Agave cordillerensis J. Lodé & G. Pino
A new species for South America.

Joël Lodé (Spain) & Guillermo Pino (Peru)

In 2003, I went to Peru and observed the most common of the agaves that we can find there: *Agave americana* var. *expansa* (Jacobi) Gentry . Immediately I noted differences between this and the taxon of Mexican origin (Jalisco) which would have been introduced in pre-Colombian time, but because I fell seriously ill, things stayed like that and nothing more was done.

I continued my investigation during this time, and then had the occasion to return to Peru in 2007 to clear up things. Together with Guillermo Pino, eminent Peruvian specialist of succulent plants, we went to observe plants in habitat, and arrived at the conclusion that this taxon is well and truly a South American one. Here are the results of this work.

• INTRODUCTION

Agave americana L. is a plant grown all over the world and we recognize some varieties like. ***A. americana*** var. ***oaxacensis*** Gentry, ***A. americana*** L. ***ssp. protamericana*** Gentry and ***A. americana*** var. ***expansa*** (Jacobi) Gentry. There are also different variegated plants grown and a similar species which is frequently confused: ***A. americana*** var. ***picta*** (Salm-Dyck) Terrac., named ***A. picta*** Salm-Dyck or ***A. ingens***. All this brings about confusion, and in South America, it was given for fact that the agave found there, had grown and naturalized almost everywhere in the Andean zone as an introduced species from pre-Colombian times, and named ***A. americana*** var. ***expansa***.

But here is the puzzle, why is this the only taxon grown and and no others have been brought for the same purpose? Some plants in habitat seem not to be plants escaped from cultivation, but look more like autochtonous (native) plants. It is necessary to recognize that this taxon was studied in detail within the framework of its use, but very little from a botanical point of view. Moreover, the inflorescence corresponds in no way to that of ***A. americana***. In brief, it was necessary to look more carefully. With regard to ***A. americana*** var. ***expansa,*** Gentry illustrates the following facts: "This variety is only known as a cultivar, introduced in Western Europe where it was described by Jacobi as growing in St Germain in Laye, Paris, France". Thus, it would be the variety which we find everywhere around the Mediterranean Sea, and of which Gentry places the origin in the southwest of the United States and in Jalisco, in Mexico... Between 1864 and 1867, General Georg Albano von Jacobi described 78 species of agaves to which have become an unbelievable

Agave cordillerensis, habitat, San Jerónimo de Surco, Peru (photo : J.L.).

157 species (of which ***A. expansa***) and 18 furcraeas, all completely described according to specimens grown in gardens and greenhouses in Europe. Unfortunately, the inflorescence was not used in the descriptions at that time. Howard Scott Gentry was the first one (1982) to include the inflorescence as the main character for classification.

For my part, I continued to persist in the fact that the Mexican plants are not the same as those from South America, essentially because of its shape, but especially because of its inflorescence, which corresponds in no way to the plants which we find in South America. Furthermore, Soth American plants produce seeds, while it is considered that "reproduction in the var. ***expansa*** is strictly vegetative ".

In an article on the naming of Agaves, Jan Kolendo writes about Jacobi: "The problems with these works and those of other authors at that time is that names were based on often immature potted plants grown in cultivation in various European collections kept in very non Mexican conditions." At the herbarium of San Marcos, Lima (USM), there are only three, obviously incomplete sheets considering the dimensions of the plant. There is a sheet with two leaves in the Missouri Botanical Gardens Herbarium, USA (MB) under the name of ***A. abrupta,*** but corrected as ***A. americana*** var. ***expansa***.

Weberbauer was the first to note that it "is apparently wild in some places", but adds " that it is doubtful it is really native "...

On the Internet, photos taken in Colombia, show clearly, thanks to the inflorescence, that the Agaves of Colombia and that of Peru are identical. It is also reported in Ecuador

Agave cordillerensis, habitat, San Jerónimo de Surco, Peru (photo : J.L.).

Agave americana Desert Springs, Spain. The leaves are typically flattened. (photo : J.L.).

Agave cordillerensis, cult., Lima, Peru. Young leaves look somewhat similar to those of Sansevieria! (photo : J.L.).

Agave americana Desert Springs, Spain. The leaves are typically flattened, some hanging down (photo : J.L.).

↑ ***Agave cordillerensis***, cult., Lima, Peru. The young leaves look somewhat similar to those of Sansevieria! (photo : J.L.).
Agave americana Desert Springs, Spain. The leaves are typically flattened and not canaliculate (photo : J.L.).➔

and grown in Bolivia and in Venezuela (maybe even wild in these two last countries, but more investigation has to be done).

In 2007, I sent my doubts on the Peruvian plant to an eminent collector of agaves, Piet van Meer who answered me "I took a photo - of this plant in a small garden of Lima, and I thought that the inflorescence was bent because of the night-humidity or something like that... My friend Guy -Xhonneux- in Colombia, who saw these agaves over the years, has never noted the difference, but now, yes, I am convinced that they are different species.". Obviously my friend! It confirms my suspicions, but it is not sufficient.

I thus went to Peru to study the plants on the spot. Rather little appreciated in parks in Lima because of the spines that can hurt the passers-by, we saw it on road medians and it is there where I was to begin my work. Next day, on the advice of my friend Carlos Ostolaza, famous Peruvian cactophile, I meet the best Peruvian specialist on succulent plants, Guillermo Pino. Our passions converged at once and we organized a journey together to observe the plant in habitat.

A few days after, Guillermo, my Peruvian wife Mildred, and myself were in the small village of San Jeronimo de Surco, where the first plants came to light. Some are used as quickset hedges, the others seem escaped from cultivation, but a number of them appeared as wild.

It is difficult to find plants in flowers, because the inflorescences are cut very early before flowering (between August and November) to be able to give the juicy pulp to the cattle. The dry inflorescences are also used as beams for light constructions, and as picket fence. In fact, the forms of use are most numerous: food, drink, textile fibre and wood, all from a plant that does not need maintenance or watering and which easily propagates.

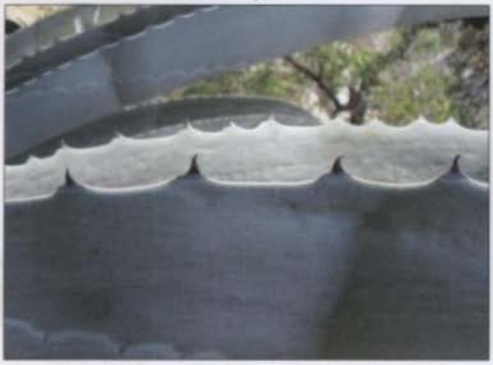
Nevertheless, some practically inaccessible wild plants had inflorescences with seeds, that we needed to be able to bring back to the Museum of Natural History Herbarium of Lima (USM). The most curious feature about this species in South America is the inflorescence, which is bent, and the branches that form a comma shape with a

Agave cordillerensis, typical inflorescence, habitat, Colombia. (photo : P. Van der Meer).

Agave cordillerensis, typical inflorescence, habitat, Peru. (photo : P. Van der Meer).

Agave americana, typical inflorescence, Desert Springs, Spain. (photo : J.L.).

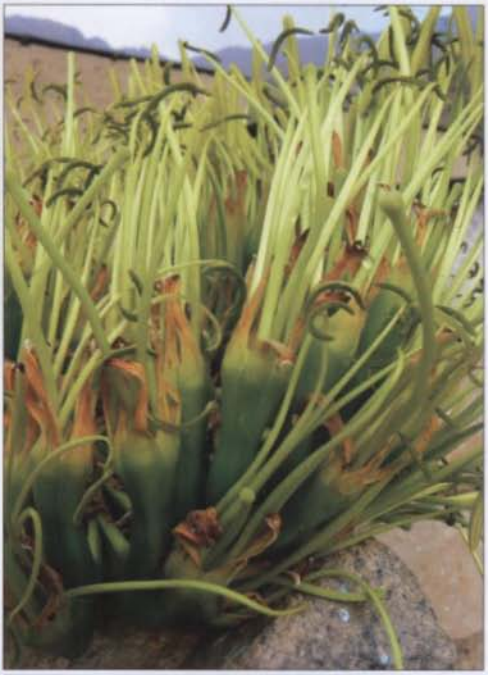
Agave cordillerensis, typical inflorescence, habitat, San Jerónimo de Surco, Peru (photo : J.L.).



Agave cordillerensis, spine closeup (photo : J.L.).

Agave americana,spine closeup (photo : J.L.).

↑ ***Agave cordillerensis***, typical inflorescence, habitat, San Jerónimo de Surco, Peru (photo : J.L.).



Agave cordillerensis, flowering, habitat, San Jerónimo de Surco, Peru. (photo : J.L.).➔

Agave cordillerensis, capsules, Peru (photo : J.L.).

Agave americana, capsules, Spain. (photo : J.L.).

characteristic buckle which easily distinguishes it from the group Americana. To do this we needed to climb to approximately 2100 m in altitude.

Photos taken by Piet Van Der Meer in Colombia, as well as plants of Ecuador, present the same mark of identification. The most characteristic use of this species is that, according to Van Der Meer, the bent branches are used to make basket arches in Colombia (pers. comm, 2007).

For me, as for Guillermo (but also for Piet), all these features confirm that it is indeed a new species. The plant being present in Colombia and in Ecuador (probably also in Bolivia and in Venezuela), it would be ill informed and undiplomatic to describe it as *Agave peruviana*. I chose the name *Agave australis* at first but discovered that this name had already been used by Steudel in 1821 – it became *Furcraea cubensis*. *Agave andina* was also used to define what became ***Furcraea andina***... To describe it with a name which speaks about itself, both in its origin and its main habitat, I chose the name of ***Agave cordillerensis*** J. Lodé & G. Pino.

• RESULTS

Agave cordillerensis J. Lodé & G. Pino **sp. nov.**

Planta succulenta acaulis prolifera, rosula 2-2.5 m alta 2.5-3.5 m diam. Folia effusa recta vel leviter reclinata non reflexa, 120-180 × 17-21 cm, griseo-glauca vel caesia conspicue zonatim dealbata, lanceolata ensiformia prope basin nonnihil angustata, rigida, apicem versus canaliculata, margine ondulato dentibus nigris armato, supra mamillas applanatis 3-7 mm insertis, 10-47 mm distantibus, spina terminali atrobrunnea subulata 2-3 cm longa. Scapus floriferus inclinatus 8-10 m, 20-45 bracteis triangularibus acuminatis 17-40 cm longis vestitus. Inflorescentia angusti-paniculata 14-20 ramis lateralibus umbelliformibus rhachidi deorsum retrocurvata trifurcata 50-80 cm longa. Flores erecti, 7.5-8.5 cm longi perianthio smaragdino, tepalis erectis triangularibus, 23-28 mm longis, eburneo-fulvescentibus; stamina filamentis flavovirentibus supra dimidium tubi perianthii insertis, antheris viridibus 20-28 mm longis; gynoecium ovario 23-28 mm, pistillo tubulare alboviride 5-7 cm stigmati trilobato 2-3 mm diam. Capsulae oblongae vel claviformes, 60-80 mm longae 28-35 mm diam. apicibus obtusis. Perianthium siccum mox caducum. Semina discoidea nigra 8-10 mm.

Type locality: PERU, Dept. Lima. **Prov. Huarochiri**, **Dist. Surco**, central Rd., Km 67, from the village of San Jerónimo de Surco up to the waterfalls of Palakala, in dry mountainous wood of *Schinus molle* L. *and Caesalpinia tinctoria* (Kunth) Dombey ex DC, on unstable stony ground at 45°, northern exposure, growing together with cactaceae: *Echinopsis peruviana* (Britton & Rose) Friedrich & *Rowley, Haageocereus acranthus* (Vaupel) Backeberg, *Cleistocactus acanthurus* (Vaupel) DR Hunt, *Armatocereus matucanensis* Backeberg et *Matucana haynei* (Otto) Britton & Rose; succulent plants like *Oxalis peduncularis* Kunth, *Portulaca sp .*, *Jatropha macrantha* Müll. and *Echeveria chiclensis* var. *backebergii* (Poellnitz) Pino, 2160 m, S11°53'36", W76°26' 23", Oct. 25, 2007, TYPE: Joël Lodé n°2007-01 (*G. Pino 1744)* (**HOLOTYPE: USM216437**).

The native Quechua name of ***A cordillerensis***, is "Killiw" in Huascoy, Huaral.

Distribution:

Peru: Dpt. Lima, Prov. Huarochirí: all along the main road from Surco (2160m. in alt.), city of Matucana, up to crossing the city of San Mateo (3700 m. alt.); Prov. Huaral, Dist. Atavillos Alto. Valle del Río Chancay, Road from Acos to Pacaraos; Prov. Canta. Dist. Canta, Road to Lachaki; Dpt. Huánuco, Prov. Ambo: Huancahuasi (2100-2200m. in alt.) Ferreyra 6908, USM 214784; Dpt. Ancash, Prov. Bolognesi: Cerro Chacchash, near Chiquián (3260m alt.) Cerrate 348, USM 125066; Prov. Yungay, Mancos, Callejón of Huaylas, E. Smith 4885, USM 186724; Dpt. Junín: Rio Mantaro (between Huancayo-Ayacucho); Dpt. Piura: Ayabaca; Dpt. Cuzco: Urubamba, Moray, Salinas, Maras, Lucre-Huacarpay; Dpt. Huancavelica; Dpt. Ayacucho; Dpt. Cajamarca, Prov. Cajamarca: Cajamarca-Chilete road, 5Km of Cajamarca, on rocky hillside 45° growing together with *Peperomia dolabella* Rauh & Kimnach, *Peperomia nivalis* Miq. and *Matucana aureiflora* Ritter, 07°12'15S 78°30'24W(2970 m. alt.) G.Pino 203.

Ecuador: coastal zone, desert and inter-andine semi-desert (0-500 m and 1500-3500 m. alt.), Prov. of Azuay, Bolívar, Cotopaxi, Imbabura, Los Ríos, Pichincha. Chota, Guayllabamba, Potato, Yunguilla-Jubones, Malacates y Vilcabamba, Chanchán, León, Valley of Catamayo, Cerro Ahuaca 2 km of Cariamanga, Prov. Loja, 2000-2480m. Considered as introduced and grown. Together with *Schinus molle, Acacia macracantha, Caesalpinia tinctoria, Opuntia spp.*

Colombia: Via de Leiva, Dpt. Boyaca (Van der Meer & Xhonneux pers. comm. 2007).
Bolivia: presence is confirmed.
Vénézuela: suspected but presence unconfirmed.

• DESCRIPTION

Plants acaulescent, commonly suckering, rosettes 2-2.5 m × 2.5-3.5 m. Leaves erect, ascending, generally not reflexed, 120-180 × 17-21 cm; glaucous-gray to bluish, typically cross-zoned, elongated to lanceolate, slightly shrunk near the base, canaliculate, smooth to slightly rugose, stiff; margins nearly straight, armed, teeth single on a flattened bulb, 3-7 mm, 10-47 mm apart, black; terminal spine dark brown to blackish, subulate, 2-3 cm. Scape 8-10 m. Inflorescences paniculate, not bulbiferous (not observed), with 20-45 acuminate triangular bracts 6-10 cm wide at the base, 2-3-5 cm wide in the middle x 17-40 cm long, erect, then reflexed; with 14-20 umbellate lateral branches, dividing into a fork 3 (4), typically curved downwards, but forming a loop, thus allowing the flowers to be upright. Flowers erect, 7.5-8.5 cm; pedicel 14-16 mm with a triangular bract of 5-8 mm, perianth green emerald, erect lobes, 23-28 mm, 4-6 mm wide on the base, 4 mm wide in the middle, yellow to orange; stamens long-exserted; filaments inserted above mid perianth tube at 11-13 mm from the base, erect, greenish-yellow, 5-7 cm; anthers dull green, 20-28 mm; ovary 23-28 mm, pistil tubular 5-7 cm, diam 1.5-2 mm, light green, stigma trilobed, 2-3 mm diam.. Capsules short-pedicellate, oblong to clavate, 60-80 mm long and 28-35 mm large, apex rounded. Perianth remains quickly falling. Seeds shiny black, (6) 8-10 mm.

• DISCUSSION

A recently described species is not necessarily an unknown species! Actually, the plant is probably grown in many botanical gardens and private collections all over the world, under the erroneous name of ***Agave americana*** or its variety ***expansa***. Only the inflorescence can allow a correct identification.

The description of ***Agave americana*** is to be reconsidered, because it may include characteristics of the Peruvian plants mistaken for ***Agave americana.***

On the other hand, according to the geographic conditions, ***Agave cordillerensis*** can vary in size: according to Cerrate (1988), rosettes measure hardly 2 m of diam. at 3800 m in alt., while the plants of the coastal zone can exceed 3 m. in diam. It was observed at about 4000 m (Middendorf, 1974), as spontaneous plants (wild) on the side of mountains, together with Bromeliads).

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Thanks:
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NB. Please note that only the protologue in Spanish refers to the description of the species.

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Guillermo Pino, specialist of Peperomias, picturing ***Peperomia nivalis*** v. ***lepidophylla*** in habitat, San Jerónimo de Surco, Peru (photo : J.L.).

Joël Lodé and ***Agave cordillerensis*** in habitat, San Jerónimo de Surco, Peru (photo : M. Canales Azabache.).

COMPARATIVE TABLE
between ***A. americana, A. a.*** var.. ***expansa & A. cordillerensis***
(J. Lodé & G. Pino, 2007)

	A. americana L.	***A. americana*** var. ***expansa***	***A. cordillerensis***
Trunk	acaulescent or short	with a short trunk	*acaulescent*
Leaves	erected, some tipically bent	erected	*recurved towards outside*
	lanceolate to narrowly obovate	lanceolate-acuminate	*lanceolate*
	flattened	sometimes canaliculate	*always canaliculate*
	sometimes cross-zoned	cross-zoned	*always cross-zoned*
	light green to glaucous grey	light green to glaucous grey	*greyish-blue*
Foliar Margin	straight to almost undulate	straight to crenulate	*almost straight to undulate*
Marginal Teeth	5-10 mm	5-8 mm	*3-7 mm*
	directly on margin	on a prominent bulb	*on a flattened bulb*
Terminal Spine	conical or subulate, 2-6 cm	conical, 2-3 cm	*subulate, 2-3 cm*
Stem of the inflorescence	erected	erected	*typically bent to hanging down*
Bracts of the inflorescence	triangular 5-15 cm	triangular 10-15 cm	*triangular-acuminate 17-40cm*
Branches of the inflorescence	horizontal	horizontal	*forming a loop*
Flowers	anthers yellow 30-36 mm	anthers pale yellow 28-32 mm	*anthers greenish 20-28 mm*
	filaments 60-90 mm inserted at 5-10 mm from the base	filaments 65-70 mm inserted at 8-9 mm from the base	*filaments 50-70 mm inserted at 11-13 mm from the base*
	ovary 30-45 mm	ovary 35-40 mm	ovary 23-28 mm
Capsules	obovate with pointed apex	no capsules, viviparous	*club-shaped with rounded apex*
Perianth dry on capsules	persisting		*quickly falling off*
Seeds	6-8 mm		*8-10 mm*