

Notes on the nomenclature of species of *Agave* L. (Agavaceae / Asparagaceae) grown in and described from European gardens and nurseries

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Summary: Several species of *Agave* L. (Agavaceae / Asparagaceae) have intricate nomenclatural histories, given that material imported into Europe from their New World habitats took several years, if not decades to flower, resulting in hasty and cryptic descriptions often being based on vegetative material only. Furthermore, multiple authors sometimes, but not always, used the same binomials to refer to plants known in cultivation, making it important to clarify and establish correct author citations to determine which species are referred to. In this paper we clarify the use of the well-known names *Agave applanata* Hort. ex K.Koch, *A. verschaffeltii* Lem. ex Jacobi and *A. ghiesbreghtii* Hort. ex Jacobi. In addition, notes are provided on 12 further species names that K. Koch established and, where appropriate, furnished by him with descriptive statements in an often overlooked paper that he published in 1862.

Zusammenfassung: Mehrere Arten der Gattung *Agave* L. (Agavaceae / Asparagaceae) haben eine komplizierte nomenklatorische Vergangenheit, u.a. weil das aus den neuweltlichen Habitaten nach Europa importierte Material bis zur Blüte mehrere Jahre oder sogar Jahrzehnte benötigte, weshalb oft übereilte und kryptische Beschreibungen allein auf der Basis von vegetativem Material publiziert wurden. Zusätzlich verwendeten mehrere Autoren manchmal, aber nicht immer, dieselben binomialen Namen für aus Kultur bekannte Pflanzen, weshalb es wichtig ist, die korrekten Autorzitate zu klären und festzuhalten um Klarheit zu schaffen, welche Arten jeweils gemeint waren. In diesem Beitrag klären wir die

Anwendung der bekannten Namen *Agave applanata* Hort. ex K.Koch, *A. verschaffeltii* Lem. ex Jacobi und *A. ghiesbreghtii* Hort. ex Jacobi. Zusätzlich machen wir Bemerkungen über 12 weitere Artnamen, die von K. Koch verwendet wurden, in einigen Fällen mit beschreibenden Bemerkungen in einem oft übersehenen Beitrag, den er 1862 veröffentlichte.

The intricate nomenclature of *Agave* taxa

Many species of *Agave* L. have intricate nomenclatural histories (see Gentry, 1982 for several examples). Since the first representatives of this New World genus were introduced to Europe, these plants have been the subject of huge horticultural interest (Ullrich, 1993). Because most Agaves take several years to flower, and often will not do so under the conditions in which they were grown in Europe, numerous species were described based on vegetative material only. Most of these descriptions were devoid of other original material (specimens or illustrations), which complicates their interpretation. Many of these names are now widely regarded as synonyms, while others are of unresolved application. For example, The Plant List (www.theplantlist.org) records 246 accepted names, 618 synonyms and 89 unresolved names in the genus *Agave*.

Different authors sometimes, but not always, used the same binomials to refer to plants known in cultivation, making it important to clarify and determine correct author citations to decide which species are referred to. Here we provide clarity on the author citations of the well-known *Agave* names *Agave applanata* Hort. ex K.Koch, *Agave*

verschaffeltii Lem. ex Jacobi [a synonym of *Agave potatorum* Zucc.] and *Agave ghiesbreghtii* Hort. ex Jacobi, along with notes on 12 further species names that Koch (1862a) established in a little known publication.

Names without description

In the genus *Agave* many names were published without a description (a written statement of a feature or features of a taxon) or diagnosis (a written statement of that which distinguishes the taxon from other taxa) of the plant referred to. These are *nomina nuda* (*nomen nudum* = naked name) and not validly published according to Art. 38.1 of the International Code of Nomenclature for algae, fungi, and plants (ICN) (McNeill *et al.*, 2012). When they are later validated with a description, this is indicated in the authority of the name by adding 'ex' between the name of the person who first referred to it, and the name of the author who validated it. Quite remarkably, at least 10% of the legitimate, validly published nomenclatural novelties in *Agave* have been validated by another, later author. For comparison, the figure for the Old World rosulate leaf-succulent genus *Aloe* L. is only 1.5% (Figueiredo & Smith, 2010). These figures are only estimates because according to the ICN the name of the person preceding 'ex' (i.e. the person who originally provided the name, but did not give a description) and the word 'ex', can be omitted from the author citation.

When a description of the plant is provided, there are also requirements that will apply for its acceptance as valid. For instance, according to Art. 38.3 of the ICN, "...statements describing properties such as purely aesthetic features, economic, medicinal or culinary usage, cultural significance, cultivation techniques, geographical origin, or geological age..." do not meet the requirements. This is particularly relevant for *Agave* where many names have been accompanied with brief statements focusing on the beauty or oddity of the plants. The validity of these descriptive statements is debatable. In Art. 38.4, the ICN also addresses these situations, stating that "When it is doubtful whether a descriptive statement satisfies the requirement of Art. 38.1(a) for a "description or diagnosis", a request for a decision may be submitted to the General Committee..."

Names of horticultural origin

About 10% of the validly published nomenclatural novelties in *Agave* are of horticultural origin. Over 70 names of *Agave* have the word 'Hort.' (an abbreviation that indicates their use in horti-

culture, from 'Hortus' or 'Garden') in their author citation. *Agave ellemeetiana* Hort. ex Jacobi is one such example. For comparison, only seven names of *Aloe* are known to have that origin. Furthermore, about 6% of the *Agave* names encountered in the literature were published in plant catalogues. These catalogues were produced by nurseries for trade purposes, and often included very short statements of plant features. According to Art. 30.6 of the ICN, names are accepted as validly published in trade catalogues up to 31 December 1952. Catalogues in which *Agave* names were published originated from often well-known and reputable horticultural companies or nurserymen who typically operated from continental Europe, and included Van Houtte, Verschaffelt, De Smet, Haage & Schmidt, Cels and Besaucèle. These catalogues are today extremely rare and as far as we could ascertain, not available online, which further complicates the assessment of the nomenclatural status of the names provided in them.

The case of *Agave applanata* Hort. ex K.Koch

In *Agave*, many names were used in the horticultural trade long before they were validly published. These names were usually adopted by the authors who later described the plants. In some cases, their etymology remains unknown. An example is *Agave warelliana* Hort. ex Baker for which the origin of the name has not been recorded. Like these agave names, the name *Agave applanata* existed in the horticultural trade for several years before the name was validated. The name was used for one of the many Mexican agaves introduced to Europe through nurseries in the 19th century. The authority of *Agave applanata* has been variously attributed to 'K.Koch', 'K.Koch ex Jacobi' or 'Lem. ex Jacobi'.

Karl Koch (1809–1879) appears to be the first author to have provided a description of *Agave applanata* (1862a: 198) in a paper where he described several species from the garden of Tonel in Belgium. Jean Baptiste and Constant Tonel had a well-known garden near Ghent, a centre for *Agave* horticulture in the 19th century. Jean Tonel travelled to Mexico where he eventually obtained a wing of a Franciscan monastery at Mexico City that he used for growing material that he imported from Belgium to Mexico (Loriaux, 1993). This included horticultural and floricultural material popular at the time, such as roses. He regularly returned to Ghent where he also had a garden with Mexican plants, particularly succulents. Koch's description of *Agave applanata* from Tonel's garden was very short (Figure 1), but it

7. *Agave applanata* wächst der von mir *A. polyphylla* genannten Art sehr ähnlich, bildet aber doch mehr eine kugelige Rosette, indem die grünen Blätter am unteren Theil der Pflanze flach aufliegen, sich aber stets mehr erheben, je höher sie stehen. Sie haben bei einer Breite von 4 bis 4½ Zoll eine Länge von 1 bis 1½ Fuss und sind an der Basis ziemlich dick. Grosse braune Zähne umgeben die Blätter und ein langer brauner Stachel endigt sie. Jung sind sie von einem blaugrünen und abwischbaren Reife überzogen.

Figure 1. The valid description of *Agave applanata* extracted from Koch (1862a).

was accepted by some later authors as validating the name (Berger, 1915; Trelease, 1920).

However, both Gentry (1982) and Thiede (2001) considered this description as insufficient and cited Jacobi as the validating author of the name mentioned by Koch (as *Agave applanata* K.Koch ex Jacobi). In our view the original description provided by Koch is certainly sufficiently diagnostic to regard Koch as the only validating author of the name.

In 1864 in his extensive work on the genus *Agave*, Georg Albano von Jacobi (1805–1874) commented that he was adopting the name *Agave applanata* already in use in horticulture, because he thought a new name would increase nomenclatural complexity. However, he did not mention Koch. Instead he cited Lemaire as the author of the name. For this reason, recent authors (e.g. Govaerts *et al.*, 2011) cite the name as *Agave applanata* Lem. ex Jacobi. Jacobi (1864) further noted that his species was the same as the one grown in Tonel's garden in Ghent (which was the one described by Koch). The name should therefore be cited as *Agave applanata* Hort. ex K.Koch.

The cases of *Agave verschaffeltii* and *A. ghiesbreghtii*

Charles Antoine Lemaire (1800–1871) was the originator of several *Agave* names that he neglected to describe and that were eventually validated by other authors. In 1864 he commented that he had examined and named several species from the collections of Tonel, Ambroise Verschaffelt (1825–1886) and Jean Verschaffelt (?–1884), the latter two being associated with the famous Verschaffelt family nurseries. Plants with which these names are associated were exhibited at horticultural exhibitions in Belgium, especially at Ghent, and later more widespread, without having been adequately described by him. For example, in 1864 Lemaire mentioned two names to be described soon (Lemaire, 1864: 66): *Agave verschaffeltii* and *A. ghiesbreghtii* (that he ascribed

Eine der neuesten Agaven ist unbedingt *A. Ghiesbreghtii*, welche, manchen Aloën gleich, eine Rosette macht. Wahrscheinlich möchte sie auch die kleinste Art sein. Das vorhandene Exemplar hatte einen Durchmesser von kaum $\frac{1}{4}$ Fuss. Ihre Farbe war von der Mitte der Blätter gegen die Basis heller.

Figure 2. The statement on *Agave ghiesbreghtii* extracted from Koch (1862b).

to A. Versch.). When Lemaire eventually described *A. verschaffeltii* (Lemaire, 1868: t. 564) it was too late as the name had already been validated by Jacobi (1865: 122). Therefore, the correct authority for the name is *A. verschaffeltii* Lem. ex Jacobi, and not *A. verschaffeltii* Lem.

In the case of *A. ghiesbreghtii*, no description by Lemaire or Verschaffelt could be found in the literature. The name is recorded in IPNI as validly published by Koch in “Wochenschr. v. (1862) 83, 143”, and this publication was accepted by some authors (Trelease, 1914, 1920; Berger, 1915; Breitung, 1968). We could find no reference to the name on page 143 while on page 83 only a short statement refers to it (Figure 2). Recent authors (Govaerts *et al.*, 2011) considered this statement to be insufficient and listed the name as validated two years later by Jacobi (1864: 545), who provided a more comprehensive description. Both Koch (1862b) and Jacobi (1864) spelled the epithet as ‘*ghiesbrechtii*’, but the correct spelling is ‘*ghiesbreghtii*’, as it commemorates Auguste Boniface Ghiesbreght (1810–1893). Article 60.1 in the ICN stipulates that orthographical errors in names or epithets can be corrected. Ghiesbreght was a plant collector who introduced many Mexican agaves into Europe. He went to Mexico in 1836 as a collector, and eventually settled there. We conclude that the names should be cited as *Agave verschaffeltii* Lem. ex Jacobi and *A. ghiesbreghtii* Hort. ex Jacobi.

The names of other Agaves in Tonel's garden

In addition to *Agave applanata*, Koch (1862a) – an often overlooked paper – included descriptive statements for 12 further species that he obtained from Tonel's garden, as follows:

1. *Agave montezumae* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 197 (1862).

Probably a synonym of *Agave salmiana* Otto ex Salm-Dyck. Although ‘*Agave montezumae* Hort.

ex Jacobi (1864)' was cited by Thiede (2001), this citation apparently reflects the listing of *A. mon-tezumae* as a possible synonym of *A. jacobiana* by Jacobi (1864: 557). There was no validation of the name by Jacobi (1864).

2. *Agave ferdinand-cortez* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 198 (1862).

Probably a synonym of *Agave salmiana* Otto ex Salm-Dyck. Jacobi also saw plants under this name at Tonel's garden, and listed it as a possible synonym of *A. jacobiana* Salm-Dyck (Jacobi, 1864: 557).

[3. *Agave concinna* Lem.]

[4. *Agave vivipara* L.]

5. *Agave oblongata* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 198 (1862).

Probably a synonym of *Agave mitis* Mart. This publication yields as illegitimate the later validation of the name for the plants from Tonel's garden by Jacobi, as *Agave oblongata* Hort. ex Jacobi (1869). Jacobi's name is considered a synonym of *Agave mitis* Mart.

6. *Agave toneliana* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 198 (1862).

A name of unresolved application. This publication yields as illegitimate *Agave toneliana* Hort. ex Baker. Baker (1881) noted that the name was in use but he did not know if it had been published before. Baker's name is of unresolved application.

7. *Agave applanata* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 198 (1862).

An accepted name. This publication yields as illegitimate *Agave applanata* Lem. ex Jacobi (1865) which was described from the same plants from Tonel's garden.

8. *Agave malinczii* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 198 (1862).

A name of unresolved application. It is listed as valid in IPNI (misspelled '*malinezii*'). Curiously, it also has a very short description, but in the recent literature (Govaerts *et al.*, 2011), *A. malinczii* is listed as a validly published name and a synonym of *Agave rudis* Lem. ex Jacobi, itself an unresolved name.

9. *Agave coccinea* Roezl ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 198 (1862).

Probably a synonym of *Agave atrovirens* Karw. ex Salm-Dyck. This publication yields as illegitimate *Agave coccinea* Roezl ex Jacobi (1865). Jacobi's name is considered a synonym of *Agave atrovirens* Karw. ex Salm-Dyck.

10. *Agave serrata* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 198 (1862).

A name of unresolved application.

11. *Agave taeniata* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 199 (1862).

A name of unresolved application. Probably the same as '*Agave toeniata* Hort.' that was cited by Berger (1915: 94) as used by Besaucèle, with Thiede (2001) considering it as of unresolved application.

12. *Agave noacksii* Hort. ex K.Koch in Wochenschr. Vereines Beförd. Gartenbaues Königl. Preuss. Staaten 5: 199 (1862).

Probably a synonym of *Agave pendula* Schnittsp. It could be an orthographical variant of *A. noackii* Jacobi (1865), which is considered a synonym of *Agave pendula*, making it illegitimate.

[13. *Agave schidigera* Lem.]

Conclusion

The common 19th century practice of describing nomenclatural novelties in nursery catalogues and popular journals with brief statements (that are often acceptable for valid publication of plant names) has contributed to the confusion of names in some taxa, including *Agave*. As we argue above, the names established by Koch in his 1862 paper on Tonel's plants are validly published and their authorities should be cited as indicated above.

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