

*The increasing potency of
“street” cannabis*



David Potter



Cannabinoid biosynthesis and exploitation



Increasing THC levels 1995 - 2008



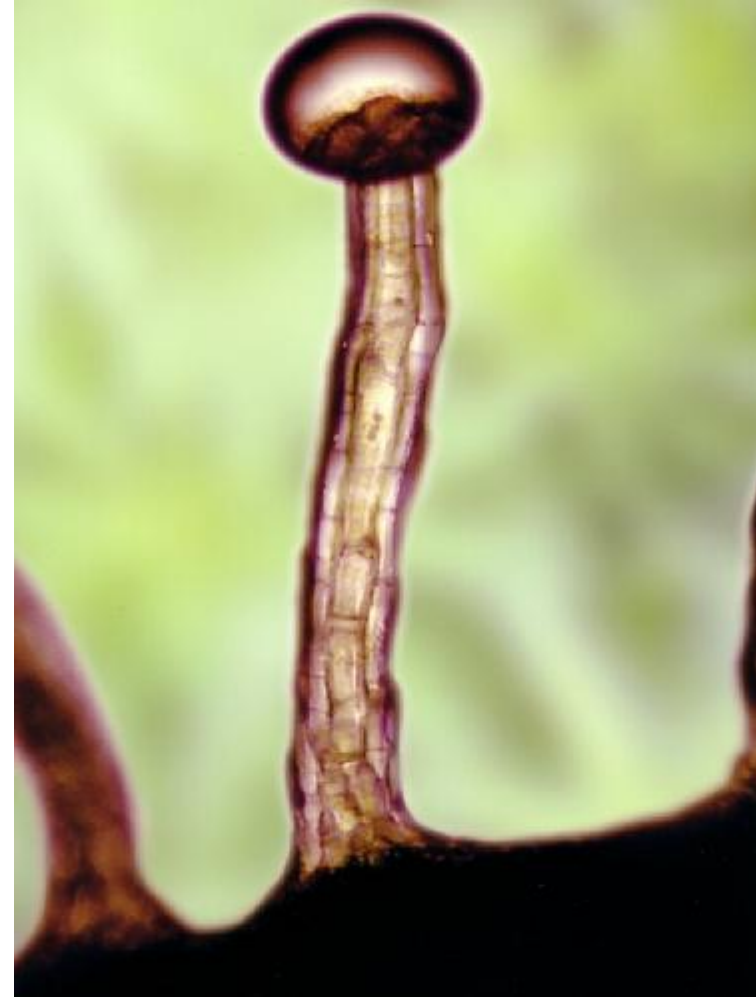
Changing cannabinoid ratios in cannabis



Modern cannabis resin – a new threat to safety?



Cannabis inflorescences appear white due to capitate stalked trichomes.



Microscope view - capitate stalked trichome.
Cannabinoids accumulate in resin head.



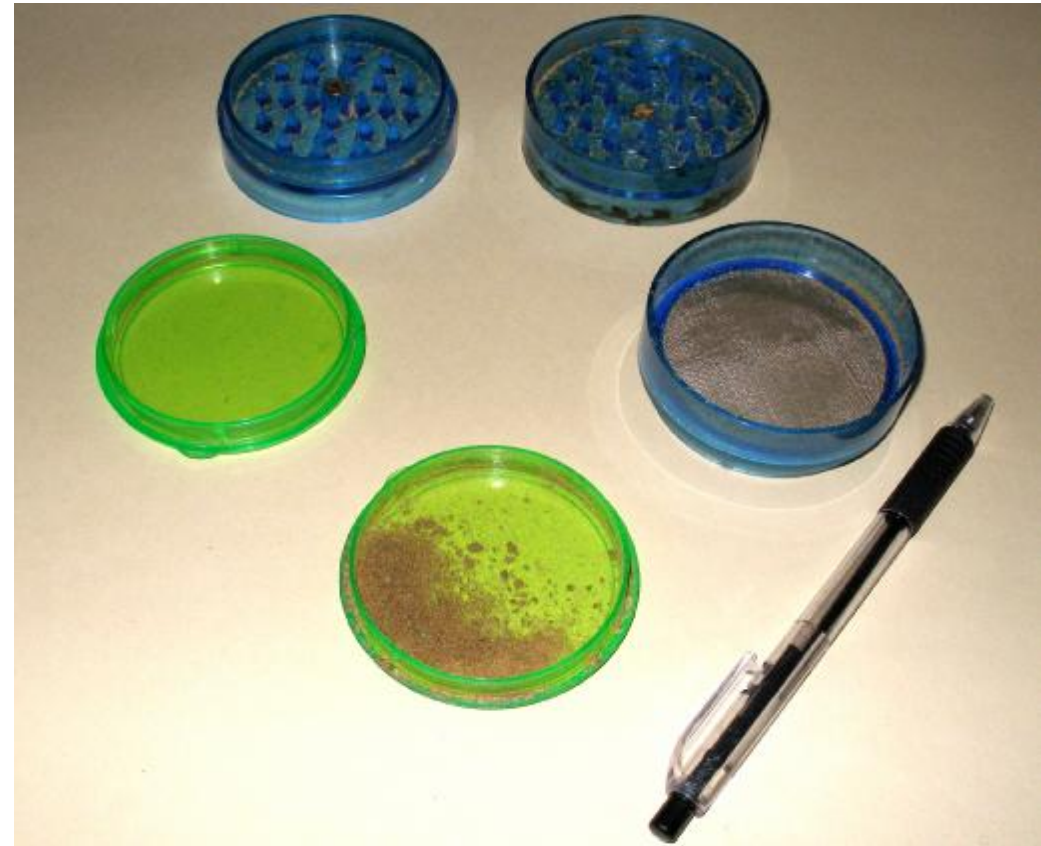
Traditional
Resin



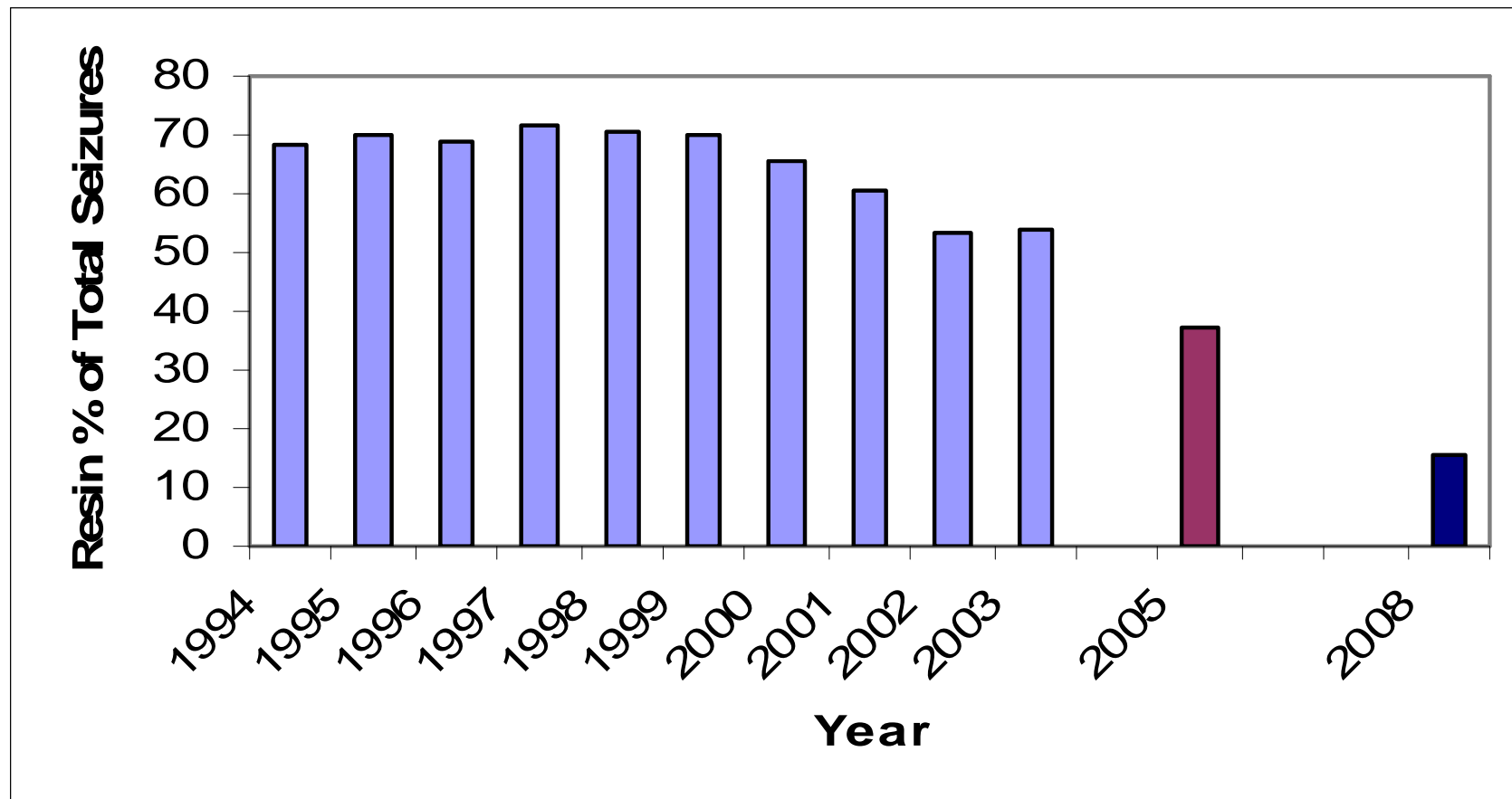
Sinsemilla
(Skunk)



Imported
Herbal



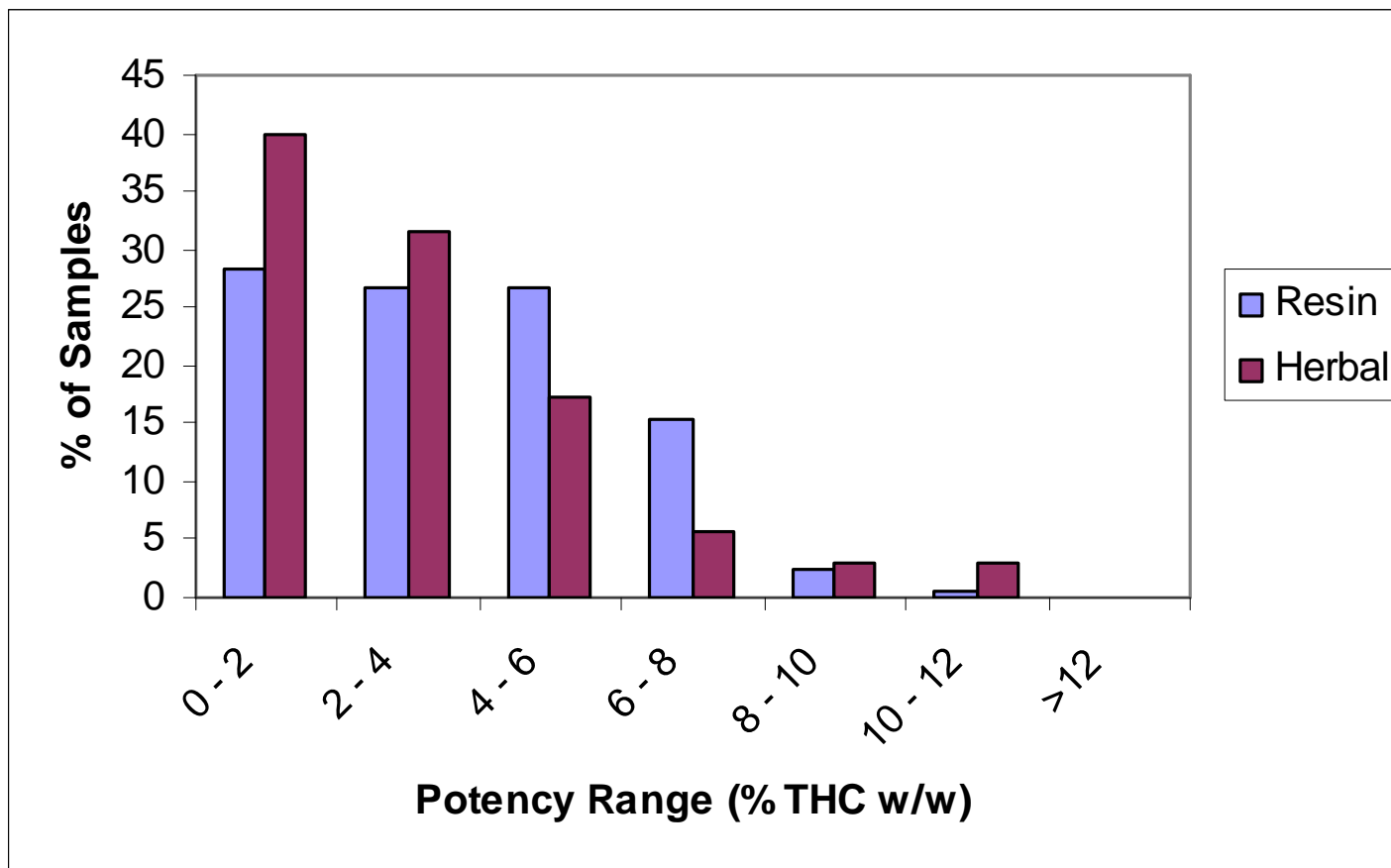
As cannabis is ground into a friable product for smoking, a powder of dislodged trichome resin heads falls through a mesh into the lower chamber.



Mwenda et al. Home Office (2005) Findings 265 - Seizures of Drugs in England and Wales 2003

Potter DJ, Clark P and Brown MB. (2008) Journal of Forensic Sciences; 53:1 90-94

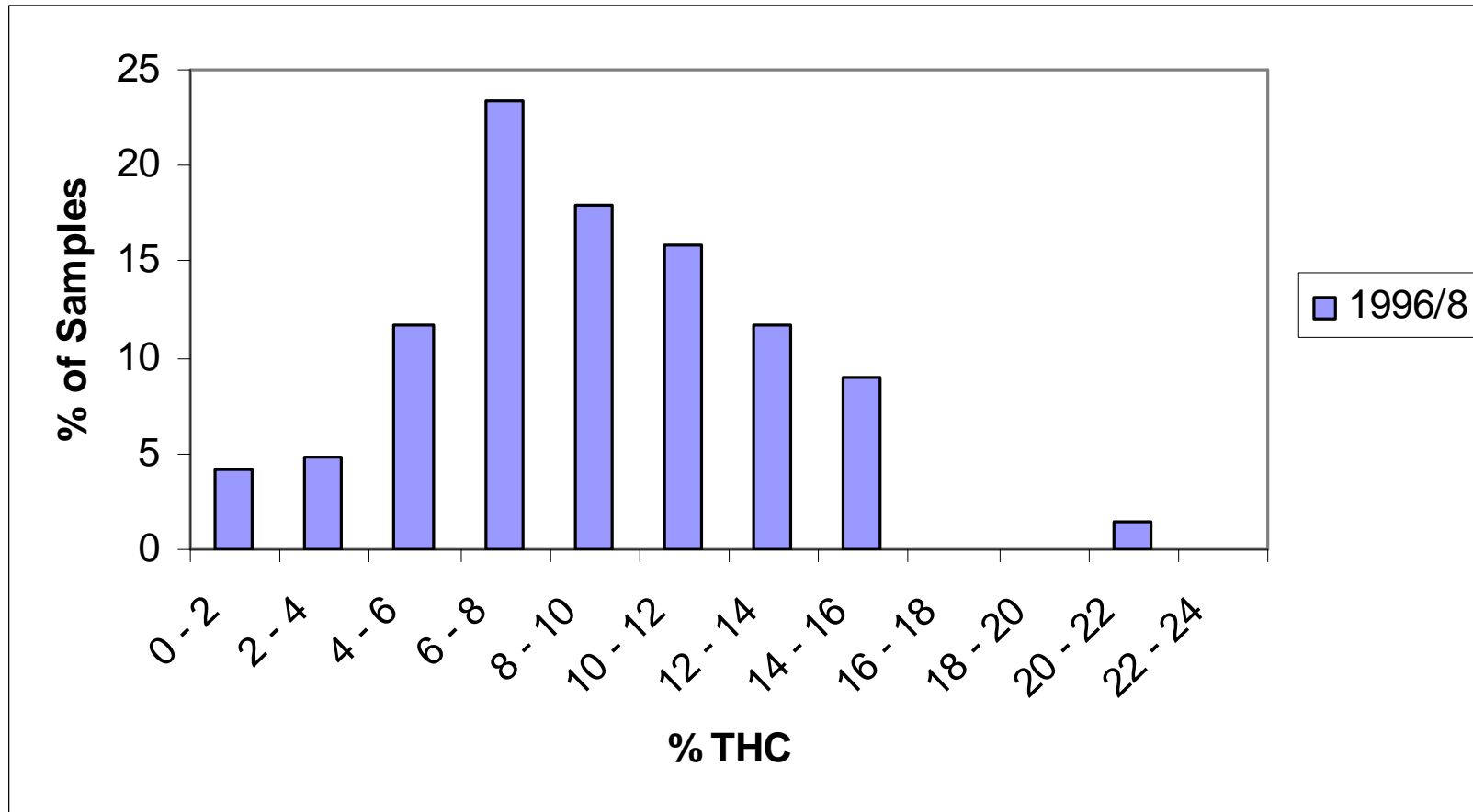
King L and Hardwick S (2008) Home Office Cannabis Potency Study



Mean THC Content of Resin 3.7% (n = 169)

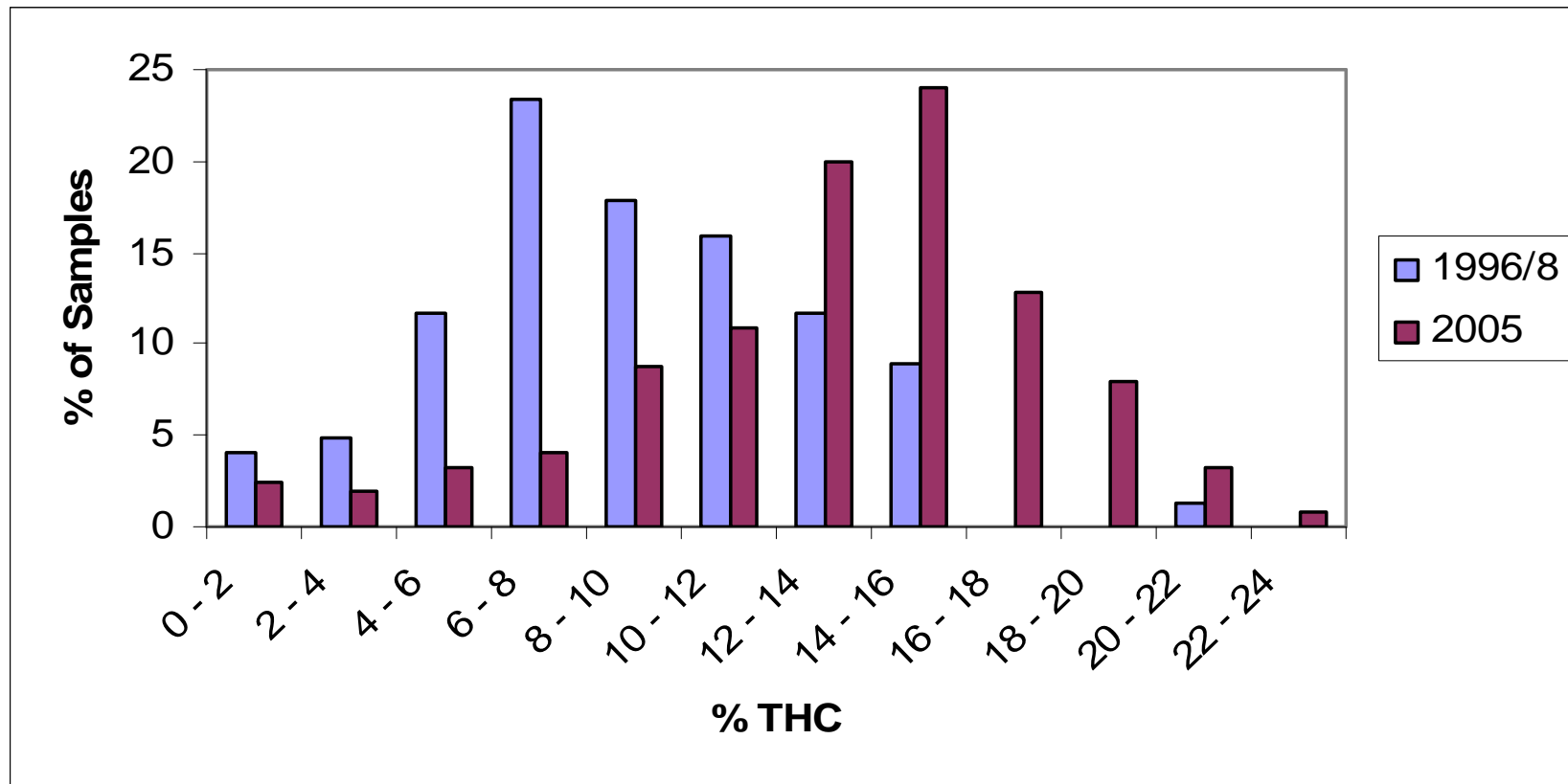
Mean content of Herbal Cannabis 3.1% (n = 35)

Potter DJ, Clark P and Brown MB. (2008) Journal of Forensic Sciences; 53:1 90-94.



King et al., 2004. EMCDDA overview of cannabis potency (n = 145).

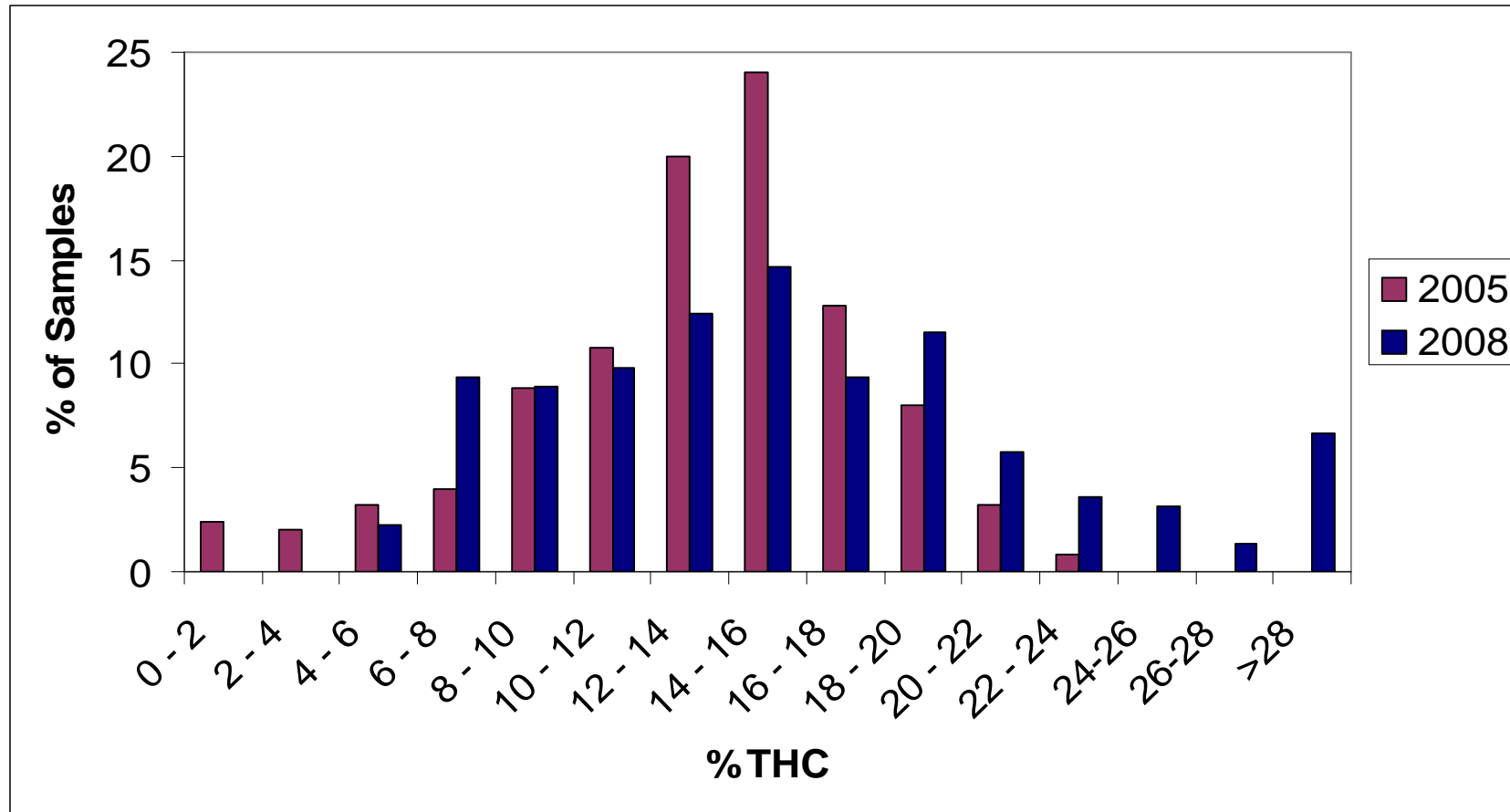
EMCDDA - European Monitoring Centre for Drugs and Drug Addiction



Significant increase in potency between samples (Wilcoxon Rank Sum Test, $p < 0.001$)

King et al., 2004, EMCDDA Overview of Cannabis Potency (n = 145).

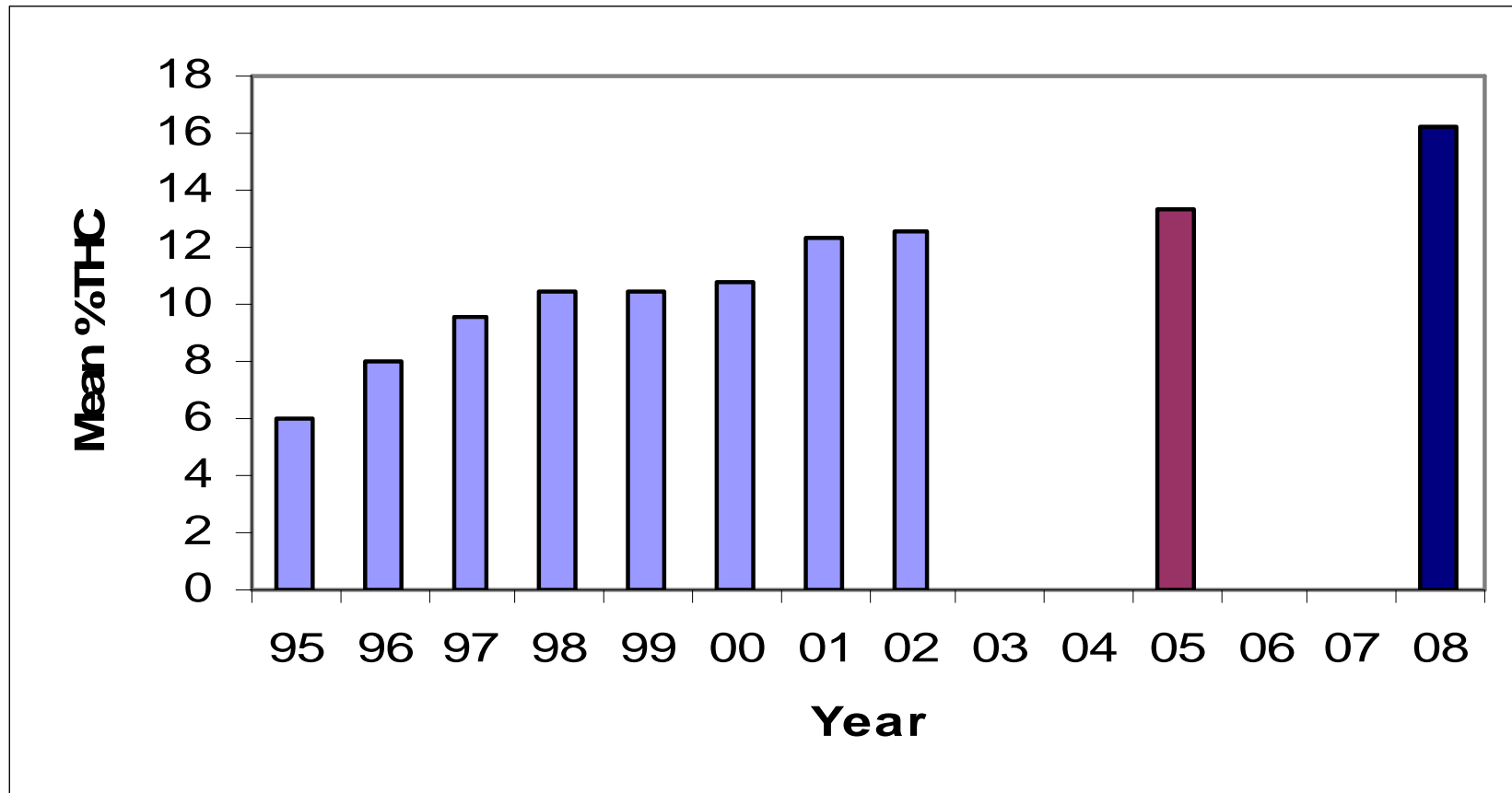
Potter et al., 2008, J Forensic Sci (n = 247).



Significant increase in potency between samples (Wilcoxon Rank Sum Test, $p < 0.05$)

Potter et al., 2005 survey (n = 247)

Home Office 2008 survey (n = 225)



1995 – 2002 King L et al., EMCCDA Survey

2005 Potter DJ et al

2008 King L and Hardwick S., Home Office Cannabis Potency Study

***“High potency cannabis products lacking CBD
have the potential to be more harmful.*”**

***More research is required to investigate how
cannabis type or variety affects clinical
disorders.”***

Smith N. (2005) (Inst. of Psychiatry, Kings College London).

“High potency cannabis: the forgotten variable.” *Addiction*, 100, 1558 - 1559

“THC is only one of a number of psychoactive chemicals in cannabis, and one, cannabidiol (CBD) in particular is believed to ‘moderate’ the effects of THC.....possibly having an antipsychotic effect.

Sinsemilla, which typically shows low levels of CBD could be changing the nature of the cannabis experience.

Where possible it would be advisable to track both THC and CBD levels in future evaluations of ‘potency’.

The emergence of ‘new cannabis’ and the reassessment of health risks.
World Drug Report 2006 Volume 2.3 p174

CBN is psychoactive, but much less so than THC

Peres-Reyes et al., 1973

THC and CBN effects are additive

Jarbe and Hiltunen 1987

CBN moderates psychoactive effects of THC

Pertwee 1998

*CBN is a natural breakdown product of THC

GPP + Olivetolic Acid

↓
CBG

Bt

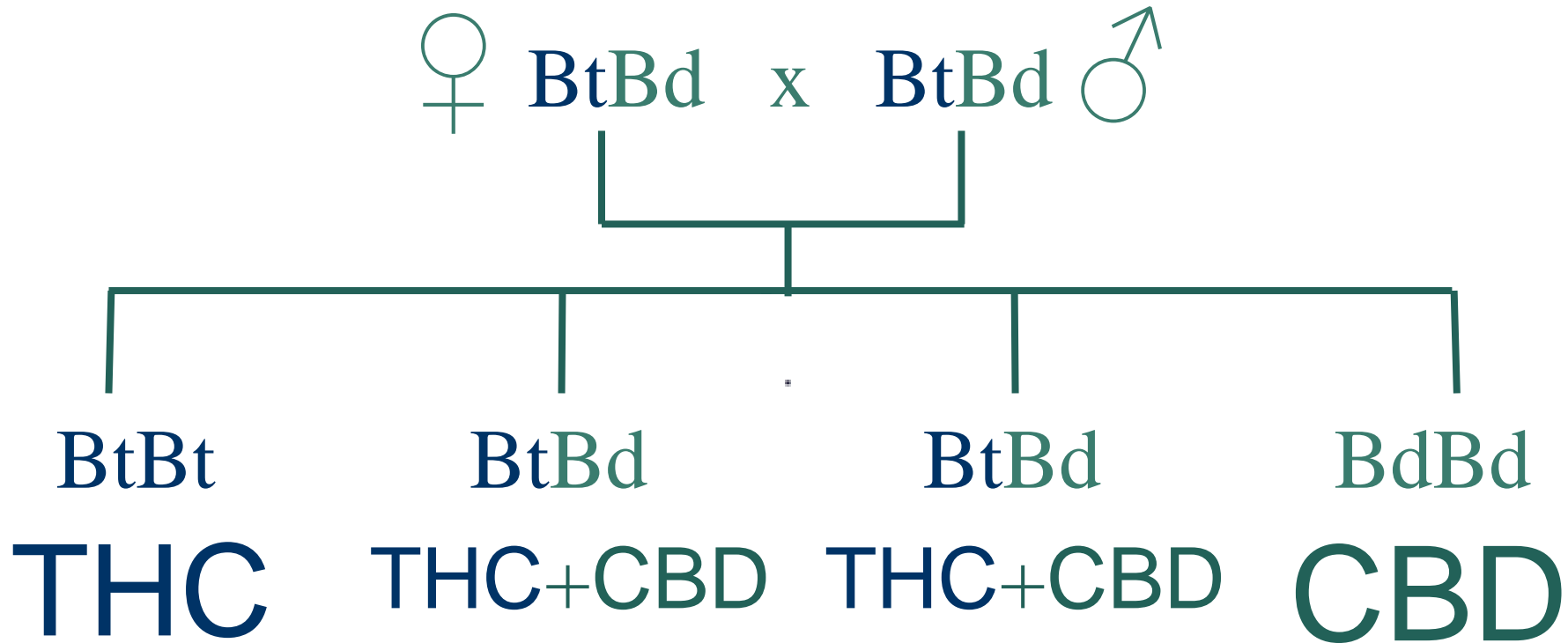
Bd

↓
THC

↓
CBD

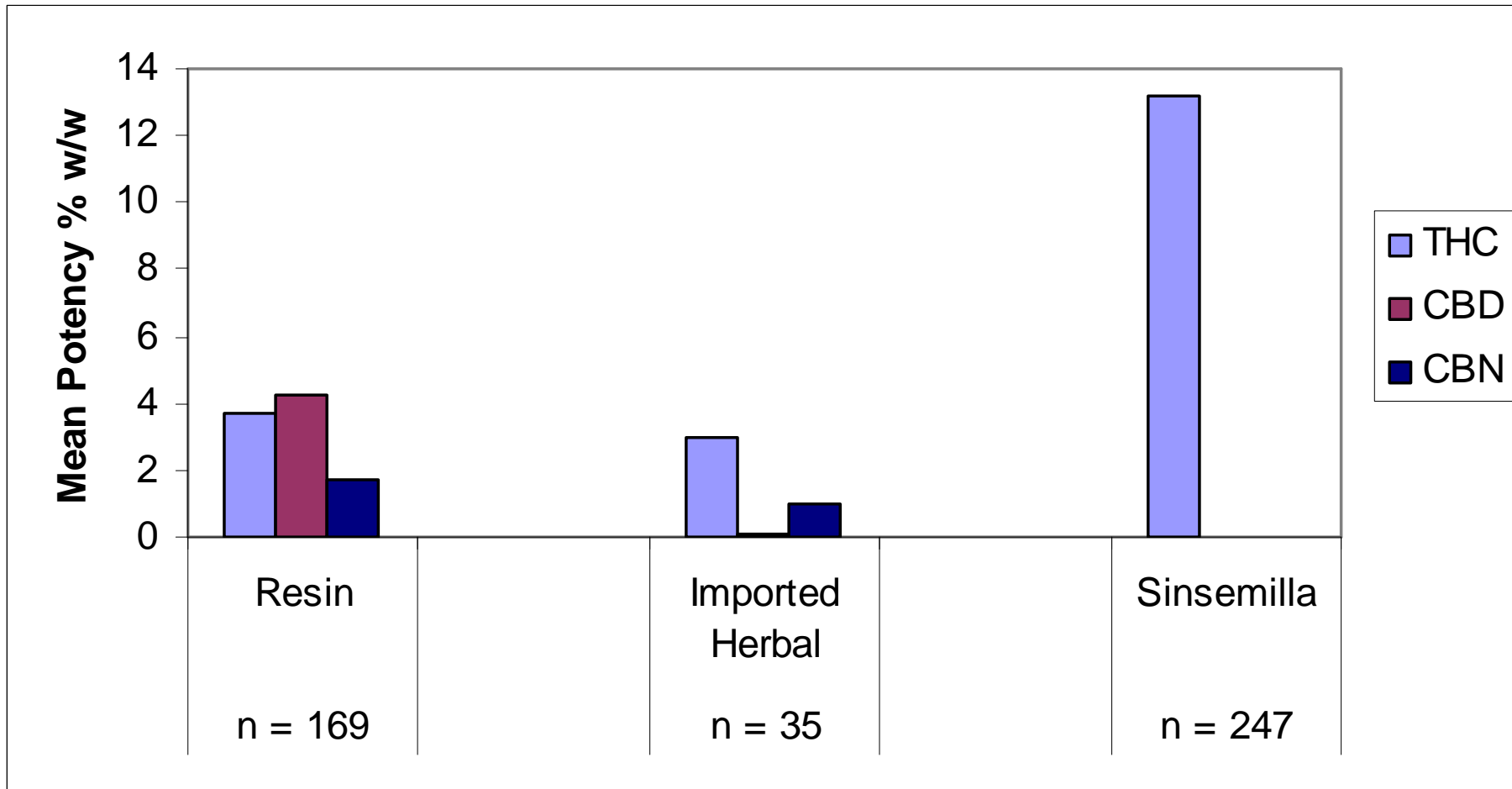
Decay

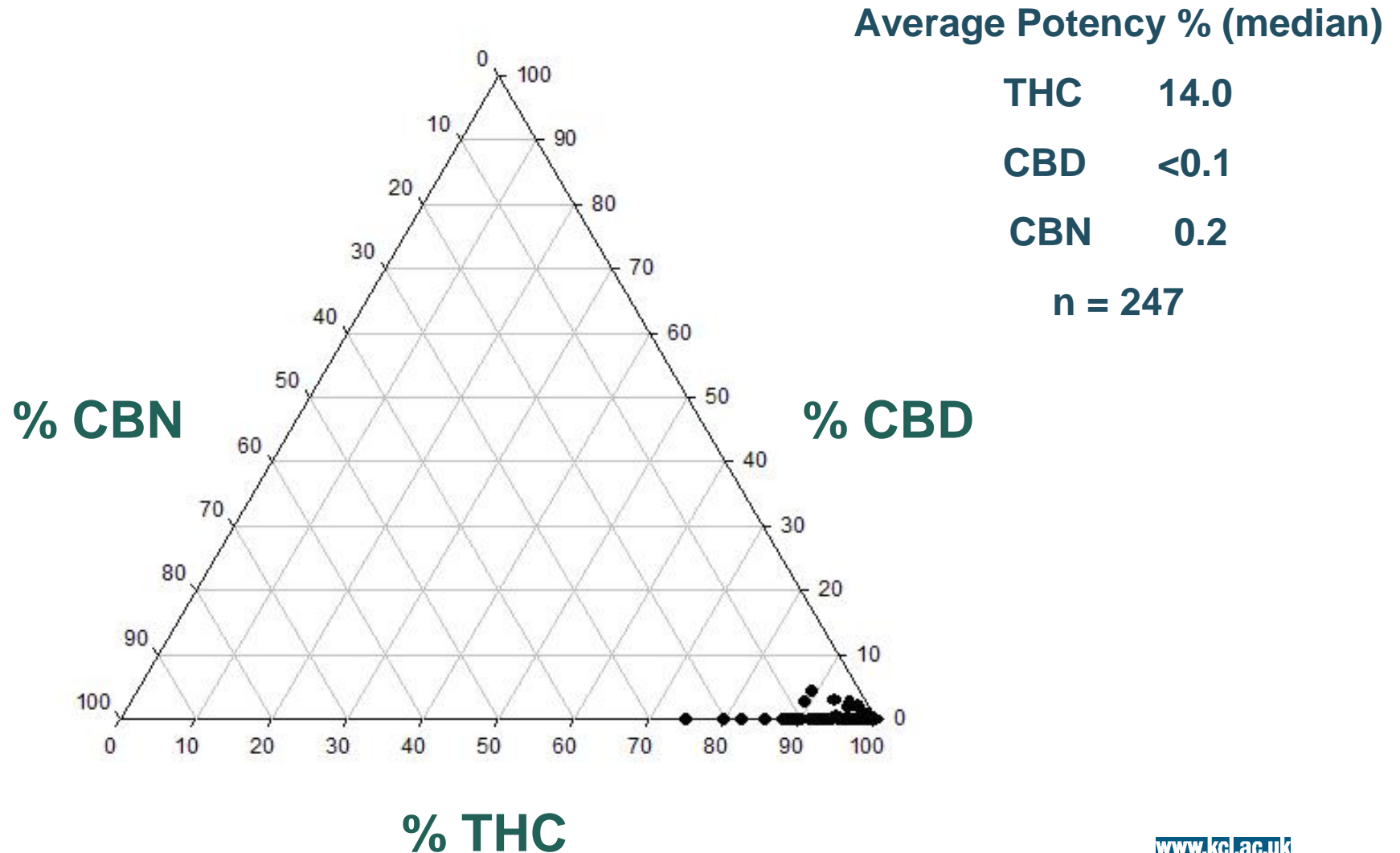
↓
CBN

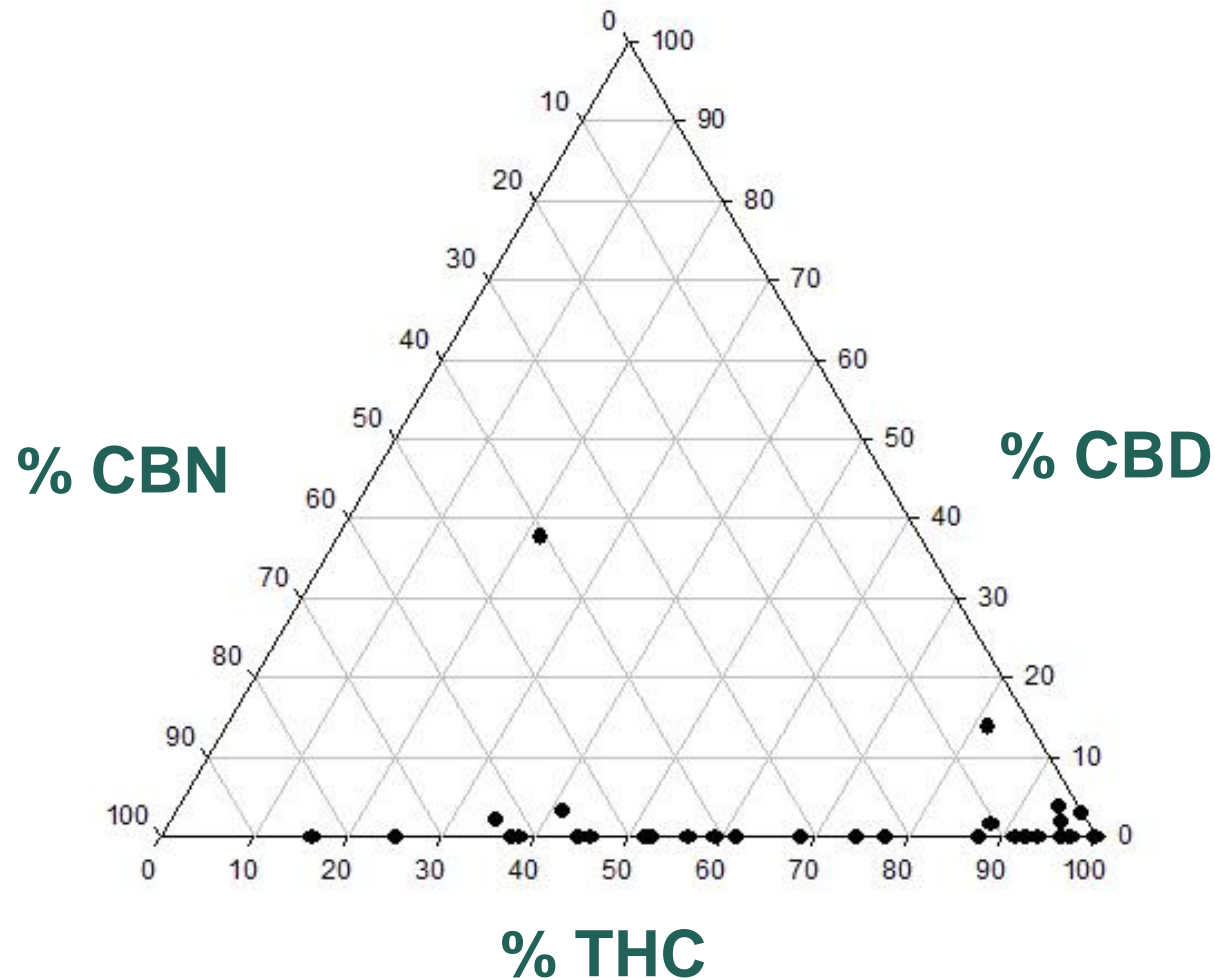


Only BtBt type is found in most sinsemilla, herbal cannabis and 'modern resin'.
All combinations are found in traditional resin.

De Meijer, E. P. M. et al. (2003). *Genetics* **163**: 335-346. Inheritance of Chemical Phenotype in *Cannabis sativa* L.







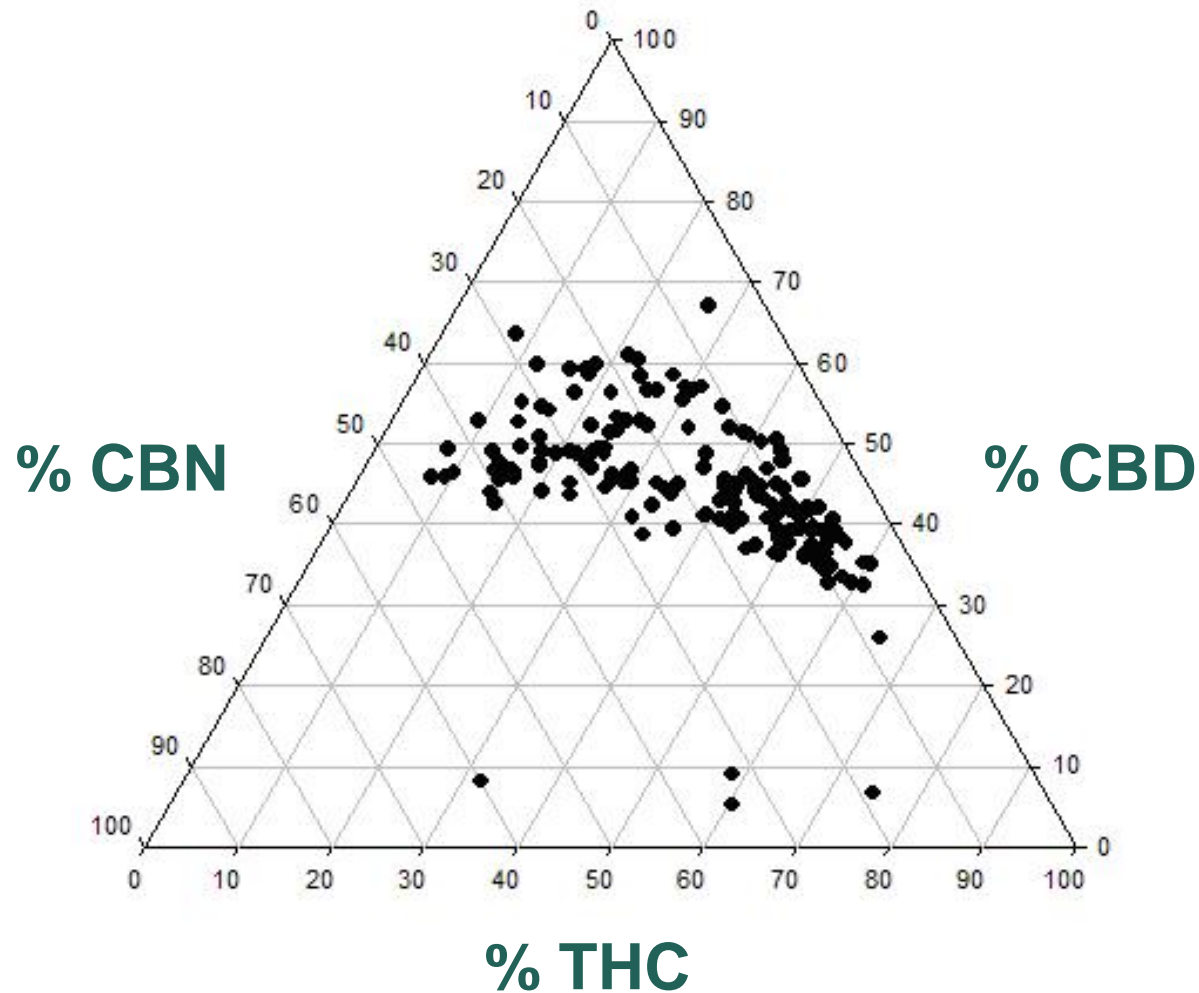
Average Potency % (median)

THC 2.1

CBD <0.1

CBN 0.6

n = 35



Average Potency % (median)

THC 3.5

CBD 4.2

CBN 1.6

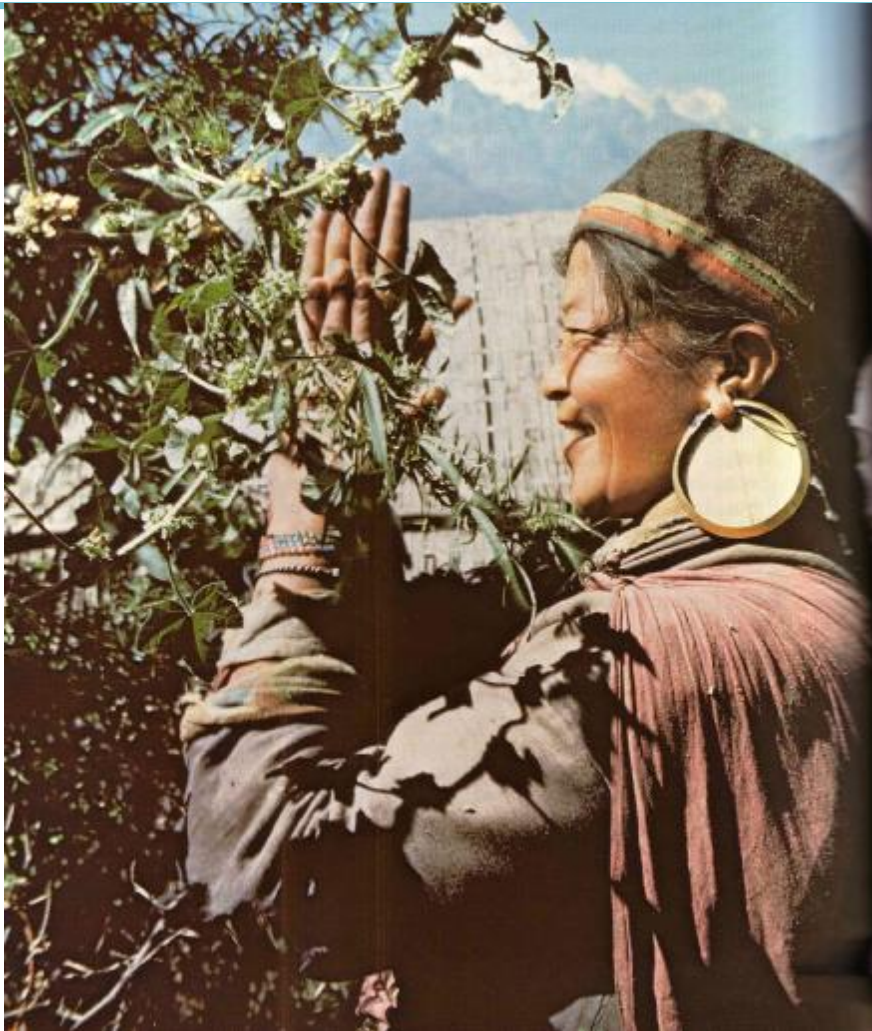
n = 169



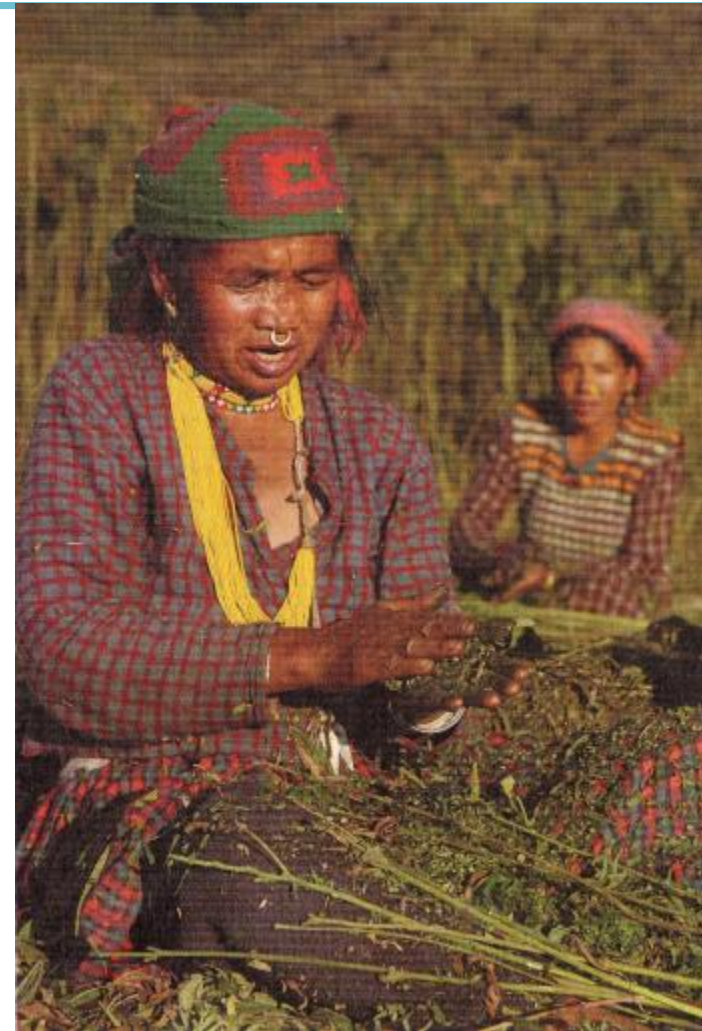
24 varieties were tested.
22 were entirely THC dominant.
2 produced a few plants with mixed THC / CBD.
Overall, 98% of plants were THC dominant



Dry cannabis inflorescences are pulverised over a fine sieve. Resultant powder is rammed into cellophane bags – nine ounces at a time – and compressed to make the 'nine bar'.



Fresh Cannabis



Partly dried cannabis (twelve hours)

Courtesy of Rob Clarke – International Hemp Association



Don't try this at home!

13 grams
(30 minutes work)





Dry Sieving.

Trichomes are removed in the rotating drum.

They then fall through the rotating sieve's outer wall.

Wet Sieving

Trichomes are removed by agitating the cannabis in icy water. The mixture is sieved.

Resin collected on the finest sieve (right) is highly potent.



		% THC	%CBD
Average - England	2005 *	4	4
Maximum - England	2005 *	11	7
Average - Imported into Netherlands	2004 **	18	8
Average - Made in Netherlands	2002 †	33	-
Average - Made in Netherlands	2004 **	39	1
UK Glasshouse 'Hand Rubbed'	2005	39	1
Powder in Herb Grinder	2005 *	43	1
Unofficial UK Forensic Maximum		59	-
Made on Police Training Course	2005	67	1

* David J Potter, Peter Clark and Marc B. Brown. *Journal of Forensic Sciences* 2008;53:1 90-94

** Pijlman et al., 2005 *Addiction Biology* **10**,171-180 † UNODC World Drug Report 2006

Traditional 'Nine Bar' versus 'Modern Resin'



230 g. 3.7% THC, 4.2% CBD

8.5 g THC, 9.7 g CBD



15 g. 58.0% THC, 0.3% CBD

8.7 g THC, > 0.1g CBD

-
- **Traditional Resin** - low potency
- varying ratios of THC, CBD and CBN
 - **Imported ‘Herbal’** - low potency
- lacks CBD
 - **Sinsemilla (‘skunk’)** - high potency
- lacks CBD
 - **Sinsemilla - increasing potency and relative popularity**
 - **THC:CBD balance in ‘street cannabis’ has shifted**
- decreasing antipsychotic CBD
- increasing psychoactive THC
 - **Modern resin may further increase UK THC levels.**

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- Chief Constables of Derbyshire, Hampshire, Kent, London Metropolitan, Merseyside and Sussex

 - Ch Insp. Philip Painter, Kent Police
-while seconded to Home Office, Government Office South East

 - Department of Pharmaceutical Research, Kings College London

 - GW Pharmaceuticals Ltd

 - CINP