

# BROADENING THE DEFINITION OF CANNABIS: AN ARGUMENT FOR SPECIATION INCLUDING INDICA AND SATIVA

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## I. INTRODUCTION

On July 24, 2014, the Illinois Department of Agriculture adopted administrative rules implementing and governing the Illinois Compassionate Medical Cannabis Pilot Program Act.<sup>1</sup> Specifically, the Department was charged with control of cultivation centers management and operation.<sup>2</sup> Cultivation Centers are facilities operated to perform those necessary activities to provide “usable medical cannabis.”<sup>3</sup> The Cannabis Control Act<sup>4</sup> defines cannabis as:

[M]arihuana, hashish and other substances which are identified as including any parts of the plant *Cannabis Sativa*, whether growing or not; the seeds thereof, the resin extracted from any part of such plant; and any compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds, or resin, including tetrahydrocannabinol (THC) and all other cannabinol derivatives, including its naturally occurring or synthetically produced ingredients, whether produced directly or indirectly by extraction, or independently by means of chemical synthesis or by a combination of extraction and chemical synthesis; but shall not include the mature stalks of such plant, fiber produced from such stalks, oil or cake made from the seeds of such plant, any other compound, manufacture, salt, derivative, mixture, or preparation of such mature stalks (except the resin extracted therefrom), fiber, oil or cake, or the sterilized seed of such plant which is incapable of germination.<sup>5</sup>

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1. 410 ILL. COMP. STAT. 130 (2018).
2. 410 ILL. COMP. STAT. 130/15 (2018).
3. 410 ILL. COMP. STAT. 130/10(e) (2018).
4. 720 ILL. COMP. STAT. 550 (2018).
5. 720 ILL. COMP. STAT. 550/3(a) (2018).

The Illinois Compassionate Medical Cannabis Pilot Program Act defines cannabis as “the meaning given that term in Section 3 of the Cannabis Control Act.”<sup>6</sup> However, the Illinois Department of Agriculture, in enacting their administrative rules governing the control of cultivation centers management and operation, adopted the following definition:

“Cannabis” means marihuana, hashish and other substances which are identified as including any parts of the plant *Cannabis sativa* **and including derivatives or subspecies, such as *Indica*, of all strains of cannabis**, whether growing or not; the seeds thereof, the resin extracted from any part of such plant; and any compound, manufacture, salt, derivative, mixture, or preparation of such plant, its seeds, or resin, including tetrahydrocannabinol (THC) and all other cannabinol derivatives, including its naturally occurring or synthetically produced ingredients, whether produced directly or indirectly by extraction, or independently by means of chemical synthesis or by a combination of extraction and chemical synthesis; but shall not include the mature stalks of such plant, fiber produced from such stalks, oil or cake made from the seeds of such plant, any other compound, manufacture, salt, derivative, mixture, or preparation of such mature stalks (except the resin extracted therefrom), fiber, oil or cake, or the sterilized seed of such plant which is incapable of germination.<sup>7</sup>

Obviously, the Department of Agriculture has broadened the definition by including *Cannabis Indica*, referring to it as a subspecies of *Cannabis Sativa*.<sup>8</sup> And therein lies the rub. Is *Cannabis Indica* a sub species of *Cannabis Sativa* or are *Indica* and *Sativa* both species of the genus *Cannabis*?<sup>9</sup> They both contain tetrahydrocannabinol (THC), Cannabinol (CBN), and cannabidiol (CBD).<sup>10</sup> They are both used to treat debilitating medical conditions.<sup>11</sup> However, they both exhibit different biological and

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6. 410 ILL. COMP. STAT. 130/10(b) (2018).

7. 68 ILL. ADM. CODE tit. 68, § 1290.10 (2014) (emphasis added).

8. *Id.*

9. See Ernest Small & Arthur Cronquist, *A Practical and Natural Taxonomy for Cannabis*, 25 TAXON 405 (1976); But see Richard Evans Schultes et al., *Cannabis: An Example in Taxonomic Neglect*, *Botanical Museum Leaflets*, 23 HARV. U. BOTANICAL MUSEUM LEAFLETS 337 (1974).

10. Joseph Dylan Summer, *Note: Patenting Marijuana Strains: Baking Up Patent Protection for Growers in The Legal Fog of this Budding Industry*, 23 J. INTELL. PROP. L. 169, 177 (2015); Karl W. Hillig & Paul G. Mahlberg, *A Chemotaxonomic Analysis of Cannabainoid Variation in Cannabis (Cannabaceae)*, 91 AM. J. OF BOTANY 966 (2004).

11. *Qualifying Conditions for a Medical Marijuana Card by State*, LEAFLY (Oct. 30, 2017), <https://www.leafly.com/news/health/qualifying-conditions-for-medical-marijuana-by-state>; *Marijuana*, MAYO CLINIC (Oct. 24, 2017), <https://www.mayoclinic.org/drugs-supplements-marijuana/art-20364974>; *Medical Marijuana*, MAYO CLINIC (Oct. 14, 2016),

chemical properties, exude different smells, and offer different narcotic benefits.<sup>12</sup> The differences are distinct enough for some biologists and taxonomists to categorize Sativa and Indica as separate species of the genus Cannabis.<sup>13</sup> What empirical evidence did the Department of Agriculture have in broadening the definition to include Indica as a subspecies of Sativa?

While the debate on Cannabis may seem limited to biologists and taxonomists,<sup>14</sup> the answer as to whether one or more species of Cannabis exists has important legal ramifications.<sup>15</sup> Although the plain meaning of Illinois's statute shows that the prohibition against possessing, selling, or using cannabis is limited to Cannabis Sativa,<sup>16</sup> defendants found with substances testing positive for cannabis are punished regardless of what the substance actually is.<sup>17</sup> Inconclusive empirical evidence derived from examining physical characteristics, tissue samples, and chemical tests have resulted in this problematic state of affairs.<sup>18</sup> A better source of empirical evidence is now available with DNA evidence, which can conclusively determine whether Indica is a separate species from Sativa.<sup>19</sup> Importantly, a finding that Indica is a separate species from Sativa would provide defendants with a revived and convincing argument that the State's prohibitions do not apply to those who are not conclusively found to be in possession of Cannabis Sativa.<sup>20</sup>

## II. ARGUMENT IN SUPPORT OF INDICA AS SEPARATE SPECIES OF GENUS CANNABIS

The roots of the debate go back over two hundred years to the work of Carl Linnaeus, a Swedish botanist considered the father of modern

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<https://www.mayoclinic.org/healthy-lifestyle/consumer-health/in-depth/medical-marijuana/art-20137855>.

12. See generally Bailey Rahn, *Sativa vs. Indica vs. Hybrid: What's the Difference Between Cannabis Types?*, LEAFLY (Jan. 26, 2018), <https://www.leafly.com/news/cannabis-101/sativa-indica-and-hybrid-differences-between-cannabis-types>; Anna Wilcox, *The Easiest Ways To Differentiate Sativa & Indica*, HERB (May 29, 2016), <https://herb.co/marijuana/news/differentiate-sativa-indica>.
13. See generally Schultes, *supra* note 9.
14. Taxonomy is the study of the general principles of scientific classification: the description, identification, binomial nomenclature and classification of organisms. *Taxonomy*, MERRIAM-WEBSTER (Jan. 18, 2018), <https://www.merriam-webster.com/dictionary/taxonomy>.
15. David A. Lightfoot, Winston C. Throgmorton, & Colton Johnson, *A Rapid Method for Cannabis Species Determination by DNA Sequencing*, 2016 ATLAS J. OF BIOLOGY 292 (2016).
16. 720 ILL. COMP. STAT. 550/3(a) (2018).
17. See generally *People v. Brisco*, 78 Ill. App. 3d 282, 286, 397 N.E.2d 160, 163, 33 Ill. Dec. 827, 830 (1st Dist. 1979).
18. See generally Schultes, *supra* note 9.
19. See Lightfoot, Throgmorton & Johnson, *supra* note 15.
20. *Id.*; see generally Schultes, *supra* note 10.

taxonomy.<sup>21</sup> The genus *Cannabis*, as we know it today, was established by Linnaeus, who named the genus after the ancient classical term for hemp.<sup>22</sup> *Cannabis Sativa* is binomial<sup>23</sup> name for a species within the larger genus *Cannabis* and was first identified and “published by Linnaeus in *Species Plantarum* in 1753.”<sup>24</sup>

Taxonomically speaking, *Cannabis Sativa* is described as being tall and Christmas tree shaped; its branching is moderate, being wide at the base with a single stem at the top; with long stem length between the thin long leaves which are pale to medium green; and the flowers are long, and sausage shaped with a sweet to spicy odor.<sup>25</sup> Interestingly, the Linnaeus Society of London has preserved two specimens of *Cannabis* used by Linnaeus during his research, which provide an understanding of the plants he considered when developing the binomial.<sup>26</sup> Although the specimens are taxonomically different and attributed to different geographic locations, Linnaeus considered them to represent one species: *Cannabis Sativa*.<sup>27</sup> The classification as one species would have a lasting and profound impact on taxonomy and the law.<sup>28</sup> Because Linnaeus recognized only one species of cannabis (i.e. *Cannabis Sativa*), this first identification of the genus and its species *Cannabis Sativa* was critical because it established a paradigm that many biologists and taxonomists refused to reconsider for centuries.<sup>29</sup>

However, there were some early indicators that multiple species of cannabis existed.<sup>30</sup> Thirty years later after Linnaeus published *Species Plantarum*, in 1783, the French naturalist Jean-Baptiste Pierre Antoine de

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21. See Marta Paterlini, *There Shall Be Order. The Legacy of Linnaeus in the Age of Molecular Biology*, 8 EMBO REPORTS 814 (2007); *Who was Linnaeus?*, THE LINNEAN SOC'Y OF LONDON, <https://www.linnean.org/learning/who-was-linnaeus> (last visited Jan. 24, 2018); THE BOTANY & CHEMISTRY OF CANNABIS, 20 (C.R.B. Joyce & S.H. Curry, eds., 1970).
  22. Schultes, *supra* note 8, at 345 (“The name *Cannabis* (Greek *Kávvabis*, Kannabis) is a very ancient classical vernacular name for hemp . . .”).
  23. A binomial is a system of naming species “based on the combination of two Latin names denoting genus and species; similar to the way that a name and surname identify humans.” Paterlini, *supra* note 21.
  24. Schultes, *supra* note 10, at 345; THE BOTANY & CHEMISTRY OF CANNABIS, *supra* note 21, at 23.
  25. *The Difference Between Indica and Sativa Strains*, THE SPOT 420 (Nov. 18, 2016), <https://www.thspot420.com/whats-the-difference-between-indica-and-sativa/>; Steve Elliott, *The Ultimate Guide on Indicas vs. Sativas*, HERB (Feb. 28, 2018), <https://herb.co/marijuana/news/indica-vs-sativa-whats-the-difference>; Miles Klee, *Indica vs. Sativa: What's the Difference, How to Identify Them and Which is Better for You*, MIC (Apr. 20, 2017), <https://mic.com/articles/173973/indica-vs-sativa-what-s-the-difference-how-to-identify-them-and-which-is-better-for-you#.cfaeVwyui>.
  26. Schultes, *supra* note 9, at 346.
  27. *Id.* at 346–48; Karl W. Hillig, *Genetic Evidence for Speciation in Cannabis (Cannabaceae)*, 52 GENETIC RESOURCES AND CROP EVOLUTION 161, 162 (2005); see also THE BOTANY & CHEMISTRY OF CANNABIS, *supra* note 21, at 23.
  28. Schultes, *supra* note 9, at 346.
  29. *Id.* at 340–41.
  30. *Id.* at 350–54, 430–41.

Monet, Chevalier de Lamarck, described in his tome, *Encyclopedie Methodique*, what he referred to as another species of Cannabis, that being Cannabis Indica.<sup>31</sup>

“Lamarck considered [the species Indica] . . . ‘distinct’ from . . . [S]ativa.”<sup>32</sup> Cannabis Indica is described as being conical to bush in shape; there is much side branching and is usually wider than tall; the leaves are short and wide and usually dark green to purple; and the odor is pungent and sometimes considered fruity.<sup>33</sup> Lamarck considered the odor “‘strong and resembling . . . tobacco.”<sup>34</sup> He “pointed out that the principal virtue of this species lay in the strength of its narcotic properties.”<sup>35</sup> Despite these distinctions, most taxonomists disregard Lemarck’s work, while adhering to Linnaeus’s binomial.<sup>36</sup>

Thus was born a taxonomic binomial nomenclature problem and argument for speciation.<sup>37</sup> Whereas Linnaeus considered the genus to be monotypic—one species that being Sativa—Lamarck proposed a polytypic genus—more than one—that being Sativa and his identified species, Indica.<sup>38</sup> Thus, by examining the physical characteristics and taxonomic differences (height, leaf structure, stem cortex and production of intoxicant) of cannabis plants, one could fairly argue that more than one species existed.<sup>39</sup> And until recently, these differences were the only way to distinguish or compare the two.<sup>40</sup>

However, through the introduction and refinement of genetic research—DNA analysis and genetic markers—it is now possible to investigate Cannabis strains from different world geographic regions using DNA analysis.<sup>41</sup> Simply stated, genetic research has developed a technique used in molecular biology to amplify a single copy or a few copies of DNA generating thousand to millions of Polymerase Chain reaction.<sup>42</sup> The two strands of the DNA double helix are physically separated at high

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31. *Id.* at 350.

32. *Id.* at 351.

33. *Id.*; see also *The Difference Between Indica and Sativa Strains*, *supra* note 25; Steve Elliott, *supra* note 25.

34. Schultes, *supra* note 9, at 351.

35. *Id.*

36. *Id.*

37. Hillig, *supra* note 27.

38. William A. Emboden, *A Polytypic Genus*, 28 *ECONOMIC BOTANY* 304, 305 (1974); Schultes, *supra* note 9, at 351.

39. See generally Small & Cronquist, *supra* note 10. But see Schultes, *supra* note 10.

40. *The Cannabis Taxonomy Debate: Where Do Indica and Sativa Classifications Come From?*, LEAFLY (Feb. 28, 2016), <https://www.leafly.com/news/cannabis-101/the-cannabis-taxonomy-debate-where-do-indica-and-sativa-classific>.

41. See Hillig & Mahlberg, *supra* note 11, at 968; Hillig, *supra* note 27.

42. Lightfoot, Throgmorton & Johnson, *supra* note 15.

temperatures.<sup>43</sup> Then the temperature is lowered and the two strands become templates for DNA polymerase to amplify the DNA.<sup>44</sup> Thus, many strands of DNA from related organisms may be reproduced and compared with any DNA strands deposited with the gene data repository at the National Center for Biotechnology Information.<sup>45</sup>

In fact, researchers have already implemented this technique and the results are promising to definitively resolve the debate.<sup>46</sup> “Recent genome sequencing has shown that the genomes of [Cannabis] sativa . . . [ and Cannabis] indica . . . can all be distinguished.”<sup>47</sup> Furthermore, as one study demonstrates, a comparison of genetic sequences “suggests a separate origin for the two species which would agree with their separate centers of genetic diversity.”<sup>48</sup> Thus, DNA evidence supports Lamarck’s finding that Cannabis Sativa and Cannabis Indica are in fact separate species.<sup>49</sup> The question that remains is how this distinction will and should be treated under the law, which has developed statutes based on the assumption that there is only one species.<sup>50</sup>

#### A. Cannabis Indica v. Cannabis Sativa: A Criminal Defense?

The Illinois Cannabis Control Act<sup>51</sup> specifically criminalizes the possession, production, manufacture or delivery of Cannabis Sativa.<sup>52</sup> Does this mean that Cannabis Indica is excluded from the Act? A plain meaning analysis of the statute would suggest so and arguments relying on the variance in statutory definitions have been used as a defense since 1969 in *Leary v. United States*.<sup>53</sup> However, it is not one that works, as multitudes of cases have come down on the side of the prosecution, emphatically finding that Sativa and Indica mean the same or are of the same species.<sup>54</sup> The last

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43. Randi B. Weiss et al., *The Use of Genetic Testing in the Courtroom*, 34 WAKE FOREST L. REV. 889, 899 (1999).

44. *Id.*

45. David L. Wheeler et al., *Database resources of the National Center for Biotechnology Information*, 29 NUCLEIC ACIDS RES. 11 (2001).

46. Lightfoot, Throgmorton & Johnson, *supra* note 15.

47. *Id.* at 293.

48. *Id.* at 294.

49. *Id.*

50. *Id.* at 340 (“This establishment of the monotypic concept is reflected in modern chemical publications and even in the drafting of laws in some of the countries that control the use of Cannabis.”).

51. 750 ILL. COMP. STAT. 550 (2018).

52. 750 ILL. COMP. STAT. 550/3(a) (2018) (defining cannabis as “marihuana, hashish and other substances which are identified as including any parts of the plant Cannabis Sativa . . .”).

53. *Leary v. United States*, 395 U.S. 6 (1969).

54. See *United States v. Rothberg*, 351 F. Supp. 1115, 1116 (E.D.N.Y. 1972), *aff’d*, 480 F.2d 534 (2d Cir. 1973); *United States v. Moore*, 330 F. Supp. 684, 686 (E.D. Pa. 1970), *aff’d*, 446 F.2d 448 (3d

known case in Illinois trying this defense took place well over forty years, seemingly to foreclose the issue forever.<sup>55</sup> However, since then DNA analysis and genetic testing have become the gold standard in evidence proof, offering an opportunity to revive the legal argument, change existing law, and definitively show whether Sativa and Indica are separate species.<sup>56</sup>

#### B. Has Genetic Analysis Comparing the Two Species Finally Resolved this Argument Which Could Change the Current Law?

To examine the effect of genetic analysis on the current state of the law, consider the following example:

On September 11, 2014, in Williamson County, Illinois, defendant was charged by way of information with the unlawful production of more than five but less than twenty Cannabis Sativa plants, a class 4 felony.<sup>57</sup> As a result of the arrest, all plants were seized and kept in Illinois State Police evidence locker. Samples from the seized plants were eventually submitted for testing to the Illinois State Police Crime Lab. The samples were tested under the Duquenois-Levine and the presence of cystolithic hairs tests to identify Cannabis Sativa plants and the presence of cannabinoids.<sup>58</sup> Pursuant to the case, the defendant enlisted Dr. David A. Lightfoot, a professor of genetics at Southern Illinois University Carbondale,<sup>59</sup> to serve as an expert witness regarding the accuracy of these tests.

The first test, Duquenois-Levine, is a visual test<sup>60</sup> subjecting the evidence (specimens of the seized plants) to chemical titration.<sup>61</sup> The results

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Cir. 1971); *United States v. Gaines*, 489 F.2d 690 (5th Cir. 1974); *Williams v. State*, 524 S.W.2d 705, 710 (Tex. Crim. App. 1975); *State v. Morrow*, 535 S.W.2d 539, 542 (Mo. Ct. App. 1976).

55. *See People v. Rege*, 30 Ill. App. 3d 127, 332 N.E.2d 154 (5th Dist. 1975), *aff'd in part, rev'd in part*, 64 Ill. 2d 473, 356 N.E.2d 537 (1976) (finding that “the legislature adopted ‘Cannabis Sativa’ believing it to be the term that botanists used to embrace all forms of Cannabis.”).

56. Michael Lynch, *God’s Signature: DNA Profiling, The New Gold Standard in Forensic Science*, 27 ENDEAVOUR 93 (2003); Winston Ross, *The Man Mapping the Marijuana Genome Is Changing the Weed Game*, NEWSWEEK (Mar. 14, 2016), <http://www.newsweek.com/2016/03/25/marijuana-scientist-mapping-cannabis-genome-changing-weed-game-436526.html>; Lightfoot, Throgmorton & Johnson, *supra* note 15, at 293.

57. *People of the State of Illinois v. Colton Johnson*, Williamson County, IL 2014-CF-419

58. *People v. Park*, 72 Ill. 2d 203, 213, 380 N.E.2d 795, 800, 20 Ill. Dec. 586, 591 (1978) (“To determine accurately that a particular substance contains cannabis, all that is necessary is microscopic examination combined with the Duquenois-Levine test.”).

59. David A. Lightfoot, Ph.D., S. ILL. U., <http://coas.siu.edu/people/faculty/plant-soil-agssystems/lightfoot.html> (last visited Jan. 31, 2018).

60. *See generally* JOHN KELLY, FALSE POSITIVES EQUAL FALSE JUSTICE 2 (2008), [http://www.cacj.org/documents/SF\\_Crime\\_Lab/Studies\\_Misc\\_Materials/FalsePositives.pdf](http://www.cacj.org/documents/SF_Crime_Lab/Studies_Misc_Materials/FalsePositives.pdf) (describing the Duquenois-Levine test as a color test).

61. *See People v. Brisco*, 78 Ill. App. 3d 282, 283, 397 N.E.2d 160, 161–62, 33 Ill. Dec. 827, 828–29 (1st Dist. 1979) (During the test, “a portion of the substance is put in a spot plate and the Duquenois reagent is added to the substance. A hydrochloric acid concentrate is added to this mixture, and a violet color is produced if the test is positive for cannabis. Some of this liquid is then placed in a

of the specimen when mixed with certain chemicals yield colors based on the contents of the specimen.<sup>62</sup> The presence of cannabinoids yield color anywhere from blue to purple and is usually considered a positive indication of cannabis.<sup>63</sup>

However, there are several notable problems with this test.<sup>64</sup> First, the results are dependent upon the subjective eye of the lab technician.<sup>65</sup> That is, what might appear as blue to some might not be to another.<sup>66</sup> A second and more endemic problem with the Duquenois-Levine test is that one cannot assume that a positive detection of cannabinoids in a tested substances means that the cannabinoids came from Cannabis Sativa plants.<sup>67</sup> The Duquenois-Levine test can produce positive test results for cannabinoids on any plant that contain cannabinoids, not merely cannabis.<sup>68</sup>

As one might expect, the Duquenois-Levine test used on the substance seized at the time of the defendant's arrest detected cannabinoids. However, the defendant's expert found the test simply inadequate.<sup>69</sup> As the expert noted, cannabinoids pop up all over the tree of life in the plant kingdom.<sup>70</sup> For example, Elm Trees, hops, and the common Liverwort contain these

test tube and chloroform is added. This is the Levine modification of the Duquenois test. The violet liquid is soluble in the chloroform if the test is positive for cannabis. A Duquenois reagent consists of acetaldehyde, vanillin and ethyl alcohol.”)

62. *Id.* (noting that a positive test produces a violet color); *see also* John F. Kelly, Krishna Addanki, & Omar Bagasra, *The Non-Specificity of the Duquenois-Levine Field Test for Marijuana*, 5 THE OPEN FORENSIC SCI. J. 4, 5 (2012) (“formation of the proper blue-violet or purple color and its extraction into the lower layer is a positive test for marijuana”).
63. *Brisco*, 78 Ill. App. 3d at 283, 397 N.E.2d at 161–62, 33 Ill. Dec. at 828–29; Kelly, Addanki & Bagasra, *supra* note 62.
64. *See generally* Kelly, Addanki & Bagasra, *supra* note 62.
65. Jacob Sullum, *Lying Drug Tests Incriminate Innocent People*, FORBES (July 14, 2016, 7:39 AM), <https://www.forbes.com/sites/jacobsullum/2016/07/14/lying-drug-tests-incriminate-innocent-people/2/#6f41591e4c57> (“Another source of false positives is human error. Police may perform a test incorrectly, misunderstand the instructions about what different colors mean, or misperceive the colors in the poor lighting conditions that are common during roadside stops.”); Kelly, Addanki & Bagasra, *supra* note 62 (Finding “results of this field test are at the discretion of the tester’s color discrimination abilities. In other words, the ‘proper blue-violet or purple’ color which yields a positive test for marijuana is different for each testing official; what is blue-violet or purple enough for a positive test result to one official may not be blue-violet or purple enough for another.”).
66. Sullum, *supra* note 65.
67. *Id.* (discussing a study finding false positives for legal plants such as “spearmint, peppermint, basil, oregano, patchouli, vanilla, cinnamon leaf, lemon grass, bergamot, lavender, ginseng, anise, ginkgo, eucalyptus, rose, cloves, ginger, frankincense, vine flower, chicory flower, olive flower, cypress, and St. John's wort.”); *see also* Stewart J. Lawrence & John Kelly, *A Miscarriage of Justice on Marijuana*, THE GUARDIAN, (Aug. 4, 2011, 4:30 PM), <https://www.theguardian.com/commentisfree/cifamerica/2011/aug/04/marijuana-flawed-test> (noting false positives detected with sage and chocolate.).
68. Sullum, *supra* note 65.
69. *People v. Brisco*, 78 Ill. App. 3d 282, 287, 397 N.E.2d 160, 164, 33 Ill. Dec. 827, 831 (1st Dist. 1979).
70. *Id.* at 286, 397 N.E.2d at 163, 33 Ill. Dec. at 830 (“The bear-claw cystolith hair is also common throughout the plant kingdom.”).



chemicals.<sup>71</sup> Additionally, and importantly, if the Duquenois-Levine testing procedures are inadequate, further testing of the specimens is needed. These further testing procedures would include gas chromatography<sup>72</sup> and mass spectrometry.<sup>73</sup> However, the only other test or examination that the substance receives is an equally problematic visual inspection of the plant for cystolithic and covering hairs.<sup>74</sup>

Cystolithic hairs are calcium oxalate crystals which look like hairs in the form of microscopic spears or “bear claws.”<sup>75</sup> The cystolithic hairs are on one side of the leaf while, on the opposite side, covering hairs are examined.<sup>76</sup> Although cystolithic hairs have been perceived as unique to cannabis plants,<sup>77</sup> there are many other plant species that have them.<sup>78</sup> For example, cystolithic hairs are common in hops, thyme, and various herbs.<sup>79</sup> In fact, about half the plants that the defendant’s expert looked at have these hairs.<sup>80</sup>

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71. Frederic Whitehurst, *Why Do We Convict As Many Innocent People as We Do?: Forensic Analysis of Marijuana and the Kurzman Mystery: A Case Study of Flawed Logic in Determination of Guilt*, 41 TEX. TECH L. REV. 117, 118 (2008); *see also* Allie Beckett, *5 Plants You Probably Didn’t Realize Were Related to Cannabis*, MARIJUANA (June 16, 2017, 11:47 AM), <https://www.marijuana.com/news/2017/06/5-plants-you-probably-didnt-realize-were-related-to-cannabis/>; Anna Wilcox, *Check Out These Non-Marijuana Plants That Contain Cannabinoids*, HERB (Mar. 29, 2016), <https://herb.co/marijuana/news/the-health-authority-offering-provisional-registration-to-marijuana-extract-makers>; Anna Wilcox, *6 Plants That Contain Healing Cannabinoids (Other Than Cannabis)*, HERB (Oct. 12, 2016), <https://herb.co/marijuana/news/plants-contain-healing-cannabinoids>.
  72. IDAHO STATE POLICE, FORENSIC LABORATORY TRAINING MANUAL, MARIJUANA ANALYSIS 29 (2011), <https://www.isp.idaho.gov/forensics/documents/currentAMs/Controlled%20Substances/MJ%20training%20rev%203.pdf> (providing a description of these methods).
  73. Kelly, Addanki & Bagasra, *supra* note 62, at 5.
  74. *People v. Park*, 72 Ill. 2d 203, 213, 380 N.E.2d 795, 800, 20 Ill. Dec. 586, 591 (1978) (“To determine accurately that a particular substance contains cannabis, all that is necessary is microscopic examination combined with the Duquenois-Levine test.”).
  75. Whitehurst, *supra* note 71, at 122; *see also* *People v. Brisco*, 78 Ill. App. 3d 282, 286, 397 N.E.2d 160, 163, 33 Ill. Dec. 827, 830, (1st Dist. 1979); *see also* NORTH CAROLINA DEPARTMENT OF JUSTICE, TECHNICAL PROCEDURE FOR THE IDENTIFICATION OF MARIJUANA (2016), <http://www.ncdoj.gov/getdoc/1f4280e1-3824-4e16-9781-3d117f57a3ae/Identification-of-Marijuana.aspx>.
  76. TECHNICAL PROCEDURE, *supra* note 75; *see generally* *Brisco*, 78 Ill. App. 3d at 285, 33 Ill. Dec. at 830, 397 N.E.2d at 163 (describing the examination of cystolithic hairs).
  77. Kelly, Addanki & Bagasra, *supra* note 62, at 6; *see also* *Park*, 72 Ill. 2d at 214, 380 N.E.2d at 800, 20 Ill. Dec. at 591 (Demonstrating that Illinois courts have treated cystolithic hairs as a unique attribute of cannabis because, in conjunction with the Duquenois-Levine test, only plants with the hairs test positive and only plants without the hairs trigger false positives.).
  78. *See Brisco*, 78 Ill. App. 3d at 285, 397 N.E.2d at 163, 33 Ill. Dec. at 830 (citing evidence and testimony that recognized numerous plants have cystolithic hairs); *see also* Baruch Glattstein & Azriel Gorski, *Marijuana Identification: A Test for Calcium in Cystolithic Hairs*, 48 MICROSCOPE 215 (2000).
  79. *Brisco*, 78 Ill. App. 3d at 285, 397 N.E.2d at 162, 33 Ill. Dec. at 829 (citing testimony that “other plants . . . have cystolith tree cones, such as hops, nettles, mulberry, elm, lavender, oregano, mint and tobacco.”).
  80. *Id.* at 286, 397 N.E.2d at 163, 33 Ill. Dec. at 830.

The defendant's expert concluded that the two tests, Duquenois-Levine and cystolithic hairs, ordered by the Illinois State Police Crime Lab could not determine to a scientific certainty that the particular plant material in question was some kind of cannabis.<sup>81</sup> Therefore, the State's report was not credible.<sup>82</sup> It failed to prove beyond a reasonable doubt that the defendant possessed Cannabis Sativa plants proscribed by the charging statute.

It was stipulated that the State Police used only Duquenois-Levine and cystolithic hairs to identify cannabis. However, just because this is the State Police procedure does not mean it is scientifically sufficient to prove the plants are in fact Cannabis Indica or Cannabis Sativa.<sup>83</sup> Dr. Lightfoot's uncontradicted testimony is that two tests used by the State Police are in fact insufficient to find to a scientific degree of certainty that the plants are cannabis or some other type of plant as he testified.<sup>84</sup> The testing regime of the State Police is scientifically insufficient to find beyond a reasonable doubt that the plants are Cannabis Indica or Cannabis Sativa.<sup>85</sup>

The defendant's expert agreed that because those two aforementioned tests were inadequate and could yield doubtful results, he would instead sequence the DNA of the specimens.<sup>86</sup> He would then compare the sequenced DNA to reference sequences held at the National Library of Medicine at the National Institute of Health.<sup>87</sup> The defendant's expert noted that the states lab technician's results or policies promulgated by the State for the identification of Cannabis Sativa plants did not include alpha systematics (visually inspecting the plants as to form of leaves or branches) nor DNA genetics testing.<sup>88</sup> There was no indication that the seized plant material was compared against the known Cannabis Sativa plant samples contained at the National Institute of Health.<sup>89</sup> Those species samples of the genus cannabis are Cannabis Sativa plants and Cannabis Indica plants.<sup>90</sup> Cannabis Sativa plants were included in the National Institute of Health in 2004 followed by Cannabis Indica plants in 2007.<sup>91</sup> There is no dispute, included species are either Cannabis Sativa plants or Cannabis Indica plants.<sup>92</sup>

Q Do you know how the—or what the distinction is between the two types of samples at the National Institutes of Health?<sup>93</sup>

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81. *Id.*

82. *See generally* Kelly, Addanki & Bagasra, *supra* note 62.

83. *Colton Johnson*, Williamson County, IL 2014-CF-419.; 720 ILL. COMP. STAT. 550/3(a)(2018).

84. *Colton Johnson*, Williamson County, IL 2014-CF-419.

85. *Id.*

86. *Id.*

87. *Id.*

88. *Id.*

89. *Id.*

90. *Id.*

91. *Id.*

92. *Id.*

93. Transcript of Record at 32, *Colton Johnson*, Williamson County, IL 2014-CF-419.

A Yes. So in this particular gene we're talking which is one of the Barcode of Life genes, there are three changes in the part of the gene that forms the protein-building machinery of the cell. They're very critical changes. We sequenced this piece of DNA because it's between two things that are normally very highly conserved, but here we have one of them with three changes and just force base pairs in it, three changes, three critical changes. That's going to change everything about the way the cell produces its protein. It's going to look very different. It's always enough to cull a species. We've done this 75,000 times. That level of change in that gene says, two species.<sup>94</sup>

An offer of proof was made to the Court that included a description of cellular activity on a microbiological scale; sampling and testing by the defendant's expert of the seized plant material for genetic identifiers of Cannabis Indica Plants versus Cannabis Sativa Plants.<sup>95</sup>

Speciation of plants takes place on a cellular level and to identify species of plants, geneticists look at the smallest units of genetics.<sup>96</sup> That is the nucleotides, adenine (A), thymine (T), guanine (G), & cytosine (C).<sup>97</sup> It is these four nucleotides that make the millions of cells in a living organism.<sup>98</sup>

The defendant's expert testified that he had an opportunity to view the seized plant material; that he took samples of the seized plant material; that he took the samples to his laboratory for purpose of making DNA all the while keeping the samples in his care, custody and control.<sup>99</sup> Once isolated, the DNA was shipped in a controlled shipping method for chain of custody purposes, to Genewiz Laboratories in Plainfield, New Jersey.<sup>100</sup> The samples were under GLP or good lab practices of the laboratory for chain of custody purposes.<sup>101</sup> Samples were sequenced—literally reading the code of the gene that was targeted.<sup>102</sup> The genetic sequence of the samples were compared with a genetic sequence located at the Nation Library of Medicine.<sup>103</sup>

Q. And you compared your sample from GENEWIZ with the data indicating the A, C, T, Gs of what?<sup>104</sup>

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94. *Id.*

95. *Colton Johnson*, Williamson County, IL 2014-CF-419.

96. *Speciation*, SCI. OF EVERYDAY THINGS (Feb. 3, 2018), <http://www.encyclopedia.com/plants-and-animals/botany/botany-general/speciation>.

97. *What is DNA?*, U.S. NAT'L LIBR. OF MED., (Jan. 23, 2018), <https://ghr.nlm.nih.gov/primer/basics/dna>.

98. *Id.*

99. *Colton Johnson*, Williamson County, IL 2014-CF-419.

100. *Id.*

101. *Id.*

102. *Id.*

103. *Id.*

104. Transcript of Record at 56, *Colton Johnson*, Williamson County, IL 2014-CF-419.

A. That was all 18 samples came back as cannabis indica, perfect match.<sup>105</sup>

The defendant's expert authored a report based on the analysis of the 18 plants sampled from City of Marion Police Department, Defendant's exhibit #1.<sup>106</sup> He concluded that the plants were all Cannabis Indica because the region sequenced area on the DNA is a primary diagnostic test of genus and species.<sup>107</sup> The conclusion cannot be reasonably refuted when this test is used by systematists around the world.<sup>108</sup>

The State relies on the definition of Cannabis in 720 ILCS 550/3.<sup>109</sup> However, in this case the defendant was not charged with possession of cannabis, rather Cannabis Sativa plants.<sup>110</sup> There is no definition of Cannabis Sativa plants in the statute.<sup>111</sup> The definition specifically excludes mature stalks of Cannabis Sativa. In spite of previous arguments concerning the motion in limine in *People v. Rege*, which concerned facts of possession of cannabis as would fit within the expansive definition of cannabis under 550/3 but did not deal with Cannabis Sativa plants as prohibited in 550/8.<sup>112</sup> *People v. Binkley*, involved a conspiracy for a substance containing cannabis.<sup>113</sup> Again, this would fit into the broad definition of cannabis under 720 ILCS 550/3,<sup>114</sup> but does not address the specific more narrow prohibition of Cannabis Sativa plant under 720 ILCS 550/8.<sup>115</sup>

Dr. Lightfoot's testimony is that the plants in this case are clearly Cannabis Indica, and clearly not Cannabis Sativa. This is unrefuted by any evidence of the State.

An additional point in this case is the proper definition of a Cannabis Sativa plant under 550/8.<sup>116</sup> The scientific evidence in this case is that cannabis is polytypic, and there are two species. The Cannabis Control Act has no definition of Cannabis Sativa plant.<sup>117</sup> For the court to impose the general definition of cannabis under 720 ILCS 550/3 on a section that deals specifically with Cannabis Sativa plants is a violation of due process under

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105. *Id.*

106. *Id.*

107. *Id.*

108. *Id.*

109. 720 ILL. COMP. STAT. 550/3 (2018).

110. *Colton Johnson*, Williamson County, IL 2014-CF-419.

111. 720 ILL. COMP. STAT. 550/3.

112. *People v. Rege*, 30 Ill. App. 3d 127, 332 N.E.2d 154 (5th Dist. 1975), *aff'd in part, rev'd in part*, 64 Ill. 2d 473, 356 N.E.2d 537 (1976).

113. *People v. Binkley*, 687 P.2d 480 (Colo. App. 1984).

114. 720 ILL. COMP. STAT. 550/3(a) (2018).

115. 720 ILL. COMP. STAT. 550/8 (2018).

116. *Id.*

117. 720 ILL. COMP. STAT. 550/1 (2018).

the United States and Illinois Constitutions by failing to give adequate notice of criminality to the defendant.<sup>118</sup>

In *People v. Dunlap*, the court addressed the due process question of the Controlled Substances Act, concerning those who possessed mushrooms not knowing they contained psilocin, a Schedule I substance.<sup>119</sup> The court found that Controlled Substance Act was not a violation of due process because “the State must prove that a defendant had knowledge of the nature of the substance possessed or sold.”<sup>120</sup> In the present case there is no general or specific definition of Cannabis Sativa plant in the statute. The defendant was charged with possession of Cannabis Sativa plant.<sup>121</sup> The State failed to prove the plants are Cannabis Sativa plants, and the defense has proven the plants are in fact Cannabis Indica. The plain language of 750 ILCS 550/8 limits itself to Cannabis Sativa plants.<sup>122</sup> The legislature already barred possession of cannabis in 550/4.<sup>123</sup> To apply the general definition of cannabis (not Cannabis Sativa plant) in section 550/3 to the specific terms of section 550/8 violates due process to citizens in an unconstitutional way and makes it impossible for a citizen to conform his behavior to the plain language of 550/8.<sup>124</sup>

### III. CONCLUSION

The taxonomic argument for speciation of the genus Cannabaceae has been ongoing since 1753, when first it was taxonomically described and named Cannabis Sativa L.<sup>125</sup> Thirty years later in 1785, a second taxonomist, Jean-Baptiste Lamarck proposed a description and named Cannabis Indica L.<sup>126</sup> As the discussion in this article progresses, the argument continues with some empirical data support for speciation through DNA analysis specifically addressing, that Sativa and Indica are distinct species of the genus Cannabaceae.

Almost fifty years has spanned since the first enterprising criminal defense attorneys utilized the defense of speciation, Sativa versus Indica. The court continually dismissed that defense based on the fact that the intent of the law is clear.<sup>127</sup> Botanists from both sides of the debate excoriated each

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118. 720 ILL. COMP. STAT. 550/3(a).

119. *People v. Dunlap*, 110 Ill. App. 3d 738, 744, 442 N.E.2d 1379, 1383 (5th Dist. 1982).

120. *Id.* at 746–47.

121. *People of the State of Illinois v. Colton Johnson*, Williamson County, IL 2014-CF-419.

122. 720 ILL. COMP. STAT. 550/8 (2018).

123. 720 ILL. COMP. STAT. 550/4 (2018).

124. *See* 720 ILL. COMP. STAT. 550/3(a) (2018); 720 ILL. COMP. STAT. 550/8.

125. *See* Small & Cronquist, *supra* note 10. *But see* Schultes, *supra* note 10.

126. *Cannabis Indica*, WIKIPEDIA, [https://en.wikipedia.org/wiki/Cannabis\\_indica](https://en.wikipedia.org/wiki/Cannabis_indica) (last visited Feb. 3, 2018).

127. *People v. Rege*, 64 Ill. 2d 473, 477-78, 356 N.E.2d 537, 539 (1976).

other outside of court. The last known appellate case in Illinois was over forty years ago, which utilized the defense.<sup>128</sup> Since then, as noted above, molecular analytical techniques have advanced questions of taxonomic clarification with new speciation additions.

As applied to a recent Williamson County, Illinois case, there was distinct evidence indicating a genetic difference between Indica and Sativa.<sup>129</sup> The argument then became one of how to address the due process guarantee of charging an individual with violation of a statute that proscribes one thing while seemingly to allow another.<sup>130</sup> That is barring the possession of Cannabis Sativa while allowing the possession of Cannabis Indica.

The Illinois Department of Agriculture's attempts to address the argument in regulating the production and dispensation of medical cannabis. By broadening the definition of cannabis from the Cannabis Control Act to include a subspecies of Cannabis Sativa, that being Cannabis Indica, the Department concludes that Indica is a subspecies of Sativa and otherwise ends a 250 year old argument. The Department does not cite any authority or empirical data in doing so. This paper has attempted to produce the empirical data justifying broadening the definition as used by the Illinois Department of Agriculture. In doing so, it additionally attempts to cure the purported lack of due process inherent in today's definition in the Cannabis Control Act. Therefore, it is incumbent on the legislature to adopt this evidence and rewrite the statutes and regulations to comport with the presented evidence to recognize at the minimum two species of the genus cannabis, which are Cannabis Sativa and Cannabis Indica.

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128. *People v. Jones*, 75 Ill. App. 3d 214, 393 N.E.2d 1132 (5th Dist. 1979).

129. *People of the State of Illinois v. Colton Johnson*, Williamson County, IL 2014-CF-419.

130. *Id.*