

## Some Speculations on the effect of Geomagnetism on the Pineal Gland 1.

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### **Abstract**

Research over the past 10 years into the pineal gland and its possible connection with a psi-conductive state of consciousness (Roney Dougal, 1986 & 1989), has recently become linked with research on the connection between the earth's magnetic field (EMF) and psi awareness (Persinger, 1988a; Roney - Dougal, 1988). This connection is explored with particular reference to neurochemical research into the effect of the EMF on pineal gland activity. Basically, the pineal gland makes the hormone melatonin and an endogenous hallucinogen (6-MeOTHBC) that possibly causes a psi-conductive state of consciousness. It also has enzymes which affect serotonin so as to produce a variety of possible hallucinogens. The functioning of the pineal gland is affected by the EMF. Thus the production of melatonin, 6-MeOTHBC and the serotonin hallucinogens, is affected by variations in the EMF, and this could well be related to variations in a psi-conductive state of consciousness, resulting in ostensible psychic occurrences. The implications from this synthesis are far-reaching, and those concerning our understanding of dowsing and certain anomalous phenomena are mentioned.

### **Introduction**

Just recently there has been considerable interest in the effect of the earth's magnetic field (EMF) on living organisms, particularly as a direction finder (Baker, 1980, 1981; Husing, 1960). This interest seems to be spreading into much more esoteric fields, parapsychology being one of them. There are suggestions that psi ability is related to changes in magnetic field strength (e.g. Persinger, 1989). There is the suggestion that psi ability is linked with the pineal gland (Roney Dougal, 1989) - and the pineal gland is affected by geomagnetic variations as shall be detailed in this article. There are suggestions that dowsing ability is related to the EMF (Williamson, 1987). There are suggestions that UFO phenomena are linked with areas of geomagnetic anomaly (Devereux, 1982), and UFO phenomena seem to have a psi component (Roney - Dougal, 1991).

Putting all these individual pieces together an intriguing picture emerges, which suggests that the old idea of a "sixth sense" may be just that, a sensitivity to the EMF. However, this sensitivity is a subliminal perception, and so the psychological process by which we become aware of this information is in many ways similar to that by which we become aware of psi inputs (Roney - Dougal, 1987). From a practical, subjective level therefore, awareness of the EMF and awareness of psi information will manifest in very similar ways. Thus map dowsing (awareness of psi impressions) and field dowsing (awareness of electromagnetic impressions) manifest in similar ways, the dowser obtaining information from the swing of a pendulum or from rods, these being a sort of biofeedback tool informing the conscious mind of subliminal body responses. This suggests, as with my research into more traditional subliminal perceptions, that the line between sense perceptions and psi perceptions is a very fuzzy one, the one merging imperceptibly into the other.

## 1. The Pineal and Psi

There is a large body of neurochemical and anthropological evidence that suggests that the pineal gland may produce a neuro-modulator that enhances a psi-conducive state of consciousness. An abstract of this research was presented at the PA Conference in 1985 (Roney - Dougal, 1986). For full details of this research please see Roney-Dougal (1989, 1991). Research into the neurochemistry and related behavioural effects of the pineal gland is very recent and so there is no clarity as yet into exactly what is going on, but there are some very suggestive findings emerging from the neurochemical literature that tie in with the apparent relationship between psi experiences and changes in magnetic field intensity.

In brief, the pineal gland has been found to synthesise melatonin, various beta-carbolines and certain peptides, and to contain enzymes that produce psychoactive compounds from serotonin (5-hydroxytryptamine) and its precursor tryptamine (Strassman, 1990). These have wide-ranging effects throughout our brain and body, affecting sexuality, adrenals, pancreas, thyroids, and other emotional and endocrine activities. The pineal works together with the pituitary through the hypothalamus controlling the endocrine system. Basically it governs our circadian rhythm, is implicated in our emotional state, reproductive function, possibly dream sleep and in certain psychoses.

Of most interest here is the pineal gland as the psychic centre. It has been found to produce neuromodulators called beta-carbolines which are MAO inhibitors that prevent the breakdown of serotonin. This results in an accumulation of physiologically active amines within the neuronal synapses which may lead to hallucinations. Further there is the possibility that another hallucinogen 5-methoxy dimethyltryptamine is synthesised in the pineal from serotonin (Strassman, 1990). The pineal contains the greatest concentration of serotonin in the brain, this being accentuated in those who suffer from psychoses. Because beta-carbolines are MAO inhibitors they may also act by increasing the levels of these endogenous tryptamines (Strassman, 1990). The pineal also contains enzymes that inhibit synthesis of these hallucinogenic compounds, thus suggesting a regulating mechanism within this gland. There is a suggestion that it is the action of the pineal beta-carbolines on serotonin that triggers dreaming (Callaway, 1988) and it is often reported in parapsychology that most spontaneous psi experiences occur during the sleeping and dreaming state of consciousness. Further, there is now a considerable body of research into the action of serotonin and melatonin in relation to psychiatric disorders such as manic-depression (Halaris, 1987) and schizophrenia (Bigelow, 1974, Tanimukai et al., 1970).

Anthropological data suggest that these beta-carbolines, in particular 6MeOTHBC (6-Methoxytetrahydrobetacarboline), are psi-conducive because their chemical structure is very similar to a naturally occurring group of chemicals called harmala alkaloids which occur in an Amazonian vine, *Banisteriopsis caapi*, used by Amazonian tribes for specifically psychic purposes (Roney - Dougal, 1986 & 1989). This vine is used extensively over a wide area of South America for healing, out-of-body experiences, clairvoyance and precognition. It is only used when psi experiences are

desired. My speculation is that when the pineal gland is stimulated to produce these chemicals we are more likely to enter an altered state of consciousness which is psi-conductive.

## 2. Geomagnetism and Psychic Ability

There has been continuous lore concerning magnetism and mental effects, the first well known example being that of Mesmer, even though he was discredited. Various mediums, such as Bertha Harris, have reported sensitivity to the EMF, but the only research I have found with regard to mediums and electromagnetic field effects is that in which Eileen Garrett sat in a Faraday chamber which was either electrically charged or left in its ground state to see how this would affect her. It was found that when charged she obtained statistically significant scoring (Puharich, 1962).

Recent research (Adams, 1986; Persinger, 1986) has found that:

- a) remote-viewing experiments are more successful when the (daily average aa values of the) geomagnetic field is relatively quiet;
- b) taking selected criterion cases from Stevenson, Phantasms of the Living, and Fate, that spontaneous telepathic impressions were more frequent on days of quiet geomagnetic activity;
- c) this relationship did not hold for precognition; and
- d) that poltergeist episodes are correlated with sudden increases in geomagnetic activity (Gearhart & Persinger, 1986).

Since then there have been numerous reports in the literature, of which a selection follow.

Persinger (1988a) analysed the Maimonides Dream experiments and found that the best hits occurred when geomagnetic activity was quiet. A single subject was tested over a four month period and it was found that the lower the geomagnetic activity the stronger the psi hitting. This correlation did not hold with Honorton's Ganzfeld data nor with the Princeton data (ibid). Persinger & Schaut (1988) found that telepathic occurrences occurred on days when geomagnetic activity was less than when precognitive or postmortem psi occurred, and lower than average monthly or annual geomagnetic activity.

Tart (1988) did two psi studies which he analysed for possible correlation with geomagnetic effects. Again, lower values of GMF activity on days preceding more successful psi performance was found, though not at a statistically significant level. One of the studies showed more successful psi on days of quiet geomagnetic activity, but not the other.

And once again we have a report of another type of psi experience (bereavement hallucinations) which occurs when geomagnetic activity is increased (Persinger, 1988b). Peak displays of spontaneous experiences concerning death and crisis to significant others occurred between 2 and 4a.m. with a secondary peak at 9 - 11p.m. (from Gurney, Myers and Podmore collection, Sidgwick collection & Fate collection). The hours after midnight are the time when the pineal gland's melatonin production is at a maximum.

Following the idea that different types of psi relate to different intensities of EMF, Braud (1989) examined four sets of his biological psychokinesis data: spontaneous electrodermal activity, mental influence on electrodermal activity, rate of haemolysis of blood cells in vitro and mental influence on haemolysis rate. He found that the relations were statistically significant for all the measures except the in vitro haemolysis rate, such that greater effects were shown on days when the EMF was increased. With regard to my pineal hypothesis this finding is of added significance because the pineal is innervated by the autonomic nervous system, which is being measured in all studies on electrodermal activity.

Chauvin & Varjean (1990) used an artificial magnetic field to try and enhance PK effects, following the lead from Harvalik's (1978) work with dowzers. They attempted to influence the fall of lead balls in a mechanical cascade surrounded by a magnetic field and found that when the electrical plates were at a certain distance that a significant enhancement of influence was obtained. This work is very preliminary but does fit in with the overall pattern of an increase in magnetic field strength being linked to enhanced PK.

Persinger (1988a) considers that these correlations hold over decades as well as diurnal time spans, there being some decades that have a noticeably quieter geomagnetic activity than others, e.g. 1870-1879 and 1890-1909. He says "Perhaps this might explain the historical episodes of psi epidemics."!

This research has been criticised by Hubbard & May (1987) who urge that local geomagnetic measurements are made. This recommendation is a valid one, and most of the research on the pineal gland reported below uses local measurements or artificial magnetic fields. It has also been criticised by Gauld & Wilkinson (1989,1990) who analysed spontaneous case collections, including those used by Persinger, and did not find the above correlations.

The major basic suggestion from this body of data is that psi ability is affected by the EMF so that when the magnetic field is different from normal psi experiences occur. This suggests to me that sensitivity to psi experiences is in some way affected by the EMF. We know that certain practices enhance psi experiences, e.g. being hypnotized, and it seems as if a magnetic field that is different from normal may be a similarly psi-conducive situation.

If this is so, then we must seek a physiological explanation for this link between sensitivity to psi and geophysical variation. I have noticed in my literature survey of research on the pineal gland that it too is responsive to the EMF. The production of melatonin and the possibly psi-conducive beta-carbolines in the pineal gland, is affected not only by light and stress, but also by the EMF.

### 3. The Pineal and Geomagnetism

Over the past decade there has been some interest in the effect of the EMF on the functioning of the pineal gland. Most of the experiments have been performed on animals of various sorts, and we should be wary of generalising to humans. However, the tiny body of research that has been done with humans in no way contradicts the animal research. What follows is a selection of research culled from the neurochemical literature that best illustrates the findings with regard to the effect of the EMF on pineal activity.

a) Semm et al (1980, 1982), Barr et al (1983) and Cremer-Bartels et al (1983a) have shown that the EMF affected electrical activity of pineal cells and autonomic cells, and that the activity of the pineal enzyme Hydroxy-indole-O-Methyltransferase (HIOMT) is strongly dependent on magnetic field changes, such that decreased magnetic intensity and reversed horizontal component decrease HIOMT activity. HIOMT is involved in the production of melatonin from serotonin and possibly in the production of the hallucinogen 5-methoxy-tryptamine from serotonin (Prozialeck et al,1978). A lot of experiments not only change the intensity of the magnetic field but also the horizontal component, and this too produces changes in the activity of pineal enzymes (Olcese, Reuss & Semm, 1988).

b) Welker et al (1983) found that artificial magnetic fields, differing only slightly in strength from the EMF, inhibited the melatonin biosynthesis in rat pineals at night by inhibiting NAT (serotonin N-acetyltransferase) activity. It seems as if the change in MF is the important factor, because animals habituate to artificial fields. (NAT is one of the enzymes involved in the synthesis of melatonin from serotonin).

c) Cremer-Bartels et al (1983b, 1984) found that melatonin synthesis is affected by changing magnetic field strengths and that the retina is also affected. In particular they state that NAT increases concomitantly with exposure to increased EMF, and decreases with decreased EMF, whereas HIOMT decreases with both increased and decreased magnetic field strengths. Therefore, NAT alone is important for synchronising the pineal with the EMF and its rhythmic activity persists for at least three days in constant darkness, whilst HIOMT seems to be more implicated with the alteration of consciousness with a change in magnetic field whatever the direction. Reuss & Semm (1987) found that rotating the magnetic field's horizontal component also resulted in decreased NAT activity and therefore decreased melatonin production in pigeons.

As a result of these findings Cremer-Bartels et al (1984) state that: **"The general biological role of melatonin may be interpreted as translator of environmental conditions."** They conclude: "The determinations of the enzymes involved in the melatonin biosynthesis clearly revealed that 50% increased or decreased EMF affects the melatonin biosynthesis in birds in vitro and in vivo . . . the natural EMF variations may be suggested to be the Zeitgeber of diurnal oscillations of NAT in the pineal gland and retina".

d) There is some suggestion that magnetic field effects on the mammalian pineal depend on retinal activation by light (Reuss & Olcese, 1986, Olcese et al, 1988). Reuss and Olcese (1987) report that not only pineal HIOMT but also retinal HIOMT is affected by magnetic fields. Pineal NAT and melatonin content in rats is inhibited by nocturnal exposure to a short-term very intense (100 microTesla) MF when the rats are kept in red light at nighttime. If the rats were in darkness when exposed to the MF their enzyme level was not affected and was anyway lower than those in red light. Though this could be an artifact of the experimental method it is worth bearing in mind. As both the retina and the pineal are innervated by the autonomic nervous system the suggestion is that it is this system which is influenced by alterations in magnetic field strength.

e) However, Wever (1968) showed that **shielding the EMF desynchronised circadian rhythms in humans significantly**, even when light perception was not excluded. This suggests that the magnetic component of the regulation of circadian rhythm is just as important as light. When an animal is kept in constant darkness it is found that its circadian rhythm carries on, but on a 25 hour rhythm. Since the moon circles the earth once every 25 hours, it is possible that this is one aspect of the various factors which govern our circadian rhythm. There are other studies on humans that conflict with this, the people being kept in constant darkness showing a variety of biorhythms. Early days yet!

f) Reuss et al (1985) suggest that there is a magnetic window and the body does not respond to fields whose strength is greater than or far lower than this window, which is around earth strength, but this seems to be true only for mammals and not for birds where some of the experiments have used 50% increased or decreased magnetic field strengths. And yet Reiter et al (1988) found that rats exposed to high voltage (10, 65 & 130 kV/m exposure) 60-Hz electric fields from conception to 23 days of age exhibited reduced peak nighttime pineal melatonin content. Adult rats exposed to electric and magnetic fields show reduced nighttime melatonin. Thus high voltage 60 Hz fields to which we are all exposed when near electricity pylons abolishes the nighttime pineal melatonin rhythm in rats.

Thus, the pineal gland, and particularly its enzymes NAT and HIOMT which are involved in the production of melatonin and serotonin related hallucinogens, is definitely affected both by magnetic and electric fields, such that decreased EMF results in decreased melatonin production, and a short term intense change in magnetic field strength in either direction inhibits melatonin production. This could possibly underlie Persinger's apparently contradictory results noted above in which he sometimes finds a correlation with days of low EMF and sometimes with sudden increase in EMF. It appears to be the change in EMF that is the important factor affecting HIOMT so that potentially psi-conducive state of consciousness hallucinogens are made in the brain through the pineal enzyme HIOMT.

Since melatonin affects a wide range of endocrinal and neuronal functions within the body, anything which affects the pineal gland will have wide ranging effects. I hesitate to mention specific behavioural effects of melatonin, but it is considered to be a major component of our biological clock, and so is implicated in such diverse effects as jet lag and depression, control of reproduction and other aspects of sexuality, and a regulator of stress together with the adrenals and the thyroid (see Roney - Dougal, 1989 for a fuller discussion of this).

There are strong reasons to believe that the melatonin - serotonin neural activities are linked with psychosis (Halaris, 1987, Smith, 1978). Recent research has shown a clear link between long dark nights in winter, depression and melatonin (Arendt, 1985). There is a possibility that the converse is also true; long light days in summer, psychotic mania and serotonin. Thus a reduction in melatonin production through the use of artificial daylight lamps reduces levels of depression.

Serotonin has been linked not only with some aspects of psychosis but also with the action of psychedelics, which were originally called psychotomimetic. Although there are no clear experimental studies that correlate certain psychotic states with increased psi, there is a considerable amount of speculation in the literature that this is the case. If so, then we have here a clear physiological rationale for such a correlation. This aspect will be explored more fully in a future paper.

Although, to my knowledge, there has been no specific research yet on the production of beta-carbolines in the pineal in relation to geomagnetic effects, it is highly probable that its synthesis will be similarly affected since it is made in the pineal gland from serotonin (Uemura et al., 1988). As it is speculated that pineal beta-carbolines are responsible for the production of dreams (Callaway, 1988) and that 6-MeOTHBC is a psi-conducive neuromodulator (Roney - Dougal, 1986 & 1988) all this research suggests that through the pineal gland we have a physiological means by which the EMF can change our inherent sensitivity to psi awareness.

This sensitivity of the pineal gland to the EMF links in with two other areas of research, which I shall mention only briefly here.

#### **4. Dowsing and Geomagnetism**

Dowsers rod movements seem to be linked with changes in the intensity of the EMF. For a full survey of the literature see Hansen (1982). More recently, Williamson (1987) reports that the scientific consensus that seems to be emerging is that dowsers search for flowing ground water which is associated with geological features such as faults. These geological faults are associated with geomagnetic anomaly. For example: "Simmons, a geophysicist at the Massachusetts Institute of Technology . . . conducted surveys of gravity and magnetic fields around two dowsed wells near Boston, Massachusetts. Unlike most other wells drilled into the crystalline rock of the district, the holes yielded large quantities of water, at least 140,000 litres per hour. Simmons found that the dowsers had sited both holes within a narrow magnetic anomaly only a few metres wide. The anomaly resulted from a fracture zone that was channelling the flow of ground water, hence the exceptionally high yields of the wells."(ibid.).

This theory, that people can respond to changes in magnetic field strength, also explains how dowsers may find veins of metal ores. Like underground water, these veins are usually associated with faults or fracture zones, and in some cases ore minerals are themselves magnetic.

Experimental research into dowsers has been conducted for over 100 years the most notable being that of Solco Tromp, a Dutch geologist (1968), Yves Rocard, a French physicist (1964), Sochevanov & Matveev, Soviet geophysicists (1976) and Chadwick & Jensen (1971) of Utah State University. All this experimental research supports the idea that dowsing utilises a magnetic sense.

This magnetic sense has also been extensively researched in animals. It has been detected in robins, termites, cochafers, slugs, beetles, crickets, grasshoppers, wasps and flies. For example, Mather & Baker (1980) found that the woodmouse uses magnetic cues for direction finding. And homing pigeons magnetic direction sense has been well studied (Presti & Pettigrew, 1980). These researchers have found that the magnetic field affects not only direction finding but also other aspects of behaviour. Stutz (1971) considered that the circadian rhythm in gerbils is entrained by the daily magnetic field fluctuations. Rudolph et al (1985) found that 60 Hz electric fields as well as artificial magnetic fields affected rat behaviour, there being a decrease in "emotional reactivity" after exposure. Walker (1984) found that tuna could detect changes in magnetic fields as small as one nanotesla (less than one twenty-thousandth of the Earth's field).

A comparable system in humans could easily be sensitive enough to account for the results of dowsing experiments. A.S. Presman (1970) found that electromagnetic fields have an effect on human tissue, and this work has been amplified and developed in the last two decades by numerous researchers (Becker, 1985; Smith & Best, 1990; Shallis, 1988), the overall picture emerging that we are affected by artificial electromagnetic fields in a variety of ways from epilepsy, nausea and headaches, to bone healing and other beneficial effects.

Baker (1981), in his book on human navigation, calls our ability to sense changes in magnetic field strength and direction the "sixth sense". He tested university students and found that they could point out directions to a significant degree of accuracy only when their blindfolds did not contain concealed magnets. A student of his, Gai Murphy, extended his research to children and appears to have found that this magnetic sense of direction emerges at puberty (Young, 1989). In some experiments researchers have noticed that the direction of the field appears to have a biological effect (Becker, 1969; Narayan Sanker, 1984; Semm, 1982), this tallying with the research on the pineal gland already reported.

This body of research suggests that field dowsing is at least partially a physical response to variations in the EMF. Research on a psi component to dowsing, as is evidenced by map dowsing, has not been so conclusive, though Hansen (1982) reviews several experiments that suggest that the dowsing rod is an excellent biofeedback tool that tells our conscious mind of responses to psi targets made by our body. This links with research on responses to targets using the Galvanic Skin Response and the plethysmograph in which researchers found that the body responded to psi events (e.g. Dean, 1966; Braud & Schlitz, 1983). All of this research suggests that these responses occur through the autonomic system which once again brings us back to the pineal gland which is also innervated by the autonomic nervous system.

## **5. Sacred Sites and geomagnetism**

Research into UFO's and ancient stone circles suggests that these also appear to be connected with geomagnetic anomaly (Devereux, 1982). The research mentioned here is very preliminary, but very interesting and definitely warrants further investigation.

Devereux mentions Persinger and Lafreniere's book "Space-Time Transients and Unusual Events" (1977) which analyses a range of UFO and anomalous happenings. Their data suggest that UFO phenomena tend to cluster in areas though there is the confounding effect of population density. These areas were primarily areas of seismic related stresses. During seismic strain, pressure on the rock crystals produces electromagnetic fields through a piezoelectric effect. The fields created by this process then have physical effects such as ball lightning, will-o-the-wisps, and other UFO related light effects, and are also connected with psychological and psychic effects such as poltergeist outbreaks (Persinger & Lafreniere, 1977; Persinger & Cameron, 1986).

Devereux (1982) has shown that there is a strong correlation not only between UFO sightings and areas of geomagnetic anomaly, but also sacred sites, in Britain and France at least. Of the 286 stone circles extant in Britain today, 235 of them are found on Pre-Armorican rock outcrops. Pre-Armorican rocks are those that are more than 250 million years old (Pre-Cambrian through to Carboniferous) and cover 36% of the land mass of Britain. The chi-square test of this occurring by chance yields the figure of  $\chi^2 = 169.35$ ,  $p < 1 \times 10^{-6}$ . In other words, stone circles are found on specific rock outcrops. These rocks are extensively faulted. These geological faults are all areas of tectonic stress, leading to piezo-electric effects and geomagnetic anomalies.

Measurements of unusual physical effects associated with megalithic stones have been made using gaussmeters, which have shown anomalous magnetic readings near the stones compared to the locality; using geiger counters, which appear to show ionization effects rather than straightforward excess radioactivity; using audiosonic equipment which measured a high pitched sonic outburst from the stones just at the moment of dawn; and infrared photography which showed the same energy burst from the stone at the moment of dawn. Several well-known and well-respected dowsers, for example Bill Lewis, have also measured unusual effects (Devereux, 1982; Robins, 1985 & 1988). This field research is of a preliminary nature and so the findings are only suggestive. It is to be hoped that it will be followed up by further work soon.

Comprehensive maps in Devereux's book (1982) show the relationship between UFOs and earthquake epicentres, between UFOs and geological faulting, between UFOs and areas with less

thunderstorms than the average, between stone circles, ley lines and UFOs and between stone circles, ley lines and geological faulting.

## **Discussion and conclusions**

Persinger (1988a) considers that there are two possible interpretations of geomagnetic correlations: 1) EMF affects psi functioning; 2) EMF affects brain receptivity. This assumes that the psi process is a constant - everpresent - and geomagnetic activity affects the detection capacity of the brain for this information. He considers that: "If we include the hippocampal and amygdaloid model for psi experiences, then the geomagnetic activity might affect the neural pathways that facilitate the consolidation and declarative (conscious) access to this information. Without the geomagnetic effect, the conscious awareness of the psi stimulus within the brain might not be as probable." My research into the pineal gland suggests that option 2 - EMF affects brain receptivity - is most likely to be the correct interpretation of the data.

Roll & Montagno (1985), Robinson (1985) and Neppe(1983) have all suggested that the temporal lobe might be implicated in psi awareness. Dixon (1978) considers that the limbic system is the most probable. Both of these areas are closely connected with the pineal glands neuro-endocrinal effects. Persinger(1988a) notes that EMF temporal lobe seizures, and generalized motor convulsions are most prominent between 2 and 4 a.m. with a secondary peak at 10p.m. "These data suggest that some important process within the temporal lobes is enhanced during the early morning hours." Pineal melatonin is enhanced during the night, its peak production occurring six hours after the onset of darkness, and this could be the "important process" that links the temporal lobe with the psi process.

Persinger (1988a & b) also links temporal lobe activity with melatonin - temporal lobe related disorders such as depression can most definitely be related to melatonin since melatonin has been shown to be implicated in winter depression (Arendt, 1985). Day light inhibits melatonin production but house lights do not. One needs intensities of 2000 lux (Whitehouse, 1985) to inhibit melatonin production, which is why so many people get depressed in winter and sun lamps are being found to be efficacious in curing it. I have noticed that some experiments with rats have used red light as red light does not inhibit melatonin production - in fact in one experiment it even seemed to enhance it. This makes me wonder if the red light used in Ganzfeld experiments is having some sort of physiological as well as a psychological effect. Also mediumistic effects are traditionally considered to be best in dim light. And most spontaneous psi seems to occur at night time, especially whilst dreaming. All of these are times when melatonin production, and possibly beta-carboline production, are enhanced.

The information which I have presented here is merely the tip of a vast body of information concerning our sensitivity to electrical and magnetic effects. Although it is at present unclear as to the exact mechanism within the brain of the pineal chemicals, and their exact effects on our state of consciousness and behaviour, this information could lead to a greater understanding of a physiological process underlying certain psi-conducive states of consciousness.

In conclusion, I am beginning to consider that the pineal gland is in some way involved in the psi-conducive syndrome through its production of melatonin and beta-carbolines which affect us at physical, emotional and mental levels. Geomagnetism appears to be one of the environmental conditions which seem to enhance pineal activity although the details are not yet clear. I have always wondered why the fact that the EMF affects the functioning of the pineal gland, suggests a neuromechanism by which our psi ability is affected by the EMF, since the pineal gland makes an endogenous hallucinogen (6 MeOTHBC also known as pinoline) that is chemically similar to the active principle in a vine used by Amazonian Indians specifically to produce a psi-conducive state of consciousness (see Roney - Dougal, 1987 for details of this research). Thus, psi ability which is reported to be affected by changes in the EMF might be due to the formation of these endogenous hallucinogens. Hallucinations associated with mental illness appear to be part of the same

neurochemical process and so the lore surrounding psychic aspects of psychosis could well have a physiological foundation.

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