Craving for Drugs Is a Consequence of Evolution

Arthur Saniotis and Maciej Henneberg

Evolution of Human Behaviour

Traditionally, studies of the brain evolution of fossil hominins were focusing attention on the increase of brain size, either in absolute terms or in terms of encephalisation as an indicator of increasing through Pleistocene complexity of human behaviours.[1] Studies of artifacts, butchered animal bones, living sites, and the use of fire also contributed to the picture of increasing repertoire of human behaviours.[2] Special interest focused on those intellectual qualities that could be directly related to sophistication of technologies and interactions with the environment (Stiles 1991; Harmand 2007). Much less attention has been paid to such qualities of humans as emotions, interpersonal relationships, and the influence of external stimuli on internal feelings (Darwin 1871; Harris and Pashler 2004). Of course, it is more difficult to find objective indicators of these phenomena and to quantitate them in the manner comparable with the measurements of cranial capacity or encephalisation.

The artefactual evidence of emotions and internalised feelings before the beginning of the Upper Pleistocene is scarce, limited to some burial practices (Solecki 1971; Duarte et al. 1999). It was only the proliferation of the evidence of art, body decoration, and dwelling construction from the Upper Pleistocene onwards that could be directly interpreted as an indicator of complex internal workings of human consciousness (Renfrew and Morley 2009).

Variation in the size of the modern human brain is not related to its quality – any attempts at finding a relationship between brain size and variously measured mental aptitude turned out at best very weak correlations (Henneberg et al. 1985). It can also be argued that during hominin evolution brain size changed in unison with body size (Henneberg 1998; Henneberg and Saniotis 2009). It is, therefore, more likely that the functions specific for human brain evolved as a result of physiological and biochemical changes related to the operation of neurotransmitters and to the neurohormonal regulation of body functions (Previc 1996, 2002, 2006, 2009).

Neurohormonal regulation of the body and the distribution of neurotransmitters in the brain and their levels, strongly influence our emotional states, feelings, and consciousness. Alterations of feelings, attitudes, and even states of human consciousness by various substances, either introduced from outside or produced in the body as a result of physical exercise, are well known and widely used in practically all human cultures. It can be argued that this arose in evolutionary perspective through inherited animal interactions with ancient psychotropic plants (Saah 2005). Widespread of shamanistic practices is but one example (Saniotis 2002; Henneberg and Saniotis 2009). Use of synthetic neurotransmitters in treatment of psychiatric disorders is equally widespread now.

It can be said, that the abundant imagery occurring in conscious minds of humans, together with the complexity of their emotional states can be regulated, enhanced, or dampened by alterations in brain physiology. Similar to animals, whose behaviours are driven by neurohormonal and neurotransmitter states, humans seek satisfaction of their emotions. In the majority of cases this is achieved by reacting to external stimuli (views, sounds, smells) and seeking interactions with other individuals that satisfy emotional needs. Since, however, humans learned to manipulate their external environment, they also produce a number of substances that are neuroactive. The introduction of those substances into the human body changes emotional states or states of consciousness without a need for often complex interactions with natural, cultural, and social surroundings. In order to "feel good" one can either engage in social interactions that may become complex and lead to stresses rather than to good feelings, or one can "take something" with an immediate pleasant effect. This is why many people drink alcohol. The drive to obtain emotional, mental satisfaction concentrates on immediate effects without much attention to future dangers. Thus, use of various substances that alter states of mind is a natural consequence of the evolution of human brain function. Like with many other human activities – use of technology to alter, and ultimately destroy, natural environment – use of mind altering substances, though immediately beneficial, has detrimental long-term consequences in the present-day situation when the operation of natural selection has been beneficially replaced by human actions.

Recently evolved neurohormonal regulation and biochemistry of neurotransmitters produced variations in biochemical balance of some human brains. These individuals will feel better after the introduction of some chemicals into their bodies. These are

1 Tobias (1971); Martin (1998); De Miguel and Henneberg (2001); Henneberg (1987).

2 Mellars and Gibson (1996); Petraglia and Korisettar (1998); Lewin and Foley (2004).

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people with propensity to develop drug use. Their situation should be acknowledged and handled in a way that does not disrupt normal functioning of the society rather than leaving them prey to unscrupulous criminals.

History of Hallucinogens

Hallucinogens may be defined as exogenous substances such as plants which contain compounds that can produce trance states, hallucinations, and can lead to disorientation (Winkelman 1996: 16). In contrast, psychedelic substances which may also cause hallucinations or "distortions" in perceptions often resemble psychotic states (Winkelman 1996). The term "psychedelic," though, as Winkelman points out refers to an "imprecise category of drugs" (Stedman 1982: 1163).

Hallucinogenic substances have been used since prehistoric times, and were central to shamanic and traditional societies (Grob 1998). Winkelman (2001) suggests that humans as far back as the Upper Paleolithic period had an innate drive to experience altered states of consciousness via the use of hallucinogenic substances or through shamanic practices which "enhanced serotonergic" and "endogenous opoid production." Shamanism constitutes the first known theological and spiritual system (Previc 2006; Winkelman 2004). Central to shamanism are altered states of consciousness (ASC) which provide sociobiological advantages such as integrating human consciousness and enhanced "socioemotional and self-functions of the paleomammalian brain" (Winkelman 2002b: 1874). According to McClenon (1997), hypnotisability in Upper Paleolithic humans fostered a range of psychophysiological advantages such as increased fertility, stress alleviation, and lowering of sympathetic response system. "Hypnotic suggestibility" may have also contributed to humans actively seeking altered states of consciousness through the use of exogenous substances.

Other scholars have suggested that hallucinogens were foundational to human civilisation.[3] Exogenously administered hallucinogens for inducing altered states of consciousness were used in the Indian Vedic period as far back as the fifth millennium B.C.E. (Strassman 1984). Ancient written accounts of using alkaloid substances have been derived from 4,000 year old Assyrian clay tablets, which mention 250 different plants including *Atropa belladonna*, *Papaver somniferium* and *Mandragora officinarum* (Wink 1998). In China, 365 drugs were described circa 3000 B.C.E. during the reign of Shen Nung (Wink 1998). By 1550 B.C.E. the Egyptians were using alkaloid plants such as pomegranate (*Punica granatum*), henbane (*Hyoscyamus niger*), and poppy (*Papaver somniferium*).[4] The ancient Greeks based their pharmacopeia on Egyptian, Mesopotamian, and Indian traditions reaching its zenith with Hippocrates (460–377 B.C.E.) who critically examined "more than 200 medicinal plants" (Wink 1998).

Grob (1998) argues that although shamanic societies used hallucinogenic substances during religious rituals, as societies became more hierarchical and stratified such substances tended to be viewed as being detrimental to public welfare "and controls were placed on direct and revelatory access to the sacred" (Grob 1998: 8).

Use of Psychoactive Substances in Shamanic/Traditional Societies

There has been impressive anthropological research investigating the use of hallucinogens in shamanic/traditional societies.[5] The majority of these studies examine the ritual use of hallucinogens such as peyote (mescaline), ayahuasca, cannabis, psilocylin mushrooms, as well as other psychoactive substances. The importance of such hallucinogens to shamanic/traditional cultures is central. The aim of taking psychoactive substances is to attain altered states of consciousness as part of religious based experiences. Winkelman presents a relevant psychophysiological model of their use. For instance, the chemical structures of some hallucinogens closely correspond with neurotransmitters and intervene in the normal functioning of the latter (Winkelman 2002a, b); Hoffmeister and Stille 1982). Moreover, some of the aforementioned psychoactive agents "contain phenylalkylamine and indole alkaloids" which are similar in chemical structure to the neurotransmitter serotonin (Winkelman 2002a: 151). These agents have "inhibitory effects on the mesolimbic temporal lobe structures," leading to "synchronous discharges in the temporal lobe limbic systems" (Winkelman 2002a: 151). It is postulated that the psychoactive agents effects on the serotonergic system cause hyperactivity in the visual cortex regions which also produce at the same time activity

3 Grob (1998); Wasson et al. (1978); Huxley (1977).

4 Wink (1998); Mann (1992); Geßner (1974); Baumann (1986).

5 Winkelman (1996); Grob (1998); Wink (1998); Dobkin de Rios (1984); Furst (1972); Harner (1973); Myerhoff (1974); Saniotis (2001); Winkelman (2000).

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in the hippocampus. This may last for days or even for weeks (Winkelman 2000; Mandell 1980). While such agents affect both sympathetic and parasympathetic systems, they generally incline towards parasympathetic dominance as characterised in trance states (Winkelman 2000).

Anthropological studies of the use of hallucinogens in shamanic/traditional societies note various common schemata.

1. The central role of a guide or shaman who has extensive experience with the psychoactive substance. This person acts in initiating the neophyte via the ingestion of the entheogen, and also acts to interpret and corroborate the neophyte's altered states experience.
2. The entheogen is believed to reveal hidden or esoteric domains of knowledge. Thus, entheogens are also used during divination ceremonies.
3. The entheogen allows access to metaphysical realms which are inaccessible during ordinary consciousness.
4. Hallucinatory experiences often involve "the perception of nonmaterial" spirit beings or supranormal entities. These may be ancestor spirits or animal spirits. These spirits form a crucial part of vision states and may act as guides, allies or guardians (Metzner 1998).

We want now to examine some of the excellent crosscultural studies into the ritual use of entheogens which will assist our understanding on their relationship with religion and altered states of consciousness. For Myerhoff (1974), the ritual use of the plant peyote cactus (*Lophophora williamsii*) by the Huichol Indians in the Southwest United States is central to their religious pilgrimage to the sacred site of Wirrikuta. The taking of peyote must be viewed in relation to the sacred Huichol symbolic complex of the deer, corn, and peyote. Having reached Wirrikuta, pilgrims ingest peyote in order to access the Huichol deities through altered states of consciousness. During altered states of consciousness pilgrims may achieve a state of oneness or unity with the Huichol deities and existence, which Myerhoff refers to as "universal communitas" (1974: 40). In this way, ritual use of peyote fosters communion with the Huichol deities which cannot be accessed with such intensity during ordinary consciousness.

Similarly, for the Navajo peyote is used during religious rituals and is considered to have positive psychotherapeutic benefits for practitioners such as maintaining psychophysiological integration. According to the Navajo, peyote is a medicinal plant which is endowed with personality or spirit which is omniscient (Calabrese 1994). Peyote plays a central part in Navajo healing symbolism and is used in conjunction with other symbols such as the moon and tipi. Navajo believe that peyote enables them to become receptive to the "teachings of Peyote," and fosters "corrective reflexivity" and "contemplative reflexivity" (Calabrese 1994: 505). The psychological process attached to the peyote ritual enhances symbolic healing and "allows unconscious and somatic processes to be controlled by symbolic communication" (Calabrese 1994: 506).

Among South American indigenous people such as Jívaro, Shipibo-Conibo, Quijos, and others, ayahuasca or *yagé* vine (*Banisteriopsis caapi*) is used as a hallucinatory beverage in order to trigger altered states of consciousness. Oberem states that Ecuadorian ayahuasca-using shamans had told him that they "have the power to go to a place beneath the earth, beneath Hell, from which they are able to bewitch somebody" (Oberem 1958: 80). An interesting aspect of ayahuasca is the homogeneity of visions amongst South American tribes. For example, commonly reported visions are of snakes, pythons such as the anaconda, and jaguars. Among the Jívaro, visions of fighting snakes and jaguars are common (Harner 1962). Alternately, Reichel-Dolmatoff (1960) suggests that among the Noanamá and Emberá ayahuasca is used for divination purposes; as a way of identifying personal enemies, to commune with the ancestral spirits and the spirits of predator animals, and to locate the place of lost or stolen items. Ayahuasca ceremonies usually involve small groups who sit in a circle or in semidarkness. During this time the shaman usually sings as part of the healing ceremony. Metzner (1998: 5) notes that the shamanic songs "have a fairly rapid rhythmic pulse" which probably triggers the sympathetic system and enhancing hallucinatory experience. Shamans may also use "sucking" methods for "extracting toxic psychic residues."[6]

In Africa, various cultures also have used hallucinogenic plants to attain altered states of consciousness. Johnston's study of the Tsonga people in South Africa provides a revealing account of the ritual use of hallucinogens. The major plant ingested by the Tsonga is *Datura fastuosa*. The plant is used in two core Tsonga rituals. The first ritual is the *khomba,* which is the girl's initiation ceremony (a structured set of fertility rites) held annually after the May harvest. The second ritual is called the *mancomane* or the Tsonga exorcism rite, held during January–March and is used for the expelling of spirits from possessed people (Johnston 1977: 217). During the *khomba*, the administering of *Da-*

6 Metzner (1998: 5); cf. Luna and Amaringo (1991); Dobkin de Rios and Grob (1994).

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tura fastuosa is preceded by a series of energetic dances and mimes. The dancing is accompanied by loud and rhythmic drumming. During the ritual the female initiates "wear blue-dyed salempores" and paint their faces blue, and "erect a blue flag" (Johnston 1977: 221). The symbolic significance of the colour blue correlates with the bluish-green visual spectrum which the drugged initiates see and which is associated with the fertility deities (Johnston 1977: 221). The powerful and rhythmic movements of the initiates during dancing compound the hallucinogenic effect. On this note, Neher states that "violent dancing and gestures make hyperventilation a possibility and increase the production of adrenaline" (1962: 157). Additionally, the increase in adrenaline production via the aroused sympathetic system "increases susceptibility to tapping of the basic brain rhythms" (Neher 1962: 157).

In India, cannabis as an entheogen has been used by Hindu and Sufi mystics for centuries. Cannabis has been cited in the Hindu Vedas (2000–1500 B.C.E.) and in the Atharvaveda, and is referred to by Hindus as the "food of the gods" (Abel 1980). Saniotis (2001) provides a seminal study of North Indian Sufis and their ritual use of cannabis. The use of cannabis is central to the ritual performance of *nara* – "a kind of poetic utterance or expletive that is endowed with profound religious meaning" (Saniotis 2001: 362). Before and during *nara* Sufis smoke cannabis which is placed in a small pipe and is called chillum. The chillum is usually shared between Sufis. It is common when smoking chillum that Sufis shout the name of Ali (cousin of the prophet Muhammad and fourth caliph of Islam). The uttering of his name spiritualises the act of smoking chillum. The smoking of chillum combined with the "paroxysmal quality" of *nara* enables Sufis to attain altered states of consciousness (Saniotis 2001: 364).

The widespread use of hallucinogens in shamanic/traditional societies may point to a human need of experience of altered states of consciousness. While it is not known whether such a craving is an evolutionary by-product of our intense consciousness, it does suggest that humans possess a predilection towards polyphasic states. Perhaps, the use of hallucinogens may indicate the human need to understand the multifaceted nature of consciousness.

Endogenous Neurohormonal Agents Producing Altered States of Consciousness

In this section we will provide an overview of the neurohormonal basis of shamanic and mystical states and the techniques which are used to produce endogenous neurochemicals and opioids. According to various authors,[7] the human brain is neurologically and neurohormonally predisposed towards attaining altered states of consciousness without the need of hallucinogens. The neurognostic features of the human brain allow it to "encounter with the transcendental nature of itself and the external environment" (Laughlin 1996: 23). As Laughlin (1996: 23) notes:

> The brain is prepared by virtue of its neurognosis to both come to know the self and the world, and to experience the transcendental nature of reality in ways that surpass the normal limitations of either the senses or rational thought.

In Winkelman's (2002a, b) terms the neurognostic features of the brain are universal, and, therefore, have given rise to ubiquitous shamanic and mystical experiences. Both Mithen (1996) and Winkelman (2002a, b) concur that the universality of shamanism and altered states of consciousness is a by-product of cross-modal integration in the brain. Laughlin et al. (1990) and Winkelman (2002a, b) contend that prehistoric shamanism involved the integration of consciousness and that this drove shamans to project more advanced states of development than other people. Such projections included the production of alternate modes of thinking about the environment and of the self's socio-cognitive adaptation (Winkelman 2002a, b). A central feature of shamanism is a penchant towards altered states of consciousness which from a neurological viewpoint produces strong "coherent brain patterns that synchronize the frontal areas of the brain" and "integrating nonverbal information into the frontal cortex" (Winkelman 2002b: 1878). The psychic integration of altered states of consciousness elicits endogenous opioids and serotonergic functioning which accesses "repressed emotional dynamics" and fosters social bonding (Winkelman 2002b: 1878).

Newberg et al. (2002: 115) argue that both fast and rhythmic body movements which often accompany religious rituals can produce in the brain a unitary state. "In each case, rhythmic behaviors can lead to unitary states by causing the orientation area to be blocked from neural flow." The intensity of such unitary states depends on the level of neural blockage. A total blockage may eventually lead to a "unitary continuum" (Newberg et al. 2002: 115).

The role of the neurotransmitter dopamine is also important in the reaffirmation of supernatural

7 Winkelman (2002a, b); D'Aquilli and Newberg (2000); Laughlin et al. (1990); Laughlin (1996).

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or paranormal events which are found in shamanic and world religions. Such events are associated with believers' power to control them via healing and divining. Dopamine is significant due to its ability to induce in a person a sense of control over external situations and goal-directed activities (Previc 2009: 46). It can, therefore, be hypothesized that the role of dopamine plays a central aspect in religious belief and the need for existential control over external forces and circumstances. In this way, it may be suggested that shamanic and traditional religious practices, such as chanting and meditation, trigger the dopaminergic circuit which regulates the neurohormonal, autonomic, and hypothalamic systems.

This complex has a decisive impact on one's ability to respond to stress (McNamara et al. 2006). The stress managing penchant of the dopaminergic system may be a major reason why dopamine is so important to the formation and maintenance of religious beliefs. Religion's impact on human health may also be due to "dopaminergic modulation" of the autonomic and hormonal nervous systems (McNamara et al. 2006: 2). Thus, it can be argued that the humans crave dopamine for its stress alleviation which in turn enhances religious belief and gives health benefits.

The link between altered states of consciousness and endogenous opioid production has been further elucidated by Jilek (1982) in his informed study of the Salish Spirit Dance and the Sioux Sun Dance found in North American Indian societies. These religious ceremonies involve initiates who must undergo a series of psychophysical ordeals such as hypermotility, hypoglycemia, and dehydration, pain stimulation, temperature stimulation, acoustic stimulation, visual-sensory deprivation, and sequestering without mobility. Jilek speculates that these ritual elements induce opioid agents beta-endorphin and enkephalin, as well as neuroendocrine peptides, such as bradykinin and neurotensin (1982: 339). Furthermore, the neuroendocrine opioid system is intrinsically connected to visual, kinetic, and auditory functions as evident in the Salish Spirit Dance and the Sioux Sun Dance. "Endogenous polypeptides with opioid activity appear also to be involved in emotional reactions to pain stimuli and in the control of affective states associated with food and fluid intake" (Jilek 1982: 339; Cleghorn 1977). The extensive ritual elements of both dance complexes reaffirm the tie between the central nervous system and the neuroendocrine opioid system.

Meditation, Endogenous Agents, and Altered States of Consciousness

Meditation has been subjected to numerous scientific studies.[8] It has been discovered that during meditation there is a relative increase in the neurotransmitters dopamine and acetylcholine. Meditation leads to an increased activity in the parasympathetic autonomic systems, which is reflected in lowered heart rate and blood pressure. Furthermore, dopamine seems to be important in parasympathetic tone and functions (Previc 1996; Oppenheimer et al. 1992).

Some meditational studies reveal that EEG shows a decrease in alpha and theta brain wave patterns during meditation which aids in overall relaxation (Winkelman 2004). These results strengthen "the hypothesis that meditation induces significant reorganization of frontal hemispheric activity" which is related to increases in alpha and theta brain patterns (Cahn and Polich 2006: 201). Newberg et al. (2002) assert that there was increased activity in the inferior parietal lobe during meditation which mediates the self's orientation in space.

The use of mantra (repetitions of verbal formulae), which is found in various religious traditions, seems to "occupy awareness" and is a specific concentrative technique. Crosscultural studies of mantra meditation, such as the Sufi practice of *dhikr* (remembrance of God) are particularly insightful. During the practice of *dhikr* Sufis are either arranged in a circle or in lines chanting the names of God in Arabic. The repetitive and loud chanting often incorporates rhythmic swaying of the body and hyperventilation. All of these elements enable Sufis to attain altered states of consciousness referred to as *hal* (state). The Sufi experience of *hal* corresponds with the "Absolute Unitary Being" (Newberg et al. (2002). Moreover, Sufis' state of *hal* is similar to altered states of consciousness found in shamanic rituals, which act on the serotonergic system.

The conclusion which can be drawn from here is that humans have craved the powerful and euphoric feelings, emotions, and insights which endogenous agents elicit. As Winkelman (2000) states the production of endogenous agents through the auspices of religion enables people to share their experiences, thereby enhancing group bonding. Altered states of consciousness are universally viewed as a way of identifying hidden aspects of the self.

8 Cahn and Polich (2006); Piron (2001); Rapgay et al. (2000); Kjaer et al. (2002); Kwon et al. (1996); Newberg and Iversen (2003); Newberg et al. (2001, 2003).

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Perhaps, the allurement of investigating esoteric aspects of the self, or to coin the adage "to find oneself" is a powerful motivator in humans which is probably a part of our intense reflexive consciousness. This same consciousness is highly curious about the world and its place in it. We contend that the experience of altered states of consciousness is an important way to connect in Batesonian terms with the wider world. Connectivity with nature has always been privileged in most cosmologies. Perhaps, evolution has enabled humans to attain altered states of consciousness as a way to better understand their place in the world. In this way, altered states of consciousness are cognate with an ecology of mind.

Instead of criminalizing the use of drugs, we should consider to provide people with nontoxic, nonaddictive, minimally harmless methods of satisfying their natural, evolutionary need.

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References Cited

Abel, Ernest L.
1980 Marijuana – The First Twelve Thousand Years. I. The Early Years: 1. Cannabis in the Ancient World. India: The First Marijuana-Oriented Culture. <http://druglibrary.org/schaffer/hemp/history/first12000/1.htm> [24. 04. 2012]

Baumann, Hellmut
1986 Die griechische Pflanzenwelt in Mythos, Kunst und Literatur. München: Hirmer Verlag. [2. überarb. Aufl.]

Cahn, B. Rael, and **John Polich**
2006 Meditation States and Traits. EEG, ERP, and Neuroimaging Studies. *Psychological Bulletin* 132/2: 180–211.

Calabrese II, Joseph D.
1994 Reflexivity and Transformation Symbolism in the Navajo Peyote Meeting. *Ethos* 22: 494–527.

Cleghorn, Robert A.
1977 Morphine-Like Peptides in Brain and Their Relation to Hormonal Neurotransmitters. *Psychiatric Journal of the University of Ottawa* 2: 133–137.

D'Aquili Eugene G., and **Andrew B. Newberg**
2000 The Neuropsychology of Aesthetic, Spiritual, and Mystical States. *Zygon: Journal of Religion & Science* 35/1: 39–51.

Darwin, Charles
1871 The Descent of Man, and Selection in Relation to Sex. London: J. Murray.

De Miguel, Carmen, and **Maciej Henneberg**
2001 Variation in Hominid Brain Size. How Much Is Due to Method? *Homo – Journal of Comparative Human Biology* 52: 3–58.

Dobkin de Rios, Marlene
1984 Hallucinogens. Cross-Cultural Perspectives. Albuquerque: University of New Mexico Press.

Dobkin de Rios, Marlene, and **Charles Grob**
1994 Hallucinogens, Suggestibility and Adolescence in Cross-Cultural Perspective. *Yearbook of Ethnomedicine and the Study of Consciousness* 3: 113–132.

Duarte, Cidália, João Maurício, Paul B. Pettitt, Pedro Souto, Erik Trinkaus, Hans van der Plicht, and **João Zilhão**
1999 The Early Upper Paleolithic Human Skeleton from the Abrigo do Lagar Velho (Portugal) and Modern Human Emergence in Iberia. *Proceedings of the National Academy of Sciences* 96/13: 7604–7609.

Furst, Peter T. (ed.)
1972 Flesh of the Gods. The Ritual Use of Hallucinogens. London: George Allen and Unwin.

Geßner, Otto
1974 Gift-und Arzneipflanzen von Mitteleuropa. (Hrsg. und neu bearb. von G. Orzechowski.) Heidelberg: Winter, Univ. Verlag.

Grob, Charles S.
1998 Psychiatric Research with Hallucinogens. What Have We Learned? *The Heffter Review of Psychedelic Research* 1: 8–20.

Harmand, Sonia
2007 Economic Behaviors and Cognitive Capacities of Early Hominins between 2.34 Ma and 0.70 Ma in West Turkana, Kenya. *Mitteilungen der Gesellschaft für Urgeschichte* 16: 11–23.

Harner, Michael J.
1962 Jívaro Souls. *American Anthropologist* 64: 258–272.

Harner, Michael J. (ed.)
1973 Hallucinogens and Shamanism. London: Oxford University Press.

Harris, Christine R., and **Harold Pashler**
2004 Attention and the Processing of Emotional Words and Names. Not So Special After All. *Psychological Science* 15: 171–178.

Henneberg, Maciej
1987 Hominid Cranial Capacity Change through Time. A Darwinian Process. *Human Evolution* 2: 213–220.
1998 Evolution of the Human Brain. Is Bigger Better? *Clinical and Experimental Pharmacology and Physiology* 25/9: 745–749.

Henneberg, Maciej, A. Budnik, M. Pezacka, and **A. E. Puch**
1985 Head Size Body Size and Intelligence Intraspecific Correlation in Homo Sapiens Species. *Homo – Journal of Comparative Human Biology* 36: 207–218.

Henneberg, Maciej, and **Arthur Saniotis**
2009 Evolutionary Origins of Human Brain and Spirituality. *Anthropologischer Anzeiger* 67: 427–438.

Hoffmeister, Friedrich, and **Günther Stille** (eds.)
1982 Psychotropic Agents. Vol. 3: Alcohol and Psychotomimetics, Psychotropic Effects of Central Acting Drugs. Berlin: Springer. (Handbook of Experimental Pharmacology, 55/3)

Huxley, Aldous
1977 Moksha. Writings on Psychedelics and the Visionary Experience (1931–1963). New York: Stonehill.

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Jilek, Wolfgang G.
1982 Altered States of Consciousness in North American Indian Ceremonials. *Ethos* 10: 326–343.

Johnston, Thomas F.
1977 Auditory Driving, Hallucinogens, and Music-Color Synesthesia in Tsonga Ritual. In: B. M. du Toit, (ed.), Drugs, Rituals, and Altered States of Consciousness; pp. 217–236. Rotterdam: A. A. Balkema.

Kjaer, Troels W., Camilla Bertelsen, Paola Piccini, David Brooks, Jørgen Alving, and **Hans C. Lou**
2002 Increased Dopamine Tone During Meditation-Induced Change of Consciousness. *Cognitive Brain Research* 13: 255–259.

Kwon, J. S., B. J. Hahm, and **B. Y. Rhi**
1996 EEG Changes During "Danhak" Korean Traditional Meditation. In: C. Ogura, Y. Koga, and M. Shimokochi (eds.), Recent Advances in Event-Related Brain Potential Research; pp. 16–21. Amsterdam: Elsevier. (International Congress Series, 1099)

Laughlin, Charles D.
1996 The Mystical Brain. Biogenetic Structural Studies in the Anthropology of Religion; pp. 1–35. <Biogeneticstructuralism.com> [20. 04. 2012]

Laughlin, Charles D., John McManus, and **Eugene G. d'Aquili**
1990 Brain, Symbol, and Experience. Toward a Neurophenomenology of Human Consciousness. New York: Columbia University Press.

Lewin, Roger, and **Robert Foley**
2004 Principles of Human Evolution. Malden: Blackwell. [2nd ed.]

Luna, Luis Eduardo, and **Pablo Amaringo**
1991 Ayahuasca Visions. The Religious Iconography of a Peruvian Shaman. Berkeley: North Atlantic Books.

McClenon, James
1997 Shamanic Healing, Human Evolution, and the Origin of Religion. *Journal for the Scientific Study of Religion* 36/3: 345–354.

McNamara, Patrick, Raymon Durso, Ariel Brown, and **Erica Harris**
2006 The Chemistry of Religiosity. Evidence from Patients with Parkinson's Disease. In: P. McNamara (ed.), Where God and Science Meet. How Brain and Evolutionary Studies Alter Our Understanding of Religion. Vol. 2: The Neurology of Religious Experience; pp. 1–14. Westport: Praeger Perspectives.

Mandell, Arnold J.
1980 Toward a Psychobiology of Transcendence. God in the Brain. In: J. M. Davidson, and R. J. Davidson (eds.), The Psychobiology of Consciousness; pp. 379–464. New York: Plenum Press.

Mann, John
1992 Murder, Magic, and Medicine. Oxford: Oxford University Press.

Martin, Robert D.
1998 Comparative Aspects of Human Brain Evolution. Scaling, Energy Costs, and Confounding Variables. In: N. G. Jablonski, and L. C. Aiello (eds.), The Origin and Diversification of Language; pp. 35–68. San Francisco: California Academy of Sciences. (Wattis Symposium Series in Anthropology; Memoirs of the Californian Academy of Sciences, 24)

Mellars, Paul, and **Kathleen Gibson** (eds.)
1996 Modelling the Early Human Mind. Archaeological and Psychological Perspectives on the Evolution of Human Intelligence. Cambridge: McDonald Institute for Archaeological Research.

Metzner, Ralph
1998 Hallucinogenic Drugs and Plants in Psychotherapy and Shamanism. *Journal of Psychoactive Drugs* 30: 333–341.

Mithen, Steven J.
1996 The Prehistory of the Mind. A Search for the Origins of Art, Religion, and Science. London: Thames and Hudson.

Myerhoff, Barbara G.
1974 Peyote Hunt. The Sacred Journey of the Huichol Indians. Ithaca: Cornell University Press.

Neher, Andrew
1962 A Physiological Explanation of Unusual Behavior in Ceremonies Involving Drums. *Human Biology* 34/2: 151–160.

Newberg, Andrew B., Eugene G. d'Aquili, and **Vince Rause**
2002 Why God Won't Go Away. Brain Science and the Biology of Belief. New York: Ballantine Books. [2nd ed.]

Newberg, Andrew B., and **J. Iversen**
2003 The Neural Basis of the Complex Mental Task of Meditation. Neurotransmitter and Neurochemical Considerations. *Medical Hypotheses* 61/2: 282–291.

Newberg, Andrew B., Michael Pourdehnad, Abass Alavi, and **Eugene G. d'Aquili**
2003 Cerebral Blood Flow during Meditative Prayer. Preliminary Findings and Methodological Issues. *Perceptual and Motor Skills* 97: 625–630.

Newberg, Andrew B., Abass Alavi, Michael J. Baime, Michael Pourdehnad, Jill Santanna, and **Eugene G. d'Aquili**
2001 The Measurement of Regional Cerebral Flow during Complex Cognitive Task of Meditation. A Preliminary SPECT Study. *Psychiatry Research: Neuroimaging* 106: 113–122.

Oberem, Udo
1958 Espíritus y brujos en las riberas del Napo. *Humanitas: Boletín Ecuatoriano de Antropología* 1: 76–83.

Oppenheimer, Stephen M., Adrian Gelb, John P. Girvin, and **Vladimir C. Hachinski**
1992 Cardiovascular Effects of Human Insular Cortex Stimulation. *Neurology* 42/9: 1727–1732.

Petraglia, Michael D., and **Ravi Korisettar** (eds.)
1998 Early Human Behaviour in Global Context. The Rise and Diversity of the Lower Palaeolithic Record. London: Routledge. (One World Archaeology, 28)

Piron, Harald
2001 The Meditation Depth Index (MEDI) and the Meditation Depth Questionnaire (MEDEQ). *Journal for Meditation and Meditation Research* 1: 50–67.

Previc, Fred H.
1996 Nonright-Handedness, Central Nervous System and Related Pathology, and Its Lateralization. A Reformulation and Synthesis. *Developmental Neuropsychology* 12/4: 443–515.
2002 Thyroid Hormone Production in Chimpanzees and Humans. Implications for the Origins of Human Intelligence. *American Journal of Physical Anthropology* 118/4: 402–403.

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2006 The Role of the Extrapersonal Brain Systems in Religious Activity. *Consciousness and Cognition* 15: 500–539.
2009 The Dopaminergic Mind in Human Evolution and History. Cambridge: Cambridge University Press.

Rapgay, Lobsang, Ven. Lati Rinpoche, and **Rhonda Jessum**
2000 Exploring the Nature and Functions of the Mind. A Tibetan Buddhist Meditative Perspective. *Progress in Brain Research* 122: 507–515.

Reichel-Dolmatoff, Gerardo
1960 Notas etnográficas sobre los indios del Chocó. *Revista Colombiana de Antropología* 9: 73–158.

Renfrew, Colin, and **Iain Morley** (eds.)
2009 Becoming Human. Innovation in Prehistoric Material and Spiritual Culture. Cambridge: Cambridge University Press.

Saah, Tammy
2005 The Evolutionary Origins and Significance of Drug Addiction. *Harm Reduction Journal* 2: 8.

Saniotis, Arthur
2001 Mystical Styles of Expression among North Indian *Faqir. Nara* as a Manifestation of *Hukm. The Australian Journal of Anthropology* 12: 355–366.
2002 Sacred Worlds. An Analysis of Mystical Mastery of North Indian Faqirs. Adelaide. [PhD Thesis, University of Adelaide, Dept. of Anthropology]

Solecki, Ralph S.
1971 Shanidar, the First Flower People. New York: Knopf.

Stedman, Thomas L.
1982 Stedman's Medical Dictionary. Baltimore: Williams and Wilkins. [24th ed.]

Stiles, Daniel
1991 Early Hominid Behaviour and Culture Tradition. Raw Material Studies in Bed II, Olduvai Gorge. *The African Archaeological Review* 9: 1–19.

Strassman, Rick J.
1984 Adverse Reactions to Psychedelic Drugs. A Review of the Literature. *Journal of Nervous & Mental Disease* 172/10: 577–595.

Tobias, Phillip V.
1971 The Brain in Hominid Evolution. New York: Columbia University Press.

Wasson, R. Gordon, Albert Hofmann, and **Carl A. P. Ruck**
1978 The Road to Eleusis. Unveiling the Secret of the Mysteries. NewYork: Harcourt Brace Jovanovich. (Ethno-Mythological Studies, 4)

Wink, Michael
1998 A Short History of Alkaloids. In: M. F. Roberts, and M. Wink (eds.), Alkaloids. Biochemistry, Ecology, and Medicinal Applications; pp. 11–44. New York: Plenum Press.

Winkelman, Michael J.
1996 Psychointegrator Plants. Their Roles in Human Culture, Consciousness, and Health. In: M. Winkelman, and W. Andritsky (eds.), Sacred Plants, Consciousness, and Healing. Cross-Cultural and Interdisciplinary Perspectives; pp. 9–53. Berlin: Verlag für Wissenschaft und Bildung. (Yearbook of Cross-Cultural Medicine and Psychotherapy, 6)
2000 Shamanism. The Neural Ecology of Consciousness and Healing. Westport: Bergin and Garvey.
2001 Alternative and Traditional Medicine Approaches for Substance Abuse Programs. A Shamanic Approach. *International Journal of Drug Policy* 12/4: 337–351.
2002a Shamanism and Cognitive Evolution (with Comments). *Cambridge Archaeological Journal* 12: 71–101.
2002b Shamanism as Neurotheology and Evolutionary Psychology. *American Behavioral Scientist* 45/12: 1873–1885.
2004 Shamanism as the Original Neurotheology. *Zygon: Journal of Religion & Science* 39: 193–217.

Secular, Secularization, and Secularism

A Review Article

Andrzej Bronk

Secularism is still a popular topic in social sciences and religious studies, discussed at many conferences and the title of many books. But the word itself and associated words "secular" and "secularization" remain ambiguous, having a lot of opposite and excluding meanings. So-called resurgence of religion in the public sphere has elicited a wide array of reactions and a vehement opposition to the very idea that religious reasons should ever have a right to expression in public political debate. The collection of 13 essays, "Rethinking Secularism," edited by Craig Calhoun, Mark Juergensmeyer, and Jonathan VanAntwerpen,[1] is a new attempt to rethink the confusions about these categories, especially of the binary secular/religious, and a scrutiny of the phenomenon of secularism itself in its many diverse manifestations in the contemporary globalized and pluralized world. The volume is the effect of an interdisciplinary, multiyear project, sponsored by the Social Science Research Council (its president is Calhoun), where prominent, leading scholars – coming from sociology, political science, anthropology, international affairs, as well from history, literature, and religious studies – have collaborated in a reconsideration from many perspectives of secularism and secularity in the context of contemporary global politics and transnational social change. Their aim was to take stock of the ongoing research on multiple forms of secularism, and to reframe dis-

1 Calhoun, Craig, Mark Juergensmeyer, and Jonathan VanAntwerpen (eds.), Rethinking Secularism. Oxford: Oxford University Press, 2011. 311 pp. ISBN 978-0-19-979668-7. Price: £ 12.79.

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