Devotion and Awe

The Biopsychological Basis of Peak Propensities

Richard Maxwell

The human body is a "biological machine" which is "goaded by propensive propulsion," that is, by mental propensities which motivate all overt or covert activities (Sarkar, 1994c, p. 153). The concept of mental propensities is somewhat analogous to the concept of emotion in a broad sense. The term "emotion" came into general use in the English language in the 1800's, being preceded by various categorizations including "appetites," and "sentiments" and the distinction between "passions" and "affections," respectively referring to "evil propensities" and "virtuous propensities" (Dixon, 2012, p. 339). Consistent with the notion that propensities may be a meaningful way to conceptualize emotions, a more modern perspective considered all emotional states to involve a change of some sort in action readiness (Frijda, 1988). From this perspective, an emotion is a feeling state that modifies the motivational inclination to engage in some form of action, which is well represented by the term mental propensity. In yogic literature, mental propensities are referred to as *vrttis*.

One conception of vrttis has been attributed to the ancient yoga scholar, Patanjali, who compiled information from several traditions into a set of aphorisms (*sutras*). In that version of vrttis, five forms of mental vascillation were described: correct perception, misconception, imagination, sleep and memory (Stiles, 2002). These five propensities have also been described as: forms of proving conceptions (based on perception, inference or authority), defective cognition, conceptions that vary from normal forms of meaning, sleep/mental vacuity, and memory/mental regeneration of past experience (Ánandamúrti, 1988b).

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A second vrtti conception that available records suggest developed more recently (Hatley, 2024) is related to cakras. Most people have some familiarity with the yogic concept of *cakras* that are energy centers at various locations in the body which are said to influence mental functioning (Goswami, 1999; Maxwell, 2009). In this second framework, vrttis are components of the cakras. Cakra vrttis are present only in a few yoga systems (including Avalon, 1913, 1974/1919; Goswami, 1999), and are most developed by Shrii Sarkar (Sarkar, 1994b). Beyond specifying vrtti qualities, vrttis were considered to arise from the magnitude of glandular secretions occurring in regions of the body related to each cakra. However, no specific hormones were ever designated for the vrttis (e.g., Sarkar, 1994a, 1994b).

There are 50 vrttis in Shrii Sarkar's system. The focus of this analysis will be on the peak vrttis, the 49th and 50th, which are associated with the *ájiṇá cakra*, the sixth cakra. Those peak vrttis were proposed to arise from fluctuations in pituitary hormone levels. The yogic terms for those vrttis are *pará* and *aparā*, respectively representing spiritual knowledge and mundane knowledge (Sarkar, 1994b) and visualized as the two petals of ájiṇá cakra. (See Figure 1.) Other than Shrii Sarkar, those that have described cakra vrttis have neglected to name vrttis for ájiṇá cakra, despite noting the presence of two petals for that cakra (Avalon, 1913, 1974/1919; Goswami, 1999).

The following analysis will provide a summary of yogic conceptions of pituitary activity, how those may relate to emotional feeling states that one may experience in relation to the two ájiṇá cakra vrttis, and what pituitary hormonal activity may promote those states. A designation of specific hormonal secretions for any of the cakra related vrttis has never previously been published, to the best of the author's knowledge.

Figure 1. *A representation of the basic 7 cakras, including their petals and forms. Each of the cakra petals represents a particular vrtti. Digital artwork created by Aaron Stangl (ayurvedaposters.com), and used with permission.*

Psycho-Spiritual Analysis of the Pituitary

A somewhat complex description of lateralized functions has been provided for the pituitary. The pituitary's "left wing" (pará vrtti) was considered to control "rightistic propensities" which "pave the way to supra-consciousness." The "right wing" (aparā vrtti) was considered to control "leftistic propensities" which have a "degenerating and depraving effect" (Sarkar, 1994a, p. 98). In a different work, this was explained further in relation to subtle energy currents (*iḍá* and *piuṇgala*) which were lateralized, iḍá being associated with rightistic propensities and piuṇgala with leftistic (Ánandamúrti, 1968). The energy currents are too complex a topic to explore here, but right and left are not distinctions used when describing the pituitary in physiological scientific literature. This quandary may be clarified by indications that processing of human emotions is lateralized in the brain.

In a review of 50 years of laterality research, one of the earliest researchers assessing asymmetries in hemispheric processing of emotion provided a useful perspective from which to interpret right and left pituitary distinctions (Gainotti, 2019). In Gainotti's perspective, research has demonstrated that the right hemisphere (which controls the left side of the body) specialized earlier in evolution as an automatic emergency adaptive emotional system, facilitating essential rapid responses for survival. As such, it emphasized management of more severe, danger-related negative emotions using limited conscious awareness. In contrast, the left hemisphere (controlling the right side of the body) developed verbal expressive capacity that included verbal cognitive processing, greater conscious awareness and intentionality. As a result, the left hemisphere has a tendency to express more positive and socially oriented emotions that are not urgent survival needs. This formulation is consistent with Shrii Sarkar's distinctions (although people without typical handedness may be different). The control of the left hemisphere is associated with control of the right side of the body and "rightistic propensities," ones that are elevating. The right hemisphere is associated with control of the left side of the body and "leftistic propensities" that are inclined to be degenerative. While this may make sense, it still needs to be determined how this relates to the pituitary. That will be examined in two later sections associated with the pituitary hormones. Pará and aparā will be examined individually in the next two sections.

Spiritual (Intuitional) Knowledge/Pará Vrtti

The basic concept of the spiritual knowledge propensity is that it "aims at the subjectivization of the internal objectivity." Subjectivization in that sense means to takes one's individual subjective "I-ness," focus it, and merge it into the "ultimate subjectivity" of Universal Consciousness (Ánandamúrti, 1999, p. 101). This process has been directly associated with devotion. At its fullest, devotion has been described as "being merged in the constant thought of God" (Ánandamúrti, 1996, p. 35), and being "identical with love. …The moment devotion is aroused, love for God comes" (Ánandamúrti, 2024b, p. 11).

Spiritual love is in a separate category from more worldly forms of love. "Love and passion are mutually antagonistic tendencies. The attachment for a finite thing is an expression of extroverted energy, whereas the attraction for the Infinite is an expression of the introverted energy. That is why these two can never co-exist. Therefore, the aspirant has to skillfully transform passion into love (Ánandamúrti, 1971, p. 80)." In other words, 49 propensities are forms of crude, or more subtle, but still externalized longings/feeling states. For spiritual development, those propensities must be systematically internalized, and converted into the 50th propensity (pará) which represents devotional love. That is a process of channelizing and directing all vrttis to the devotional subject, the one Universal Consciousness (God) described by many different names (Ánandamúrti, 2024a).

Devotion, associated with the 50th vrtti, has a special role. "Without devotion, one's mind cannot rise beyond the pituitary gland [ájiṇá cakra] – if one wants to take the mind beyond that, one needs devotion. So, the supreme spiritual progress of microcosms is never possible without devotion" (Ánandamúrti, 1992, pp. 44–45). "At such a stage all propensities, all entities, become calm and tranquil. …the state of Yoga is a state of the tranquility of the organs (Ánandamúrti, 1968, p. 99)." These assertions imply that achieving tranquility or a balanced state of homeostasis within the organs is necessary in addition to promoting self-transcending devotional love. This may also demonstrate the importance and contribution of the broader set of yoga practices which facilitate not just mental tranquility, but also tranquility within the body's physiology.

Mundane Knowledge/Aparā Vrtti

While the relationship of devotion with pará vrtti has been described extensively, there has been no similar elucidation of a feeling state for aparā. Similarly positioned at the pituitary, aparā has been described as mundane knowledge, representing an impermanent and imperfect process which "seeks to subjectivize the external objectivity" (Ánandamúrti, 1999, p. 101). Being associated with ájiṇá cakra and the pituitary, aparā should nevertheless represent a propensity that is relatively subtle. In contrast, progressively lower cakras and their associated glands would have increasingly cruder qualities for their vrttis.

Despite the greater importance of pará, the importance of both pituitary vrttis has been emphasized. "When both sides of the pituitary plexus are fully developed and fully utilized, one attains apexed intellect (Sarkar, 1994a, p. 98)." "Apexed intellect" refers to the fully focused point at which the last awareness of individual I-ness exists within the mind. Through this pointed intellect, spiritual aspirants can come in closest proximity to the Universal Consciousness while retaining self-awareness (Ánandamúrti, 2018). Thus, a relationship with external reality must be developed to unify knowledge of that external reality with a devotional internal reality. "…the correct course is to gain the maximum Pará knowledge and along with it to acquire such and so much of Aparā knowledge as may be found helpful and necessary while dealing with the external objectivity (Ánandamúrti, 1999, pp. 101–102)." That state of pointed intellect with the proper mix of pará and aparā facilitates the ultimate complete devotional surrender of the ego.

So, what feeling state, analogous to devotion's relationship with pará, could be related to aparā? One possibility could be that mundane knowledge refers to lesser forms of devotion, ones that are externally oriented. One description of devotion (*bhakti*) divides it into two types, superior and inferior (Ánandamúrti, 1971). With the inferior, fulfillment of various kinds of personal desires are sought from the One worshipped. In contrast, the superior category would represent pará in which there are no personal desires, except to express love to the one Universal Consciousness.

While the distinction of superior and inferior could represent the two vrttis, pará and aparā, all vrttis have been considered to have varying degrees of expression as a result of the magnitude of their

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particular hormonal secretions. If the hormonal state associated with pará is relatively imbalanced or weak, it would be expected for that devotion to be weaker, with other vrttis remaining active, coloring devotion with personal desires. When devotional longing is constrained by other desires, it would represent an "inferior" form of devotional longing, but that would still be a form of devotion, and not a separate vrtti.

A reasonable place to search for a relatively subtle feeling state that has qualities that could represent apará is in the work of Abraham Maslow. Maslow conducted a psychological study of strong spiritual experiences, which he called "peak experiences." Peak experiences were found to include "emotions" of wonder, awe, reverence, humility, surrender and worship, in addition to a temporary loss of fear, anxiety, confusion, conflict and a variety of other characteristics (Maslow, 1964). Examining Maslow's six peak emotions, together with Sarkar's distinction of subjectivizing internal versus external objectivity, may provide a relevant framework to distinguish aspects of pituitary vrttis.

Maslow observed that a quieting of challenging negative emotions occurred first, before achieving peak experiences, which is consistent with the earlier spiritual process of balancing lower vrttis. With peak experiences, some of Maslow's suggested peak emotions are more devotional and appear related to pará vrtti, spiritual knowledge, while others appear more externally oriented and related to apará vrtti, mundane knowledge. For example, worship has been described as part of a devotional process. "The word Bhakti (devotion) means worshiping….Bhakti signifies longing for the Supreme (Ánandamúrti, 1971, p. 68)." Surrender may also be related. It

involves a release of ego control. The most complete surrender is unconditional (Ánandamúrti, 1988a), and a natural component of superior devotion.

The remainder of Maslow's peak experience feeling states, awe, wonder, humility, and reverence, are more externally oriented. Awe has gotten the greatest attention, being described as arising from the perception of vastness, or power, that went beyond normal frames of reference, requiring a major restructuring of referential frameworks (Keltner & Haidt, 2003). Many different dimensions of experience can have the potential to trigger awe, including environmental, physical, cognitive, social and spiritual. Awe-inducing experiences were considered capable of producing rapid and dramatic personal change and growth. Subsequent experimental induction of awe found awe to include the sense of being in the presence of something greater than oneself, feeling personally connected with the surroundings (Shiota et al., 2007), and also promoting prosocial behavior (Piff et al., 2015).

In the yogic literature of Shrii Sarkar, what has been translated as awe has been mentioned infrequently and in a negative context. For example, it was considered natural for individuals to "fear and hold in awe what is beyond their own limitations" (Ánandamúrti, 1970, p. 113). That kind of enhanced stature may come from superior strength, education, intelligence, wealth, social status, etc. The combination of fear and awe has also been described as a means to exploit others, particularly women, to make them submissive in the name of religious dictates made by (male) authorities (Sarkar, 1995). This has included the double standard of holding women to a high moral standard, while ignoring male immorality. Another problem is the implication for how one relates to the Divine. A healthy spiritual perspective has been considered to have a direct loving (devotional) relationship with the Divine (Ánandamúrti, 1971), but even relatively positive awe may lead many to an irreconcilable separation. "They cherish a certain degree of awe in their minds for *Parama Puruśa* [Universal Consciousness/God]: 'My Lord is the Supreme! How Great He is! How then can I go near Him?' (Ánandamúrti, 2021, p. 118)."

While awe is typically classified as a positive emotion (e.g., Fredrickson, 2013), psychological research agrees there can be negative aspects of awe. In a study of threat-based awe (awe induced by overwhelmingly powerful and threatening circumstances), there were increased feelings of powerlessness and fear, in contrast to positive awe which was associated with increased well-being (Gordon et al., 2017).

Meditation research has emphasized effects on physiological measures including autonomic parameters, and largely neglected consideration of underlying hormone states.

The other emotions in Maslow's set of peak experience emotions have all shown relationships with awe. This includes wonder (Fingerhut & Prinz, 2018), reverence (Ai et al., 2017), and humility (Stellar et al., 2018). The correspondence of humility, reverence, and wonder with awe, and their typically extroverted focus, supports the conclusion that awe can be considered the superordinate representative of a group of emotions that represents the subtle feeling state associated with apará vrtti. As Shrii Sarkar emphasized, as expansive as awe may be, awe is in relation to something else. Awe includes a fundamental separation between self and other. As a result, awe represents well the potentially strong spiritual qualities present in the nature of apará vrtti that would be expected for its ájiṇá cakra location.

It might be asked why a feeling state such as compassion is not also represented in apará. Compassion's feeling state may be more directly relevant in relation to a *vishuddha* (fifth cakra) vrtti, such as the "desire for universal welfare" of the *sváhá vrtti* (Ánandamúrti, 1993, p. 101). The increased prosocial behavior associated with awe, does not mean that prosocial behavior is part of awe's characteristics. Much prosocial behavior can also arise from devotion. Similar to compassion, forms of prosocial service may be associated with other subtle vishuddha vrttis.

Pituitary hormones will now be explored for how they may be related to pará and apará.

Posterior Pituitary Hormones

The pituitary has two lobes, one considered posterior and the other anterior. The posterior pituitary does not synthesize the hormones it releases. Those hormones are synthesized primarily in the neurons of the supraoptic and paraventricular nuclei of the hypothalamus. The axons of those neurons form a tract (hypothalamohypophyseal tract), transporting the hormones and releases them in the posterior pituitary. (See Figure 2.) Two primary hormones are released from those axons: **oxytocin** (**OT**) and **vasopressin** (**VP**). VP is also known as arginine-vasopressin in humans, and **antidiuretic hormone** (Rosol et al., 2013). The physiological functions of OT include promoting uterine contractions during childbirth and milk release from the breast tissue. VP promotes vasoconstriction and reabsorption of water from the kidney's collecting duct system, and ensures the equilibrium of intracellular and extracellular water contents. To accomplish those functions, the two hormones enter the blood supply from the posterior pituitary.

OT and VP also have complex involvement in mood, stress-response regulation and related behaviors (Kupcova et al., 2022). OT plays an important role in social recognition and bonding. Research has also associated OT with trust, empathy, and cooperation, in addition to broader effects on sensory, autonomic, visceral, and motor systems (Carter, 2014). Clinical research with humans has had varied findings, but targeting the OT system may provide a meaningful therapeutic approach for some forms of social dysfunction (Kendrick et al., 2018). Animal research has also demonstrated that OT plays a role in male and female sexual behaviors, although this is not clear in humans (Melis & Argiolas, 2021).

VP has been associated with attachment to and defense of self, family, and other members of social networks (Carter, 1998) which includes maternal aggression and paternal defense of the young. VP has been identified as a key regulator of social cognition, communicative behaviors, the balance of aggression and cooperation, and influencing the interpretation of social circumstances that activate empathy and other prosocial behaviors (Crespi et al., 2022; Du et al., 2024).

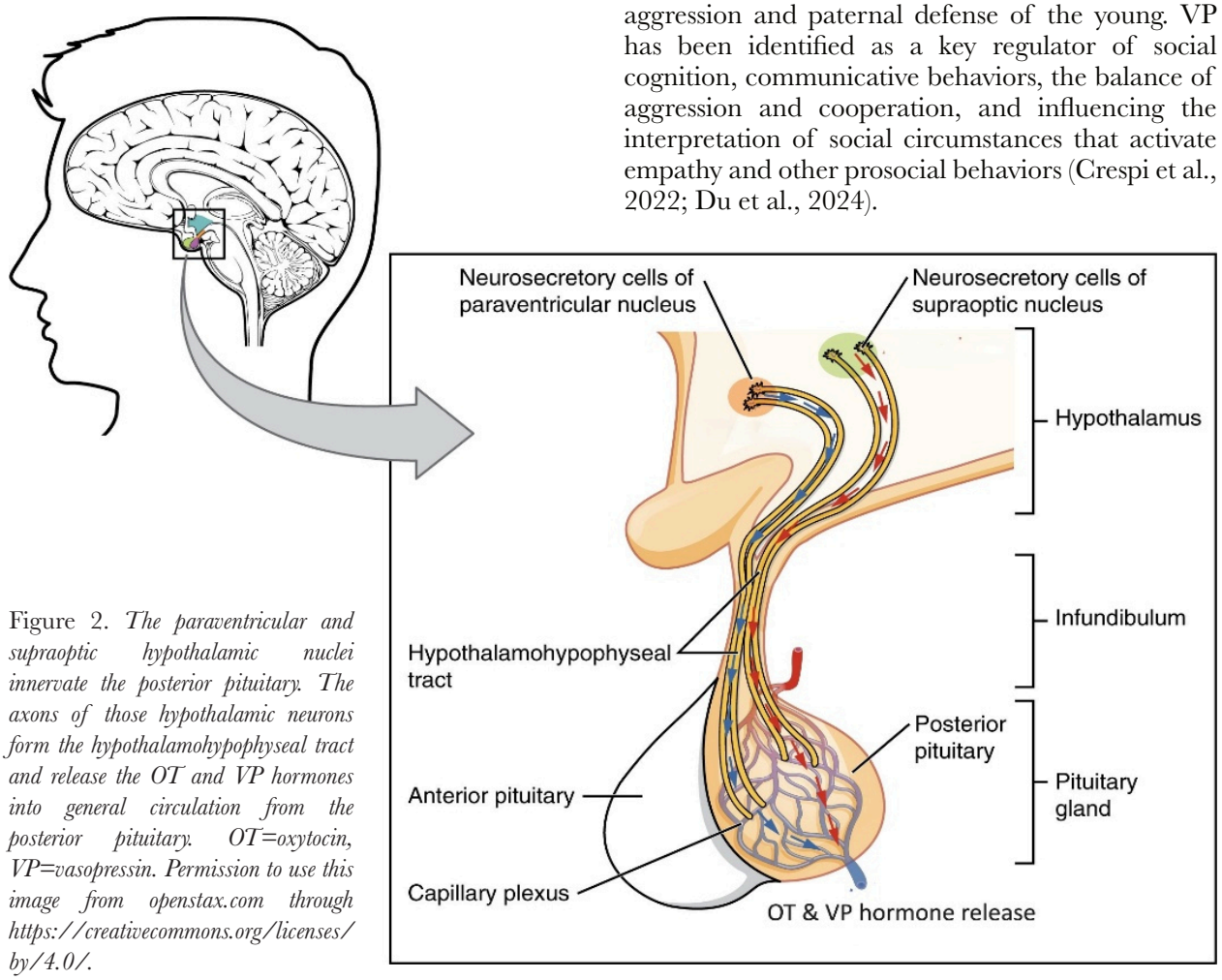

Figure 2. *The paraventricular and supraoptic hypothalamic nuclei innervate the posterior pituitary. The axons of those hypothalamic neurons form the hypothalamohypophyseal tract and release the OT and VP hormones into general circulation from the posterior pituitary. OT=oxytocin, VP=vasopressin. Permission to use this image from openstax.com through https://creativecommons.org/licenses/by/4.0/.*

Perhaps of interest to yogis, an unusual effect was shown in an animal experiment as a result of extended water deprivation. That water deprived condition caused increased blood levels of VP and also a significant increase of blood melatonin concentrations. The source of VP's elevation may have been due either to circulating VP released from the posterior pituitary, or from branching hypothalamic VP fibers directly activating the pineal (Barassin et al., 2000). That uncertainty demonstrates the complexity often present when attempting to interpret activity in hormonal systems. At least under extreme conditions, this research indicates that VP may stimulate melatonin release from the pineal gland, considered associated with sahasrára cakra, the seventh cakra. If this is valid, individuals who fully observe the yogic practice of periodic 24 hour fasting, taking no food or water during that period (Ánandamúrti, 2011), could experience an elevated pineal melatonin release. Melatonin has been considered to have a possible relationship with spiritual experience, but discussing melatonin is beyond the scope of the current work.

VP hypothalamic neurons do send branches to multiple sites outside of the hypothalamus, especially limbic regions, influencing emotional responses during stress coping and motivational behaviors. VP has been implicated in the regulation of circadian rhythm, body temperature, social behavior, and social cognition and emotion, including psychiatric disorders such as anxiety, depression and post-traumatic stress disorder (Rotondo et al., 2016).

OT fibers from the hypothalamus going to the posterior pituitary, also branch to many other areas of the brain. In humans, a high density of OT receptors is present in the amygdala, hippocampus, cingulate cortex, and nucleus accumbens, which play key roles in human socio-emotional behavior. In some cases, these overlap those involving VP (Christ-Crain & Ball, 2000). Both OT and VP neuron branches from the hypothalamic paraventricular nucleus can regulate autonomic functions via brain stem and spinal projections (Lozić et al., 2018; Tsai & Kuo, 2024). These effects of branching fibers are technically not from the posterior pituitary, another example of the complex interaction between glandular systems, and the central and the autonomic nervous systems.

This description of OT and VP is limited and does not represent the full complexity of these not fully understood hormones. Further, it is difficult to distinguish OT and VP effects from each other, because each can activate the other's receptors (Song & Albers, 2018). Therefore, OT and VP have recently become viewed as a joint OT/VP system (Korenberg, 2024). Korenberg further speculates that this OT/VP system, which has been shown to have a major role in self/other distinctions, may also have the capacity to produce an abstract distinction that distinguishes the ultimate "Other," commonly referred to as "God." Korenberg did not consider spiritual systems that recognize non-dual states, transcending all self/other distinctions and therefore may be underestimating the potential of this system if adequate devotional intensity is present. There is at least some truth to Korenberg's specultation. Administration of intranasal OT into both nostrils shortly before a period of guided meditation increased self-reported spirituality (represented most strongly by feelings of interconnectedness, and belief in a larger meaning and purpose in life) and this effect remained significant a week later (Van Cappellen et al., 2016). Thus, the OT/VP system does appear strongly connected to spirituality of some form, and a reflection of the elevating rightistic qualities of pará.

If people want to control the excitement of this or that propensity, they must rectify the defects of related glands. Asanas help practitioners to a large extent in this task, so they are an important part of spiritual practice. Additionally, dietary and behavioral restraint can assist in maintaining proper glandular balance.

Anterior Pituitary Hormones

The anterior pituitary synthesizes its own more extensive set of hormones that are triggered by releasing factors produced in the hypothalamus. Those releasing factors are secreted into a circulatory portal system which links with the anterior pituitary (Hiller-Sturmhöfel & Bartke, 1998). (See Figure 3.) The major hormones released by the anterior pituitary generally target specific functions of lower glands (Spencer & Deak, 2017).

They include **thyroid-stimulating hormone**, triggering the secretion of thyroid hormones thyroxine, or T4, and triiodothyronine, or T3; **adrenocorticotropic hormone** (**ACTH**), activating adrenal cortisol and androgen production in the adrenal cortex; the gonadotropins: **follicle-stimulating hormone**, stimulating the production and maturation of sex cells, sperm in males, and ova plus estrogen in females; and **luteinizing hormone**, triggering ovulation and release of estrogen and progesterone in women, and the release of testosterone in men; human **growth hormone** (**GH**), also known as somatotropin, inducing growth in almost all tissues and organs of the body, especially during adolescence; and **prolactin**, stimulating milk production and development of breast tissues; (Rosol et al., 2013). The anterior pituitary also produces a group of **melanocortins**, also known as melanocyte stimulating hormones, which contribute to skin color and are important in energy metabolism (Kim et al., 2014) and management of inflammation (Luger et al., 1997).

Greater complexity is present in these hormone systems than that basic description. The endogenous opiod **enkephalin** accompanies the production of growth hormone (Weber et al., 1978). Enkephalin has been shown to be extensively involved in subcortical reward circuitry and is disturbed by drugs of abuse (Rysztak & Jutkiewicz, 2022). Similarly, most cells which release ACTH also contain and release **β-endorphin**, another endogenous opiod (Osamura et al., 1980), notably during strenuous exercise, excitement, pain and orgasm, producing analgesia, a sense of well-being and the "runner's high" (Koneru et al., 2009).

Relevant to a spiritual focus, one study that compared runners with a form of concentrative yoga meditation, found that both runners and meditators had increased hypothalamic corticotropin-releasing hormone (CRH) which directly activates ACTH and the hypothalamic-pituitary-adrenal (HPA) axis, and this correlated with increased positive affect (Harte et al., 1995). The increased positive affect was considered potentially related to β-endorphin release, secondary to the

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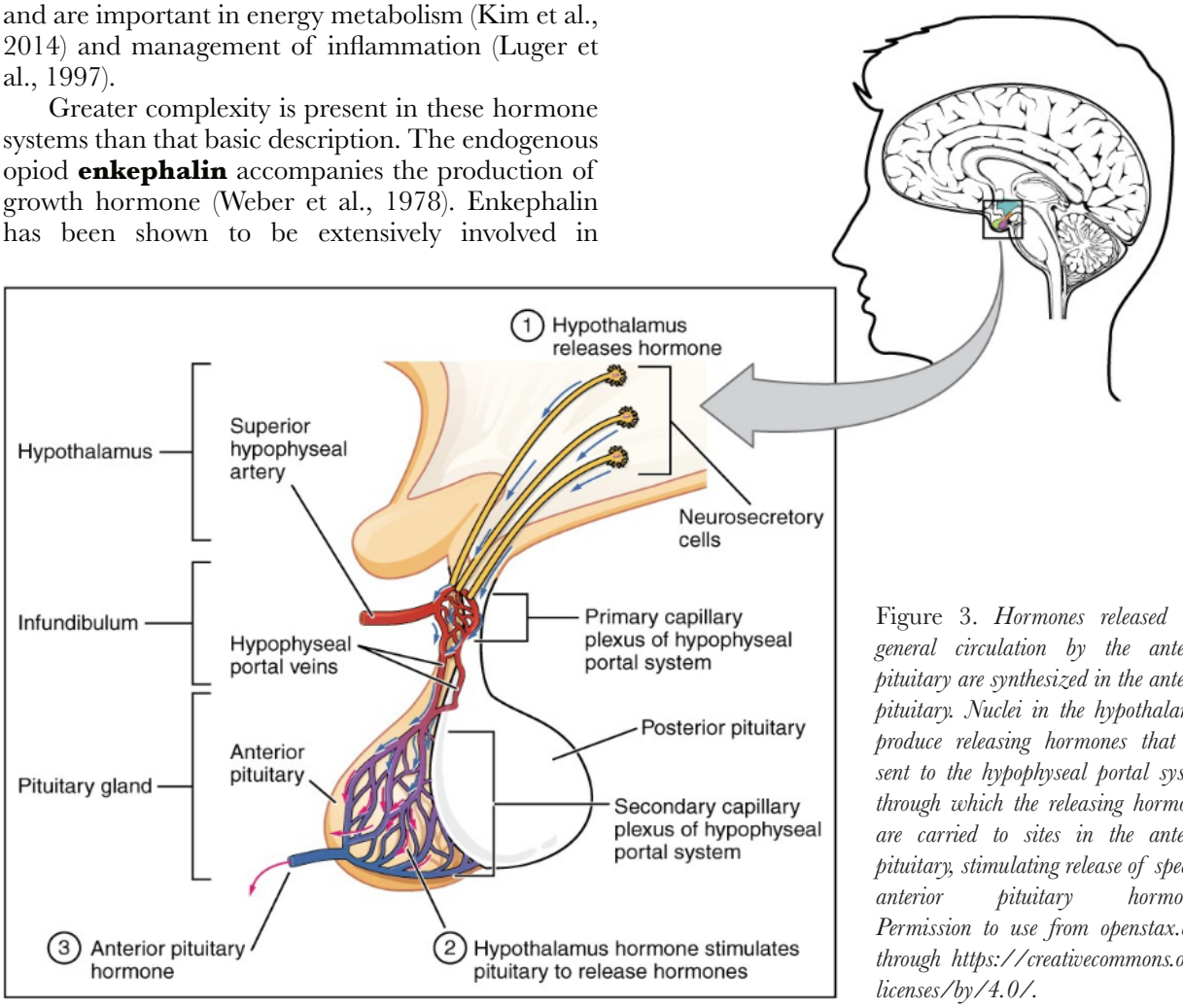

Figure 3. *Hormones released into general circulation by the anterior pituitary are synthesized in the anterior pituitary. Nuclei in the hypothalamus produce releasing hormones that are sent to the hypophyseal portal system through which the releasing hormones are carried to sites in the anterior pituitary, stimulating release of specific anterior pituitary hormones. Permission to use from openstax.com through https://creativecommons.org/licenses/by/4.0/.*

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CRH activation of ACTH. This was the first time that a CRH increase had been observed in an activity that was not overtly physically stressful, implying that the mental activity of yogic concentrative meditation promoted the CRH release and HPA axis activation.

The hypothalamic neurons which release CRH into the portal system to trigger ACTH release also contain VP. CRH typically has the primary releasing effect, but during acute psychosocial stress VP amplifies the release of ACTH (Mavani et al., 2015). During chronic stress, the HPA axis regulation switches from CRH to VP. This has been interpreted as VP having a primary role in the HPA axis adaptation to long-term stress (Rotondo et al., 2016). Thus, the hormones of the two lobes of the pituitary do not function entirely independently. This demonstrates another form of complexity in hormonal control systems, plus the importance of managing stress and physiological balance, or tranquility and homeostasis.

The HPA axis is generally activated when internal or external (environmental) conditions

deviate from the norm or what is expected, resulting in increased circulating glucocorticoid levels (primarily cortisol in humans). Research indicates that it is critical to maintain an appropriate balance of HPA axis activity, as both insufficient and excessive cortisol signaling (reflecting a potential vrtti of the mańipura cakra, third cakra) may contribute to various disorders including anxiety and trauma-related behaviors, depression, overeating and obesity arising from daily life stressors, as well as promoting or disturbing some types of memory and learning depending on the degree of change (Packard et al., 2016). This variability in hormone activity is consistent with how vrttis are generally thought to fluctuate (Avdk. Ananda Nivedita, 1999).

Analogous complex interactions occur between the hypothalamic-pituitary-thyroid (HPT) axis activity and other hormone systems, including growth hormone, estrogen, testosterone, and cortisol (Feldt-Rasmussen et al., 2021). Proper thyroid function is critical for normal brain development and normal sexual function (Carosa et al., 2018), cognitive function (Rovet, 2014) and avoidance of mood disorders (Ittermann et al., 2015).

Androgen receptors play a crucial role in modulating aggression by mediating the effects of androgen hormones, such as testosterone. Androgen receptors are expressed in various regions of the brain, including the amygdala, hypothalamus, prefrontal cortex, and striatum, which modulate offensive and defensive forms of aggression, plus the motivational and rewarding aspects of aggression and stress-induced aggression. Ultimately, the hypothalamus, specifically the ventromedial hypothalamus (VMH), acts as a central hub that integrates sensory information and hormonal signals to coordinate aggressive responses (Mbiydzenyuy & Qulu, 2024).

Men generally maintain a high estrogen activity in their brain because testosterone is converted to estradiol (a type of estrogen) in the brain. It may surprise some that estradiol present in the brain near birth is the primary determinant of sex differences (Höfer et al., 2013; Konkle & McCarthy, 2011). The normal estrogen fluctuations experienced by women result in times of low estradiol that are most prominent during menopause. This can alter emotional reactivity and the cognitive processing of negative information, especially in women with emotional vulnerabilities. Women have been found to be more quickly responsive to emotional information and to have stronger memory of emotional information than men, particularly during periods of low estradiol. This has been associated with more strongly activated limbic processing in contrast to frontal cortical processing (Albert & Newhouse, 2019).

As a whole, the anterior pituitary's hormonal systems are related to managing physical functions and interactions with the external environment. This makes them good candidates to represent the leftistic propensity of apará.

Vrtti Hormones

The internally oriented elevating rightistic qualities of pará are considered best represented by the function of the entire posterior pituitary with its complex OT/VP system. OT has historically been associated with many forms of bonding, typically mundane forms of social bonding, and has been shown to increase spiritual sentiments when administered intranasally prior to meditation (Van Cappellen et al., 2016). VP has been identified as a key regulator of social cognition, social behavior, stress and emotion in addition to other more physical functions (Rotondo et al., 2016), complementing the "rightistic" elevating qualities historically associated with OT's loving bonding. In a spiritual context, fully expressed devotion, or kevala bhakti and ragatmika bhakti, arises from a relationship of overwhelming love of the Divine (Ánandamúrti, 1988a). Such devotional bonding could lead to a total surrender of one's self-awareness/existential independence, and to an immersion into a state of unlimited consciousness. VP's regulation of chronic stress in the anterior pituitary demonstrates a role on both sides of the pituitary which may facilitate a full activation of ájiṇá cakra.

Externally oriented "leftistic" degenerating and depraving qualities have been associated with with apará, which would best be represented by anterior pituitary activity. Achieving tranquility and homeostasis within just one anterior pituitary hormone system would be unlikely given the anterior pituitary's complexly interactive hormones. If the multiple primarily physically oriented hormonal systems of the anterior pituitary are collectively able to achieve tranquility and homeostasis, that could allow awe's deeper qualities to be achieved, fully expressing the best of apará. If there is activation of endorphins associated with ACTH and/or enkephalins associated with growth hormone, that expanded engagement could yield an ecstatic state, fostering a deep empathic embrace of

the surrounding environment. However, affective systems other than those hormones could also be involved in producing that state.

Imbalances in any of these hormonal systems can have significant and complex effects on affective and cognitive functioning, as well as meditation practices. Several yogic practices offer a natural approach to maintain the balance of hormonal secretions. The most direct is through practicing yoga postures. "If there is any defect in the secretion of hormones or any defect in a gland, certain vrttis become excited. For this reason, we find that in spite of having a sincere desire to follow the moral code, many persons cannot do so; they understand that they should do meditation, but they cannot concentrate their minds because their minds become extroverted due to the external excitement of this or that propensity. If people want to control the excitement of these propensities, they must rectify the defects of their glands. Asanas [yoga postural exercises] help the sádhaka [meditator] to a large extent in this task, so they are an important part of sádhaná [meditation] (Ánandamúrti, 2010, p. 113)." Additionally, dietary and behavioral restraint can assist in maintaining proper glandular balance.

Conclusions

It has been shown that the term "mental propensity" (vrtti) describes well the broad motivational nature of emotion. The association of the pará vrtti with devotion was essentially predetermined by Shrii Sarkar's extensive discussion of that relationship. Based on the work of Maslow, and Keltner and colleagues, the qualities of awe have been found to represent well the nature of apará vrtti characteristics. The most salient interpretation of the hormonal basis of these ájiṇá cakra vrttis is that hormones collectively associated with each lobe of the pituitary are associated with one of the vrttis, pará with the posterior pituitary and apará with the anterior pituitary. Given the potential for interactions among the various pituitary hormone systems, to conclude that only one hormone represented each vrtti would be overly simplistic.

Pituitary hormonal activity can not only modulate multiple other glands besides the target glands and physiological systems, it can also be associated with modulation of autonomic activity, a huge topic that can only briefly be addressed. Both OT and VP axons going to the posterior pituitary can influence autonomic systems via branches to brain stem and spinal locations (Lozić et al., 2018; Tsai & Kuo, 2024). It is possible that related sympathetic activation could help develop the full devotional intensity of pará vrtti. This is suggested by research demonstrating sympathetic activation occurring within concentrative forms of meditation, including Ananda Marga meditation (i.e., Corby et al., 1978; Harte et al., 1995; Kozhevnikov, 2019). Similarly, at a minimum, the HPA axis activity associated with the anterior pituitary has extensive connection with autonomic activity and may help establish critical cortisol balance (Packard et al., 2016). When the whole of anterior pituitary activity is in a balanced state, an expansive tranquility and homeostasis could allow the awe of apará vrtti to be expressed. Increased parasympathetic activity found often in meditation studies, including Ananda Marga meditation, could complement the hormonal process (i.e., Benson et al., 1974; Elson et al., 1977; Katyal & Goldin, 2021; Oman, 2019).

It has been noted that both sides of the pituitary need to be fully developed and fully utilized (Sarkar, 1994a). This supports the idea that a simultaneous combination of increased sympathetic activity for pará and increased parasympathetic activity for apará might support optimal hormonal states. Such autonomic coactivation has been postulated as necessary for achieving peak "altered states of consciousness" (Newberg & Yaden, 2018). A study of Ananda Marga meditation experiences included a description of elevated experiences that were consistent with autonomic coactivation (Maxwell & Katyal, 2022).

Research can more easily measure and characterize autonomic and central nervous system activity compared to recording hormonal levels of a complex mix of hormonal systems. As a result, meditation research has emphasized effects on physiological measures including autonomic parameters, and largely neglected consideration of underlying hormone states.

The current analysis has highlighted the important role of hormonal systems for spiritual development, beginning a process of establishing greater recognition of the spiritual importance of hormonal system activity. These conclusions will remain speculative until a convenient means of simultaneously testing multiple hormonal systems is developed, but they begin a process of extending Shrii Sarkar's biopsychological insights and foster increased understanding of the biological basis of the peak propensities.

The article with its complete references is available at the journal web pages theneohumanist.com. The author may be reached at rwmaxw@gmail.com