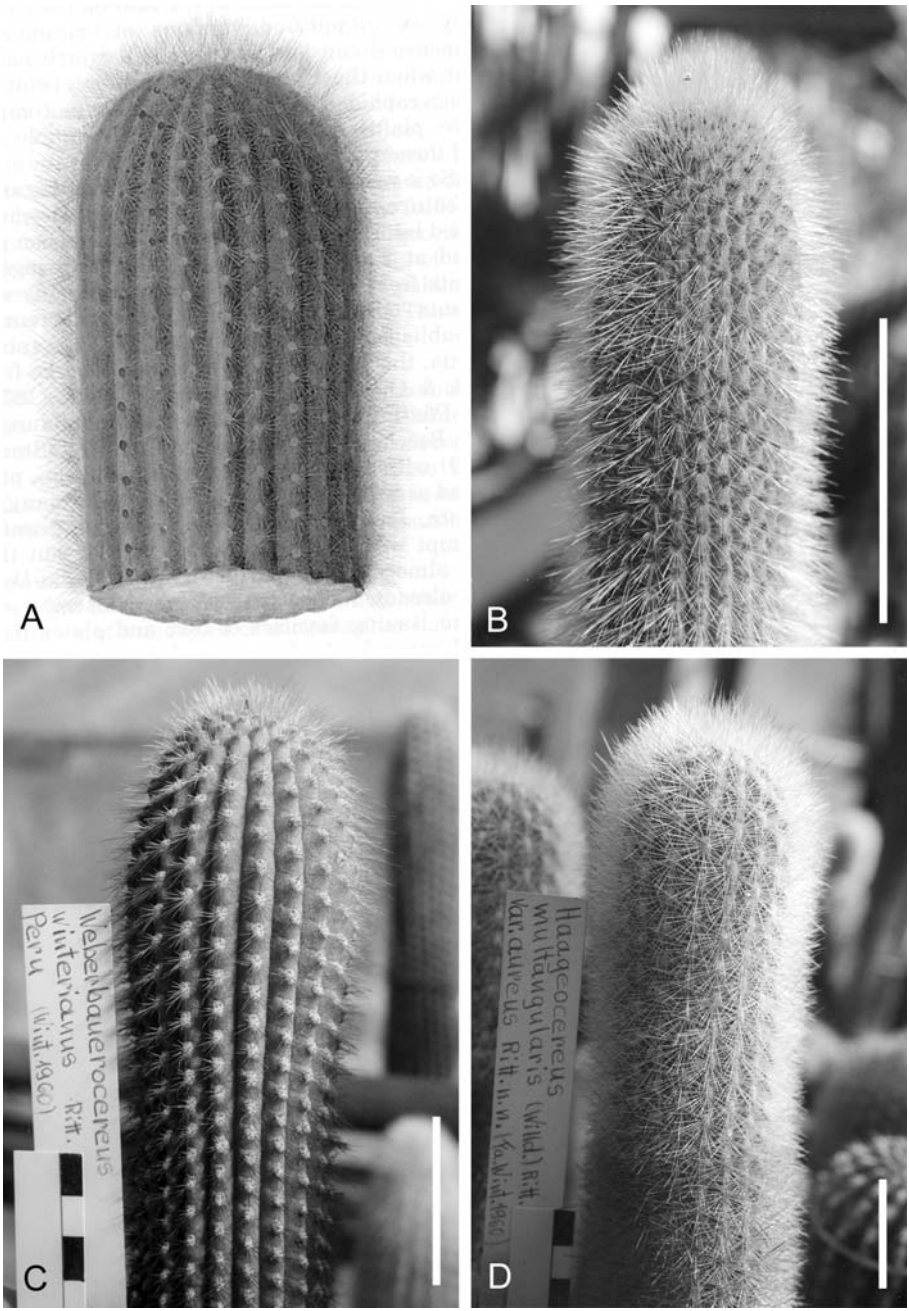

Fig. 1. A: *Cactus multangularis* Willd., Salm-Dyck's painting reproduced by Rowley (1999) in Bradleya 17: 15, pl. 19; B: *Weberbauerocereus johnsonii* F. Ritter, cultivated in the Botanic Garden Berlin-Dahlem in 2003 *(F. Ritter 570);* C: *Weberbauerocereus winterianus* F. Ritter, cultivated in the Botanic Garden Berlin-Dahlem in 2003 *(F. Ritter 165);* D: *Haageocereus multangularis* (Haw.) F. Ritter (as "var. *aureus* F. Ritter nom. nud."), cultivated in the Botanic Garden Berlin-Dahlem in 2003 *(F. Ritter 147d).* B-D: photographs by B. Leuenberger.

Table 3. The names of Willdenow specimens of *Cactaceae* at B-W. – Both the Willdenow herbarium names and the currently accepted names are listed with cross-reference to the B-W numbers, see Table 1.

Name	B-W number
Austrocylindropuntia cylindrica	9422-1
Cactus bleo	9442-1
Cactus curassavicus	9438-1
Cactus cylindricus	9422-1
Cactus endecagonus	9423-1
Cactus ficus-indica	9436-1
Cactus flagelliformis	9430-1
Cactus grandiflorus	9428-1
Cactus heptagonus	9424-1, 9424-2
Cactus horridus	9441-1
Cactus icosagonus	9429-1
Cactus mamillaris	9421-1
Cactus opuntia	9435-1
Cactus pendulus	9432-1, 9432-2, 9432-3, 9432-4
Cactus pereskia	9443-1
Cactus phyllanthus	9440-1, 9440-2
Cactus pilosus	9431-1
Cactus quadrialatus	9425-1
Cactus repandus	9427-1
Cactus spinosissimus	9439-1
Cactus tetragonus	9426-1
Cactus triangularis	9434-1
Cactus tuna	9437-1
Cactus variabilis	9433-1
Cereus alacriportanus	9424-1, 9424-2
Cereus sp.	9426-1
Cleistocactus icosagonus	9429-1
Cleistocactus sepium	9423-1
Consolea spinosissima	9439-1
Disocactus amazonicus	9440-2
Disocactus flagelliformis	9430-1
Disocactus speciosus	9425-1
Epiphyllum phyllanthus	9440-1
Harrisia sp.	9427-1
Hylocereus undatus	9434-1
Mammillaria mammillaris	9421-1
Opuntia dillenii	9437-1
Opuntia ficus-indica	9436-1
Opuntia humifusa	9435-1
Opuntia repens	9438-1
Pereskia aculeata	9443-1
Pereskia bleo	9442-1
Pereskia horrida	9441-1
Pseudorhipsalis amazonica	9440-2
Rhipsalis baccifera	9431, 9432-1, 9432-2, 9432-3, 9432-4

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