San Pedro & Mescaline

by Keeper Trout

pachanoi & vilca at Vilcabamba, Ecuador

Photo by Hubbie Smidlak
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”

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

Ogunbode 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
  Ogunbode et al. 2010
Monstrose *Trichocereus bridgesii*

- 0.48% mescaline
  Using dried outer green tissues.

Horticultural California Ogunbode 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.

regrowth after sampling
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


All using dried outer green tissues.
• 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 riomizquensis

- 0.40% mescaline

Using dried outer green tissues.

Grown from Ritter’s FR856 seed by NMCR.

Ogunbodede et al. 2010
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.
  Ogunbode et al. 2010
Trichocereus uyupampensis
Trichocereus peruvianus

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

- 0.0% mescaline
  Huacarpay, 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

- 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%
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.

Ogunbode *et al.* 2010
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

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
pachanoi purchased in Arequipa market
A *pachanoi* in cultivation at Arequipa

Photo by Grizzly
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
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

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.
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
Jardín Botánico

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.
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.
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
Alkaloid content and composition appears to be wildly variable.

*Trichocereus terscheckii*

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 it's still not clear what to believe.
Clear misidentification of *Armatocereus laetus* for *Weberbaueroocereus acranthus*.
& there is the intimate coexistence of *pachanoi* with *Anadenanthera*.
Photographs were by Trout unless credited otherwise.

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For a tabular referenced summary of this information, download:

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