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The Cactician

A miscellany of topics on the subject of Succulent plants Authored and edited by Roy Mottram

Taxonomy
Botanical History
Databases
&c.

Linnaean cactus legacy

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Summary

A journey through the life and times of Carl Linnaeus during his most creative period, an examination of the cacti that he encountered and a complete re-evaluation of the 22 species known to him in 1753, the starting date for botanical nomenclature.

A new name combination is validated for *Stenocereus heptagonus*, along with proposals for 6 new lectotypifications, 3 neotypifications and 1 epitypification (all highlighted in green print).

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Linnaean cactus legacy

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Fig. 1 Linnaeus as a bridegroom in 1739. A portrait by Jean Haagen after an earlier portrait by J. H. Scheffel.

Carl Linnaeus (1707-1778) (Fig. 1) was a Swedish physician and natural historian, who rose to stardom as a result of his cataloguing of natural history objects and organisms under a universal system of two-ranked names, the so-called binomial nomenclature and a system of simple rules for new name creation. In his country of birth, Sweden, he has become something of a national hero, and his image appears on the modern 100 Swedish Kroner banknote (Fig. 2). He has also been commemorated on Swedish postage stamps of 1939, 1963 and 1978.

Linnaeus did not invent binomial nomenclature as is often assumed. It had been randomly applied by some authors from as early as the 14thC.

Highly regarded by Linnaeus and

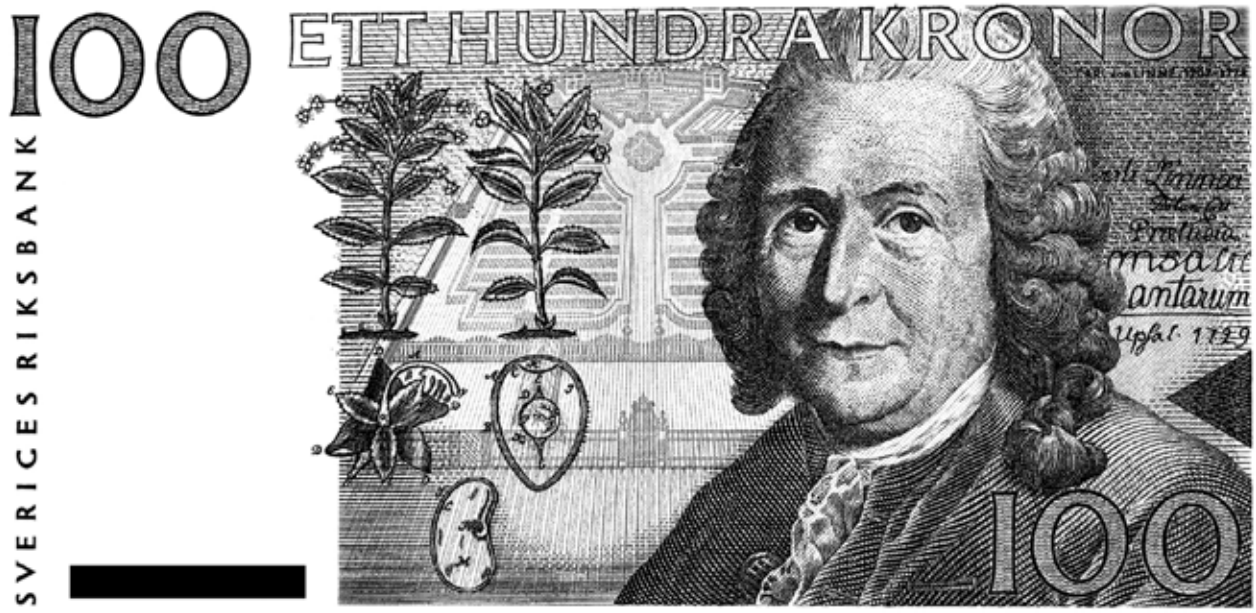

Fig. 2. Linnaeus around 1770 on the current 100 Swedish Kroner banknote. In 2014-15 the designs will change and Linnaeus is to be replaced by Greta Garbo!

Fig. 3. Gaspard (Caspar) Bauhin (1560-1624)

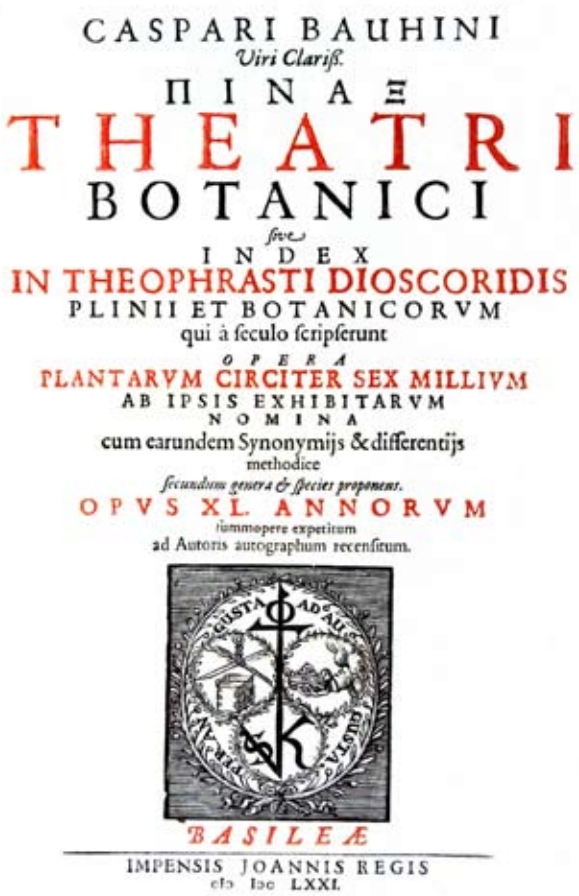

Fig. 4a. Bauhin, *Pinax* (1623 & 1671) title page.

frequently cited by him were the sixteenth and seventeenth century dictionaries of plants known as the *Pinax* (index or register) and the *Phytopinax* (index of plants) by Caspar Bauhin (1560-1624) (Fig. 3), which contained many binomials (Fig. 4). Indeed, Bauhin wrote in the preface of his *Phytopinax* of 1596:

"For the sake of clearness, I have applied one name to each plant, and added also some easily recognisable character."

This has led many commentators to describe Bauhin as the true founder of the binomial system. However, there were others even earlier than Bauhin, including Mathioli and Tabernaemontanus, who had also occasionally applied binomial names.

Nevertheless, authors before Linnaeus had applied binomials very inconsistently, preferring instead to use the long descriptive sentences known as phrase-names that were becoming ever more cumbersome as each differentiating character was added in order to distinguish them from related plants that were already known. Linnaeus's genius was to recognise that this anarchic approach was a road to chaos and that simplification was needed.

Linnaeus attended Lund University, joining it at the age of 21, and was then at Uppsala University in 1730-1731, where he gave public lectures on botany. It was here that he befriended another student at the University, Peter Artedi, with whom he shared ideas about natural history, classification and nomenclature. Just how much of Linnaeus's concepts were inspired by this close

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lis, ſed ex anniculis, atq; etiam vetuſtioribus: illæ ſe terræ conjungentes, ceu ſepem circa arborem faciunt, ita ut veluti tabernaculum condatur, quo etiam morari homines ſolent, &c. Plinio l.12.c.5. Ficus Indica exilia poma habet: ipſa ſe ſemper ſerens, vaſtis diffunditur ramis, quorum imi in terram curvantur, &c. & l.7. c.2. ſub una Ficu turmæ conduntur equitum.
Arbor Indica admirabilis, Straboni.
Ficus Indica, Cluſ.ex.Lugd.Tab.
Mangle forte, Oviedi.
an Mangen, Ferd.Lopez.
Arbor de rayz, id eſt, radicoſa, Linſc.part.4.Ind. Orient.14. & fig.12.
Enzada, Pigafettæ, part.1. Ind. Or. c.4.
Arbor Goa ſive Indica, Ger.
Ex cortice veſtes conficiunt.

IX. Ficus Indica folio ſpinoſo fructu majore.

Ficus Indica, Matth. Dod.ut: Cardano, Lac. Geſ.Lob.Caſt. Cæſ.Eyſt.
Carduus Indicus & Ficus Indię, Cl.cor.ad Dod.
Pala ſive Ficus Indica, Bellonio.
Tuni ficifera Indorum, Ad.
Ficus Indicæ ſpecies, Tune Indorum, Frag.
Anapallus Bellonij, Cam.
Tunes, Oviedo, Card.
Tune, Opuntia, Lon.
Ficus Indica ſpinoſa, Tab.
Tune & Tunas Indorum, Lugd.
Opuntia vulgo habita, Cam.
Tunal in nova Hiſpania, nonnullis locis Cardi: part.9. Ind. Occid. l.4. c.23.
Tunales qui fructus bonos promunt; & magni qui in India æſtimantur, Tunas vocari ſolent, Idem.
Arbor Nepal: fructus, Nucchti in Inſula Cuba, Ferdi, Corteſio, Cardan.

Opuntiam nonnulli credunt, de qua Theoph. 1.hiſt.12. ſic: huic (Ficui Indicæ) ſimilis eſt, vel potius quodammodo mirabilius, ſi qua ex folij radicem mittat, qualem circa Opuntem herbulam eſſe ajunt, quæ & eſu ſuavis eſt. Plinio l.21. cap.17. item circa Opuntem, Opuntia eſt herba etiam homini dulcis, mirumq; è folio ejus radicem fieri, ac ſic eam naſci: Alijs Pala Plinij, & Tala Arriano, Guil.

Colore fructus variat, virides internæ purpurei, cerei, albi variegati.

X. Ficus Indicæ grana.

Cochinillia ſive Grayn vermiculus ſub folio Tunal: par.8. Ind.Occid. l.4.c.13.
Quidam Tunas (id eſt, fructus) nullos gignunt, ſed ſub folijs fructum alium Greyn dictum edunt, vermiculum ſcilicet folijs adhæreſcentem & tenui pellicula obductum, & hæc celebratiſsima Indiæ Cochinillia, qua Grayne colorantur, Idem.
Arbor Cochenille, Claud. Dureto.

XI. Ficus Indica ſpinoſa ſylveſtris.

Cardis ſeu Tunades ſylv. fructum nullum protrudentes: ſi verò proferant, meris ſpinis horrent, part.9. Ind. Occid. l.4.

XII. Ficus Indica folio ſpinoſo fructu minore.

Indorum ferruminatrix, Adverſ.
Opuntia oſtocollos, quos artuum fracturis & luxationibus proſit: de qua & Author hiſt. generalis Indiarum.
Arbor rupturas conſolidans, Ovied. qui ſuſpicatur Carduum Tunes in hanc arborem tranſmutari.

XIII. Mippi nonnullis Indis Caiahaba, quæ oſsium fracturis alligata ea ferruminare ſolet, Cluſ.ex. l.4.c.14.

XIV. Cereus Peruanus ſpinoſus fructu rubro nucis magnitudine.

Cardui ſpecies, quem Chri ani Cereum appellant, Oviedo.
Euphorbij arbor Cerei effigie, Ad.Lob.ico.
Euphorbium, Caſt.ico.
Cereus ſpinoſus, Lugd. Ger.
Cereus Peruvianus, Tab.
Stipites ſpinoſi haſtæ altitudine, Linſc. 4. part. Ind.Orient. fig.21.

XV. Ficus Indica lævis piloſa: hæc ex Creta miſſa: eaq; duplex, altera folio rotundo, altera folio oblongo.

XVI. Ficus Indica humilis: hanc ex horto Doctoris Saltzmanni Poliatri & Profeſſ. Argentinenſis habeo, quæ pedem vix ſuperat, ramis eſt reflexis & veluti repentibus, flore magno, luteo: de qua in hiſtoria.
Ficus Indica minima, alijs Lichen marinus, vel Opuntia marina, de Bry.

SYCO.

Fig. 4b Bauhin, *Pinax*, one of the cactus pages (p.458), where we can find, for example, the binomials: Ficus Indica & Carduus Indicus (*Opuntia ficus-indica*), Cereus spinosus & Cereus peruvianus (*Selenicereus grandiflorus*).

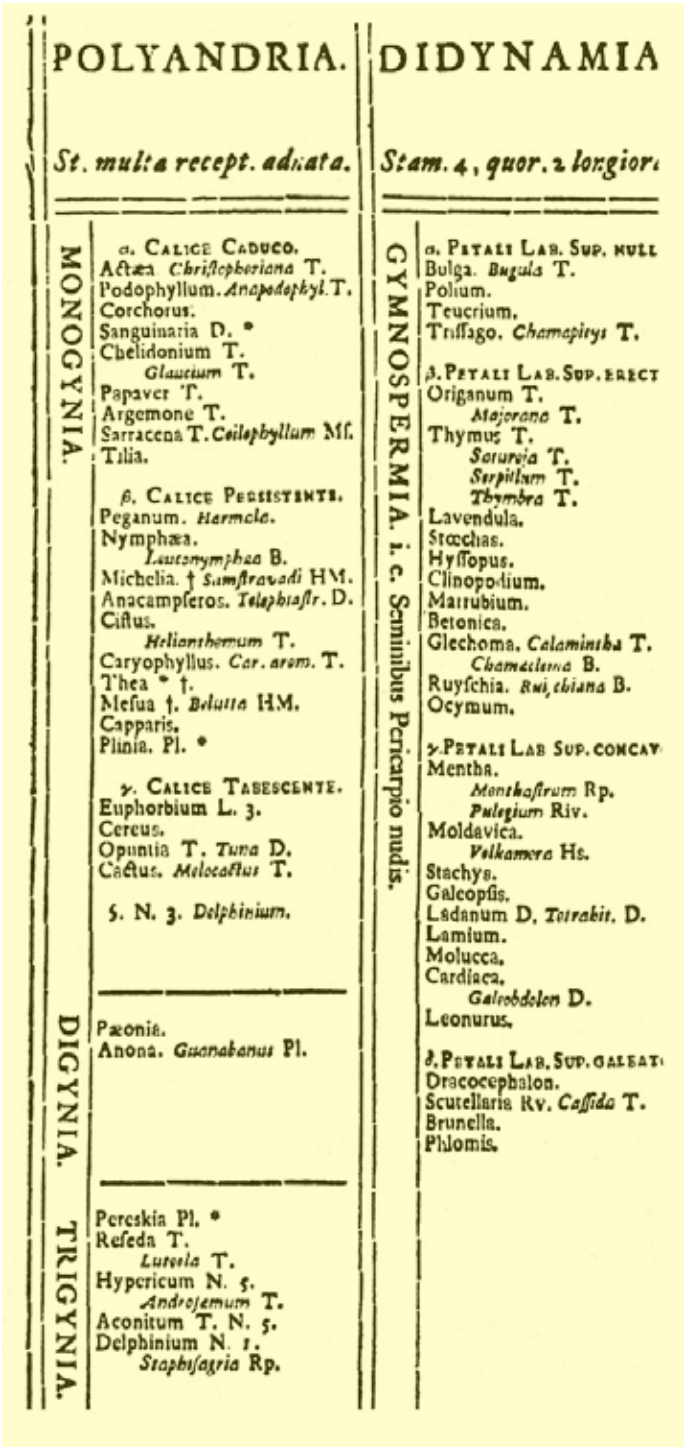
acquaintance, we are never likely to know, because Artedi met with a tragic death by drowning in an Amsterdam canal in 1735. Linnaeus inherited Artedi's unpublished notes and manuscripts on ichthyology and the *Umbelliferae*.

Students at that time were pretty much left to their own devices, so Linnaeus spent much of his time in the neglected botanical garden at Uppsala and the rich libraries of the University. He also worked on the herbarium of Joachim Burser (1583-1639) and used it extensively for his botanical training. The 25 volumes of some 3200 specimens contained a great diversity of plants, some collected by Burser himself but also many obtained from Caspar Bauhin, and they were arranged in the order of Bauhin's *Pinax*. Many of Linnaeus's taxa have subsequently been lectotypified with Burser specimens, on the assumption that they were seen by him and therefore original material, although he seldom mentioned them, and none of the cactus Burser specimens were ever cited.

He began to travel, visiting Lapland (1732), west and east Dalarna, a region of Sweden (1734), through Denmark, Germany and Holland (1735), and to England (1736). In England he was proclaimed a member of the Imperial Academy of Naturalists and given the illustrious pseudonym of 'Dioscorides Secundus'.

A flowering of genius.

By the age of 28 in 1735 he had already written several manuscripts that would later become his major works. The first edition of his innovative system of classification for minerals, animals and plants was published in 1735, which he called *Systema naturae* (1735). This included large tables of plants organised into a new classification with many new names and was full folio in size (Fig. 5). It was here that the name *Cactus* as


POLYANDRIA. | DIDYNAMIA

St. multa recept. adnata. | *Stam. 4, quor. 2 longior.*

MONOGYNIA. DIGYNIA. TRIGYNIA. GYMNOSPERMIA. i. e. Seminibus Pericarpio nudis.

α. Calice Caduco.
Actæa *Christopheriana* T.
Podophyllum. *Anapodophyl.* T.
Corchorus.
Sanguinaria D. *
Chelidonium T.
Glaucium T.
Papaver T.
Argemone T.
Sarracena T. *Ceilophyllum* Mſ.
Tilia.

β. Calice Persistente.
Peganum. *Harmala.*
Nymphæa.
Lautonymphæa B.
Michelia. † *Samſtravadi* HM.
Anacampſeros. *Telephiaſtr.* D.
Ciſtus.
Helianthemum T.
Caryophyllus. *Car. arom.* T.
Thea * †.
Meſua †. *Beluta* HM.
Capparis.
Plinia. Pl. *

γ. Calice Tabescente.
Euphorbium L. 3.
Cereus.
Opuntia T. *Tuna* D.
Cactus. *Melocactus* T.

5. N. 3. *Delphinium.*

Pæonia.
Anona. *Guanabanus* Pl.

Pereskia Pl. *
Reſeda T.
Lutcola T.
Hypericum N. 5.
Androſæmum T.
Aconitum T. N. 5.
Delphinium N. 1.
Staphiſagria Rp.

α. Petali Lab. Sup. nulli
Bulga. *Bugula* T.
Polium.
Teucrium.
Triſſago. *Chamæpitys* T.

β. Petali Lab. Sup. erect
Origanum T.
Majorana T.
Thymus T.
Satureja T.
Serpillum T.
Thymbra T.
Lavendula.
Stœchas.
Hyſſopus.
Clinopodium.
Marrubium.
Betonica.
Glechoma. *Calamintha* T.
Chamæclema B.
Ruyſchia. *Rui, chiana* B.
Ocymum.

γ. Petali Lab Sup. concav
Mentha.
Monthaſtrum Rp.
Pulegium Riv.
Moldavica.
Velkamera Hs.
Stachys.
Galeopſis.
Ladanum D. *Tetrahit.* D.
Lamium.
Molucca.
Cardiaca.
Galeobdolon D.
Leonurus.

δ. Petali Lab. Sup. galeat
Dracocephalon.
Scutellaria Rv. *Caſſida* T.
Brunella.
Phlomis.

Fig. 5. Extract showing cactus entries in the *Systema naturae* first edition of 1735, the earliest place of publication of the name *Cactus* as a genus.

a genus was borne.

Plants were classified based on their numbers of stamens (male parts) and ovaries (female parts), the socalled sexual system. It was actually Sebastien Vaillant (1669-1722), a demonstrator of plants at the Jardin des Plantes, Paris, who had first drawn attention to

the value of sexual organs in plants for classification. Vaillant had proposed a classification based on the number of stamens and ovaries, which Linnaeus then adopted for his own system. He broke down the plant kingdom into 24 orders, based on the number of flower stamens and ovaries (Fig. 6), which may seem artificial but it conveniently approximates well to a system of natural relationships.

Cacti fell into the order with over twenty stamens, the *Polyandria*, later moved to the *Icosandria*, also having more than twenty stamens. It should be especially noted that he equated his new name *Cactus* with *Melocactus*, a pre-Linnaean generic name formalised by the earlier author Tournefort. Linnaeus was a great believer in simple names, so he shortened the word *Melocactus* to just *Cactus*. This happens to coincide with the application of the word cactus in ancient times to the Spanish artichoke, a prickly plant found in Sicily, as well as being very loosely applied to almost anything thorny or unpleasant, but whether Linnaeus had the ancient usage in mind at the time he never made clear.

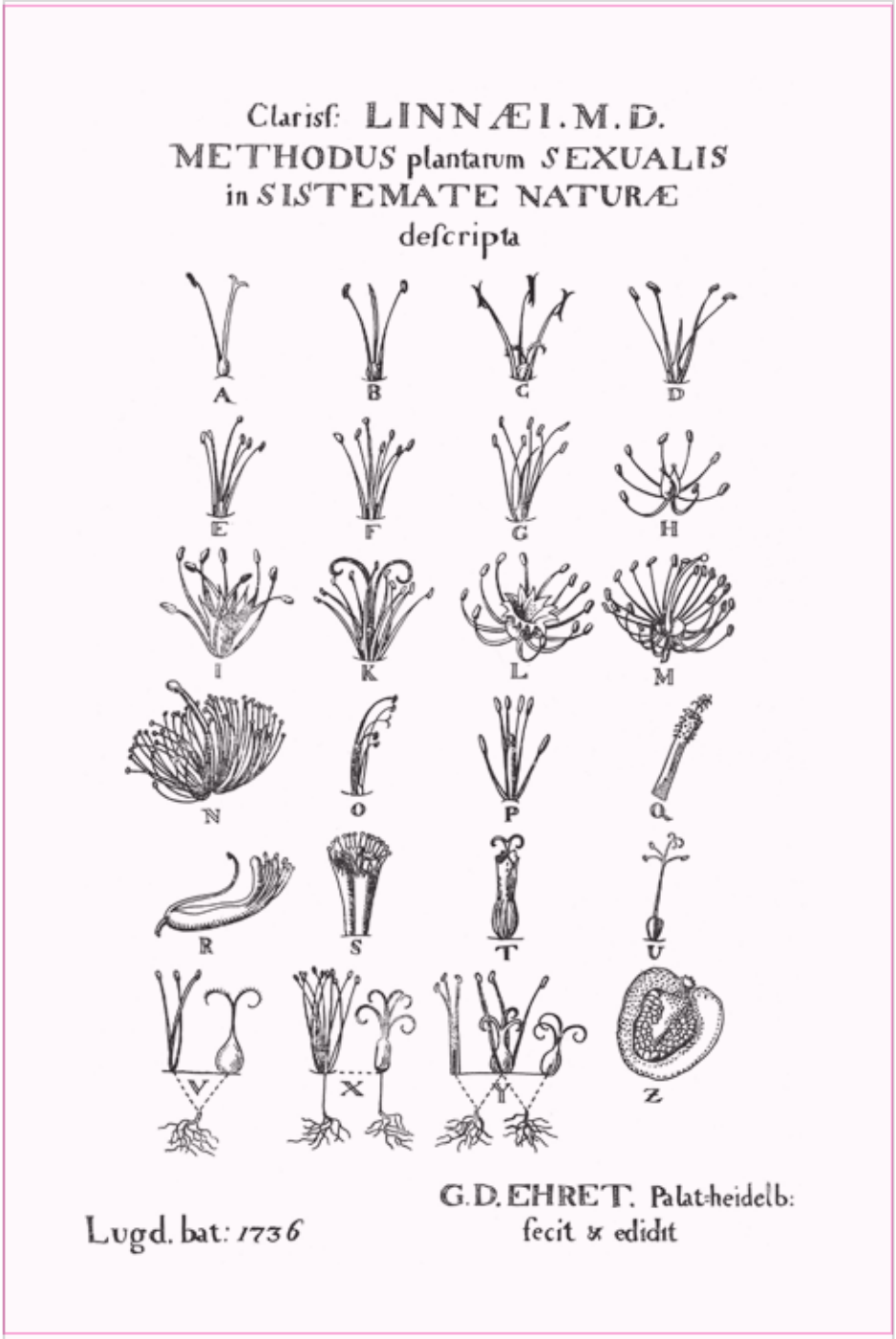
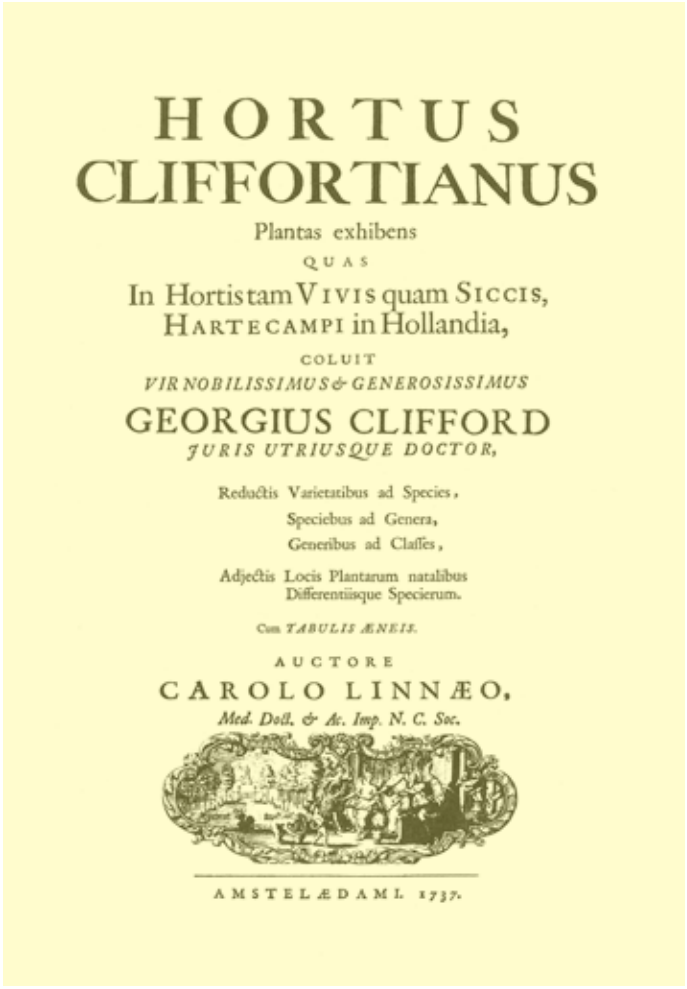


Fig. 6. Frontispiece from *Genera plantarum* (1737) showing Linnaeus's sexual system, first published in *Systema naturae* (1735).

By good fortune Linnaeus was able to work in the garden of the wealthy Dutch banker and patron of the sciences, George Clifford (1685-1760), and was made the Director of the garden of his De Hartecamp estate, south of Haarlem, in 1737.

By 1736 he had already authored fourteen printed works, and shortly afterwards came the most sumptuous of his works, a major illustrated catalogue of the plants in Clifford's garden, *Hortus cliffortianus* (Fig. 7), completed in only 9 months in July 1737 & published in 1738, illustrated with 36 magnificent uncoloured plates by the famous botanical artist George Ehret.



HORTUS
CLIFFORTIANUS

Plantas exhibens
QUAS
In Hortis tam VIVIS quam SICCIS,
HARTECAMPI in Hollandia,
COLUIT
VIR NOBILISSIMUS & GENEROSISSIMUS
GEORGIUS CLIFFORD
JURIS UTRIUSQUE DOCTOR,

Reductis Varietatibus ad Species,
Speciebus ad Genera,
Generibus ad Classes,
Adjectis Locis Plantarum natalibus
Differentiisque Specierum.

Cum *TABULIS ÆNEIS.*

AUCTORE
CAROLO LINNÆO,
Med. Doct. & Ac. Imp. N. C. Soc.

AMSTELÆDAMI. 1737.

Fig. 7. *Hortus cliffortianus* (1738) title page.

Fig. 8 *Hortus cliffortianus* (1738) frontispiece from one of the few coloured copies.

Fig. 9. Group of three displaying a copy of *Hortus cliffortianus* (1738) by Jacob de Wit (1695-1754).

Initially it was distributed to a few friends of Clifford in 1738, but not placed on the market until 1739.

Contemporary coloured copies are exceedingly rare and only known in the botanical libraries at Paris and Uppsala. (Fig. 8). Fig. 9 is a painting by the Dutch master Jacob de Wit of three unknown people

Fig. 10. *Cactus* pages (181-183) from *Hortus cliffortianus* (1738).

Claſſis XII.

ICOSANDRIA.

MONOGYNIA.

CACTUS. *g. pl.* 390.

1. CACTUS ſubrotundus, tectus tuberculis ovatis barbatis.
Melo-Cactus americana minor. *Boerh. lugdb.* 2. *p.* 83.
Melo-Carduus mamillaris major ſeſſilis & globoſus, ſpinis brevioribus. *Moriſ. hiſt.* 3. *p.* 171.
Echino-Melo-Cactos minor lacteſcens, tuberculis ſeu mammillis majoribus. *Herm. parad.* 136. *t.* 136.
Ficoides ſ. Melo-Cactos mammillaris glabra ſulcis carens, fructum ſuum undique fundens. *Pluk. alm.* 148. *t.* 29. *f.* 1
Ficoides vel Ficus americana ſphærica tuberculata lacteſcens, flore albo, fructu rubro pyramidali. *Comm. hort.* 1. *p.* 105. *t.* 55.
Opuntia Echino-Melo-Cacti effigie tuberoſa, fructu leviſſimo amethyſtino. *Breyn. prod.* 2. *p.* 79.
Creſcit in rupibus Americæ, *Curaſſaviæ, aliarumque.*
Hæc tota obvallatur undique tegiturque papillis ovatis barbatis, uti Meſembryanthemum; lacteſcit (quod congeneres non) uti Euphorbia; fructificat uti Cactus.

2. CACTUS quatuordecim-angularis ſubrotundus.
Melo-Cactus indiæ occidentalis. *Baub. pin.* 384. *Tournef. inſt.* 653. *Plum: ſpec.* 19. *Boerh. lugdb.* 2. *p.* 83.
Melo-cactos. *Beſl. eyſt. aut.* 36.
Melo-carduus echinatus. *Dalech. hiſt.* 1442.
Melo-carduus, ſulcis rectis, ſpinis ad angulos appoſitis, major. *Moriſ. hiſt.* 3. *p.* 170.
Echino-Melo-Cactos. *Cluſ. exot.* 92. *Sloan. flor.* 198. *Baub. hiſt.* 3. *p.* 93.
Echino-Melo-Cactos major non lacteſcens, coſtis rectis. *Herm. parad.* 135.
Ficoides ſ. Melo-cactos americana, tomentoſo capite, ſulcis rectis. *Pluk. alm.* 148.
Creſcit in petris maritimis Americæ, *uti* Jamaicæ *& aliarum.*
Figura ſua lepide Echinum refert, undique ſpinis obvallatus, in apice corpore diſcoideo convexo villoſo inſtructus, e quo flores prodeunt.

3. CACTUS ſeptem-angularis oblongus erectus.
Cereus peruvianus major erectus maximus, ſpinis fuſcis obſitus, flore purpuraſcente. *Eichr. Carolsr.* 13.
Creſcit in America.
Noſtra planta exacte ovata eſt, ſeptem angulis profunde inſculptis; dicunt alii ſe eandem pedalem & bipedalem vidiſſe, noſtra tamen ſibi figura ſemper per plures annos ſimilis fuit, nec licet bene creverit figuram mutavit.

4. CACTUS quadrangularis longus erectus, angulis compreſſis.
Cereus erectus quadrangulus, coſtis alarum inſtar aſſurgentibus. *Boerh. ind.* 180. *lugdb.* 1. *p.* 293.
Cereus erectus minor, fructu ſpinoſo, coſtarum numero varians. *Herm. parad.* 117.
Ficoides ſ. Ficus americana erecta, cerei effigie, maxima craſſiſſima quadrangularis vel potius angulorum numero variabilis, ſpinis longiſſimis armata, flore ſubviridi, fructu ſpinoſo rotundo, ſeminibus nigris majoribus & ſplendentibus pleno. *Kigg. beaum.* 20. *Pluk. alm.* 147.
Creſcit in America, Curaçao *& alibi.*
Anguli in hac planta compreſſi & fere membranacei ſunt.

5. CACTUS ſex-angularis longus erectus.
Cereus erectus altiſſimus ſurinamenſis. *Herm. parad.* 116. *Raj. dendr.* 23.
Cereus erectus altiſſimus ſurinamenſis, ſpinis fuſcis. *Boerh. lugdb.* 1. *p.* 292.
a Cereus erectus altiſſimus ſurinamenſis, ſpinis albis. *Boerh. lugdb.* 1. *p.* 293.
Creſcit in Surinama.
Hæc planta altiſſima eſt & firma.

6. CACTUS novem-angularis longus erectus, angulis obſoletis.
Cereus erectus, fructu rubro non ſpinoſo. *Herm. parad.* 114. *Boerh. lugdb.* 1. *p.* 293.
Cereus craſſiſſimus, fructu intus & extus rubro. *Sloan. flor.* 196. *hiſt.* 2. *p.* 157. *Raj. dendr.* 21.
Cereus peruanus ſpinoſus, fructu rubro nucis magnitudine. *Baub. pin.* 458.
Cereus ſpinoſus. *Dalech. hiſt.* 1829.
Melocactus americanus monoclonos, flore albo, fructu atro-purpureo. *Tournef. inſt.* 653.

Euphorbii adulta planta, ſive cerei effigie. *Stap. theophr.* 1057.
Creſcit in America, *præſertim* Jamaicæ *inſulis in maritimis arenoſis & ſylvis campeſtribus aridis & apertis ubique.*

7. CACTUS ſæpius novem-angularis longus erectus, angulis obſoletis, ſpinis lanâ brevioribus.
Cereus curaſſavicus erectus maximus, fructu rubro non ſpinoſo, lanuginoſus, lanugine flaveſcente. *Herm. parad.* 115. *t.* 115. *Boerh. lugdb.* 1. *p.* 292.
Creſcit in Curaçao.

8. CACTUS octangularis longus erectus, angulis compreſſis undatis, ſpinis lanâ longioribus.
Cereus erectus craſſiſſimus maxime anguloſus, ſpinis albis pluribus longiſſimis, lanugine flava. *Boerh. lugdb.* 1. *p.* 293.
Creſcit in Curaçao.
An varietas ſola præcedentis?

9. CACTUS quinquangularis longus erectus, articulatus.
Creſcit in America.
Caulis erectus, quinquangularis, articulatus, internodiis pedalibus. Spinarum acervi per marginem abſque tomento ullo manifeſto admixto prodeunt. Anguli rarius variant ad ſex; nullos unquam emittit e caule radices, ſed tenuis, erectus, debilis perſiſtit.

10. CACTUS ſcandens, angulis quinque pluribusve obtuſis.
Cereus ſcandens minor polygonus articulatus. *Herm. parad.* 120. *Boerh. lugdb.* 1. *p.* 293:
Cereus americanus, major articulatus, flore maximo noctu ſe aperiente & ſuaviſſimum odorem ſpirante. *Volk. heſp.* 1. *p.* 233. *t.* 234.
Ficoides americanum ſive Cereus minima ſerpens americana. *Pluk.alm.* 148. *t.* 158. *f.* 6.
Creſcit in Vera Cruce, Jamaica, *aliisque Americæ variis tractibus arbores ſcandens.*
Floret hæc unica ſolum nocte ſingulo flore, qui ſat infrequens eſt, explicatur enim occidente ſole, fulget per noctem copioſis ſuis radiis, oriente ſole contrahitur; qui floruit die 30. junii 1737. ſic ſe habuit.
Germen *ſubrotundum, papillis tectum, apicibus papillarum pilis albis, folio minimo & ſetis fuſcis pungentibus inſtructis, uniloculare, ſeminibus numeroſiſſimis, lateri pericarpii adnatis.*
Perianthium *maximum, germini inſidens, monophyllum, fere clavatum, ſpithamæum, glabrum, tubuloſum, deciduum, adſperſum* Foliolis *lanceolato-linearibus, erectis, ad quorum ſingulorum exortum* ſetæ *fuſcæ, pungentes &* crines *albi, foliolo longiores exeunt; baſis folioli ſinguli elevata, decurrit per calycem, unde angulatum evadit perianthium; Foliola dein inferiora gradatim minora, uti ſuperiora majora.*
Limbus *perianthii maximus, patens, æqualis, corolliformis: conſtans foliolis* 60. *pluribus, lanceolato-linearibus, longiſſimis, fulvis, quadruplici ſerie digeſtis.*
Corolla *alba, calyci adnata ita, ut an Flos polypetalus vel monopetalus dicendus vix conſtet. Petala itaque circiter viginti, duplici ſerie diſpoſita, lanceolata, longitudine limbi calycis, ſed duplo latiora, obtuſa, ſeſſilia, adnata calycis limbo.*
Staminum *infinitus numerus:* Filamenta *filiformia, longitudine fere corollæ, quorum numeroſa, ſecundum totam longitudinem tubi calycis, perianthio adnata, ut totam ejus internam tegant ſuperficiem, apicibus parum diſcedentia a calyce. Alia Filamenta innumera ex infimo tubo perianthii orta, libera, nec adnata, adeoque a prædictis diſtinctiſſima ſitu; hæc prioribus ſimillima, ſed paulo breviora, declinata, flaccida.* Antheræ *oblongæ, obtuſæ, erectæ.*
Stylus *teres, filiformis, filamentis longe craſſior, longitudine corollæ adeoque ſtaminibus paulo longior, declinatus.* Stigmata 20, *erecto-patula, ſubulata, molliſſima.*
Mirus naturæ luſus. In planta tam ſimplici, nulla, indigna, dejecta Flores prognaſcantur de principatu cum omnibus certantes, hi ſola nocte floreant pulcherrimi, odoratiſſimi, maxime colorati, unica nocte diu exſpectati.

11. CACTUS triangularis ſcandens articulatus.
Cereus ſcandens minor trigonus articulatus, fructu ſuaviſſimo. *Herm. parad.* 118. *Boerh. lugdb.* 1. *p.* 293.
Ficus indica, folio triangulari enſiformi, profunde canaliculato, ſtellatim aculeato. *Raj. dend.* 20. *Sloan. flor.* 196.
Ficoides americanum ſive Cereus erectus criſtatus, foliis triangularibus profunde canaliculatis. *Pluk. alm.* 147. *t.* 29. *f.* 3.
Melocactus americanus repens trigonus, flore albo, fructu violaceo. *Plum. ſpec.* 19.
Jama-caru. *Marcgr. braſ.* 23. *f.* 24.
Creſcit in Jamaica, Braſilia *variisque aliis americæ regionibus in ſylvis campeſtribus, arboribus inſidens & aſcendens.*

12. CACTUS tereti-compreſſus articulatus ramoſus.
Opuntia curaſſavica minima. *Boerh. lugdb.* 2. *p.* 82.
Ficus indica ſeu Opuntia curaſſavica minima. *Kigg. beaum.* 19. *Comm. hort.* 1. *p.* 107. *t.* 56.
Creſcit in Curaçao.

13. CA-

13. CACTUS compreſſus articulatus ramoſus, articulis ovoto-oblongis, ſpinis ſetaceis.
Opuntia maxima, folio ſpinoſo latiſſimo & longiſſimo. *Tournef. inſt.* 240. *Boerh. lugdb.* 2. *p.* 82.
Creſcit in America.
An hæc a ſequenti ſpecie re ipſa diſtincta ſit fere dubium eſt, ſpinas raro ſubulatas exerit, communiter vero ſetas faſciculatas, & caule longe minus ramoſo eſt.

14. CACTUS compreſſus articulatus ramoſus, articulis ovato-oblongis, ſpinis ſubulatis.
Opuntia major, folio oblongo rotundo, ſpinis longis & validiſſimis confertim naſcentibus obſito, flore luteo. *Sloan. flor.* 193. *hiſt.* 2. *p.* 149. *t.* 224. *f.* 1.
Opuntia major, validiſſimis ſpinis munita. *Tournef. inſt.* 239. *Boerh. lugdb.* 2. *p.* 82.
Tuna major, ſpinis validis flavicantibus, flore gibbo. *Dill. elth.* 396. *t.* 295. *f.* 380.
α Tuna elatior, ſpinis validis nigricantibus. *Dill. elth.* 395. *t.* 294. *f.* 379.
Creſcit in Jamaica *& plurimis* Americæ *regionibus.*

15. CACTUS compreſſus articulatus ramoſiſſimus, articulis ovatis, ſpinis ſetaceis.
Opuntia vulgo herbariorum. *Bauh. hiſt.* 1. *p.* 154.
Ficus indica, folio ſpinoſo, fructu majore. *Bauh. pin.* 458.
Ficus indica. *Cæſalp. ſyſt.* 89 *Dod. pempt.* 813.
Ficus indica eyſtettenſis ex uno folio enata. *Beſl. eyſt. aut.* 41.
Creſcit in America, nova Hiſpania, *&c.*

16. CACTUS foliis enſiformibus obtuſe ſerratis.
Epiphyllum americanum. *Herm. prod.* 388.
Phyllanthos americana, ſinuoſis foliis longis craſſis & carnoſis opuntiæ in modum florigera. *Pluk. alm.* 296. *t.* 247 *f.* 5.
Opuntia folio plano glabro ſcolopendriæ. *Boerh. lugdb.* 2 *p.* 82.
Opuntiæ forte affinis ſurinamenſis, e foliorum crenis folia nova producens. *Kigg. beaum.* 19.
Cereus ſcolopendri folio brachiato. *Dill. elth.* 73. *t.* 64. *f.* 74.
Ficus indica, ſcolopendriæ foliis. *Till. piſ.* 62.
Ficus ſeu Opuntia non ſpinoſa, ſcolopendriæ folio ſinuato. *Raj. dendr.* 21.
Canambaya. *Marcgr. braſ.* 78. *t.* 79.
Nopalxoch cuez alticquizi. *Hern. mex.* 392 & 457.
Creſcit in Braſilia, Mexico, Surinama *aliisque calidioribus Americæ regionibus.*
Hocce genus totum ſedem in ſola America poſuit & in Hortorum hybernaculis hocce ævo primas tenet.
Singularis plantarum familia abſque foliis, nuda, echinata fere tota; Folia ſi quæ ſit, iſta ſubulata caduca.
Diviſa fuit in tria genera a Botanicis: in Opuntias, Cereos & Melocactos, non autem diſtinguendam eſſe docet facies & floris conſideratio, in quo tam multæ notæ propriæ occurrunt.
Opuntia nomen rejectum a Cl. Dillenio, Cereus & Melocactus & Tuna vix meliora vocabula dimitto, nomen antiquum ſuperfluum Cactum aſſumo, quo veteres plantam indigitarunt aculeatam, carnoſam, edulem, uti ſpecies 2da eſt.

PERESKIA. *g. pl.* 402.

1. PERESKIA.
Pereskia aculeata, flore albo, fructu flaveſcente. *Plum. gen.* 35. *Dill. elth.* 305. *t.* 227. *f.* 294.
Groſſularia, fructu majore, arbor ſpinoſa, fructu foliaceo e viridi albicante. *Sloan. flor.* 165. *hiſt.* 2. *p.* 86. *Raj dendr.* 27.
Malus armeniaca ſpinoſa, portulacæ folio, fructu folioſo, ſemine reniformi ſplendente. *Comm. hort.* 1. *p.* 135. *t.* 70.
Portulaca americana latifolia ad foliorum ortum lanugine obducta, longioribus aculeis horrida. *Pluk. alm.* 304. *t.* 215. *f.* 6.
Creſcit in America in Inſula Margaretha, Jamaica, *aliisque.*
Apud nos non floret; ex figuris tamen Plumerianis patet eam Cacto valde affinem, ſi non ejusdem generis eſſe; qui itaque eam conjungere velit, per me poteſt, cum calyx imbricatus ſit, germini impoſitus, petala plura, ſtigma diviſum, fructus modo in hac retineat ſquamas germinis poſt floreſcentiam, reliquæ vero ſpecies non omnes Cacti eas rejiciant. Succulenta planta, & ſpinoſa, (licet hæc ſola foliis perfectis inſtructa ſit) confirmat idem.

holding a coloured copy of *Hortus Cliffortianus*. The open plate in this oil painting is quite faithful to the actual copper engraving of the original, but the captions in the book have been exagerated to make them more legible.

Cacti were represented in *Hortus Cliffortianus* with seventeen plants growing in the Clifford garden, and listed on three pages (Fig. 10). They were all plants native to the Caribbean area or adjacent South America.

Linnaeus's genera were very broadly based, and although at that time he recognised *Pereskia* as distinct from *Cactus*, he refused to adopt the genera *Melocactus*, *Opuntia* and *Cereus* which had been widely accepted at the time. Not long after, by 1748, he had also abandoned *Pereskia*.

Linnaeus's concept of species was also extremely broad and some of his names included more than one species recognised today. On this subject he wrote to Haller: "Having fixed the species, you will reduce the varieties to their proper place under each, as I do not doubt your having the same opinion of them as I have. Have you observed what multitudes of varieties are put forth as species by Pontedera, Micheli, and others? If every minute difference, every trifling variation, is to establish a new species, why should I delay to exhibit ten thousand such species? and who cannot point out as many? I have always preferred taking two distinct species for one, reckoning them but varieties of each other, so long as I was doubtful of a clear and obvious mark of difference; rather than publishing any doubtful plant as a certain species."

This philosophy can be readily recognised in the attitudes of many botanists today, although it neglects the importance of scientific precision and the fact that specialists can always spot significant differences of which the generalist is ignorant or blind. However, today even the most conservative of botanists has a far broader concept of species than Linnaeus ever had.

During the time that he was working on the *Hortus cliffortianus*, when he tired of that in the evenings he set about compiling an update of his *Fundamenta botanica* (1735), essentially a series of rules for naming plants and very similar to the modern *Code of nomenclature*. He called this new work *Critica botanica*, also published with the *Hortus* in July 1737.

The "see-saw of altercation."

He dedicated *Critica botanica* to his favourite correspondent, John James Dillenius (Fig. 11), who had been brought to England from Germany by the wealthy patron William

Fig. 11. John Jacob Dillenius (1684-1747). About a year before he died of apoplexy (stroke).

Sherard in 1721 as his personal physician and to look after his famous garden at Eltham. Linnaeus later met him at Oxford in 1736, staying with him for eight days, and he frequently cited Dillenius plates from *Hortus elthamensis* (Fig. 12) in many of his later books.

Despite having praise heaped upon him by Linnaeus as "the foremost botanist of this age" and "the unshakable pivot of our science", Dillenius was not amused. Churlishly he wrote a forthright letter dated 18 Aug 1737, admonishing Linnaeus: "I feel as much displeased with your *Critica botanica* as I am pleased with your *Lapland Flora*, especially as you have, without my deserving such a compliment, or knowing of your intention, dedicated the book to me. You must have known my dislike to all ceremonies and compliments. I hope you have burdened but few copies with this dedication. Perhaps only the copy you have sent me. If there be more, I beg of you to strip them out of this vain parade, or I shall take it much amiss."

Dillenius went on to critique the *Critica*, and admonished Linnaeus for not giving the etymology of his new names, and particularly for recycling and applying old Greek and Latin names in a different sense to those of Dioscorides, Theophrastus & Pliny. He argued: "I think the names of the ancients ought not rashly and promiscuously to be transferred to our new genera….The day may come when the plants of Theophrastus and Dioscorides may be ascertained; and, till this happens, we had better leave their names as we find them."

Among these disputed names was *Cactus*, of which he wrote:
"Why do you give the name of *Cactus* to the Tuna (Dillenius's own generic name for cacti)? Do you believe the Tuna, or Melocactus (pardon the word), and the Arbor Vitae, were known to Theophrastus?" (Oxford, 18 Aug 1737).

Dillenius wriggled in subsequent letters and tried to placate the annoyed Linnaeus, but would have done even more harm with the put-down: "I cannot but observe that you are not very patient under the attacks of adversaries.

Fig. 12. Dillenius, Hortus Elthamensis (1732). Spine view.

For my part, I am not more pleased with my own opinion than with that of other people. I am ready to listen to any body's remarks, for the sake of discovering truth, but have no inclination for the see-saw of altercation." (Oxford, 28 Nov 1737).

Naturally enough, Linnaeus defended himself, and was later able to turn the argument back on Dillenius with the following: "With regard to unoccupied names in ancient writers, which I have adopted for other well-defined genera, I learned this from you. You, long ago, pointed out to me that your own genus *Draba* is different from the plant so called by Dioscorides." (6 Aug 1739). Perhaps this is as near as we will ever get to being a confession that he had actually taken the name *Cactus* from ancient usage?

Dillenius died in 1747 of a stroke, then known as apoplexy, a fate which also befell Linnaeus himself in 1783.

All this prevarication could well have been annoyance because Dillenius had no particular wish to be seen to be associated with the sexual system of Linnaeus. English botanists in general rejected the system, partly because they were happy with the system of John Ray, and also because they were offended and disgusted at the very thought of sex in plant classification. In the rest of Europe, the Dutch loved it, but the eastern Europeans adopted the same combative attitude as the British. American botanists, however, took to it straightaway, looking on it as a breath of fresh air, a release from the drudgery of having to learn the characters of every single known plant in order to classify new discoveries.

The American connection

A correspondence began in 1755 between Linnaeus and Dr. Alexander Garden (1728-1792), a Scottish physician living in Charles Town (now Charleston) in South Carolina (Fig. 13). Unlike the irascible Dillenius, Garden's character was cheerful and benevolent, and he was said to have been fond of good company, particularly that of the opposite sex. His correspondence with Linnaeus became extensive over a period of 26 years, although it fell to another close friend, John Ellis of London, to honour Garden with the generic name *Gardenia*.

Garden sent Linnaeus many natural history specimens gathered in the neighbourhood of the town. Among the huge number of fishes, amphibians, insects, and of course plants that he sent to Europe, he is well known for having introduced the decorative Atlantic coast Loblolly Bay, a member of the tea family.

Fig. 13. Garden's home in Charles Town. Unfortunately there are no known portraits of Dr. Garden.

The only cacti he sent were the local opuntias, and then mainly to act as a host for the cochineal insect, or mealy bug as we know it (Fig. 14). Linnaeus had a great fascination for the mealy bug, as did a group of London scientists led by John Ellis, and Garden searched for a long time before he was able to send Ellis and Linnaeus examples of the elusive male. He finally succeeded in capturing a male in August 1759, studying it with his Cuff microscope and making notes of his observations, before sending a few specimens to Ellis and Linnaeus.

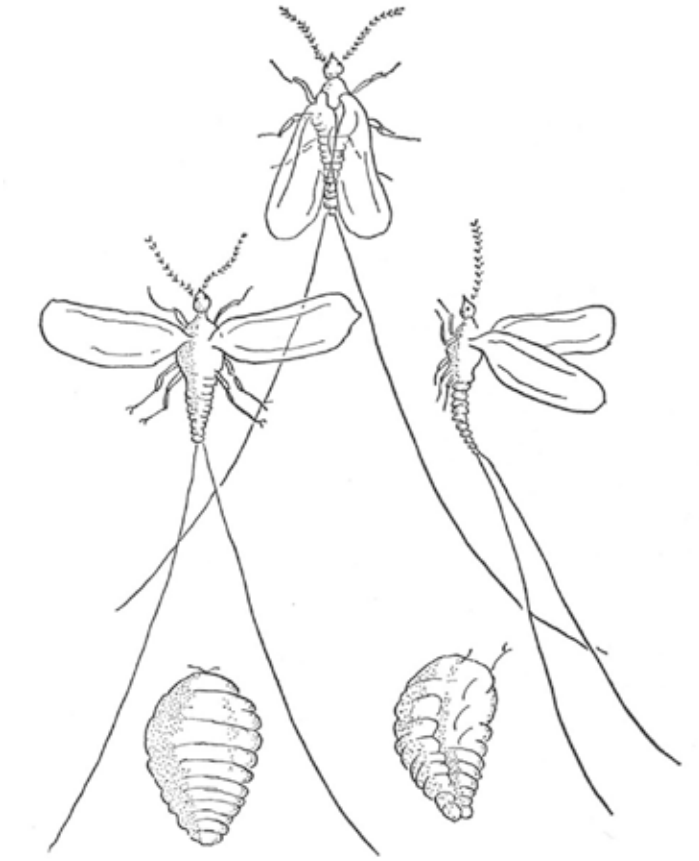
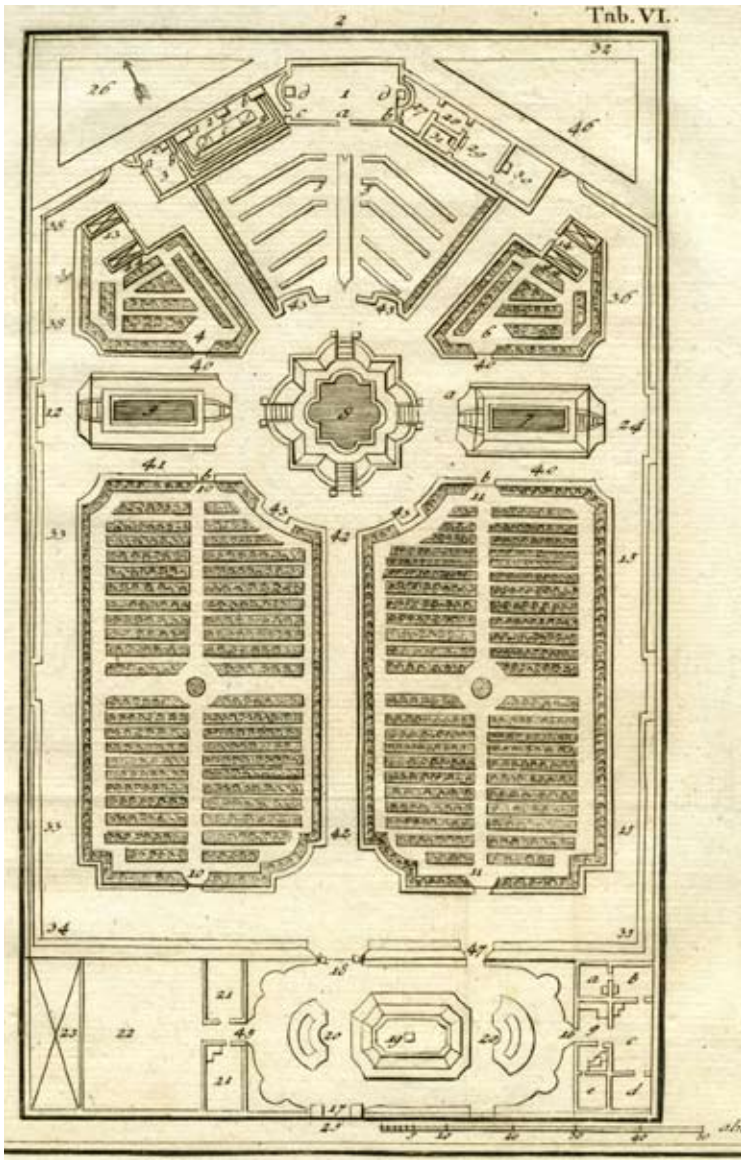
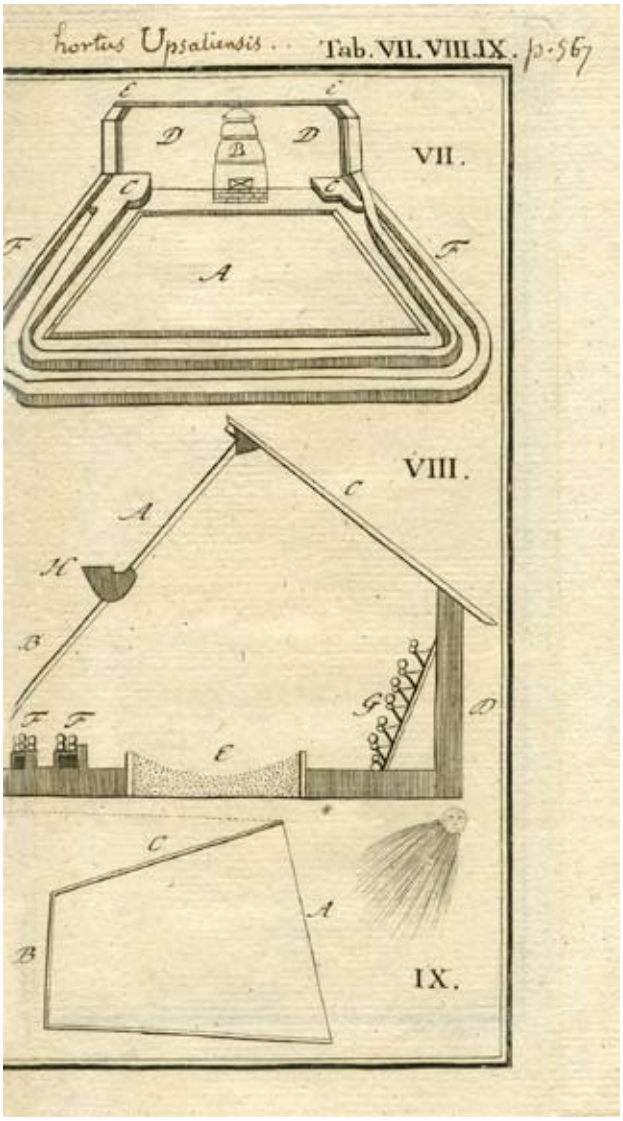


Fig. 14. Cochineal insects. After Berkeley & Berkeley, *Dr. Alexander Garden of Charles Town* (1969: 130) & photo by Champion Crabtree (1954).

Garden described the local opuntia as being unlike the *Cactus cochenillifer* of Linnaeus in having obovate rather than ovate joints, yellow flowers instead of red, and it was heavily armed with spines and glochids instead of almost naked. This could have been either *Opuntia drummondii* (Fig. 15) or *Opuntia pusilla*, the two most common species in the environs of Charleston, which would have been lumped by Linnaeus into his catch-all species *Cactus opuntia*. The only other two opuntias of the area, *O. humifusa* and *stricta*, are more or less spineless.

Fig. 15 (bottom right) *Opuntia drummondii* (ex La Mortola 1912) from Britton & Rose, *The Cactaceae* **1**: t.17, fig.6. 1919.





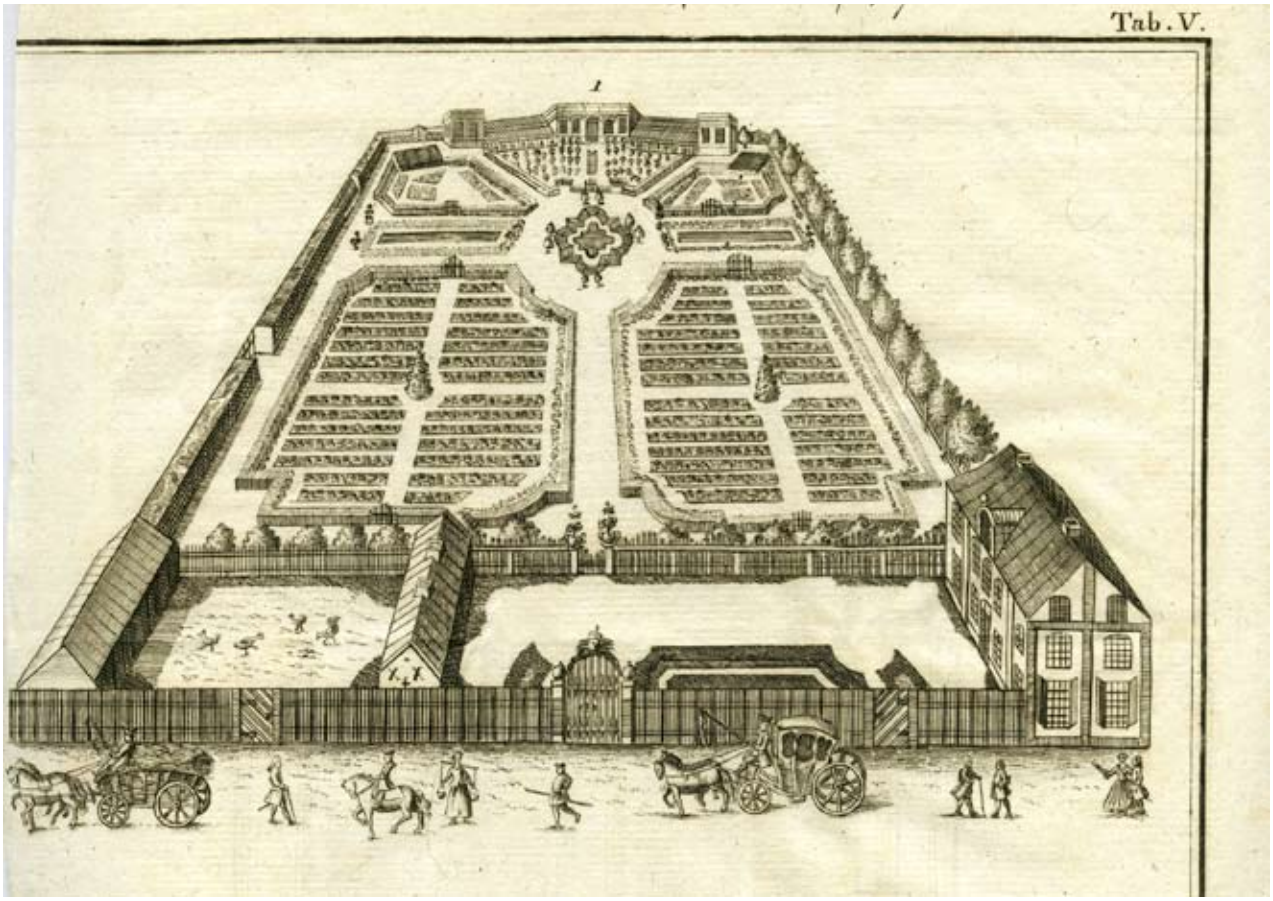


Fig. 16. The plans of Linnaeus's garden at Uppsala, from *Amoenitates academicae*, ed.3 (1787).

Linnaeus's garden

Linnaeus had probably encountered his first cacti in Clifford's garden at Hartekamp, cataloguing them for his *Hortus Cliffortianus* in 1737.

The garden at Uppsala University had been established by Olaus Johannis Rudbeck (1630-1702) in 1685, who then cultivated 1800 plants. He was succeeded by his son, Olaus Olai Rudbeck (1660-1740) who was not so interested and allowed the garden to go into decline. By 1739 the number of species cultivated had dwindled to less than 300, while the professor's residence and outbuildings had fallen into disrepair.

Linnaeus wrote to the Senate of the University, complaining about the state of affairs in the garden. Amazingly, this struck a chord and work immediately began to restore the buildings and garden. To run the garden, at Linnaeus's suggestion, Clifford's head gardener at Hartekamp, Dietrich Nietzel, was head-hunted for the job, an act seen by Clifford and his family as ingratitude for their kindness to Linnaeus and he remained out of favour from then on.

Under Nietzel, the garden thrived again, laid out to Linnaeus's design (Fig. 16). The wages of the staff were doubled, a new hothouse was constructed, designed by Linnaeus's friend and patron Baron Carl Hårleman, while the professor's residence was rebuilt to a very high standard. By 1745, 3000 species were under cultivation.

It fell into decline once again after Nietzel died in 1756, but today the garden has been once more fully restored, thanks to the Swedish Linné Society, who rebuilt the Orangery in 1955, complete with lecture rooms and offices, and converting the house to a Museum.

Linnaeus compiled two catalogues of plants in the Uppsala garden, in 1742 and in 1745. The first list was published in 1748, while the second did not appear until 1787, edited and submitted as a dissertation by Samuel Naucler.

Table 1 gives a comparison of the cacti from the three catalogues, together with the list that appeared in Species plantarum in 1753.

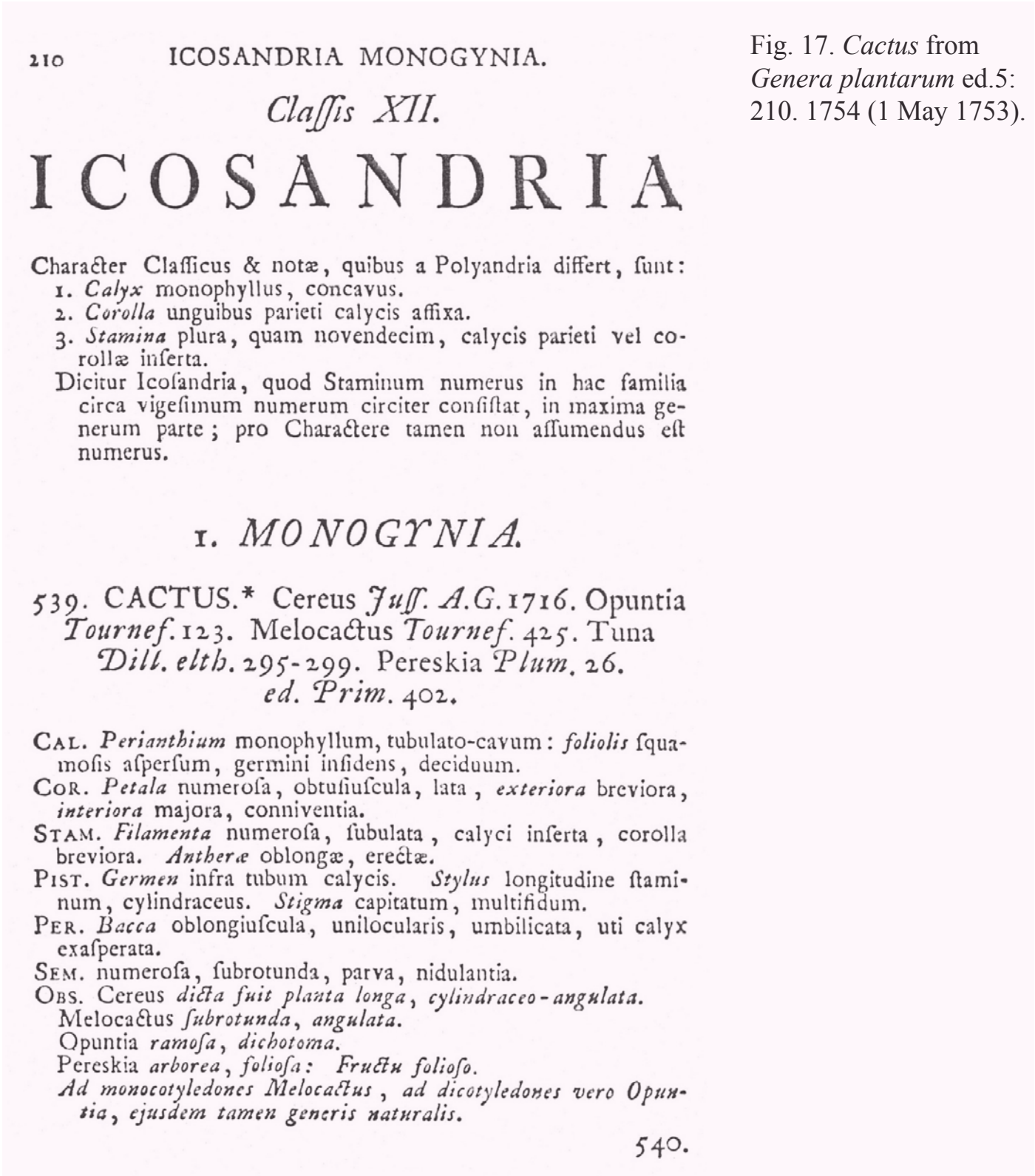
Note that three of the entries only appear in *Species plantarum*, namely *royeni*, *moniliformis* & *portulacifolius*. This implies that Linnaeus had not seen living plants and he only knew them from the descriptions and illustrations of Van Royen, Plumier & Plukenet.

Table 1: Cacti listed in the catalogues of the gardens worked in by Linnaeus, compared with the species first published at the starting point of nomenclature in 1753.

Species	**1737 Clifford's Garden**	**1742 (publ. 1748) Uppsala Garden**	**1745 (publ. 1787) Uppsala Garden (Naucler)**	**1753 *Species plantarum***
1. *Cactus mammillaris*	×	×	×	×
2. *Cactus melocactus*	×	×		×
3. *Cactus heptagonus*	×			×
4. *Cactus tetragonus*	×	×	×	×
5. *Cactus hexagonus*	×	×	×	×
6. *Cactus pentagonus*	×			×
7. *Cactus repandus*	×		×	×
8. *Cactus lanuginosus*	×			×
9. *Cactus peruvianus*	×			×
10. *Cactus royeni*				×
11. *Cactus grandiflorus*	×	×	×	×
12. *Cactus flagelliformis*		×	×	×
13. *Cactus triangularis*	×	×	×	×
14. *Cactus moniliformis*				×
15. *Cactus opuntia*	×	×		×
16. *Cactus ficus-indica*	×	×	×	×
17. *Cactus tuna*	×	×	×	×
18. *Cactus cochenillifer*		×	×	×
19. *Cactus curassavicus*	×	×	×	×
20. *Cactus phyllanthus*	×			×
21. *Cactus pereskia* L. *Pereskia aculeata* Mill.	×	×	×	×
22. *Cactus portulacifolius*				×

Taxonomic analysis

Modern botanical nomenclature starts with the names of taxa described by Linnaeus in his two seminal works *Genera plantarum* ed.5 (Fig. 17) and *Species plantarum* ed.1 (Fig. 18). For the purposes of nomenclature, these two works are deemed to have been published simultaneously on 1 May 1753, and therefore both need to be taken into account in assessing the typifications of species. Also, wherever the earlier Linnaean works *Hortus Cliffortianus* (1738) and *Hortus Upsaliensis* (1748) are cited, data published there are also to be considered as part of the protologue.



210 ICOSANDRIA MONOGYNIA.

Classis XII.

ICOSANDRIA

Character Classicus & notæ, quibus a Polyandria differt, sunt:
1. *Calyx* monophyllus, concavus.
2. *Corolla* unguibus parieti calycis affixa.
3. *Stamina* plura, quam novendecim, calycis parieti vel corollæ inserta.

Dicitur Icosandria, quod Staminum numerus in hac familia circa vigesimum numerum circiter consistat, in maxima generum parte; pro Charactere tamen non assumendus est numerus.

1. *MONOGYNIA.*

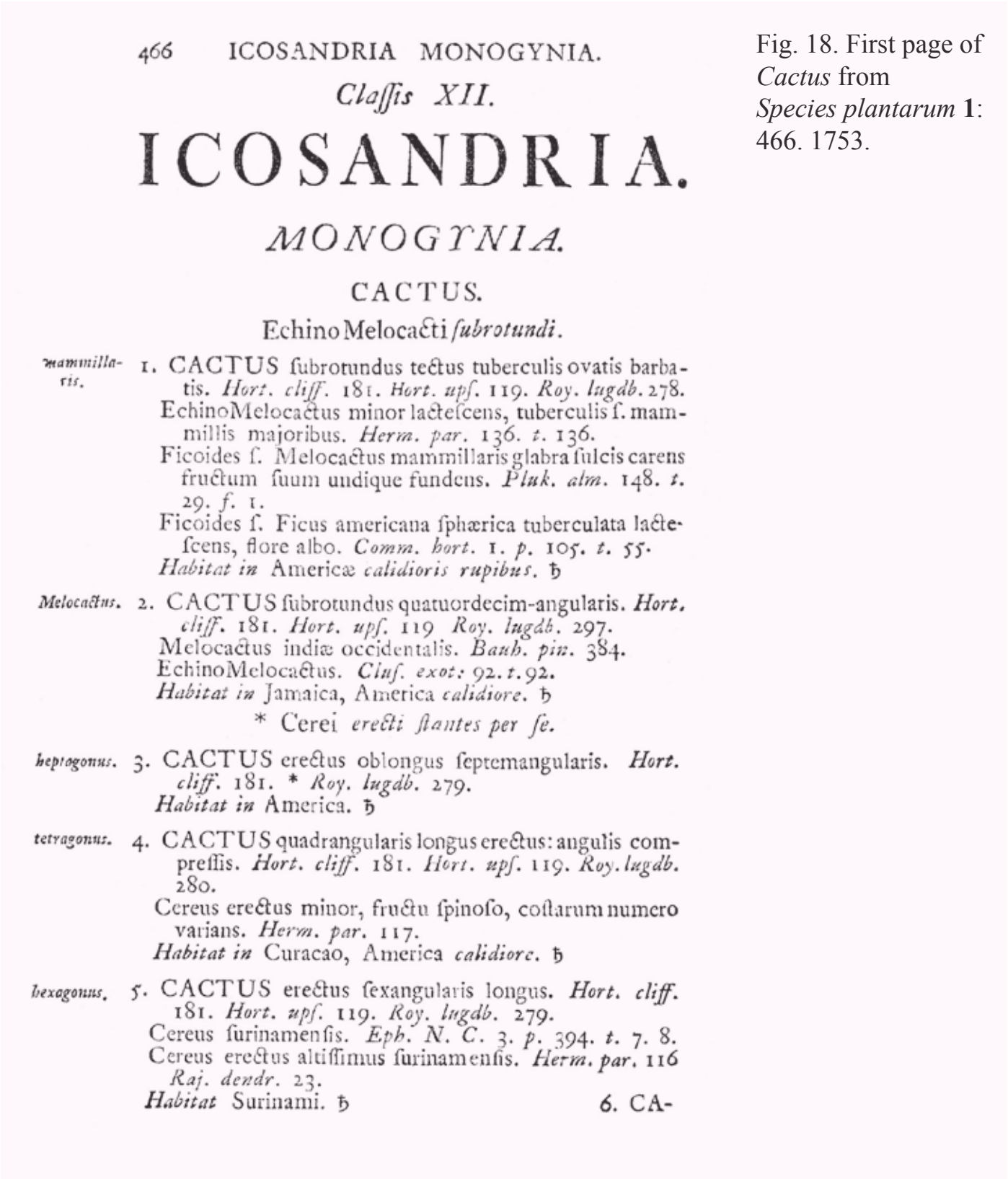
539. CACTUS.* Cereus *Juss. A.G.* 1716. Opuntia *Tournef.* 123. Melocactus *Tournef.* 425. Tuna *Dill. elth.* 295-299. Pereskia *Plum.* 26. *ed. Prim.* 402.

CAL. *Perianthium* monophyllum, tubulato-cavum: *foliolis* squamosis aspersum, germini insidens, deciduum.
COR. *Petala* numerosa, obtusiuscula, lata, *exteriora* breviora, *interiora* majora, conniventia.
STAM. *Filamenta* numerosa, subulata, calyci inserta, corolla breviora. *Antheræ* oblongæ, erectæ.
PIST. *Germen* infra tubum calycis. *Stylus* longitudine staminum, cylindraceus. *Stigma* capitatum, multifidum.
PER. *Bacca* oblongiuscula, unilocularis, umbilicata, uti calyx exasperata.
SEM. numerosa, subrotunda, parva, nidulantia.
OBS. Cereus *dicta fuit planta longa, cylindraceo-angulata.*
Melocactus *subrotunda, angulata.*
Opuntia *ramosa, dichotoma.*
Pereskia *arborea, folios: Fructu folioso.*
Ad monocotyledones Melocactus, ad dicotyledones vero Opuntia, ejusdem tamen generis naturalis.

540.

Fig. 17. *Cactus* from *Genera plantarum* ed.5: 210. 1754 (1 May 1753).

Note particularly that at the foot of the page from *Genera plantarum* are brief diagnoses and the place of publication of the names *Melocactus* (illegitimate here because it should be called *Cactus*), *Cereus*, *Opuntia* and *Pereskia* as unranked infrageneric taxa. They are validly published, despite the rejection of *Cactus* L., and available for future use. These names were all subsequently used as genera by Miller and others and had been in common usage as genera in pre-Linnaean times.



466 ICOSANDRIA MONOGYNIA.

Classis XII.

ICOSANDRIA.

MONOGYNIA.

CACTUS.

Echino Melocacti *subrotundi.*

mammillaris. 1. CACTUS subrotundus tectus tuberculis ovatis barbatis. *Hort. cliff.* 181. *Hort. upsal.* 119. *Roy. lugdb.* 278.
Echino Melocactus minor lacteſcens, tuberculis ſ. mammillis majoribus. *Herm. par.* 136. *t.* 136.
Ficoides ſ. Melocactus mammillaris glabra ſulcis carens fructum ſuum undique fundens. *Pluk. alm.* 148. *t.* 29. *f.* 1.
Ficoides ſ. Ficus americana ſphærica tuberculata lacteſcens, flore albo. *Comm. hort.* 1. *p.* 105. *t.* 55.
Habitat in Americæ *calidioris rupibus.* ♄

Melocactus. 2. CACTUS ſubrotundus quatuordecim-angularis. *Hort. cliff.* 181. *Hort. upsal.* 119 *Roy. lugdb.* 297.
Melocactus indiæ occidentalis. *Bauh. pin.* 384.
Echino Melocactus. *Cluſ. exot.* 92. *t.* 92.
Habitat in Jamaica, America *calidiore.* ♄

* Cerei *erecti ſtantes per ſe.*

heptagonus. 3. CACTUS erectus oblongus ſeptemangularis. *Hort. cliff.* 181. * *Roy. lugdb.* 279.
Habitat in America. ♄

tetragonus. 4. CACTUS quadrangularis longus erectus: angulis compreſſis. *Hort. cliff.* 181. *Hort. upsal.* 119. *Roy. lugdb.* 280.
Cereus erectus minor, fructu ſpinoſo, coſtarum numero varians. *Herm. par.* 117.
Habitat in Curacao, America *calidiore.* ♄

hexagonus. 5. CACTUS erectus ſexangularis longus. *Hort. cliff.* 181. *Hort. upsal.* 119. *Roy. lugdb.* 279.
Cereus ſurinamenſis. *Eph. N. C.* 3. *p.* 394. *t.* 7. 8.
Cereus erectus altiſſimus ſurinamenſis. *Herm. par.* 116 *Raj. dendr.* 23.
Habitat Surinami. ♄

6. CA-

Fig. 18. First page of *Cactus* from *Species plantarum* **1**: 466. 1753.

There are no Linnaean protologues of cacti that include citations of herbarium specimens, and the few exsiccata that do exist are undated and mainly preserved after the botanical nomenclature starting date of 1753. Illustrations, however, are frequently cited, both directly in the protologue, or indirectly via a reference to his own and other publications, but most researchers to date have taken little account of the numerous illustrations cited in *Genera plantarum*, *Hortus cliffortianus*, and *Hortus Upsaliensis*. This omission is rectified here with a fresh overview that has hitherto not been done.

Genus

Cactus L., *Species plantarum* **1**: 466. (1 May) 1753, & *Genera plantarum*, ed.5: 210. 1754 [but considered to be (1 May) 1753] nom. rej. (1905).

The name *Cactus* was abandoned in 1905 and replaced with:
Mammillaria Haw., *Syn. Pl. Succ.*: 177. 1812 nom. cons. (1905).
Typ: *Cactus mammillaris* L. typ. cons. (1905).

Obs: *Cactus melocactus* L., was the autotype under Art. 10.1, but in 1905 the type of *Cactus* L. was conserved as *Cactus mammillaris* L. Thus, *Cactus* L. nom. rej. is today a homotypic synonym of *Mammillaria* Haw.

This conservation was in serious conflict with the first 150 years of prior usage and irrational because the rules could have been applied without problem. Indeed, there was a spirited objection to the conservation from the American school of botany, led by Nathaniel Britton, who continued to use the name *Cactus* L. in its original sense, but gradually by default the conservation has become so widely and persistently used in this sense for over 100 years that it now seems to be impossible to correct (Art. 57.1, & Mottram 1993).

Note: Rejected names are not available for use. *Cactus* L. is a rejected name that is now referred to *Mammillaria* Haw. However, the epithets of such name combinations that are validly published are available for later legitimate recombinations.

Infrageneric divisions

Cactus L. nom. rej. infragen.
Echinomelocactus L., *Species plantarum* **1**: 466. (1 May) 1753 nom. inval. (Art. 22.6)
Descr: Subrotundi (Almost globular).
Typ: *Cactus mammillaris* L. typ. cons. (1905).
Syn: *Cactus* L. nom. rej. infragen. *Cactus* (1753); *Mammillaria* Haw. (1812) nom. cons. (1905)
Obs: Comprised the two species *Cactus mammillaris* L. typ. cons. [*Mammillaria mammillaris* (L.) Haw.] and *C. melocactus* L. [*Melocactus communis* Link & Otto].

Cactus L. nom. rej. infragen. ***Melocactus*** L., *Genera plantarum*, ed.5: 210. 1754 [1 May 1753].
Descr: Subrotunda, angulata (Almost globular, angled).
Typ: *Melocactus communis* Link & Otto [subst. for *Cactus melocactus* L.] typ. cons. (1969).
Syn: *Melocactus* (L.) Link & Otto (1827) nom. cons. (Proposed for conservation by Rothmaler 1944. Adopted by the International Botanical Congress 1969).
Obs: Comprised the two species *Cactus mammillaris* L. typ. cons. [*Mammillaria mammillaris* (L.) Haw.] and *C. melocactus* L. [*Melocactus communis* Link & Otto].

Cactus L. nom. rej. infragen. ***Cereus*** L., *Species plantarum* **1**: 466-467. (1 May) 1753, & *Genera plantarum*, ed.5: 210. 1754 [1 May 1753].
Descr: Dicta suit planta longa, cylindraceo-angulata (Applied to any long, cylindrical angled plant). Divided into 2 infrageneric unnamed ranks, described as: Cerei erecti stantes per se (Erect, free-standing cerei), & Cerei repentes radiculis lateralibus (Creeping cerei with adventitious roots).

Lectotyp: (design. Britton & Rose, *The Cactaceae* **2**: 3. 1920): *Cactus hexagonus* L. [*Cereus hexagonus* (L.) Mill.].
Syn: *Cereus* (L.) Mill. (1768).
Obs: The Linnaean circumscription included the eleven species *Cactus heptagonus*, *C. tetragonus, C. hexagonus*, *C. pentagonus*, *C. repandus*, *C. lanuginosus*, *C. peruvianus*, *C. royeni*, *C. grandiflorus*, *C. flagelliformis*, and *C. triangularis*.

Cactus L. nom. rej. infragen. ***Opuntia*** L., *Species plantarum* **1**: 468. (1 May) 1753, & *Genera plantarum*, ed.5: 210. 1754 [1 May 1753].
Descr: Ramosa, dichotoma (Dichotomously branched). The description: Opuntiae compressae articulis proliferis, in *Species plantarum* applies only to the six species that directly follow it.
Typ: *Cactus Opuntia* L. (auto.) ≡ *Opuntia ficus-indica* (L.) Mill.
Syn: *Opuntia* (L.) Mill. (1768).
Obs: The Linnaean circumscription in *Species plantarum* includes the eleven species *Cactus moniliformis*, *C. Opuntia*, *C. Ficus-indica*, *C. Tuna*, *C. cochenillifer*, *C. curassavicus*, *C. Phyllanthus*, *C. Pereskia*, *C. portulacifolius*.
The last three of these species correctly belong to *Pereskia* (L.) Mill. and *Epiphyllum* Haw.

Cactus L. nom. rej. infragen. ***Pereskia*** L., *Genera plantarum*, ed.5: 210. 1754 [1 May 1753].
Descr. Arborea, foliosa: fructu folioso (Tree-like, leafy: with leafy fruit).
Typ: *Cactus Pereskia* L. ≡ *Pereskia aculeata* Mill.
Syn: *Pereskia* (L.) Mill. (1768).
Obs: Comprised two species: *Cactus Pereskia* and *C. portulacifolius*.

The 22 species:

1. ***Cactus mammillaris*** [*Mammillaria mammillaris*]. (Fig. 19)
Cactus mammillaris L., *Species plantarum* **1**: 466. (1 May) 1753. Cactus subrotundus tectus tuberculis ovatis barbatis L. *Hort. cliff.*: 181 nr.1. 1737. *Hort. ups.*: 119 nr.1. 1748.
Typ: Rocky places in tropical America. [Introduced c.1687 from Curaçao].
Lectotyp: (design. Willdenow 1809: 30): Plukenet, *Phytographia* t.29 fig.1. 1691, as Ficoides, s. Melocactos mammillaris glabra, sulcis carens, fructum suum undique sundens. (Fig. 20).

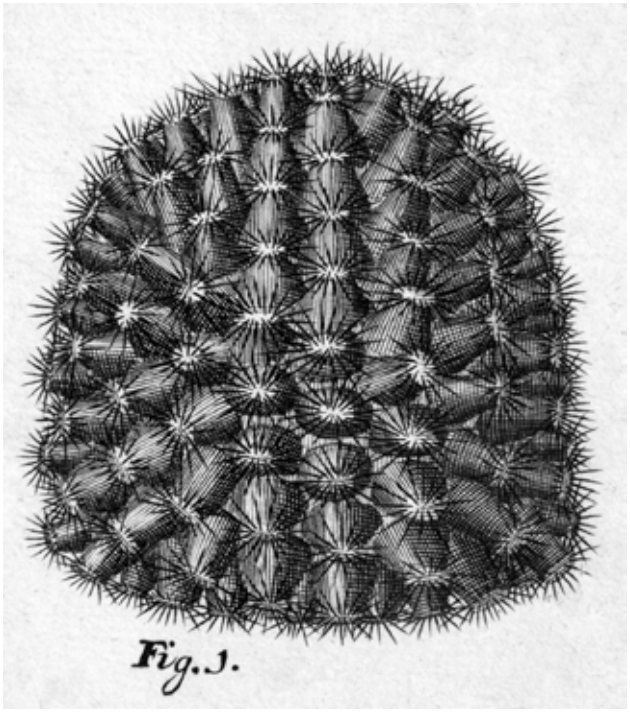
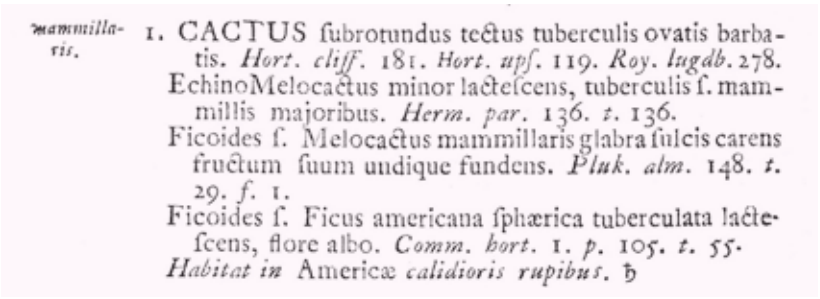


Fig. 19. *Cactus mammillaris* L. from Plukenet, *Phytographia* t.29 fig.1. 1691. (Lectotype).

According to Aiton (1811: 175), this species was cultivated in Bishop Compton's garden from before 1688, the source of the plant illustrated by Plukenet. It probably first arrived in Europe from the Dutch West Indies in 1687 or earlier since Herman grew it at Leiden (1687: 670), crediting Simon van Beaumont (1641-1726) of The Hague for its introduction. Commelijn wrote: "America is its habitat, and it has been sent us from



mammillaris. 1. CACTUS ſubrotundus tectus tuberculis ovatis barbatis. *Hort. cliff.* 181. *Hort. upſ.* 119. *Roy. lugdb.* 278. EchinoMelocactus minor lacteſcens, tuberculis ſ. mammillis majoribus. *Herm. par.* 136. *t.* 136. Ficoides ſ. Melocactus mammillaris glabra ſulcis carens fructum ſuum undique fundens. *Pluk. alm.* 148. *t.* 29. *f.* 1. Ficoides ſ. Ficus americana ſphærica tuberculata lacteſcens, flore albo. *Comm. hort.* 1. *p.* 105. *t.* 55. *Habitat in* Americæ *calidioris rupibus.* ♄

Fig. 20. Protologue of *Cactus mammillaris* L. from *Species plantarum*: 466. 1753.

Curaçao and other neighbouring islands."

Other cited original material:

Commelijn, J., *Horti medici amstelodamensis rariorum* 1: t.55. 1697. (Fig. 21) [Copied from the unpublished Moninckx Atlas (1686-1690) **5**: t.9., reproduced in Wijnands (1983: t.36). An earlier depiction of the species of more natural shape was also executed in the Moninckx Atlas and dated 1687, but that did not appear in Commelijn's work and was therefore not seen by Linnaeus].

Fig. 21. *Cactus mammillaris* L. from Commelijn, J., *Horti Medici Amstelodamensis rariorum* **1**: t.55. 1697. Copied from Moninckx Atlas **5**: t.9. 1686-1690.

Hermann, *Paradisus batavus*: t. 136. 1698. (Fig. 22).

Principal homotypic synonyms:
Mammillaria mammillaris (L.) Karsten, *Deut. fl.*: 888. 1882.
Neomammillaria mammillaris (L.) Britton & Rose, *The Cact.* **4**: 70. 1923.

Principal heterotypic synonym:
Mammillaria simplex Haw., *Syn. pl. succ.*: 117.1812 nom.illeg. (Art. 52.1). [Based on *Cactus mammillaris* α W.T.Aiton, which includes the type of *C. mammillaris* L.]

All three illustrations are readily identifiable, as this was the only mammillaria known at the time apart from *Mammillaria prolifera* from Haiti, which had been drawn and described by Plumier (1689-1690 or 1693) and by Plukenet (1691), but was overlooked by Linnaeus in this edition. It was, however,

Fig. 22. *Cactus mammillaris* L. from Hermann, *Paradisus batavus*: t. 136. 1698.

listed in ed. 2 of 1762 as a synonym of *Cactus mammillaris*.

The three illustrations show plants that were unnaturally elongated, as they invariably tend to be when in cultivation, but those of Commelijn and Hermann are particularly exagerated.

to plate 425.

Other original material:

Echinomelocactus, L'Ecluse, *Exoticorum libri decem*: 92, t.92. 1605. (Fig. 25) [This was later claimed to be automatically the holotype by Heath (1994: 90), who believed

539. CACTUS.* Cereus *Juss. A.G.* 1716. Opuntia *Tournef.* 123. Melocactus *Tournef.* 425. Tuna *Dill. elth.* 295-299. Pereskia *Plum.* 26. *ed. Prim.* 402.

Melocactus. 2. CACTUS subrotundus quatuordecim-angularis. *Hort. cliff.* 181. *Hort. upf.* 119 *Roy. lugdb.* 297. Melocactus indiæ occidentalis. *Bauh. pin.* 384. EchinoMelocactus. *Clus. exot.* 92. *t.* 92. *Habitat in* Jamaica, America *calidiore.* ♄

Fig. 23. Protologues of *Cactus* infragen. *Melocactus* L. & *Cactus Melocactus* L. from *Gen. Pl. & Sp. Pl.* (1753).

2. ***Cactus Melocactus*** [*Melocactus communis*]. (Fig. 23)
Cactus melocactus L., *Species plantarum* **1**: 466. (1 May) 1753. Cactus subrotundus quatuordecim-angularis L. *Hort. cliff.*: 181 nr.2. 1737. *Hort. ups.*: 119 nr.2. 1748. *Gen. Pl.*: 210. 1753 [autotype of *Cactus* infragen. *Melocactus* ≡ *Cactus* L. nom. rej. infragen. *Cactus*].
Typ: West Indies. Cited as "Jamaica, tropical America" in Species plantarum, "On coastal rocks of America, such as Jamaica and elsewhere" in *Hortus Cliffortianus*, and "Rocky places of Jamaica and tropical America" in *Hortus Upsaliensis*.
Lectotyp: (design. Mottram 1993: 462): Tournefort, *Inst. rei. herb.* ed.3: t.425. 1719, as *Melocactus* without specific identity. (Fig. 24). Vernacular names from the text on loc. cit. page 653 were: "Melon épineux ou Tête à l'Anglois." [Spiny Melon or Englishman's Head, both early common names of *Melocactus intortus* (Mill.) Urb.]. The illustration was listed by Linnaeus in the synonymy of the genus *Cactus*, and overlooked by other authorities because they assumed that "*Melocactus* Tournef. 425" was a page reference, whereas it is in fact a direct reference it to be the only cited illustration and therefore the holotype].

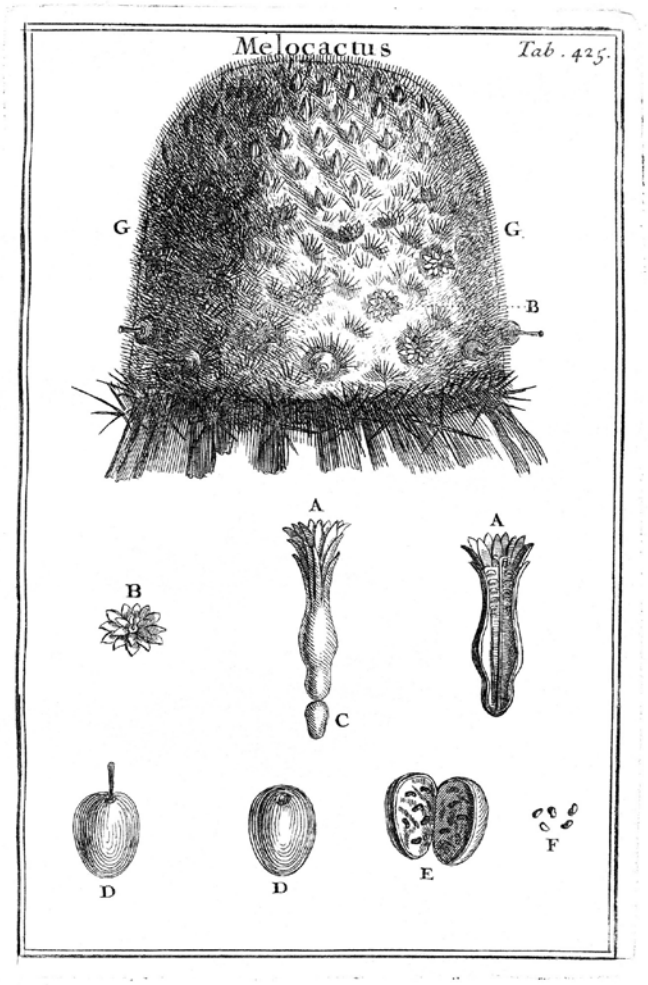


Fig. 24. *Cactus Melocactus* L. from Tournefort, *Institutiones rei herbariae* **3**: t.425. 1719 (Lectotype).

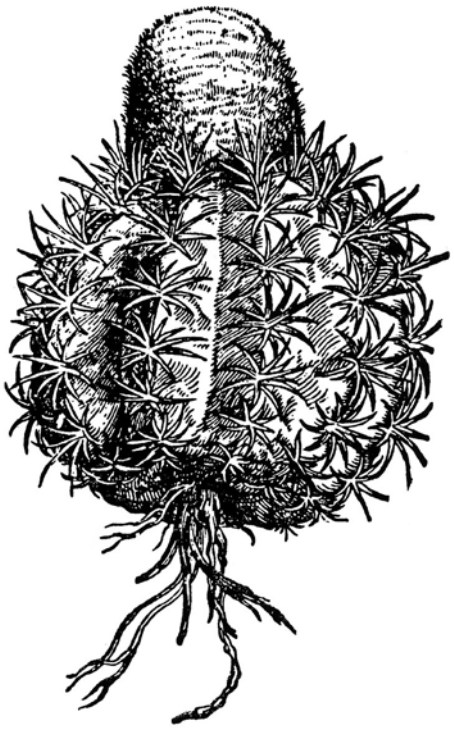


Fig. 25. Echinomelocactus, from L'Ecluse, *Exoticorum libri decem*: 92, t.92. 1605.

Principal homotypic synonyms:

Cactus Melocactus α *communis* W.T.Aiton, *Hortus kewensis*, ed.2 **3**: 175. 1811 nom. rej. & illeg. (Art. 52.1) ≡ *Cactus melocactus* L. var. *melocactus*.

Melocactus communis (W.T.Aiton) Link & Otto, *Ueber die Gattungen Melocactus und Echinocactus, Verhandslungen des Vereins zur Veförderung des Gartenbaues in den Königlich Preussischen Staaten* **3**: 417-418, 430. 1827. Heterotypic synonym of ***Melocactus intortus*** (Mill.) Urb.

Principal heterotypic synonyms:

Cactus intortus Mill., *Gard. dict.*, ed.8: Cactus 2. 1768. T: Antigua.
Miller said that he received his plant from Antigua along with the common sort and speculated that they might be variants of the same species.
Neotyp.(design. Taylor, *Bradleya* **9**: 78): Antigua; *R. A. Howard 18492* (K).

Melocactus intortus (Mill.) Urb., Sertum antillanum 8, *Repert. Spec. Nov. Regni Veg.* **16**: 35. 1919.

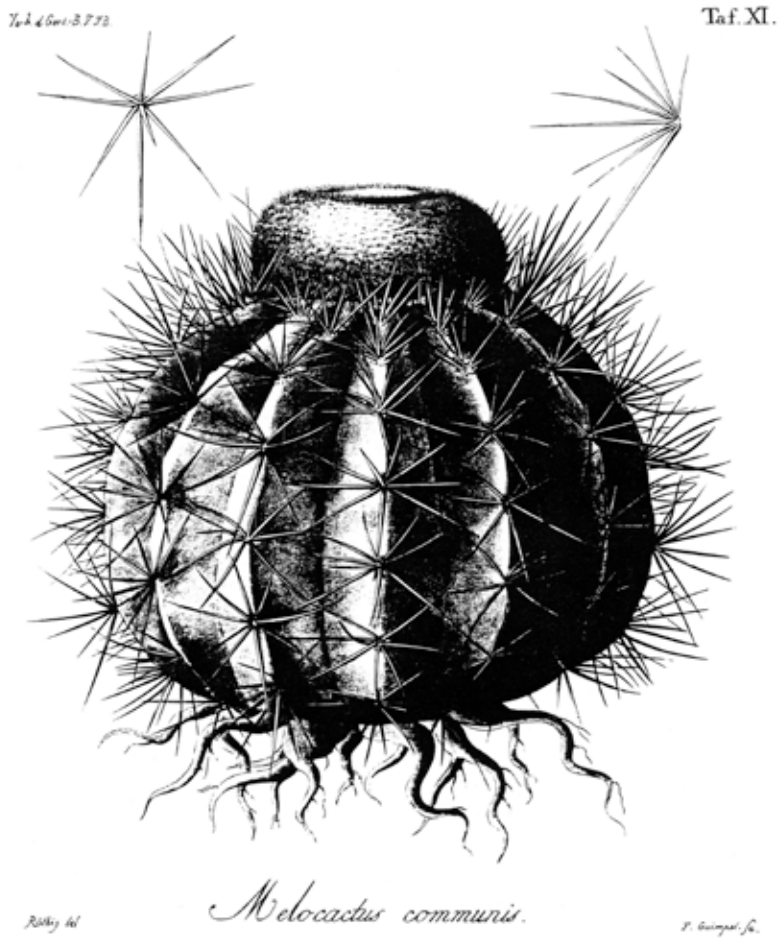


Fig. 26. *Melocactus intortus* [*M. communis*] Link & Otto, *Ueber die Gattungen Melocactus und Echinocactus, Verhandlungen des Vereins zur Beförderung des Gartenbaues in den Königlich Preussischen Staaten* **3**: t.11. 1827.

Only two illustrations were directly cited by Linnaeus. Of these, the illustration by Tournefort (1719) (Fig. 24) was designated by Mottram (1993) as the lectotype of *Cactus melocactus* L., because it was the only included element in *Genera plantarum*, and therefore the type of *Cactus* infragen. *Melocactus* L., making *Cactus Melocactus* L. automatically the type species of *Cactus* L. until the rejection at the 1905 Congress.

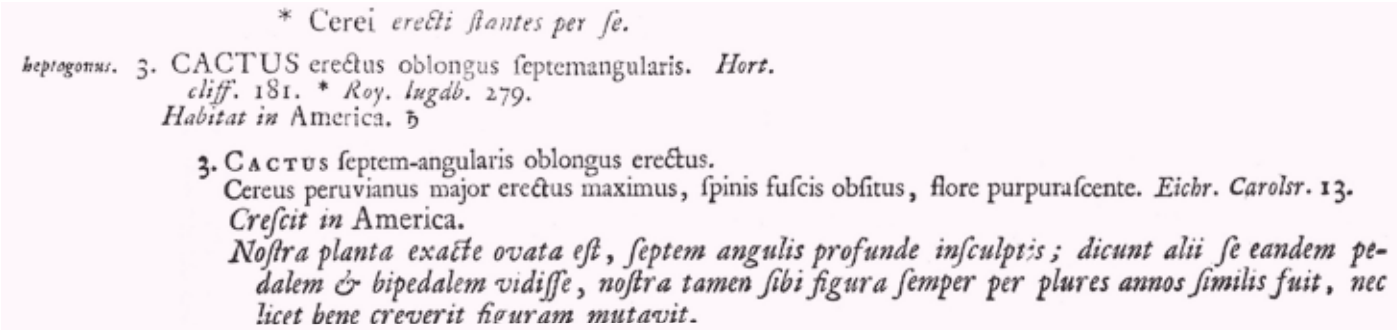
The specific epithet was spelt with a capital M to signify that it was named from the pre-Linnean generic rank name of Melocactus.

The name *Melocactus caroli-linnaei* was given to *Cactus melocactus* by Nigel Taylor in 1991 because it was said that the type locality cited by Linnaeus was Jamaica. However, Linnaeus did not unequivocally designate Jamaica as its type locality. There are no key characters mentioned in the protologue that would enable us to identify the species of *Melocactus* he cited, because to Linnaeus there was only one species in the sense of the generic name as applied today. The identity of Tournefort's illustration is also uncertain, although it probably represents one of the three species figured by his compatriot and friend Plumier, namely *intortus*, *broadwayi* or *lemairei*, from the islands of the Caribbean occupied by, or friendly towards, France at the time. So the correct name for *Cactus melocactus* L. is the earliest name that includes *Cactus melocactus* as a synonym. This happens to be *Melocactus communis* Link & Otto (1827), whose own correct identity is also still somewhat uncertain, but all authorities appear to think that this was the same as *Melocactus intortus* (Mill.) Urb., the earliest legitimate name for it in the rank of species, and the most common Caribbean species of *Melocactus*.

Fig. 27. *Melocactus intortus* [syn. *communis*] in cultivation. Photo: Roy Mottram

The plant that Link & Otto illustrated as *Melocactus communis* in plate 11 was in cultivation in the Berlin Botanical Garden, and appeared six years later in the checklist of cacti growing in that garden in Otto (1833: 364). In this checklist, Plate 11 is more precisely named as *Melocactus communis* var. *macrocephalus*, and Santo Domingo and Thomas (U.S. Virgin Islands) given as its source. Only *Melocactus intortus* occurs in the Virgin Islands, but two *Melocactus* species inhabit Santo Domingo. The checklist also lists three other illustrations in the synonymy of *M. communis*, namely those in *Curtis's Botanical Magazine* t.3090 (1851) and the two by de Candolle from *Historia plantarum succulentarum* t.112 [listed erroneously as 12] (1803) and *Revue de la familie de Cactées* t.6 (1827). All these are evidently *Melocactus intortus* (Mill.) Urb.

Link & Otto's own illustration (Fig. 26) is not characteristic of *Melocactus intortus* (cf. Fig. 27), which has more ribs and areoles per rib than their plate 11, but their concept of *M. communis* was probably mixed, because their typical form was described as being a very small plant, only 6 inches high.



* Cerei *erecti ſtantes per ſe.*

heptagonus. 3. CACTUS erectus oblongus ſeptemangularis. *Hort. cliff.* 181. * *Roy. lugdb.* 279. *Habitat in* America. ♄

3. CACTUS ſeptem-angularis oblongus erectus.
Cereus peruvianus major erectus maximus, ſpinis fuſcis obſitus, flore purpuraſcente. *Eichr. Carolsr.* 13.
Creſcit in America.
Noſtra planta exacte ovata eſt, ſeptem angulis profunde inſculptis; dicunt alii ſe eandem pedalem & bipedalem vidiſſe, noſtra tamen ſibi figura ſemper per plures annos ſimilis fuit, nec licet bene creverit figuram mutavit.

Fig. 28. *Cactus heptagonus* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

3. ***Cactus heptagonus*** [*Stenocereus heptagonus* (L.) Mottram **comb. nov.**]
Cactus heptagonus L., *Species plantarum* **1**: 466. (1 May) 1753. Cactus erectus oblongus septemangularis L. *Hort. cliff.*: 181 nr.3. 1737.
Typ: America.
Lectotyp: (designated here): Haiti, La Bande du Sud, clearings of hot, rough woodland, by the sea; Charles Plumier, in Botanicon Americanum 3: t.25. 1689-1697, as Opuntia monoclonos cereiformis amplo flore roseo fimbriato. Reproduced in Mottram (2002: 112). (Fig. 29)

Other phrase names cited by other authors that were known to Linnaeus applicable here:
Bauhin (1623: 458): Cereus Peruanus spinosus fructu rubro mucis magnitudine.
Sloane (1696: 196): Cereus crassissimus, fructu intus & extus rubro. (The Larger Dildo Tree).
Tournefort (1700: 653): Melocactus Americanus, monoclonos flore albo, fructu atro-purpureo. (Cierge épineux du Tertre [Spiny mound candle]).
Plumier (1703b: 19): Melocactus monoclonos, fructu atro-purpureo. *Inst. r. herb.* 653.

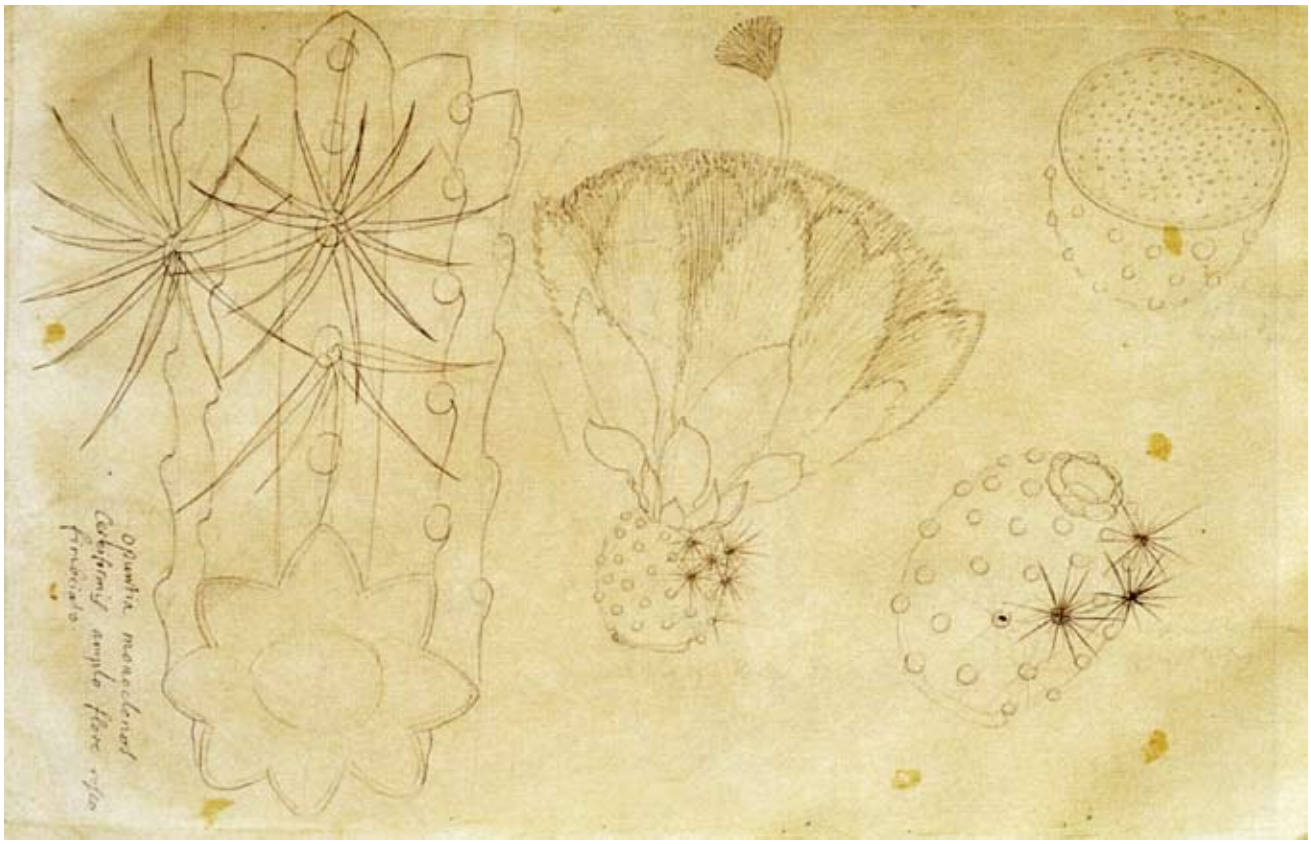


Fig. 29. *Stenocereus heptagonus* (Haiti, La Bande du Sud, clearings of hot, rough woodland, by the sea). Plumier, *Botanicon Americanum* **3**: t.25. c.1690. Also the lectotype of *Stenocereus fimbriatus*, designated by Lourteig (1991: 408).

Principal homotypic synonyms:
Cereus heptagonus (L.) Mill., *Gardeners dictionary*: Cereus 6. 1768.

Cactus fimbriatus Lam., *Encyclopédie méthodique. Botanique* **1**: 539. 1785. *LT*(design. Hunt 1984: 42): t.25 in Plumier (1689-1697).

Cereus grandispinus Haw., *Philos. Mag. Ann. Chem.* (N.S.) **7**(38): 113. 1830. *T*: t.195, fig. 2(E, F, G), in Burman (1758). (Tubeless [-flowered] Great-spined Cereus).

Stenocereus fimbriatus (Lam.) Lourteig, *Bradea* **5**(44): 400-411. 1991.

Principal heterotypic synonyms:
Cereus griseus Haw., *Synopsis plantarum succulentarum*: 182. 1812. *T:* South America, ex cult. Mr. Vere collection.

Cactus hystrix Haw., *Supplementum plantarum succulentarum*: 73. 1819. *T*: West Indies, ex cult. Chelsea since 1818.

Cereus eburneus Salm-Dyck, *Observationes botanicae in horto Dyckensis notatae* **3**: 6-7. 1822. *T*: Based on *Cactus peruvianus* Willd. non. L. (*Enumeratio Suppl.*: 32. 1814). *LT*(design. here): Salm-Dyck t.9, in Rowley (1999: 10), titled "*Cactus eburneus* hor. Dyck: – *peruvianus* Willd.: – an *heptagonus* Lin:?" (Fig. 30)

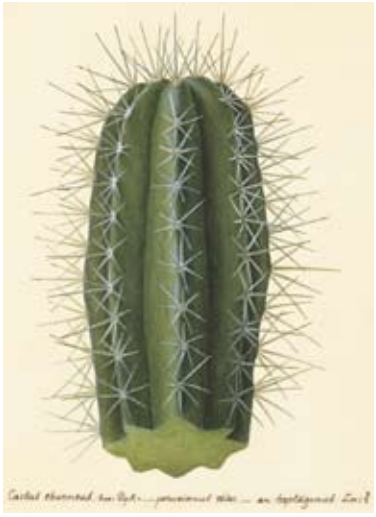


Fig. 30. Salm-Dyck t.9, in Rowley (1999: 10), identifiable as *Stenocereus heptagonus* (L.) Mottram and lectotype of *Cereus eburneus* Salm-Dyck (1822).

The protologue of this taxon comprised the descriptions in *Species plantarum* (1753) and *Hortus Cliffortianus* (1738) (Fig. 28) in which no illustrations are cited. However, in the second & third editions of *Species Plantarum* (1762-63, 1764: 666-667), Linnaeus noted: "The history of the angular cacti [numbered] 3-14, remains somewhat obscure, but they mostly appear in the illustrations of Plumier, where they are skilfully delineated for the benefit of travellers to the Indies". The set of 508 copies from Plumier's original drawings known as the *Codex Boerhaavianus* were studied by Linnaeus at Leiden while he was collaborating with Van Royen in the winter of 1737-38, and
Plumier's Vol.3, plate 25 of what is now known as a *Stenocereus* was certainly among them (eventually recopied by Burman). This is therefore original material and available for designation as a lectotype of *Cactus heptagonus* L.

Linnaeus described a plant in Clifford's garden as being "exactly ovate, with 7 deeply cut ribs and purplish flowers; it continued the same for many years, though it grew well; others say that they have seen it a foot and a half and two feet high." The dimensions of the plant suggest a *Melocactus* to some, and indeed Jarvis (2007) identifies it as such, following the suggestion made by some earlier authors. In reality, it was a short top cutting of a rather stout cereus. Moscosco (1941: t.5B) provided a photo of a top cutting (Fig. 31a) from the Dominican Republic within reasonable distance of the type locality, which agrees well with the Linnaean protologue, including the requisite seven ribs, as also does the Britton & Rose photo (1909: t.67) (Fig. 31b). The photo of the top of a flowering stem of a plant from Curaçao in Backeberg (1960: 2183) appears to have eight ribs (Fig. 31c), the same as the plant in Plumier's drawing.

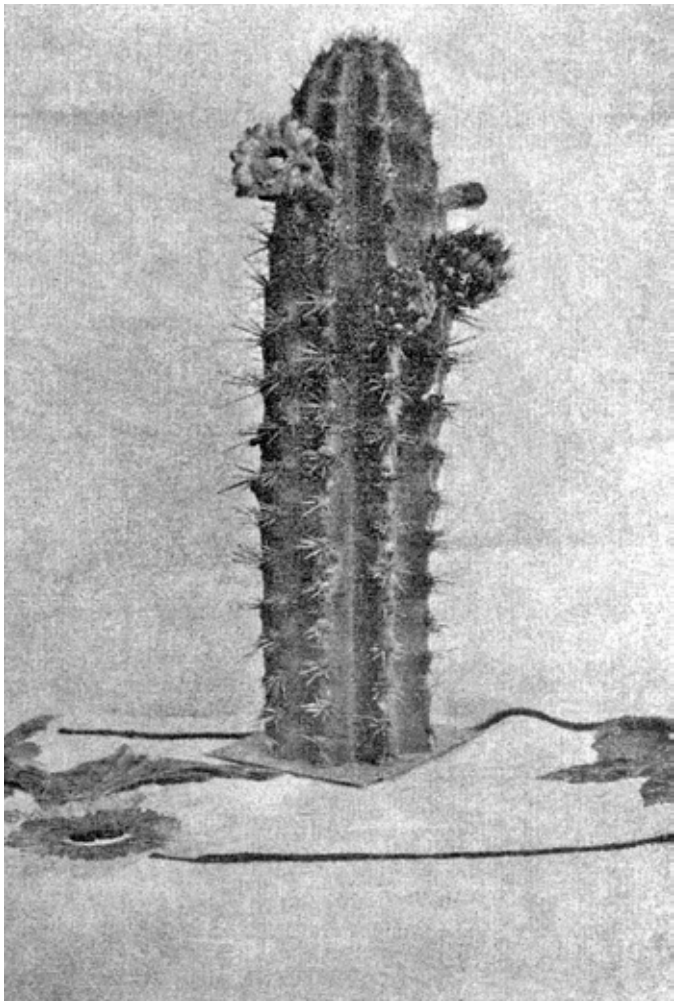
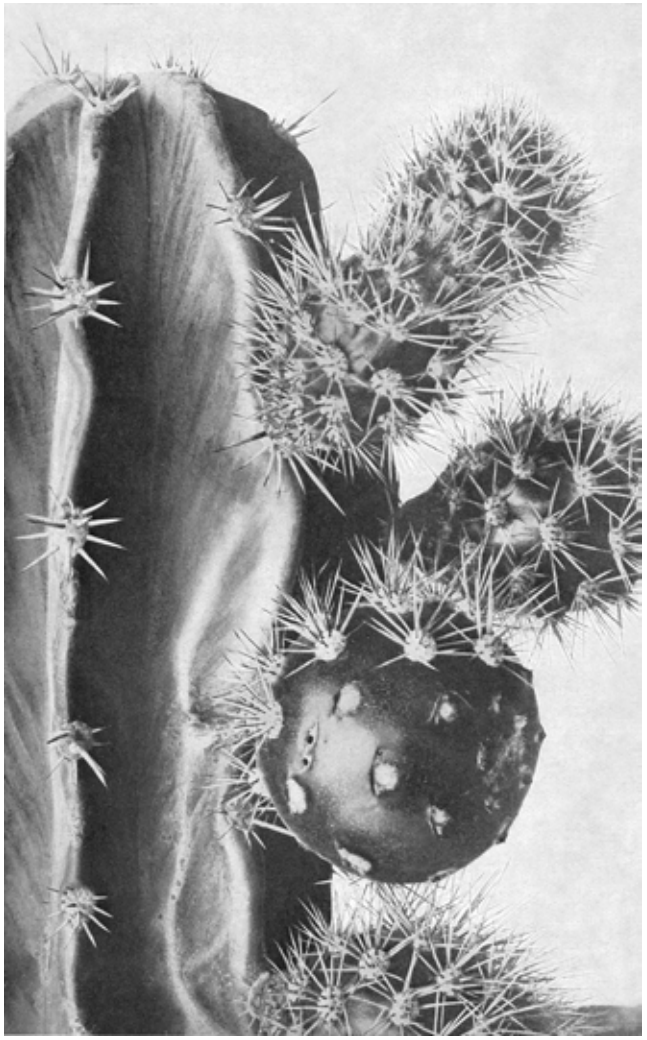
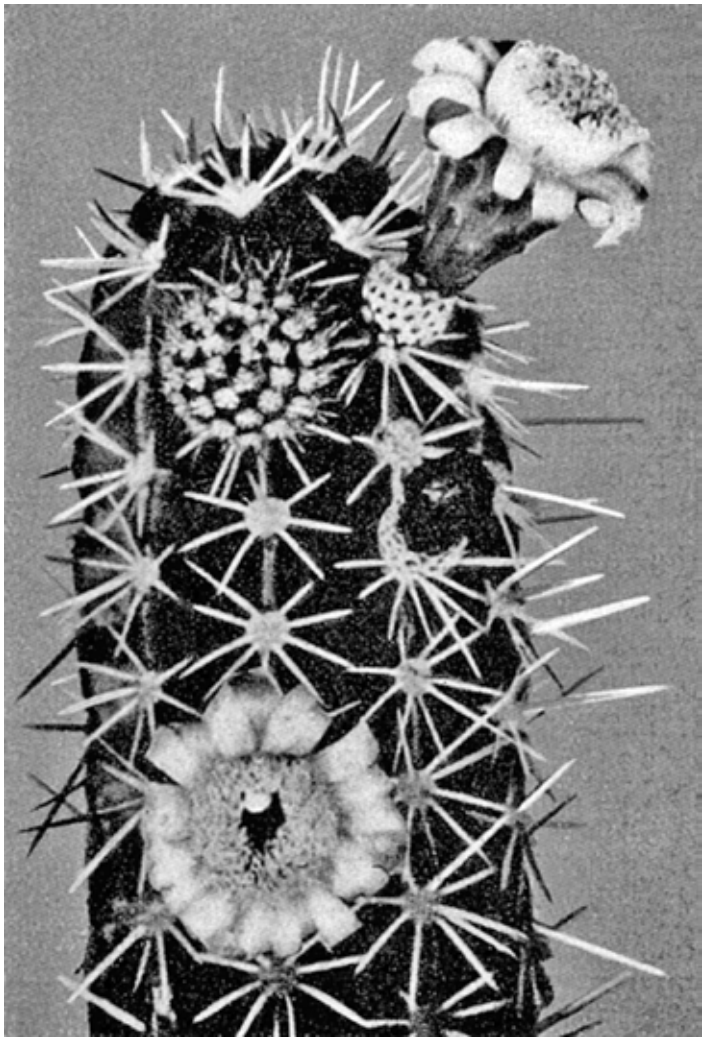


Fig. 31. *Stenocereus heptagonus*
a. (Dominican Republic, Prov. Santiago, La Herradura, c.500m.). Moscosco photo from *Las Cactaceas de la Flora de Santo Domingo*: t.5B. 1941.

b. G. N. Collins photo, from Britton & Rose, Cereus & its allies, *Contributions from the U. S. National Herbarium* **12**(10): t.67. 1909, as *Lemaireocereus griseus*.

c. (Curaçao). F. W. Arnaldo photo, in Backeberg, *Die Cactaceae* **4**: 2183, f.2068. 1960.





Miller (1768) also knew the plant and was credited with introducing it to Europe in 1728 (Aiton 1811: 176), and he definitely considered it to be an erect cereus with 7 or 8 angles, and the thickest of the Torch-Thistles. He quoted Boerhave who was said to have described it as having "several very long, white spines and a yellow down".
In 1771 (*Abridged Gardeners dictionary* ed.6), Miller grouped all his third to eighth sorts (*heptagonus* was number 6) together as all having the same form as the first, but differing in the size of their stems, number of angles and length of the spines.

Martyn (1807) noticed the inconsistencies between the two descriptions, commenting "The *Cereus heptagonus* of Miller does not seem to be the same as the *Cactus heptagonus* of Linnaeus. It rather agrees with his [Linnaeus's] *repandus*". However, the latter does not accord with Miller's description of the flower, which he said was as large as that of a hollyhock, with inner petals white and with a scaly, hairy and "prickly" receptacle. This is the description of a stenocereus flower, and the only such species with 7-8 ribs from the Caribbean is the one species of *Stenocereus* that was figured by Plumier from Haiti. His plant had 8-10 ribs.

This taxon, which is widespread throughout the Caribbean, has always been poorly understood. Although Plumier's drawing appears to indicate petals with fringed margins, no other authors have ever reported flowers like that. Plumier was rather unreliable in recording some morphological details, and in this case it is possible that his field sketch may have shown shading on the petals that was later misinterpreted by him as cilia when he came to write it up back in his quarters. Apart from the supposed fringed petals, there are no other characters to separate *Stenocereus fimbriatus*, *S. griseus* and *S. hystrix*. It is widely cultivated locally as field boundary and much prized for its juicy, blood-red fruits from early times, but has never enjoyed much interest from cactus fanciers.

This taxon should not be confused with the later homonym *Cactus heptagonus* Vellozo, whose plate 19 (1829) is referrable to *Pilosocereus arrabidae*. It has also often been confused with *Cactus peruvianus* L., while Willdenow's specimen at Berlin that is labelled as *Cactus heptagonus* L. seems to be the flower of a *Cereus hexagonus* or similar.

4. ***Cactus tetragonus*** [*Acanthocereus tetragonus* (L.) Hummelinck].
Cactus tetragonus L., *Species plantarum* **1**: 466. (1 May) 1753. Cactus quadrangularis longus erectus: angulis compressis L. *Hort. cliff.*: 181 nr.4. 1737. *Hort. ups.*: 119 nr.3. 1748.
Typ: Curaçao & tropical America.
Neotyp: (design. Hummelinck 1938: 165): Curaçao; Hummelinck 196 (flower), 170 (fruit); U. Photographed prior to preservation (Fig. 33).

Principal homotypic synonym:
Acanthocereus tetragonus (L.) Hummelinck, Over *Cereus repandus*, *Cephalocereus lanuginosus*, *Lemaireocereus griseus* en *Acanthocereus tetragonus* III, *Succulenta* **20**(10): 165. 1938.

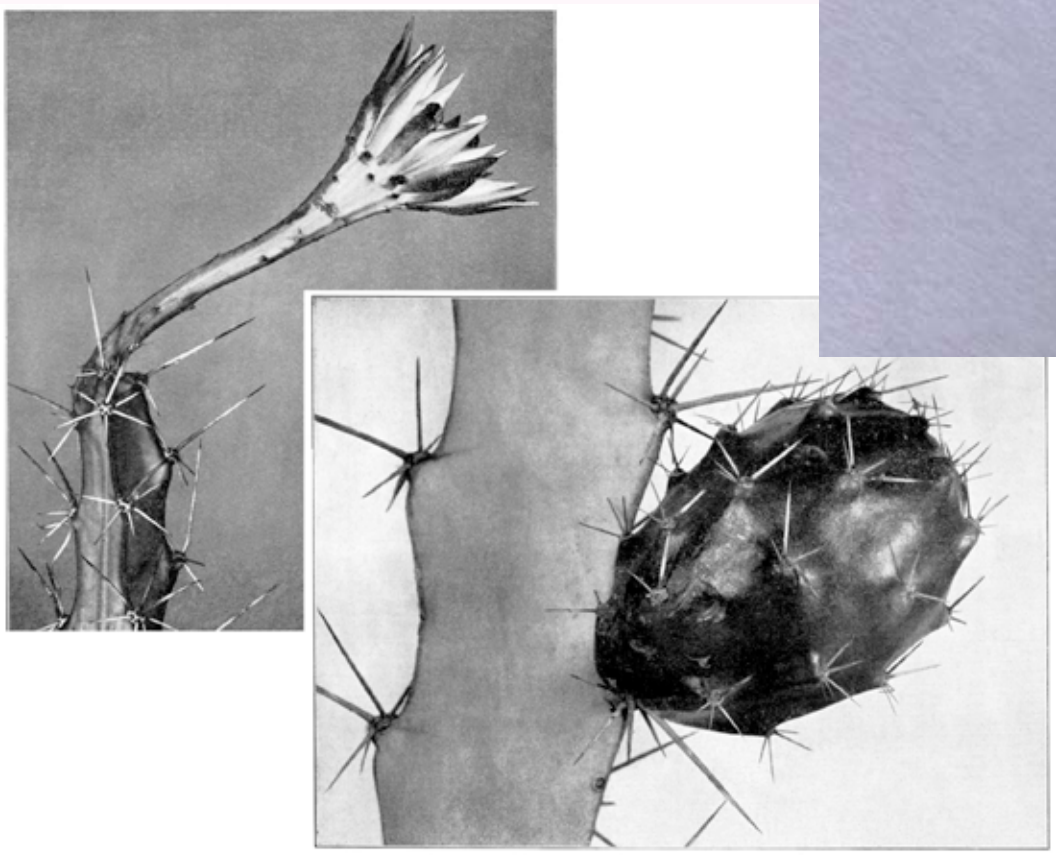
The Linnaean protologue (Fig. 32) contains no references to specimens or illustrations. To rectify the lack of typification, Hummelinck (1938) designated a neotype to fix the application of the name, with specimens of a flower and a fruit deposited at Utrecht.

A flowering stem of a plant is shown here for comparison in Fig. 34. Note the extrafloral nectaries on the receptacle areoles, a feature also to be seen in the related genus *Epiphyllum*.

tetragonus. 4. CACTUS quadrangularis longus erectus: angulis compreſſis. *Hort. cliff.* 181. *Hort. upſ.* 119. *Roy. lugdb.* 280.
Cereus erectus minor, fructu ſpinoſo, coſtarum numero varians. *Herm. par.* 117.
Habitat in Curacao, America *calidiore.* ♄

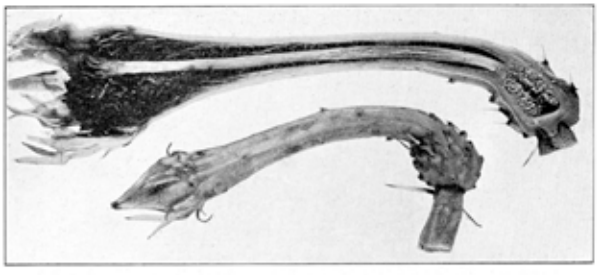
Fig. 32 (above). Extract from *Species plantarum* (1753).

Fig. 34 (right). *Acanthocereus tetragonus* (Yucatan).



Afb. 11. Rijpe vrucht van *Acanthocereus tetragonus*, Curaçao. (nat. gr.)

Afb. 8. Geopende bloem van *Acanthocereus tetragonus*, Curaçao. (ongeveer nat. gr.)



Afb. 10. Verwelkende bloem en bloemknop van *Acanthocereus tetragonus*, Curaçao; bloem overlangs doorgesneden. (geconserv.)

Fig. 33. *Acanthocereus tetragonus* neotype (design. Hummelinck, *Succulenta* **20**(11): 170. 1938.

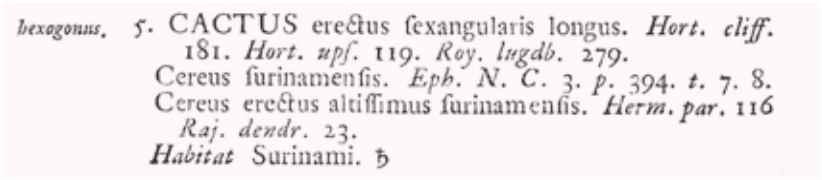

hexagonus. 5. CACTUS erectus sexangularis longus. *Hort. cliff.* 181. *Hort. upſ.* 119. *Roy. lugdb.* 279.
Cereus ſurinamenſis. *Eph. N. C.* 3. *p.* 394. *t.* 7. 8.
Cereus erectus altiſſimus ſurinamenſis. *Herm. par.* 116 *Raj. dendr.* 23.
Habitat Surinami. ♄

Fig. 35. *Cereus hexagonus* extract from *Species plantarum* (1753).

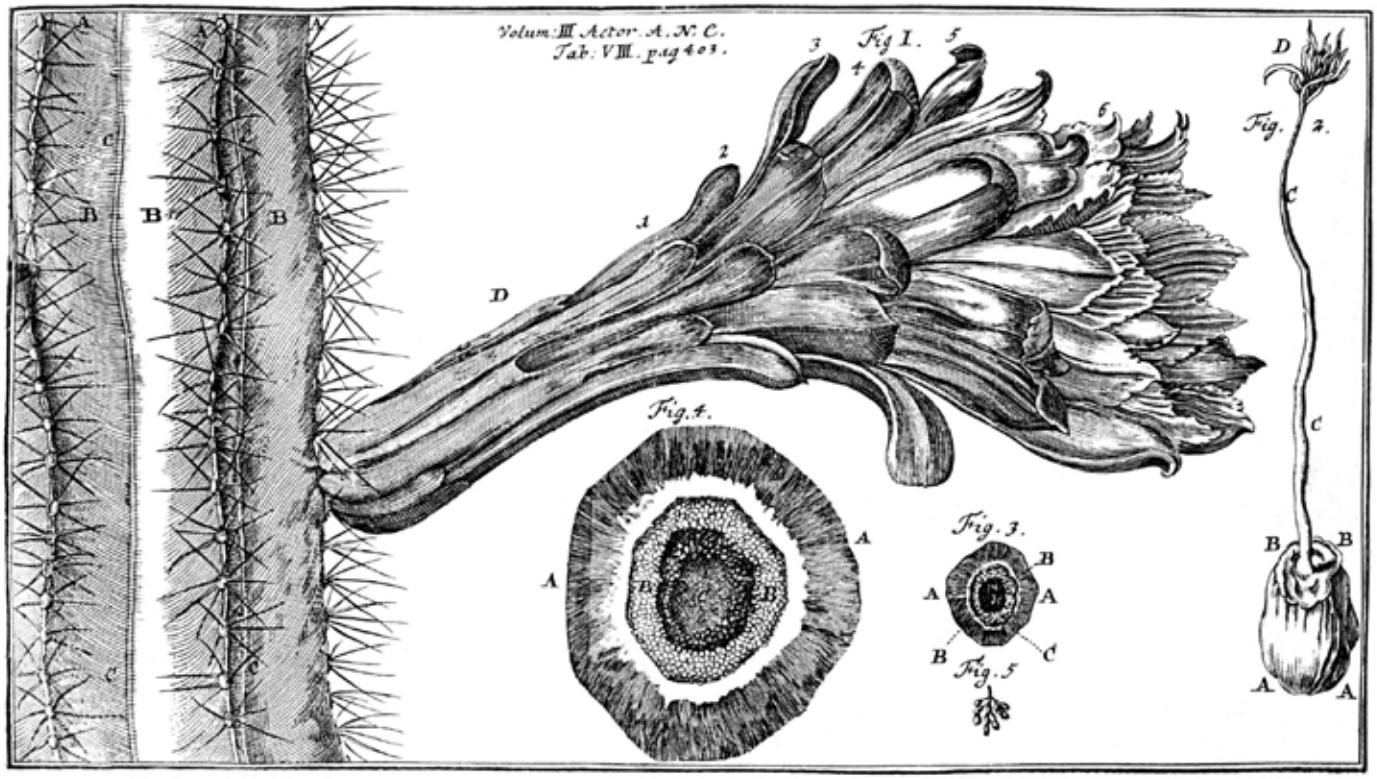


Fig. 36. *Cereus hexagonus* from Trew (1733: t.8, lectotype).

5. ***Cactus hexagonus*** [*Cereus hexagonus* = *Cereus peruvianus* hort. non (L.) Mill.].

Cactus hexagonus L., *Species plantarum* **1**: 466. (1 May) 1753. Cactus erectus sexangularis longus L. *Hort. cliff.*: 181 nr.5. 1737. *Hort. ups.*: 119-120 nr.4. 1748. (Fig. 35).
Typ: Surinam.
Lectotyp: (design. Leuenberger 1989: 153): Cereus sirinamensis Trew, Observatio CXX-IX: De Cerei plantae charactere generico, eiusque speciei Sirinamensis specifico, *Acta Physico-medica academiae Caesareae Leopoldino-Carolinae Naturae curiosorum exhibentia ephemerides sive observationes historias et experimenta* **3**: t.8. 1733. (Fig. 36)

Principal homotypic synonym:
Cereus hexagonus (L.) Mill., Gardeners *Dictionary*, ed.8: Cereus 1. 1768.

The cryptic citation in the Linnaean protologue to "Cereus sirinamensis. Eph. N. C. 3. p. 394. t. 7. 8." is actually a reference to two engraved plates by Trew (1733: t. 7-8). Of these two illustrations (Fig. 36-37), Leuenberger chose plate 8 as the lectotype of this species in 1989.

Christoph Jakob Trew (1695-1769) was a Bavarian physician and botanist, who for 10 years was the Director and Curator of the Medical College Botanic Garden in Nuremberg. His portrait (Fig. 39) is taken from his celebrated florilegium *Plantae selectae* of 1733. In 1731 he had relinquished his post at the botanic garden to establish his own private garden in order to grow rare plants. Befriending the great botanical artist Georg Ehret, he commissioned him to draw plants from his collection, of which the two plates of *Cereus hexagonus* are examples.

Fig. 37. *Cereus hexagonus* from Trew (1733: t.7)

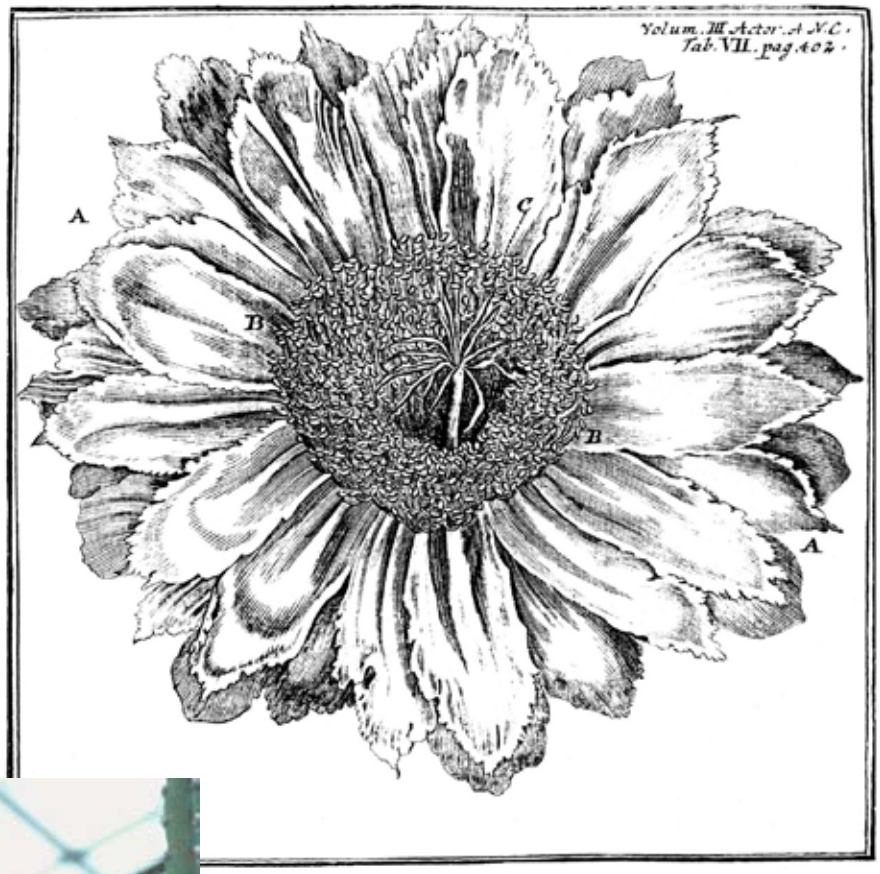


Fig. 38. *Cereus hexagonus* in cultivation at Whitestone in 1979.

Fig. 39. Portrait of Christoph Jakob Trew (1695-1769) by Georg Ehret (published in *Plantae selectae* (1750).

6. CACTUS ſubquinquangularis erectus longus articu- *pentagonus.*
latus. *Hort. cliff.* 182. * *Roy. lugdb.* 280.
Habitat in America.

9. CACTUS quinquangularis longus erectus, articulatus.
Creſcit in America.
Caulis erectus, quinquangularis, articulatus, internodiis pedalibus. Spinarum acervi per marginem abſque tomento ullo manifeſto admixto prodeunt. Anguli varius variant ad ſex; nullos unquam emittit e caule radices, ſed tenuis, erectus, debilis perſiſtit.

Fig. 40. Cactus pentagonus extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

6. ***Cactus pentagonus*** [*Cereus pentagonus* (L.) Haw.].
Cactus pentagonus L., *Species plantarum* **1**: 467. (1 May) 1753. Cactus subquinquangularis erectus longus articulatus L. *Hort. cliff.*: 182 nr.9. 1737. (Fig. 40).
Typ: America.
Neotyp. (design. here): Brazil; Vellozo, J. M. da C. (prepared for publication 1790, but not published till 1829) *Cactus pentagonus*, *Florae fluminensis* **5**: t.22. (Fig. 41).
Epityp. (design. here): Brazil, Pernambuco, Mun. Jaboatão dos Guararapes, Candeias, by the sea, 20 Feb 1990, *D. Zappi 228* (HRCB) [*Neotyp.* (design. Taylor & Zappi 2004: 273) of *Cereus fernambucensis* Lem.]

Principal homotypic synonyms:
Cereus pentagonus (L.) Haw., *Synopsis plantarum succulentarum*: 180. 1812.

Acanthocereus pentagonus (L.) Britton & Rose, The genus *Cereus* and its allies in North America, *Contributions from the U.S. National Herbarium* **12**(10): 432-433. [Based on the same type, but name misapplied and refers to *Acanthocereus tetragonus* (L.) Hummelinck].

Principal heterotypic synonyms:
Cereus fernambucensis Lem., *Cactearum genera nova speciesque novae in horto Monvilliano cultarum*: 58, 79. 1839.

Linnaeus left no specimens and did not cite any illustrations. He indicated that he knew the living plant in Clifford's garden, and it was also grown at Leiden. It was known only in Holland at that time and only introduced to England later (Miller & Martyn 1807: Cactus p.[4]). Miller himself appeared not to know it at all, and it was only edited into the list of cacti in *The Gardeners dictionary* by Martyn in the final and ninth edition, where he said that it had been grown at Kew since about 1769 (confirmed by Aiton in 1811).

Thomas Martyn's description: "Stem jointed; the internodes a foot long. Knots of spines come out along the edge without any visible

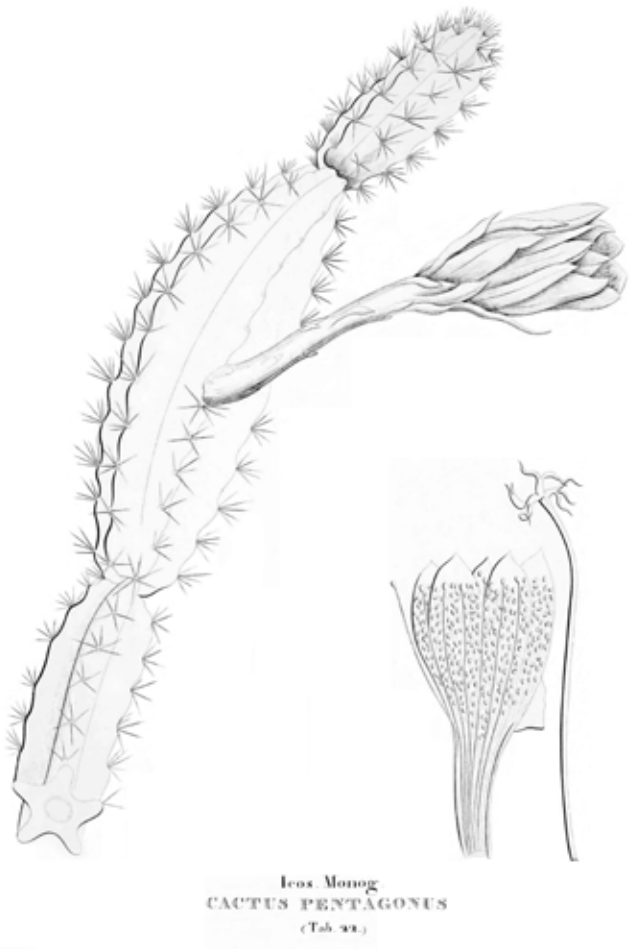


Fig. 41. *Cactus pentagonus*: t.22 from Vellozo, *Florae fluminensis*, Vol. 5 [prepared for publication 1790, but not published till 1829].

nap [tomentum] among them. Sometimes, but rarely, the stem has six angles; it never puts out any roots [aerial roots from the stem], and though slender and weak, grows upright." This description is merely an English translation of the Latin description given by Linnaeus himself of the plant growing in Clifford's garden (1737: 182).

The only illustration to bear this name which appears to be in agreement with the Linnaean protologue, is that of Vellozo in *Florae fluminensis* (Fig. 41), prepared for publication in 1790, but not distributed until 1829. His concept agrees with the species most often found today under the name *Cereus fernambucensis* Lem. (1839: 58).

Since about 1800 the name has been misapplied many times. The confusion appears to have started at the Berlin Botanical Garden. Despite *Cactus pentagonus* being listed as represented in the garden, the Willdenow herbarium has nothing labelled as such, but there is a 4-ribbed specimen labelled as *Cactus tetragonus*, which appears to be a young, seed-raised plant of a *Cereus* species. This could be *C. fernambucensis* but perhaps more likely to be a juvenile *Cereus hankeanus* F.A.C.Weber, as suggested by Taylor & Zappi (2004: 273). There are also two flower specimens labelled as *Cactus heptagonus*, also flowers of a true *Cereus*. Willdenow's *Cactus tetragonus* was recognised by Backeberg (1960: 2363) as being something other than the Linnaean concept, so he gave it the new name of *Cereus neotetragonus* Backeb. citing Willdenow's description and Werdermann's colour photo (1934: t.77) as its type.

Willdenow added further to the confusion by describing the typeless *Cactus prismaticus* in 1814, said to differ from *Cactus pentagonus* in having a spreading rather than erect habit, but also 5-angled.

In 1818, Haworth received some cacti from Mr. Gul. Anderson at the Berlin Botanical Garden, among which was a plant that Haworth interpreted as being *Cactus prismaticus*, although received labelled as *Cactus speciosus*. The garden's curator, Friedrich Otto (1833: 366), later listed *Cactus prismaticus* in the synonymy of *Cactus pentagonus*, where it has been accepted ever since.

Salm-Dyck grew a plant that he called *Cactus pentagonus* from about 1800, but his painting of it (Rowley 1999: 15) probably depicts a branch of *Heliocereus speciosus*, or a hybrid of that with *Epiphyllum* (*Cereus speciosissimus*). *Cactus speciosus* Cav. was first described from a plant in the Madrid Botanic Garden in 1803, and Salm-Dyck recorded having it from 1805. It was also grown in Berlin from about that date.

Most improbably, Britton & Rose (1909: 432-433) decided to equate *Cactus pentagonus* L. with a plant described as *Cereus variabilis* Engelm. nom. illeg., which was the type of *Cereus* subgen. *Acanthocereus* Engelm. (Engelmann 1863: 202-203), despite the fact that no *Acanthocereus* grows in the foot-long articulations called for in the Linnaean protologue, or consistently have 5-6 ribs.

At the same time, Britton & Rose (1920: 15) identified Vellozo's plate as representing *Cereus fernambucensis* Lem., a position upheld by all subsequent authors.

Hunt (1967: 445) followed Britton & Rose, but also, like Backeberg, subsequently did not distinguish *Acanthocereus pentagonus* from *Acanthocereus tetragonus*. Hunt was not willing to consider the possibility that Vellozo had the correct identification, because he was unaware of any evidence that any of the Linnean elements were of

Brazilian origin.

In point of fact most of northern Brazil was under Dutch administration from 1630 to 1654, with headquarters at Recife in Pernambuco, then called Olinda (later Fernambuc). That was the Dutch Golden Age and the time of tulipomania, which reached a peak of excitement in 1637. The Dutch were importing all kinds of exotic plants from their colonies at the time, so it is very plausible that this cactus was from Pernambuco and in cultivation in Holland at the time of Linnaeus.

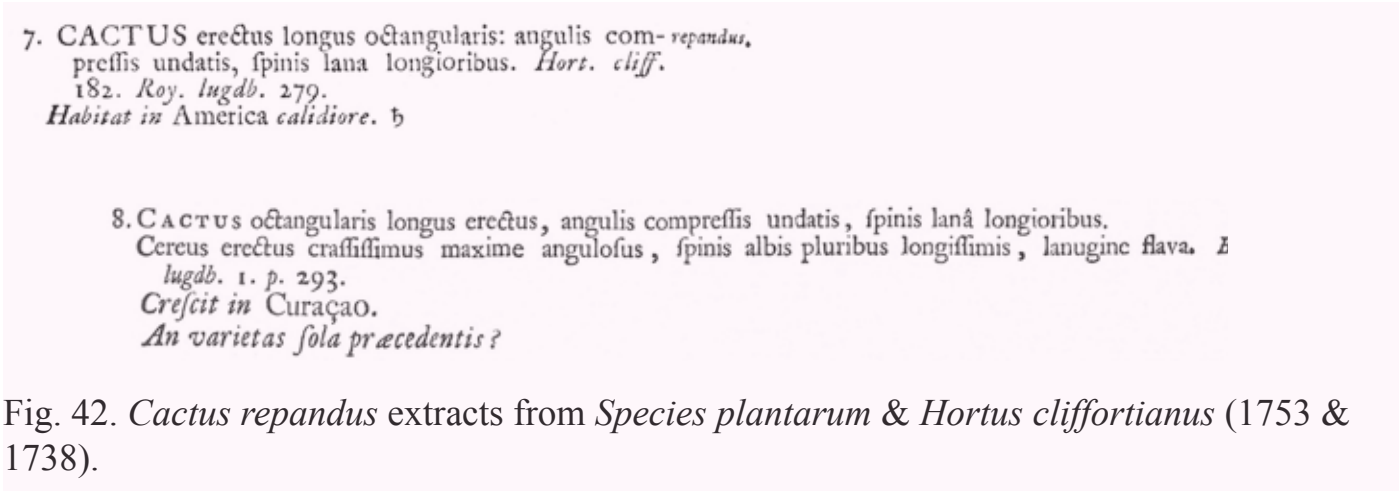
Cereus fernambucensis matches the Linnaean protologue perfectly well in all respects, and does not fit well with any known *Acanthocereus*. I therefore propose to restore the usage of *Cereus pentagonus* (L.) Haw., with Vellozo's illustration as its neotype.

Principal homotypic synonym:

Cereus repandus (L.) Mill., *Gardeners dictionary*, ed.8: Cereus 5. 1768.

Earliest of the later heterotypic synonyms:

Cereus albispinus Salm-Dyck, *Observationes Botanicae in horto Dyckensi notatae. Anno 1822*: 5-6. 1822. *T*: Not cited. *LT* (design. here): Photo of plate titled "*Cactus albispinus*. hor. Dyck." in Rowley (1999: 14, t.16). Year unknown (after 1805), but believed to have been executed by Salm-Dyck himself. (Fig. 44).



7. CACTUS erectus longus octangularis: angulis com- *repandus.*
preſſis undatis, ſpinis lana longioribus. *Hort. cliff.*
182. *Roy. lugdb.* 279.
Habitat in America *calidiore.* ♄

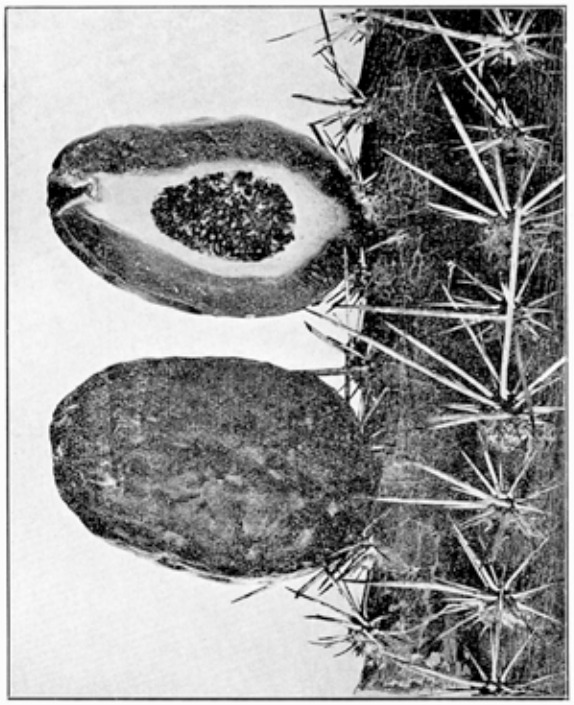
8. CACTUS octangularis longus erectus, angulis compreſſis undatis, ſpinis lanâ longioribus.
Cereus erectus craſſiſſimus maxime anguloſus, ſpinis albis pluribus longiſſimis, lanugine flava. *E*
lugdb. 1. *p.* 293.
Creſcit in Curaçao.
An varietas ſola præcedentis?

Fig. 42. *Cactus repandus* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

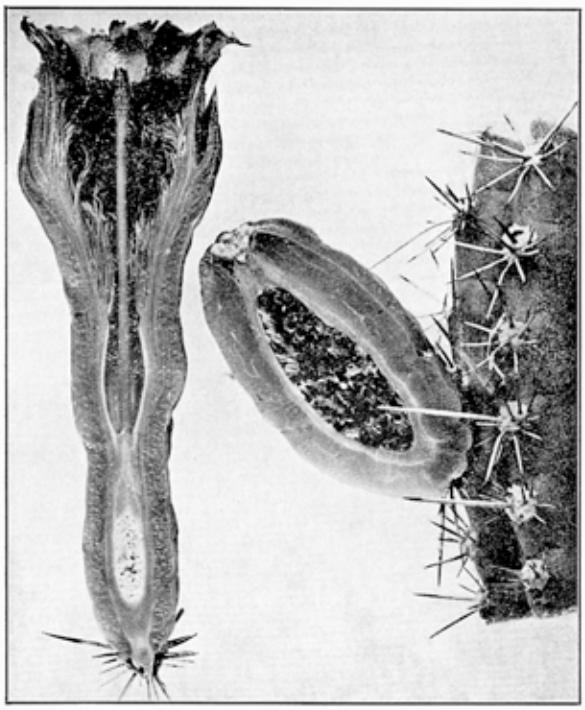
7. ***Cactus repandus*** [*Cereus repandus* (L.) Mill.].

Cactus repandus L., *Species plantarum* **1**: 467. (1 May) 1753. Cactus erectus longus octangularis: angulis compressis undatis, spinis lana longioribus L. *Hort. cliff.*: 182 nr.8. 1737. (Fig. 42).

Typ: Tropical America (in *Sp. Pl.*); Curaçao (in *Hort. cliff.*).
Neotyp. (design. here): Curaçao; Jun 1938, *Hummelinck 197*; U. A photo of the neotype prior to preservation is shown in Fig. 43 (top left), from Hummelinck, *Succulenta* **20**(9): 133-140. 1938.

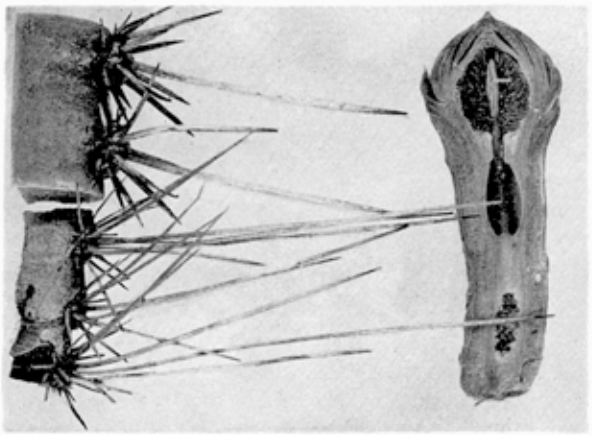


Afb. 2. Vruchten van *Cereus repandus*, Curaçao; de bovenste overlangs doorgesneden (nat. gr.; Herb. nr. 197, Juni 1938).



Afb. 3. Vrucht en bloem van *Cereus repandus* var. *Weberi*, Curaçao; overlangs doorgesneden (nat. gr.; bloem geconserveerd; Herb. nr. 198, Juni 1938).

Cereus repandus, Curaçao.



Afb. 4. Bloemknop en enkele areolen van *Cereus repandus*, Curaçao en Bonaire (l. o.); knop overlangs doorgesneden (nat. gr.; geconserveerd).

Fig. 43. *Cereus repandus* (L.) Mill. (Curaçao) from Hummelinck, *Succulenta* **20**(9): 133-140. 1938. The neotype prior to preservation is at top left.

The history of this name is very convoluted, having been applied in three very different senses.

Cactus repandus was first recorded by Linnaeus in Clifford's garden. In *Hort. cliff.*, Linnaeus said "Only a variety of the previous?", a reference to *Cactus lanuginosus*, and giving its origin as Curaçao, the same as for *C. lanuginosus*. Following that initial description of 1737, Linnaeus had by 1753 broadened its origin to "tropical America".

Linnaeus listed Sloane's and Browne's phrase names and Ehret's plate 14 (Fig. 45) from Trew, *Plantae selectae* (1733) in the synonymy of *repandus* from the second edition of *Species plantarum* (1762-63) onwards. The plate and citations all refer to a plant endemic to the south coast of Jamaica that does not occur in Curaçao, correctly segregated by Miller as *Cereus gracilis* Mill.

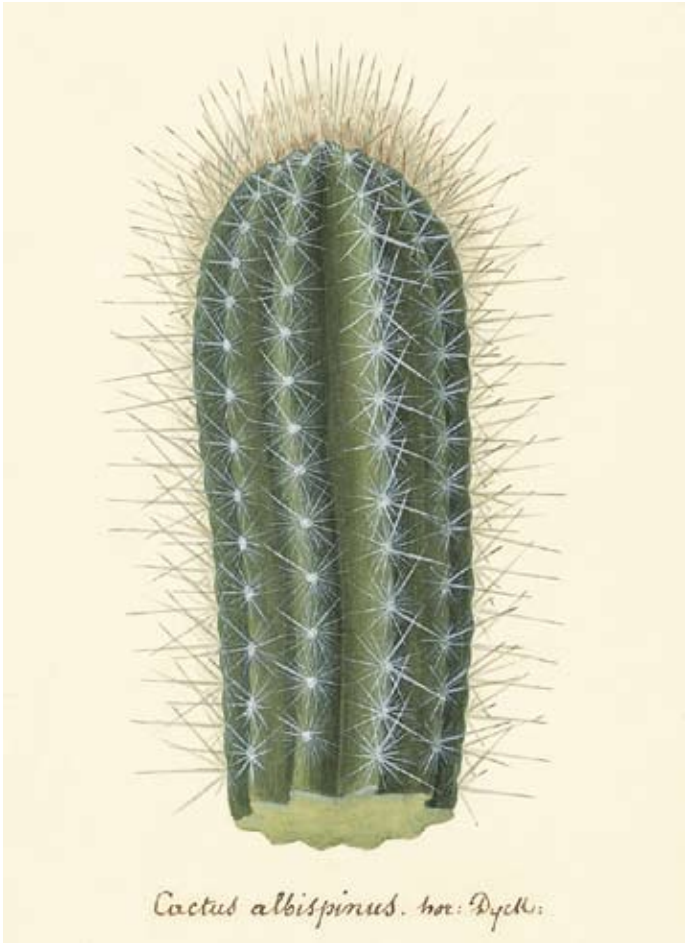


Fig. 44. *Cereus albispinus* Salm-Dyck. Lectotype plate titled "Cactus albispinus. hor. Dyck.", from Rowley (1999: 14, t.16).

Fig. 45. A Georg Ehret plate, from Trew, *Plantae selectae* (1750). This plate was designated as the lectotype of *Cereus gracilis* Mill. by Franck in *Haseltonia* **18**: 101. 2012.

in 1768, not *Cactus repandus* L. It appears that Linnaeaus's very broad species concept allowed him to countenance putting *Cereus gracilis* Mill. into the circumscription of *Cactus repandus* L.

Martyn (1807) continued the confusion by assigning *Cereus repandus* Mill. to *Cactus lanuginosus* L., but placing *Cereus gracilis* Mill. in the synonymy of *Cactus repandus* L. Martyn quoted page references only from the 3rd. edn. of *Species plantarum*, so maybe he had not seen the protologue of the first edn.

All the nineteenth century authors such as Willdenow (Fig. 46), De Candolle, Haworth, Salm-Dyck and Schumann followed the usage of *Cactus repandus* L. in the sense of *Cereus gracilis* Mill.

Fig. 46. Willdenow's voucher (B-W. 9427), collected by Krausse, clearly shows his concept of *Cactus repandus* L. as being that of *Cereus gracilis* Mill.

That usage in the wrong sense might have continued had it not been for yet a further change proposed by Britton & Rose (1920: 17-18) replacing that concept in favour of another very different Curaçaoan plant. No reasoning was given, and it represented a reversal of their opinion expressed in their paper on *Cereus and its allies* (1909) where they had put *Cereus repandus* (L.) Mill. in the synonymy of *Cereus lanuginosus* (L.) Mill., while correctly placing Haworth's usage of the same name under *Harrisia gracilis* (Mill.) Britton.

Hummelinck (1938: 133-140) in turn followed Britton & Rose's 1920 proposal, preserving material of a fruit and a flower under his numbers 197 & 198 at Utrecht (Fig. 43). These were not used for typification by Hummelinck.

The epithet *repandus* is a Latin adjective, the active present participle of *repare*, to creep, but Linnaeus used it specifically to describe the margins of leaves and angles that are wavy or sinuous. Here he applied it to the "angles", said to be compressed and wavy, compared to the scarcely evident "angles" of *Cactus lanuginosus* L. It may have been this that prompted Britton & Rose to apply the name the way that they did, but it still contradicts the presence of wool called for in the *Cactus repandus* L. descriptive phrase.

The Britton & Rose choice of application (Fig. 47), although not agreeing in all respects with the Linnaean protologue, particularly regarding the presence or absence of "wool longer than the spines", has been persistently in use since 1920. The uncertainty that surrounds the true identity of *Cactus repandus* L. is therefore probably sufficient grounds to maintain current usage supported by the above typification.

8. ***Cactus lanuginosus*** [*Pilosocereus lanuginosus* (L.) Byles & G.D.Rowley].

Cactus lanuginosus L., *Species plantarum* **1**: 467. (1 May) 1753. Cactus erectus longus subnovemangularis: angulis obsoletis, spinis lana brevioribus L. *Hort. cliff.*: 182 nr.7. 1737. (Fig. 48).
Typ: Netherlands Antilles, Curaçao.
Holotyp: *Cactus lanuginosus* in Hermann, *Paradisus batavus*: 115. t.115. 1698. The only included element of the protologue, and therefore automatically its holotype. (Fig. 49)
Cactus lanuginosus (Curaçao) from Hummelinck, *Succulenta* **20**(10): 151. 1938 (Fig. 50) is a useful interpretative illustration, as is his group of photos of a plant from

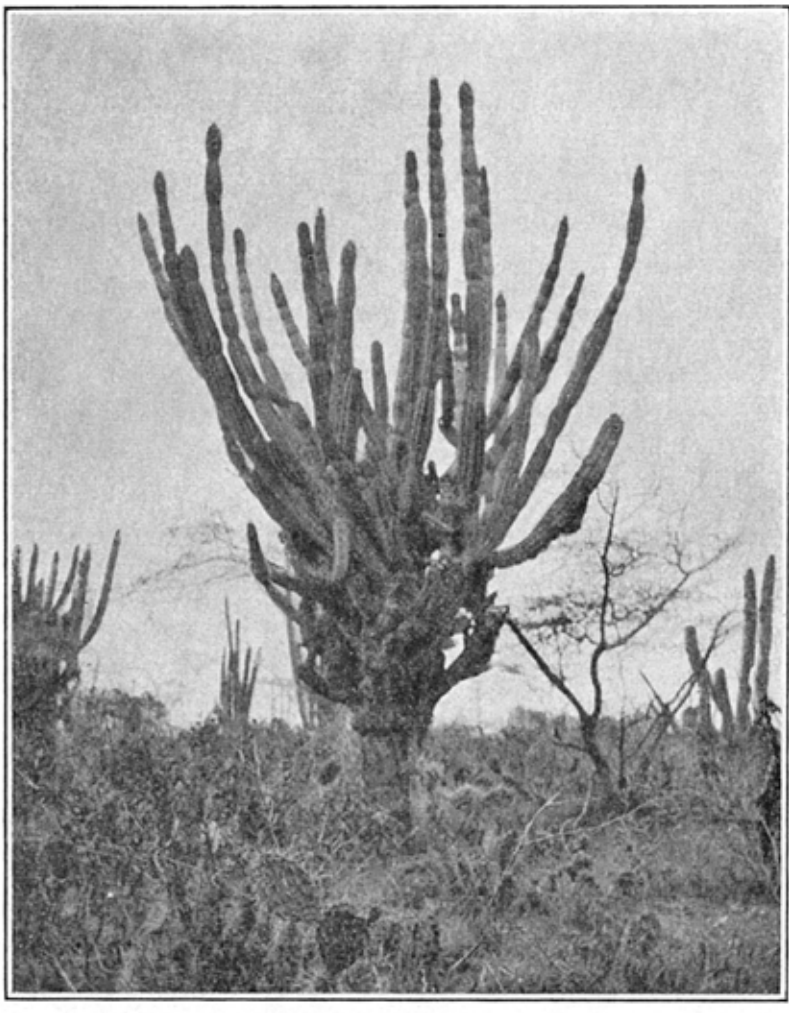


Fig. 19.—Cereus repandus.

Fig. 47. Photo of *Cereus repandus* (L.) Mill. (Curaçao) taken by Britton & Shafer in 1913.

8. CACTUS erectus longus ſubnovemangularis: angulis *lanuginoſus.* obſoletis, ſpinis lana brevioribus. *Hort. cliff.* 182. *Roy. lugdb.* 279.
Cereus curaſſavicus erectus maximus, fructu rubro non ſpinoſo, lanugine flaveſcente. *Herm. par.* 115. *t.* 115.
Habitat in Curacao. ♄

7. CACTUS ſæpius novem-angularis longus erectus, angulis obſoletis, ſpinis lanâ brevioribus.
Cereus curaſſavicus erectus maximus, fructu rubro non ſpinoſo, lanuginoſus, lanugine flaveſcente. *Herm. parad.* 115. *t.* 115. *Boerh. lugdb.* 1. *p.* 292.
Creſcit in Curaçao.

Fig. 48. *Cactus lanuginosus* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

Venezuela, Isla Margarita, *Succulenta* **20**(9-10): 135, 147-153. 1938. (Fig. 51).

Principal homotypic synonyms: *Pilosocereus lanuginosus* (L.) Byles & G.D.Rowley, *Cactus and Succulent Journal of Great Britain* **19**(3): 67. 1957.

Principal heterotypic synonym: *Cereus repandus* Mill. non L., *Gardeners dictionary*, ed.8: Cereus 5. 1768 nom. illeg. (Art. 53.1).

Hermann's book, *Paradisus batavus* (1698) (Fig. 52) is frequently cited by Linnaeus, and is a work notable for containing the first ever illustration of a tropical orchid to flower in cultivation.

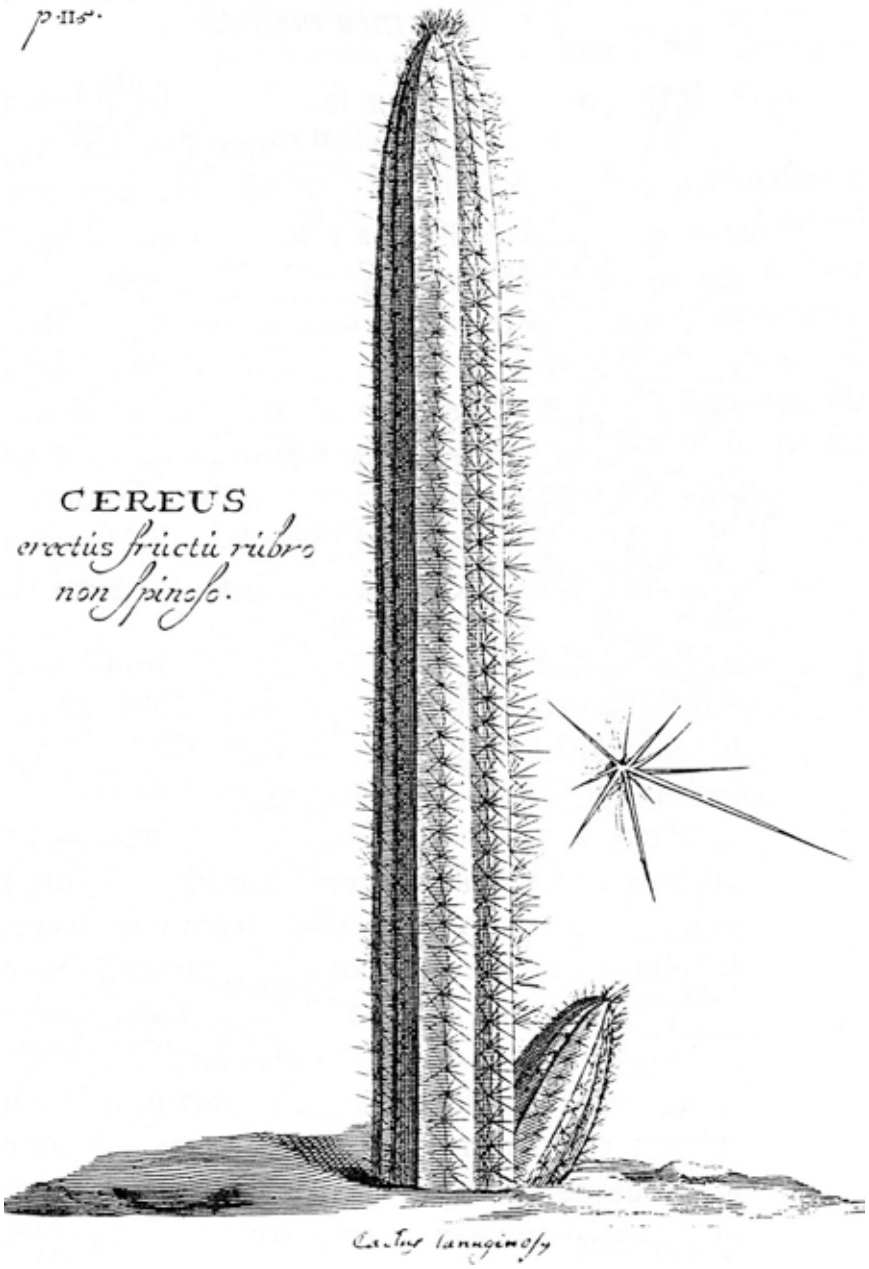
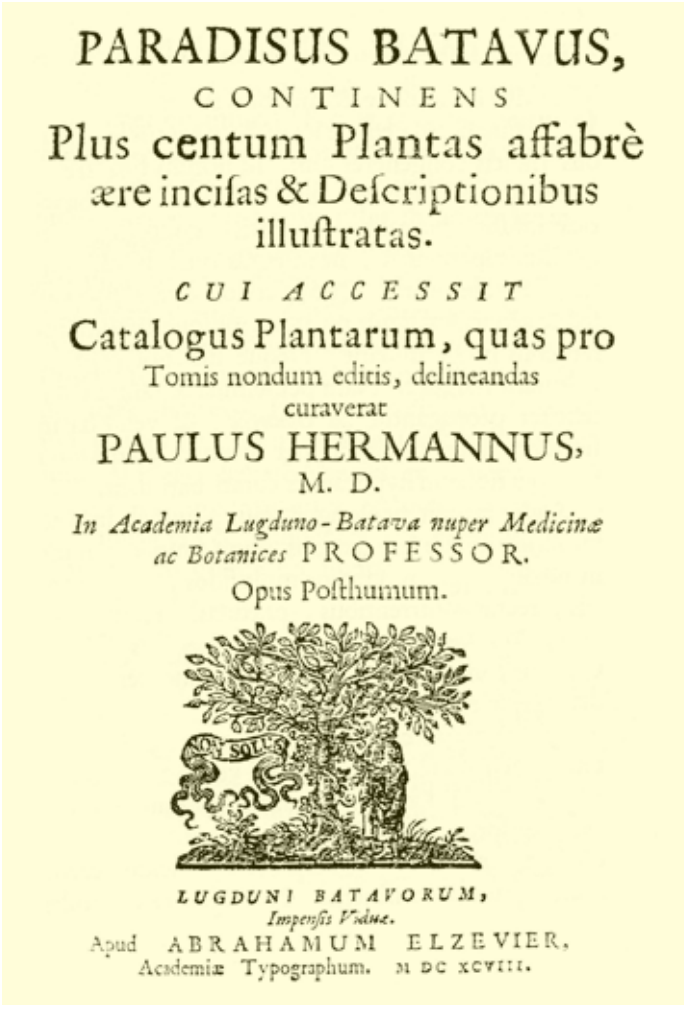


Fig. 49. Holotype of *Cactus lanuginosus* t.115, from Hermann, *Paradisus batavus*: 115. 1698.

Jonge stengeltop van *Cephalocereus lanuginosus*, Curaçao.

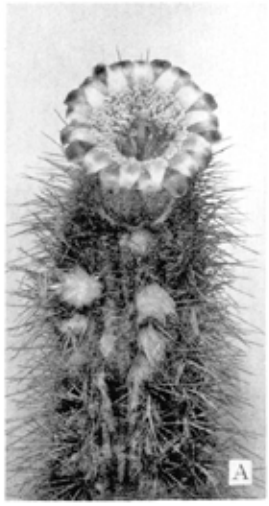
Fig. 50. *Cactus lanuginosus* (Curaçao) from Hummelinck, *Succulenta* **20**(10): 151. 1938.



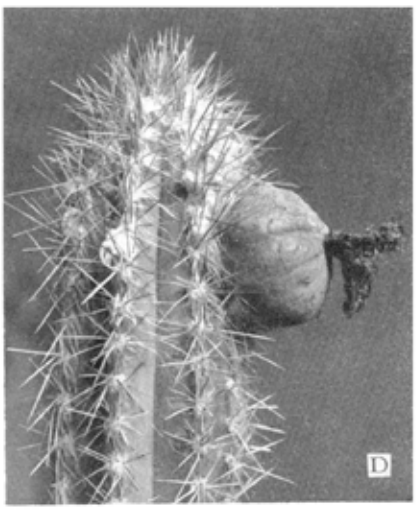
PARADISUS BATAVUS,
CONTINENS
Plus centum Plantas affabrè
ære inciſas & Deſcriptionibus
illuſtratas.
CUI ACCESSIT
Catalogus Plantarum, quas pro
Tomis nondum editis, delineandas
curaverat
PAULUS HERMANNUS,
M. D.
In Academia Lugduno-Batava nuper Medicinæ
ac Botanices PROFESSOR.
Opus Poſthumum.

LUGDUNI BATAVORUM,
Impenſis Viduæ.
Apud ABRAHAMUM ELZEVIER,
Academiæ Typographum. M DC XCVIII.

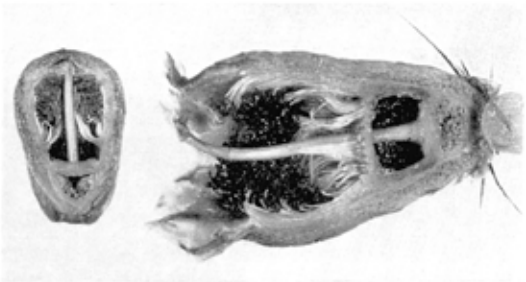
Fig. 52. Title page of *Paradisus batavus*. 1698.



Bloemen van
a. *Cephalocereus lanuginosus*.



Vrucht van *Cephalocereus lanuginosus*, Margarita.
(a-c op ongeveer $^{3}/_{4}$ nat. gr., d. op ongev. ½ nat. gr.)



Bloem en bloemknop van *Cephalocereus lanuginosus*, Los Hermanos; overlangs doorgesneden (nat. gr.; geconserveerd).

Fig. 51. *Pilosocereus lanuginosus* (Venezuela, Isla Margarita) from Hummelinck, *Succulenta* **20**(9-10): 135, 147-153. 1938.

9. CACTUS erectus longus ſuboctangularis: angulis ob tuſis. *Hort. cliff.* 181. *Hort. upſ.* 120. *Roy. lugdb.* 279. *peruvianus.*
Cereus erectus, fructu rubro non ſpinoſo. *Herm. par.* 114.
Cereus pervianus ſpinoſus, fructu rubro nucis magnitudine. *Baub. pin.* 458.
Euphorbii arbor cerei effigie. *Lob. ic.* 2. *p.* 25.
Habitat in Jamaicæ, Peru *apricis aridis maritimis.* ♄

6. CACTUS novem-angularis longus erectus, angulis obſoletis.
Cereus erectus, fructu rubro non ſpinoſo. *Herm. parad.* 114. *Boerh. lugdb.* 1. *p.* 293.
Cereus craſſiſſimus, fructu intus & extus rubro. *Sloan. flor.* 196. *hiſt.* 2. *p.* 157. *Raj. dendr.* 21.
Cereus peruanus ſpinoſus, fructu rubro nucis magnitudine. *Baub. pin.* 458.
Cereus ſpinoſus. *Dalech. hiſt.* 1829.
Melocactus americanus monoclonos, flore albo, fructu atro-purpureo. *Tournef. inſt.* 653.
Euphorbii adulta planta, ſive cerei effigie. *Stap. theophr.* 1057.
Creſcit in America, *præſertim* Jamaicæ *inſulis in maritimis arenoſis & ſylvis campeſtribus aridis & apertis ubique.*

Fig. 53. *Cactus peruvianus* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

9. ***Cactus peruvianus*** [*Selenicereus grandiflorus* (L.) Britton & Rose].
Cactus peruvianus L., *Species plantarum* **1**: 467. (1 May) 1753. Cactus erectus longus suboctangularis: angulis obtusis L. *Hort. cliff.*: 182-183 nr.6. 1737. *Hort. ups.*: 120 nr.5. 1748. (Fig. 53).
Typ: Jamaica, Peru, in sunny, dry coastland (*Sp. plant.*); America; especially on the island of Jamaica in dry coastland, dry wooded countryside and open spaces everywhere (*Hort. cliff.*); Jamaica, in dry, sandy, open coastal places (*Hort. ups.*).
Holotyp: Euphorbii arbor cerei effigie, in L'Obel, *Plantarum seu stirpium icones* **2**: 25. 1581. First published in Pena & L'Obel, *Stirpium adversaria nova*: 453. 1570, as Cerexus, and later in Tabernaemontanus, Neuw Kreuter-Buch: 1085. c.1590, as Cereus Peruvianus. This is the only included element and therefore automatically the holotype. (Fig. 54).

Principal homotypic synonyms:
Cereus peruvianus Tabernaemontanus (= Jacobus Theodorus), *Neuw Kreuterbuch*: Cap. 27, 1085. c.1590.
Cereus peruvianus (L.) Mill., *Gardeners dictionary*, ed.8: Cereus 4. 1768.

Principal heterotypic synonyms:
Cactus grandiflorus L., *Species plantarum* **1**: 467. (1 May) 1753.

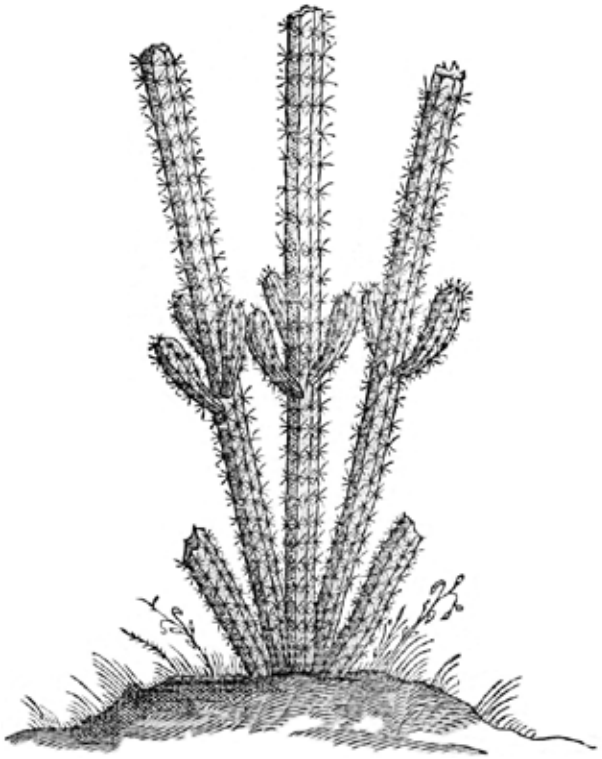
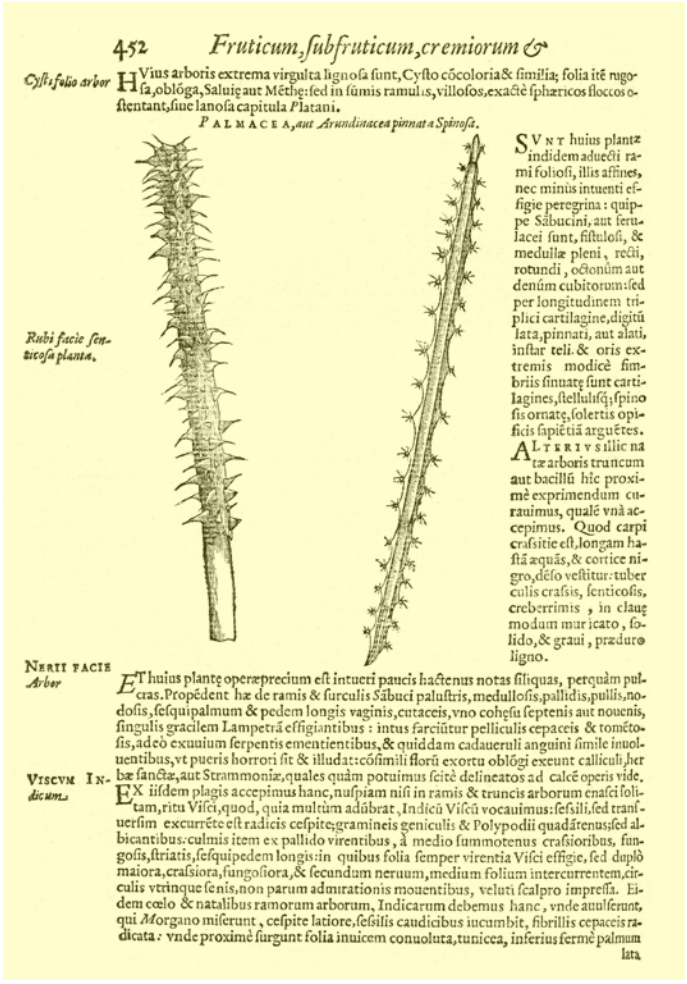


Fig. 54. *Cactus peruvianus* [*Selenicereus grandiflorus*] From Peña & L'Obel, *Nova Stirpium Adversaria*: 453. 1570 & 1576. Copied in L'Obel, *Plantarum seu stirpium icones* **2**: 25. 1581. [= Cereus peruvianus of Tabernaemontanus (c.1590)].

Selenicereus grandiflorus (L.) Britton & Rose, *Contributions from the U.S. National Herbarium* **12**(10): 430. 1909.

Because the illustration of L'Obel (1570 & 1581: Fig. 55) is the autotype of *Cactus peruvianus* L., it is necessary to investigate the identity of that drawing. However, first,


452 *Fruticum, subfruticum, cremiorum &*

Cystifolio arbor

Rubi facie sentiosa planta.

Nerii facie Arbor

Viscum Indicum.

Fig. 55. Palmacea, from Peña & L'Obel, *Nova Stirpium Adversaria*: 452. 1570 & 1576. This is probably illustrating the stem of a Catclaw Acacia (left) and a branch of a Rattan Cane (right), not a *Selenicereus* stem as suggested elsewhere.

we need to correct a long-standing error of identification for the drawing on the opposing page in Peña & L'Obel (1570: 452, Fig. 55). The righthand drawing on this page is not a stem of *Selenicereus* as hitherto supposed, but a leafless branch of a member of *Palmae* tribus *Calameae*, probably a Rattan Cane. The other drawing to the left of it is probably the stem of one of the Wait-a-Minute trees, perhaps the Catclaw Acacia or a related species.

L'Obel's drawing of what he called "Cerexus" has also been widely misinterpreted. It is not *Cereus peruvianus* hort. non (L.) Mill. Not only does it not resemble the garden cereus, but that is also of a South American, not a Caribbean, origin. It has, however, been interpreted as being *Stenocereus fimbriatus* (*Cactus heptagonus* L.) because Sloane's phrase name was cited in synonymy in *Hort. cliff.* and in the 2nd. edition of *Sp. Plant,* which is the Larger Dildo Tree of Jamaica, but the habit of growth is not a good match. Another possible identity that has been suggested is *Cereus repandus*, but that does not occur in Jamaica.

The true identity of L'Obel's illustration is equivocal and it does conflict with the protologue in as much as it shows a plant with only 5 ribs whereas Linnaeus's phrase name calls for 8-9 ribs. Very few cerei resembling the drawing have only 5 ribs from that area, but *Selenicereus grandiflorus* does fit the number of ribs, habit of growth and spination, and is recorded as having up to 10 ribs exceptionally.

The specific epithet of *peruvianus* was probably adopted from usage by the German herbalist Jacob Theodor Tabernaemontanus (1522-1590) who reproduced the L'Obel figure in his *Neu Kreuter-Buch*, calling it Cereus peruvianus. Linnaeus did not cite this reference under *Cactus peruvianus*, but the works of Tabernaemontanus were listed in his *Bibliotheca botanica* of 1736. Peru at the time of Tabernaemontanus was not clearly defined, and anywhere in the north-western part of South America was then known as Peru, distinguished from New Spain to the north by a vague and variable boundary that in the early sixteenth century included the whole of the South American continent north of the equator, other than Brazil. L'Obel's own plant might therefore have originated from anywhere on the north-western part of the South American mainland, or the nearby islands.

10. CACTUS erectus articulatus sub-decangularis: ar- *Royeni.*
ticulis subovatis, spinis lanam æquantibus. *Roy. lugdb.*
279.
Habitat in America. ♄

3. Cactus sacpius decem-angularis erectus articulatus, articulis subovatis, spinis lanae longitudine.
Cereus erectus polygonus spinosus, per intervalla compressus quasi in articulos. *Boerb. lugdb.* 1. p. 294.

Fig. 56. *Cactus Royeni* L. extracts from *Species plantarum* & Van Royen, *Florae Leydensis prodromus* (1753 & 1740).

10. ***Cactus Royeni*** [*Pilosocereus royeni* (L.) Byles & G.D.Rowley].
Cactus Royeni L., *Species plantarum* **1**: 467. (1 May) 1753. Cactus erectus articulatus sub-decangularis: articulis subovatis, spinis lanam aequantibus L. *Roy. lugdb.*: 279 nr.3. 1740. (Fig. 56).
Typ: Not cited.
Neotyp. (design. here): Lesser Antilles, chiefly in rocky places; 1695-1697, *C. Plumier*; in Burman, *Plantarum Americanum fasciculus 8*: t.191. 1758. Seen by Linnaeus in *Codex Boerhaavianus* prior to Burman's publication in 1738, but not assigned by him to any Linnaean taxon. (Fig. 57a)
Typotyp. Melocactus monoclonos, fructu atropurpureo, cereiformis Plumier, C., *Botanicon Americanum* manuscript **3**: t.30. 1689-1697. Reproduced in Mottram (2002: 117). (Fig. 57b).

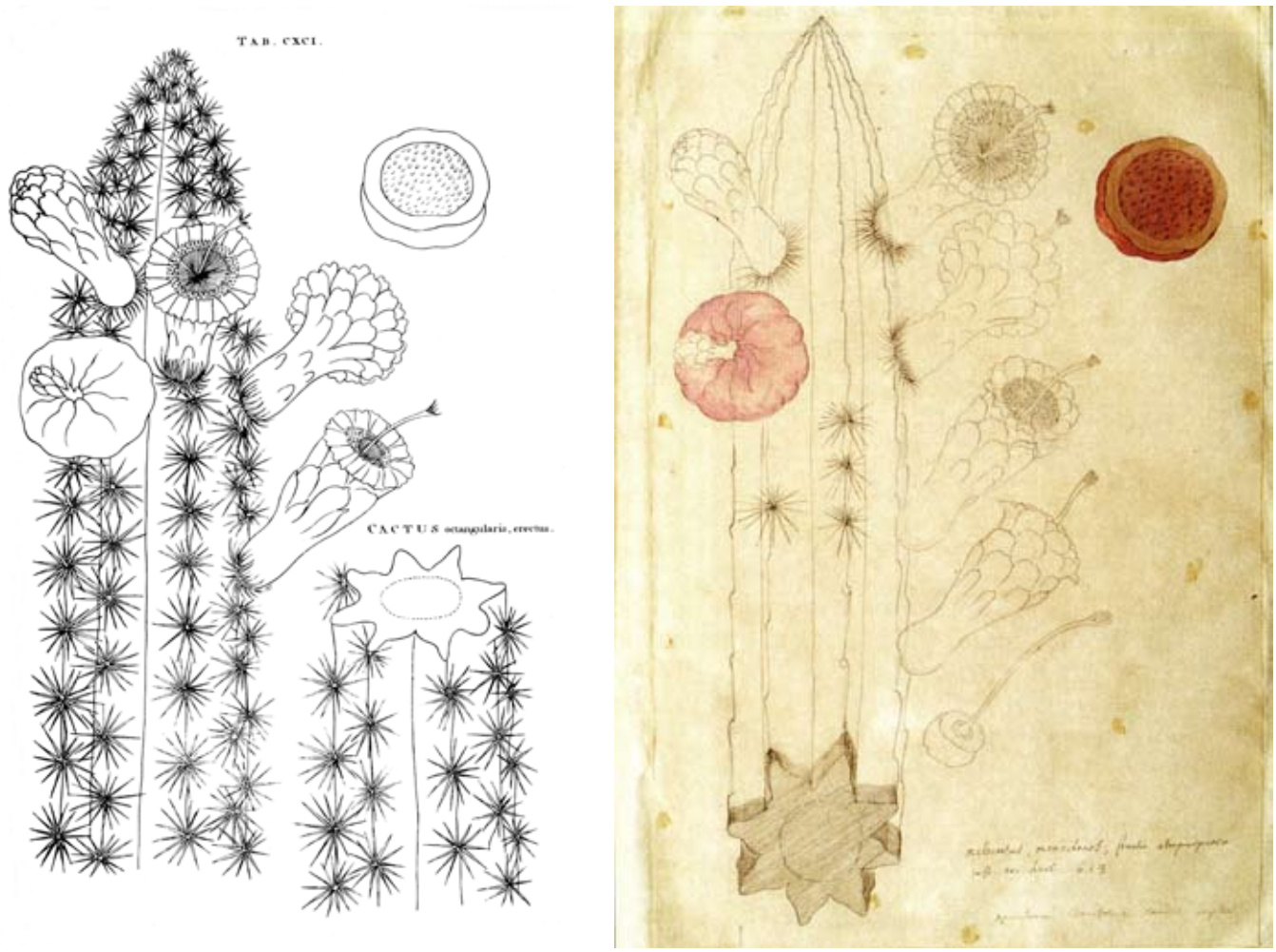


Fig. 57a & b. Neotype of *Cactus Royeni* L. & holotype of *Cereus monoclonos* DC. (a) from Burman (1758: t.191) and (b) from Plumier, *Botanicon Americanum* (1689-1697: t.30).

Fig. 58a & b. A typical colony of *Pilosocereus royeni* (Lesser Antilles, St. Lucia) Kirkbright photos 2011.

Principal homotypic synonyms:
Cereus monoclonos DC, *Prodromus systematis naturalis regni vegetabilis* **3**: 464. 1828.

Pilosocereus royeni (L.) Byles & G.D.Rowley, *Cactus and Succulent Journal of Great Britain* **19**(3): 67. 1957.

Named for Adrian van Royen (1705-1779), a student of Herman Boerhaave (1668-1739). Van Royen's herbarium comprised specimens from the Leiden Botanical Garden, and Linnaeus stayed with van Royen at his home in 1737.

Linnaeus's descriptive phrase appears to be an adaptation from those of Van Royen and Boerhaave appearing in Van Royen's catalogue of the Leiden collection. It repeats the assertion that the original plant was articulated. What Boerhaave (1710, **1**: 294) actually said was

"compressed at intervals as if in segments". This is not normally the case with the plant that we grow today as *Pilosocereus royeni*, and this has puzzled commentators ever since. Herman's Cereus nr. 4 (1698: 115), always regarded as being the same plant, was not so described, and Miller's example of it from the British West Indies in 1728 was also not described as jointed. However, articulation can occur in this species if the water supply is erratic, and we should therefore consider it as just an aberration of poor cultivation.

The usual spelling of the specific epithet with two 'i's is incorrect. Linnaeus latinised all personal names in specific epithets. The accepted latinisation of Royen is also Royen, which is to be treated as a second declension noun with the genitive *royeni*, like Greek neuter nouns of similar construction.

There are no original materials extant cited by Linnaeus, but the presently accepted application of the name has never been disputed. It is a widespread and common species throughout the Caribbean, and has many synonyms, one of the oldest of which is *Cereus monoclonos* DC, based on Burman's copy of Plumier's drawing. Linnaeus will have seen this copy, but we have no evidence that he associated it with this species. In the circumstances, the best solution to the lack of typification is to neotypify *Cactus Royeni* with Plumier's plate, the 'Cierge Espineux' (Spiny Torch) of the Lesser Antilles, the only contemporary uncited material available that also agrees with current usage.

There is a question about whether this species is truly different from *Cactus lanuginosus*, particularly as Herman's plate 115, the holotype of that species, is cited in synonymy with *Cactus Royeni* in Linnaeus & Murray (1784: 459).

11. ***Cactus grandiflorus*** [*Selenicereus grandiflorus* (L.) Britton & Rose].

Cactus grandiflorus L., *Species plantarum* **1**: 467. (1 May) 1753. Cactus repens subquinquangularis L. *Hort. cliff.*: 182 nr.10. 1737. *Hort. ups.*: 121 nr.11. 1748. *Roy. lugdb.*: 279 nr.10. 1740. (Fig. 60).
Typ: Jamaica; Mexico, Veracruz.
Lectotyp. (design. Lourteig 1991: 406): Cactus scandens minor polygonus articulatus. *Par. Bat.* 120. Mexico, Veracruz?; BM-000628597. Herb. Clifford: 182, Cactus 10. This is uncited but presumed by Lourteig to be original material. However, it is not dated, so there remains some doubt, but is retained here as the priority lectotypification. (Fig. 59)

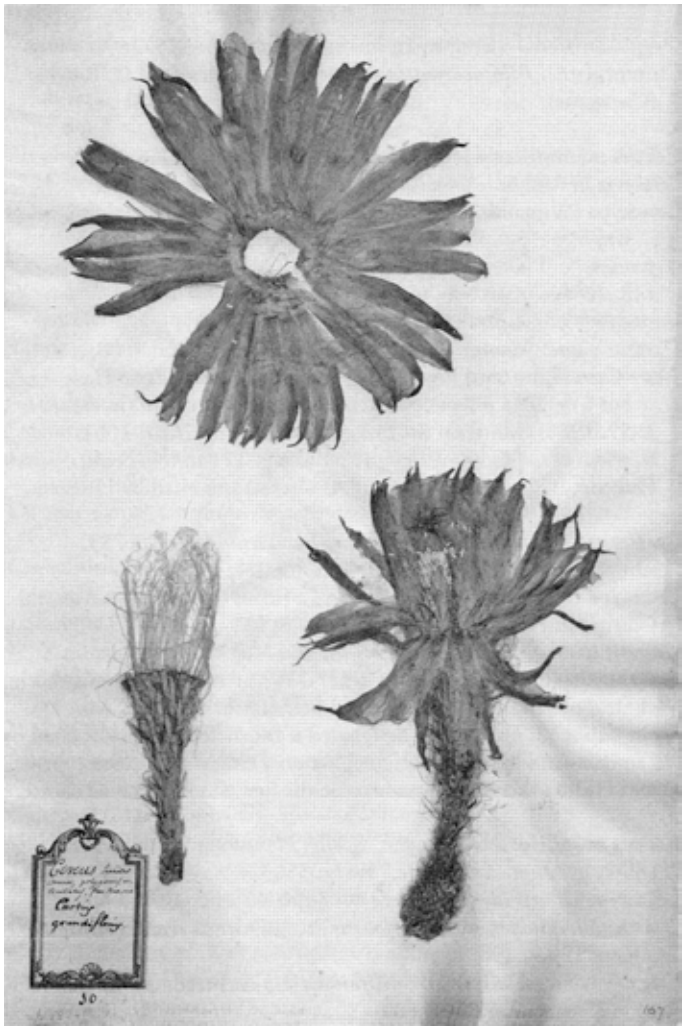
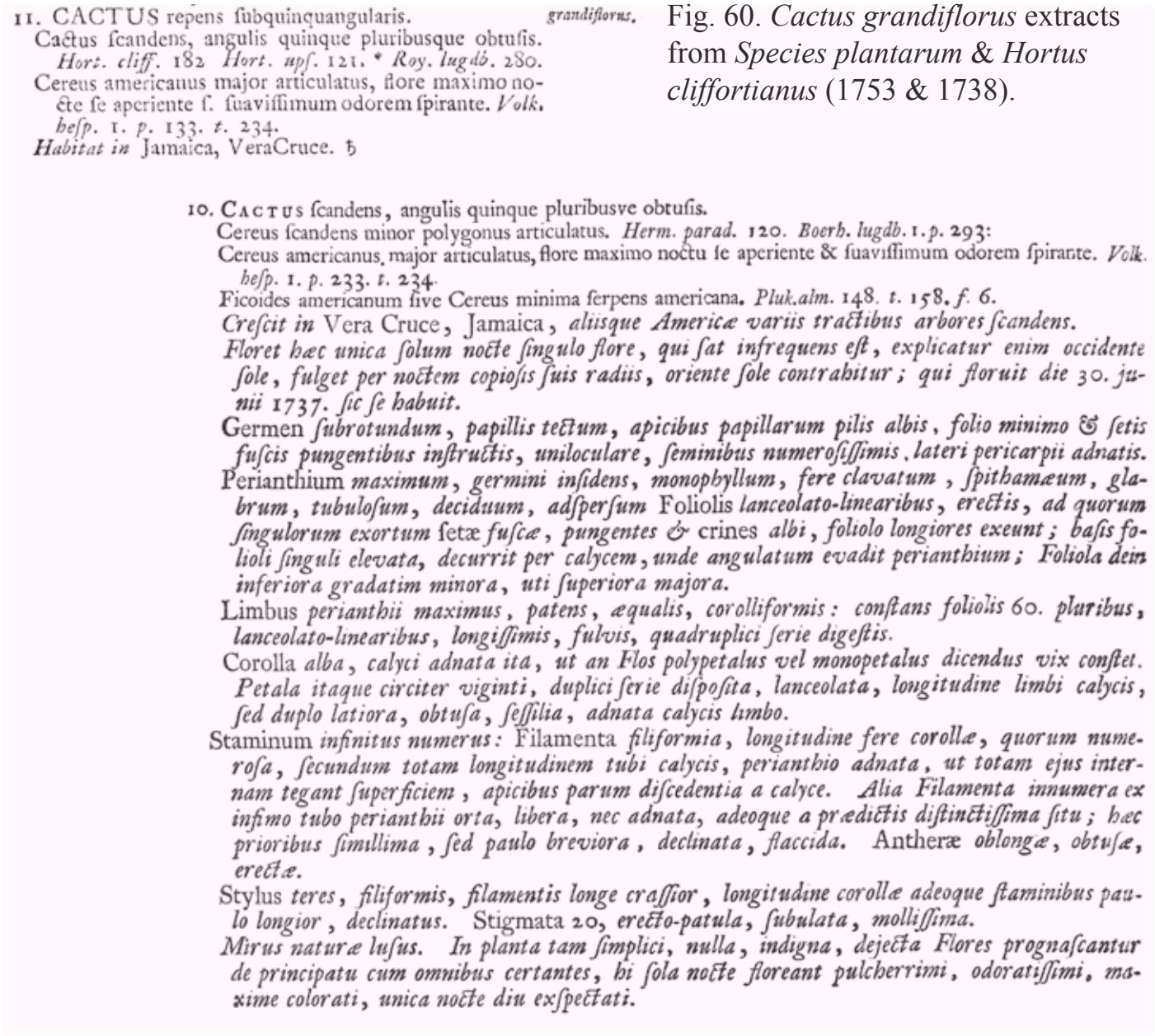


Fig. 59. Cactus scandens minor polygonus articulatus. *Par. Bat.* 120. BM-000628597. Herb. Clifford: 182, Cactus 10. Designated as lectotype by Lourteig in *Bradea* **5**: 406.1991.



11. CACTUS repens ſubquinquangularis. *grandiflorus.*
Cactus ſcandens, angulis quinque pluribusque obtuſis.
Hort. cliff. 182 *Hort. upſ.* 121. * *Roy. lugdb.* 280.
Cereus americanus major articulatus, flore maximo noctu ſe aperiente ſ. ſuaviſſimum odorem ſpirante. *Volk. heſp.* 1. *p.* 133. *t.* 234.
Habitat in Jamaica, VeraCruce. ♄

10. CACTUS ſcandens, angulis quinque pluribusve obtuſis.
Cereus ſcandens minor polygonus articulatus. *Herm. parad.* 120. *Boerh. lugdb.* 1. *p.* 293:
Cereus americanus, major articulatus, flore maximo noctu ſe aperiente & ſuaviſſimum odorem ſpirante. *Volk. heſp.* 1. *p.* 233. *t.* 234.
Ficoides americanum ſive Cereus minima ſerpens americana. *Pluk. alm.* 148. *t.* 158. *f.* 6.
Creſcit in Vera Cruce, Jamaica, *aliisque Americæ variis tractibus arbores ſcandens.*
Floret hæc unica ſolum nocte ſingulo flore, qui ſat infrequens eſt, explicatur enim occidente ſole, fulget per noctem copioſis ſuis radiis, oriente ſole contrahitur; qui floruit die 30. junii 1737. ſic ſe habuit.
Germen *ſubrotundum, papillis tectum, apicibus papillarum pilis albis, folio minimo & ſetis fuſcis pungentibus inſtructis, uniloculare, ſeminibus numeroſiſſimis, lateri pericarpii adnatis.*
Perianthium *maximum, germini inſidens, monophyllum, fere clavatum, ſpithamæum, glabrum, tubuloſum, deciduum, adſperſum* Foliolis *lanceolato-linearibus, erectis, ad quorum ſingulorum exortum* ſetæ *fuſcæ, pungentes &* crines *albi, foliolo longiores exeunt; baſis folioli ſinguli elevata, decurrit per calycem, unde angulatum evadit perianthium; Foliola dein inferiora gradatim minora, uti ſuperiora majora.*
Limbus *perianthii maximus, patens, æqualis, corolliformis: conſtans foliolis* 60. *pluribus, lanceolato-linearibus, longiſſimis, fulvis, quadruplici ſerie digeſtis.*
Corolla *alba, calyci adnata ita, ut an Flos polypetalus vel monopetalus dicendus vix conſtet. Petala itaque circiter viginti, duplici ſerie diſpoſita, lanceolata, longitudine limbi calycis, ſed duplo latiora, obtuſa, ſeſſilia, adnata calycis limbo.*
Staminum *infinitus numerus:* Filamenta *filiformia, longitudine fere corollæ, quorum numeroſa, ſecundum totam longitudinem tubi calycis, perianthio adnata, ut totam ejus internam tegant ſuperficiem, apicibus parum diſcedentia a calyce. Alia Filamenta innumera ex infimo tubo perianthii orta, libera, nec adnata, adeoque a prædictis diſtinctiſſima ſitu; hæc prioribus ſimillima, ſed paulo breviora, declinata, flaccida.* Antheræ *oblongæ, obtuſæ, erectæ.*
Stylus *teres, filiformis, filamentis longe craſſior, longitudine corollæ adeoque ſtaminibus paulo longior, declinatus.* Stigmata 20, *erecto-patula, ſubulata, molliſſima.*
Mirus naturæ luſus. In planta tam ſimplici, nulla, indigna, dejecta Flores prognaſcantur de principatu cum omnibus certantes, hi ſola nocte floreant pulcherrimi, odoratiſſimi, maxime colorati, unica nocte diu exſpectati.

Fig. 60. *Cactus grandiflorus* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

Principal homotypic synonym:
Selenicereus grandiflorus (L.) Britton & Rose, *Contributions from the U.S. National Herbarium* **12**(10): 430. 1909.

Three elements were cited in the protologue, as follows:
1. Cereus Americanus, major articulatus, flore maximo noctu se aperiente & suavissimum odorem spirante Volckamer, *Nürnbergische Hesperides*: t.234. 1708. (Fig. 61) Cited in both of Linnaeus's garden catalogues and in *Species plantarum*.
2. Cereus scandens minor polygonus articulatus, from Herman, *Paradisus Batavus* (1698): t.120. Cited in *Hort. cliff.* Said to have originated from Mexico, it might be another species of *Selenicereus* other than *grandiflorus*, such as *spinulosus*. Without a flower there is great uncertainty. (Fig. 62)
3. Ficoides americanum sive Cereus minima serpens americana, from Plukenet, *Phytographia* t.158, fig.6. 1692 was also cited in *Hortus cliffortianus* (1738), but erroneously transferred to *Cactus flagelliformis* in *Species plantarum* (1753). (Fig. 63).

The long description of the flower in *Hortus Cliffortianus* (1738: 182) may or may not have been from a plant in Clifford's garden. The way that the description is introduced in the first paragraph suggests that it may not have been:

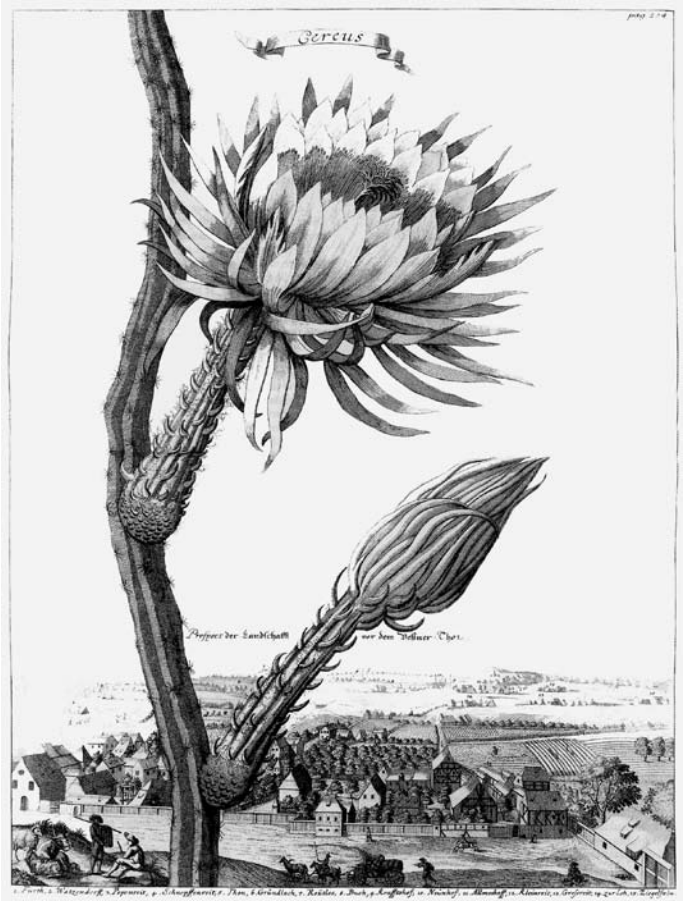


Fig. 61. Cereus Americanus, major articulatus, flore maximo noctu se aperiente & suavissimum odorem spirante, from Volckamer, *Nürnbergische Hesperides*: 234. 1708.

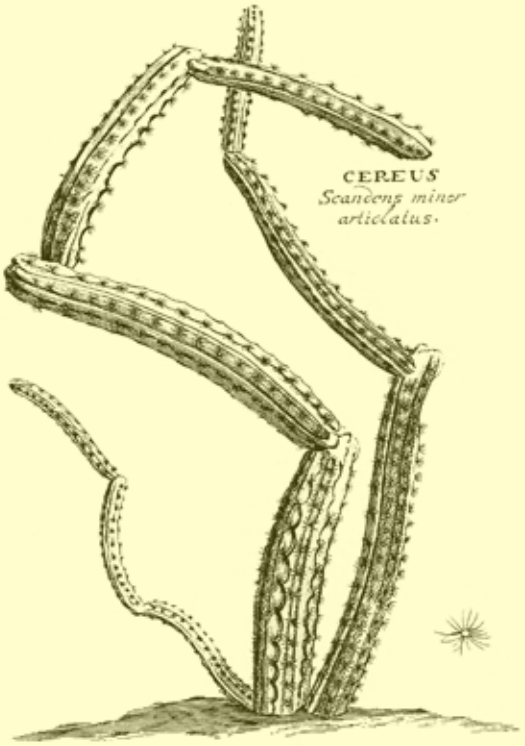


Fig. 62. Cereus scandens minor polygonus articulatus, from Herman, *Paradisus batavus* t.120. 1698.

"It has been reckoned that it flowers only for one single night, and even then infrequently, indeed it opens at sundown, expands to its full diameter through the night, to close at sunrise; there has been a report of it having flowered by day on 30 Jun 1737." The detailed observations of the flower thereafter therefore might not have been made by Linnaeus himself, but possibly by Van Royen in the summer before they met in the winter of 1737-38.

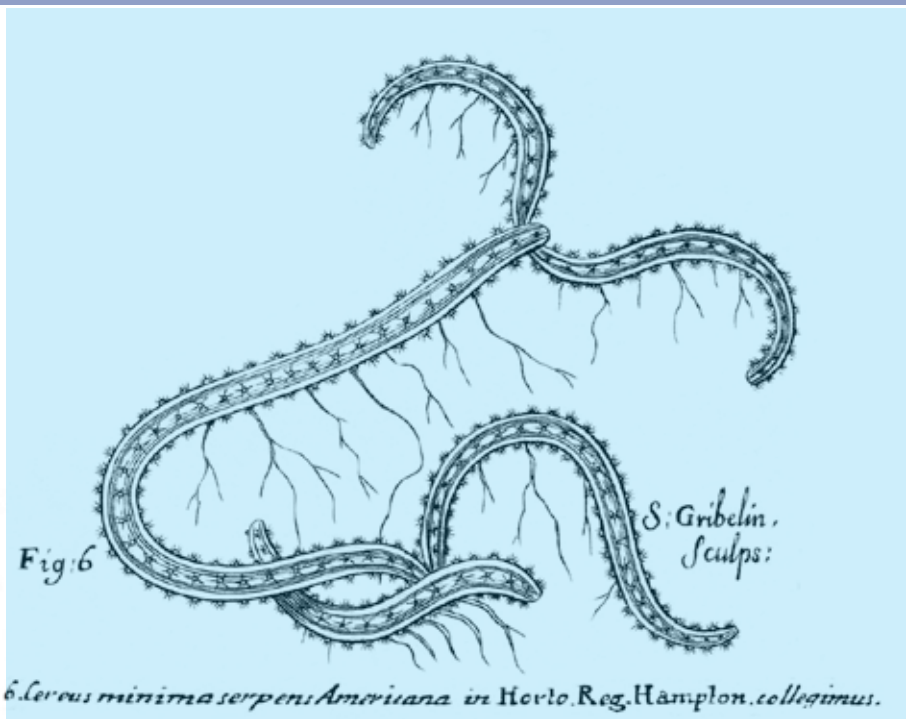


Fig. 63. Ficoides americanum sive Cereus minima serpens americana, from Plukenet, *Phytographia* t.158, fig.6. 1692.

Fig. 64. *Selenicereus grandiflorus* (L.) Britton & Rose, from Sola Palma, Veracruz, Mexico. Photo: Roy Mottram.

12. CACTUS repens decemangularis. *flagelliformis.*
Cactus ſcandens, angulis decem obſoletis. *Hort. upſ.* 121.
Cereus minor ſcandens polygonus ſpinoſiſſimus, flore purpureo. *Erhet. tab. 2. f. 2.*
Ficoides americanum ſ. Cereus minima ſerpens americana. *Pluk. alm.* 148. *t.* 158. *f.* 6.
Habitat in America *calidiore.* ♄

12. CACTUS ſcandens: angulis decem obſoletis.
Opuntia minima flagelliformis. *Plum. ſpec.* 6.
Cereus minimus ſcandens polygonus articulatus *Boerh.*
Cereus ſcandens minor polygonus. *Herm. parad.* 120. *Boerh. lugdb.* 1. *p.* 293
Ficoides americanum, ſ. Cereus minima ſerpens americana. *Pluk. alm.* 148. *t.* 158. *f.* 6.
Habitat in *America* calidiori.
Hoſpitatur in *Caldario*, ſucculenta.
Deſcr. *Minimus eſt, vix calamo ſcriptorio craſſior, angulis ita obſoletis & punctis echinatis ita confertis, ut anguli difficile numerentur.*

Fig. 65. *Cactus flagelliformis* extracts from *Species plantarum* & *Hortus upsaliensis* (1753 & 1748).

12. ***Cactus flagelliformis*** [*Aporocactus flagelliformis* (L.) Lem.].

Cactus flagelliformis L., *Species plantarum* **1**: 467. (1 May) 1753.
Cactus repens decemangularis L. *Hort. ups.*: 121 nr.12. 1748. (Fig. 65).
Typ: Tropical America.
Lectotyp. (design. Mottram 2011: 89): *Cactus flagelliformis* in Ehret, *Plantae et papiliones rariores depictae et aeri incisae a Georgio Dionysio* t.2. 1748. (Fig. 66).
Epityp. (design. Bauer 2003: 12): Mexico, Hidalgo, along Mex 85, N of Parque Natural de los Momoles, N of Cuesta Colorada; 8 Feb 2002; *Lautner L00/241* (ZSS 22701).

Principal homotypic synonyms:
Aporocactus flagelliformis (L.) Lem., *Illustr. Hort.* **7**: Misc. 68. 1860.

Disocactus flagelliformis (L.) Barthlott, in Hunt & Taylor, Notes on miscellaneous genera of Cactaceae, *Bradleya* **9**: 87. 1991.

A specimen, LINN 633.2, from the Linnaean Society of London herbarium, preserved at Uppsala, has been listed as original material

Fig. 66. Lectotype of *Cactus flagelliformis* in Ehret, *Plantae et papiliones rariores depictae et aeri incisae a Georgio Dionysio* t.2. 1748.

by Jarvis, but it is undated, and there would be difficulty in distinguishing it from *Aporocactus martianus* in the pressed condition. (Fig. 67).

Fig. 67. Herbarium specimen of *Cactus flagelliformis* LINN633.2, Linnean Society of London.

Linnaeus knew this plant well. His first mention is in the 1748 Uppsala catalogue, where it was the only cactus to actually have a description, which read "It is small, scarcely thicker than a reed pen, with weak angles and beset with sharp spines, to a point where it is difficult to count the angles."

The Species plantarum protologue includes three disparate elements. His earlier description starts with Plumier's phrase name from *Catalogus plantarum Americanarum*: 6. 1703, Opuntia minima flagelliformis, from which he appears to have adopted the name. We do know, however, from Plumier's plate in *Botanicon Americanum* **3**: t.76 shown here, that Plumier applied the name to *Rhipsalis baccifera*. (Fig. 68).

The second illustration from Plukenet, *Phytographia*: t.158, fig.6 was first cited by Linnaeus in *Hortus Cliffortianus* (1738) as a synonym of his phrase name for *Cactus grandiflorus*, and under *Cactus flagelliformis* in *Species plantarum* (1753). It is actually an image of *Selenicereus grandiflorus*. (Fig. 63)

The third illustration cited appears in *Species plantarum* (1753) for the first time, and is Ehret's painting that appeared in his work *Plantae et papiliones rariores depictae et aeri incisae a Georgio Dionysio* (1748). This plate was again copied in mirror image in the work of Trew, *Plantae selectae* (1750). This has been selected as the lectotype of this name by Mottram (2011: 89).

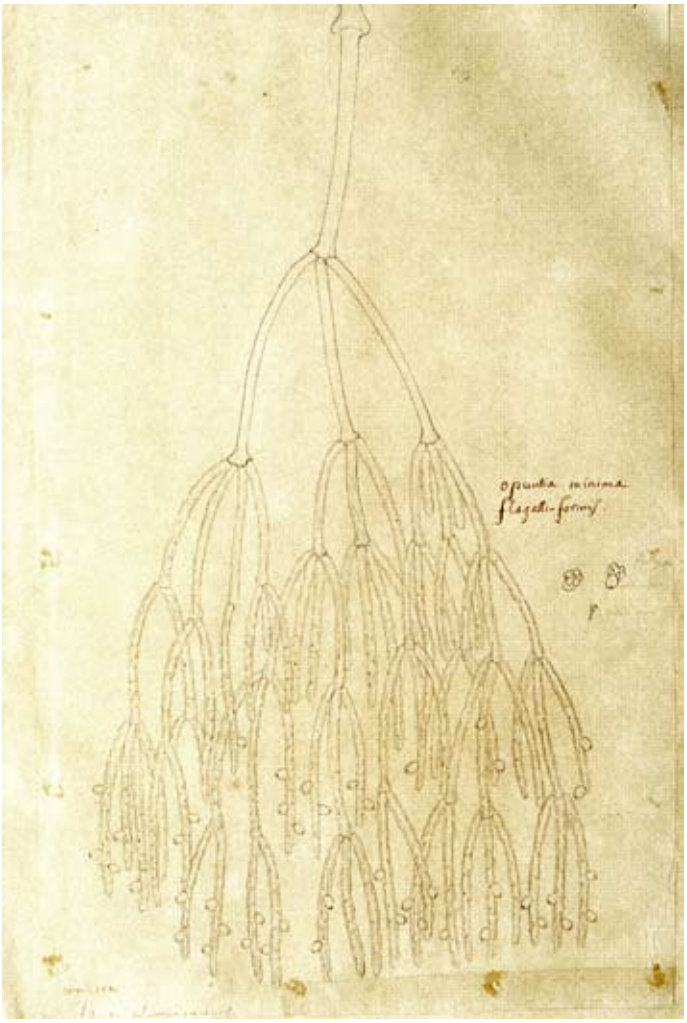
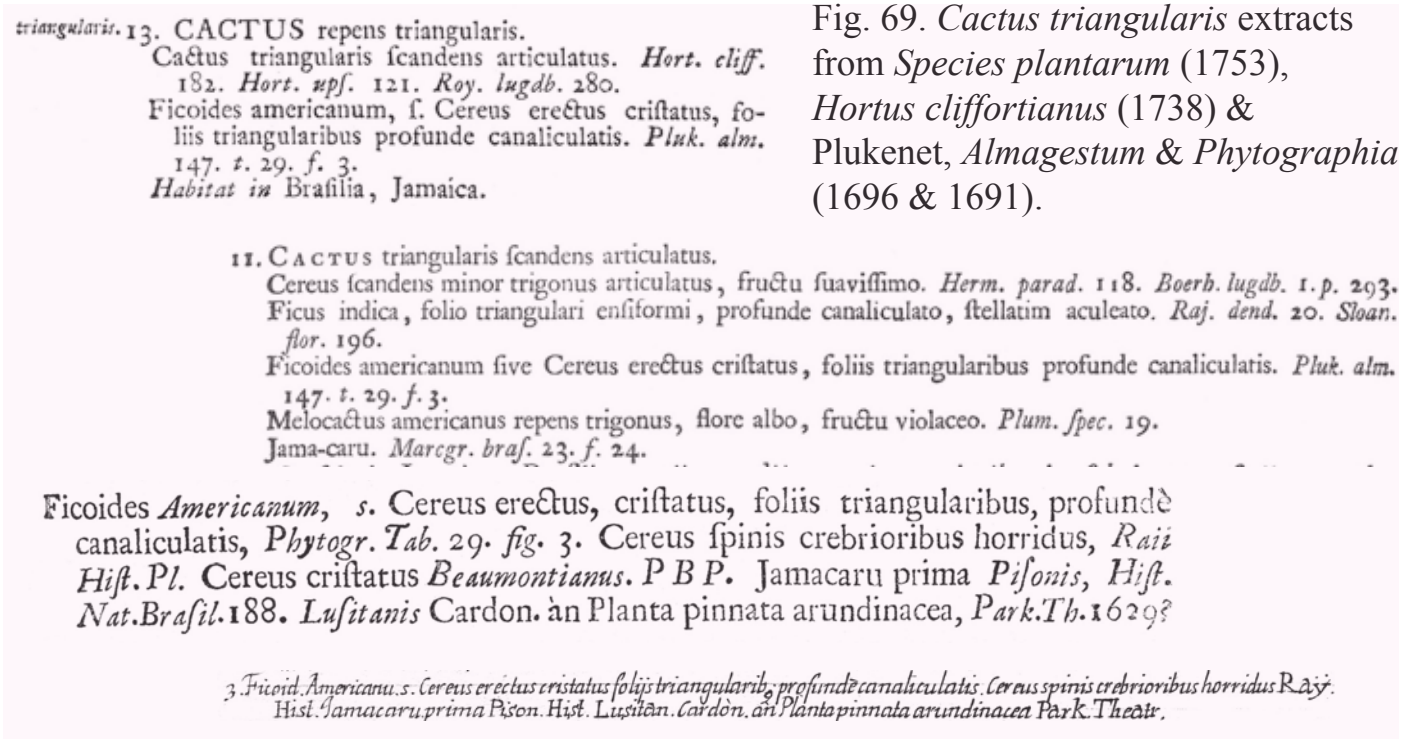


Fig. 68. Opuntia minima flagelliformis in Plumier, *Botanicon Americanum* **3**: t.76 [*Rhipsalis baccifera*] [cited by Linnaeus as the phrase name from Plumier, *Catalogus plantarum Americanarum*: 6. 1703].



triangularis. 13. CACTUS repens triangularis.
Cactus triangularis ſcandens articulatus. *Hort. cliff.* 182. *Hort. upſ.* 121. *Roy. lugdb.* 280.
Ficoides americanum, ſ. Cereus erectus criſtatus, foliis triangularibus profunde canaliculatis. *Pluk. alm.* 147. *t.* 29. *f.* 3.
Habitat in Braſilia, Jamaica.

11. CACTUS triangularis ſcandens articulatus.
Cereus ſcandens minor trigonus articulatus, fructu ſuaviſſimo. *Herm. parad.* 118. *Boerh. lugdb.* 1. *p.* 293.
Ficus indica, folio triangulari enſiformi, profunde canaliculato, ſtellatim aculeato. *Raj. dend.* 20. *Sloan. flor.* 196.
Ficoides americanum ſive Cereus erectus criſtatus, foliis triangularibus profunde canaliculatis. *Pluk. alm.* 147. *t.* 29. *f.* 3.
Melocactus americanus repens trigonus, flore albo, fructu violaceo. *Plum. ſpec.* 19.
Jama-caru. *Marcgr. braſ.* 23. *f.* 24.

Ficoides *Americanum, s.* Cereus erectus, criſtatus, foliis triangularibus, profundè canaliculatis, *Phytogr. Tab.* 29. *fig.* 3. Cereus ſpinis crebrioribus horridus, *Raii Hiſt. Pl.* Cereus criſtatus *Beaumontianus. P B P.* Jamacaru prima *Piſonis, Hiſt. Nat. Braſil.* 188. *Luſitanis* Cardon. an Planta pinnata arundinacea, *Park. Th.* 1629?

3 Ficoid. Americanu. s. Cereus erectus cristatus foliis triangularib; profundè canaliculatis. Cereus spinis crebrioribus horridus Raij. Hist. Jamacaru prima Pison. Hist. Lusitan. Cardon. an Planta pinnata arundinacea Park. Theatr.

Fig. 69. *Cactus triangularis* extracts from *Species plantarum* (1753), *Hortus cliffortianus* (1738) & Plukenet, *Almagestum* & *Phytographia* (1696 & 1691).

13. ***Cactus triangularis*** [*Hylocereus triangularis* (L.) Britton & Rose].

Cactus triangularis L., *Species plantarum* **1**: 467. (1 May) 1753. Cactus repens triangularis L. *Hort. cliff.*: 182 nr.11. 1737. *Hort. ups.*: 121 nr.13. 1748. (Fig. 69).
Typ: Jamaica, Brazil, and various other regions of the Americas in wooded fields growing and climbing on trees.
Lectotyp. (design. Doweld 2002: 12): Ficoides Americanum, seu Cereus erectus cristatus, foliis triangularibus profunde canaliculatis, from Plukenet, *Phytographia* t.29 fig.3. 1691. (Fig. 70)
Epityp. (design. Doweld 2002: 12): Jamaica, Manchester, 2100ft.; 31 Aug 1979, *G. R. Proctor 38288* (MO).

Principal homotypic synonym:
Hylocereus triangularis (L.) Britton & Rose, *Contributions from the U. S. National Herbarium* **12**(10): 428. 1909.

Other elements in synonymy listed by Linnaeus in *Hortus Cliffortianus* include Markgrave's illustration of Jama-caru nr. 2 (Fig. 71), actually either *Cereus pentagonus* or *jamacaru*. Markgrave called all cacti Jama-caru (Tupi indian for any thorny edible tree). *Hylocereus triangularis* was his Jama-caru nr. 1, with

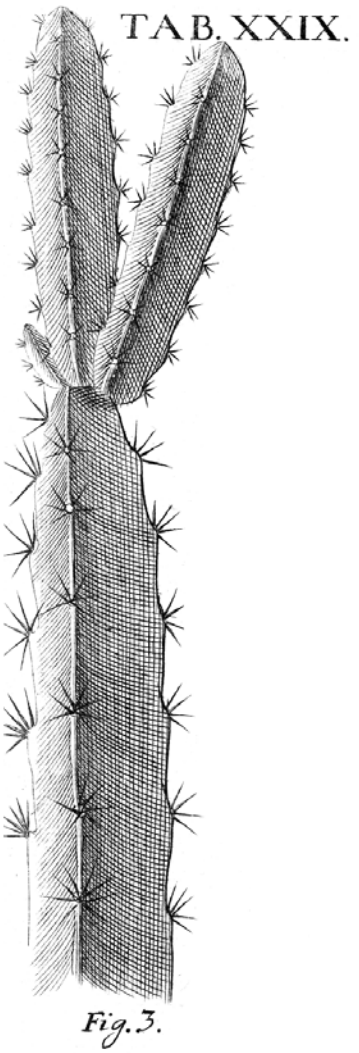


Fig. 70. *Cactus triangularis* from Plukenet, *Phytographia* t.29 fig.3. 1691, the lectotype designated by Doweld (2002).

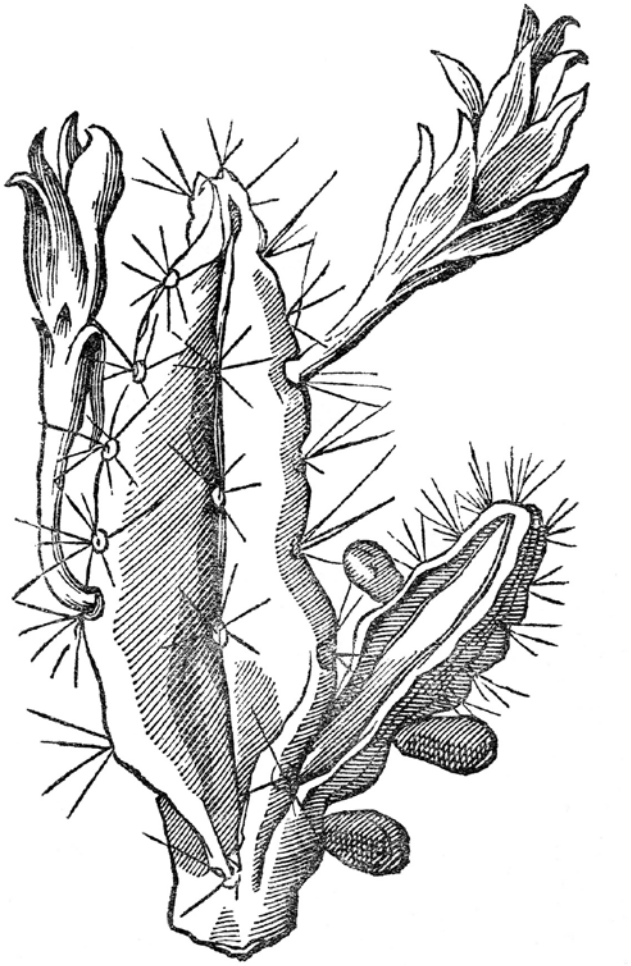


Fig. 71. Jamacaru nr.2, in Markgrave, *Historia natural do Brasil*: 24. 1648 (1942 reprint). A cited element for *Cactus triangularis* in *Hortus cliffortianus* (1738).

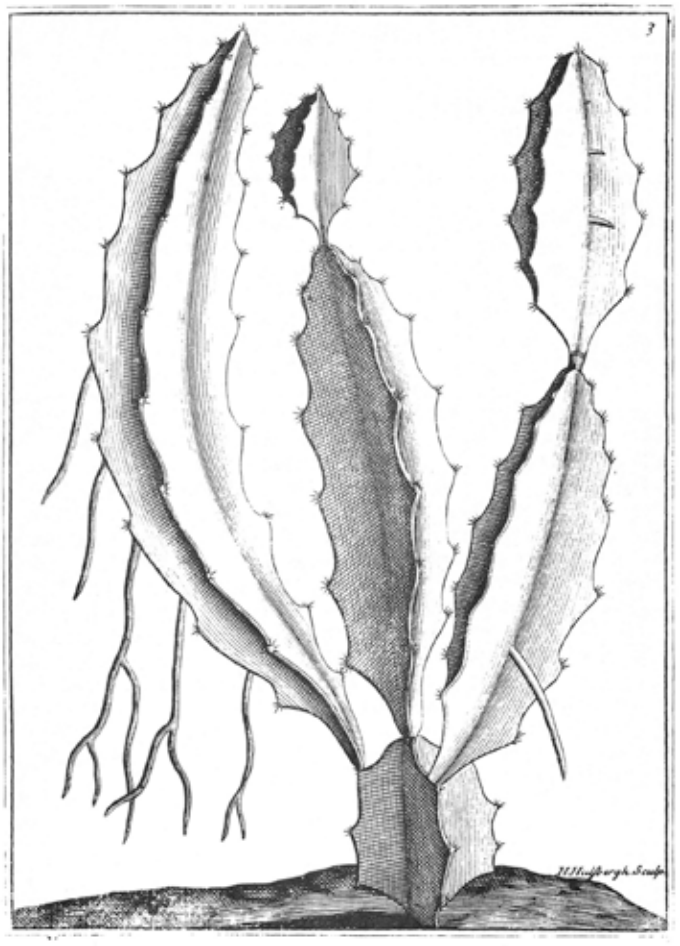


Fig. 72. *Hylocereus undatus* from Bradley, *Historia plantarum succulentarum* **1**: 4, t.3. 1716, as Cereus Americanus Triangularis radicosa.

no illustration, and Linnaeus misinterpreted the text.

Also listed is Plumier's phrase name from *Catalogus plantarum Americanarum*: 19. 1703, Melocactus [americanus] repens, trigonus, flore albo, fructu violaceo, but because Plumier slightly modified his names from *Botanicon Americanum* we cannot be sure to which of his illustrations the 1703 phrase name applied. Linnaeus & Murray (1784: 460) cited "Plum. ic. 199, 200?" (in Burman 1758), thereby expressing this uncertainty.

A new contemporary element listed in *Species plantarum* ed.2: 669 is Bradley, *Historia plantarum succulentarum* **1**: 4, t.3. 1716, as Cereus Americanus Triangularis radicosa (Fig. 72). It is often said to be *Hylocereus triangularis*, but it has the thicker, spindle-shaped articulations more typical of *H. undatus*. All species of *Hylocereus* were then considered to be the same thing but *undatus* was the plant cultivated in the West Indies, South America, and elsewhere across the Pacific for its vigour and superior fruits to the native *triangularis*.

Hylocereus undatus is considered as native to some islands of the Caribbean, but its true origin is unknown. It may have arisen in cultivation by breeding or selection in historic times, parallelling the case of *Opuntia ficus-indica*, prized for the fruits and its flowers also have an economic value to

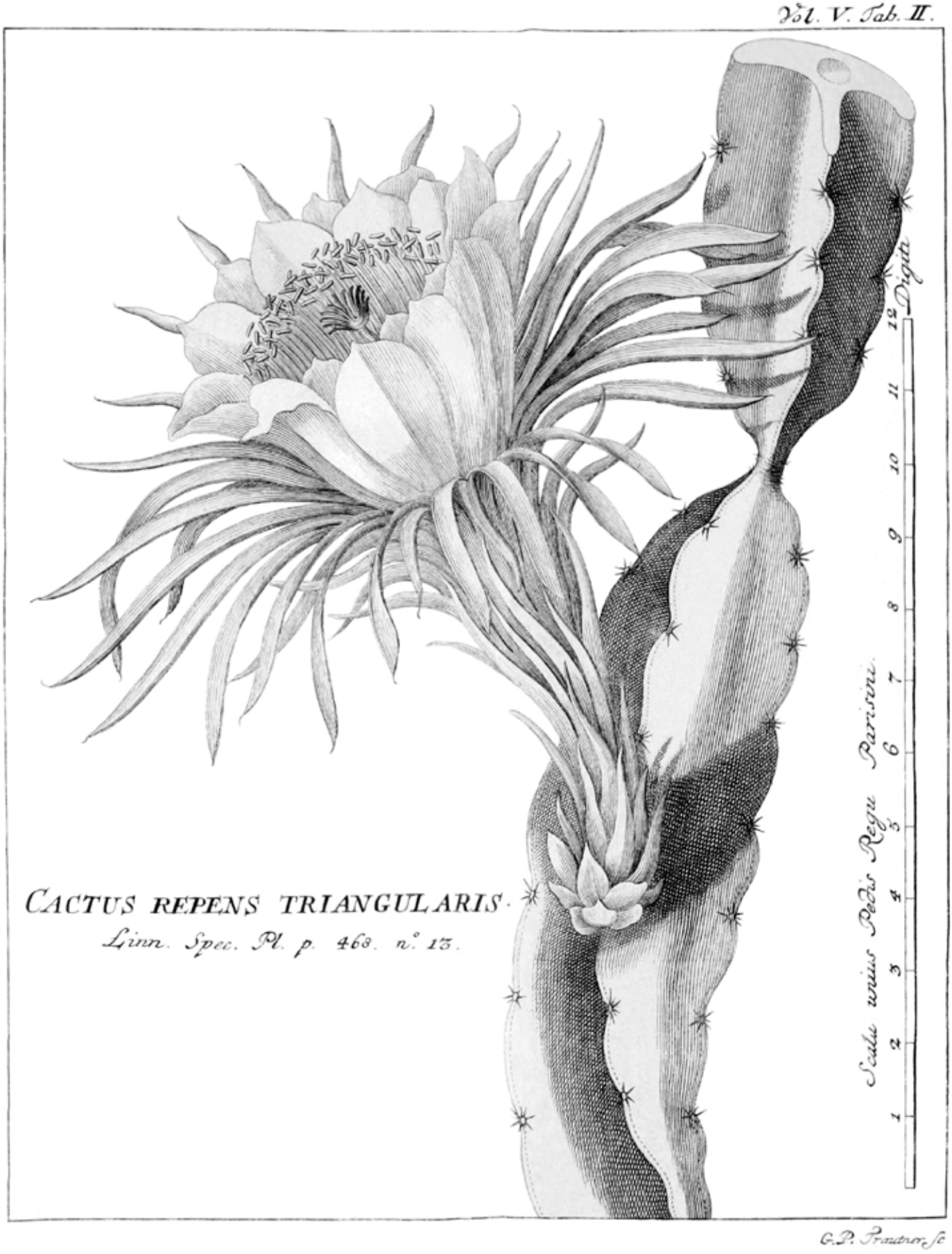


Fig. 73. *Hylocereus undatus* from Ridler, (1762) Descriptio Cacti triangularis LINN. *Acta Helvetica* **5**: t.2. 1762.

the natives as food and medicine (Degener 1932). First recorded and illustrated by Oviedo in 1535, it has been established through many parts of the world, including to many Pacific Islands and in China before 1830, from where its neotype is said to have

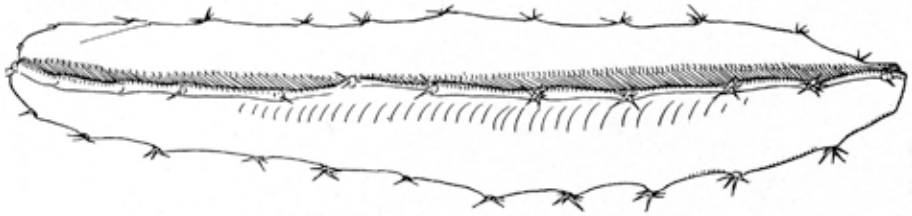


Fig. 269.—Joint of Hylocereus triangularis. ×0.5.
collected by Dr. Britton near Mandeville, Jamaica, in 1907.

Fig. 74. *Hylocereus triangularis* (Jamaica, nr. Mandeville) Joint collected by Nathaniel Britton in 1907, from Britton & Rose, *The Cactaceae* **2**: 193. 1920.

originated. It differs from *Hylocereus triangularis* in being larger in all its parts, the stem wings are more prominent, and the shorter joints are more spindle-shaped.

A further two illustrations were added to the second edition from *Academia Caesarea Leopoldino-Carolina Germanica Naturae Curiosorum*, cited as "E. N. C. 1752. v. 9 app. 199. t.10. f. 14" and "E. N. C. 1754 v. 9. app. 349. t.3" (See Heller & Stearn 1959: 39-40). The second reference is perhaps corrupted and could not be found, but the first is a reasonable representation of a flowering stem of *Hylocereus triangularis*.

Another illustration added to *Systema Vegetabilium* (1784: 460) is the very fine plate accompanying an article by Risler (1762: t.2), but this again is not *triangularis* but *undatus* (Fig. 73).

Many illustrations have been published purporting to be this species, but few can be traced to the epitype locality in Jamaica. A sketch of a joint collected by Nathaniel Britton near Mandeville, Jamaica in 1907 is shown in Fig. 74. It is the common native hylocereus of the Caribbean and Central America.

14. ***Cactus moniliformis*** [*Opuntia* (*Consolea*) *moniliformis* (L.) Steudel].
Cactus moniliformis L., *Species plantarum* **1**: 468. (1 May) 1753. Cactus articulato-prolifer, articulis globosus spinosis glomeratis L. (Fig. 75).
Typ: Tropical America.
Lectotyp. (design. Mottram 2002: 88) Cactus articulato-prolifer, articulis globosis Plumier, in Burman, *Plantarum Americanum* fasc. 8: t.198. (20 Jun) 1758. (Fig. 76).
Typotyp.: Haiti, Band du Sud, commonly found along the coast; 1689-1690 or 1693, *Charles Plumier*; Melocactus ex pluribus globulis opuntia modo nascentibus constatus et spinosissimus Plumier, *Botanicon Americanum* **3**: t.11 (lower fig.). (Fig. 76 inset)

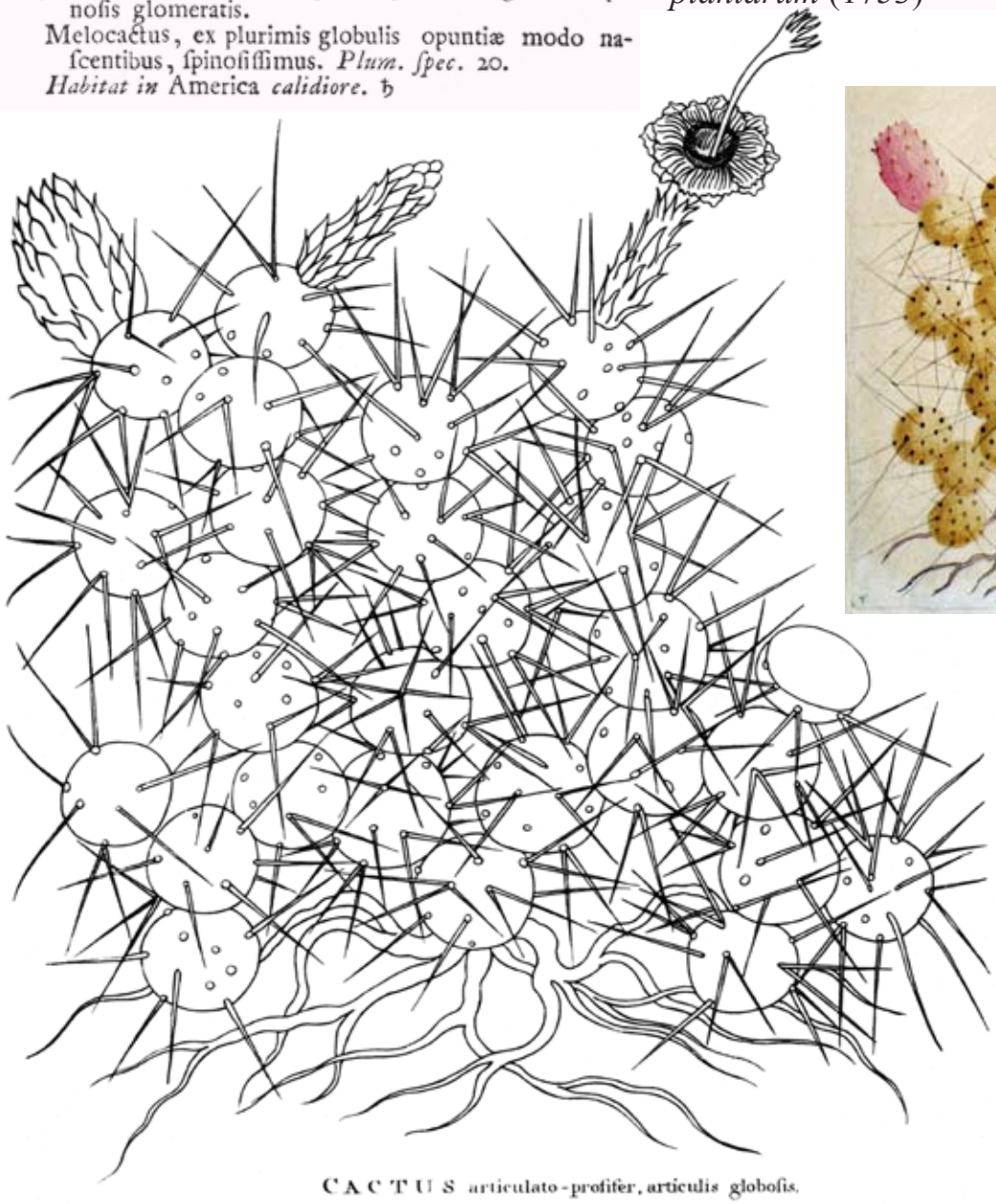
Original material seen by Linnaeus (as Burman copies), not cited or identified by him because he did not recognise it as the same plant but also belonging here is: Hispaniola (abundant at Port à Piment) & St. Thomas (Virgin Is.), very frequent in dry, wooded areas; 1689-1690, *Charles Plumier*; Opuntia arbor excelsa foliis reticulatus, flore flavescente Plumier, *Botanicon Americanum* **3**: t.27-28 (Fig. 78-79).

Principal homotypic synonyms:
Opuntia moniliformis (L.) Steudel, *Nomenclator botanicus*, ed.2 **1**: 334, 2: 221. 1841.
Consolea moniliformis (L.) A.Berger, *Die Entwicklungslinien der Kakteen*: 94. 1926.

Fig. 75. *Cactus moniliformis* extract from *Species plantarum* (1753)

* Opuntiæ *compreſſæ articulis proliferis.*

moniliformis. 14. CACTUS articulato-prolifer, articulis globoſis ſpinoſis glomeratis.
Melocactus, ex plurimis globulis opuntiæ modo naſcentibus, ſpinoſiſſimus. *Plum. ſpec.* 20.
Habitat in America *calidiore.* ♄



CACTUS articulato-profifer, articulis globoſis.

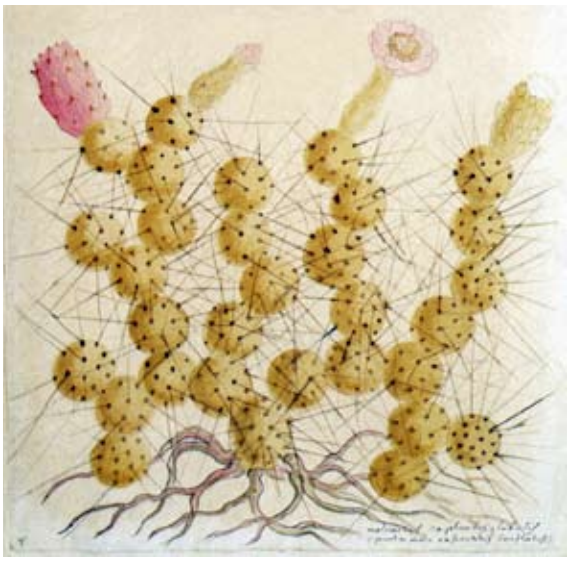


Fig. 76 (left) Lectotype from Burman, *Plantarum Americanarum fasciculus 8*: t.198. 1758.
(above) Typotype from *Botanicon Americanum* **3**: t.11. 1689-1693.

Fig. 77. *Opuntia moniliformis* (Porto Rico, Desecheo Island, Mona Passage) from Britton & Rose, *The Cactaceae* **1**: 207, fig.261-262. 1919. The left-hand photo is by Lutz, showing the glomeriform juvenile growth formed by a proliferation from fruits falling to the ground.

FIG. 261.—Opuntia moniliformis. The same species as 260, but showing a different mode of growth.

FIG. 262.—Opuntia moniliformis. ×0.66.

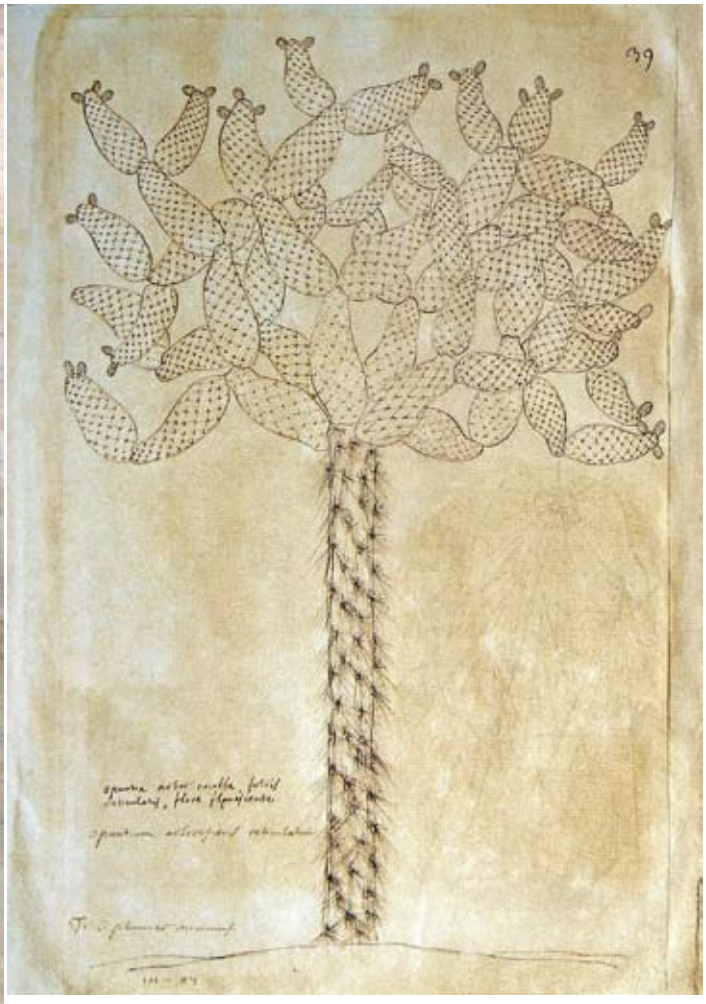
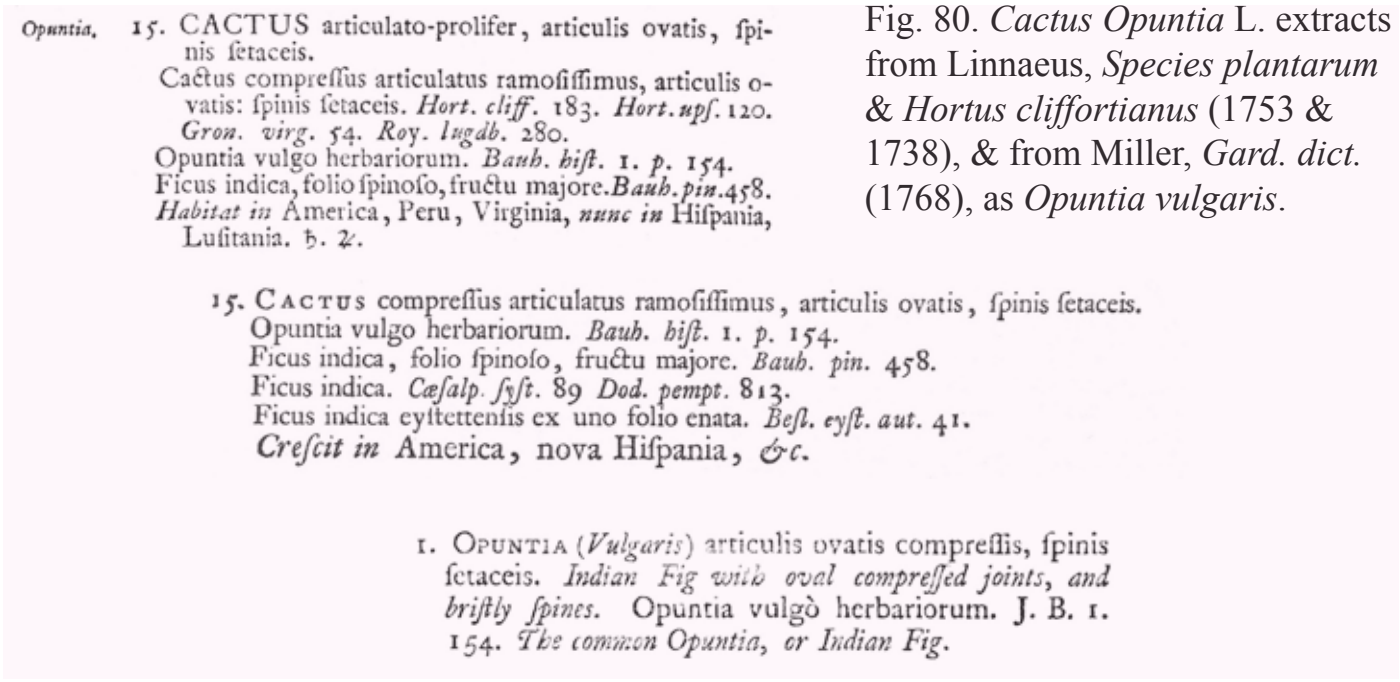


Fig. 78-79. *Opuntia moniliformis* (Haiti, Port á Piment) Plumier, *Botanicon Americanum* **3**: t. 27-28. 1689-1693.

Linnaeus made an indirect reference to the Plumier plate in the protologue by citing Plumier's phrase name from his catalogue (1703: 20), which was supported in the second edition of *Species plantarum* by the addition of the explicit reference to "ic. 198". No other elements exist, although Plumier included two other illustrations of a mature plant of the same species, however believing it to represent a different species.

This was known to Linnaeus only from the copy of Plumier's drawing. Linnaeus saw it in the *Codex Boerhaavianus* in the winter of 1737-38. Plumier's original drawing (Fig. 76 inset) and manuscript description were not seen by Linnaeus. This drawing could not be related to any known species for the next 150 years until Britton & Rose realised that it was merely the juvenile form of the tree-like consolea that we call *Opuntia moniliformis* today (Fig. 77).

15. ***Cactus Opuntia*** [≡ *Opuntia vulgaris* Mill. ≡ *Opuntia ficus-indica* (L.) Mill.]. *Cactus Opuntia* L., *Species plantarum* **1**: 468. (1 May) 1753. Cactus articulato-prolifer, articulis ovatis spinis setaceis L. *Hort. cliff.:* 183 nr.15. 1737. *Hort. ups.*: 120 nr.6. 1748. (Fig. 80).
Typ: America, Peru, USA: Virginia, and now naturalised in Spain and Portugal. [Italy added in ed.2].
Lectotyp. (design. here): Ficus Indica Eÿstettensis ex uno folio enata luxurians, Besler, *Hortus Eystettensis*, Classis Autumnalis: t. 6 (= 41), fig.1. 1613. [cited in *Hort. Cliff.* (1737)]. Supersedes the



Opuntia. 15. CACTUS articulato-prolifer, articulis ovatis, ſpinis ſetaceis.
Cactus compreſſus articulatus ramoſiſſimus, articulis ovatis: ſpinis ſetaceis. *Hort. cliff.* 183. *Hort. upſ.* 120. *Gron. virg.* 54. *Roy. lugdb.* 280.
Opuntia vulgo herbariorum. *Bauh. hiſt.* 1. *p.* 154.
Ficus indica, folio ſpinoſo, fructu majore. *Bauh. pin.* 458.
Habitat in America, Peru, Virginia, *nunc in* Hiſpania, Luſitania. ♄. *z.*

15. CACTUS compreſſus articulatus ramoſiſſimus, articulis ovatis, ſpinis ſetaceis.
Opuntia vulgo herbariorum. *Bauh. hiſt.* 1. *p.* 154.
Ficus indica, folio ſpinoſo, fructu majore. *Bauh. pin.* 458.
Ficus indica. *Cæſalp. ſyſt.* 89 *Dod. pempt.* 813.
Ficus indica eyſtettenſis ex uno folio enata. *Beſl. eyſt. aut.* 41.
Creſcit in America, nova Hiſpania, *&c.*

1. OPUNTIA (*Vulgaris*) articulis ovatis compreſſis, ſpinis ſetaceis. *Indian Fig with oval compreſſed joints, and briſtly ſpines.* Opuntia vulgò herbariorum. J. B. 1. 154. *The common Opuntia, or Indian Fig.*

Fig. 80. *Cactus Opuntia* L. extracts from Linnaeus, *Species plantarum & Hortus cliffortianus* (1753 & 1738), & from Miller, *Gard. dict.* (1768), as *Opuntia vulgaris*.

lectotypifications of Howard & Touw (1981: 237), not identifiable, and that of Leuenberger (1993: 426), not cited or known to have been definitely seen by Linnaeus. (Fig. 81a).
Isolectotyp: Ficus Indica Eÿstettensis ex uno folio enata luxurians, Folium Opuntiae cum flore & fructu, Besler, *Hortus Eystettensis*, Classis Autumnalis: t.7 (= 42). 1613. (Fig. 81b).

Three other illustrations were cited by Linnaeus as follows:
Bauhin & Cherler, *Historia plantarum* (1650 **1**: 154) [cited in *Sp. plant.* (1753), *Hort. Cliff.* (1738) & *Hort. Upsal.* (1748)]. [*Opuntia* ?*ficus-indica* (L.) Mill.] (Fig. 82)

Dodoens, *Stirpium historiae pemptades sex, sive libri XXX*: 813. 1583. [cited in *Hort. Cliff.* (1738) & *Hort. Upsal.* (1748)]. [*Opuntia ficus-indica* (L.) Mill.] (Fig. 83)

Tournefort, *Institutiones rei herbariae* **2**: t.122. 1719. [cited in *Gen. Plant.* (1754)]. [*Opuntia* ?*humifusa*] (Fig. 84)

Principal homotypic synonyms:
Cactus Ficus-Indica L., *Species plantarum* **1**: 468. (1 May) 1753.

Opuntia vulgaris Mill., *Gardeners dictionary*, ed.8: Opuntia nr.1. 1768.

Opuntia ficus-indica (L.) Mill., *Gardeners dictionary,* ed.8: Opuntia nr.2. 1768.

Miller (1768) provided the earliest substitute name, *Opuntia vulgaris*, in *The gardeners dictionary* of 1768. Miller's own description also included what we know today as *Opuntia humifusa*, as is clear not only from his description but also from the fine illustration of his plant in his celebrated work *Figures of the most beautiful, useful, and uncommon plants described in the Gardeners Dictionary*, that particular plate having been published in 1757. This has led many authors to adopt the epithet *vulgaris* for what is otherwise known as *Opuntia humifusa*. However, this is a mistaken interpretation of the naming rules. The type of a substitute name has to be the type of the replaced synonym, and, as Linnaeus could not have seen the illustration of Miller in 1753, that cannot count.

Howard & Touw (1981: 236) placed great store on the fact that in the second edition, Linnaeus had added a reference to the plate of Miller (1760: t.191), depicting what

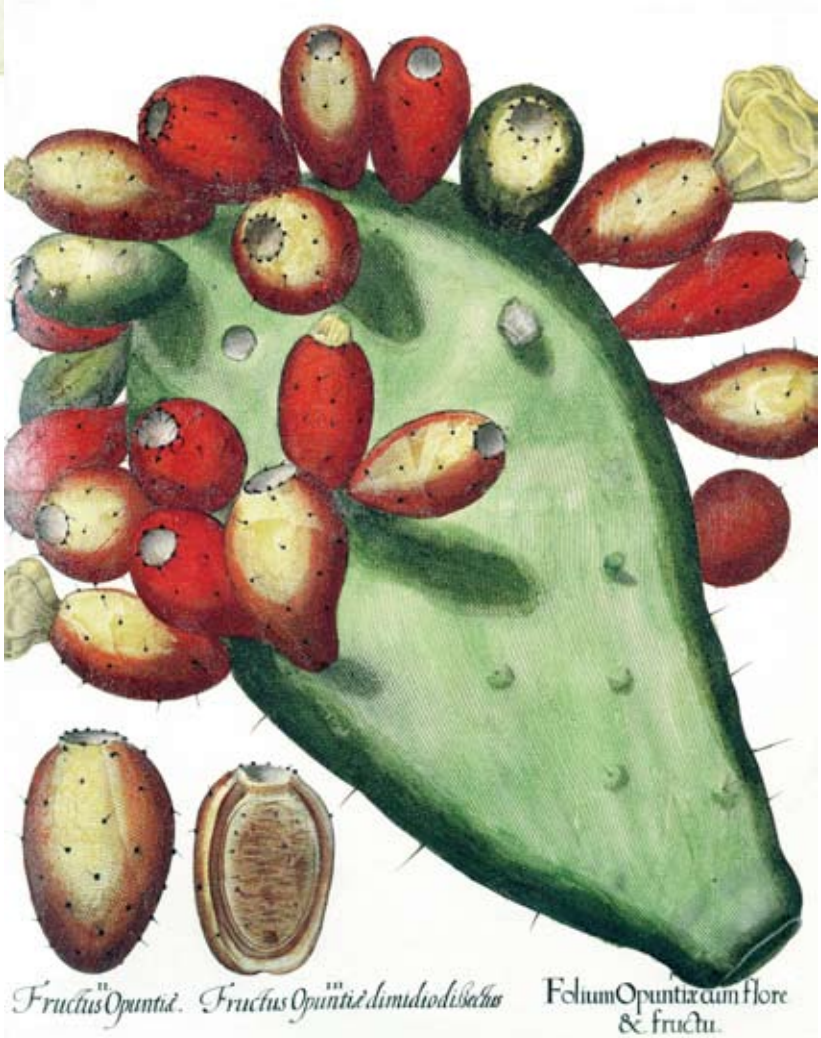
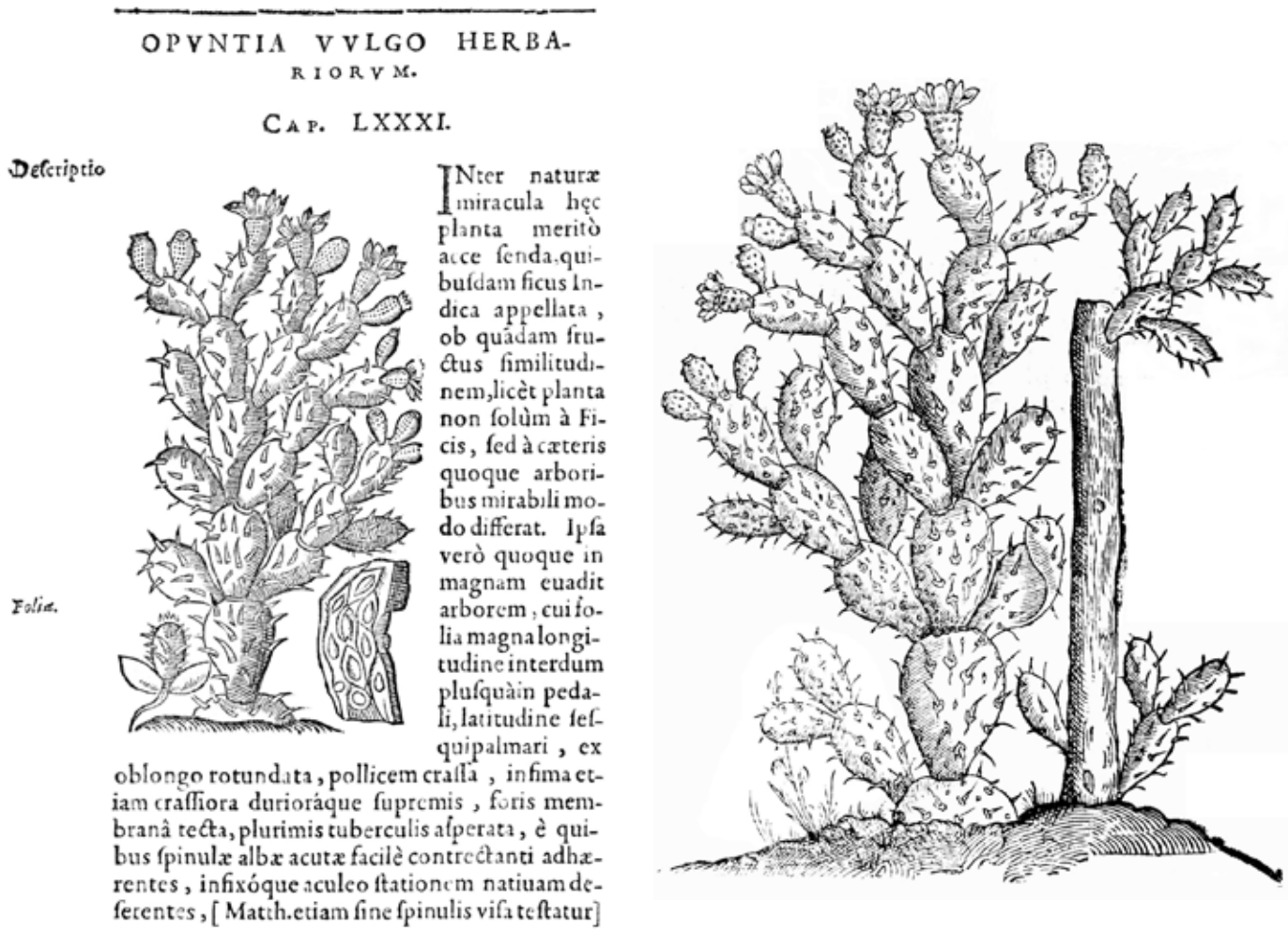


Fig. 81
(above) Besler, *Hortus eystettensis*, Classis Autumnalis: t.6 (= 41). 1613. [cited in *Hort. Cliff.* (1738)].
Lectotype of *Cactus Opuntia* L.

(right) loc. cit. t.7 (= 42). 1613.
Lectotype of *Cactus Ficus-indica* L.


OPVNTIA VVLGO HERBA-
RIORVM.

CAP. LXXXI.

Descriptio

INter naturæ miracula hęc planta meritò acce ſenda, quibuſdam ficus Indica appellata, ob quâdam fructus ſimilitudinem, licèt planta non ſolùm à Ficis, ſed à cæteris quoque arboribus mirabili modo differat. Ipſa verò quoque in magnam euadit arborem, cui folia magna longitudine interdum pluſquàin pedali, latitudine ſeſquipalmari, ex oblongo rotundata, pollicem craſſa, infima etiam craſſiora durioráque ſupremis, foris membranâ tecta, plurimis tuberculis aſperata, è quibus ſpinulæ albæ acutæ facilè contrectanti adhærentes, infixóque aculeo ſtationem natiuam deſerentes, [Matth. etiam ſine ſpinulis viſa teſtatur]

Folia.

Fig. 82. Opuntia sp. (left) Bauhin & Cherler, *Historia plantarum*: 154. 1650. (right) Peña & L'Obel, *Nova stirpium adversaria*: 454: 1570. Repeated in L'Obel, *Icones* **2**: 241. [cited in *Hortus upsaliensis* (1748)]. Lefthand plant called Indorum TUNE Ficifera: probably *Opuntia ficus-indica*, & righthand plant Indorum ferruminatrix: probably *O. spinosissima* (two separate woodcuts superimposed).

today is known as *Opuntia humifusa*, and the adding of the word *laxus* to his own phrase name. Contrary to the interpretation of Howard & Touw, Linnaeus's own definition of *laxus* was "libere in arcum flexibilis" (1762) meaning "in a freely flexible arch", a description that is more likely to apply to the branches of species with erect trunks than to those which are procumbent.

Britton & Rose confused matters further by thinking that they could somehow see *Opuntia monacantha* in the illustration of Bauhin & Cherler and applied the name *Opuntia vulgaris* in that sense.

Amongst the original material cited by Linnaeus, we must include elements known to have been used by him. The only illustration cited directly in *Species plantarum* was that of Bauhin & Cherler (1650 1: 154), which was probably *O. ficus-indica*. To many authors, this is therefore automatically the holotype of *Cactus Opuntia*, but, even if that were true, it is not useful because of its uncertain identity. It is a mirror image of one of the two superimposed woodcuts published by Peña & L'Obel in 1570, with additions of a seedling and a fruit section (Fig. 82).

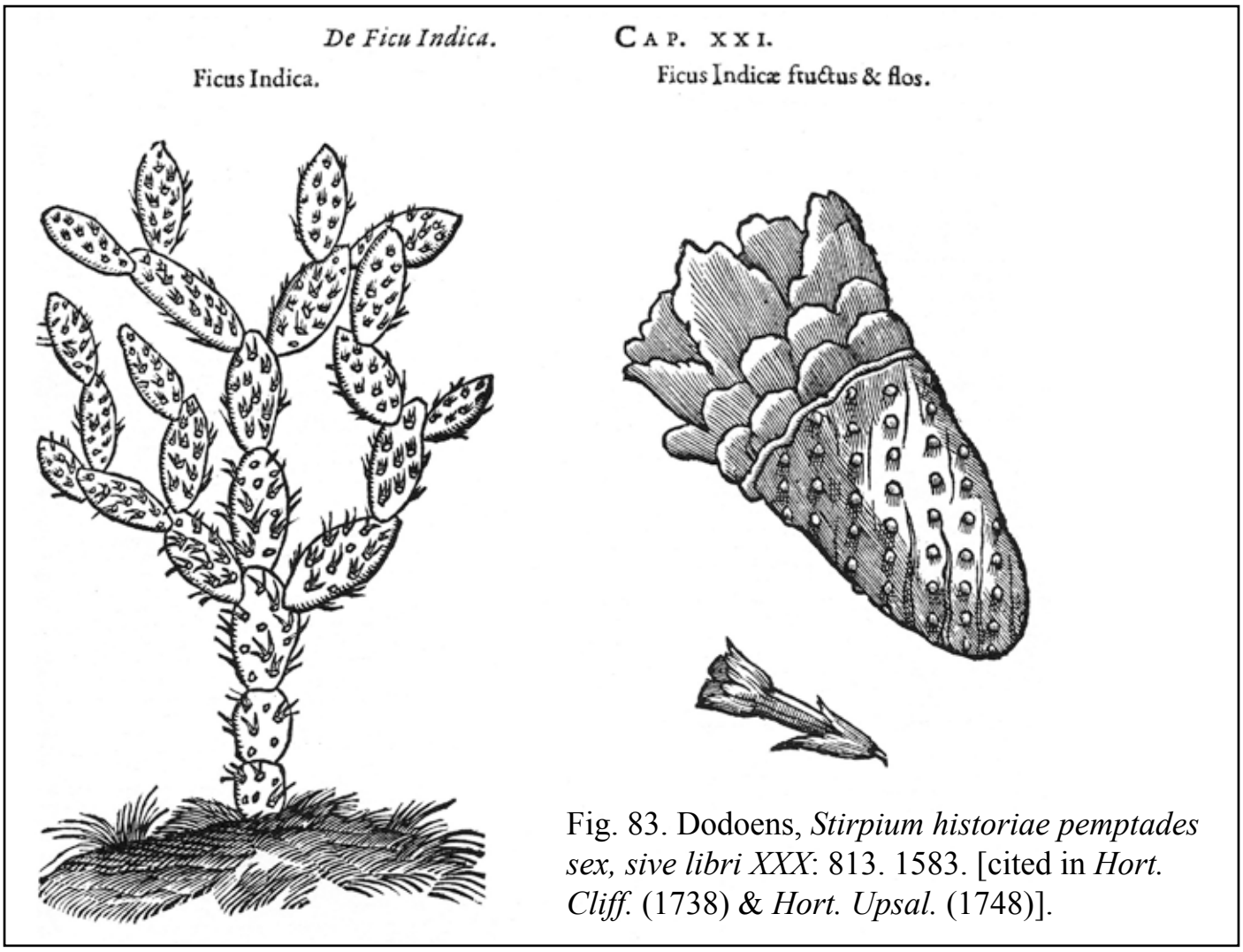


Fig. 83. Dodoens, *Stirpium historiae pemptades sex, sive libri XXX*: 813. 1583. [cited in *Hort. Cliff.* (1738) & *Hort. Upsal.* (1748)].

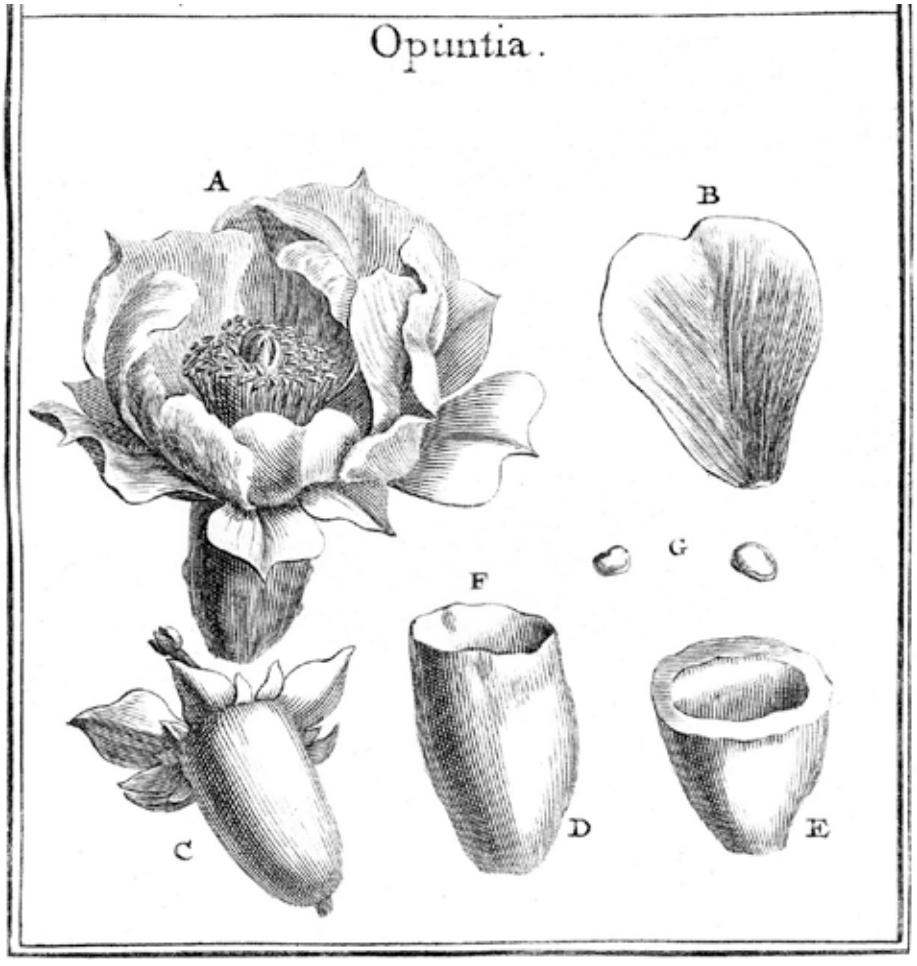


Fig. 84. *Opuntia* ?*humifusa* in Tournefort, *Institutiones rei herbariae* **2**: t.122. 1719. [cited in *Gen. Plant.* (1753)].

Of the other material worked on by Linnaeus, specimens in the herbarium of Joachim Burser (1583-1639) all predate Linnaeus's description and are therefore usually considered eligible as uncited original material, and may be used in the absence of cited and identifiable original material. Following this logic, Leuenberger chose a specimen from the Burser herbarium to lectotypify *Cactus Opuntia*, which is an example of *Opuntia ficus-indica* (Fig. 85). However, Linnaeus also cited several illustrations in *Genera plantarum*, *Hortus upsaliensis* and *Hortus cliffortianus*, making five directly cited elements that all take priority over the Burser specimen. Without a direct citation of the Burser herbarium or the specimen selected by Leuenberger, we do not know if Linnaeus studied that actual specimen.

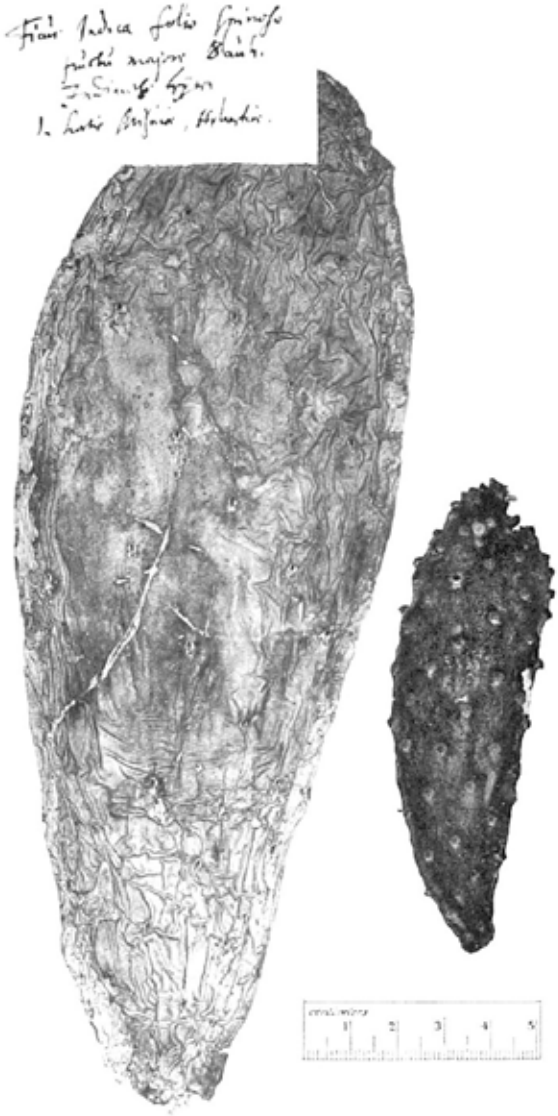


Fig. 85. Sheet in Burser herb. 24: 26 (UPS). Designated by Leuenberger (*Taxon* 1993: 419-429) as lectotype of *Cactus Opuntia* L., but not cited by Linnaeus.

The clearest and most obvious choice for a lectotype is the fine illustration of Besler (1613). This makes *Cactus Opuntia* L. & *Opuntia vulgaris* Mill. synonyms of *Opuntia ficus-indica* (L.) Mill., thereby maintaining current usage.

The widely accepted identification of Besler's plate as *Opuntia tomentosa* Salm-Dyck is not credible because the flowers are yellow not red, the segments are much narrower with a downy not glabrous epidermis, and the species is not known to have been in cultivation until its first description in 1822.

16. ***Cactus Ficus-indica*** [*Opuntia ficus-indica* (L.) Mill.].
Cactus Ficus-Indica L., *Species plantarum* **1**: 468. (1 May) 1753. Cactus articulato-prolifer, articulis ovato-oblongis, spinis setaceis L. *Hort. cliff.*: 183 nr.16. 1737. *Hort. ups.*: 120 nr.7. 1748. (Fig. 86).
Typ: Tropical America.
Lectotyp. (design. here): Ficus Indica eÿstettensis ex uno folio enata luxurians, Folium Opuntiae cum flore & fructu, Besler, *Hortus eystettensis*, Classis Autumnalis: t.7 (= 42). 1613. (Fig. 81b).
Isolectotyp: Ficus Indica eÿstettensis ex uno folio enata luxurians, Besler, *Hortus eystettensis*, Classis Autumnalis: t. 6 (= 41), fig.1. 1613. [cited in *Hort. Cliff.* (1737)]. (Fig. 81a).

Principal homotypic synonyms:
Cactus Opuntia L., *Species plantarum* **1**: 468. (1 May) 1753.

Ficus indica. 16. CACTUS articulato-prolifer, articulis ovato-oblongis, ſpinis ſetaceis.
Cactus compreſſus articulatus ramoſus, articulis ovato-oblongis: ſpinis ſetaceis *Hort. cliff.* 183. *Hort. upſ.* 120. *Roy. lugdb.* 280.
Habitat in America *calidiore.* ♄

13. CACTUS compreſſus articulatus ramoſus, articulis ovoto-oblongis, ſpinis ſetaceis.
Opuntia maxima, folio ſpinoſo latiſſimo & longiſſimo. *Tournef. inſt.* 240. *Boerh. lugdb.* 2. p. 82.
Creſcit in America.
An hæc a ſequenti ſpecie re ipſa diſtincta ſit fere dubium eſt, ſpinas raro ſubulatas exerit, communiter vero ſetas faſciculatas, & caule longe minus ramoſo eſt.

Fig. 86. *Cactus Ficus-indica* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

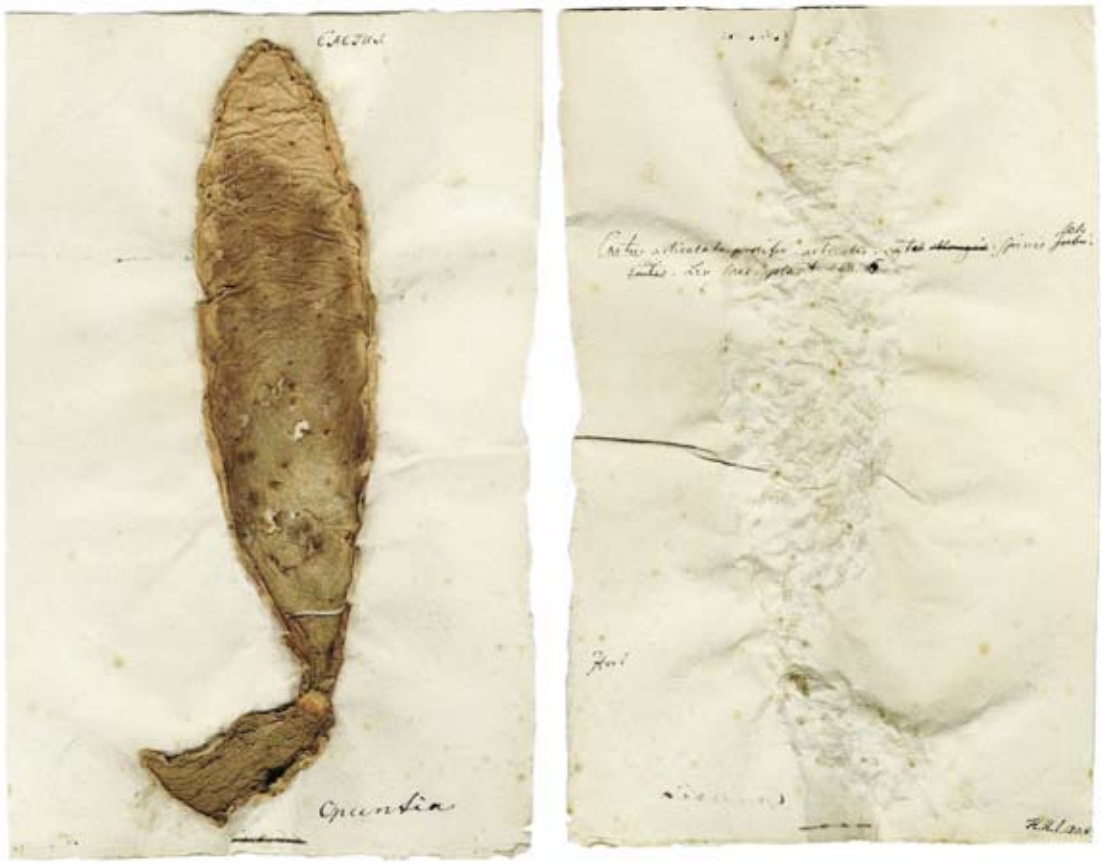


Fig.87. Herbarium sheet at the Swedish Museum of Natural History, Stockholm (S, Herb. LINN nr. 201.7), with annotations: "*Cactus Opuntia*. H.U.1.120.8. Cactus articulato-prolifer orbiculis ovatis oblongis, spinis subulatis setaceis. Lin. *Spec. plant* 468. 17 16. Hort." Designated by Leuenberger (1991) as neotype of *Cactus Ficus-indica* L. Perhaps a correct determination, but not easily distinguishable from *C. cochenillifer* in this elongated shape.

Opuntia ficus-indica (L.) Mill., *Gardeners dictionary*, ed.8: Opuntia nr.2. 1768.

Opuntia vulgaris Mill., *Gardeners dictionary*, ed.8: Opuntia nr.1. 1768.

Principal heterotypic synonyms:
Opuntia maxima Mill., *Gardeners dictionary*, ed.8: Opuntia nr.5. 1768. *T*: Not cited.

Opuntia ficus-barbarica A.Berger, *Monats. f. Kakteenk.* **22**(12): 181. 1912. *LT*(design. Crook & Mottram 1997: 100): Berger, *Hortus mortolensis*: t.6. 1912.

Numerous other synonyms exist.

Fig. 88. *Opuntia ficus-indica* c. 1560 or earlier, from Fuchs, Vienna Codex manuscript (1542-1566).

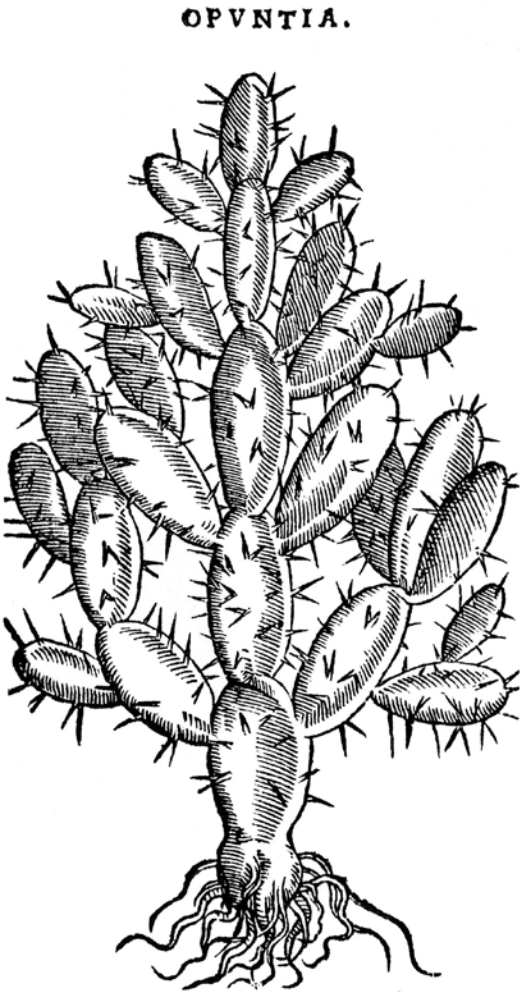


Fig. 89. *Opuntia ficus-indica* (above) in Matthioli (1559), and (below) in Matthioli (1565). The second may well have depicted the same plant as the first, six years later.

Leuenberger (1991: 623) neotypified *Cactus Ficus-indica* with a specimen at the Stockholm Natural History Museum (S) (Fig. 87). It had a cultivated origin and the date of deposition is unknown. The verso of the specimen has the phrase name of *Cactus Ficus-indica*, but it has been altered from that of *Cactus Tuna*. The neotype specimen is somewhat atypical of *Opuntia ficus-indica* in that the joint is rather elongated for this species which rather fits *Opuntia cochenillifera* better. Note also the statement by Linnaeus in *Hortus Cliffortianus* that this species may not be different from his next two, i.e. *Cactus Opuntia* and *Cactus Tuna*. There was considerable confusion at the

time.

Of the illustrations published by Besler, *Hortus eystettensis* plate Aut. 6 &7 from 1613, plate 6 was cited by Linnaeus under *Cactus Opuntia* in *Hortus Cliffortianus*. Boerhaave (1720 2: 82) had already pre-empted my selections in this paper by citing Besler's plate 6 under his phrase name for *Cactus Opuntia* (his Opuntia 6) and Besler's plate 7 under his phrase name for *Cactus Ficus-indica* (his Opuntia 1). Boerhaave evidently had not realised that both plates were illustrating the same plant. Because of this the two figures rank as eligible original material with priority over the uncited and possibly unseen neotype specimen selected by Leuenberger.

Fig. 90. *Opuntia ficus-indica* naturalised in Capri, Bay of Naples, Italy. This is typical of its random occurrence all around the Mediterranean. Photo: John Cox.

The earliest illustrations of *Opuntia ficus-indica* are those of Fuchs (c.1560 or earlier, Fig. 88) and Matthioli (1559 & 1565, Fig. 89), also establishing the earliest known usage of the name *Opuntia* as a genus. *Opuntia ficus-indica* is naturalised all around the Mediterranean, and according to Fuchs and other sixteenth century herbalists it was already widespread in Europe before 1550. Fig. 90 is a typical roadside example of it growing in Capri, Bay of Naples, Italy.

17. ***Cactus Tuna*** [*Opuntia tuna* (L.) Mill.].

Cactus Tuna L., *Species plantarum* **1**: 468. (1 May) 1753. Cactus articulato: prolifer, articulis ovato-oblongis: spinis setaceis L. *Hort. cliff.*: 183 nr.14. 1737. *Hort. ups.*: 120 nr.8. 1748. (Fig. 91).
Typ: Jamaica & throughout tropical America. *Lectotyp*. (design. Crook & Mottram 2004: 61): Tuna major, spinis validis flavicantibus, flore gilvo. Dillenius, *Hortus elthamensis* **2**: t.295, fig.380. 1732. (Fig. 92)

Principal homotypic synonym:
Opuntia tuna (L.) Mill., *Gardeners dictionary*, ed.8: Opuntia nr.3. 1768.

Principal heterotypic synonyms:
Opuntia elatior Mill., *Gardeners dictionary*, ed.8: Opuntia nr.4. 1768. *HT*(auto.): Dillenius, *Hortus elthamensis* **2**: t.294, fig.379. 1732.

Cactus nigricans Haw., *Miscellanea naturalia, dissertatio 5*: 187.1803. *NT*(design. Crook & Mottram 2000: 136): *Curtis's Bot. Mag.* **38**: t.1557. 1813.

Opuntia bergeriana Weber ex A.Berger, *Gard. Chron.* ser.3 **35**(890): 34. 1904. *HT*(auto): loc. cit. t.14.

Tuna. 17. CACTUS articulato: prolifer, articulis ovato-oblongis: ſpinis ſubulatis.
Cactus compreſſus articulatus ramoſus, articulis ovato-oblongis, ſpinis ſubulatis. *Hort. cliff.* 183. *Hort. upſ.* 120. *Roy. lugdb.* 280.
Tuna major, ſpinis validis flavicantibus, flore gibbo. *Dill. elth.* 396. *t.* 295. *f.* 238.
Opuntia major, folio oblongo rotundo: ſpinis longis & validiſſimis, flore luteo. *Sloan. jam.* 103. *hiſt.* 2. *p.* 149. *t.* 224. *f.* 1.
Habitat in Jamaica & America *calidiore.* ♄

14. CACTUS compreſſus articulatus ramoſus, articulis ovato-oblongis, ſpinis ſubulatis.
Opuntia major, folio oblongo rotundo, ſpinis longis & validiſſimis confertim naſcentibus obſito, flore luteo. *Sloan. jam.* 193. *hiſt.* 2. *p.* 149. *t.* 224. *f.* 1.
Opuntia major, validiſſimis ſpinis munita. *Tournef. inſt.* 239. *Boerh. lugdb.* 2. *p.* 82.
Tuna major, ſpinis validis flavicantibus, flore gibbo. *Dill. elth.* 396. *t.* 295. *f.* 380.
α Tuna elatior, ſpinis validis nigricantibus. *Dill. elth.* 395. *t.* 294. *f.* 379.
Creſcit in Jamaica *& plurimis* Americæ *regionibus.*

Fig. 91. *Cactus Tuna* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

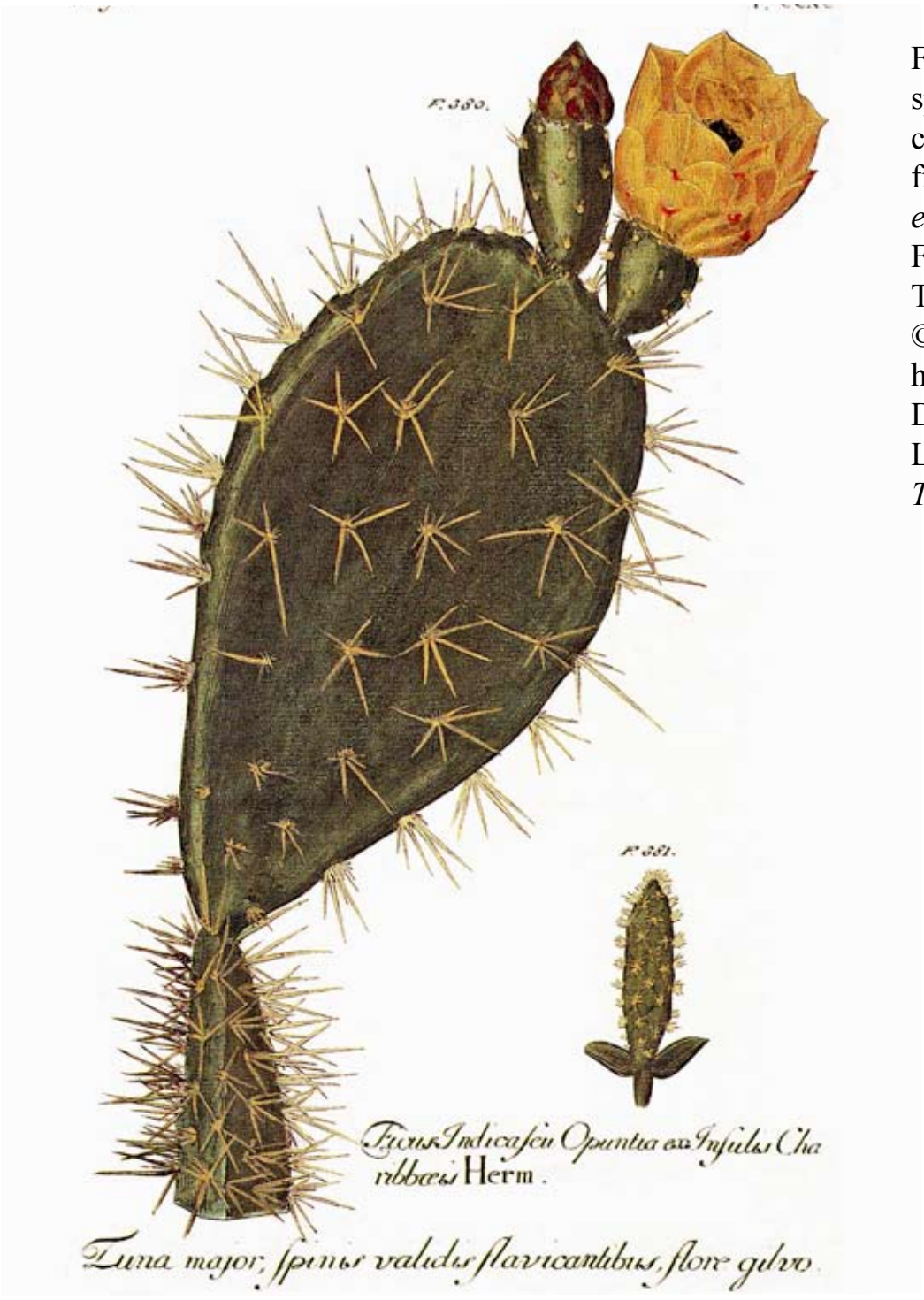


Fig. 92. Tuna major, spinis validis flavicantibus, flore gilvo, from Dillenius, *Hortus elthamensis* **2**: t.295: Fig. 380-381. 1732. The British Museum © copy, with original hand-colouring by Dillenius himself. Lectotype of *Cactus Tuna* L.

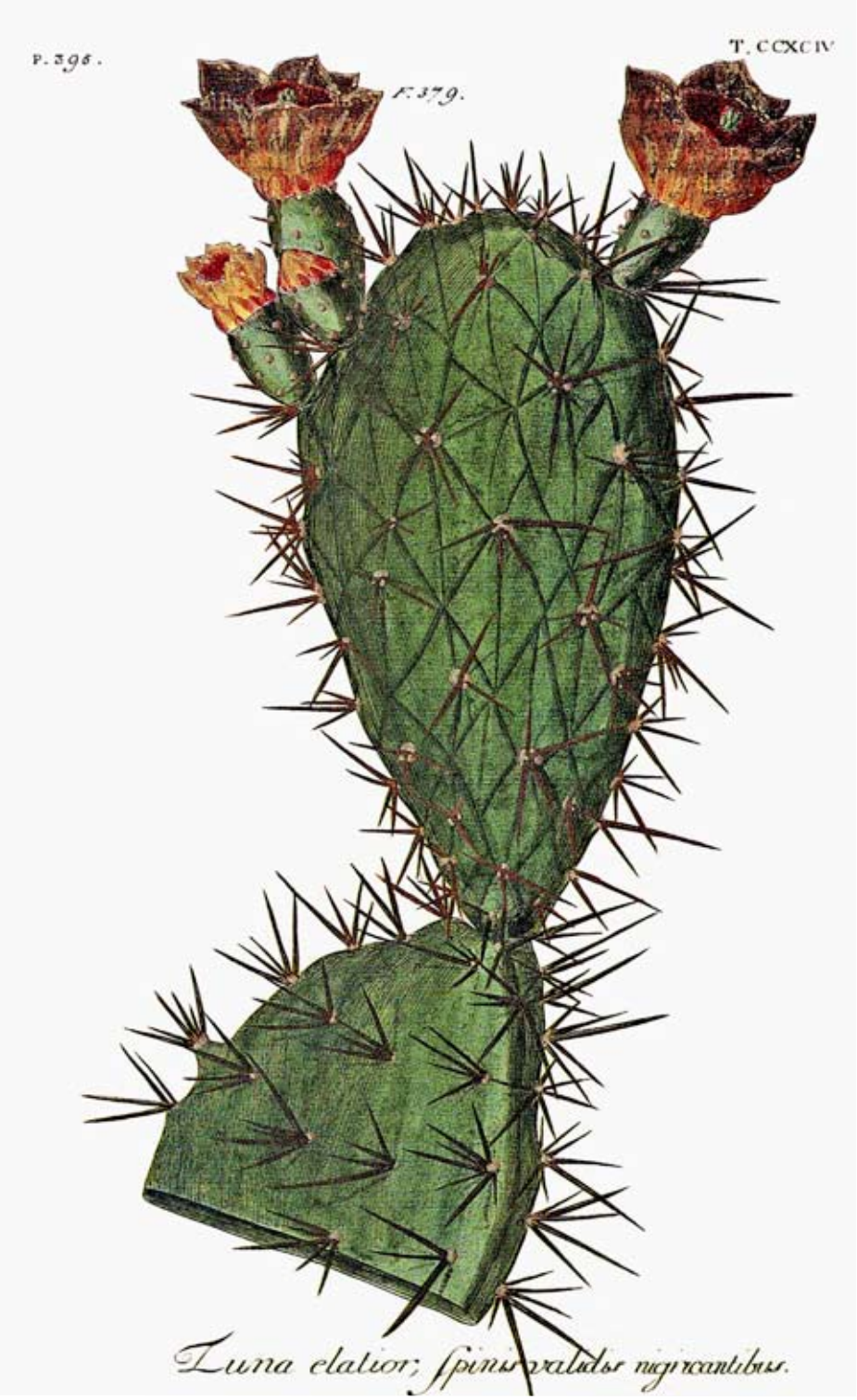


Fig. 93. Tuna elatior, spinis validis nigricantibus, from Dillenius, *Hortus elthamensis* **2**: t.294: Fig. 379. 1732. The British Museum © copy, hand-coloured by Dillenius. Holotype of *O. elatior* Mill. as the only included element.

Opuntia schumannii Weber ex A.Berger, *Gard. Chron*. ser.3 35(890): 34. 1904. *HT*(auto): loc. cit. t.16.

Opuntia boldinghii Britton & Rose, *The Cactaceae* **1**: 155, t.26. 1919. *HT*: Curaçao, Britton & Shafer 2903 (NY).

The Linnaean protologue was a mixture of two elements: *Opuntia dillenii* (Ker-Gawl.) Haw. and the species then also known as *Opuntia elatior* Mill.

Two of the three illustrations cited by Linnaeus were:
t.295 in Dillenius, *Hortus elthamensis* **2** (1732). [in *Sp. plant.*]
t.294 in Dillenius, *Hortus elthamensis* **2** (1732). [in *Hort. Cliff.*]. (Fig. 93). This is the autoholotype of *O. elatior* Mill. as it was Miller's only included element.
The two illustrations shown here (Fig. 92-93) are reproduced from the British Museum copy, hand-coloured by Dillenius, one of only four copies known to have been coloured by him.

The third cited illustration (Fig. 94) is a drawing by Sloane, in the Sloane Herbarium at the British Museum, of fruits only. These fruits are almost certainly those of *Opuntia dillenii*, with the characteristic blood-red pulp and clavate shape. However, the fruit alone is not very useful clue to identification, so the figure t.295 of Dillenius was chosen

Fig. 94. *Opuntia* ?*dillenii* fruits from Sloane's Jamaica herbarium, BM.

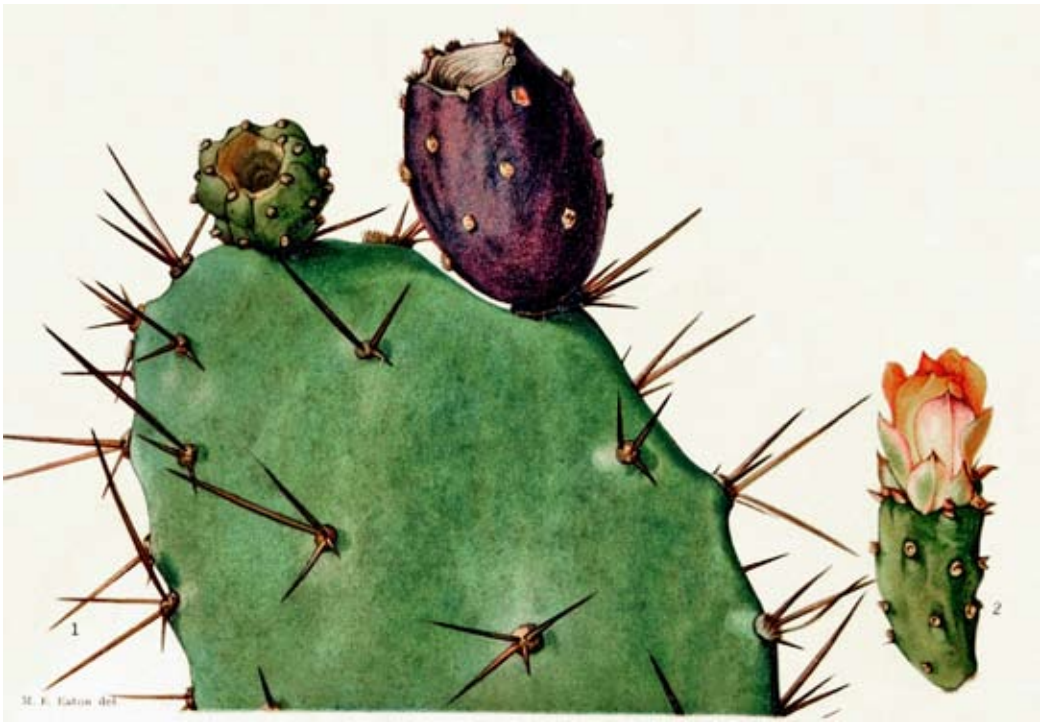


Fig. 95. *Opuntia schumannii* (Colombia, Santa Clara) Collected by John G. Sinclair in 1913. Britton & Rose, *The Cactaceae* **1**: 114. 1919.

Fig. 96. Opuntia tuna PH960.02 (Colombia, Department Boyacá, Sogamoso) Photo Paul Hoxey.

as the lectotype of *Cactus tuna* by Crook & Mottram in 2004.

Britton & Rose (1919: 113-114) misinterpreted *Opuntia tuna* and assigned the name to a plant from the southern lowland of Jamaica, near Kingston, which was probably *Opuntia dillenii*. In cultivation the name *Opuntia tuna* is also widely misapplied.

Fig. 97. *Opuntia tuna*: Three forms from Britton & Rose, *The Cactaceae* **1**: t.26. 1919, as *O. elatior, bergeriana*, *boldinghii*.

Fig. 98. *Opuntia tuna* (South Africa) Cythna Letty painting from *Farming in South Africa reprint nr. 24*: t.5. 1940, as *O. schumannii*.

Opuntia tuna (L.) Mill. is native to the southern Caribbean and the north coast of mainland South America extending as far south as central Colombia (Fig. 98). The spination is sometimes almost absent, and the flower colour varies from a muddy orange-yellow to clear red, or yellow streaked with red.

cochenillifer 18. CACTUS articulato-prolifer : articulis ovato-oblongis ſubinermibus.
Cactus compreſſus articulatus ramoſus, articulis ovato-oblongis ſubinermibus. *Hort. upſ.* 121.
Tuna mitior, flore ſanguineo, cochinillifera. *Dill. elth.* 399. *t.* 297. *f.* 383.
Ficus indica major lævis ſ. ſpinoſa vermiculos proferens. *Pluk. alm.* 146. *t.* 281. *f.* 383.
Opuntia maxima, folio oblongo rotundo majore ſpinulis nonnullis & innocentibus obſito. *Sloan. jam.* 194. *hiſt.* 2. *p.* 152. *t.* 8. *f.* 1. 2.
Habitat in Jamaica & America *calidiore*. ♄

Fig. 99. *Cactus cochenillifer* L. extract from *Species plantarum* (1753).

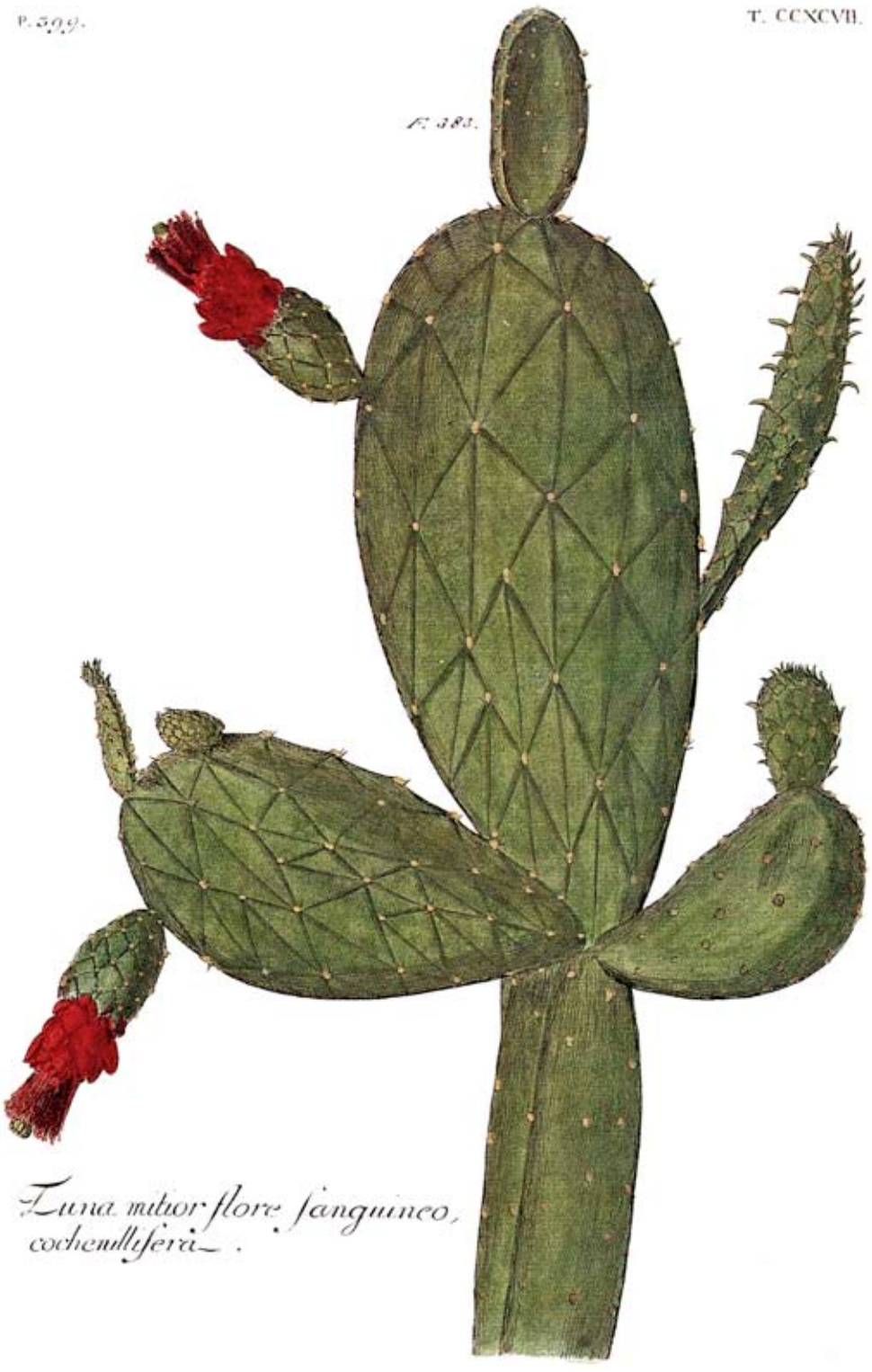


Fig. 100. The lectotype illustration of *Cactus cochenillifer* L. in Dillenius, *Hortus elthamensis* **2**: t.297: Fig. 383. 1732. British Museum © copy, hand-coloured by Dillenius.

18. ***Cactus cochenillifer***
[*Opuntia cochenillifera* (L.) Mill.].
Cactus cochenillifer L., *Species plantarum* **1**: 468-469. (1 May) 1753. Cactus articulato: prolifer, articulis ovato-oblongis subinermibus L. *Hort. ups.*: 121 nr.10. 1748. (Fig. 99).
Typ: Jamaica & tropical America.
Lectotyp. (design. Howard 1989: 411): Tuna mitior flore sanguineo, cochenillifera. Dillenius, *Hortus elthamensis* **2**: t.297, fig.383. 1732.

Principal homotypic synonyms:
Opuntia cochenillifera (L.) Mill., *Gardeners dictionary*, ed.8: Opuntia nr.6. 1768.

Nopalea cochenillifera (L.) Salm-Dyck, *Cacteae in horto Dyckensi cultae anno 1849*: 64. 1850.

Three direct citations of illustrations appear in the Linnaean protologue, all of which represent *Opuntia cochenillifera* (L.) Mill. Of these, Howard selected the fine plate from Dillenius, *Hortus elthamensis* as the lectotype.

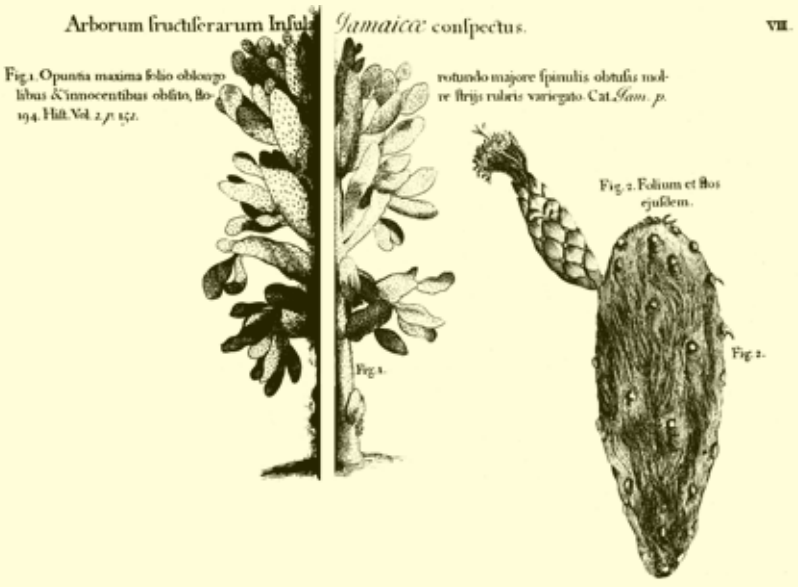
The other two cited elements were:

Ficus indica major laevis f. spinosa vermiculos, quos cochenilla vocant, proferens. Plukenet, *Almagestum*: 146, t.281, fig. 2. 1696. (Fig. 101).

Opuntia maxima, foliis oblongo rotundo majore, spinulis obtusis mollibus & innocentibus obsito, flore striis rubris variegato. Sloane, *A voyage to the islands Madera, Barbados, Nieves, S. Christophers and Jamaica* 2: 152, t.8, fig. 1-2. 1725. “This Opuntia has been grown on the plantation of Mr. Worley, established in Jamaica from the American Continent”. (1696: 194-195). (Fig. 102).

Fig. 101. The cited illustration of *Cactus cochenillifer* L. from Plukenet, *Almagestum botanicum:* t.281, fig.2. 1694.

Fig. 102. The cited illustration of *Cactus cochenillifer* from Sloane, *A voyage to the islands Madera, Barbados, Nieves, S. Christophers and Jamaica* **2**: t.8, fig. 1-2. 1725.



19. CACTUS articulato-prolifer, articulis cylindrico-ventricosis compreſſis. *curaſſavicus.*
Cactus tereti-compreſſus articulatus ramoſus. *Hort.cliff.* 182. *Hort. upſ.* 120. *Roy. lugdb.* 280.
Ficus indica ſ. Opuntia curaſſavica minima. *Comm.hort.* 1. *p.* 107. *t.* 56.
Ficus indica ſ. Opuntia minor cauleſcens arbuſculæ in modum, ramis cineritiis ſpinoſiſſima. *Pluk. alm.*147. *t.* 281. *f.* 3.
Habitat in Curacao. ♄.

12. CACTUS tereti-compreſſus articulatus ramoſus.
Opuntia curaſſavica minima. *Boerh. lugdb.* 2. *p.* 82.
Ficus indica ſeu Opuntia curaſſavica minima. *Kigg. beaum.* 19. *Comm. hort.* 1. *p.* 107. *t.* 56.
Creſcit in Curaçao.

Fig. 103. *Cactus curassavicus* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

19. ***Cactus curassavicus*** [*Opuntia curassavica* (L.) Mill.].
Cactus curassavicus L., *Species plantarum* **1**: 469. (1 May) 1753. Cactus articulato-prolifer, articulis cylindrico-ventricosis compressis. L. *Hort. ups.*: 120 nr.9. 1748. (Fig. 103).
Typ: Netherlands Antilles, Curaçao.
Lectotyp. (design. Wijnands 1983: 57): Ficus indica f. Opuntia curassavica minima. Commelijn, *Horti medici amstelodamensis plantae rariores et exoticae* **1**: 107-108, t.56. 1697. (Fig. 104).

Principal homotypic synonym:
Opuntia curassavica (L.) Mill., *Gardeners dictionary*, ed.8: Opuntia nr.7. 1768.

Principal heterotypic synonyms:
Cactus triacanthos Willd., *Enumeratio plantarum horti berolinesis, Supplementum*: 34. 1813. *NT*: Florida, Big Pine Key, L. & R. L. Benson 15367 (POM).

Opuntia taylorii Britton & Rose, A preliminary treatment of the *Opuntioideae* of North America, *Smithsonian Miscellaneous Collections* **50**(4): 520-521. 1908. *T*: Haiti, near Terre Neuve, *Nash & Taylor 1587* (NY).

Opuntia antillana Britton & Rose, The flora of the American Virgin Islands,

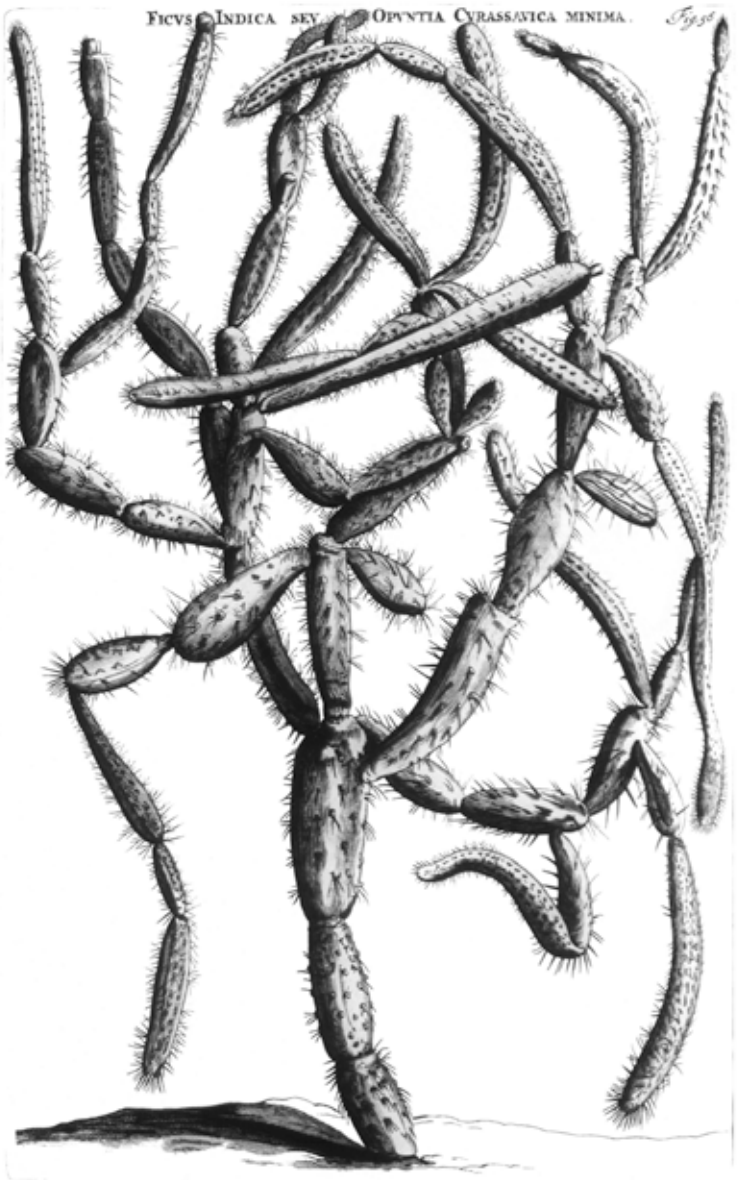


Fig. 104. *Opuntia curassavica* lectotype (Wijnands 1983: 57), from Commelijn, *Horti medici amstelaedamensis plantarum usualium catalogus* 1: 107, t.56. 1697.

Brooklyn Botanic Garden Memoirs **1**: 74. 1918. *T*: St. Kitts-Nevis, near Basseterre, *J. N. Rose & al. 3230* (US).

Linnaeus cited two illustrations for this species, and that of Commelijn (1697) was selected to be the lectotype by Wijnands (1983: 57). Commelijn's plant was badly short of light and grew unnaturally shaped joints, but is otherwise just about recognisable as the Pin Pillow (or 'pincushion' as we would say today), the vernacular name given to it in the 15th and 16th centuries.

The second cited illustration was a plant grown more naturally in Bishop Compton's garden in London, which would perhaps have been a better choice, as follows: Plukenet, *Almagestum*: 147, t.281, fig.3. 1696. (Fig. 105).

Bradley's illustration was added to the second edition of *Species plantarum*.

However, none of these illustrations show the natural habit of growth and morphology well, so an epitype would be a useful complement.

20. ***Cactus Phyllanthus*** [*Epiphyllum phyllanthus* (L.) Haw.].
Cactus Phyllanthus L., *Species plantarum* **1**: 469. (1 May) 1753. Cactus prolifer ensiformi-compressus serrato-repandus. L. *Hort. cliff.*: 183 nr.16. 1737. (Fig. 106).
Typ: Brazil, Surinam, South America. (*Sp. Pl.*); Brazil, Mexico, Surinam, and all warmer regions of America. (*Hort. cliff.*).
Lectotyp. (design. Leuenberger 1997: 17): Cereus scolopendrii folio brachiato. Dillenius, *Hortus elthamensis* **1**: t.64, fig.74. 1732. (Fig. 108).

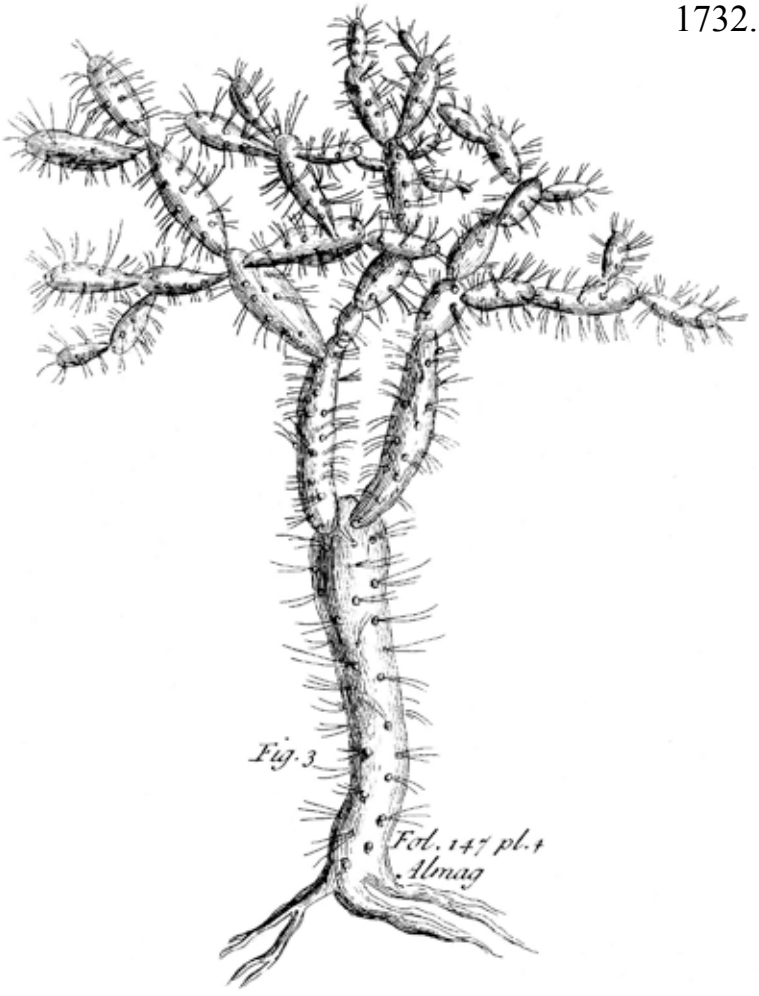


Fig. 105. *Opuntia curassavica* in Plukenet, *Almagestum botanicum*: t.281, fig.3. 1694.

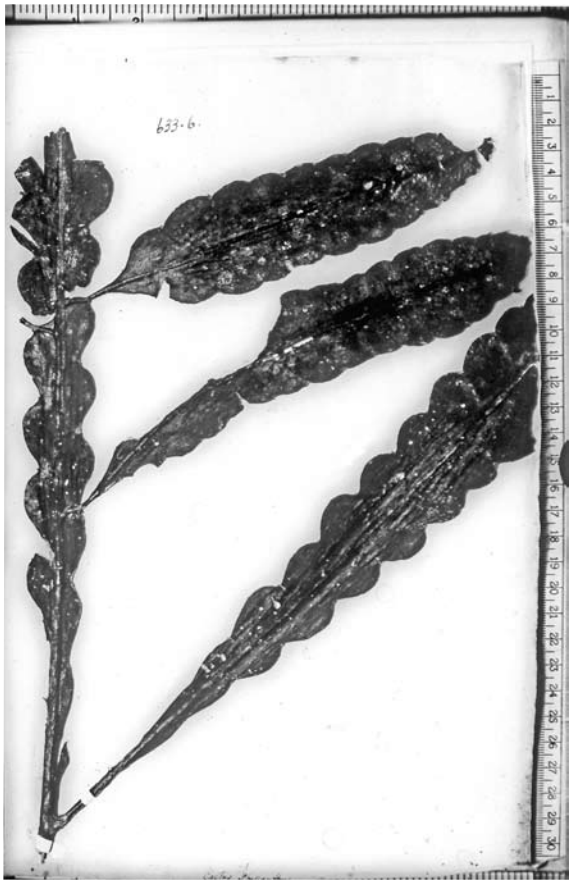


Fig. 107. *Cactus* ?*Phyllanthus* L. in the Linnaean herbarium (nr. 633.6) collected by Browne in 1758.

20. CACTUS prolifer enſiformi-compreſſus ſerrato-re- *Phyllanthus.*
pandus.
Cactus foliis enſiformibus obtuſe ſerratis. *Hort. cliff.* 183. *Roy. lugdb.* 281.
Cereus ſcolopendri folio brachiato. *Dill. elth.* 73. *t.* 64. *f.* 74.
Phyllanthos americana, ſinuoſis foliis longis. *Pluk. alm.* 296. *t.* 247. *f.* 5.
Habitat in Braſilia, Surinamo, Americe *meridionali.* ♄

16. CACTUS foliis enſiformibus obtuſe ſerratis.
Epiphyllum americanum. *Herm. prod.* 388.
Phyllanthos americana, ſinuoſis foliis longis craſſis & carnoſis opuntiæ in modum florigera. *Pluk. alm.* 296. *t.* 247 *f.* 5.
Opuntia folio plano glabro ſcolopendriæ. *Boerh. lugdb.* 2 *p.* 82.
Opuntiæ forte affinis ſurinamenſis, e foliorum crenis folia nova producens. *Kigg. beaum.* 19.
Cereus ſcolopendri folio brachiato. *Dill. elth.* 73. *t.* 64. *f.* 74.
Ficus indica, ſcolopendriæ foliis. *Till. piſ.* 62.
Ficus ſeu Opuntia non ſpinoſa, ſcolopendriæ folio ſinuato. *Raj. dendr.* 21.
Canambaya. *Marcgr. braſ.* 78. *t.* 79.
Nopalxoch cuez alticquizi. *Hern. mex.* 392 & 457.
Creſcit in Braſilia, Mexico, Surinama *aliisque calidioribus Americæ regionibus.*

Fig. 106. *Cactus Phyllanthus* extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

Principal homotypic synonym: ***Epiphyllum phyllanthus*** (L.) Haw., *Synopsis plantarum succulentarum*: 197. 1812.

Only seen by Linnaeus in Clifford's garden. Two illustrations are directly cited, and a further two in *Hortus Cliffortianus*.

The earliest type designation was by Madsen in the *Flora of Ecuador*, who wrongly treated LINN 633.6, the specimen collected by Patrick Browne in the Linnaean herbarium, as the holotype, but this was not preserved until 1758 and is not therefore original material. Moreover it has rickrack crenations that suggest *Epiphyllum crenatum* rather than *E. phyllanthus*. (Fig. 107).

Dillenius's fine plate from *Hortus elthamensis* (Fig. 108) was selected as lectotype by Leuenberger in *Flora of the*

Fig. 108 The lectotype of *Cactus Phyllanthus,* from Dillenius, *Hortus elthamensis* **1**: t.64: Fig. 74. 1732.

Guianas in 1997. This is unequivocal.

The three other illustrations cited by Linnaeus are shown in Fig. 109-111. Markgrave's illustration is probably *Epiphyllum phyllanthus*, but the other two are Mexican and referrable to *Epiphyllum ackermannii*, known to the Aztecs as Nopalxoch cuez altiquizi.

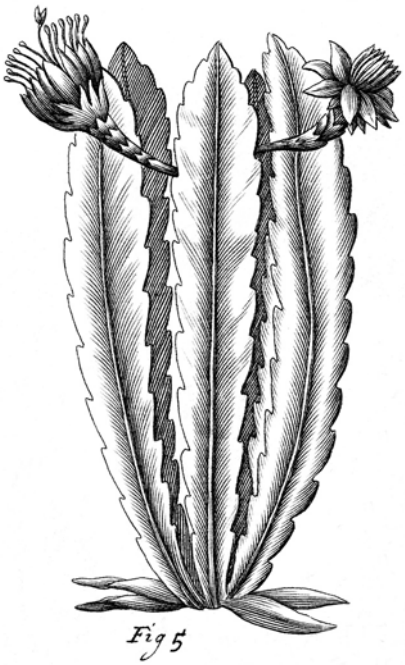


Fig. 109 (left). *Cactus Phyllanthus* L. in Markgrave, *Historia Natural do Brasil*: 79. 1648, as Canambaya. [cited in *Hortus cliffortianus*]

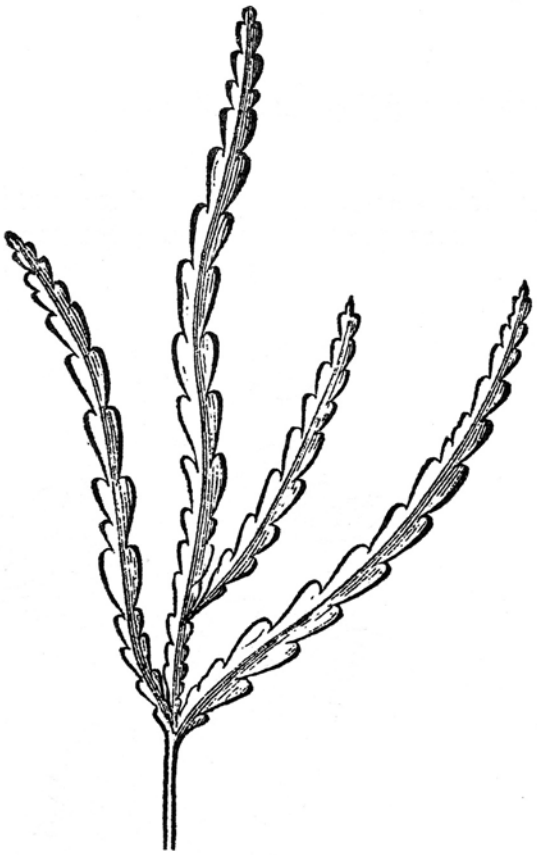
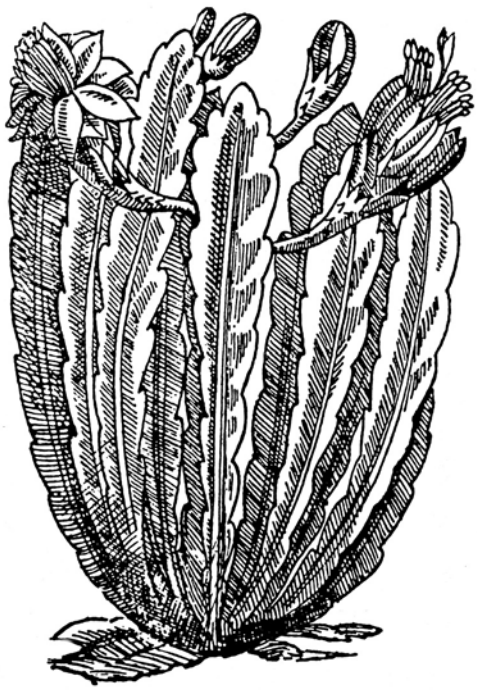


Fig. 110 (below). *Epiphyllum ackermannii* [Nopalxoch cuez altiquizi], Nova plantarum, animalium et mineralium Mexicanorum, in Hernandez, *Rerum medicarum Novae Hispaniae thesaurus, seu plantarum, animalium, mineralium historia*. 1651.

Fig. 111 (above). *Epiphyllum ackermannii* in Plukenet, *Phytographia*: t.247, fig.5. 1692. Copied from Hernandez (1651).



21. CACTUS caule tereti arboreo ſpinoſo, foliis lanceo- *Pereſkia.*
lato-ovatis. *Hort. upſ.* 122.
Pereſcia. *Hort. cliff.* 122. *Roy. lugdb.* 281.
Pereſkia aculeata, flore albo, fructu flaveſcente. *Plum. gen.* 37. *Dill. elth.* 305. *t.* 227. *f.* 294.
Malus americana ſpinoſa, portulacæ folio, fructu folioſo, ſemine reniformi ſplendente. *Comm. hort.* 1. *p.* 135. *t.* 70.
Portulaca americana latifolia ad foliorum ortum lanugine obducta, longioribus aculeis horrida. *Pluk. alm.* 135. *t.* 215. *f.* 6.
Habitat in America calidiore, Jamaica, Margaretha. ♄

Fig. 112. *Cactus Pereskia* L. extracts from *Species plantarum* & *Hortus cliffortianus* (1753 & 1738).

PERESKIA. *g. pl.* 402.

1. PERESKIA.
Pereskia aculeata, flore albo, fructu flaveſcente. *Plum. gen.* 35. *Dill. elth.* 305. *t.* 227. *f.* 294.
Groſſularia, fructu majore, arbor ſpinoſa, fructu foliaceo e viridi albicante. *Sloan. flor.* 165. *hiſt.* 2. *p.* 86. *Raj dendr.* 27.
Malus armeniaca ſpinoſa, portulacæ folio, fructu folioſo, ſemine reniformi ſplendente. *Comm. hort.* 1. *p.* 135. *t.* 70.
Portulaca americana latifolia ad foliorum ortum lanugine obducta, longioribus aculeis horrida. *Pluk. alm.* 304. *t.* 215. *f.* 6.
Creſcit in America in Inſula Margaretha, Jamaica, *aliisque.*
Apud nos non floret; ex figuris tamen Plumerianis patet eam Cacto valde affinem, ſi non ejusdem generis eſſe; qui itaque eam conjungere velit, per me poteſt, cum calyx imbricatus ſit, germini impoſitus, petala plura, ſtigma diviſum, fructus modo in hac retineat ſquamas germinis poſt floreſcentiam, reliquæ vero ſpecies non omnes Cacti eas rejiciant. Succulenta planta, & ſpinoſa, (licet hæc ſola foliis perfectis inſtructa ſit) confirmat idem.

Fig. 113. Lectotype of *Cactus Pereskia* L., in Dillenius, *Hortus elthamensis* **2**: t.227: Fig. 294. 1732. a) Original colouring by Dillenius from the British Museum © copy (white pigment affected by age). Reproduced here with permission. & b) later inaccurate colouring.

21. ***Cactus Pereskia*** L. [*Pereskia aculeata* Mill.].
Cactus Pereskia L., *Species plantarum* **1**: 469. (1 May) 1753. Cactus caule tereti arboreo spinoso, foliis lanceolato-ovatis. L. *Hort. cliff.*: 183 Pereskia nr.1. 1737. *Hort. ups.*: 122 nr.14. 1748. (Fig. 106).
Typ: Tropical America, Jamaica, Margaretha [Venezuela, Isla Margarita, but only *P. guamacho* is known from there according to Leuenberger], and elsewhere.
Lectotyp. (design. Leuenberger 1986: 59, 65): Pereskia aculeata flore albo, fructu flavescente Plumier, in Dillenius, *Hortus eltha-mensis* **2**: t.227: Fig. 294. 1732. (Fig. 107).
Typotyp. Fielding-Druce herbarium (OXF), annotated by Sherard with a direct reference to this plate.

Principal homotypic synonym:
Pereskia aculeata Mill., *Gardeners dictionary*, ed.8: Pereskia. 1768.

A mixed taxon. Three illustrations were cited by Linnaeus. The clearest and only one that is identifiable as *Pereskia aculeata* Mill. is the Dillenius plate chosen as lectotype by Leuenberger (1986: 59), taking up the hint that this would be an appropriate choice by Wijnands (1983: 58). Benson (1982: 911, 969) made the earliest lectotype designation, but his choice was confusing with references to specimens at both LINN and S. There are two specimens at S, and all three at both herbaria are of young sterile and spineless branches that cannot be clearly identified. Leuenberger (1986: 59, 64-65) rejected all these specimens on the grounds that they were without any direct reference in *Species plantarum* (1753) [or earlier].

The other two cited illustrations by Commelijn (Fig. 114) and Plukenet (Fig. 115) are actually *Pereskia guamacho* according to Leuenberger (1986: 89), another denizen of the Dutch East Indies and coast of Venezuela and the only species endemic to Isla Margarita, while *P. aculeata* is widespread throughout the Caribbean.

Fig. 114. *Pereskia* sp. in Commelijn, *Horti medici amstelaedamensis plantarum usualium catalogus* **1**: 135, t.70. 1697. [perhaps *P. guamacho*].

Fig. 115. *Pereskia* sp. in Plukenet, *Phytographia* t.215 fig.6. 1692. [perhaps *P. guamacho*].

22. CACTUS caule tereti arboreo ſpinoſo, foliis cunei- *portulacifo-*
formibus retuſis. *lius.*
Opuntia arbor ſpinoſiſſima, foliis portulacæ cordatis.
Pluk. ſpec. 6.
Habitat in America *calidiore.* ♄
Fructus hujus minime foliis adſperſus, uti præcedentis.

Fig. 116. *Cactus portulacifolius* extract from *Species Plantarum* (1753).

22. ***Cactus portulacifolius*** L. [*Pereskia portulacifolia* (L.) DC.].
Cactus portulacifolius L., *Species plantarum* **1**: 469-470. (1 May) 1753. Cactus caule tereti arboreo spinoso, foliis cuneiformibus retusis. L. (Fig. 116).
Typ: Tropical America.
Lectotyp. (design. Leuenberger 1986: 93, 97): Cactus caule terei, arboreo, spinoso. Burman ex Plumier, *Plantarum Americanum fasc. 8*: t.197, Fig.1. (20 Jun) 1758. (Fig. 117b).
Typotyp. Haiti, Le Grand Cul-de-Sac, Fond Parisien, in fields; 1689-1690 or 1693, Charles Plumier; Opuntia arborescens spinosissima foliis portulaca cordatis. Plumier, *Botanicon Americanum* **3**: t.29. (Fig. 117a).

Principal homotypic synonym:
Pereskia portulacifolia (L.) DC., *Prodromus systematis naturalis regni vegetabilis* **3**: 475. 1828.

Linnaeus cited the phrase name from Plumier's *Catalogue of American plants* (1703), which is an indirect reference to Plumier's plate.This taxon has the same history as *Cactus moniliformis*, known only to Linnaeus from the copy of Plumier's drawing published by Burman from the Codex Boerhaavianus. This Burman copy was selected as the lectotype by Leuenberger in 1986, having been seen by Linnaeus in 1737, and is directly cited in the second edition of *Species plantarum*.

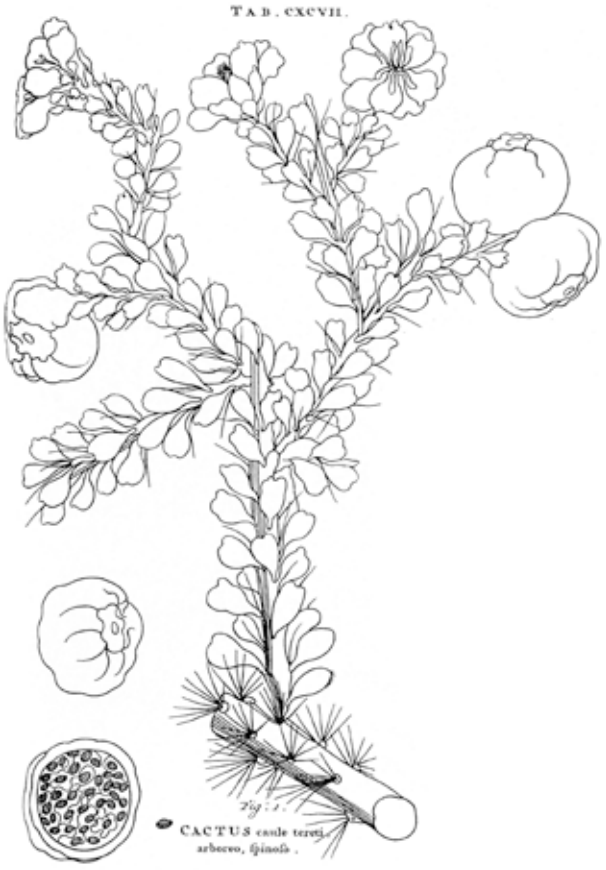


Fig. 117. a) Typotype of *Cactus portulacifolius* from Plumier, *Botanicon Americanum*: t.29. 1689-1690 or 1693; b) The lectotype from Burman, *Plantarum Americanum fasciculus 8*: t.197, f.1. 1758.

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