

# Bufo Toads and Bufotenine: Fact and Fiction Surrounding an Alleged Psychedelic

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**Abstract**—This paper investigates the supposedly psychedelic *Bufo* toad and the allegedly psychedelic drug bufotenine, which is contained in the skin and glands of this toad. The *Bufo* toad has held a place in human mythologies and medicines worldwide since archaic times. Used by ancient peoples for a variety of purposes, its most spectacular effects, according to lore, involve magical and shamanic or occult uses for casting spells and for divination. In the Middle Ages, the *Bufo* toad was celebrated as a panacea and persecuted as a powerful poison. More recently, in the 1960s the *Bufo* toad was resurrected as a countercultural icon, with people purportedly licking or smoking the secretions to get high. Bufotenine has been at the center of a scientific debate since its discovery in 1893. This paper examines the extensive literature surrounding the *Bufo* toad and bufotenine, and untangles many of the myths and the misinformation that continue to vex both science and popular reporting. Finally, to promote further investigation, a comprehensive bibliography is provided that charts the history of the *Bufo* toad and bufotenine.

**Keywords**—bufotenine, *Bufo* toads, drug history, hallucinogen, psychedelic, urban myths

The toad genus *Bufo* contains *Bufo marinus*—the common marine toad also known as *Bufo aqua*—and related species, including the European *Bufo vulgaris*, the Asian *Bufo gargarizans*, and the North American *Bufo alvarius*. Lesser known species include *Bufo arenarum*, *Bufo asper*, *Bufo blombergi*, *Bufo formosus*, *Bufo fowerii*, *Bufo quercicus*, *Bufo valliceps*. There are over 200 known species. All have parotoid glands on their backs that produce a wide variety of biologically active substances. Depending on the species, these include dopamine, epinephrine, norepinephrine, serotonin and many others in various combinations. The parotoid glands of many *Bufos* also produce analogs or congeners of these substances.

One substance found both in humans and the *Bufo* toad is serotonin or 5-hydroxytryptamine. Serotonin is O- and/or

N-methylated in some species of the *Bufo* toad, and the substances resulting from this methylation include 5-MeO-DMT, bufotenidine, dehydrobufotenine, and bufotenine. Again, these substances appear in some but not all *Bufo* toad venoms. Bufotenine or 5-hydroxydimethyltryptamine is present in all *Bufo* species, usually in different concentrations. The other substances vary according to the species of *Bufo*. Bufotenine and 5-MeO-DMT appear together, in less than one percent of the known *Bufo* species. According to the literature the only species that produces 5-MeO-DMT or 5-methoxydimethyltryptamine is *Bufo alvarius* (Davis & Weil 1992; Most 1984).

Also present in all toad venoms are other extremely toxic cardioactive steroids called bufogenins and bufotoxins. Together these are known as the bufodienolides (Bucherl & Buckley 1971; Chen & Kovarikova 1967; Erspamer 1966).

The past several hundred years have produced an abundant literature regarding the *Bufo* toad's alleged psychoactive or psychedelic effects on humans. These

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references include the pharmacological, the anthropological, the religious or mythological, and the popular. Such citations also include very recent reports of people using some species of *Bufo* toads "to get high" by licking the *Bufo* toad or smoking its venom. There is major confusion regarding the actual chemical cause of the psychoactivity. This confusion focuses on one chemical in the venom called bufotenine. Bufotenine was originally named through its first isolation over a century ago from *Bufo vulgaris* toad venom, and it was initially blamed for a number of toxic reactions, both physical and mental; however, many of these reactions are now known to be caused by other substances in the venom. For example, hallucination, when it does occur, stems from 5-MeO-DMT, which is present in only one *Bufo* species, *Bufo alvarius*.

The present article investigates the pharmacology of *Bufo* toad venom, with an emphasis on what bufotenine is and is not. In addition, humankind's symbolic and religious interactions with the *Bufo* toad (and toads generally) are reviewed based on this exotic pharmacology.

### ARCHAIC PSYCHOLOGY AND THE BUFO TOAD

The *Bufo* toad (and related genera) has held a place in humanity's archaic consciousness since time immemorial. The earliest representations of *Bufo* toads (and toads generally) go back thousands of years. The appearance of toad-based artifacts is prehistoric and possibly protolinguistic, being portrayed in ancient pictographs, paintings and small sculpture (DeGraaf 1991; Ekenvall 1978; Volker 1950; Born 1939). Furst (1972) placed the uses of *Bufo* toad venom "all the way back to Neanderthal Man, one hundred thousand years ago." Bufotenine is also mentioned, as though it somehow contributed to the psychoactivity, which may well be a false assumption based on limited research.

There is in fact no real scientific link between bufotenine and psychoactivity, which can be substantiated through reviewing the primary literature regarding *Bufo* toad toxins. There are toxic effects, however, as well as pressor and other physiological effects regarding bufotenine. These strange and complicated effects apparently helped to create thousands of years of myth and resulted in a century of confused pharmacological data about bufotenine's alleged hallucinogenic effects. To this day the media, scientific papers, and the legal system continue to report bufotenine as being hallucinogenic.

Another factor that adds to the confusion surrounding bufotenine and toad venom in general is the ancient and pervasive associations with psychoactive mushrooms. One association is that some *Bufo* toads secrete a toxic/hallucinogenic venom; and many toxic/hallucinogenic mushrooms exist. It is known that bufotenine can be detected in some members of the species *Amanita*, for instance. *Panellus*

mushrooms contain analogs of serotonin and its precursor 5-hydroxytryptophan. However, *Panellus* species are unable to doubly methylate serotonin into bufotenine (Gartz, In press; Andary et al. 1978).

These strong associations between mushrooms and toads have contemporary correlates in the languages of many cultures, including the English "toad stool," which first appeared in 1398; the Welsh *bwyd y llyfant* (toad's bread) and *caws llyfant* (toad's cheese); the Dutch *paddestoel* (toad's stool); the Norwegian *paddehatt* (toad's hat); the French *pain de crapaud* (toad's bread); the Ukrainian *zhabjachi hryb* (toadlike mushroom); the Basque *amoroto* (toadlike thing) and the Chinese *ha-ma chun* (toad mushroom) among many other examples (Morgan 1987; Wasson 1968; Furst 1976, 1972).

Researchers like Antonio Bianchi, Francesco Festi, Edvard Klapp, H. Wassen (not to be confused with R. Gordon Wasson), and Richard Evans Schultes, among many others, have suggested that toad venoms might have activated the first Indo-Uralic or "Ur" religions of the Stone Age (Bianchi 1991; Festi 1988; Schultes 1979; Wassen 1934a).

Toad venom was used by ancient peoples for utilitarian hunting-gathering purposes, and as a divinatory and occult device, according to many scholars (Furst 1972; Volker 1950; Wassen 1934a, 1934b). *Bufo* toad venom is also part of the many *Bufo* species potent, poisonous defense mechanisms. As well, *Bufo* toad venom is a powerful antibacterial and antifungal agent that protects the toad against illness in a variety of harsh environments. *Bufo* toads secrete this venom to ward off predators and also to stay healthy in unclean environments (Habermehl 1981).

Bufotenine, which is present in all *Bufo* toad venom, has a general effect (in humans) that has often been questioned or reviewed (Chern, Ray & Wu 1991; McLeod & Sitaram 1985; Shulgin 1981; Isbell 1956; Turner & Merlis 1959). Bufotenine is a pressor, meaning it affects the heart rate and blood pressure; it is not psychedelic (Fozard & Ali 1978). Again, confusion over what bufotenine does has led to erroneous reports of bufotenine's psychoactive (or psychedelic) effects in the literature from the Middle Ages to modern times.

### Persistent Myths

In the sixteenth century, Culpepper developed his famous *Doctrine of Signatures*. This "doctrine" theorized that plants and animals that looked like human anatomy might be used as medicines, and especially to affect or cure the human body parts that they resembled (Miller 1985). For Culpepper, the lower parts of the *Bufo* toad resembled the parts of ancient human anatomy below the waist, save for details in the genital area. For ancient peoples, this might have afforded strong association and psychological connections to fertility and sexual reproduction in particular.

*Bufo* toad muscles seem to resemble those of humans, especially the legs (Bachtold-Staubli & Hoffmann-Krayer 1987; Ekenvall 1978). Thomas Riedlinger, author of *The Sacred Mushroom Seeker* (Riedlinger 1987), has made a pastel and chalk drawing, pointing out a symbolic connection between the *Bufo* toad and the human brain; this drawing shows the psychedelic *Bufo* toad sitting in an open human skull (Riedlinger 1995). In addition, *Bufo* toads lay their eggs in a "semen-like casing" that is protoplasmic, another symbolic connection to semen/menstruum, fertility, and Culpepper's *Doctrine of Signatures* (Goin 1978; Holbrook 1976; Freytag 1972). And Ekenvall (1978) talked at length about the "resemblance between *Bufo* toads and human embryo's one or two months old." These natural correspondences or symbolic "signatures" may have influenced archaic psychology, and played into protoshamanic ideas.

The *Bufo* toad's life cycle naturally places its seasonal appearance in relation to springtime rains the world over, and the fertility associated with this life-giving force. Ancient peoples very likely formed associations and a psychology connecting these two ideas, the toad and rain-fertility (Clarkson 1980; Christiansen 1977). A natural totemic-iconic relationship developed between the toad and rain-fertility. The first primitive charms relating to sexuality, fertility and rain included the *Bufo* toad (or other toads and frogs) in many cultures, according to these scholars.

Humankind's original fascination with the toad may well have been triggered by several "supernatural" traits and behaviors that the *Bufo* toad (and toads generally) display. For example, *Bufo* toads have tongues that are "as quick as lightning," which no human eye can follow—these "sweep the insects they catch with such speed that the victims seem to melt into thin air" (Anonymous 1886). As well, *Bufo* toads cannot breathe if their mouths are held open (Morgan 1987). They also have their tongues "rooted in backwards" in their mouths, with the tip "resting backwards towards the throat" (Grant 1980). Grant also stated that the *Bufo* toad tongue "flicks forward like a spear-throwing stick, snaring the hapless victim with its abrasive bifurcate tip." Note the psychologically suggestive connections between the Stone Age "spear-throwing stick" (termed *atlatl* by anthropologists) and the *Bufo* toad's tongue action in regard to archaic symbolism.

*Bufo* toads also "seem to appear out of the air itself." Ekenvall (1978), in his *Batrachians as Symbols of Life, Death and Woman*, stated that "... for a very long time they [*Bufo* toads] were included among the animals thought to be spontaneously generated, i.e. created without any parent bodies. They were thought to be created out of the slime and mud under the influence of the sun." This same idea—the toad appearing out of nowhere—is emphasized in Ovid's *Metamorphosis*. Pliny stated that "... and strange to say, that after six months of life, they [toad's] melt back into the mud, and again in the waters of Springtime are

reborn what they were before." Moreover, *Bufo* toads (and toads generally) can climb in uncanny ways. This ability seems unnatural and probably was believed to be supernatural by primitive peoples. Toads climb against outslipping walls and up steps, certainly an unusual ability. As well, *Bufo* toads have no teeth. They also swallow their own skin periodically, again playing into the "self-generating" symbolism. *Bufo* toads also hibernate for extended periods and then "seem to rise from the dead," according to Ovid—another psychological marker regarding ancient, archaic beliefs about the toad.

The gist of this is that for ancient peoples such toad traits and behaviors seemed supernatural or unnatural. These traits placed the *Bufo* toad (and toads generally) in an exalted position in regard to superstition and the shamanic point of view, which was and is extremely magical.

### ANCIENT MESOAMERICAN AND SOUTH AMERICAN BUFO TOAD MYTHS

*Bufo* toads (and toads generally) claim a substantial place in ancient Olmec, Mayan and Aztec art and mythology dating back to 2000 B.C. (Hamblin 1979; Coe 1971; Greene 1967). At the Olmec ceremonial site at San Lorenzo, large quantities of *Bufo marinus* remains were discovered. Researcher Muriel Weaver (1972) stated that "... the Olmecs had a predisposition for consuming [*Bufo*] toads" and that "consumption of these toads produces hallucinations." Furst (1976) also believed that "these [*Bufo* toad] remains at San Lorenzo were not used as ordinary foods due to the high poisonous structure. . . ."

In Mesoamerican anthropology representations of *Bufo* toads (and toads generally) are found in art and religious iconography. *Bufo* toads (as well as related toad genera) are also expressed in relation to other animals in a pictographic context. This is especially so with the jaguar, where the toad is often shown "above the jaguar claws and fangs in the yugo's-yokes, dating back from the pre-classic and classic Aztec" (Furst 1972; Bernal 1970; Roth 1915).

Especially interesting is the *Bufo* toad-related art represented in Aztec icons. Many Aztec icons focus in great detail on the *Bufo* toad's parotoid glands, which contain substances that may be trance inducing. Such is shown in detail in the Aztec sculpture of the toad at the National Museum of Anthropology in Mexico City. The tablet at the palace in Palenque contains a glyph that shows "the detail of the toad . . . one of the major attributes of this sculpture is the poison gland [parotoid gland] represented by three circles on the back of the head" (Hamblin 1979). Shook and Kidder (1952) mentioned that "at least one example of [Mayan] 'toad bowls' appear[s] in the high status pre-classic burial tomb #1, Mound #E-III,3 at Kaminaljuyu, Guatemala, as well as several other figures on them [the tombs] which resemble toads."



The ancient Tanani peoples of lowland Bolivia show the "Earth Mother" motif as a "monstrous toad" (Hissink 1961). The *Bufo* toad is shown as one of the few female-oriented goddesses in the Tanani pantheon and is called *Panchamama* or *Eaua Edutzi* (Earth Goddess). *Panchamama* is shown in her human form to have overly large sexual organs (breasts and vulva), emphasizing the symbolic connections between the *Bufo* toad and female sexuality and fertility. In the Tanani temples, large living *Bufo* toads (and other toads) were kept in a circular hole thirty centimeters deep below the main altars.

Lowy (1971) has shown Mesoamerican connections between the *Bufo* toad and mushrooms, discovering "a pre-classic mushroom effigy stone in which a toad is shown sitting right under the mushroom cap."

According to Wassen—an expert in *Bufo* (and other) toad venom uses—the hallucinogenic venom of the *Bufo* toad was also used by tribes to change the feather colors on pet parrots. This tribal practice is called "tapirage." Wassen stated that "feathers are pulled from the living parrot. And the [hallucinogenic] poison is smeared on the wound—the new feathers grow back a different color." This apparently supported further tribal beliefs that *Bufo* toads (and toads generally) were magical or supernatural (Furst 1976; Lowy 1971; Wassen 1934a).

Olsen (1978) reported that there were "[*Bufo*] toad remains in the burial vessels at Seibal [Mexico], therefore this may be interpreted as part of Mayan funerary practice." Another researcher, Pohl (1976), claimed that "it is entirely possible that this represents . . . a toad which was steeped in a fermented beverage used for ritual purposes."

Today, *Bufo* toads and *Bufo* toad excretions and extractions are still used among Mesoamerican and South American tribes. The practice is a staple among *curanderos* and *brujos* (shamanic healers and sorcerers). Furst (1976) reported that ". . . the toad is irritated gently to make it release the poison from its parotoid glands. This poison is collected in small bowls and subjected to secret techniques passed down from generation to generation of *curanderos*. After repeated treatments over fire to remove the harmful elements, the remaining substance is hardened and rolled into pills for later use—one of the purposes being love magic." According to Furst, these surviving tribal practices help explain the appearances of small, toadlike effigy-bowls found on archaeological sites at Veracruz [Mexico] and adjacent sites in Southwest Mexico and Guatemala (Dobkin de Rios 1974; Shook & Kidder 1952).

The *Chacs* are the Yucatan rain gods who taught fertility and farming to the ancient Mayans. According to Thompson (1954), "*Chacs* are found in art representations . . . attended by little toads called *Uo* which announce a rain storm through their croaking calls." *Uo* is also the name of the second month of the Maya year. The beginning of *Uo* is August 15, the height of the Yucatan rainy (fertile or farming) season. Dobkin de Rios (1974) especially has

emphasized that [*Bufo*] toads were used for "ritual hallucinogenic purposes" by the Maya.

In the fifteenth century, explorer and Dominican Friar Thomas Gage reported that "the *Potomam Maya* made a fermented ritual drink called *Chicha* which certainly caused the death of many Indians—especially when they used the toad poison with it" (Thompson 1958). In 1648, Gage stated that ". . . among themselves they make a drink far stronger than wine. . . . They put a little in water, and fill up the jar with some molasses or the juice of sugar cane, or some honey to sweeten it. They put in roots which grow there and which they know to be strong in operation. Nay, to my knowledge in some places they put in a live toad, and closed up the jar for a fortnight or a month, till all that have put in are thoroughly steeped, the toad consumed and the drink well strengthened. . . ." Furst (1976) stated that "certainly, the fermented toads were steeped in the beverage to give it extra potency. . . ."

Roth stated that "the magical practices among the Peruvian Indians and Guyana peoples . . . which were using a poisonous exudation . . . were from the spawn of toads. These were rubbed into the skin through cuts, or introduced into the eyes . . . where skills would be received from the *Toad Mother*" (Furst 1976; Roth 1915).

In his classic *The Book of the Toad*, DeGraaf (1991) mentioned that "a solid body of evidence lies beneath the [*Bufo*] toad Meso American art . . . the toad appears in some ways in the art, myth, folklore and in almost every culture, from Mexico City to South America—from the Olmec to the present day."

## THE BUFO TOAD AND CROSS-CULTURAL MYTHS

In China, healers have used *Bufo* and other toad venoms as medicine for thousands of years. According to Addienne Morgan "they extracted the venom, called *ch'an su*, by pressing the animal's head against oiled paper and scraping off the secretions. This would be on the [toad's] back. They did this with bamboo sticks. Then they sold the venom in brown disks" (Morgan 1986; Cooper 1978; Christie 1968). Christie also reported that "another preparation called *Kyushin* (perorally recommended as a heart medication) contains two bufodienolides. Other folk uses include oral preparations of dried venom or toad skin extractions . . . as a diuretic (increases urine flow); externally for toothaches and to stop gum bleeding."

In Tibet, according to Abbe Huc, they "tell of a toad that dwells amid the lofty mountain range, and unless he is propitiated [sacrificed to], it flings ice and avalanches down the mountain on those who pass the valley below" (Anonymous 1886).

The Newars of Nepal also associate the toad (or frog) as *Nagas*, female magical deities. The Newars worship the toad/*Naga* as controllers of rain (David-Neel 1971).

In India, the religious *Rig-Vedas* contain many references to toads and frogs. This includes poems associating frogs and toads to rain and fertility. The *Rig-Vedas* also associate toads with the high priests called Brahmins. According to Asta Ekenvall, "20 or 30 Brahmins went down to the river and recited two [toad or frog] poems to call forth rain" (Ekenvall 1978; Nadkarni 1955).

Elsewhere, an Indian ritual of sorcery shows that "intermittent fever can be cured by the moistness of a toad or frog; or fever can be cured by the cold moistness of a toad." This ritual prescribes that the Brahmin should "tie blue and red threads round the fore-legs of a striped toad which is then tied to the patient's couch . . . the patient is then sprinkled with water, and as it runs down his body it is washed off into the toad. As blue and red . . . are the colors of hostile witch-craft, the demoness *kyrta*—who personifies sorcery—is also associated" (Stutley 1980; Wassen 1934a).

The mystical *Soma*—a legendary Indo-Euranean hallucinogen—is also associated with the *Bufo* toad. In the *Rig-Veda*, viii, 103 one finds the following:

Each [toad or frog] with merry croak and loudly calling  
Salutes each other, as Son of his Father  
What one calls out, another quickly answers  
like boys at school their teachers words repeating . . .  
They shout aloud like Brahmins drunk on *Soma*  
when they perform their annual devotions

Ancient myths from Germany also show the *Bufo* toad associated with the human female uterus. Elsewhere toads are associated with human embryos. Ekenvall (1978) stated that "as far back as ten thousand years ago people are likely to have seen a resemblance between toads and human embryos one or two months old."

The earliest Germanic representations of the *Bufo* toad come from the *Kaiserchronik* (in the twelfth century). A middle-high Germanic poem from about 1215 A.D. tells that "the emperor Nero wished to know how it feels to be pregnant. His doctor gave him a potion that caused a toad to develop inside his stomach. . . ." And that " . . . he was like a woman to look like in front. The [*Bufo*] toad caused severe pain and the doctor removed it" (Ekenvall 1978).

The more northern Norse Vikings used artifacts that showed toads on belt-buckles circa pre-800 A.D. *Grabretter*—a type of ancient Norse wooden grave marker—also has been shaped like a *Bufo* toad. Viking graves also contained bronze toad statuettes, placed as gifts with the deceased (Toynbee 1973).

In Siberia, toads are associated with "bear feasts" celebrated by various tribes. "A ritual killing of bears was part of the celebration. The dead bears were given muzzles on which there was a picture of a toad" (Ekenvall 1978).

In Africa, ancient traditions among the Yoruba tribes in Nigeria show that the "celebrants of the cult of *Enungan* take part . . . in a procession, whipping themselves into a

frenzy as they go, but showing no signs of pain. According to tradition, they gain this anesthesia by anointing themselves with [*Bufo*] toad venom before they set out (Ekenvall 1978).

Elsewhere in Africa, the Somali tribes "rub live toads on their foreheads to relieve the heat and end the fatigue of a journey. In certain regions the Yoruba still use these dried toads in their herbal remedies" (Dorson 1972).

The ancient Finnish-Ugric peoples evolved from an earlier culture called the Uralic who lived in the upper parts of the Danube River. The Ugric's ancestors used to venerate the [*Bufo*] toad as well as the "toad stool" [*Amanita*, various species] mushroom, which is toxic and hallucinogenic. Elsewhere in this culture one finds toads on pots in Czechoslovakia from 2200 B.C. and from Germanic tribes from the early Iron Age. The Lithuanians came from this same stock. They put the toad in their mythology as "portents of good fortune." The Lithuanians used to bury the dead under a marker shaped like a [*Bufo*] toad's hind-quarters. According to more recent reports, these same villagers still use the Fly Agaric (*Amanita muscaria* or "toad stool") (DeGraaf 1991; Morgan 1986).

In ancient Greece, myths were replete with [*Bufo*] toad references as far back as the seventh millennium B.C. Ekenvall (1978) quoted from *Gods and Goddesses of Old Europe* by Gimbutas, which mentions that "this fertility Goddess could assume the shape of a toad, and many iconic statues show human/toad mixtures—with women's breasts and toad legs, for example." Ekenvall stated that "she [the Goddess] has appeared since time immemorial but represents the same toad-based Goddess."

The Greek god Dionysus was associated with intoxication as well as the [*Bufo*] toad (Cooper 1978). The Greek gods and goddesses Zeus, Diana and Hera all have been associated with toads (DeGraaf 1991). Votive toads were shown being sacrificed at the Temple of Sparta for the god Artemus. There are even toads shown on votive gifts, at the famous Temple of Delphi, which housed the Oracle of Delphi (Cooper 1978; Ekenvall 1978).

## BUFO TOAD MYTHS IN MEDIEVAL WITCHCRAFT

To say that the *Bufo* toad played a part in medieval sorcery and the so-called witch craze of medieval Europe would be an understatement to say the least. There exist thousands of references to the *Bufo* toad being an ingredient in "witches brews" or "philtres" (Fletcher 1896). There are also many references to the toad representing or materializing as the Devil, or acting as a "witches familiar" or totem animals.

The *Bufo* toad's links with the witches seem to date to antiquity, but it came to much public attention and religious review during the Middle Ages. The poet Propertius (a Roman) described toads as "ingredients in a

potion that a witch devised to enslave a man for sexual purposes" (Morgan 1987):

Toad, under that cold stone  
Days and nights has thirty one  
Welter'd venom sleeping got  
Boiled thou first, I the charmed pot

Later when witches went on trial in Europe, people frequently cited [*Bufo*] toads as being ingredients in witches "philtres" and as "familiars" (power animals). Witches were even supposed to be able to "turn into a toad" (Summers 1973; Scot 1972; Burr 1914).

In *De Alchemica*, Michael Scot found alchemical virtues in the *Bufo* toad "as the first step in the preparation of a magical powder for purposes of transmutation." He recommended that "five live toads be shut up in a vessel and made to drink the juices of various herbs and vinegar (Thorndike 1923).

As late as 1604 A.D., Guibert reported that "the magical team of Porta and Pizzimenti once succeeded in turning Mercury into Silver by heating it up with a toad over a slow fire . . . in an Earthenware pot. Before it died, the toad absorbed the Mercury, and converted it into Silver" (DeGraaf 1991; Thorndike 1923).

Robin (1970) mentioned the famous (or infamous) alchemist Albertus Magnus (St. Albert the Great) telling of a spell that used the [*Bufo*] toad for testing gemstones: "the trick was to draw a circle around the toad using the gem in question . . . then place the gemstone in front of the toads eyes, who was mesmerized by the stone. Within minutes either the toad or the stone would blow up into pieces."

More purely psychedelic applications of the *Bufo* toad had to do with the so-called toad stone, supposedly found in the head of the *Bufo* toad. According to Shakespeare scholar J. Halliwell-Phillips (1856), and others, "this [toad stone] was found in the head of mature toads . . . this stone, perhaps by some mystical sympathy it would heat up and change colors in the presence of a poison." The author, referring to Shakespeare, also recommended "swallowing the toad-stone if the person had already been poisoned" and that "it would drive out every poisonous quality that is lodged." Nash, in his *Anatomy of Absurdity* referred to the "pearl that is affixed to be in the toad's head" (Robin 1970).

In 1644, Boetius de boot, in his *Parfait Joallier*, described "the toad stone" alleged ". . . to exist in the toads head . . . another sure talisman for obtaining perfect Earthly happiness . . ." (de Givry 1963). In 1498, Johannes de Cuba, in his *Hortus Sanitatus*, mentioned ". . . a method, at once both practical and elegant, of extracting this stone which I especially recommend to my readers . . ." (de Givry 1963).

Poet Robert Graves (1986) cited Gwion regarding "the toad" and its uses in sorcery. He stated: ". . . Gwion implies that a single gem can enlarge itself under the influence of the [*Bufo*] toad, or the serpent, into a whole treasury

of jewels. He claims to be learned in math, and know myriads of secrets that may also belong to the toad/serpent sequence. . . ."

Even Shakespeare commented on the "toad-stone." In *As You Like It* one finds the line "sweet are the uses of adversity which, like the toad, ugly and venomous, wore a precious jewel in its head" (Asimov 1978). In Shakespeare's *MacBeth* one of the three witches threw a toad into the "hell broth" (Mack 1990).

In 1329 A.D., Peter Recordi (a Carmelite monk) was tried and condemned by the Holy Inquisition "for having made images of wax, toads blood and spittle, and then hiding them in the house of women for whom he purported sexual intercourse" (Russel 1972). Various psychedelic and magical ointments, salves, and other witchcraft potions were also concocted. A list from Johannes Tinctorus (1460) was ". . . to take toads to whom consecrated [Catholic sacramental] hosts have been fed, and kill them. Combine their flesh with the blood of murdered children and the bones of corpses, and menstrual blood . . . and mix well." Various herbs "and other things" were put into this hallucinogenic mixture. Interestingly, in medieval times it was believed that toads received their toxicity from the plant called the Christrose or Christmas Rose, under which they may be found (Rose 1973; Fletcher 1896). In the twentieth century it was discovered that the Christmas Rose (*Helleborus Niger*—also commonly called *Black Hellebore*) contained two bufodienolides.

Especially popular were the so-called flying ointments used by witches to fly to the "sabbat" or "sabbath" (a secret witches meeting—the flying was often done on broomsticks or the backs of demons). Harner (1973) has collected a noteworthy amount of evidence from the fourteenth century to date regarding witchcraft potions.

According to Allen (1979), the "illusions of flight" and other magical effects that the witches experienced, like turning into toads or other animals, may have had a purely pharmacological basis. Allen believes that bufotenine and its analogs (present in the *Bufo* toad) were combined with "witch herbs" that contained hallucinogenic belladonna, mandrake, and henbane. Allen speculated that "bufotenine might have been synergized into a powerful hallucinogen."

The theory that psychoactive pharmacology triggered witch-trances and magical visions is the generally accepted view among anthropologists and ethnopharmacologists, but it is not new. In 1451 the Catholic Bishop of Avila, Alfonso de Torado, asserted that "flights and shape-shifting were not supernatural wonders, nor lies, but merely hallucinogenic effects of the drugs incorporated in the ointments" (Allen 1979; Fletcher 1896). Side-effects of this *Bufo* toad/belladonna "trip" included "the sensation of flying—of being transformed into a bird or a beast, the feeling that one's skin was being converted into fur, feathers or a toads warty hide, etc." (Allen 1979).



## TOAD SWALLOWING AND TOAD EATERS

In seventeenth-century England, traveling mountebanks sold elixirs to the gullible. One of the ways they proved the efficacy of their so-called medicines was to have a person swallow a live toad that was known for its deadly poisonous nature. The mountebank would then apply the elixir, and save the toad eater's life. The toad swallowing was very real; the rest of the act was pure theater. By this dramatic demonstration, large amounts of quack elixirs were sold.

Carnival magicians also would swallow live toads to prove the superhuman nature of their ability. Here, for example, is Gilbert White of Selbourne, Hampshire (England) from his journal in 1786: "And I well remember the time, but I was not an eye witness to the fact (though numbers of persons were) when a quack of this village ate a toad to make the country people stare; afterwards he drank oil." In the eighteenth century, the term "toad swallower" had degenerated into "toady" and implied a "lowly assistant, sycophant, fawning flatterer, creep."

Why were the "toadies" not made ill or killed by the toad's deadly poisons? It is possible that small toads were used and that oil was drunk first to coat the mouth and stomach lining of the toad swallower. It is likely that a good meal was consumed before swallowing the toad as well.

The best study recounting the history of toad swallowers and toadies is Andrew Allen's "Toadies" for *History Today*. It draws from various diary excerpts from the period, novels and broadsheets, as well as local English folklore (Allen 1994). The toady folklore from the seventeenth and eighteenth centuries helped set the stage for more modern toad myths and folklore.

## CONTEMPORARY BUFO MYTHS: TOAD LICKING AND TOAD SMOKING

"Toad licking" or "toad smoking" are the terms that newspaper reporters attached to the ingestion of *Bufo* venom by users of illicit drugs. This was (and is) done with the intent purpose of getting stoned or high, or going into a trance in a shamanic manner. (It is important to reiterate that bufotenine—a minor constituent of all *Bufo* toad venoms—is not hallucinogenic.) In light of this, politicians and the courts stepped in to attempt to control this perceived drug-misuse problem.

In 1967 the Food and Drug Administration placed bufotenine in Schedule 1 of the Controlled Substances Act. Schedule 1 maintains that a drug (or plant or substance) shows no redeeming medical value, is too dangerous for human research, and has a high potential for abuse. The initial proposal for placing bufotenine, diethyltryptamine, and ibogaine in Schedule 1 as controlled drugs appeared in

the *Federal Register* (FR 10308) on July 13, 1967 (Shulgin 1988). The final action appeared in the *Federal Register* (FR 103407) on September 23, 1967. The "official final word" occurred in the *Federal Register* (FR 15350) on November 3, 1967 and maintains bufotenine as a Schedule 1 drug.

*Bufo* toads are well known as part of shamanic rituals. No mention of the oral ingestion of toad venom exists in classic shamanic literature, however, because the bufotenine present in the venom does not cause trance or mystical experiences, and both bufotenine and 5-MeO-DMT are inactive orally (Root 1990; Horgan 1990; McKim 1986). Also, 5-MeO-DMT is present in only one species of *Bufo* toad, *Bufo alvarius*.

Toxic reactions in human and lower animals are common, however, and include death (in animals) from oral toad venom ingestion (Chern, Ray & Wu 1991; Uzelac 1990; Anonymous 1986; McLeod & Sitaram 1985). Toad smoking and toad licking should be profiled and studied as two distinct activities. This is an important consideration, especially when studying media reports about toad licking, which involves the oral ingestion of the venom only.

The subject of these clandestine or cultlike uses of *Bufo* toads presents an interesting dilemma for researchers. The very nature of such activity makes open data-gathering troublesome. Anecdotal or word-of-mouth descriptions often prove invaluable for building a tentative profile of any illegal drug activity; or a legal but persecuted drug activity. This case involves alleged illegal bufotenine use and misuse, and legal but persecuted 5-MeO-DMT misuse.

From all this (but usually with little concern for scientific facts), the media continue to print "psychedelic toad" articles, thus continuing and sensationalizing age-old *Bufo* toad mythologies, including the myth that bufotenine is hallucinogenic. The focus of these many popular articles are on *Bufo* toads and getting high from bufotenine and its analogs. This is confusing, as only one of the analogs (not bufotenine) causes hallucination.

### *Bufo* Toad Smoking

In the late 1960s, LSD evangelist Art Kleps founded a psychedelic church called The Neo-American Church. The church's newsletter was called "Divine Toad Sweat" (Kleps 1971). In 1984, *Bufo* toad evangelist Albert Most revealed his Church of the Toad of Light with his publication of the book *Bufo alvarius: Psychedelic Toad of the Sonoran Desert*. The Sonoran Desert is in New Mexico. This small booklet details how to use the *Bufo* toad for ritual and pleasure, as well as how to catch the *Bufo alvarius* toad, extract or "milk" the glandular secretions, dry them, and "enjoy the smoked venom." Most's book claims that 5-MeO-DMT (5-methoxy-N,N-dimethyltryptamine) is the active hallucinogen, not bufotenine. He is correct, as 5-MeO-DMT is the O-methylated version of bufotenine (Shulgin 1988;

Marki, Axelrod & Wiscop 1962; Marki 1962; Gessner, Khairalloh & McIsaac 1961). Again, it is important to mention that 5-MeO-DMT is present in only one of the more than 200 types of *Bufo* toads.

Bufotenine is illegal to possess in the United States because it is a Schedule 1 drug, even though it is not psychoactive; 5-MeO-DMT is unscheduled and legal to possess, even though it is psychoactive. This makes 5-MeO-DMT potentially illegal in the U.S. as an analog of bufotenine or DMT, by application of the 1987 drug analog act. Possession of only one type of *Bufo* toad (the type that contains both substances in endogenous forms) for the purpose of getting "stoned or high" or for sacramental use remains in legal limbo, pending legislative debate, which is ongoing at the time of this writing. Although seemingly farfetched, conspiracy to possess a (certain type of) *Bufo* toad may someday be a civil violation or a crime in the United States.

In contrast, a letter to the lead author (Lyttle) talks about the introduction of "hallucinatory toad venom" to well-known American Indian artist Christobal. This letter details Christobal's "yarn art" (a stylized shamanic art form, based loosely in traditional Huichol yarn art). One of Christobal's artworks was based on his ritually taking *Bufo* toad venom. Letter writer Jacaerber Kastor stated that "the colors are very subdued in the Polaroid. They are vibrant and fluorescent in the yarn painting, etc. This piece has to do with Leo [Mercado] turning Christobal on to the *Bufo* toad secretions and Christobal incorporating the desert toad into his technology-iconography, etc. . . . a very interesting mixology" (Lyttle 1989b). Kastor is the owner of an art gallery in New York City called Psychedelic Solution. Leo Mercado, at the time, was a deacon in the Peyote Way Church of God in Arizona. In another note to author Bartlett J. Ridge, Kastor stated that "the *Bufo* toad is in their [Huichol] cosmology, but I don't think any of the elders have tried smoking it" (Lyttle 1989a).

Christobal's actual description of the *Bufo* toad-venom "visions" is as follows (Christobal 1989b):

The symbol of brother toad and the mushroom, which are Gods . . . to give wisdom of the shamanism, and how to study; how to be able to communicate and be able to receive direction. And encounter the sacred spaces that exist. Because not all (places) serve for that which one wants to know.

For the Gods say in which place, one can ask for that; which a person "living in reality" wants to know. To be able to learn here, is when the shaman are in the sacred places with their candles, praying to wait for the hour when God arrives . . . to be able to communicate for their powers and ask for luck for their shamanism. And when that hour arrives, they see the candles surge . . . the life-force appears, as if it explodes. . . . And from the sparks, the force which comes out is seen, and that is the way it is, where the transformation occurs. It is power which the brother toad and the mushrooms have. Because in this way . . . the Gods speak.

A more recent anecdotal account showing *Bufo* toad venom use comes from the *Village Voice* in July 1990. Author G. Trebay described art critic Carlo McCormick's sojourn with the hallucinogenic *Bufo* toad: "the group drank tincture of Peyote, chewed dried Peyote buttons and smoked the dried secretions of a desert toad whose toxins produce . . . 'an effect'" (Trebay 1990).

There is anthropological literature to support *Bufo* toad smoking among New World tribes and shamans. Part of this literature is riddled with confusion, based on hearsay and poor research. The excellent paper "Identity of a New World Psychoactive Toad" by Davis and Weil (1992) sums up parts of the research problems: "When Dobkin de Rios asserts that 'Bufotenine' is an hallucinogenic drug which has dangerous cardiovascular effects in man and is usable only in low doses (1974:149) she not only ignores pharmacological evidence (Holmstedt & Lindgren 1967; Turner & Merlis 1959) but she also appears to be confusing the physiological effects of the cardioactive steroid in the venom, with the purported activity of bufotenine on the central nervous system. . . ." Davis & Weil go on to dispell research myths "created by experts": "When LaBarre (1970:146) refers to bufotenine as a 'violently hallucinogenic drug' he mistakenly attributes the psychoactivity of the South American vegetable snuffs to bufotenine (5-OH-DMT) when it has already been well established that the compound responsible was not bufotenine but rather 5-MeO-DMT (Holmstedt & Lindgren 1967)." These authors also clearly understand the many confusions. They have shown that it may be a mistake to cite secondary as opposed to primary sources when establishing a profile of the pharmacological action of a little-known drug like bufotenine or 5-MeO-DMT.

### *Bufo* Toad Licking

The first wave of news reports regarding toad licking occurred in the early 1980s in the popular press, and have continued to the present (Chamakura 1994; Davis & Weil 1992). Although highly sensationalized in the media, this story is developing still, and holds implications for serious social pharmacologists, sociologists, and legal experts, not to mention animal-rights activists.

These toad-licking stories are usually reported in English-speaking countries (South America and Central America, Canada, the United States, and Australia) where the *Bufo* toad is either indigenous or where it has been introduced from its indigenous environment and bred. Reports have also appeared where the *Bufo* toad has been artificially introduced into an ecosystem for reasons of "pest control" (Anonymous 1990a; Lewis & Lewis 1989; Ebert 1988).

The practice of toad licking seems to have developed out of the legendary and mythological uses of *Bufo* toads throughout history, as described previously in this article.



For example, Christopher Columbus carried *Bufo* toads aboard his ships on his return trip from "discovering" America (Davis 1985). And both *Lancet* and *Discover* magazines reported that "classic German violinists used to handle [*Bufo*] toads before their performances because the toxins reduced the sweat on their palms" (Anonymous 1986).

In the mid-1980s, *Discover* reported that Australian "hippies" were forsaking "traditional illegal drugs for *Cane* toads, which they boil for a slimy, potentially lethal cocktail" (Anonymous 1986). A later corresponding report described "the drug squad in Brisbane (Australia) as having . . . a Heinz Baby-Food jar which carried the label 'Venom Cane Toad: Hallucinogenic; Bufotenine' (Lewis & Lewis 1989).

In 1986 a report by Hitt and Ettinger (1986) described a five-year-old boy licking (by accident) a live *Bufo* toad. Profuse salivation and seizures were reported and the boy was admitted to the university of Arizona Medical Center. Within 15 minutes of licking the toad, severe complications developed; the child survived.

A few months later, a "Dr. Inaga" gave a lecture in Baltimore in which he "comically" mentioned the Australian report, and the "phenomena [of toad licking]" (Lewis & Lewis 1989). Almost simultaneously Dr. Alex Stalcup, then of the Haight-Ashbury Free Medical Clinics, gave this statement to reporters: ". . . it is amazing the lengths that people will go to, to get high" (Carillo 1990). He was referring to the many recent toad-licking articles starting to circulate in the media.

The media interest regarding *Bufo* toads was the topic of discussion at a 1989 conference on crack cocaine misuse in San Francisco (Presley 1990; Seligman 1989). Police Chief R. Nelson of Berkeley, California was there, and commented that "[toad-licking] . . . is a problem that comes up from time to time," legitimizing the rumors. Pressed at a news conference, Robert Sager, head of the Drug Enforcement Administration's (DEA) Western regional laboratory said "[*Bufo* toad venom/bufotenine] . . . is in the same legal category as LSD and heroin" (Seligman 1989). This further confused the issue through incomplete comparisons. While all three are in the same legal category, only LSD and heroin are widely misused drugs; and bufotenine is not psychoactive, regardless of the DEA's beliefs.

A New York City DEA spokesman also stated to the press that "we have heard of it [toad licking or smoking] . . . but have yet to make an arrest," implying that there was some sort of an active problem (Carillo 1990). The rumors now circled back to the Haight-Ashbury Free Medical Clinics. In response to the *Bufo* toad press-releases, the Clinic stated that "ironically . . . the DEA's actions have inspired a few people to try licking live toads" (Carillo 1990).

Reporters now pressed anyone they could find to investigate these fantastic but apparently "legitimate"

stories. In Australia, Glen Ingram—a herpetologist at Queensland Museum—told the press "it [*Bufo* toad venom] gives them a kick like alcohol." This and other wire-service stories led some Australians to react with "panic" according to Horgan (1990). Alarmed at the latest "drug craze" and the infestation of *Cane* toads (which also occasionally poison pets, especially dogs that cannot leave them alone), people in Australia formed "toad eradication leagues" (Horgan 1990). Back in California a probation officer stated to the media that "we hear of youngsters who do this frequently [lick live *Bufo* toads] . . . it's not as strong as LSD, but it's free" (Montgomery 1990).

At this point little in the way of actual names, precise locations, witnesses to events, hospital reports or deaths appeared in the legitimate press surrounding these stories. The press had repeatedly quoted "experts" in related drug-misuse fields. These quotes fueled rumors, hyperbole and a lot of fantastic misinformation. As well, most of the press reports surrounding *Bufo* toad misuse lacked the solid primary sources needed for tracing facts.

Later in 1990, after a bulk of fantastic literature had been created, this started to change. The press grew even bolder. Reports naming "P. Cherrie and R. Murphy" appeared in the *Albany Times Union*. These stories reported that "Paul Cherrie saw a TV show about 'toad-licking' and decided to experiment. They scraped some [*Bufo*] toad secretions from the back of the *Cane* toads in Cherrie's collection and spread it on a cracker" (Anonymous 1990e). Murphy, 21, said that after an hour of "deep hallucinations" that he awoke . . . "bam!" . . . in the hospital. Both men suffered from severe vomiting." This story was amended a few days later in the tabloids, which reported that "Murphy had killed himself after being prematurely released from the hospital" (Alexander 1990).

Stanton Geer was named next, awaiting trial in Columbia after being arrested on "toad licking" charges. He faced a sentence of "two years and a \$10,000 fine, if convicted of drug misuse" (Street 1990). Other names also started appearing in press releases.

During all of this, Dr. Alex Stalcup of the Haight-Ashbury Free Medical Clinics in San Francisco complained that "we were getting calls from all over the world—Germany, England, South America, etc.—from reporters wondering about this new high" (Dorgan 1990). According to Dr. Sager of the DEA, Australian journalists were now studying the situation in the U.S. "to see if there was a *Cane* toad problem in California" (Dorgan 1990).

According to Dorgan (1990), the main problem with substantiating these original and then these later reports was "that they are all based in other reports . . . and that there is no evidence to support them." Journalist Eileen Uzelac said "that this is a case of media feeding on media" (Dorgan 1990). Words like "urban legend," a term coined by professor and author Jan Brunvand (*The Choking*

Doberman, etc.) were now being used along with other explanations for this media circus. Around this time, the popular television show *LA Law* even did a segment about a man charged with using *Bufo* toads to illegally get high.

In all this confusion, a number of legislators were convinced that where there was smoke there must be fire. Not to be beat to the punch so far as solutions to this new so-called drug epidemic, Representative Beverly Langford (D-Calhoun, Georgia) introduced legislation to the State General Assembly regarding toad licking (Secrest 1990): "In a resolution introduced Monday, apparently with a straight face, Rep. Beverly Langford . . . called on the General Assembly to look into the 'extreme dangers of toad licking becoming the designer drug of choice in today's sophisticated society . . . The [Assembly] has been very diligent in finding and proposing a legitimate solution to every conceivable type of drug problem. . . ." South Carolina Representative Patrick P. Harris also introduced similar legislation that same year (1990), finding the practice of toad licking "repulsive but amusing" and suggested sentencing offenders to "60 hours of public service in a local zoo" (Richards 1991).

The next legislative attempt to curb this new drug menace appeared in Vancouver, British Columbia (Canada). This report stated (Anonymous 1991b) that "... Vancouver police today said that they want the Canadian government to ban imports of the potentially lethal giant toad blamed on the deaths of several Australian drug users . . . Cpl. John Dragoni said the city police force is applying to Ottawa to prohibit ownership of . . . the toads . . . by outlawing them under the Federal Narcotics Control Act." Amid this hysteria, legislators in New South Wales, Australia, also passed laws against psychoactive toad use, making bufotenine a Schedule 2 Controlled Substance under the Queensland Drug Misuse Act of 1986 (Chamakura 1994), which again is ironic as bufotenine is not hallucinogenic.

Trying to lend credibility to what was becoming an embarrassing flurry of misinformation, medical anthropologist George Root—a former administrator at SP Labs in Miami, Florida—had this to say (Root 1990): "... there has been much speculation in the anthropological literature regarding the possible hallucinogenic uses of *Bufo*. This debate is largely based on the fact that *Bufo* is a common representation in the art of some Meso American peoples . . . and the fact that *Bufo* skeletal remains have been discovered at archaeological sites. . . . Speculations aside . . . there is a very good reason why licking toads will not get you high. The toxic compounds are likely to kill you before you could possibly consume enough bufotenine to have any hallucinogenic effect (if there is an hallucinogenic effect)." The lead author's academic article "Misuse and Legend in the Toad Licking Phenomena" (Lyttle 1993) also capsulized a lot of this data, as well as the media "comedy of errors" created in part by quotes from legitimate but misinformed scholars.

Calaveras County, California, has also been the site of a highly publicized *Bufo* toad seizure and arrest. In early 1994, Bob and Connie Shepard were arrested for breeding *Bufo* toads for psychoactive uses. Four toads were impounded and the couple was charged with possession of bufotenine, called "toad missionaries," and Bob Shepard was placed on a special form of probation called PC-1000 (of the California Drug Diversion Act for first-time, non-violent offenders) after a highly publicized media circus (Bancroft 1994; Boire 1994; DeKorne 1994; Reed 1994).

James Kent's (1994) short article "The Truth About Toad Licking" talked about "smoking the chopped skins" of the toad and "coming on almost instantly . . . you will feel a buzzing head-rush, and notice a profound change in light and color perception. Acute closed-eye visual hallucinations . . . and heart palpitations . . . are commonly reported." Kent also mentioned a graduate thesis by David Spoerke, M.S., R.Ph., in this area. This thesis gives a lot of detailed information regarding emergency-room treatments of humans and animals poisoned by toad venom. (This is available through the Internet bulletin board: Altered Consciousness BBS 206.652.3086.)

*High Times* magazine also recently ran a brief review of the psychedelic toad myths, mentioning that the MTV show "Beavis and Butt-Head" was touting toad licking in one episode, although a bullfrog, not an actual toad, was shown (Wishnia 1995). "The show reflects what is going on in the youth culture" said a spokesman for the TV show (Richards 1994). *High Times* has periodically run articles following the *Bufo* story, with seven articles appearing between 1974 and 1995.

Important recent academic papers regarding *Bufo* toad and bufotenine misuse (for illegally altering consciousness) include "Bufotenine: An Hallucinogen in Ancient Snuff Powders of South America and a Drug of Abuse on the Streets of New York" (Chamakura 1994) and "*Bufo alvarius*: A Potent Hallucinogen of Animal Origin" (Weil & Davis 1994). The Chamakura paper goes into detail regarding chemical analysis of various illegal materials termed "bufotenine" found in the New York City street-underground by police. "In May 1992 a substance was received by the author's laboratory alleged to be hashish. The samples were small, candy-like, irregular cubes, resinous in texture and reddish-brown in color. They were packaged in small, clear Zip-Loc bags and weighed approximately 0.6 grams to 1.0 grams. Since November 1992, 40 more cases [samples] were received . . . from different locations throughout New York City." The author analyzed the samples with thin-layer chromatography, gas chromatography-mass spectrometry, and color tests. Results showed bufotenine, psilocybin, and psilocin. This was clearly an error because there is no known plant or fungus that contains bufotenine with the other four substitutes of DMT (psilocin and psilocybin) together. It seems

that congeners like serotonin, the precursor of bufotenine (and other analogs), were confused, and mistakenly called psilocin and psilocybin.

The author concluded, however, that the bufotenine came from *Anadenanthera* seeds (the basis of South American shamanic snuffs) and not toads (Chamakura 1994). He also isolated several other indole compounds besides bufotenine. These other indoles (5-MeO-DMT) are known to cause psychoactivity, whereas bufotenine does not. Why bufotenine was placed in this paper's title as a psychoactive drug is curious. Chamakura's paper again presents false facts regarding bufotenine's psychoactivity, and strangely cites numerous authors who deny any psychoactivity attributable to bufotenine.

Weil and Davis's paper is more sound, and describes the *Bufo* plus many other animal-based hallucinogens of interest, such as psychoactive moth larvae, grubs, and fish. The focus is on shamanic aspects of the toad.

### MAJOR CONSTITUENTS OF TOAD VENOMS

There are two main areas of the body that *Bufo* toad venom attacks as it poisons: the heart and blood vessels, and the peripheral vascular and nervous systems. To understand bufotenine, one needs to place it in a certain context: bufotenine does not appear in nature alone, it appears as part of a living pharmacological complex, along with many other poisonous and nonpoisonous chemicals in the venom. These families of chemicals are generally labeled as phenethylamines, tryptamines, and bufodienolides. Some phenethylamines present in toad venom would be epinephrine, norepinephrine, and dopamine. A typical tryptamine might be serotonin or bufotenine.

The bufodienolides include bufagenins (or genins) and bufatoxins. The bufagenins (the first was named bufagin and was discovered and named by Abel and Macht in 1911) are steroidlike and effect the heart directly. Bufagenins also act in a digitalislike manner (digitalis is a steroidal plant cardenolide). Much understanding regarding how bufagenins work has come from studying the pharmacological actions of digitalis itself. The work of Chern, Ray and Wu (1991) supports this research, and details the effects of some bufagenins on humans. Another relevant study was conducted by Keival and colleagues (1988). Both of these studies were done for medical-cardiology journals, and emphasize *Bufo* toad venom and the effects of the steroidal bufagenins on the heart.

The bufagenins are biosynthesized from cholesterol, containing 24 carbon atoms (while digitalis has 23 carbon atoms and does not contain nitrogen). The bufatoxins do contain nitrogen and are conjugates of the steroidal bufagenins with suberic acid/arginine. The bufatoxins are

generally distinguished from each other by the number and location of the hydroxyl radicals, and the toad species from which they are isolated. The bufatoxins also effect the heart. They act as well to help the bufagenins get absorbed. The bufatoxins are vasoconstrictors, raising blood pressure, which results in anoxia. It is beyond the scope of this paper to explore the categories, subcategories and effects of these many toxins and chemicals, as the topic of interest is one tryptamine molecule only, bufotenine.

### A PHARMACOLOGICAL HISTORY OF BUFOTENINE

Over one hundred and sixty years of pharmacological research has appeared regarding the *Bufo* toad's venom, bufotenine, and its effects on humans and animals. The first study regarding *Bufo* toad skins and venom, "The Acrid Fluid Secreted by the Common Toad" was conducted in 1839 by John Davy, who tasted the acrid skin. The next important study was that of Vulpian in 1854. He discovered the toxic actions of the venom on the heart and likened it to the actions of digitalis. Vulpian also discovered that the *Bufo* toad was immune to both digitalis and its own venom, as were snakes (Vulpian 1854). Within the next few years, important studies included detailed analyses of the many chemicals present in this venom. But many mysteries remained, especially regarding the pressor bufotenine, the first endogenous chemical isolated from the venom. This isolation occurred around the turn of the century in 1893.

More solid research appeared in the late 1800s with the work of Phisalix and Bertrand (Deulofeu & Ruveda 1971; Meyer & Linde 1971). These researchers isolated an amorphous base they named bufotenine in 1893. In 1920, Handovsky crystallized the oxalate and the picrate of this same base, but kept the original name bufotenine (this was a very refined version of the original 1893 bufotenine). These studies formed a foundation for other laboratories, which did further pharmacological investigations. Important studies followed, such as those by Jensen and Chen (1929) and Deulafue (1948).

Bufotenine is the most mysterious and myth-laden of all the *Bufo* toad biochemicals. It has been the darling of hundreds of scientific and pseudoscientific claims regarding toxicological or "psychedelic" or "occult" rumors since its discovery. Even the DEA has made and kept bufotenine illegal, giving it the registry number of 74333. The bufotenine "trade name" mentioned in Alexander Shulgin's *CSA Manual* is Mappine. Mappine-bufotenine is thought (by Shulgin and the DEA) to be derived from the *Amanita mappa* mushroom (Shulgin 1991, 1981). This is an old name for *Amanita citrina* (Andary et al. 1978a, 1978b). However, there is some controversy regarding this as well, as the original extractions have never been conclusively replicated.



## BUFOTENINE IN HUMAN VOLUNTEERS

The first "scientific" human studies were attempted in 1956 by Fabing and Hawkins where they injected bufotenine into convicts. The subjects were four young, White male murderers in the Ohio Penitentiary (in Fabing 1957, he identifies six subjects, not four). The actual details from Fabing's study where bufotenine was administered intravenously over three minutes at doses of .06 to .25 mg/kg caused the following: (1) tingling from head and neck to the extremities; (2) constriction of the chest (comments from one convict were "... a load pressing down from above ... my body feels heavy"); (3) visual disturbances and color "hallucinations" (comments included "red and black spots moving around" and "white straight lines on a black background"; "purple spots all over the visual field" followed by "a yellowish cast seen over everything"); (4) mental confusion and mild disorientation (comments included "I feel doopy but not sleepy"; "my body feels nervous"; "I am here and not here"; and "My mind feels crowded"); (5) purpling of skin in head and neck as "the diluted color of eggplant"; and (6) nausea, retching, vomiting, nystagmus. Within a few minutes after stopping the injection there was a gradual relaxation, lassitude and withdrawal, followed by a slow return to mental awareness and significant euphoria lasting for several hours. According to Fabing's interpretation, lower doses and slower administration of bufotenine was devoid of the unpleasant initial symptoms, but the euphoric state developed directly and "... its effects are reminiscent of LSD-25 and Mescaline" (Fabing et al. 1956). No further studies regarding human research were ever published, although it was mentioned that several unpublished papers exist (Saavedra & Udabe 1970).

Bufotenine taken from the seeds of *Piptadenia peregrina*, or the revised *Anadenanthera peregrina*, was tested on humans. *Piptadenia peregrina* is part of a shamanic snuff preparation in South America called *cohoba*, *niopo* or *yopo*. Five hundred sixty milligrams of this snuff was taken intranasally, which contained 6 mg of bufotenine. This did not produce any intoxication. To cite Isbell's letter of October 4, 1956: "Neither subjective [n]or objective effects were observed after inhalation of as much as 1 gram of the snuff powder, repeated at intervals of 1/2 hour. Patients just sneezed and coughed. Pure bufotenine (as the salt—*creatinine sulfate*) was administered at 6 mg intranasally, and the first symptoms appeared. At 10 mg intranasally the only symptoms were a feeling of fear, associated with a flushed face, lacrimation, tachycardia and tachypnea. At 40 mg with intranasal spraying, there were no further subjective or objective effects beyond the initial 10 mg dose" (Turner & Merlis 1959).

It is clear that bufotenine salt is either active or inactive, depending on the route of administration and dosage. It is important to note that Isbell's patients who were given

bufotenine at 10 to 12.5 mg intramuscularly reported visual disturbances. In addition, intramuscular bufotenine caused "marked accentuation of sinus arrhythmia, with fluctuating P-R interval."

Shulgin (1981) reported on his experimental self-administration of bufotenine. The overall description of the effects was one of "physical tension, anxiety and of dopiness."

In their excellent paper "Bufotenine Reconsidered," McLeod and Sitaram (1985) reported more research with human volunteers. Bufotenine was given intranasally (with nose drops) and through injection intravenously (IV) using "bufotenine oxalate." No visual effects were reported at 2 mg and 4 mg IV and up to 16 mg intranasally. At 8 mg IV the subject reported "profound emotional and perceptual changes ... involving extreme anxiety and a sense that death was imminent." At this dosage, strange visual effects were reported, with "color reversals and distortions of light that might be seen in a photographic negative."

Bufotenine base or salt obviously is not meant for human consumption. However, recurring conjecture centers on a possible metabolite of bufotenine; or a counteracting admixture that would change its powerful pressor effects into a less toxic, or even nontoxic hallucinogen—by admixture is meant an endogenous chemical created through special diet or meditation, or through fasting, as in the manner of the Amazonian *Ayahuasceros* who control food intake (e.g., no salt, eating foods in whole chunks) days before *ayahuasca* sessions. Or there may be a natural method of bufotenine distillation (e.g., plant or animal enzymes, ultraviolet sunlight radiation) that might curb the pressor activity while leaving some central action, such as psychedelic or hallucinatory effects, or trance effects, or an as yet unknown buffering agent. Davis (1988) presents a compelling tact for this argument.

Bufotenine is structurally similar to the neurotransmitter serotonin, and the two have been compared in a number of studies. This familiarity was first established through the works of Erspamer in 1933. At that time, Erspamer was researching a substance he found in the intestinal tract, which he called enteramine (Erspamer 1940). Following his enteramine research, Erspamer showed this new substance to a colleague, Dr. Page. Enteramine was identical to a substance Page had isolated from the blood (Page 1957, 1954, 1953). Both substances turned out to be serotonin, of which bufotenine is a homolog. Perhaps the work of Erspamer, followed by the works of Woolley and Shaw (1954, 1952), best established this serotonin-bufotenine connection. Both serotonin and bufotenine are pressors, and bufotenine is half as active as serotonin in this regard (Erspamer 1952; Chen & Chen 1931).

There are some important pharmacological differences between bufotenine and serotonin, however, including bufotenine's inability to cross the blood-brain barrier and low lipid solubility. In this parameter, serotonin is more soluble and is readily accepted by the brain (Torres et al.

1991; Holmstedt & Lindgren 1967). Bufotenine's inability to be readily absorbed into the brain has thrown controversy into the question of its psychoactivity. Holmstedt also mentions this controversy, referring to a personal letter (to him) from the bufotenine researcher Harris Isbell. It was Isbell who originally pointed out the low solubility of bufotenine in relation to its mistakenly reported psychoactivity (Holmstedt 1967).

The letter between Isbell and Holmstedt states: "I don't think we should say that bufotenine is not psychotomimetic." He goes on to say that "the difficulty is that bufotenine is a drug that has extremely powerful and dangerous cardiovascular effects, and for that reason it is not possible to push the dose in humans. Simultaneously, with hypertension and arrhythmia (amounting to a ventricular standstill) one sees spectacular cyanosis in the upper part of the body." But Isbell says if it were possible to "extract out" these effects, then he would "not be surprised if bufotenine had some sort of central action" (Holmstedt & Lindgren 1967).

The important thing to note is that a plethora of professional literature exists establishing bufotenine's psychoactivity, and an equal amount of literature exists denying bufotenine's psychoactivity. There have been hundreds of papers on both sides and in many languages throughout the twentieth century. From reviewing much of this literature, one can conclude with some assurance that bufotenine shows no psychedelic effect, but that it is a powerful pressor agent in very high intravenous and intramuscular doses. As the heart tempo is affected, oxygen is cut off from parts of the body, including the starved optic nerve, which then shows distorted images.

## TOADS IN MEDICINE

Besides toxicological and pharmacological studies, toad venom has a long-standing place in medicine and pharmacopoeia studies throughout history. For two thousand years the Chinese have used toad-venom preparations called *ch'an su*, applied externally, to stop nosebleed and as a local anesthetic. In Japan the word for this is *senso*.

Another Chinese preparation called *Kyushin* (perorally recommended as a heart medication) contains two bufodienolides. Other folk uses include oral preparations of dried venom of toad skin extractions as (of course) an expectorant and as a diuretic (increases urine flow); externally for toothaches and to stop gum bleeding. A pharmacological product derived from toad toxin was marketed in France as a "hemostatic and stimulant of the adrenal glands." It was called BUFON<sup>TM</sup> and manufactured by Laboratoires Hardy and was still available in France in 1960 (Poisindex 1991).

In European medicine, a fifteenth-century physician, Petrus de Abbons, wrote a book on toad medicines, *De Venesis*, in which he stated that the blood of toads was of

value in the treatment of "difficulty of breathing," a symptom of heart failure (Podolsky 1934).

The usefulness of toad preparations as a medication was suggested in numerous early pharmacopoeias including (a) Johannes Schroder—*Thesaurus Pharmacologicus*, Leyden, 1672; (b) Samuel Dale—*Pharmacologia*, London, 1692 (highly recommended dried toad for dropsy, heart failure, and for bleeding of the nose and other organs); (c) William Salmon—*London Dispensatory*, 1702; (d) R. James—*Pharmacopoeia Universalis*, London, 1747; (e) John Quincy—*English Dispensatory*, London, 1749; and (f) J.A. Harris—*Pharmacologia*, 1833. It has been suggested that the strong hemostatic action from externally applied toad venom can be attributed to the presence of adrenaline (epinephrine), bufotenine and bufotenidine (Gordon 1964). The strong local anesthetic action of toad venom comes from the steroidal bufagenins and bufotoxins; their numbing effects actually exceed that of cocaine (Habermehl 1981). Toad venom also acts as a powerful antibacterial and prevents fungal infections (Habermehl 1981). Toad venom may also offer self-protection to the toad.

## CONCLUSION

This article is an attempt to organize a brief mythological and pharmacological comparison regarding the supposed psychedelic *Bufo* toad and the supposed psychedelic bufotenine. Science often supports myth, but sometimes science is overtaken, creating or re-creating newer and more complex myths. There is no doubt that the *Bufo* toad has been and is central to humankind's medicines, mythologies, and religions since ancient times. Part of this connection is based in psychology, part in pharmacology, and a good part remains a mystery.

Perhaps when this mystery is uncovered we will know why we dream, why we have religions based on animals, and why some animals seem "princely" or worthy of worship (or atavistic fears). Certainly the *Bufo* toad is one such prince.

Cutting through the mythology and getting at the hard facts seems central to establishing the strictly pharmacologic effects of bufotenine. There are absolutely no psychedelic, mind-manifesting effects or hallucinations regarding bufotenine. There do seem to be some strange visual effects or visual distortions from injected bufotenine, which may be related to its pressor effects and oxygen-starvation of the optic nerve. However, one type of *Bufo* toad venom, that of *Bufo alvarius* (which contains 5-MeO-DMT), does seem to cause delirium and/or hallucination.

Future researchers must recognize that there is a considerable confusion regarding this subject, but that it is possible to turn a toad into a prince with correct and accurate information. This is a complicated matter that requires diligence and a cross-disciplined approach, such as this article has attempted.

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