

ON THE HISTORY OF *AGAVE ASPERRIMA* AND *A. SCABRA* (AGAVACEAE) AS WELL AS SOME TAXA OF THE *PARRYANAE*

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ABSTRACT

An evaluation of available literature, as well as the historical connections and an original photograph from the herbarium at Berlin-Dahlem (B) shows that *Agave scabra* Salm-Dyck cannot be an older name for *A. asperima* Jacobi, as interpreted by Gentry, but rather belongs to the complex of *A. parryi* Engelm. Because of *A. scabra* Ortega, *A. scabra* Salm-Dyck becomes an illegitimate younger homonym and *A. wislizeni* Engelm. again is legitimate. The three subspecies described by Gentry for *A. scabra* Salm-Dyck are here combined with *A. asperima*. To equalize species rank *Agave neomexicana* Wootton & Standley is treated as a new subspecies of the variable *A. parryi*.

ZUSAMMENFASSUNG

Eine Auswertung der verfügbaren Literatur, sowie die historischen Zusammenhänge und ein bisher unveröffentlichtes Originalphoto aus dem Herbarium Berlin-Dahlem (B), zeigen, daß *Agave scabra* Salm-Dyck kein älterer Name für *A. asperima* Jacobi sein kann, wie Gentry interpretierte, sondern vielmehr dem Komplex um *A. parryi* Engelm. zuzuordnen ist. Wegen *A. scabra* Ortega ist *A. scabra* Salm-Dyck allerdings ein illegitimes, jüngeres Homonym, wodurch *A. wislizeni* Engelm. wiederum legitim wird. Die drei von Gentry für *A. scabra* Salm-Dyck beschriebenen Subspezies werden mit *A. asperima* neu kombiniert. Im Interesse einer Angleichung des Artranges innerhalb der Gattung *Agave*, wird *A. neomexicana* Wootton & Standley neu als Subspezies der variablen *A. parryi* statuiert.

By detailed investigation of literature this contribution clarifies the following questions: (1) What is the identity of *A. scabra* Salm-Dyck? (2) Is *A. wislizeni* Engelm. an illegitimate name? (3) What is the status of *A. parrasana* Berger? (4) Has *A. asperima* Jacobi priority over *A. scabra* Salm-Dyck? (5) How to rearrange the complex of *A. parryi* Engelm?

(1) *Agave scabra* Salm-Dyck

At the end of July 1849 Georg Albano von Jacobi (Fig. 1) got an *Agave* from the botanical garden of Freiburg/Br. The garden originally received it from Dr. Wislizenus from Chihuahua. Engelmann (1875:320) wrote concerning that taxon: "This interesting species was discovered by Dr. A. Wislizenus on the celebrated march of Doniphan's corps through northern Mexico, on the Nazas River near San Sebastiano, in the southeast corner of the State of Chihuahua, not



FIG. 1. General Georg Albano von Jacobi (9 Apr 1805, Düsseldorf; † 2 Nov 1874, Berlin), monographer of the genus *Agave* and author of *Agave asperrima* (with kind permission of Jan Wartenberg, Berlin).

far east from Parras, May 10, 1947, in fl. and fr. Living shoots were sent by me to Prince Salm and seeds to different European correspondents, among others to Prof. A. Braun of Freiburg."

Jacobi saw, "1856 the same plant in multiple propagation, but without a name, in the garden of Munich," and further explained (1865:124): "As the Prince Salm dealt in 1858 with the writing of his paper on the agaves of his garden, we communicated to him description and leaves of the then unnamed and undescribed species of *A. scabra*, *A. jacobiana*, *A. uncinata*, and *A. variegata* for the eventual inclusion of these species in his arrangement." Indeed Salm-Dyck (1859:89) published the diagnosis of his *A. scabra* and explained: "This plant, which is growing at Chihuahua and germinated in our garden from seed, which Dr. Wislizenus sent to Germany, was often confused with *A. tehuacanensis*." The latter today is regarded as a synonym of *A. salmiana* Otto ex Salm-Dyck.

Jacobi (1865:124) accepted *A. scabra*, but placed it near *A. potatorum* Zucc. on the basis of habit. He described the specimen of his own collection, emphasizing that: "Both sides of the leaf are totally smooth and so the mention by the Prince that these are scabrous is an error." In the same month Koch (1865a:94) argued: "The roughness [of *A. scabra*], on which the Prince apparently states a high value, was not so noticeable on the specimens at my disposal. Do we no longer possess the true plants?" Regarding Jacobi's remark, he further explained: "But one cannot suppose, that an experienced botanist as the Prince Salm-Dyck, should have made such a mistake that he described something scabrous as smooth."

There is the question, whether Salm-Dyck and Jacobi described indeed two different agaves. The former wrote of "foliis asperis," the latter of "absolutely smooth" leaves. One has to remember that many characters of a diagnosis are subjective. Further, different authors often use a different vocabulary in describing similar plants. Many mentioned characters are not absolute but relative, such as "multi-leaved, bright apple-green, lanceolate, spine strong, teeth remote," etc. Even "asper" is a relative judgment. The leaves of agaves are in one extreme glossy-smooth, in the other extremely asperous, like sandpaper. However, it is my experience that the character of the leaf surface is relatively constant, rather independent of the age or culture of the species.

Koch (1865b:186) noted "*A. scabra* of most of our gardens is nothing more than one of the many forms under which *A. scolymus* (= *A. potatorum*) occurs. The plant of Salm-Dyck of this name seems to be lost, for it no longer exists at castle Dyck near Neuss; what is cultivated there now is the same form of *A. scolymus*..." If, however, *A. scabra* at castle Dyck was still authentic material, which is plausible, Koch considered the leaves smooth, too. He continued: "Following him [Salm-Dyck] his *A. scabra* was often confused with *A. tehuacanensis*, thence they all must be closely allied." This sounds logical, but basically it is possible, too, to confuse the names of totally different plants. If this happens "often," the confused specimens came most probably from the same origin. Indeed Salm-Dyck (1859:89) listed *A. scabra* in his arrangement directly behind *A. tehuacanensis*, which seems to support Koch's thesis. But note that his systematics is based on the character of the teeth, thus both taxa fell in the group "Macracanthae." Indeed

A. tehuacanensis was not described until 1859 by Salm-Dyck, but had been known for several years (Otto 1842) under the latter name in the gardens and had originally been introduced by Karwinski. A photograph of an original (?) plant from the Munich Botanical Garden (Berger 1915:146) seems to confirm that this taxon is a synonym of *A. salmiana* as this species is growing together with others around Tehuacan, Mexico.

Koch (1865a:86) further pointed out: "The roughness of the leaves must, on the contrary, have been very noticeable to him [Salm-Dyck], for he gave this species the name "the rough Agave" (*A. scabra*) because of this characteristic. And if he really had made his first diagnosis in error, he would surely not insist on his error and not say the truth." Surely Koch is right. But it should be noted that Salm-Dyck (1861:179) not only expressed *A. scabra* was rough, but rather affirmed its importance: "It is and remains one of the best characterized species." Furthermore, it is uncertain whether Salm-Dyck actually chose the epithet "scabra," himself, for he (1859:89) writes regarding *A. tehuacanensis*: "It was sent to me later—if I'm not wrong, from the Munich garden—under another name, *A. scabra*." From that it can be concluded the name *A. scabra*, at least there, existed before. It is surely possible that the plant known in gardens as *A. tehuacanensis* was erroneously treated in Munich as *A. scabra*. Why Salm-Dyck used this epithet for his *A. scabra* cannot be explained, since he was free to choose a more appropriate name. But he did not publish the name as *A. scabra* "Hort. Monac.," as, e.g., *A. mitis* Hort. Monac.

Salm-Dyck pointed out that "[*A. tehuacanensis*] is closely allied to *A. potatorum* regarding the teeth, but is totally different in its less numerous leaves, which are longer (45 cm), at the base (7.5 cm) broad, and with the spine tapering." Further he wrote in his Latin diagnosis, of "foliis asperis" too, which Jacobi (1864:560) commented on: "The first diagnosis...corresponds very well with the characteristics, with the only exception that the surfaces of the leaves are described as rough, what is not the case." Indeed the leaves of *A. salmiana* (*A. tehuacanensis*) are not really rough. This is another indication there was no agreement between Jacobi and Salm-Dyck over the meaning of "asper."

(2) *Agave wislizeni* Engelm.

Salm-Dyck (1859:89) described the leaves of his *A. scabra* as "rhomboid-oblong" and wrote: "It differs (from *A. tehuacanensis*) by more numerous leaves, not tapering, but becoming broader, only 5 inches long and 2–2.5 inches broad (at the broadest point)." This is a leaf-index (broadness/length) of 0.4 to 0.5. He continued: "This species, which we have cultivated for 11–12 years [starting about 1847], is apparently one of the smallest in the genus." Jacobi (1865:124) described the leaf-form of his 16-year-old plant as "short-rhomboid...5 inches long...at 2/3 of its length 3.5 inches broad..." Hence a still higher leaf index of 0.7; however, it is quite clear that Jacobi, as well as Salm-Dyck, were observing

plants with short and broad leaves which, judging by historical events, go back to the same collection by Wislizenus.

It is not quite clear on what plant Salm-Dyck based his *A. scabra*. He spoke only of "in our garden germinated from seed" and "which we have cultivated for 11 – 12 years." We must assume he is not speaking of himself here as Prince in the royal plural "pluralis majestatis" (designation by the plural "we"), since he wrote in the same article "I" and "my garden." In any case he did not expressly mention Engelmann as the source of the "offshoots" sent to him. He wrote: "This plant, which is growing at ["bei"] Chihuahua, germinated from seeds sent to Germany by Dr. Wislizenus..." Jacobi (1865:123) on the contrary spoke of "seeds... which the garden [Freiburg/Br.] received from Dr. Wislizenus from ["aus"] Chihuahua." This difference between "at" and "from" (bei/aus) is, of course, important.

In most cases it is possible to evaluate the identity of an *Agave* with a known location, even if the description alone is not clear. Engelmann (1875:320) reported the seeds he sent to Prof. Braun of the Freiburg/Br. Botanical Garden were collected "on the Nazas River near San Sebastiano, in the southeast corner of the state of Chihuahua, not far east of Parras, May 10, 1847." The delightful travelogue of Frederick Adolphus Wislizenus (1848) contains a relatively precise description of the journey on 10 May 1847. Figure 7 shows the travel route during May 1847. The Hacienda San Sebastian lies at the Rio Nazas, the boundary between Durango and Coahuila, west of Parras and east of Mapimi. Wislizenus (1848:67) believed the 2 days before passing the village of Pelayo, about 60 km northeast of Mapimi (Type locality of *Echinocereus flexispinus* Engelm.), were spent in Durango. However, Engelmann considered the epithet "scabra" of Salm-Dyck not suitable and explained: "As thus the published name is inadmissible, I deem it proper to substitute for it that of the discoverer of this and so many other interesting plants of Northern Mexico." In his description of *A. wislizeni* he wrote: "The leaf of the wild plant, now before me, is 8 inches long and 4 wide..." This is a leaf-index of 0.5.

Johnston (1944:78) gave the location of San Sebastian as "10 km northeast of Torreon" and stated that neither *A. scabra* nor *A. wislizeni* grows there, but rather *A. asperrima* Jacobi. On the occasion of an expedition in May 1973, Gentry (1975a) studied this case and reported: "During the 126 years after Wislizenus, the country has been much changed by man's increase and industry. There are no Agaves about the ruins of the Hacienda San Sebastian. All the flat land about there for 8 – 15 miles is occupied by intensive agriculture and outlying industries of the cities of Torreon and Gomez Palacio. On the chance that Wislizenus may have collected his seeds on the way from Mapimi to San Sebastian, I checked the old mule trails coming down the eastern bajadas of the Sierra Sarnoso. Along the eastern base of this limestone range, about ten miles west of San Sebastian, there is a fine stand of what has been long recognized as *Agave asperrima* Jacobi. Some of these plants follow the rocky bajadas to the border of the cleared farm land. This

is a widespread variable species in the Chihuahuan Desert and the only paniculate *Agave* I located near San Sebastian and the lower Rio Nazas. Wislizenus rode through this area on May 10, 1847, the day he reached San Sebastian (Wislizenus 1848:68). These plants all have the scabrous leaves and the reflexed teeth as described by Salm from his young specimens (11 – 12 years old). *Agave scabra* Salm-Dyck (1859) has priority over *A. asperrima* Jacobi (1864) and, according to my interpretations, should replace the latter in usage."

Gentry further considered *A. wislizeni* and *A. parrasana* Berger as conspecific, but classified Berger's taxon of the Sierra Parras as a subspecies. He assumed that Wislizenus collected seeds of two different *Agaves*: first from *A. asperrima* (= *A. scabra* sensu Gentry) at the Sierra Sarnoso and the next day, during the ride to Parras, from *A. wislizeni*. He wrote: "I have a collection (Gentry 11546) from the lower elevations of that range, a few miles east of Parras, what is not far from the trail Wislizenus followed... He may have considered the two collections as of one species and had no time or energy to make a note of it." This interpretation sounds plausible, since mixed collections cannot be excluded. Finally Gentry stated (1975a:104): "General von Jacobi might have cleared up the confusion about the seeds, if he had visited Prince Salm's garden. Apparently he was too busy naming species and made another synonym. Did that Old World rivalry deter him from visiting Prince Salm's garden? What sort of man was he anyway?"

If one reads the whole work of Jacobi, one can conclude this author always speaks with high esteem of Prince Salm-Dyck. Like the latter he tried, too, to follow the original sources of the described *Agaves*. Both realized the insufficiency of their systematic-taxonomic work and were not afraid to correct earlier false diagnoses. One absolutely cannot infer from the known literature that there was rivalry between these two respectable gentlemen. Of course a visit by Jacobi to Salm-Dyck would have cleared up this case. But if one looks at this from Jacobi's view, it was for him quite clear. He sent leaves and a diagnosis of a short- and broad-leaved, slow-growing *Agave*, which was raised from seeds collected by Wislizenus in Chihuahua, to Salm-Dyck, who published this plant the next year with the same field data. The only difference between the two diagnoses was the word "asper." Further, Salm-Dyck was surely considered by Jacobi to be an authority on agaves at that time. He began five years later to publish his monograph, which became a standard on *Agave*. The mobility of that time was quite different than today. Salm-Dyck spent the winter 1859/60, following his own account (1861:177), in Pau, near the Pyrenees; the following winter, 1860/61, in Nice, where he died 21 March 1861. Consequently there remained little time for a meeting after Salm-Dyck's publication in April 1859.

After F.S. Crosswhite and R. McVaugh (pers. comm. to H.S. Gentry) called attention to the fact the name *A. wislizeni* was illegitimate (Art. 11, ICBN), Gentry (1975b) published a short notice and concluded that "The correct name

for these taxa is *Agave parrasana* Berger." Surprisingly, his recently established differentiation of two taxa (*A. wislizeni* and *A. wislizeni* ssp. *parrasana*) was abandoned after a few months in favor of one taxon. Nowhere is there an explanation given why *A. wislizeni* now is not called something different and presented as a subspecies of *A. parrasana*. In his monograph Gentry (1982) accepted only *A. parrasana*, with *A. wislizeni* as an illegitimate synonym. But in the exsiccatae the type of the latter (*Wislizenus* 280) is not listed under *A. parrasana*. I made an attempt to clear up all questions involved and sent a letter to Dr. Gentry, who just in January 1986 had informed me, "I do not work with Agaves any more." So it was not surprising his answer (17 Nov 1990), unfortunately, contained no further information.

Gentry used the spelling "wislizenii." Following the recommendation 73.C2 of the ICBN, the genitive form of *Wislizenus*, "wislizeni," should be used, just as Engelmann did.

During the documentation of all taxa ever published for the Agavaceae, I found somewhat by accident in fasc. 2 of *Novarum aut rariorum plantarum...* by Ortega (1797) the well-done description of *Agave scabra*. This taxon was overlooked in *Index Kewensis*. Following today's delimitation of genera in the Agavaceae, this species belongs to *Manfreda* (tribe *Poliantheae*). McVaugh (1989:234) transferred the name to *Manfreda* and accepted its priority over *Manfreda brachystachya* (Cav.) Rose. The history of the latter species is well worth a more exhaustive study and will be given elsewhere. There are reasons that make McVaugh's synonymy plausible, but one interesting detail should be given here. Ortega diagnosed "foliis margine cartilagineo scabris," but Cavanilles wrote (1803:453) "foliis...integerrimis glabris." This is a really remarkable analogy to the "scabrous," respectively "smooth," leaves of *A. scabra* Salm-Dyck. The existence of Ortega's *A. scabra* affects the nomenclature:

1. *Agave scabra* Salm-Dyck is a younger homonym of *A. scabra* Ortega and according Art. 64 (ICBN) illegitimate.
2. If *A. scabra* Salm-Dyck is illegitimate, *A. wislizeni* cannot be illegitimate too. (This is the opinion of N.P. Taylor (submitted kindly from Dr. U. Eggli in a letter of 26 Sep 1990) and of Dr. W. Greuter [pers. comm. of 5 Oct 1990]). Therefore the name for this taxon must be *A. wislizeni*.

What is the identity of *A. scabra* Salm-Dyck, the later *A. wislizeni*? The obituary of G.A. von Jacobi (Anonymous 1875) mentions his proposal to publish his *Versuch zu einer systematischen Ordnung der Agaveen* in an edition with many photographs. Jacobi died in 1874 and this project was never realized. But in a listing, Dr. Koeber, curator of the botanical collection of the Schlesische Gesellschaft at Breslau, wrote under point four: "carton oversize-folio, containing a very great collection of photographs of Agaveen (very valuable)." I received on



FIG. 2. Authentic photograph of Jacobi's specimen of *Agave scabra* Salm-Dyck, the later *Agave wislizeni* Engelm., as deposited in the herbarium of the Botanical Garden at Berlin-Dahlem (B).

18 Sep 1989 a letter from Dr. E. Panek (kindly transmitted from Dr. H.G. Richter, Hamburg) with a listing of the deposited photographs of Jacobi's residue in the herbarium of Breslau. During a visit to the herbarium of the botanical garden at Berlin-Dahlem, 2 to 5 Oct 1990, I found there doubtlessly authentic copies of Jacobi's original plates, with a stamp "H. Buchwald, Breslau." The photograph in figure 2 is reproduced for the first time, and shows *A. scabra* Salm-Dyck which Jacobi (1865:123/24) described. The compact growth, the short, broad leaves, and the armature place this Agave without doubt in the group "Parryanae." Salm-Dyck's affirmation (1861:179) "It is and remains one of the best characterized species," is absolutely justified, since at that time no other member of this group was known in European gardens. If *A. scabra* Salm-Dyck was not an illegitimate homonym of *A. scabra* Ortega, the well-established and persistently used name of *A. parryi* Engelm. would have been replaced by the former. Trelease (1912, pl. 75, 76) illustrated the type of *A. wislizeni* (Wislizenus 280, MO) and indeed this leaf corresponds well with Jacobi's plant.

Although the history of *A. scabra* could well have been explained here in the essential points, neither Johnston (1944) nor Gentry (1975a) could rediscover this species at the locality given by Engelmann (1875) as San Sebastian. There are basically two explanations:

1. Up to now, the search for *A. scabra* was confined to the environs of the old Hacienda San Sebastian and the foot slopes of the eastern Sierra Sarnoso. Nevertheless, this species could easily be found in the mountains between Mapimi and San Sebastian.
2. *Agave scabra* really does not grow there, Engelmann's statement notwithstanding, but the seed was collected previously, coming from Chihuahua or, as Gentry supposed, later on the travel to Parras.

The question is to what extent Wislizenus and Engelmann distinguished species of *Agave* as delimited today. The less this may be the case, the more is the possibility of mixed collections.

Wislizenus (1848:50 – 53) resided from 13 Sep 1846 to 3 Mar 1847 in Cusihiuriachic, about 90 km southwest of Chihuahua. Engelmann (Wislizenus 1848:102) remarked with regard to the plants collected there: "In fact almost everything collected there appears to be new!" Trelease (1912:86) arranged *A. wislizeni*, *A. parrasana*, and his *A. chihuahuana* side by side in his key. Pringle 958 (MO, mountains near Chihuahua, 8 Sep 1886), a plant originally distributed as *A. wislizeni*, is cited as a type of the latter. Rose 11654 (US, Chihuahua: Cosihuiachic, 2 – 3 Apr 1908) and the photograph of this plant in the field (Trelease 1912: pl. 82(1)) correspond well with the picture of Jacobi's residue. Salm-Dyck's location for his *A. scabra* fits well here. In this light the conception of Johnston (1944) is obvious, treating *A. chihuahuana* Trel. as a synonym of *A. wislizeni*.



FIG. 3. *Agave parrasana* Berger growing in the Sierra Paila, Coahuila, Mexico. Photographed by Alfred B. Lau in Oct 1990.

(3) *Agave parrasana* Berger

Agave parrasana, described by Berger (1906), is frequently seen in European gardens, distributed via offshoots because of its compact growth and attractive armature. Although natural stands are scattered in the Sierras of Coahuila, access is not easy. The first picture is in Berger (1915; others are in Boss (1943) and Breitung (1964, 1968)). The members of the 'Parryanae' are rather similar to each other, except for *A. guadalupensis* Trel., but *A. parrasana* is easy to recognize in its typical form. *Agave parryi* is sometimes identified in collections as *A. parrasana*. Janse (1975) showed one such plant, an apparently very old specimen, in the "Städtische Sukkulente-Sammlung" in Zürich. This particular plant flowered there in January 1990 (Eggli 1990). At a later stage of the inflorescence (April 18th) nothing was seen of the typical imbricate, fleshy bracts covering the shaft. Figure 3 gives a typical rosette from the Sierra Paila, Coahuila, photographed by A. B. Lau. Gentry (1973) found this plant there too. The exact position of *A. wislizeni* cannot be evaluated now because on one hand, the locality given by Engelmann could not be verified and, on the other hand, different indications point to a type locality near Chihuahua. Because *wislizeni* could lie closer to *A. parryi* than to *A. parrasana*, it appears to be premature to reinstate the combination *A. wislizeni* ssp. *parrasana* by Gentry (1975a), nor to follow the conception of Gentry (1975b, 1982) and replace *A. parrasana* by *A. wislizeni*.



FIG. 4. *Agave asperima* Jacobi growing about 20 km north of Saltillo, Coahuila, Mexico. Photographed in Apr 1989 by the late Wilhelm Frey.

Where has *A. wislizeni* been collected? Notable is the statement of Trelease (1912:90): "Specimens which are still small occur in the living collections of the Missouri Botanical Garden, recorded as from Engelmann, and from these it is impossible to distinguish other specimens distributed from Lampazos, Nuevo Leon, by Mrs. Anna B. Nickels, under the name *A. noah*." He further (1912: pl. 79) showed a flowering specimen of *A. noah* at Fairmont Park in 1907. An excellent article on A.B. Nickels from Laredo, Texas, was published by Mitich (1971), where page 26 of her catalogue for 1894 (?) is reproduced. There *A. noah*

is described as follows: "The leaves of this plant are of pale ashy green color; are very wide and short, also very much turned up at the sides."

(4) *Agave asperrima* Jacobi

As shown here, *A. scabra* Salm-Dyck is not identical with *A. asperrima* Jacobi. In all major taxonomic works on *Agave* (Baker 1888; Berger 1915; Trelease 1920; Breitung 1968), *A. asperrima* was accepted. It is the most common member of the subgenus *Agave* of the northern central plateau of Mexico. Figure 4 shows a typical plant about 20 km north of Saltillo, Coahuila, photographed in 1989 by Wilhelm Frey (deceased). The habit is similar to *A. americana* L., but the leaves are very rough. Gentry (1982:286) mentioned natural hybrids between these two taxa, which he arranged in the "Americanae." These groups, as Gentry calls them somewhat informally, are to be interpreted as sections. If *A. americana* is the type of the genus, the correct name for this section is, following Art. 22.1 (ICBN), *Agave*. The name *A. asperrima* is also used in the Mexican literature, e.g., in Matuda (1965). I saw, in most European collections, this name for the plant under discussion.

Gentry's neotypification of *A. scabra* Salm-Dyck, an illegitimate name, is based on a misinterpretation of this taxon. The question of typification of *A. asperrima* is unresolved. Jacobi (1864:561) discussed a specimen of the Munich Botanical Garden, raised from seeds sent by F. Lindheimer from "Talmit." Prof. Dr. Martius, the late director of this famous garden, assumed Texas as the homeland of this plant. This is plausible, for indeed Ferdinand Lindheimer collected in that region about 1850. Jacobi's (1864) plant had leaves 30 cm long; it could well be possible the seed germinated ca. 1850. Despite great efforts I was unable to locate "Talmit" on any map of Texas, nor can this be found in the *Plantae Lindheimerianae* III (Blankinship 1907) or the *Aufsätze und Abhandlungen von Ferdinand Lindheimer* (Passavant 1879). It is really curious: there is a location given for *A. wislizeni*, but this taxon could not be found there today and the type locality "Talmit" of *A. asperrima* is unknown. The cited exsiccatae from Gentry (1982), and several additional locations from Galvan & Gonzales (1991), Berger (1915), and Synnott (1989) for the *A. asperrima*-complex, are indicated in Figure 7. Gentry lists *A. asperrima* for Starr, Zapata, and Webb counties, Texas, and as the most northeasterly location, Catarina in Dimmit County. Mulford (1896:89) wrote: "This plant (*A. asperrima*) is reported as occurring spontaneously in Texas at a point about twenty miles northeast of San Antonio, and at Eagle Pass. From the former place Mr. Gurney received a plant a number of years ago..." This is the more interesting, as New Braunfels lies only about 50 km northeast of San Antonio. Lindheimer, remembered today in a small museum in New Braunfels, collected, according to Blankinship (1907:150), the type of *Nolina texana* S. Watson at the "upper Cibolo," in March 1846. Cibolo Creek, at the southeast corner of the Edwards

Plateau, is today the boundary between Bexar Co. (San Antonio) and Comal Co. (New Braunfels) and lies about 20 miles northeast of San Antonio. These relations suggest the possible type locality of *A. asperrima* lies in the northeasternmost part of its range in Texas. Unfortunately there are no cited exsiccatae of this species near New Braunfels and the illustration of a leaf, as shown by Mulford (1896: pl. 53[1–4]), was apparently drawn from a living specimen. Berger (1915:147) included this illustration in his *A. caeciliana* even if he in the description obviously is referring to living plants in La Mortola which C.A. Purpus had sent from Viesca in Coahuila. This taxon is at any rate a synonym for *A. asperrima*.

As I affirmed in September 1990, no specimen of *A. asperrima* is deposited in the Munich herbarium (M). The listing of Dr. Panek cites no material for the Breslau herbarium. Apparently no original material exists and it is necessary to select a neotype. This was the intention of Gentry (1975a), but since he referred to *A. scabra* Salm-Dyck, his selection is superseded (Art. 8.1(b), ICBN). Gentry's selection could be used for *A. asperrima*, but the map shows that Gentry & Engard 23268 (US, Durango: Dinamitita, 15 May 1973) originated from the western limit of its range, many hundreds of kilometers southwest of the original location, as indicated by the reviewed history of *A. asperrima*.

The names of plants, collectors, or locations are often corrupted more or less. Dr. Almut G. Jones, curator of the University of Illinois herbarium (ILL), wrote (letter of 9 Apr 1991): "In Starr Co. (Texas), is a village 'Delmita'. Lindheimer has made many mistakes with geographical names, especially on the labels of herbarium specimens. I would view 'Delmita' as a good possibility."

Dr. Marshall C. Johnston (letter of 23 Jun 1991) wrote: "I doubt very much that Ferdinand Lindheimer ever travelled in what is now Starr Co., Texas, that lying about 450 km south of the southernmost point that he is known to have searched. I have no idea what is meant with "Talmit" unless the plant was growing in a Tal mit...anderen Pflanzen." Because Lindheimer sent the seed to Munich, he collected in Texas and *A. asperrima* is known today from the southern part of this state, there are historical reasons to assume Texas as the original locality. Of course it is possible that Lindheimer did not collect the seed himself, but only submitted it, together with other material of his own, to the Botanical Garden of Munich.

As neotype for *Agave asperrima* Jacobi I select: Gentry & Barclay 20012 (U.S.A. TEXAS. Starr Co.: 8 km SE Saus, 7 Jun 1963; US; ISONEOTYPE: DES).

Jacobi placed *A. asperrima* side by side with *A. tehuacanensis* in his systematics, based on habit characters. Indeed young plants may be similar. The seedlings of the later *A. asperrima* could well have the name *A. scabra* within the Munich Botanical Garden. If during the next year the labels of these two taxa were interchanged in part, this could be the reason why (1) the name *A. scabra* existed within Munich Botanical Garden before the publication of Salm-Dyck (1859),



FIG. 5. *Agave asperima* Jacobi ssp. *zarcensis* (Gentry) Ullrich near the type locality, about 15 km south of La Zarca, Durango, Mexico. Photographed by Ernst Wölfling 11 Jan 1991.

and (2) that he, as well as Jacobi, received from that institution plants of *A. tehuacanensis* as *A. scabra*. Gentry (1982) described three subspecies of *A. scabra* Salm-Dyck, which are given here as new combinations with *A. asperima*:

Agave asperima* Jacobi ssp. *asperima, Hamburger Garten Blumenzeitung 20(12):561, Dec 1864. TYPE: TEXAS. Starr Co.: 8 km SE Saus, 7 Jun 1963, Gentry & Barclay 20012 (NEOTYPE: US; ISONEOTYPE: DES).

A. caeciliana Berger, Die Agaven. 147. 1915.

***Agave asperima* Jacobi ssp. *maderensis* (Gentry) Ullrich, comb. nov.** BASIONYM: *A. scabra* Salm-Dyck ssp. *maderensis* Gentry, Agaves Continental North America 300. 1982. TYPE: MEXICO. Coahuila: Canyon de la Hacienda, Sierra Madera, NW Quatro Cienegas, 10 May 1973, Gentry & Engard 23251 (HOLOTYPE: DES; ISOTYPES: MEXU, US).

***Agave asperima* Jacobi ssp. *potosiensis* (Gentry) Ullrich, comb. nov.** BASIONYM: *Agave scabra* Salm-Dyck ssp. *potosiensis* Gentry, Agaves of Continental North America 300. 1982. TYPE: MEXICO. San Luis Potosi: 27 km E Huizache jct along route 80, 16 Jul 1963, Gentry et al. 20162 (HOLOTYPE: US; ISOTYPES: AMER, DES).

***Agave asperima* Jacobi ssp. *zarcensis* (Gentry) Ullrich, comb. nov.** BASIONYM: *A. scabra* Salm-Dyck ssp. *zarcensis* Gentry, Agaves Continental North America 302. 1982. TYPE: MEXICO. Durango: along route 45, 24 – 32 km S La Zarca, 31 Oct 1966, Gentry & Arguelles 22084 (HOLOTYPE: US; ISOTYPES: DES, MEXU).

Eggli & Taylor (1984) treated *A. scabra* ssp. *maderensis* as nom. inval. (based on syntypes, Art. 37.1, ICBN). Together with the information given by Gentry



FIG. 6. Fine plant of *Agave parryi* Engelm. ssp. *parryi*. Photographed by Ernst Wölfling, 10 Jan 1991, about 25 km west of Hidalgo del Parral direction El Vergel, Chihuahua, Mexico.

(1982:307) this taxon is legitimately published (pers. comm. with Dr. U. Eggli, 18 Apr 1990). I never saw this subspecies in European collections. The ssp. *potosiensis* is extremely scarce in culture, but in 1990 a fine specimen flowered in the Palmengarten of Frankfurt/M., which was collected by G. Andersohn east of San Luis Potosí. The plant had not been pollinated and formed no seeds, but an offshoot is in my collection.

Small plantlets, collected from the late W. Frey about 5 km south of El Palmito, Durango, in April 1989, could represent ssp. *zarcensis*. Seeds collected by Ernst Wölfling on 11 Jan 1991, about 15 km south of La Zarca near the type locality (Fig. 5), germinated very well.

(5) *Agave parryi* Engelm.

As shown here, *A. scabra* Salm-Dyck, the later *A. wislizeni*, is apparently related to *A. parryi*. In the last paragraph of this paper I shall give full synonymy of this most common taxon of the "Parryanae," including a new combination.

Agave huachuensis Baker is a highly ornamental plant often seen in gardens. It suckers profusely and is in general apparently a single clone. Such plants are always easy to recognize. Gentry (1972:119) accepted this taxon at the species rank but (1982:542) preferred the status as a variety of *A. parryi*, distinguished by larger leaves and flowers, as well as a broader panicle. Benson & Darrow (1981:73) mentioned its limited habitat as "an area less than 30 miles in diameter

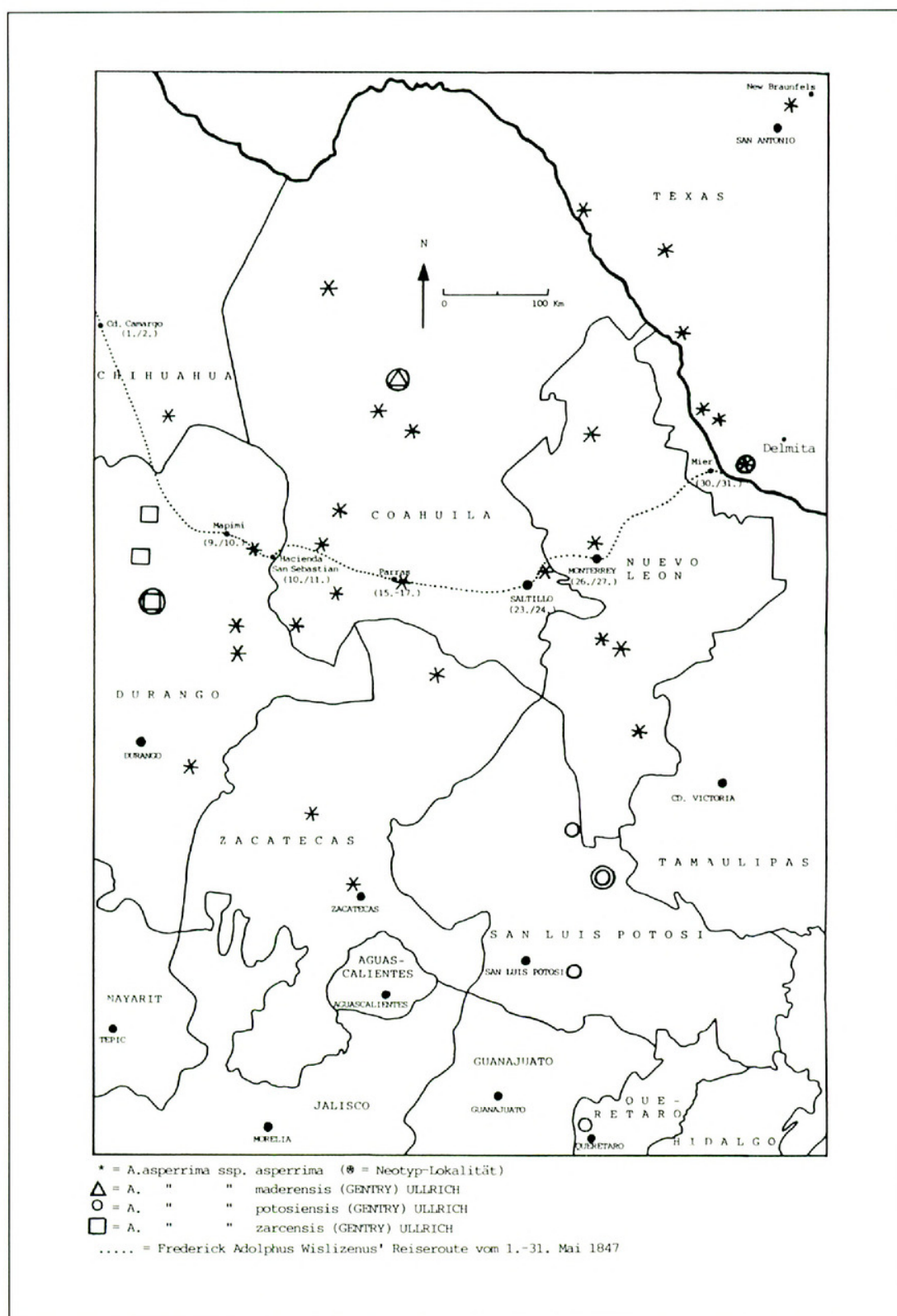


FIG. 7. Distribution of *Agave asperima* ssp. *asperima*, ssp. *maderensis*, ssp. *potosiensis*, ssp. *zarcensis* in Mexico.

in southeastern Arizona" (Fig. 8). Skinner (1961) visited the population between Sonoita and Patagonia and remarked: "This section of the country is noted as being one of the moistest spots of the state." It is possible, that this environmental situation is responsible for the more robust growth of *A. huachuensis*. The flower lengths listed by Gentry (1982:525)—*A. huachuensis* with 62–81 mm, and *A. parryi* with 60–77 mm—show no clear distinction of the two taxa. Even the geographical separation of *A. huachuensis* is unclear, since certain plants from Durango, Mexico, have a similar habit, as indicated by a picture of a superb specimen (Ullrich et al. 1991). Furthermore the status varietal is unusual in modern *Agave* taxonomy for wild populations.

Gentry (1982:542) further accepted *A. couesii* Trel. as a variety of *A. parryi*, distinguished by smaller leaves and flowers. But here too, the flower length of 46–59 mm for *A. couesii* approaches the 60–77 mm for *A. parryi*. This form is growing in the northwesternmost corner of the wide distribution area of *A. parryi*. Perhaps the smaller growth is affected by the colder climate at the cold-fringe of "Agave-land." Gentry (1982:542/43) commented: "Small-leaved forms of *A. parryi*, however, occur at random elsewhere, as on the Sierra Ancha of Arizona (Gentry 2231) and again in central Chihuahua (Gentry & Arguelles 22953)." Benson & Darrow (1981) treated *A. couesii* as a synonym of *A. parryi*; I am inclined to accept this for the time being.

The form of *A. parryi* without marginal teeth described by Breitung (1964:76) as *f. integrifolia* grows side by side with *A. couesii* about 16 km SW of Prescott, Arizona. The suppression of teeth appears, following Gentry (1982:543), to be "a homologous character widely distributed in the genus *Agave*." Such forms are known, e.g., with *A. deserti* Engelm., *A. utahensis* Engelm. in King, *A. potatorum* Zucc., *A. fourcroydes* Lemaire, and *A. triangularis* Jacobi.

Agave parryi var. *truncata*, described by Gentry (1982) as new, is said to differ in its smaller, truncate leaves, "inflorescence as in *A. parryi*." He further wrote: "The wild plants appeared rather depauperate..." A specimen of the original collection flowered in 1977 in the Huntington Botanical Garden, San Marino, California. This plant was "relatively large," as Gentry admitted himself, and his photo (1982:544) shows a specimen that could fit without great problems in the *A. parryi*-complex. Different growth habit caused by climatic or edaphic factors disappears under equal garden conditions, but genetically affected differences remain. An offshoot of the HBG-plant developed in my collection (Ullrich 1991) within the normal range of variability of the whole complex of *A. parryi*. Gentry (1982:539) summed up: "A competent taxonomic segregation of these forms requires a detailed analytic field study beyond the limits of this work."

Agave parryi Engelm. ssp. *parryi*, Trans. Acad. Sci. St. Louis 3(20):311. 27 Dec 1875. (Figs. 6,8).

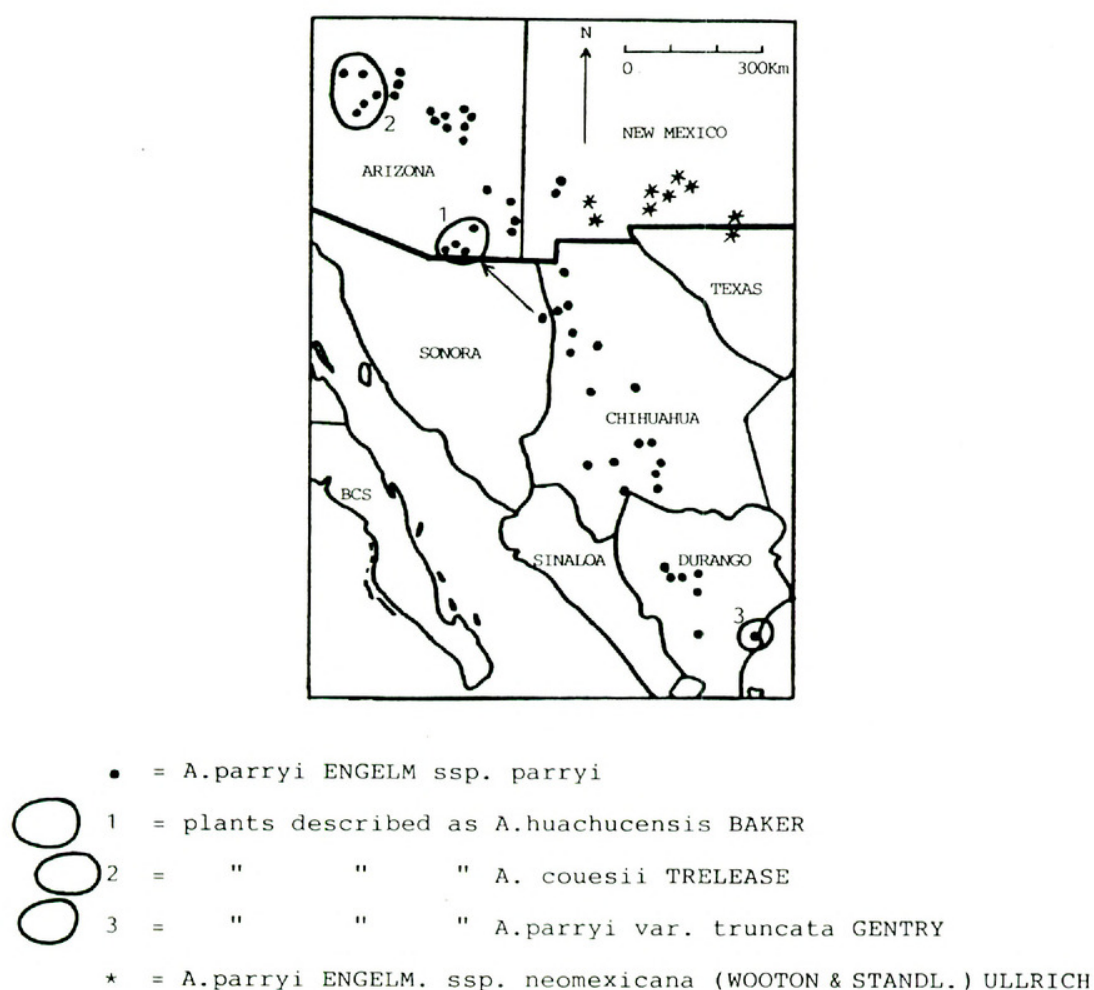


FIG. 8. Distribution of the complex of *Agave parryi* Engelm. (following Gentry 1982).

- A. scabra* Salm-Dyck, Bonplandia 7:89. 15 Apr 1859 (nom. illeg.) non: *A. scabra* Ortega, Nov. Rar. Pl. Hort. Reg. Bot. Matrit., Decas 2:13. 1797.
- A. americana* L. var. *latifolia* Torr., U.S. Mex. Bound. Survey 213. Apr 1859
- A. wislizeni* Engelm., Trans. Acad. Sci. St. Louis 3(20):320. 1875.
- A. huachucensis* Baker, Handb. Amaryll. 172. 1888.
- A. noah* Nickels, Catalogue: 26. 1894(?).
- A. applanata* Koch var. *parryi* (Engelm.) Mulford, Annual Rep. Missouri Bot. Gard. 7:83, pl. 36 – 39. 23 May 1896.
- A. applanata* Koch var. *huachucensis* (Baker) Mulford, Annual Rep. Missouri Bot. Gard. 7:85, pl. 40 – 41. 23 May 1896.
- A. chihuahuana* Trel., Annual Rep. Missouri Bot. Gard. 22 (1911):90, pl. 82 – 83. 14 Feb 1912.
- A. patonii* Trel., Annual Rep. Missouri Bot. Gard. 22 (1911):92, pl. 90, 14 Feb 1912.

- A. coesii* Trel., Annual Rep. Missouri Bot. Gard. 22 (1911):94, pl. 94 – 97, 14 Feb 1912.
A. parryi Engelm. var. *coesii* (Engelm. ex Trel.) Kearney & Peebles, J. Wash. Acad. Sci. 29(11):474, 15 Nov 1939.
A. parryi Engelm. var. *huachuensis* (Baker) Little, in Benson, Amer. J. Bot. 30(3):235. 12 Apr 1943.
A. parryi Engelm. f. *integrifolia* Breitung, Cact. Succ. J. (Los Angeles) 35(3):76. Jun 1963
A. parryi Engelm. var. *truncata* Gentry, Gentry, H.S: Agaves Continental North America 543. 1982.

THE STATUS OF *A. NEOMEXICANA* WOOTON & STANDLEY

Wooton & Standley (1913) compared *A. neomexicana* with *A. applanata*. Berger (1915) as well as Trelease (1920) made no mention of this species. McKechnie (1949:166) stated: "Its botanical name is *Agave parryi* Engelm. variety *Neo Mexicana*." It is not known that this combination has ever been made public before. Breitung (1968) as well as Benson & Darrow (1981:72) treated this taxon as a synonym of *A. parryi*. Gentry (1982) accepted *A. neomexicana*. Table 1 gives some characters of his diagnoses.

TABLE 1. Diagnostic characters of *Agave neomexicana* and *A. parryi*.

Character	<i>A. neomexicana</i>	<i>A. parryi</i>
Leaves (L × W)	20 – 45 × 5 – 12 cm	25 – 40 × 8 – 12 cm
Teeth (L)	5 – 7 mm	3 – 7 mm
Spine (L)	25 – 40 mm	15 – 30 mm
Inflorescence (H)	3 – 4 m	4 – 6 m
Branches	10 – 17	20 – 36
Flowers (L)	55 – 67 mm	60 – 75 mm
Tube (L)	12 – 14 mm	8 – 12 mm
Tepals (L × W)	15 – 20 × 3 – 4 mm	18 – 24 × 4 – 6 mm

The leaves of *A. neomexicana* tend to be somewhat more narrow, the inflorescence shorter, and the branches fewer. In comparison, the flowers of *A. neomexicana* at the type-locality (USA: New Mexico, Dona Ana Co.: Organ Mts., 22 km E Las Cruces, 18 Jun 1967, Gentry 22304) and of *A. parryi* (USA: New Mexico, Grant Co.: 5 km N Pinos Altos, 18 Jun 1967, Gentry 22305) are very similar. Both taxa are clearly very closely related. Their distribution areas are adjacent (Fig. 8). To equalize species rank within the genus *Agave*, I classify *A. neomexicana* as a subspecies of *A. parryi*.

Agave parryi Engelm. ssp. *neomexicana* (Wooton & Standley) Ullrich, stat. nov. BASIONYM: *Agave neomexicana* Wooton & Standley, Contr. U.S. Natl. Herb. 16(4): 115, pl. 48. 12 Feb 1913.

Agave parryi Engelm. var. *neomexicana* (Wooton & Standley) McKechnie, Cact. Succ. J. (Los Angeles) 21(6):166. 1949.

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