

Endogenous N, N-Dimethyltryptamine (DMT) and Dreams

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## **Introduction**

N, N-Dimethyltryptamine (DMT) is most commonly known as a notably potent psychedelic which can be ingested in a variety of ways to produce a strong and immediate, although relatively short-lived, psychedelic experience. What makes DMT somewhat notable among psychedelic compounds (Lysergic acid diethylamide/LSD, psilocybin, etc.) is that while DMT can be extracted from plants and also synthesized like these others, the scientific literature points to it being produced endogenously (i.e., from within the human neuro-biological structures). The focus of this paper will be to explore and discuss the nature, role, effects, and underlying mechanisms of endogenous DMT with a special focus on how DMT influences dream consciousness. Since DMT was discovered it was an attractive possible explanation for a variety of conditions, and especially since the late 1980s it has been popular to look to some psychoactive endogenous chemical as a way of understanding at a neuro-physiological level how dreams come about. A variety of authors, especially Dr. Richard Strassman, believe that DMT is ultimately responsible for our dreams but authors struggle noticeably to explain the exact mechanism by which DMT causes dreams, so much so that while it is certainly plausible that DMT *is* responsible for dreams, the idea at this stage is still a hypothesis rather than a conclusion of the psycho-scientific community.

## **Early DMT Studies**

DMT has perplexed the scientific community for some time. The possibility of interiorly produced psychoactive chemicals was naturally viewed as a plausible explanation for people with schizophrenia and other hallucinogenic conditions. When DMT was first claimed to be

discovered endogenously (Franzen and Gross, 1965), a variety of studies ensued in an attempt to establish a relationship between the chemical and psychiatric patients, with some initial studies suggesting a link between blood and urine samples between schizotypal and control patients (Jacob and Presti, 2005). But throughout the seventies, several studies were conducted that found no significant difference in DMT concentration between patients with psycho-schizo and psycho-depressive conditions (Wyatt, Mandel, Ah, Walker, and Vanden Heuvel, 1973; Angrist, Gershon, Sathananthan, Walker, Lopez-Ramos, Mandel, and Vanden Heuvel, 1975). After a variety of clinical studies attempting to establish this relationship, a review by Gillin, Kaplan, Stillman, and Wyatt (1976) synthesized the extant findings and barring a considerable shift in the reliability and results of these studies, concluded that there was little evidence to support a meaningful relationship there. While it is no longer a normative theory in which to understand schizophrenia, the theory never altogether died out and has enjoyed some resuscitation in recent years (Strassman, 2017).

### **Early Theories of DMT and Dreams**

The opening salvo for considering DMT as influential in dream consciousness was fired by J.C. Callaway in 1988. In an article entitled “A Proposed Mechanism for the Visions of Dream Sleep” in *Medical Hypotheses*, Callaway was the first author to attempt to formalize a neurotransmittal account of dream visions. Callaway’s hypothesis was just that, a hypothesis, but it served as a seminal source for later DMT researchers who have continually attempted to falsify/verify the theory. Given the foundational nature of Callaway’s work, it is appropriate to summarize what he proposed.

Sleep plays an instrumental and profound role in our lives given that about a third of the entirety of human experience is spent doing it. Dream visions are a common and frequent

phenomenon of the dream state, and are believed to occur during the REM stage, which is the fifth of five sleep stages, and characteristically occurs from the last two hours of sleep until waking, which is also when the “most vivid and emotionally charged dreams also tend to occur” (p. 119). But dream visions do not normally occur in the ordinary course of waking experience, which suggests that there is something that “happens” to us while in the REM stage of sleep which allows for the creation of dreams.

Callaway refrains from proposing any specific compound as being responsible for the dream state. He instead focuses on providing an overarching framework and general mechanism for how it could be the case that some neurotransmitter or chemical is responsible for our dream visions. This mechanism, he argues, would be periodic and dose dependent and would play both an initiation and inhibition role to begin and end dream processes, which explains why humans do not dream every time they sleep (or at least, not vividly enough to remember it), and which would also account for day-dreaming phenomenon. This mechanism could even, in instances of “excessive seepage,” result in an overlap of the dream-vision mechanism into the waking world; he opines that “such an overlap may occur in some schizophrenic patients, where a desynchronized dream mechanism allows the intrusion of dream chemicals into the waking state” (p. 120). Callaway justified the proposal of such a mechanism on the known role that beta-carbolines (a group of psychoactive indoles) play in transmitting *exogenous* tryptamines, such as Ayahuasca (a DMT derived herbal-meditative mixture used in South America).

In other words, given that we already know that the human body contains these beta-Carbolines, one distinctive role of which is to communicate psychoactive exogenous chemicals, and given that similarly psychoactive effects are known to occur *naturally* in humans *without* exogenous intervention (i.e., dreams, which can and do occur in humans who have never

ingested any psychoactive compounds), it is bio-neurologically reasonable to postulate that the human body itself creates and inter-mediate something similar (or identical to) the exogenous psychoactive chemicals we are aware of.

To be clear, Callaway's early theory did not argue that "DMT caused dreams," but focused more on beta-Carbolines as playing a mediating role with whatever chemical or chemicals were principally responsible for dream visions. He did argue that tryptamines serotonin/melatonin may play a role, though, pointing out that Melatonin, like serotonin, "is produced primarily in the pineal gland... during the sleep cycle of most animals studied, including humans, the levels of serotonin decreased while the levels of melatonin increased [due to serotonin being converted into melatonin] (p. 122)." REM stages and dreams tend to reach their peaks co-incidental to melatonin's peak, and authors debate whether or not the pineal gland produces DMT, while also debating that if does produce DMT, whether or not it produces a sufficient amount to elicit dream visions.

Callaway's hypothesis somewhat frustratingly (to psychonauts and scientists who specialize in altered consciousness, dream consciousness, etc.) still more or less remains in the stage of a hypothesis, even thirty years after the fact. To date, there have been no smoking gun proofs to explain conclusively why or how we dream, the role that DMT plays (or doesn't play) in dreaming, and what the exact mechanism of dreaming *is*. Nevertheless, Callaway's hypothesis is plausible in light of a better explanation, and despite any conclusive proofs, DMT has arose as a very popular and attractive explanation of why our dreams can be presented so vividly to us.

### **Richard Strassman on DMT and Dreams**

One of the world's foremost authorities (if not *the* foremost authority) on DMT is Dr. Richard Strassman, a clinical psychiatrist who has conducted a variety of studies on DMT, including self-reports of the drug's effects. His (2000) *DMT: The Spirit Molecule: a Doctor's Revolutionary Research into the Biology of Near-Death and Mystical Experiences* has been something of a disruptive force in popular and professional psycho circles. In a (2018) interview, Strassman was credited with having popularized the notion that DMT is produced during dreams and also near physical death, to which he deferentially replied that "those were educated speculations rather than objective data and that "we don't have [enough] information about dreams yet, though" (paras 4-5). He nevertheless noted that while the extant stage of research into DMT and its role in dream visions is infantile, that his "speculations" have still spurred on bona fide research which might be able to provide some real answers eventually.

In *The Spirit Molecule*, Dr. Strassman entertains a plethora of these "educated speculations" regarding the role of DMT in dreams. One of the most notable findings of Strassman from one subject to the next (he conducted DMT experiments not only on himself but with willing participants) was that many participants who took DMT were initially convinced they were dreaming, and then realized that whatever they were experiencing (hyper-colorful visualizations, alien encounters, encounters with preternatural creatures, etc. were all common across participants and are common themes in the "trip literature" online) was really happening. As one participant put it,

If you have a wonderful dream and bring a rose back with you and then you wake up and the rose is in your hand, that meant the dream was real. When I came home and saw the bruises and the holes in my arm [from the DMT injections] I really felt like that—that it really did happen, and that I really was where I was, and felt what I felt (part 11).

Explaining his own experiences, Strassman noted that

Maybe what our volunteers encountered was a vivid hallucinatory experience, resulting from DMT activation of brain centers responsible for vision, emotion, and thought. After all, people dream and are completely swept up in the reality of the experience at the time. The rapid eye movements that sometimes took place in our subjects may have indicated the presence of a ‘waking’ dream state (part 11).

But he concludes with relative incredulity to the idea that exogenous DMT is merely endogenous DMT “but awake,” given that unlike dreams, participants—even and *especially* after the fact—were unwilling to explain their experiences away as being “just a dream.”

### **Could DMT still be the “Dream Molecule?”**

So clearly, there are some difficulties in explaining dreams as the simple product of endogenous DMT, given that people do not tend to view dreams retrospectively as “real,” whereas those who take DMT characteristically *do* view their experiences as real. Even particularly vivid dreams that “seem so real” upon waking are eventually understood to have never have “actually” happened by the dreamer.

Aside from this notable difference, there is still broad overlap. Neuro-phenomenologically, there are perceptive, imaginary, emotional, and sensory similarities between DMT and dreams, which makes them quite analogous to lucid-dreaming, and generally analogous to dreaming (Kraehenmann, 2017). One of the great paradigmatic and conceptual challenges with studying DMT’s effect on dreaming is that there is no real frame of reference for doing so. Psychedelic experiences represent the closest known phenomenon to dreaming, and while they make for a general analog, there are notable differences which can confuse the issue and lead researchers to argue that DMT doesn’t influence dreaming at all (e.g., Nichols 2017).

Not only are the amounts of DMT produced by the pineal gland (the same gland which produces melatonin) relatively small, the categorical differences between a waking and sleeping individual are profound, especially in the area of self-awareness.

But it is certainly possible that the differences in effect between exogenous and endogenous DMT are simply a matter of degree. Perhaps DMT *does* mediate dreams, but is endogenously regulated in small amounts to not provide the same lasting impression that exogenous DMT ingestion does. This would be consistent with Callaway's earlier ideas about a carefully regulated mechanism that occasionally "bleeds over" into the waking state; DMT (in this model) would normally be produced only in small amounts concurrent with circadian sleep cycles although occasional (unexplained) defects would result in DMT presenting during waking cycles, which would explain the hallucinogenic experiences of schizophrenics. While Strassman's early work made something of a clear line of demarcation between dreams and DMT, later studies he edited attempted to form more of a cohesion between the two (Sanz, Zamberlan, Erowid, Erowid, and Tagliazucchi, 2018). While it's clear from the literature on DMT that there is a stronger, lasting impact on exogenous DMT users, that may be more of a difference in effect than in actual experience. In terms of phenomenological experience, the similarities between exogenous and endogenous DMT are much closer to parity. Therefore, it is plausible to suppose that endogenous DMT really does mediate dreams, and its lower dosage (and possibly also its co-incidence with melatonin's effects) does not communicate the same dramatic profundity of lasting impact as exogenous DMT.

### **Inadequate Research on and Understanding of DMT**

The tentative tone of any exploration into DMT's role in dreaming is that it is simply not well understood yet. Even the world's leading authorities on the chemical hedge their confident



assertions about it. As Carbonaro and Gatch (2016) explain, “infrequent and inadequate sampling methods used over time make it difficult to determine specific details pertaining to DMT production in the body”, including ambiguity over production frequency along with the fact that “measurable concentrations seem to only occur intermittently” (Carbonaro and Gatch, Sec. 2.5). Thematically, it is appropriate that a chemical responsible for such profound and interactive hallucinogenic experiences would prove to be as inexplicable as experiencing DMT’s effects.

One of the difficulties in further understanding the role that DMT plays in dream visions is the constant convergence of mysticism and strange, poorly understood experiences combined with the extrinsic limitations that scholars have already noted regarding our generally inadequate understanding of endogenous DMT in the first place. It is one thing to have a poor understanding of the chemical, but this is exacerbated by the fact that DMT’s existence is inseparable from a whole host of intimate, emotional, and inexplicable human experiences (not just dreams themselves but out of body experiences, near death experiences, meditation, lucid-dreaming, psychedelic ingestions and experiences, etc.). Even Dr. Strassman’s theories from *The Spirit Molecule* have taken on something of a life of their own and transcended the empirically verifiable. His tentative conclusion is essentially that DMT’s primary role in nature are its psychedelic effects on the brain and that its presence during vaginal birth as well as at the point of death “bookend” entry and exit from this world, even opining that its absence during C-section births explains in part why adults who were not born vaginally suffer psychological disturbances later in life. As Gallimore (2013) puts it, “Strassman has certainly left the scientific arena by this point and sits squarely within metaphysical territory” (p. 485). Gallimore offers this not as a criticism of Strassman, but an observation.

### **Tension in the Literature and Questions that Can't be Answered**

The point being that studies of DMT, even if their authors don't want them to be, tend toward dichotomous propositions with a certain amount of emotional charging. Skeptics assert that DMT doesn't really do anything endogenously, or if it does anything at all it simply plays an anxiolytic role not wholly dissimilar from the pleasant effects of other drugs (Nichols, 2017; Jacob and Presti, 2005). The more engaged and experienced researchers of DMT are hardly satisfied with this explanation, but tend toward more metaphysical explanations. Concurrently, Gallimore's conclusion is simply that "the paradigm of modern materialist neuroscience fails to provide a straightforward explanation for DMT's remarkable effect on human consciousness" (p. 498). There seems to be a fair amount of truth in this. The problem in quantifying DMT's role isn't just a problem with lacking the right scientific tools (although that hasn't helped), but with lacking the right paradigms. There is arguably nothing more elusive, inexplicable, fantastic, and still yet *perfectly common* to human experience than a dream. It does not fit comfortably into the paradigms of materialism, and while scholars and researchers are attempting to find some biological basis for them (and very well may), such a basis is hardly going to make an experiential difference.

To expound, suppose it is discovered conclusively that the pineal gland does in fact produce a sufficient amount of DMT to affect dream visions, and that this occurs in a diurnal cycle, and further that this amount while sufficient is only a fraction of an exogenous ingestion, and this low dosage combined with an interaction with melatonin accounts for the fact that dreams "feel real" but at the same time a dreamer can ultimately convince themselves that what they dreamt "didn't actually happen." This fails to account for everything that makes dreaming

and DMT interesting. Bio-evolutionarily, why do we dream at *all* since dreaming is not known to serve an adaptive function (Galliman, 2013)? Neuro-evolutionarily, why is DMT endogenous? As Powell (2009r) puts this question, “our brains have enkephalins as natural opiates that reduce pain, and melatonin, which induces sleep after the sun goes down, but why would brains have molecules that cause [out of body experiences and hallucinations]?” (p. 224). Those are just a few perfectly natural questions that arise when considering DMT and dreaming that undermine scientific materialism, and even discovering the exact dream mechanism won’t answer.

### **Conclusion**

Knowing that and how DMT “causes” dreams doesn’t tell us why it causes specific dreams. What makes dreams stand out is not just the fact that they can be vivid, but that they are packed with what seems like relevant, sometimes even mystical content. Knowing the dream mechanism doesn’t tell us why a dreamer’s dream involved an encounter with a deceased loved one, or why that encounter was good or bad, or why it made them feel inspired or depressed, and so on. The question “what causes dreams” and “why do we dream what we do” are completely different questions even though they seem very related. While we may be able to eventually isolate the exact “dream mechanism” and it very well may be DMT, none of the deeper level questions about *why* we dream or why we dream what we do are answered, and in principle those aren’t questions that can be addressed by materialism anyways. So there may be an enduring and inevitable sort of discontent and disappointment when looking to science for answers about the dream state. As much as it may be able to explain the physical constructs that make the dream state possible, that no more explains the existence and nature of dreams than knowledge of aeronautics can tell us why someone took a vacation.

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