

Original Article

That which we call *Indica*, by any other name would smell as sweet

An essay on the history of the term Indica and the taxonomical conflict between the monotypic and polytypic views of Cannabis

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What's in a name?

An interesting feature of the worldwide subculture devoted to cannabis is the endless number of names given to its preparations (marijuana, pot, weed, kiff, bhang..). On top of that, there is a continuously growing list of names used to describe different varieties and strains of the cannabis plant. As a result of centuries of breeding and selection, a large variation of cannabis strains has been developed. These are commonly distinguished, by plant breeders, recreational users, and medical cannabis patients alike, through the use of popular names such as White Widow, Northern Lights, Amnesia, or Haze. Already over 700 different varieties have been catalogued [1] and many more are thought to exist, each one with a potentially different effect on body and mind. With the recent growth in medicinal use of cannabis, the need to clearly distinguish between varieties and their expected (therapeutic) effects has become more important than ever.

Although variety names remain the most common method to distinguish between the many cannabis products available, it is largely unclear how such names reflect an actual difference in chemical composition. Perhaps the current cannabis jargon just serves to give the cannabis subculture an air of sophistication, in the way that a wine connoisseur would describe his favourite alcoholic drink. And because cannabis is an immensely lucrative cash-crop, the growth in names may also be driven by the attempts of individual growers to distinguish their own product from that of competitors. What is certain is that the unscientific nature of the cultivation and naming of cannabis strains adds to the verbal chaos surrounding cannabis use. Although

this may simply be regarded as an anthropological curiosity, a more fundamental issue exists at the root of this, because over the last few centuries there has been a continuing scientific controversy regarding the taxonomic classification of cannabis.

Today, a firm belief is held by growers and users of cannabis that there exist at least two different main types of cannabis; sativa and indica. However, over the centuries opinions have been going back and forth over whether cannabis is most accurately classified as one single species or as multiple. The roots of this conflict are mostly found in the nineteenth century with tendrils stretching back in time as far as the Late Middle Ages. This essay will focus on the use of the word indica and its development throughout this history, because the problem of botanical classification is best shown through the particular history of this word. The purpose of the essay is not to ascertain which argument is the strongest, but to shine a light on the history of this issue and explain how this rather obscure taxonomical fight managed to spread out far beyond the field of science, into medicine, law and finally the worldwide subculture of cannabis.

Historical background

The starting point for our historical exploration is the entry on *Cannabis sativa* in the German edition of the Herbarium (German: Kräuterbuch) of German botanist and physician Leonhart Fuchs, published in 1543. In his book, Fuchs mentions that there exist two kinds of hemp, i.e. wild hemp (German: Wilder Hanff) and domesticated hemp (Tamer Hanff), but that he has only ever seen the domesticated variety. He is therefore

careful to mention that his description pertains to *Cannabis sativa* only, and not to the unknown wild variety he refers to as *Cannabis sylvestris* or *terminalem*. For this knowledge he relied on the generally accepted wisdom of his time that the wild variety did indeed exist. His contemporary and fellow German botanist Hieronymus Bock uses the same distinction in his own herbarium of 1539. Just like Fuchs, he had never actually seen this plant in Germany, so he goes on to explain his choice for using it [2].

The trust both men have in the existence of a plant neither of them have ever seen seems at odds with our modern concept of empirical observation. Such trust most likely stems from the scientific method both Fuchs and Bock used, in which was they understood themselves to be following in the same tradition as the ancient Greeks, Romans and Arabs who had written extensively on botany, such as Pliny, Apuleius and Pedanius Dioscorides. In this tradition empirical observation was indeed important, but it did not necessarily outrank the authoritative wisdom passed on through the pages of these ancient authors. As a result, problems could arise when these historical authorities were in conflict with one another, as Bock noticed was the case for hemp. Bock therefore spends a paragraph on explaining the views of the different historical authors. He himself seems to take a rather neutral position, treating wild hemp as an unknown plant the existence of which is nonetheless established through the works of others. Not being able to verify which one of these views about the unknown kind is the correct one he mentions them all, neither confirming nor rejecting any of them outright. Nevertheless, he leans towards the distinction made by Dioscorides between *Cannabion* (also called *Asterion* and *Schenostrophon*) and *Hydrastinan* (called *Terminalem* and *Cannabis Sylvestrem* in Latin), the former of which he identifies as domesticated hemp and the latter as the unknown wild type. This distinction, first made by Dioscorides and followed by Bock, seems to have influenced Fuchs' work which was published slightly after.

Cannabis reappears in the *Species Plantarum* published in 1753 by the famous botanist Carl Linnaeus, whose method for classifying plants and animals is still the basis of our modern taxonomical system. The book has an entry for *Cannabis* and there we find five different names, these are respectively *Cannabis sativa*, *C. foliis digitatis*, *C. mas*, *C. erratica* and *C. femina* [3]. The name *Sativa* is used for the entire species while the other names are used not to describe any varieties, but the different biological sexes of the plant. This is not surprising as Linnaeus is well known for basing his new system mainly on the appearance of the sexual organs of plants.

In the case of the cannabis plant Linnaeus did not have to resort to inventing new names for describing the different sexes, as in fact all of the names he used had been in common use before he appropriated them for his own system. Interestingly enough, before Linnaeus' publication the meaning of male and female had been

exactly the opposite; the larger seed bearing female plant was called the male, while the smaller actual male was called the female. It reflected the Aristotelian use of the terms male and female that was common throughout the Middle Ages. This was grounded in metaphysics rather than biology, with male denoting active qualities and female passive ones. Based on this principle the larger plant which produced the desired fibre was referred to as the male and the smaller ones that served as pollinators were defined as females. This practice survived well beyond the publication of Linnaeus works, for example amongst French hemp farmers [4].

Linnaeus did not use the term *indica* and considered all the variations of cannabis known to him to be of the same species, i.e. *C. sativa*. However, his entry on cannabis does end with a small note that reads: 'Habitat in India'. This is referring again to the commonly held belief that, since hemp in Europe was obviously a domesticated type, a wild variety must exist somewhere else. By the time of Linnaeus, India had emerged as the supposed homeland of this hypothetical variety, providing the fertile soil from which the idea of a *Cannabis indica* sprouts. A handmade annotation by Linnaeus in a later version of his book, currently preserved at the Linnaean Society of London, adds Persia as another possible habitat he was aware of [5].

The rise and fall of *indica*

The honour of formally proposing *Cannabis indica* as a separate species goes to the French biologist Jean-Baptiste Lamarck. Although he became most famous for the theory of evolution that bears his name, he was also an accomplished taxonomist. In 1785 his *Encyclopédie méthodique; Botanique* was published in which he proposed a new species of cannabis he had identified from samples that were sent to him from India. The differences in shape of the leaves, stems and sexual organs of these samples were the grounds for Lamarck to distinguish them as belonging to another species. His entry for *C. sativa* is found under the heading *Chanvre cultivé* (French: cultivated hemp), separating it as a species from what he calls *Chanvre des Indes*, (Indian cannabis or *Cannabis indica*) [6,7]. In this approach we see the age old distinction between cultivated and wild cannabis live on. Acting as a sort of 'missing link', the new species neatly filled the gap that had existed in European knowledge of hemp since at least the time of Fuchs, caused by the absence of any wild population of plants on the European continent.

The entry provides a description of the new species in the form of a comparison with *C. sativa*. The *indica* type is described as being smaller, having narrower leaves that consistently alternate, and a firmer stem that renders it unsuitable for the purpose of cultivating it for fibre like *C. sativa*. Quite notable and important is that this purely botanical description is followed by a description of the effects the plant produces when it is consumed. Lamarck writes that [7]:

“The principal effect of this plant consists of going to the head, disrupting the brain, where it produces a sort of drunkenness that makes one forget ones sorrows, and produces a strong gaiety.”

Here in Lamark’s work we find the idea of Cannabis indica as it will persist henceforth, i.e. as the psychoactive non-fibre producing species of cannabis that contrasts with the European Cannabis sativa both in appearance and physiological effect.

The botanical samples that Lamark based his findings on were sent to him courtesy of French naturalist Pierre Sonnerat who had collected them in India. Because Lamark had no direct access to live plants, he had to rely on third parties to supply him with materials and information about the plant. These circumstances started to change while we pass from the late eighteenth century into the nineteenth, when the European trading empires slowly transformed into colonial powers and Europeans start to directly govern the lands they had conquered. Europeans were now able to venture into the areas where cannabis originated from and where it had been used for centuries in medicine, religion, and other cultural aspects.

Early in the eighteenth century we see a surge in scientific interest coming from France, where the Napoleonic expedition to Egypt had brought the French into contact with a culture where cannabis use was widespread. A publication on cannabis in 1810 by an apothecary named Rouyer, attached to the French forces in Egypt, was for example one of the first in a trend of revived interest which began around this time and would last in Europe for the first half of the nineteenth century [8]. A British interest in cannabis developed around the same time, perhaps stirred by their French rivals. The difference was that the British were in a much better position for actually studying cannabis, as its habitat was part of their Indian colonies.

It was amongst British botanists, who now had access to cannabis as well as to ancient Indian knowledge of the plant, that we see a curious thing happen: they rejected the distinction between species of cannabis that Lamark had proposed earlier. In his Flora Medica, published in 1838, the eminent British botanist John Lindley saw no reason to distinguish separate species of cannabis. He simply followed Linnaeus in this regard and wrote about the habitat of Cannabis sativa [9]:

“Persia, foothills in the north of India, from whence it has been introduced in other countries (Hemp).”

This view of the matter seems to have been the consensus amongst botanists in Great Britain at the time [10]. Although the international debate between botanists about the taxonomic classification of cannabis would continue, the monotypic view on cannabis remained dominant well into the second half of the twentieth century. Worth mentioning in this regard is the South African botanist Christiaan Hendrik Persoon who was the first in 1807 to publish a classification of cannabis

that reduced the C. Indica introduced not long before by Lamark to merely a variety of the species C. Sativa. His opinion was attacked close to half a century later by a compatriot physician of his, Dr. R.M. Armstrong, in a lecture to the Capetown medical society given in 1855. Armstrong insisted that C. Indica was indeed a separate species and not a mere variety [11]. This example marks the start of an era when the name indica was largely abandoned by botanists, only to be picked up by others, especially those in the field of medicine taking a particular interest.

Entry of indica into the pharmacological vocabulary

No publication better illustrates the confusion that surrounded the use of the term indica than the famous article written by William O’Shaughnessy on the therapeutic use of cannabis. Titled On the preparations of the Indian Hemp or Gunjah (Cannabis Indica) he republished it for a broader audience in 1843 in London after it had originally appeared in the Transactions of the Medical Society of Calcutta five years earlier. This article - a fascinating and rewarding read for anyone remotely interested in medical cannabis - carries the name Cannabis indica in the title, but interestingly enough O’Shaughnessy immediately sets out to disprove that such a species exists. In the second paragraph of the article he states:

“Much difference of opinion exists on the question, whether the hemp so abundant in Europe even in high northern latitudes, is identical in specific characters with the hemp of Asia Minor and India. The extraordinary symptoms produced by the latter depend on a resinous secretion with which it abounds, and which seems totally absent in the European kind. The closest physical resemblance or even identity exists between both plants; difference of climate seems to me more than sufficient to account for the absence of the resinous secretion, and consequent want of narcotic power in that indigenous in colder countries.”

O’Shaughnessy repeats his commitment to the monotypic view in his botanical description of the plant, which starts thus:

“Assuming, with Lindley and other eminent writers, that the Cannabis sativa and indica are identical...[]”

This commitment to the monotypic view raises the question why O’Shaughnessy bothered using the name Cannabis indica in the first place. The answer may lie in the purpose of O’Shaughnessy’s article, which was to draw attention to the medical use of cannabis. The scientific interest up to that moment had been mainly directed at the intoxicating effects of cannabis, as medical use was almost unknown in Europe at that time. Only in Asia was cannabis traditionally used for medi-

cal purposes and O'Shaughnessy's choice of continuing to call it Indian hemp or indica may have been meant to emphasize this Indian medical use of the plant. Perhaps he felt that he could explain his experiences with the medical use of cannabis better by referring to it as Indian hemp or indica rather than sativa. If this was indeed the case, O'Shaughnessy had picked up a word discarded by botanists and used it for advertising his paper among a broader public. Of course, by using a Latin name one implies to a reader that there exists a taxonomical consensus behind it, while in reality it merely means whatever the author wants it to mean. Although O'Shaughnessy took effort in his article to explain his choice for doing so, others that followed after him generally did not, leaving Cannabis indica to become something of a word for hire in the following century.

In the period roughly between the 1890's and the 1970's, when the interest in cannabis as a medicine was starting to fade and it was increasingly being viewed as a narcotic, the majority of professionals in the field were of the opinion that Linnaeus had gotten it right all along; cannabis was monotypic though with a very high degree of plasticity, meaning that it could rapidly develop different characteristics when its environment changed [12]. Attempts by other botanists during that period to introduce a polytypic scheme of their own design were published, but they never managed to convince a significant number of their peers. Even though some opponents of the monotypic view could be found in every major country, it was only in the Soviet-Union where they seemed to have a significant voice. It was the Soviet botanist Janischevsky who introduced a new polytypic scheme based on his own research in Russia where he had identified local plants that were different enough for him to warrant classifying them as a new species, which he named *C. ruderalis* [13].

The medical abandonment of cannabis, mostly owing to the unreliability of its effect on patients due to issues with potency and dosing, was further compounded by the fact that Western governments were becoming increasingly worried the knowledge about cannabis that crossed over from places such as Egypt and India would lead to widespread abuse as a narcotic drug, as was already the case in Egypt especially. This led to restrictions on the import and trade of cannabis and shifted the attention from cannabis as a potential medicine towards being a social menace, an attitude that would characterize the first half of the twentieth century. These changing views inhibited the taxonomic discussion from progressing and complicated scientific efforts to correct any misuse of the nomenclature that had arisen, giving the new names for cannabis the opportunity to become commonplace.

A lament about this phenomenon comes from the American botanist Richard Evans Schultes (described below), who originally defended the monotypic view. His subsequent turn towards the polytypic view marks

an important turning point in the debate. Schultes wrote in 1970 [12]:

"The binomial Cannabis indica is, however, frequently employed as though it represented a species-concept distinct from C. sativa and most often to indicate a race native to India and usually high in concentration of intoxicating principles. [...] There is still so much confusion that some pharmacological reports have even used the epithets "Cannabis indica" and "C. sativa var. indica" as though the two were distinct concepts!"

He further noted that this abuse of taxonomic nomenclature on cannabis was neither rare nor limited to pharmacology, but was frequent in agricultural, horticultural and chemical publications as well.

The long life of indica

The taxonomic issue came back to life in the 1970s after the previous decade had seen the failure of Western governments in preventing cannabis from entering their societies as a recreational drug. A substantial number of young middle class people had embraced cannabis for multiple reasons, making it a potent symbol for the spirit of the times that was seeking to blend pleasure-seeking with political awareness. This development allowed cannabis use, though often still illegal, to become something of a common youth experience and even a rite of passage throughout the Western world. Universities especially seemed to become a place where the use of this drug was tolerated to some degree, so it was not surprising that cannabis once again came into the sights of academia.

In the seventies we see a sudden reversal in the conflict between the monotypic and the polytypic view on cannabis. After being dominant since the time of Linnaeus, the monotypic consensus would suddenly be replaced by one that favoured the polytypic view. This change is best seen in the work of the previously mentioned Richard Schultes. An eminent Harvard botanist and considered to be the father of modern ethnobotany, Schultes wrote a comprehensive article in 1970 in defence of the monotypic view, but only four years later he had dramatically reversed his views. In the light of his own new research he had come to embrace the polytypic one.

Professor Schultes found his main adversary in the Canadian botanist Ernest Small who continued to defend the monotypic view, often citing Schultes earlier scientific work as some of the best available defence for his case [13]. And when we say 'case', this literally means a court case, where the two men faced off as expert witnesses at the appeal of defendant John Anthony van Alstyne. Arrested in 1973, he was brought before a California appeals court for the cultivation and sale of marijuana, and defended himself on the grounds that the plant involved was not technically speaking marijuana [14]. His legal counsel argued that there was

no evidence that the marijuana was in fact *C. sativa* L. (being the word used in the respective Californian statute) instead of some other species of cannabis. This argument, clever though it was, proved to no direct benefit of Van Alstyne as the appeals court did not agree. It recognized that the intent of the Californian drug law was to encompass all psychoactive cannabis and that it simply used the correct scientific term of that time, which had reflected the monotypic consensus. Van Alstyne's legal tactic to exploit the recent shift towards a polytypic view of cannabis had failed and his appeal was struck down [15].

By dismissing Van Alstyne's argument in this way the court seemed to have prevented a great deal of legal confusion, if it were not for the following paragraph contained in their ruling:

"Appellant's contention is initially premised on recent claims that marijuana is a so-called "polytypical" plant with more than one species presently extant. As noted earlier in the opinion, some botanical taxonomists recognize as many as four species of marijuana other than sativa L. On the other hand, studies of equally recent vintage conclude that marijuana is purely "monotypic" in species and yet has several varieties. Thus, whether marijuana is polytypic or monotypic is in doubt as of the present date. Nevertheless, we will accept appellant's initial premise and assume for purposes of decision that more than one species of marijuana are extant."

Here we see - without a straightforward explanation as to why, or even acknowledging that the scientific opinion is divided - the court declaring itself in favour of the polytypic view. Only further on in the decision the court defends its choice by referring in a footnote to some recent jurisprudence of that time which gives a reasoned argument for this choice:

"The existence of two species of Cannabis, namely Cannabis sativa L. and Cannabis indica Lam., has been known and published since about 1783, and the probable existence of the third species, Cannabis ruderalis Jan., has been published since about 1924. Despite these publications from which it has been clear that the genus Cannabis is polytypic (that is, that the genus includes more than one species), until about 1973, and specifically in 1938 and 1970, the genus Cannabis had been generally considered monotypic. Many people, including chemists, pharmacologists, physicians, and agronomists had shared the view that the genus Cannabis is monotypic, and there had been some acquiescence by taxonomists in expressions of this view. The question whether the genus is monotypic or polytypic had not been ad-

dressed and investigated in a deliberate and conscious manner within the community of taxonomists until about 1973. Presently, within the community of taxonomists, the weight of opinion is that the genus Cannabis is polytypic...[] Among the physicians and pharmacologists who have expressed over the years the view that the genus Cannabis is monotypic, there have been frequent references to Cannabis as Cannabis indica."

Although in this essay we will not discuss in depth the strength of this argument made by the Western District Court of Wisconsin, it should be clear that the Courts' main assertion seems seriously flawed. Indeed, the historical developments as we have described them in this essay support a narrative that is almost the direct opposite of this. With botanists and taxonomists engaging for centuries in a lively debate about the nature of cannabis, the monotypic view remained a firm, though not unchallenged, scientific consensus up to 1973 (the year of the arrest). Academics from outside these fields were the ones who generally challenged this consensus, seizing upon varying polytypic schemes either out of limited knowledge of the subject matter, or for reasons of their own convenience.

A somewhat irritated Small wrote of the legal fallout from this taxonomical debate in 1975 [16]:

"Unfortunately considerable mischief can result from the present forensic debate concerning Cannabis. Given the common lack of appreciation of the public for the subtle but profoundly important distinctions between "concepts", "groups", and "categories", and the ways these relate to "species" it is a simple matter for lawyers to deceive laymen by arguing that a given variant is a different species from one liable to controls, without explaining that one has simply chosen to label as a different species a variant which is clearly covered by the legislation. As scientists we recognize that some terminological choices are superior to others, and that the collective wisdom of recent, philosophically moderate, competent specialists generally provides the best available guide to good scientific usage. But science is much more than semantics, and as citizens we must be clear when society turns to us for guidance on interpreting names and terms, that its need for clarification of a mundane problem in semantics is not confused with a question of scientific fact."

Nevertheless, the Courts' arguments effectively granted *Cannabis indica* a type of legal existence and weight in the form of jurisprudence, despite the fact that the exact scientific meaning of the term was still, and remains to this day, a matter of contention.

Indica for growers and patients

Probably largely unaware of the scientific and legal disputes over Cannabis classification, the most common way currently used by recreational users to classify Cannabis cultivars is through plant morphology (phenotype). This method typically recognizes the two main cannabis types sativa and indica based on the following characteristics: Cannabis cultivars of the indica type are smaller in height with broader leaves, while sativa types are taller with long, thin-fingered leaves. [17,18] Indica plants typically mature faster than sativa types under similar conditions, and the types tend to have a different smell, most likely reflecting a different profile of terpenoids. [19,20] Most modern type cannabis varieties are in fact a hybrid (cross-breed) of sativa and indica ancestors. When buying cannabis for recreational or medicinal use, the sativa/indica background is often mentioned as a means to distinguish products.

By a tedious process of trial and error, chronically ill patients in many countries have tried to find a cannabis variety that works optimally for treatment of their specific symptoms. As a result of limited understanding and support from the medical community, medicinal users of cannabis generally adopted the terminology derived from recreational users to describe the therapeutic effects they experience. The popular distinction between sativa and indica types is an important help for patients during their search for effective cannabis. Although it is hard to study the popular cannabis literature and come to a single clear conclusion, the following general picture emerges about the differences between typical sativa and indica effects upon smoking:

The sativa high is often characterized as uplifting and energetic. The effects are mostly cerebral (head-high), also described as spacey or hallucinogenic. This type gives a feeling of optimism and wellbeing, as well as providing a good measure of pain relief for certain symptoms. Although indica types are generally said to contain more THC, many modern sativa types are also very high in THC content. Sativa strains are generally considered a good choice for daytime smoking.

In contrast, the indica high is most often described as a pleasant body buzz (body-high). Indica strains are primarily enjoyed for relaxation, stress relief, and for an overall sense of calm and serenity. They are supposedly effective for overall body pain relief, and often used in the treatment of insomnia; they are the late-evening choice of many smokers as an aid for uninterrupted sleep. Some pure indica strains are very potent in THC, and may cause the 'couchlock' effect, enabling the smoker to simply sit still and enjoy the experience of the cannabis. [18]

It has not been properly studied whether subjective descriptions such as these are indeed correlated in any way to the morphological distinctions between indica and sativa strains, or to any other classification commonly in use (described below). It is obvious that a

better understanding of chemical differences between strains could help to bridge the gap between the vast knowledge on cannabis that exists within the community of recreational users, and the information needed by medicinal users and health professionals.

Modern classification systems

In recent times, attempts have been made to classify Cannabis varieties based on chemical composition. However, the terms sativa and indica are generally not used in these classifications systems. A first study was done by Grlic [21] who recognized different ripening stages. Later, Fettermann [22] described different phenotypes based on quantitative differences in the content of main cannabinoids and he was the first to distinguish the drug- and fibre-type. Further extension of this approach was done by Small and Beckstead [23], Turner [24] and Brenneisen [25]. However, it was found that a single plant could be classified into different phenotypes, according to plant age. More recently, a classification system was developed by de Meijer [26] who recognized five different cannabis types based on the (relative) content of major cannabinoids.

Currently, for forensic and legislative purposes, the most important classification of cannabis types is that into the drug-type and the fibre-type (hemp). The main difference between these two is found in the content of the psychotropic component delta-9-tetrahydrocannabinol (THC): a high content of THC classifies as drug-type Cannabis, while a low content is found in fibre-type Cannabis (max. 0.2–0.3% THC on basis of dry matter in the upper reproductive part of the plants), which may also be cultivated for its seeds for human or animal consumption.

Conclusion

Throughout the last few centuries Cannabis indica has meant different things depending on who was using the term at that particular time. The term was originally coined as a way to distinguish the psychoactive plants found growing in warmer climates from their fibre producing relatives in Europe that had traditionally been known as *C. sativa*. Despite being discarded by botanists fairly soon after Lamarck introduced it in 1785, the term indica managed to survive and thrive due to its use by various groups: physicians who wanted to use cannabis as a medicine, lawyers who tried to keep their clients out of jail, and recreational cannabis growers who desired to market their products. They all used the same term, but may not have agreed on its actual meaning.

If Lamarck had intended to achieve anything by classifying Cannabis indica as a separate species, it was to provide us with a more generally acceptable description of the cannabis. Unfortunately, the long-term effects of his publication would turn out to do the exact opposite, and well over two hundred years later we are

still left in confusion. Modern research tools, involving detailed chemical [27] and genetic [28] analysis of a wide variety of cannabis types, may finally solve this sativa-indica dilemma: is it a single species, two species, or even more. If such scientific evaluation can take into account the vast knowledge that exists within current communities of cannabis users, we may finally decide on a definition of indica that is acceptable to all.

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