pachanoi & vilca at Vilcabamba, Ecuador
Photo by **Hubbie Smidlak**

A recent addition.

Olabode Olufunmilayo Ogunbodede *et al*. 2010

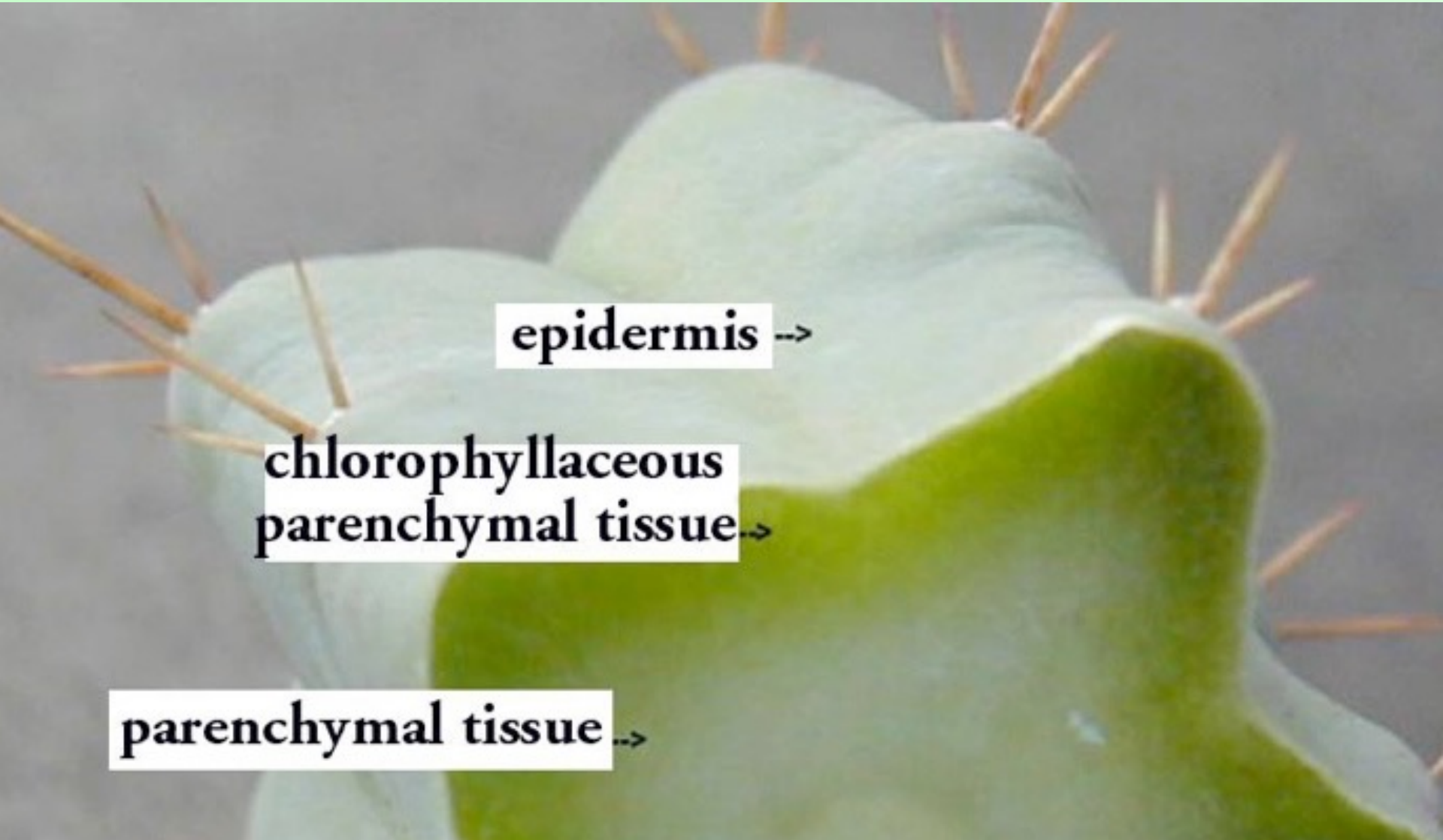
"New mescaline concentrations from 14 taxa/ cultivars of *Echinopsis* spp. (Cactaceae) ("San Pedro") and their relevance to shamanic practice"

131 (2): 356–362.

Differences in both results and procedures are common between published analytical accounts -- making direct comparisons difficult at best.

Ogunbodede wanted to be able to make direct comparisons wherever it was possible.

For that reason he only analyzed the outer green layer and tried to revisit what had been previously reported in Peru.



Analyzing only outer green dried tissues is commonly done to reduce problems from abundant mucilage.

Guillermo Cruz Sánchez was the first to use it for San Pedro analysis, in the 1940s.

It is also common in commercial dried cactus flesh.

Trichocereus bridgesii

AKA *Echinopsis lageniformis*

- **0.56% mescaline**
  Using dried outer green tissues.
  La Paz, Bolivia
  Serrano 2008

- **>0.25% mescaline**
  Dried whole plant.
  Horticultural in Europe
  Agurell 1969


bridgesii in California


bridgesii
in California

Trichocereus bridgesii

- **0.18% mescaline**

Using dried outer green tissues.
Horticultural California

Ogunbodede *et al.* 2010


bridgesii cv SS02

Monstrose *Trichocereus bridgesii*

- **0.48% mescaline** Using dried outer green tissues. Horticultural California Ogunbodede *et al.* 2010

Trichocereus bridgesii

- Bioassay accounts often report more potency than is suggested by the published literature.
- Bioassay accounts are more variable in horticulture than with wild plants.

- Anecdotal claims exist suggesting interaction with some additional active component; possibly an MAOI.

  This is not supported by the published literature but also does not appear to be examined yet.

Trichocereus pallarensis

- **0.47% mescaline**
  Using dried outer green tissues.

Trichocereus pallarensis
FR676 adult


Trichocereus pallarensis
FR676

Trichocereus puquiensis

- **0.11% mescaline**
  Incuyo, Parincochas,
  Ayacucho, Peru
- **0.13% mescaline**
  Chumpi, Parincochas,
  Ayacucho, Peru
- **0.28% mescaline**
  Chaviña, Lucanas,
  Ayacucho, Peru
- **0.50% mescaline**
  Vado, Lucanas,
  Ayacucho, Peru

Serrano 2008 &
Cjuno *et al*. 2009

All using dried outer green tissues.

Trichocereus puquiensis

- **0.13% mescaline**

Using dried outer green tissues.

Clone was collected "*across canyon from*" Pachan, Ayacucho Dept., Peru.

Ogunbodede *et al*. 2010

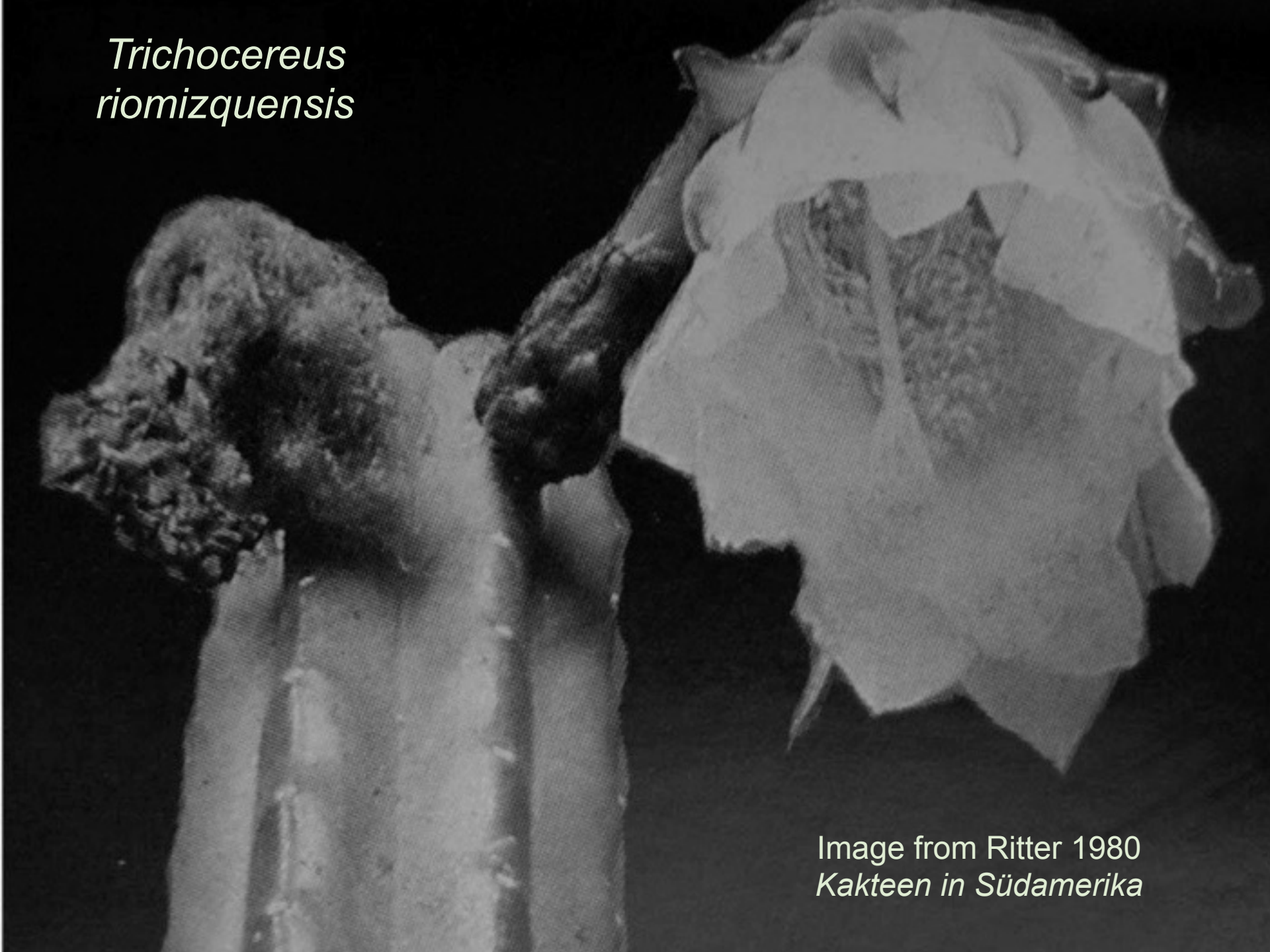

Trichocereus
puquiensis
PCH1256A


Trichocereus puquiensis
PCH1256A

Trichocereus riomizquensis

- **0.40% mescaline** Using dried outer green tissues. Grown from Ritter's FR856 seed by NMCR. Ogunbodede *et al.* 2010


Trichocereus
riomizquensis


Trichocereus riomizquensis
Image from Ritter 1980
Kakteen in Südamerika

Trichocereus scopulicola

- **0.85% mescaline**
  Using dried outer green tissues.
  Grown from FR991 seed by NMCR (acquired from Rivière De Caralt.)
  Ogunbodede *et al.* 2010


Trichocereus scopulicola


Trichocereus scopulicola
Photo by Bit

Trichocereus santaensis

- **0.31% mescaline** Mancos, Yungay, Ancash, Peru Cjuno et al. 2009
- **0.32% mescaline** OST 92701 seed, Santa Valley, Ancash Dept., Peru Ogunbodede *et*

Trichocereus santaensis

OST 92701

Trichocereus uyupampensis

- **0.053% mescaline**
  Using outer green tissues.
  Grown from a Backeberg clone via Monaco.
  Ogunbodede *et al.* 2010

Trichocereus uyupampensis

Trichocereus uyupampensis

Trichocereus peruvianus

- **0.25% mescaline**
  Using dried outer green tissues.
  Chavin de Huantar, Huari, Ancash.
  Cjuno *et al*. 2009

Cacti at Chavin de Huantar
Photographer not known - shared by Michael Smith

Trichocereus peruvianus

- **0.0% mescaline**
  Djerassi *et al.* 1959
  Provided with Peruvian material by Dr. Rama Ferreyra of the Museo de Historia Natural “Javier Prado”, Lima, Peru.
  Djerassi’s assay was flawed with regards to mescaline but he found his sample to be completely devoid of any alkaloid.

- **0.0% mescaline**
  Agurell 1969b
  Analyzing European nursery stock.
  Agurell reported tyramine to be present as the major alkaloid.
  Agurell would **not** have missed even traces of mescaline.

Both accounts analyzed the whole plant not just outer

Trichocereus peruvianus from Matucana, Peru

- **0.817% mescaline**
  Using dried intact plant.
  KK242 seed grown by Abbey Garden in California.
  Pardanani *et al*. 1977
  This was the last report of useful concentrations of mescaline from a new species for around three decades.

- **0.24% mescaline**
  Using dried outer green tissues.
  K242 obtained from Karel Knize as a living clone and grown in southern USA.
  Ogunbodede *et al.* 2010


Trichocereus peruvianus
KK242


KK242 mother plant
Photo by Anonymous


Trichocereus peruvianus
at Matucana, Peru
Photo by Grizzly

KK242 is widely asserted to be inactive.

This is based on anecdotal bioassays.

Many, perhaps even most, seed-grown KK242 appear to be *cuzcoensis*.

If even a single seed drying lot in Knize's hands became mislabeled many thousands of plants would appear worldwide.

This says nothing about KK242 outside of those seed grown plants.

It's worth considering that both Agurell & Djerassi found no mescaline in their *peruvianus* specimens.

Pachanoi also has two accounts reporting 0.0%.

We will probably never know with any certainty what happened.

We do know that the *peruvianus* KK242 Karel Knize sells as live cuttings is never *cuzcoensis*.

It is also clear the *peruvianus* in the Matucana area are quite active.


Trichocereus cuzcoensis
collected near Cuzco


Trichocereus cuzcoensis
collected near Cuzco

Trichocereus cuzcoensis

- **0.0% mescaline** Cotaruse, Arequipa, Peru
- **0.0% mescaline** Huacarpay, Cuzco, Peru
- **0.0% mescaline** Huaytampo, Cuzco, Peru
- **0.0% mescaline** Capacmarca, Cuzco, Peru

Using dried outer green tissues.
Serrano 2008

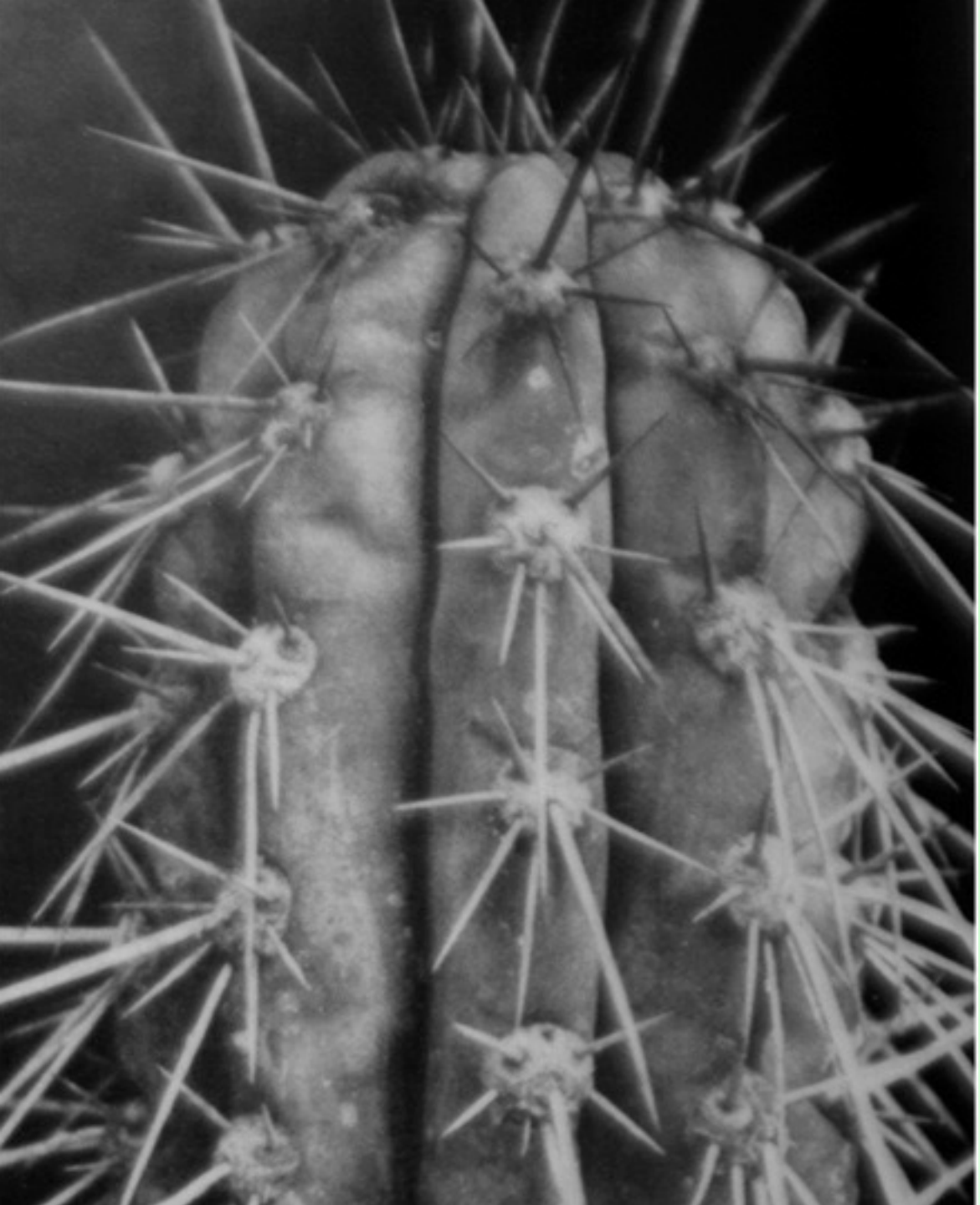
If only everything was that simple.

Trichocereus cuzcoensis

- Between 0.05-0.5% mescaline by dry weight was reported from commercial German nursery material in Agurell *et al*. 1971b.

- Mescaline was also identified but not quantified in Lindgren *et al*. 1971.
  This too looked at European nursery stock.

Trichocereus cuzcoensis collected near Cuzco

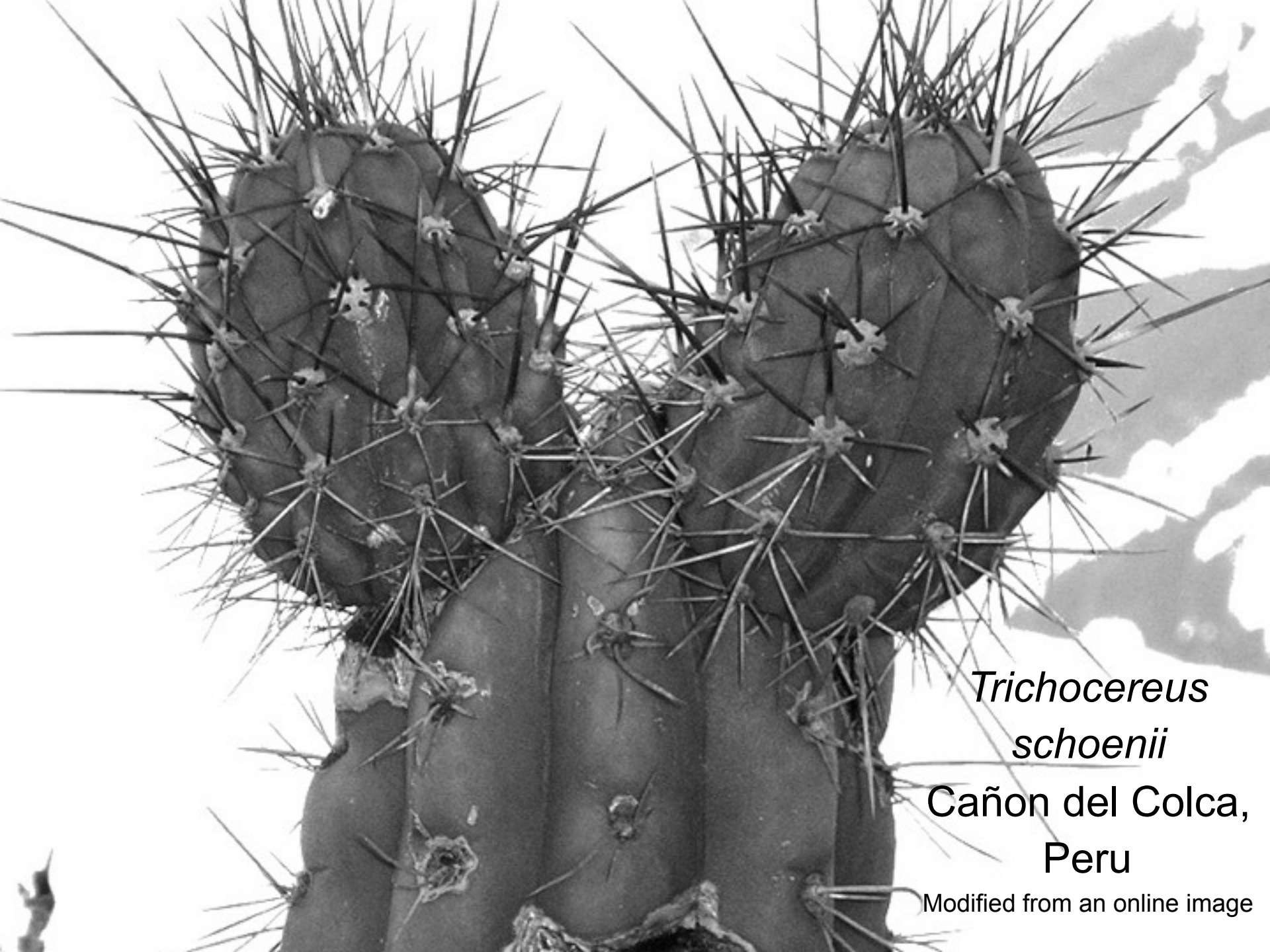


Trichocereus schoenii

from

Rauh's 1958 original description

The name *schoenii* is now discarded due to being lumped as a synonym of *cuzcoensis*



Trichocereus schoenii

Cañon del Colca, Peru

Modified from an online image

Trichocereus schoenii

Cañon del Colca, Peru

Modified from an online image

Trichocereus schoenii

- **0.22% mescaline**
  Cotahuasi, La Unión, Arequipa, Peru
- **0.20% mescaline**
  Pampacola, Castilla, Arequipa, Peru
- **0.14% mescaline**
  Huambo, Arequipa, Peru

  Serrano 2008 & Cjuno et al. 2009

- **0.24% mescaline**
  Cotahuasi, La Unión, Arequipa, Peru
- **0.20% mescaline**
  Pampacola, Castilla, Arequipa, Peru

  Cjuno et al. 2007

Everything on this page analyzed dried outer green tissues.


Trichocereus schoenii
growing at
Cañon del Colca
Photo by Grizzly

Trichocereus pachanoi

The most well-known San Pedro

Compared to the other mescaline containing *Trichocereus* species, *Trichocereus pachanoi* has many analytical reports in the literature.

With almost as many different reported results.

Peruvian *Trichocereus pachanoi*

- **1.2% mescaline**
  Using dried whole cuttings.
  Live material from Huancabamba, Peru was provided by Claudine Friedberg.
  Poisson 1960

- **1.2% mescaline**
  Using dried outer green tissues.
  Grown from seeds collected at Huancabamba, Peru by Dick Van Geest.
  Ogunbodede *et al.* 2010

- **0.54% mescaline**
  Using dried outer green tissues.
  Grown from seeds collected at Huancabamba, Peru by Dick Van Geest. Different plant but same seed lot.
  Ogunbodede *et al.* 2010


1.2%


2
1.2%


1.2%

0.54%


0.54%

Trichocereus pachanoi in Peru

- **0.00% mescaline**
  Cataratas, Otuzco, La Libertad, Peru.

- **0.38% mescaline**
  Yanasara, Sánchez Carrión, La Libertad, Peru,

  Both using dried outer green tissues.

  Cjuno et al. 2009

Another interesting Peruvian *Trichocereus pachanoi*

- **0.82% mescaline**
  Using dried outer green tissues.
  From the canyon of the Rio Marañon, Chagual, Huamachuco, La Libertad, Peru.
  Collected by Paul Hutchison, Jerry Wright & Richard Straw as PCH *et al*. 6212.

  Ogunbodede *et al.* 2010


PCH *et al*. 6212


PCH *et al*. 6212

Trichocereus pachanoi in Peru

- **0.00% mescaline**
  El Alisal, San Marcos, Cajamarca, Peru

- **0.45% mescaline**
  Kuntur Wasi, San Pablo, Cajamarca, Peru

- **0.94% mescaline**
  Tocmoche, Chota, Cajamarca, Peru

  All of the above were using dried outer green tissues.
  Cjuno et al. 2009

Trichocereus pachanoi in Peru

- **0.28% mescaline**
  Puykate, Ferreñafe, Lambayeque, Peru
- **0.23% mescaline**
  Moyán, San Vincente, Lambayeque, Peru
- **1.14% mescaline**
  Laquipampa, Ferreñafe, Lambayeque, Peru
  Cjuno et al. 2009

0.20% mescaline
Chinama, Lambayeque, Peru
Cjuno et al. 2007

Everything on this page performed using dried outer green tissues.

More *pachanoi* from Peru

- **0.78% mescaline**
  Dry weight using the whole plant.
  From Chiclayo, Peru.

- **1.4% mescaline**
  Dry weight using the whole plant.
  From Barranca, Peru.

  Reyna Pinedo & Flores Garcés 2001

Trichocereus pachanoi for sale at Chiclayo

Photo by Hubbie Smidlak

Trichocereus pachanoi obviously being maintained as cultivated specimens

- 0.55% Arequipa, Arequipa
- 0.80% Arequipa, Arequipa
- 0.86% Quequeña, Arequipa
- 1.13% Pueblo Libre, Lima

All of above were using dried outer green tissues.
Cjuno et al. 2009


Photo by Grizzly
pachanoi purchased
in Arequipa market

A *pachanoi*
in cultivation
at Arequipa


A *pachanoi* in cultivation in Lima
Photo by Grizzly

Previous highs and lows in Western horticulture

- **0.109%-2.375% mescaline**
  Dry weight using whole plant of 6 cultivated specimens.
  Photometric estimate of horticultural Swiss material.
  Helmlin & Brenneisen 1992

- **2.06% mescaline**
  Dry weight using whole plant .
  Average of three specimens grown in Italy.
  Gennaro *et al.* 1996

- **0.15% mescaline**
  Dry weight using whole plant.
  Commercial cuttings propagated in California.
  Pummangura *et al*. 1982a

Trichocereus pachanoi

cv. Juuls Giant

- **1.4% mescaline**
  Using dried outer green tissues.
  Ogunbodede *et al.* 2010

The original Juul's Giant mother plant growing in the remnants of Tom Juul's cactus garden

Prior gc-ms of Juul's Giant by Sasha also exist. None of them were quantified or published.

Alkaloid composition and content appeared to be highly variable from one sample to the next.

Regarded by some familiar cultivators as a "*woman's plant*" and "*moon medicine*".

Many users have reported a more robust experience than they believed would result from mescaline alone.


Juul’s Giant
this
not this

Peruvian *Trichocereus pachanoi* Previous highs and low

- **5% mescaline**
  Dried outer green tissues only - based on a *T. pachanoi* in the Lima Botanical Garden misidentified as "*Opuntia cylindrica*".
  Cruz Sanchez 1948

- **4.5% mescaline**
  Dried outer tissues only - correctly identified plants.
  Gonzales Huerta 1960

- **0.9% mescaline**
  Analysis was based on a previously prepared brew made from (misidentified) "*Opuntia cylindrica*" collected in Peru.
  Turner & Heyman 1960

Another Peruvian *Trichocereus pachanoi*

- **4.7% mescaline** Using dried outer green tissues. Harvested at Matucana in Peru. Ogunbodede *et al.* 2010


Trichocereus pachanoi
from
Matucana, Peru


Trichocereus pachanoi
from
Matucana, Peru

4 important points of disillusionment concerning analytical reports

Alkaloid analysis can, at best, only say something accurate about what was actually in the chemist's hands -- at least not without additional work.
Results may or may not be referable to the entire species. Possibly not even to all of the local population.

Analysis often won’t show the same results from season to season or sometimes not even from day to day.

It is often common for observable variations from one time of the day to another time of that same day -- on a single plant.

Analysis of different parts within a single plant commonly produce different results in both composition and concentration.

If only one alkaloid composition or concentration has been reported for a cactus that usually means that it has only been analyzed one time.

So, what is the point of this then?

& what do we know from any of it?

To answer both questions:

Some people analyzed some cacti and have reported results indicating **much more work is needed**.

All we presently have is essentially nothing more than a few dozen ‘snapshots’ of those individuals that found their way into a lab with an interested researcher.

To illustrate the problem:

Consider this next image from Cochabamba, Bolivia.

This would be called *pachanoi* by almost anyone and that is likely to be correct.

Compare to the assorted images that follow.


Photo by Dani

The plants in the next slides are also all recognized as *pachanoi*.


T. pachanoi cv. '*peruvianus* Huancabamba'

Yet another *pachanoi* collected at Huancabamba, Peru.
This one entered horticulture as a clone.


A shaman’s garden
near Cuzco, Peru
Photograph thanks to
Geneva Photography

T. pachanoi in Peru
from Friedrich Ritter's Kakteen in Südamerika"


Pisac, Peru
Photograph by
Hubbie Smidlak

Parque de las Leyendas,
Lima, Peru
Photograph by Hubbie
Smidlak

Jardin Botanico
Lima, Peru
Photograph by
Hubbie Smidlak


Quito, Ecuador
Photograph by
Hubbie Smidlak

Reports exist of some *pachanoi* having a mescaline content of 0.0% with the green parts of other *pachanoi* containing as much as 5% mescaline by dry weight.

That suggests our current concept of *pachanoi* is less than helpful in this area.

Obviously there are still a lot more questions than answers.

This story could end there but hopefully it is only now finally beginning again.

There are many long-standing and new questions in need of skilled phytochemical researchers with interest.

If you have interest in this subject consider getting involved.

A few of many unresolved stories:

There are many unknowns; real and imaginary. Sometimes patterns are real and sometimes illusory. Often we don't know.

Chiclayo, Peru market
Photograph by Hubbie Smidlak

The details surrounding these cuttings remain to be uncovered.

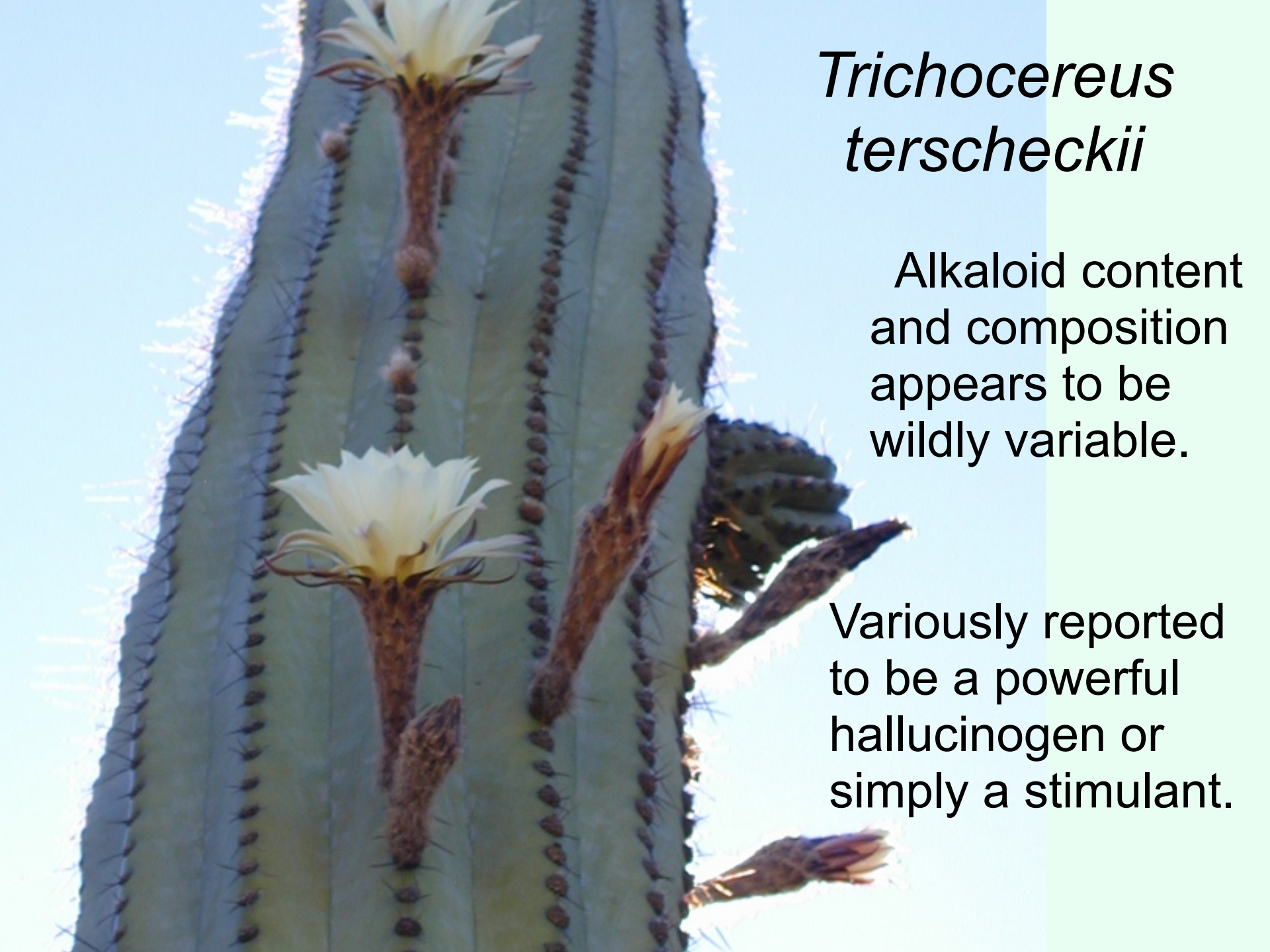
There are also the more southerly *Trichocereus* species that have barely begun to be explored by science.


Photo by Anonymous

Trichocereus taquimbalensis

Use for making a brew has been noticed by travellers in Bolivia.


Trichocereus atacamensis
has been reported to be
a potent stimulant.
Photo by Anonymous



Trichocereus terscheckii

Alkaloid content and composition appears to be wildly variable.

Variously reported to be a powerful hallucinogen or simply a stimulant.

Trichocereus werdermannianus

Commonly reported as being analogous to *pachanoi* -- with some strains being quite potent and others very weak.

Photo by Robert Schick


Trichocereus
werdermannianus

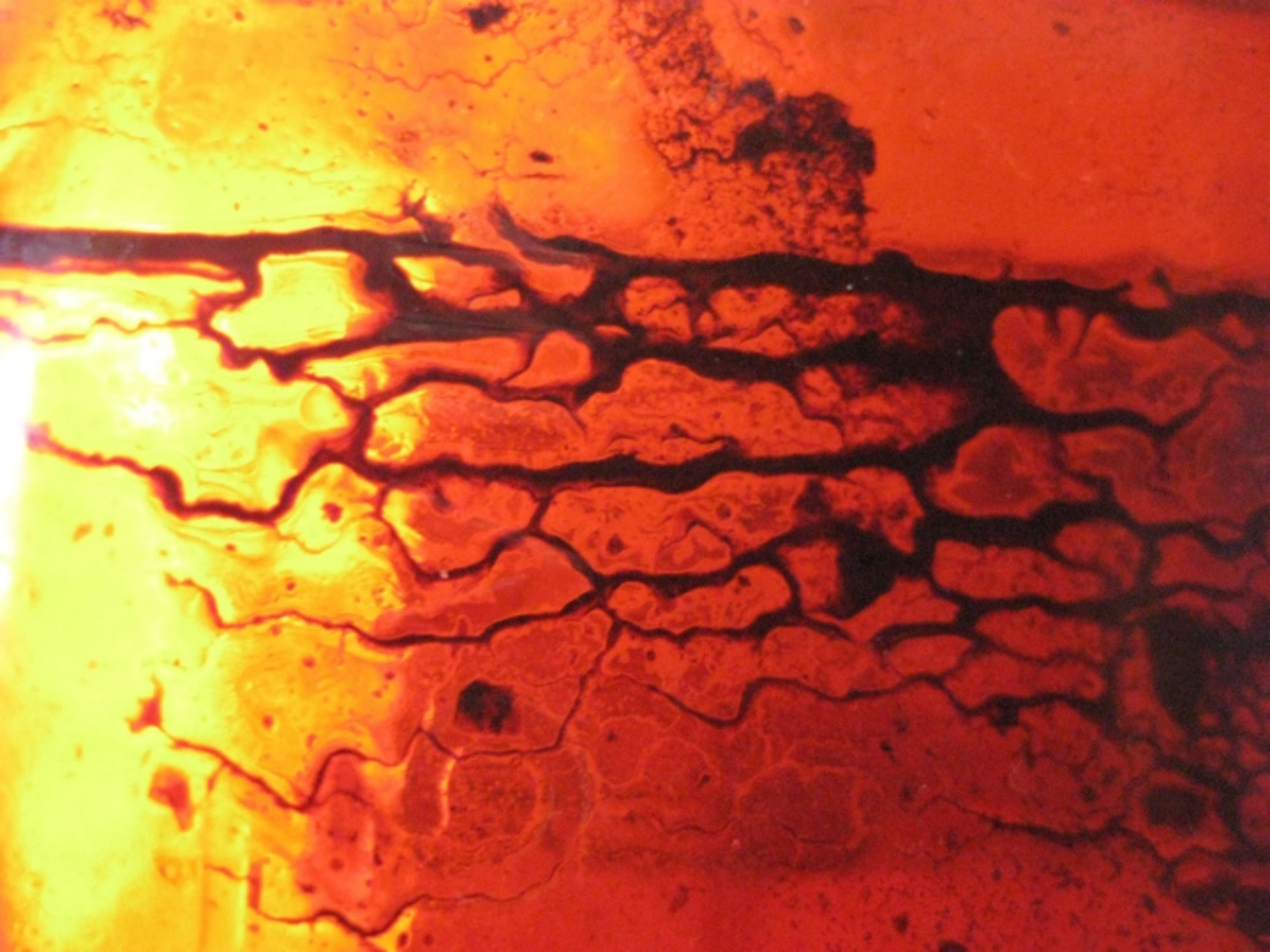
Pachycereus pringlei

This is one of three cacti the Seni people believe used to be human.

Earl Crockett was led to this species through shamanic rock art and proved its activity in human bioassay. It does not contain mescaline.

N-Methyl-mescaline is suspected of serving as its active alkaloid due to the presence of isoquinolines with MAOI activity.

Earl's Elixir & the Cardón man



Sometimes its still not clear what to believe.

"*5 tipos*" Photograph by Anonymous


Weberbauerocereus acranthus

& there is the intimate coexistence of *pachanoi* with *Anadenanthera.*

Photographs were by Trout unless credited otherwise.

References mentioned

Stig Agurell 1969a *Lloydia* 32 (1): 40-45.
"Identification of Alkaloid Intermediates by Gas Chromatography - Mass Spectrometry. I. Potential Mescaline Precursors in Trichocereus Species."

Stig Agurell 1969b *Lloydia* 32 (2): 206-216.
"Cactaceae Alkaloids I."

Stig Agurell *et al*. 1971b *Lloydia* 34 (2): 206-216.
"Cactaceae Alkaloids. X. Alkaloids of *Trichocereus* species and some other cacti."

Mihail [sic] Cjuno *et al*. 2007 *Quepo* 21: 32-38.
"Estudio de *Echinopsis schoenii*."

Mijail Cjuno *et al*. 2009 *Quepo* 23: 38-45.

"El género *Trichocereus*, Ecología y Contenido Mescalínico."

Carl Djerassi *et al. 1955 Journal of the American Chemical Society 77 (5): 1200-1203.*

"Terpenoids. XI. Investigation of Nine Cactus Species. Isolation of Two New Triterpenes, Stellatogenin and Machaeric Acid."

Guillermo Cruz Sánchez 1948 PhD Thesis; Instituto de Farmacologia y Terapeutica Universidad Nacionale Mayor de San Marcos, Lima, Peru. (pages 10-36)

"Estudio Farmacologico de la *Opuntia cylindrica* [sic]."

M. Carla Gennaro *et al*. 1996 *Analytical Letters* 29 (13): 2399-2409.

"Determination of Mescaline in Hallucinogenic Cactaceae By Ion-Interaction HPLC."

Ines Gonzalez Huerta 1960 *Revista del Viernes Médico* [Lima] 11 (1): 133-137.

"Identificación de la Mescalina Contenida en el *Trichocereus pachanoi* (San Pedro)."

Hans-Jörg Helmlin & Rudolf Brenneisen 1992 *Journal of Chromatography* 593: 87-94.

"Determination of psychotropic phenylalkylamine derivatives in biological matrices by high-performance liquid chromatography with photodiode-array detection."

Jan-Erik Lindgren *et al*. 1971 *F.E.B.S. Letters* 13 (1): 21-27.

“Detection of biochemical intermediates by mass fragmentography: Mescaline and tetrahydroisoquinoline precursors.”

Olabode Ogunbodede *et al*. 2010 *Journal of Ethnopharmacology* 131: 356–362.

"New mescaline concentrations from 14 taxa/cultivars of *Echinopsis* spp. (Cactaceae) ("San Pedro") and their relevance to shamanic practice"

Jasoda H. Pardanani *et al*. 1977 *Lloydia* 40 (6): 585-590

"Cactus Alkaloids. XXXVI. Mescaline and related compounds from *Trichocereus peruvianus*."

Jacques Poisson 1960 *Annales Pharmaceutiques Françaises* 18: 764-765.

"Présence de mescaline dans une Cactacée péruvienne."

Víctor Reyna Pinedo & José Flores Garcés 2001 *Quepo* 15: 28-37.

"El uso del "San Pedro" (*Echinopsis pachanoi*) en medicina tradicional peruana."

S. Pummangura *et al*. 1982a *Journal of Natural Products* 45 (2): 224-225.

"Cactus Alkaloids. LI. Lack of Mescaline Translocation in Grafted *Trichocereus*"

Carlos Serrano 2008 *Quepo* 22: 29-35.

"Avances en la Fitogeografía Química del género *Trichocereus* en el sur del Perú."

William J. Turner & Jack J. Heyman 1960 *Journal of Organic Chemistry* 25: 2250-2251.

"The Presence of Mescaline in *Opuntia cylindrica* [sic]."

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