EXPLORATION OF VISUAL EVIDENCE

(1st paper of supporting evidence and expanded theory for a Brain Dipole model)

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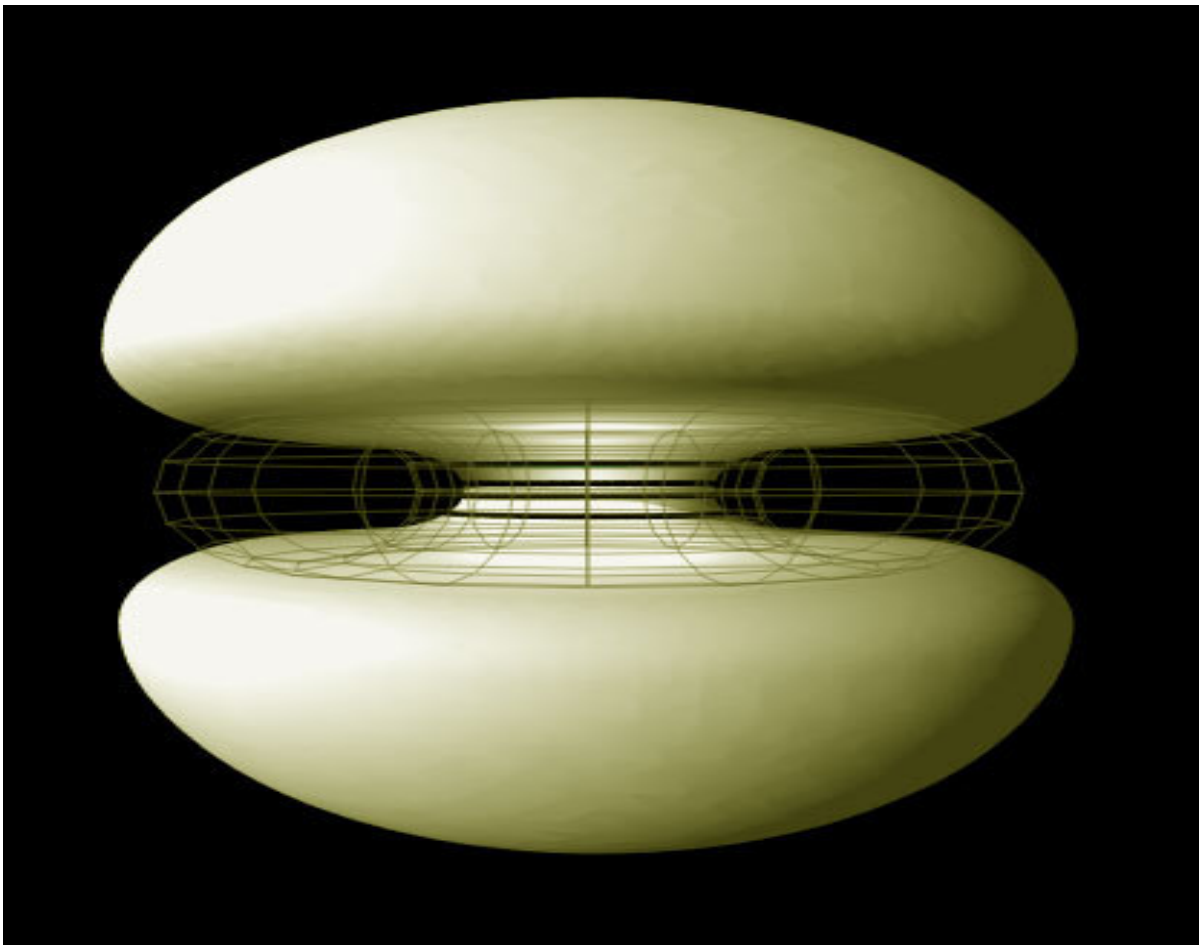

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ABSTRACT

This paper is unlike the rest. It explores some of the prominent visual premises which arose during the writing of the publication "Dipole Neurology". This has been widened to look at the cortical blood supply as a spin network, with a model of the brain which is fully spherical. By using the standard 3d representation of a dipole, from which to explore basic shapes in electromagnetic systems, it is also possible to re-explain existing brain dissections, and provide novel solutions to two kinds of cortical "torque". Yakovlevian and volume torque.

This is then taken further by using 3d dipole components within a CAD environment, to illustrate a novel process which sets out to explain why neurology is the shape it is. The limbic system comes out from that looking like a linear quadrapole with an inner to outer brain ratio of golden mean "Phi", which accords with the spectrum of it's EEG.

SECTION 2

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INTRODUCTION

This section is different. Not as intense on references. This is because there is not a great deal of precedent for what is here and the primary goal of providing an intensely reasoned dipole has already been achieved in the other three sections. This section represents going beyond that to really take a deeper look at electromagnetic structures within neurology. Most of the good ideas are in here. Some of them will be wrong. That does not mean that they are all wrong, or that those which are partly wrong are completely wrong.

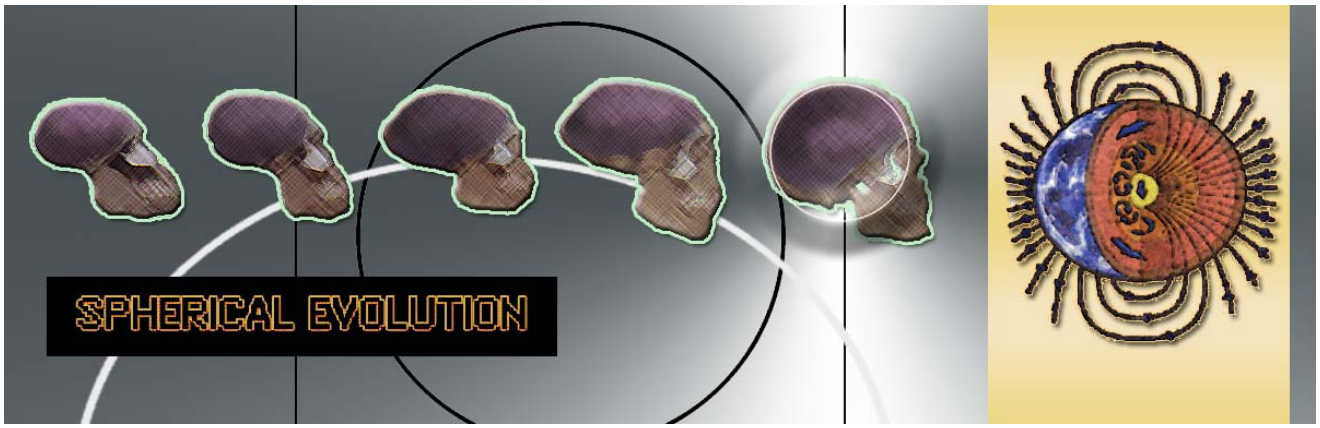
Some literal scientists will have difficulty accepting the methods and premise of this section, as these set out to re-contextualize existing research around visual ideas. I can only say, this it should be remembered that it was this same method of thinking which brought about the original dipole concept. Also, a multi-prong approach has been taken to investigate the prime Dipole neurology systems concept, which means taking research in both visual and scientifically logical language based directions at the same time. That is, one foot is trying to stick to science and another trying to go beyond that. Partly because science has not adequately described or recognised the system itself, and partly because I think science is unbalanced in approach, and cannot memorise or process global features. (1) That to say that, the tensegrity system itself is well balanced, and reveals itself to an eastern approach, where as science is landmark based, and so landmarks are what is revealed to science.

Being a global thinker means a degree of ability to accommodate the two approaches at the expense of getting things right on the money when on the first iteration of a project. So for literal readers, it would be a pity to miss the parts more relevant to that way of thinking because of the style of this section which is partly a "throw in all the other ideas" section, but also an attempt to find the limbic structure. To stick to the orginal outer cortex dipole route, it would be better to read just the intial opening part, which highlights the rest of the dipole theory, then skipping to read the last two sections, "Tensegrity systems within Neuron chemistry" and "Neurochemical modulators". These are the most intensely built from evidence, and the most revealing because of that. They focus on applying systems theory itself to review the current research in neurochemistry to show the dipole exists from existing evidence. Then if happy that a the beginning of a solid case has been provided for the dipole, this section represents the next stage to go from there.

2.1 SPHERICAL EVOLUTION

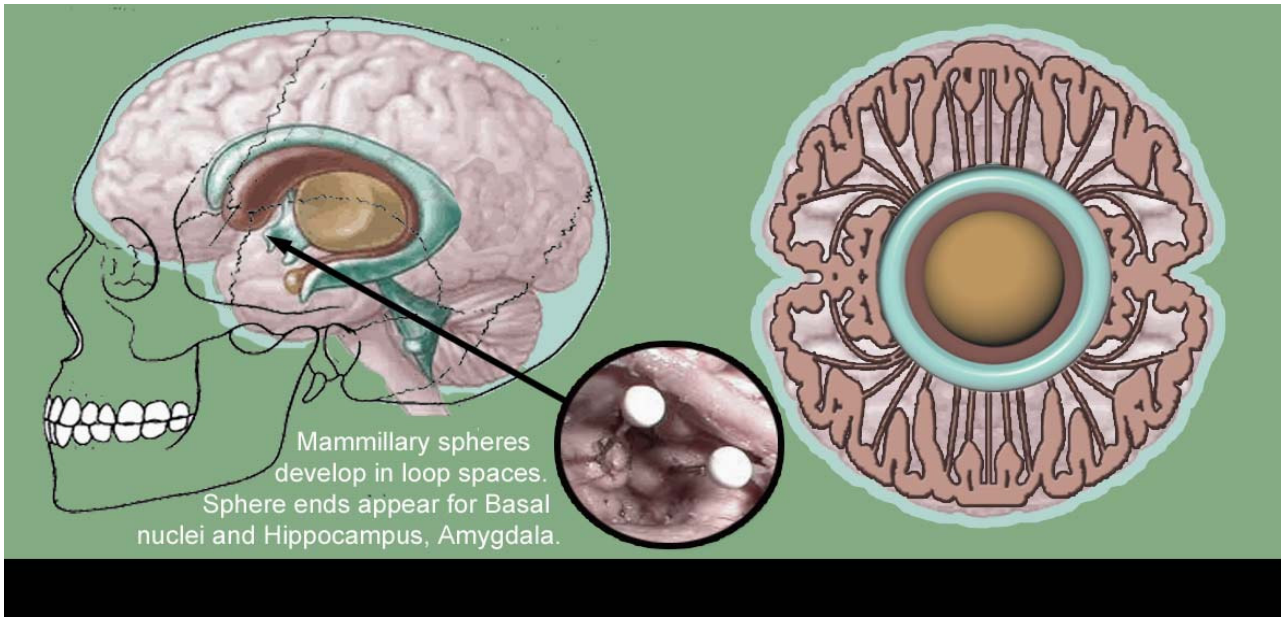
Spheres are not a big part of everyday life. Even though we are made from trillions of them, and we live on one which is in a universe of them while we look at a reality through two of them we mostly see squares. Square TV's, square edged living spaces. The square human environment defies spherical reality. Spheres can be observed at the pinnacle of system complexity. Cells tend to become spherical if no demand for another shape exists. Our eyes too. Does this says something about the shape of a system required for complex processing to work ?

The case is going to be made here that the brain is evolving to spherical proportions. Biological electromagnetic dipole forces within the brain have been pushing / pulling and rotating against the unusual spaces imposed on it by the agendas of creature form for millions of years. Evolution over time to spherical proportions is the result of overcoming these agendas. Natural selection has facilitated the emergence of the spherical brain. Mutations which allow electromagnetism to emerge, provide obvious benefits such as more redundant processing capacity. Like the earth and atoms it came from, the dipole sphere is the optimum natural shape of a well balanced system.

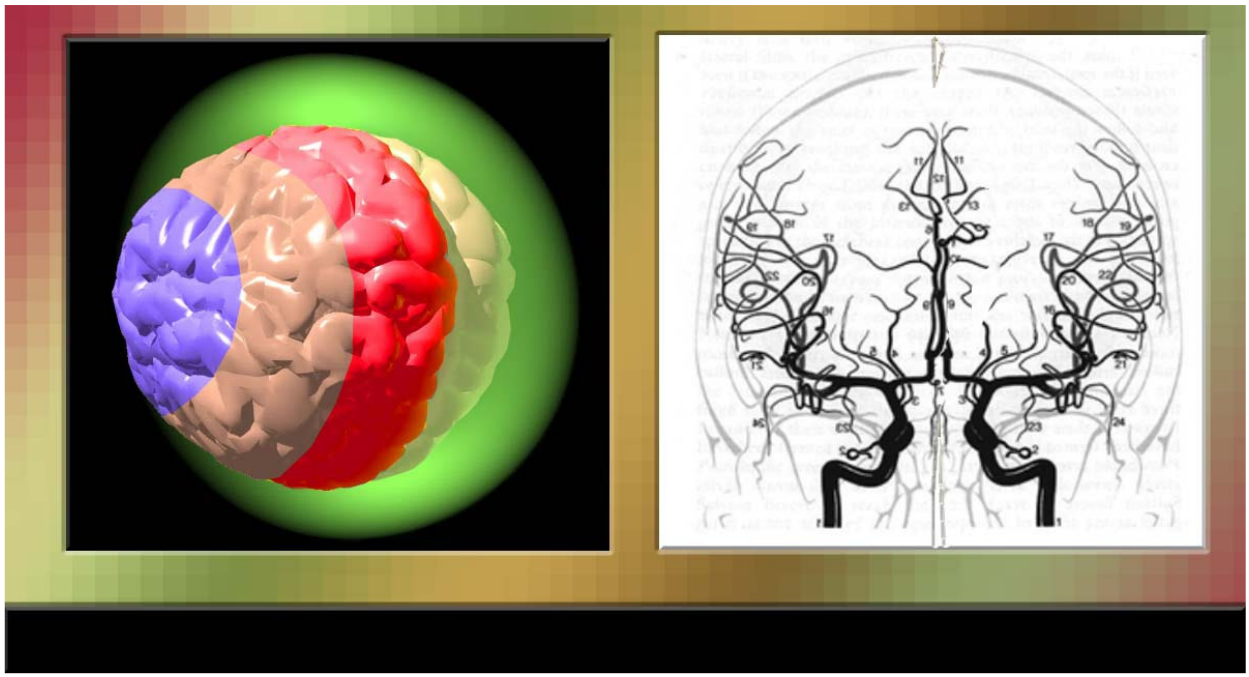


Evolution to spherical proportions as brain becomes the attractor of development.

The dipolar aspects of neural development which initially piggy backed on creature form out of pure electrochemical forces have now fulfilled their natural spherical shape almost as much as possible within a skull that has a mouth cavity and is tied to a body With optimum shape reached and larger brain sizes increasing delay times in cross-hemispheric processing. The brain is at its peak of evolution.

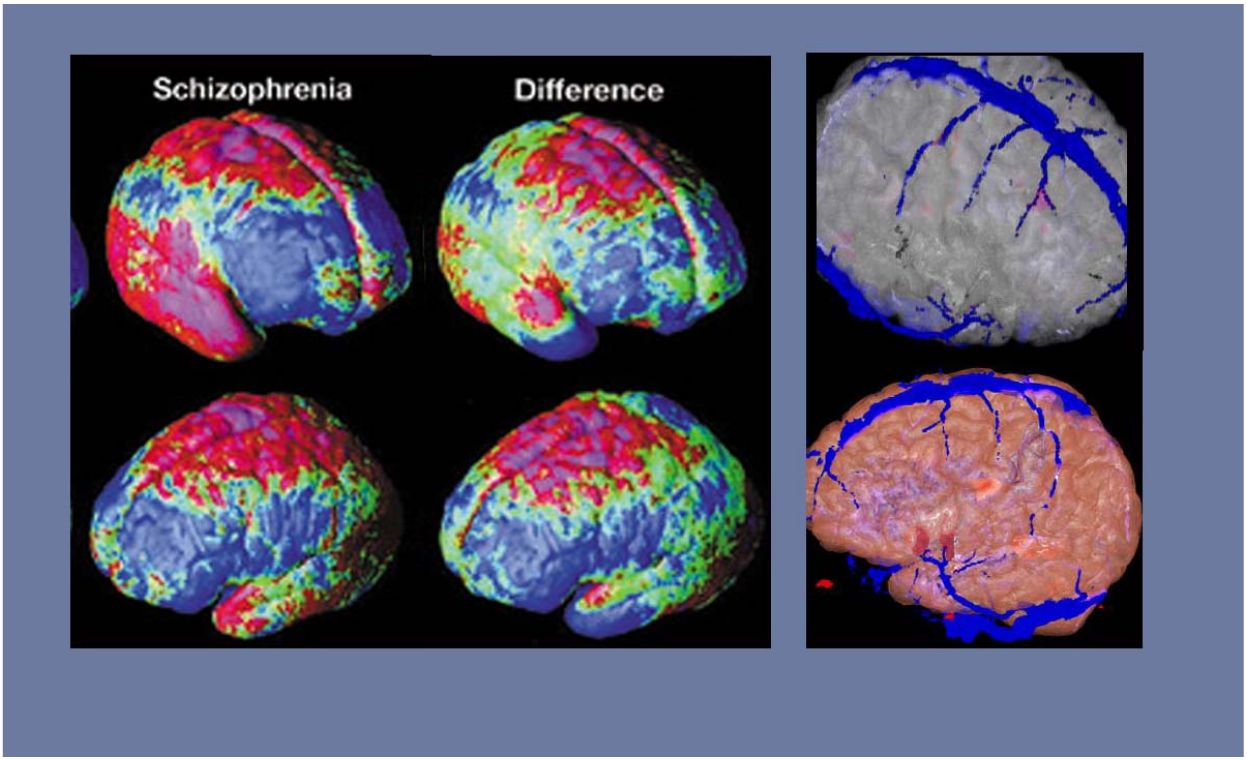


LEFT : Removing the brainstem, cerebellum and jaw reveals what the brain might really be trying to be. Its proposed that in the brain the dipole is a "Tensegrity" structure which has undergone a severe compression that complexes the limbic area to increase tension in neurological structure. Compression in temporal lobe fissures and incomplete limbic structure loops are visually related to space occupied by Jaw area. Where the loops cannot complete, magnetic feedback induces spherical nuclei to emerge. RIGHT : Rebuilding to a perfect sphere.



LEFT : Highest areas of processing red and blue zones. In a dipole this is the poles, and the toroidal midline. RIGHT : In the brain these zones correlate with larger artery density.

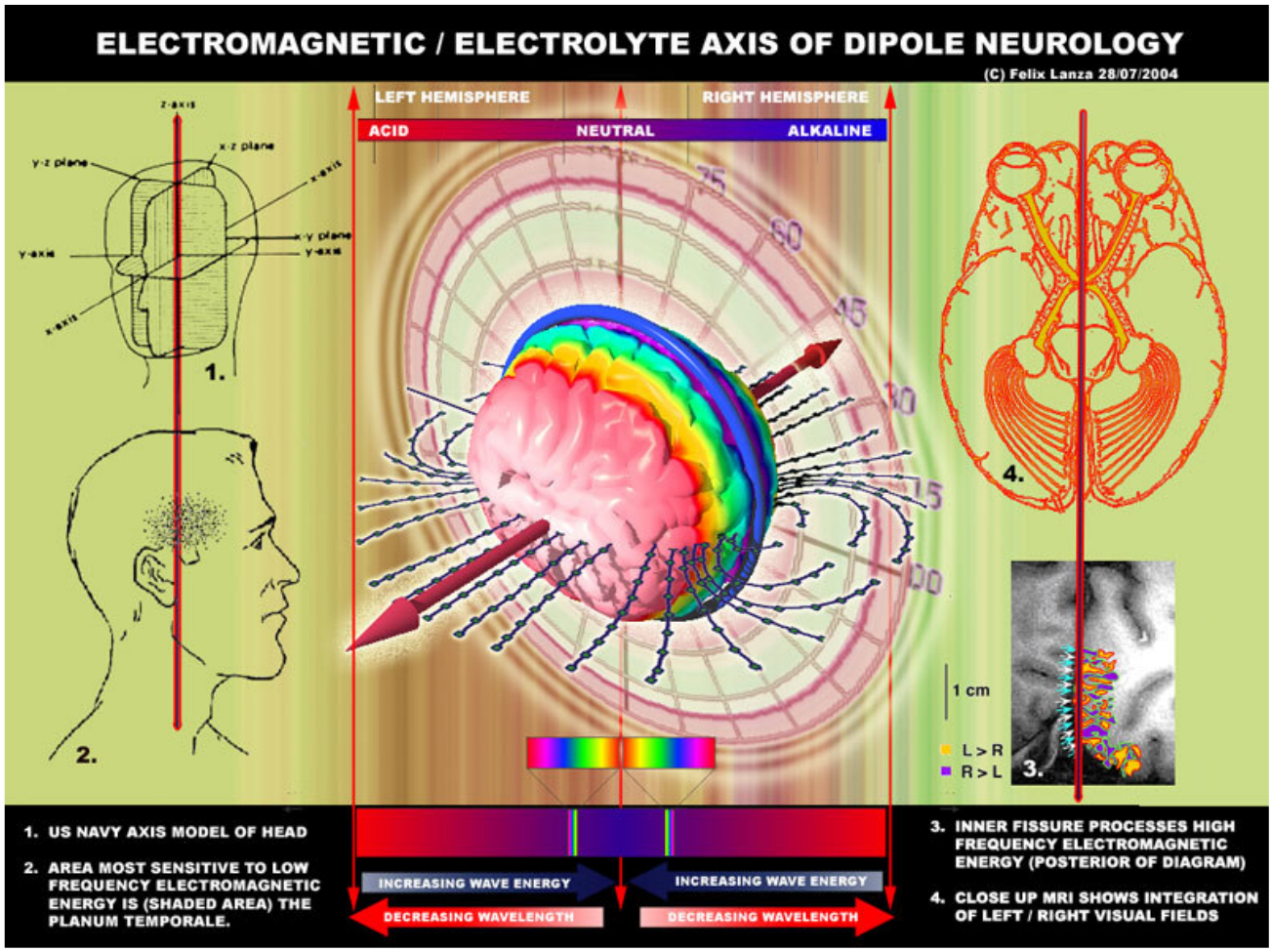
2.2 LATERALIZATION AT POLAR ENDS IN SCHIZOPHRENIA



Volumetric scans of grey matter loss in schizophrenia. Blue is no loss. (23) "Difference" images deducts for loss in normal subjects. In schizophrenia the NMDA receptor for the primary glutamate transmitter has far reduced activation, triggered during periods of natural adolescent grey matter pruning. (23) There is asymmetry of grey matter loss between right and left temporal lobes. Left temporal lobe is only slightly affected. This is consistent with the evidence put forward for a sodium / chlorine charged dipole model which has glutamate lateralized in the right hemisphere and Gaba in the left. For the dipole model polarization of this charges increases towards the temporal zones. *(This was illustrated by the separation of processing being less integrated at planum regions in comparison to the brain midline, (1) and the example previously regarding areas of greatest blood supply.)* Hence the glutamate areas in the parietal regions are symmetrical. LEFT IMAGE : The grey matter depletion zones also correlate with veinous return drains which *(return paramagnetic blood see (1) heading out towards the largest blue areas.)* These zones are proposed to be higher in terms of magnetic energy.

2.3 PUTTING IT ALL TOGETHER

The following image attempts to bring together several of the previous concepts.

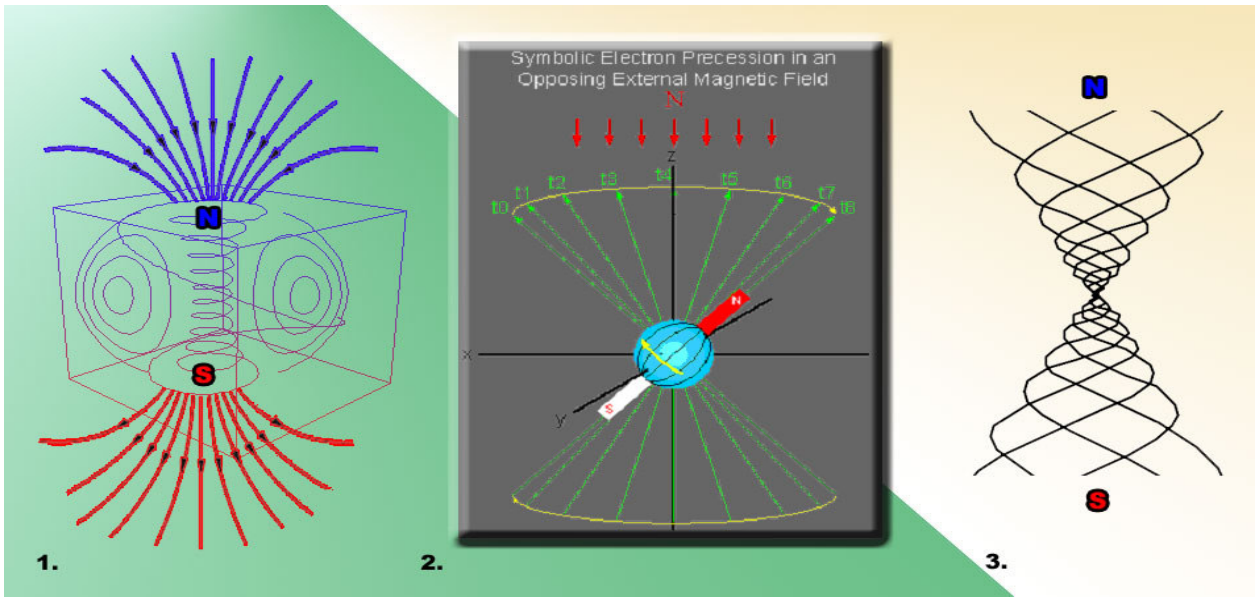


The brain in the centre is spherical. The arrowed line goes through the planum temporale auditory centres. *(2 in fig above)* The lines eminating on the x,y axis *(refer to figure 1)* are guide to magnetic field lines. *(only on the x,y axis)* Ring round z,x axis represents electrical field. *(If brain were not sealed)* Blue ring round the midline corresponds to the sagittal sinus now fully represented as a paramagnetic toroid. *(relevance of toroids will be explained in following sections)* At the midline posterior where the magnetic field lines converge, *(imagine occipital lobe)* processing between the two hemispheres is integrated, due to toroidal exhange. *(relevance of toroids will be explained in following sections)* This can be seen in how the visual system mirrors complex processing of high frequency information. *(3 in fig above)* in either side. As processing moves out from the midline to the planum auditory regions *(where the arrow emerges in figure above)* Lower frequency information is being processed with higher degrees of polarization. Negatively charged, more acidic ion process at neurotransmission (2, 3)) or positively charged with more base type ion process at neurotransmission (2, 3)

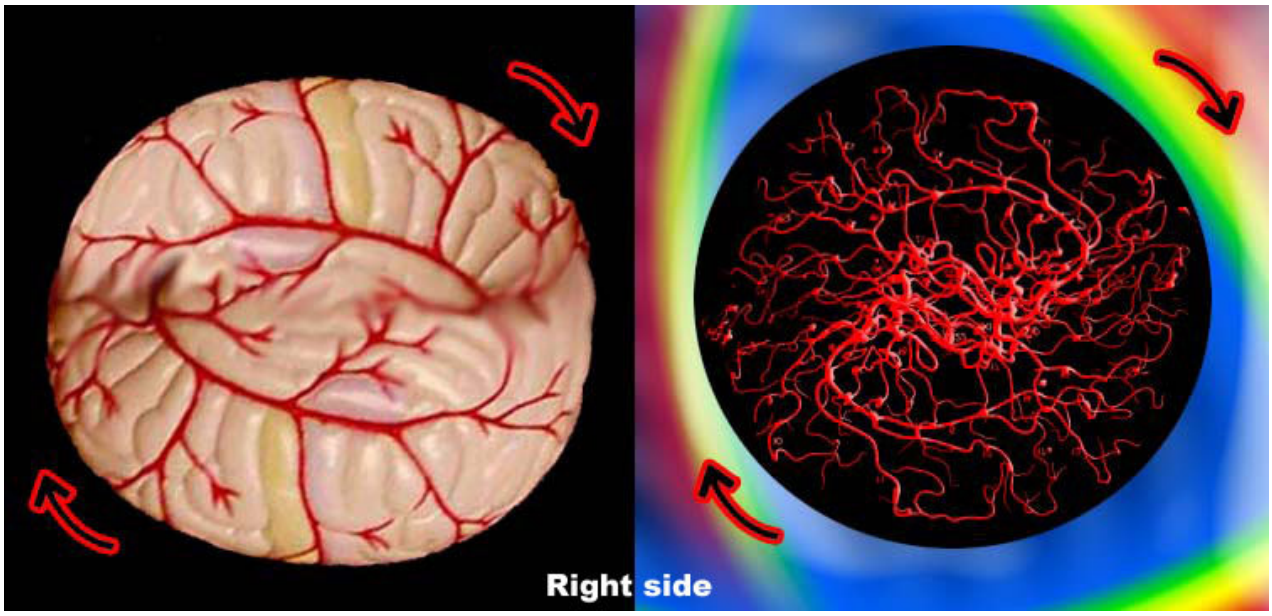
The spherical model is important to set out at the beginning of this paper, because it will be used throughout to visually highlight what neurology looks like when mirrored from the top half. It is also used later to try to re-create a spherical brain with mathematical models using shapes derived from electromagnetic spheres, as a problem solving tool for analysing brain wide problems

2.4 THE CONCEPT OF ELECTROMAGNETIC SPIN

Electromagnetic fields are compromised of a magnetic and electrical components which work perpendicular to each other. The previous example applied the magnetic field aspect to brain appearance. This section looks at the electrical aspect. First of all by bringing in the concept of electromagnetic spin or "precession" How the electrical flow spins in a dipole.

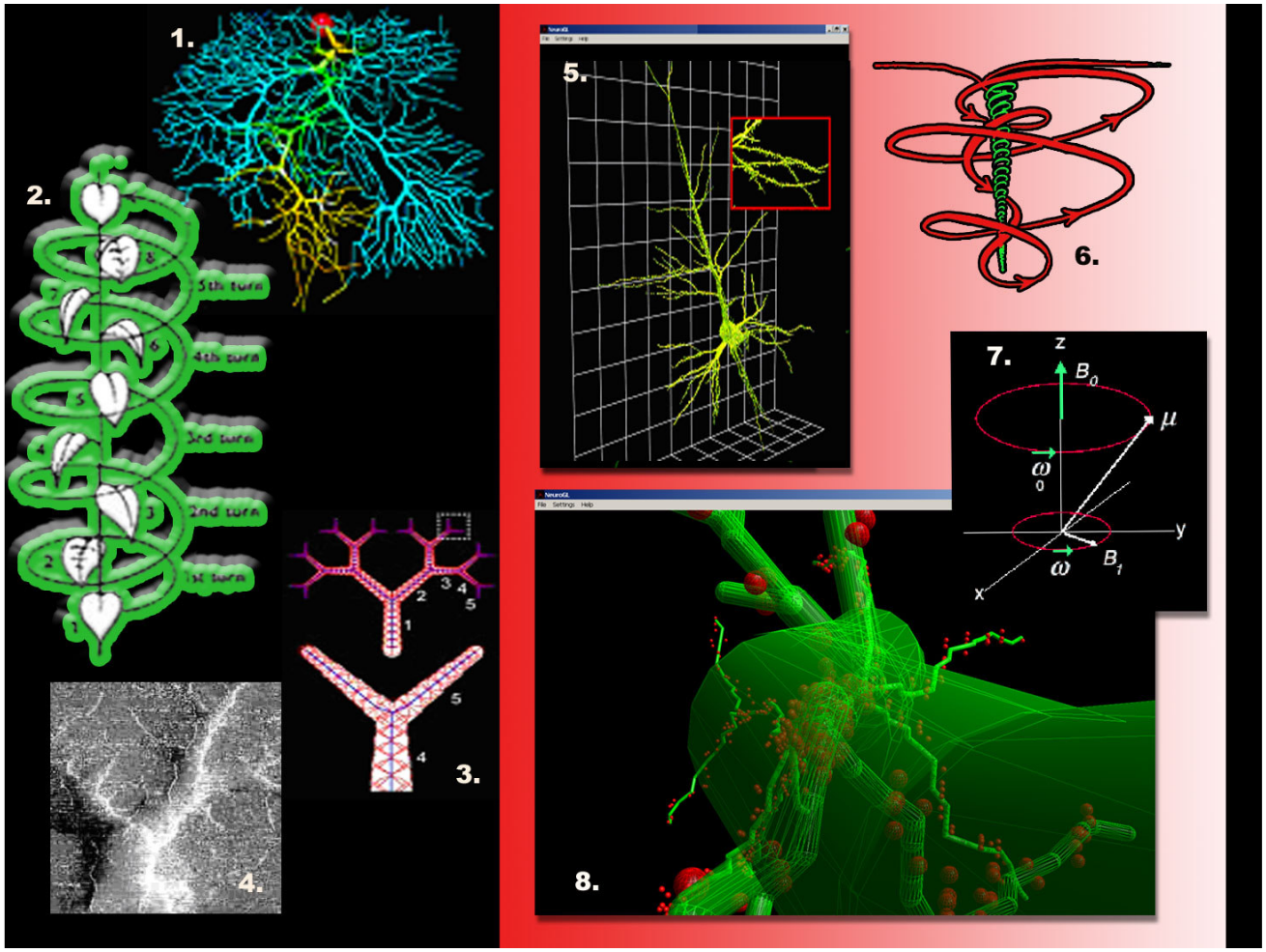


This view of a dipole is a collage showing magnetic and electrical lines separated. What is contained inside the box area is the electrical part. Notice how the electrical line winds at right angles to the magnetic field lines located outside the box. The electrical field tends to spin from negative North pole down towards the centre halfway line where the magnetic field lowers due to the field reversal, then gathers up energy spinning through to the south pole, where it emerges up re-circulates round the toroid, pulled up to the north pole again. (2) Precession spin of an electron within a magnetic field (red arrows pointing downwards) (3) Theoretical description of North / South spin within an electromagnetic field.



LEFT : Medical model mirrored, to show direction of brain folds and vessels. RIGHT : Real angiogram of blood flow mirrored. Both show right side of brain.

The above visual evidence would tell us that not only does blood structure flow have clockwise spin, but so do the brain folds, previously described as resulting from magnetic domains which is the result of magnetic state changes in blood. (1) The visual result here is entirely consistent. And will add to the sections on brain torque later on. This would surely apply to cortical neurons themselves. If the overall electromagnetic field is twisting, then this should apply to the neurons which are aligned lower in the electromagnetic hierarchy, (1) to the blood vessels themselves. The next examples show spin and conical windings within neurons themselves.

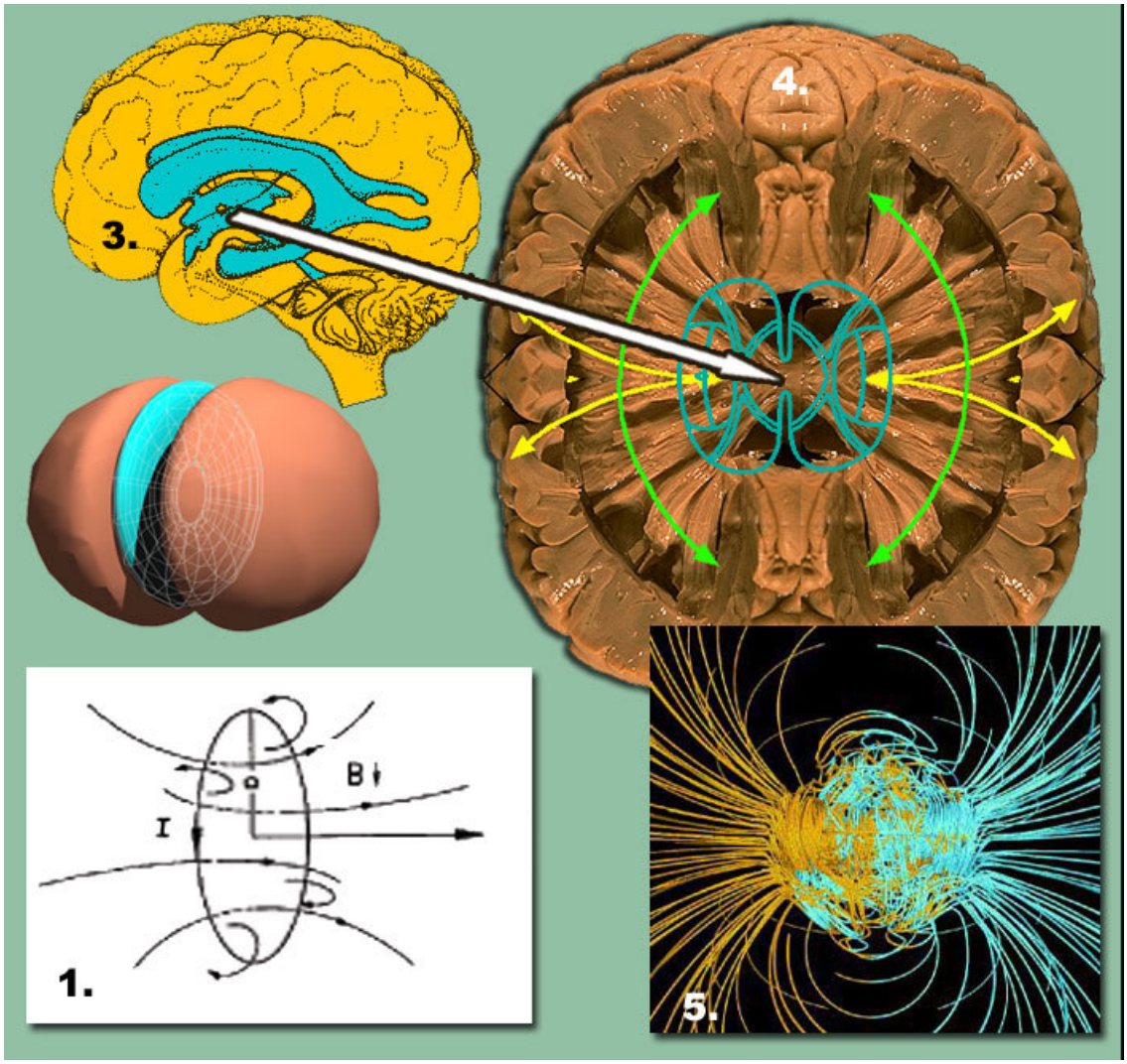


Various examples to illustrate relationship between spin and electrical fields.

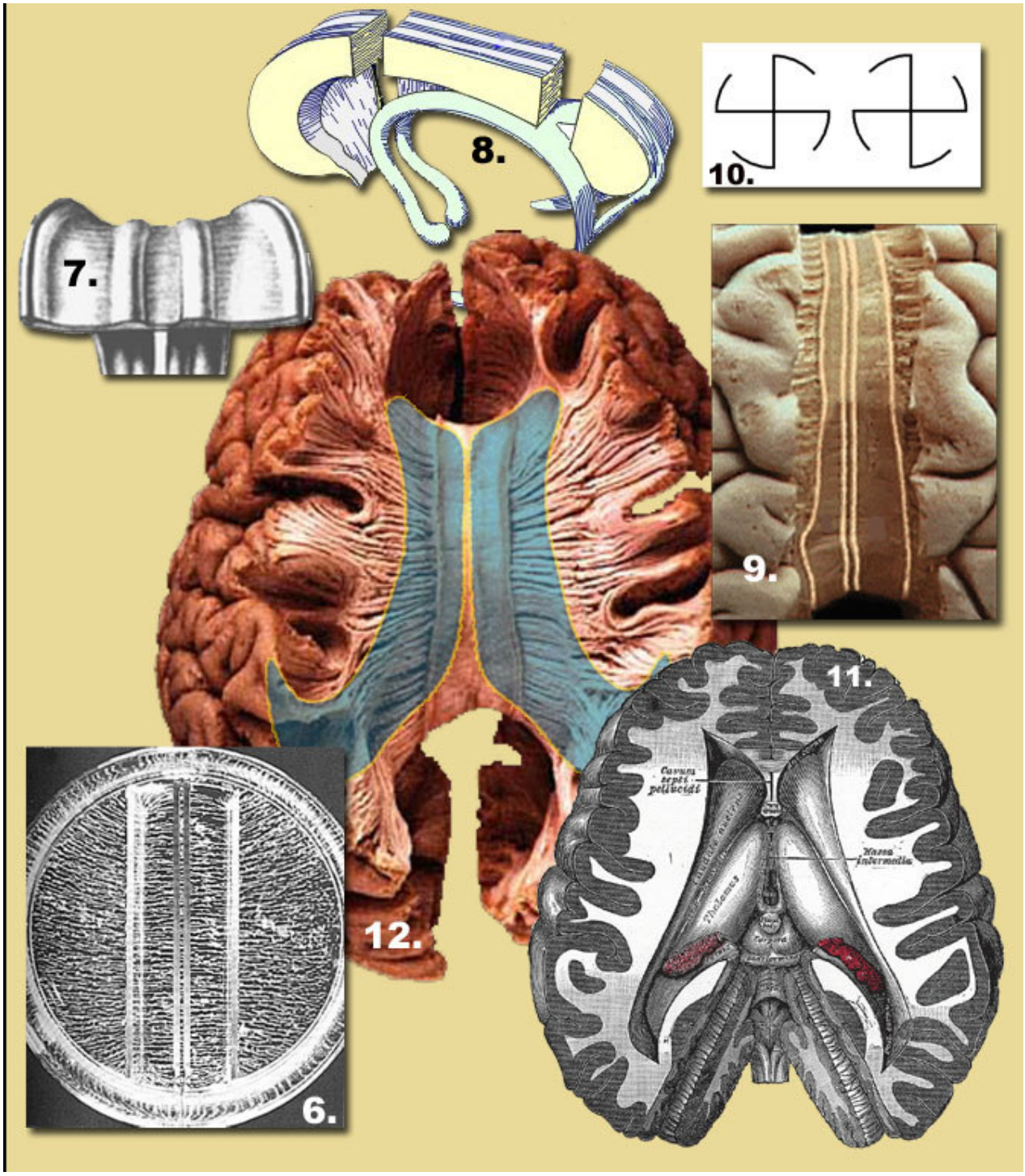
(1 in fig above) and *(2 in fig above)* illustrate branching whether in trees or neurons *(1 in fig above)* have spin winding which accords with mathematical constants. (1) A view down an electron tunnel microscope. *(4 in fig above)* This shows the fork of electricity. (not the tip) Note the tree like branching. *(3 in fig above)* Fractal bifurcation applies for electrical forks. *(6 in fig above)* rendering of spin cones. *(8 in fig above)* Mathematical rendering of precession spin cone. *(9 in fig above)* This is a view down a real computed segment of pyramidal neuron. *(3 and in fig above)* Note the fork and winding pattern.

3 UNDERSTANDING BRAIN DISSECTIONS USING DIPOLE MODELS

The purpose of this section is largely a spherical contextualization of neurology with the purpose of uncovering the brains true electromagnetic structure. Some images will be created as visual mirrors or analogies made with other electromagnetic systems. Inner and outer brain neurology will be looked at separately.



3.1.1 INNER BRAIN: There is probably no better example of a snapshot of electromagnetism than brain dissections. The thalamic fibres with the thalamus removed and placed as blue outline on top *(4 in fig above)* show very typical magnetic field lines, indicated by the arrows. These correlate with curves seen in everyday study of electric currents through a central ring *(1 in fig above)* and the earths magnetic field lines. *(5 in fig above)* What seems to be missing is a central toroid. (*see introduction to dipoles (1-1))* This is present as the 3rd ventricle *(3 in fig above)* which is sandwiched between the two sides of the thalamus. The last section in this paper sets out to find out the brains electromagnetic structure using spherical models called isotropes which simplify brain structure. For the thalamus spherical model the ventricle can be approximated by a flattened Toroid, while the thalamus itself has a classic North / South Dipole structure. Much of Thalamus / cortical structure is contra-lateral (17) This correlates with our nearest dipole system, the earth. Simulations of the magnetic field lines from the earths core *(5 in fig aobve)*, indicate both contra-lateral twisting like Thalamo Cortical axons and a central area of condensed throughput. *(3)* When twisted structures like this occur in electromagnetic cores like the earth, the result is an increased inner stability, which contribute to evolution of the system. The Thalamus is at the centre of the proposed brain dipole. This location allows it to escape much of the human restrictions to a spherical shape outlined previously, making a good starting point for rebuilding a spherical brain model. Thalamus structure is a highly complex synchronised and segregated piece of Neurology *(11, 12)* in regard to the variety of information it deals with. Inner brain will be looked at in a following section.



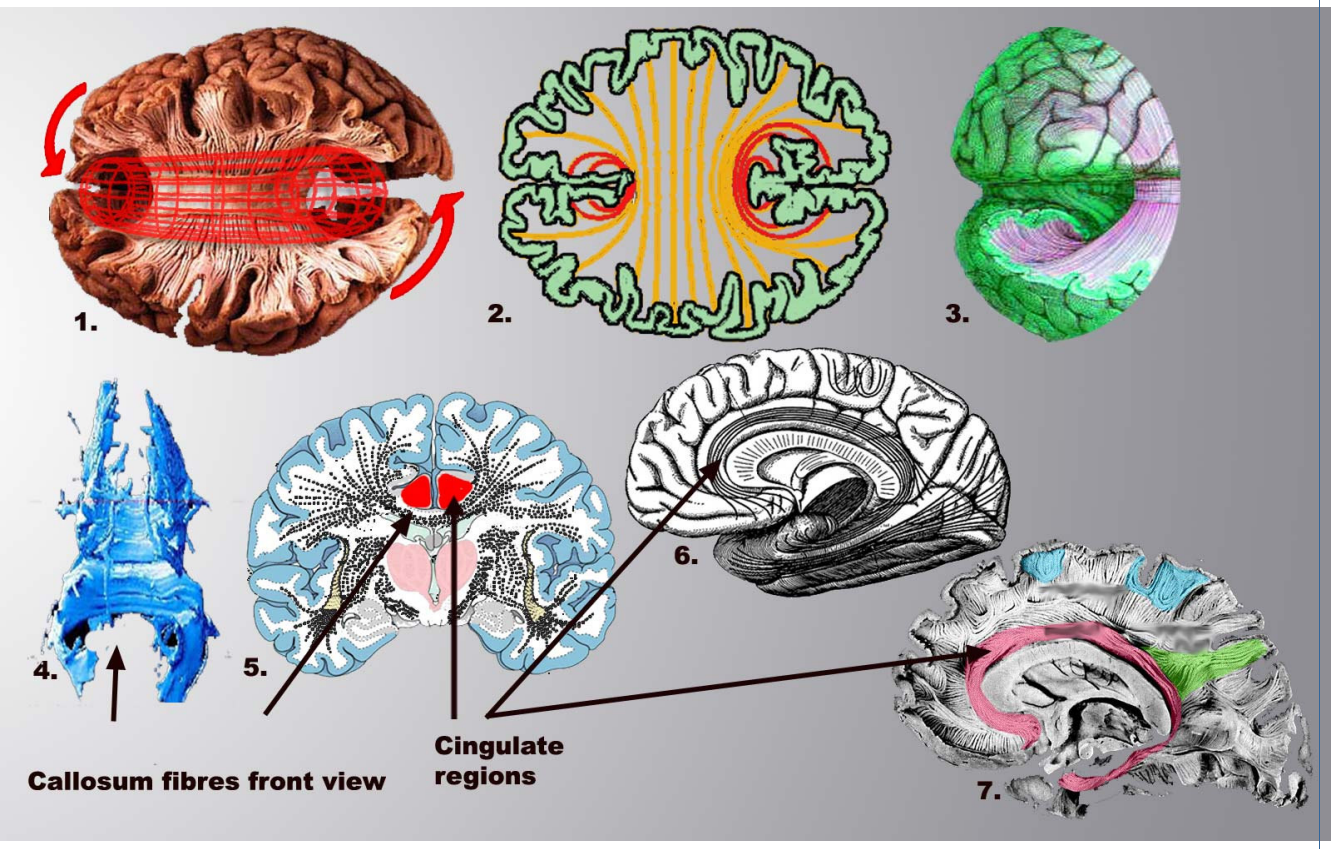
3.1.2 OUTER BRAIN The outer brain itself. *(12 in fig above)* In blue are the underlying ventricles. First thing to notice is the gaps at either end. Just in the right place it looks very much like a toroidal tunnel. Also of note here in a close up of the middle of the Corpus Callosum *(9 in fig above)* are Hippocampus Neurons which form the Indusium Griseum. Medical illustration *(7 in fig)* reveals a lane of four tubes. Midline toroids ? The corpus callosum is a thick form with two dense central blocks. *(8 in fig)* This correlates with a bloch wall, which is another midline component of electromagnetic systems. (*Bloch wall explained in following section)*) A similar pattern to the Corpus callosum can be created with 2 positive plates to be situated next to 2 negative plates. *(5 in fig simulated image*) This inusium midline structure might be require for stability. Looking underneath the Callosum reveals ventricle spaces. *(11 in fig)* The top arrow points to a thin membrane between these ventricles the septum pellicidum. Also visible underneath *(8 in fig)* as a membrane wall. Later in this paper will be discussed that the lateral ventricles could hold alternating or opposite charges, and this septum is the point of short circuiting. Finally *(10 in fig)* this

symbol come from physics and represent opposite paired spin in electrons. The callosums, bloch wall, and the indusium griseum current lines with the opposite ventricular charges held apart by the septum pellicidum below have a lot of interesting correlations with structures built by physicists for quantum tunnelling.

4 TOROIDAL ASPECTS OF THE LIMBIC LOBE

The classic component shapes and attributes of the Dipole are the Toroidal "donuts" which occur in the middle. *(see introduction to dipoles in 1-1)* The toroid is present many times over within the limbic system, venous return, and the white matter of the outer brain itself.

4.1 VOLUME TORQUE

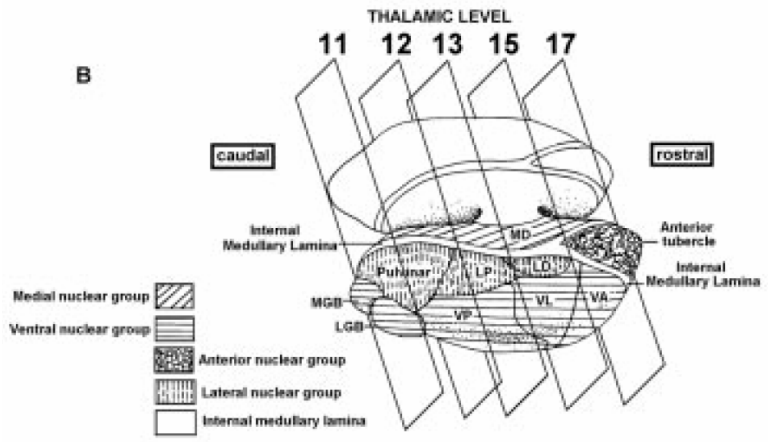


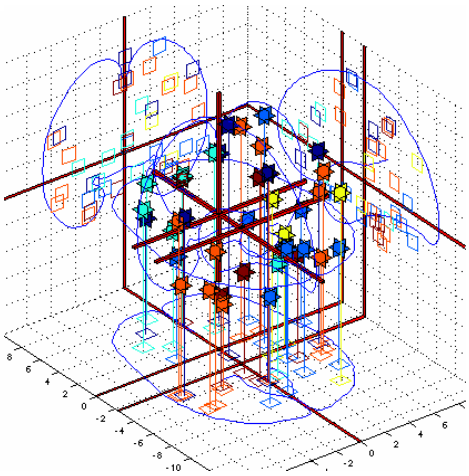
Dissection reveals the Corpus Callosum shows clearly a space which fits the expected place to find Toroid structure of a Dipole. *(1 in fig above)* The arrows represent Petalia and Yakovlevian torque.

"Noticeable protrusions of the hemispheres, anteriorly and posteriorly, are observed, as well as differences in the widths of the frontal (F) and occipital (O) lobes. These protrusions also induce imprints on the inner skull surface, known as ***petalias.*** *A twisting effect is also observed, known as* ***Yakovlevian torque****, in which structures surrounding the right Sylvian fissure are torqued forward relative to their counterparts on the left. The left occipital lobe is also splayed across midline and skews the interhemispheric fissure in a rightward direction. A related shape asymmetry is also commonly observed in the occipital horns of the lateral ventricles. These tend to project more deeply into the occipital lobes on the left than on the right" (21)*

Obviously there are no toroids in the brain as illustrated in figure 1. Apart from the aspect of adjusting for the spherical brain model. The "equatorial canal" type longitudinal division in the middle of the brain ensures this. It's theorized that this canal is the result of cranially sealed electromagnetism. The toroidal aspects are still present, regardless of the split.

This medical illustration (*2 in fig above)* of inter-hemisphere connectivity has been highlighted in red to show the classic toroid loop closing in on itself, Another medical illustration of fibers *(3 in fig above)* shows the same tube like gap. Tensor Fibre mapping *(4 in fig above)* dissects the corpus callosum by tracing fibers from Computed MRI data, revealing the tube from a front view. Whats inside the tube is what would be expected, bundles of fibers attempting to close a loop round the centre of the brain, known as the Cingulum or limbic lobe. *(highlighted red in 5 and 7 figure above). (6 in fig above)* clear drawing of the looped fibers of the cingulum.





The cingulum is an important region for our sense of self. Perhaps more important than the frontal lobes. The area represents limbic projections, from the anterior nuclear group and the lateral nuclear group of the thalamus. *(1 in figure above)* The lateral nuclear group of the thalamus also projects to the cortical association areas. Meta analysis (averaging) of several kinds of self awareness states find that it is these association areas and the cingulate cortex which fire up. *(2 in figure above)* (18)

4.2 DIFFERENT KINDS OF TORQUE

In the opening section, Schizophrenia concurred with the dipole in global distribution of lateralized neurotransmitters. There are two kinds of torque and only one kind of brain torque is altered in schizophrenia (19)

"brain torque is a combination of the petalia associated with hemisphere shift **(Yakovlevian torque)** *and differential tissue distribution within the hemispheres, the* ***volume torque****. The two can be dissociated. Therefore, the two morphometrically distinct components of torque may have different genetic bases."* (19)

" ***volume torque*** *is changed in schizophrenia , the asymmetrical A–P distribution of tissue within the hemispheres, is correlated with STG (superior temporal gyrus) volume, and is changed in schizophrenia"* (19)

"Yakovlevian torque *is reversed in individuals with situs inversus. (ORGAN REVERSAL) who appear to show normal language dominance, normal asymmetry of the planum temporale (part of the STG, linked to language function; Kennedy et al., 1999), and are mostly right-handed (Matsumoto et al., 1997)."* (19)

It is now widely considered that grey matter loss spreading is the result of dysfunctional glutamate neurotransmission. (20) Paul Thompson, of UCLA has linked this to periods of late teen grey matter pruning.

Applying the dipole theory to brain chemistry (2, 3) proposed that the hemispheres had greater lateralized volumes of sodium and chlorine in the right and left hemisphere planum and temporal lobes respectively. Glutamate and Gaba were the mechanisms for sodium and chlorine respectively. This would equate to lateralized positive and negative charges being used for ionotropic neurotransmission. EEG which represents these as a mass summed of actived current conducting ionically within the extracellular fluid, at the point of synaptic firing. This leftward asymmetry in schzioprenia is also present in EEG itself. (28)

Is volume torque the result of opposite forces of charge due to ions ? In schizophrenia the glutamate / sodium part of the dipole in the left temporal lobe breaks down, *(refer to opening section)* while the tug between hemispheres is increased in favour of the left hemisphere.

"Only volume torque was changed in schizophrenia-in comparison subjects, the coronal section of maximal left hemisphere volume was more anteriorly placed than on the right [and correlated with left superior temporal gyrus (STG) volume], and, in patients, ***it was more posterior (showing a reversed correlation with left STG volume)."*** (20)

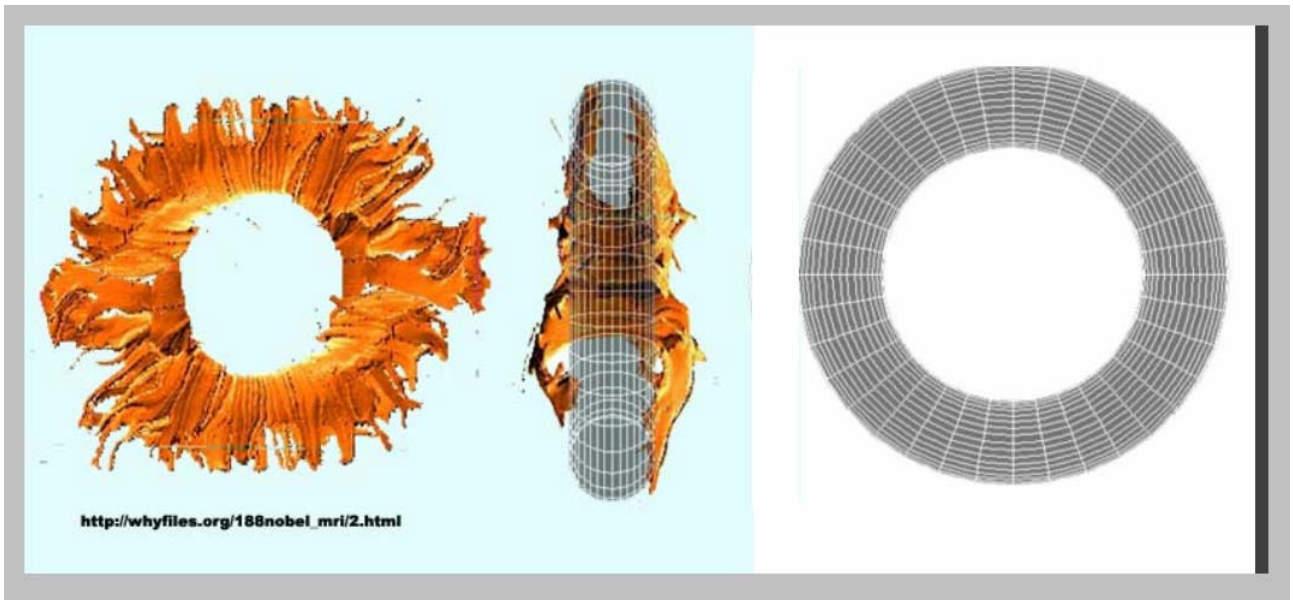
Referring to the volume loss diagrams in the opening section, this is clearly not related to veinous return flow, but the smaller amount of glutamate and greater gaba in this region (2) leaves this left area inhibitory network unaffected, and so increasing volume torque. The previous section on the concept of electromagnetic spin brought up the idea of clockwise spin for the hemisphere regions, within the blood supply and cortical domains. This clockwise direction indicates it is not Yakovlevian. Being neuron based this electromagnetic spin should be considered visually related to volume torque.

4.3 WHAT CAUSES YAKOVLEVIAN TORQUE ?

This can be seen clearly throughout development :

"The antero–posterior axis is important in brain growth. The corpus callosum expands in an antero– posterior direction during development (Giedd et al., 1996), and foetal brain dissections show increasing brain growth occipitally, with concomitant extension of the corpus callosum posteriorly (e.g., see Feess- Higgins and Larroche, 1987). Slower development has been reported for the left hemisphere compared to the right (Maier and Ron, 1996). This evidencesuggests that, as development proceeds from front to back within the hemispheres, the slower rate of development on the left normally results in a greater proportion of left hemisphere growth occurring posteriorly. This may explain why torque is usually clearest at the back of the brain (Barrick et al., 2001, and see Petty, 1999)."

The areas involved in volume torque were highlighted by glutamate grey matter loss, in Yakovlevian torque as mentioned previously, this could be the forces exerted by white matter across the corpus callosum, more likely though the axons of the cingulated area themselves. Toroidal area exert forces which twist.

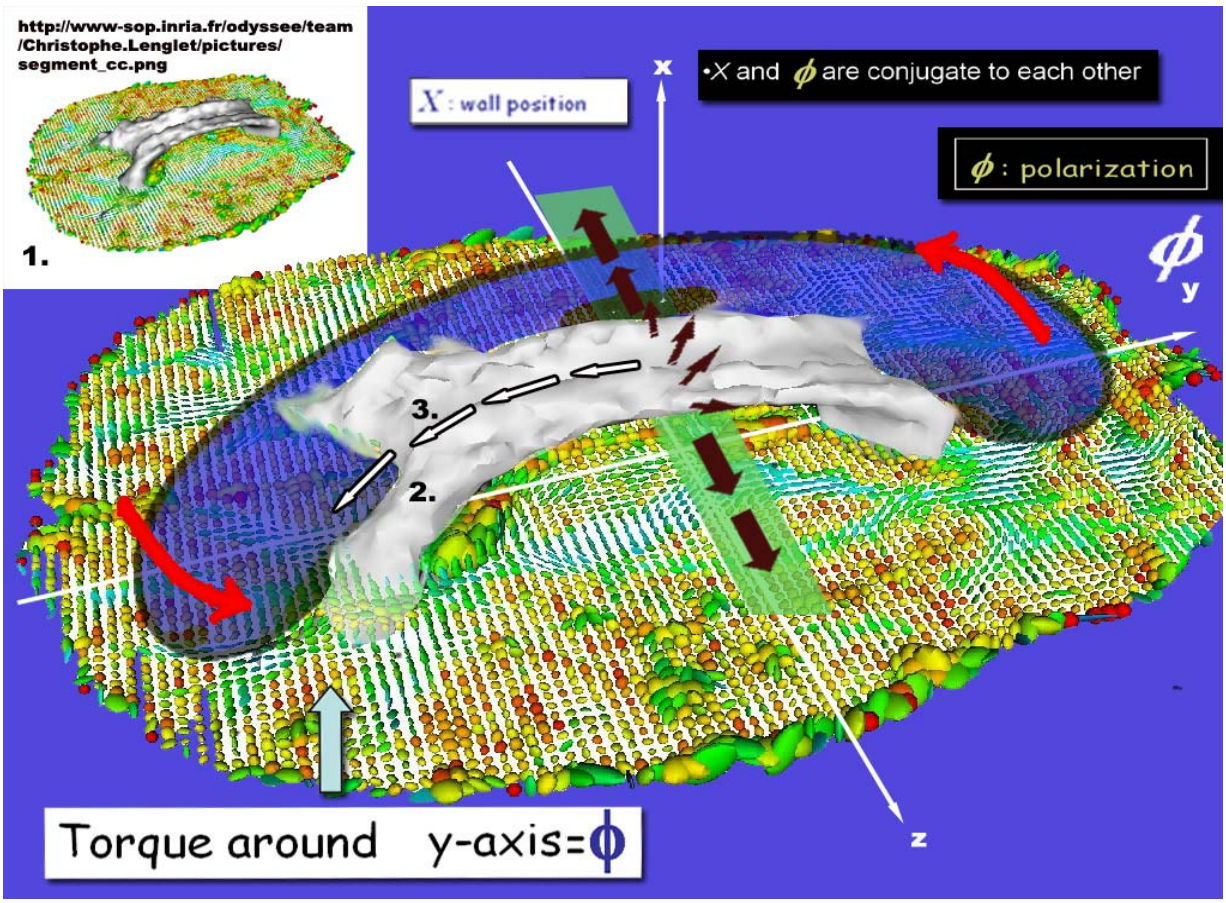


Tensor Fibre mapped corpus callosum mirrored to show that toroidal space exists within the brain

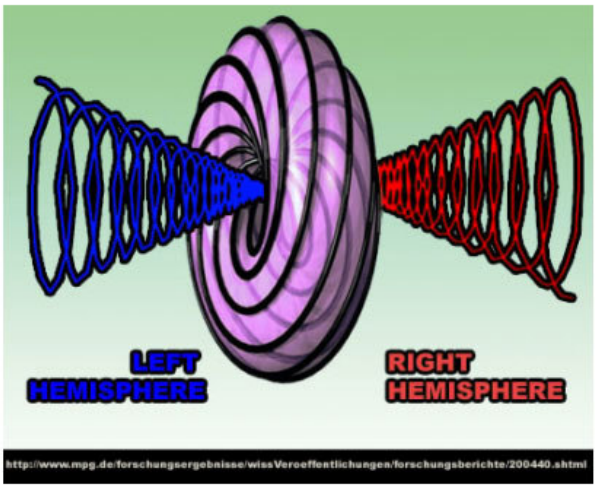
For example, the toroidal system in the earths dipole plays an important part in planetary torque. (22) The reason for this is that magnetic field is weak at this central ring, due to bloch wall reversal**. (see figure below)**

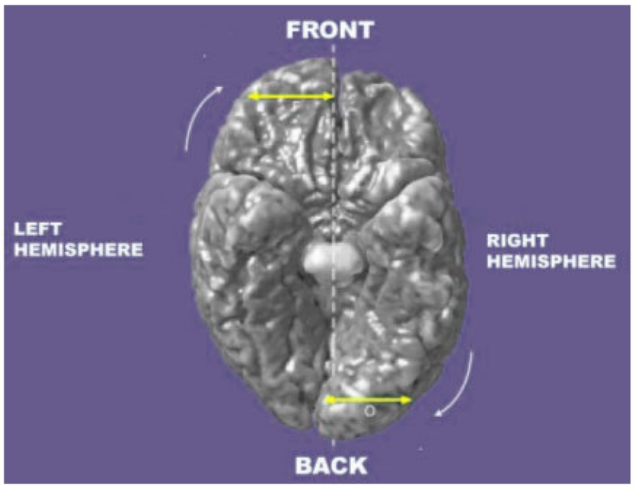
LEFT : Magnetic field, block wall effect for a single callosal fibre bundle. Magnetic vectors going north and south, reverse at middle leaving a point of low magnetism. MIDDLE : Flow of energy through a toroid. This occurs as twisting in the line of electromagnetic flow. LEFT : Manifestation of twist in a toroid.

4.4 VISUAL DESCRIPTION FOR YAKOVLEVIAN TORQUE

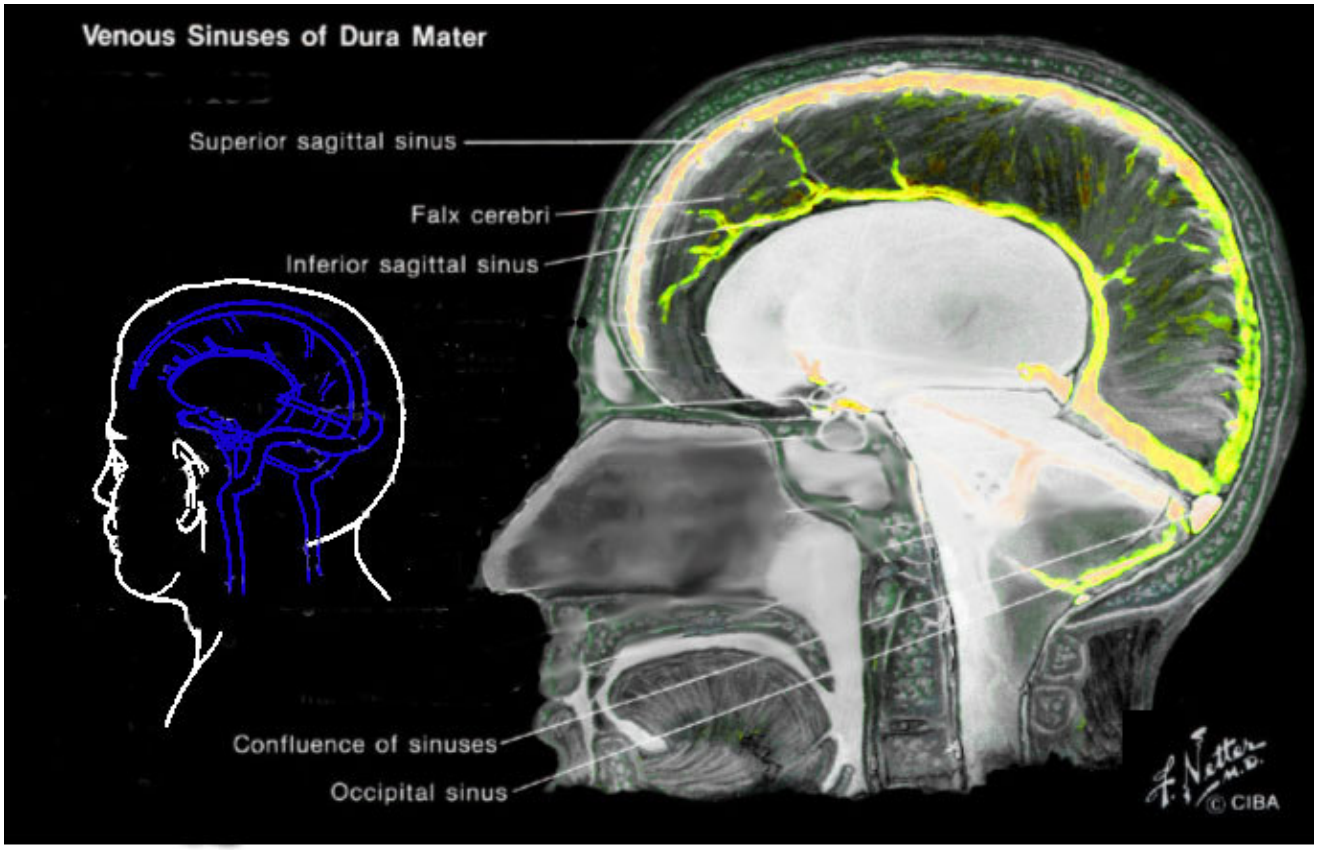


1. Original computed segmentation for corpus callosum. Brain Posterior is right of image. In the diagram The bloch wall is shown at the corpus callosum. Red arrows indicate twist round toroidal regions.





RIGHT : This diagram brings together representations for clockwise spin in volume torque, showing how this translates to toroidal spin for yakovlevian torque. LEFT : From Toga and Thompson. Showing the differences in yakovlevian torque from underneath view. Because the longitudinal fissure interrupts the toroidal flow round cingulate lobes, twist would be split and left half complete. Hence the petalias occur.



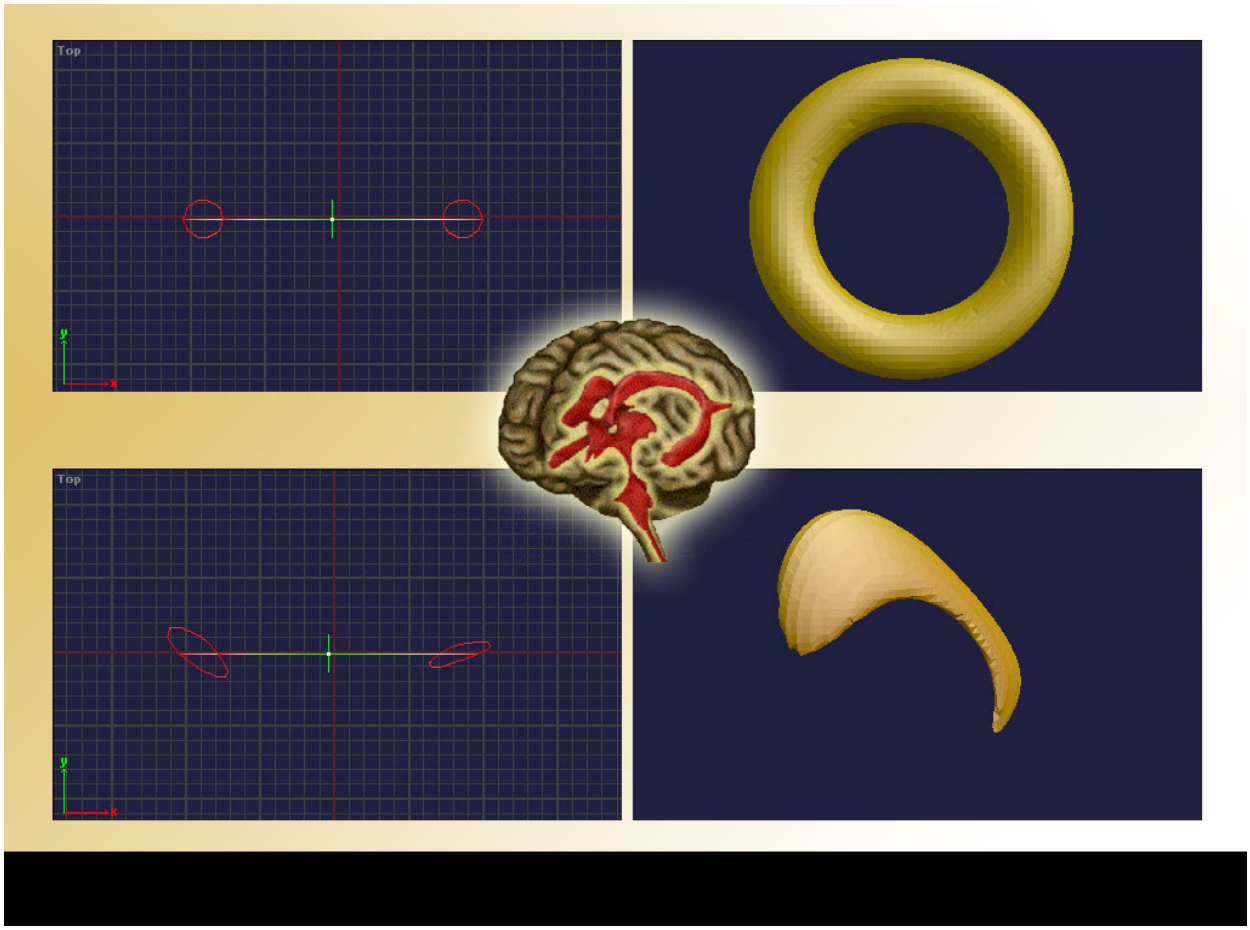
Venous return appears to represesent another system level where toroid tubes evolve round the midline.

Finally the incomplete paramagnetic (1) toroids of the sinus.

5 REBUILDING NEUROLOGY FROM DIPOLE SHAPES

5.1 WHAT HAS THIS TO DO WITH THE BRAIN ?

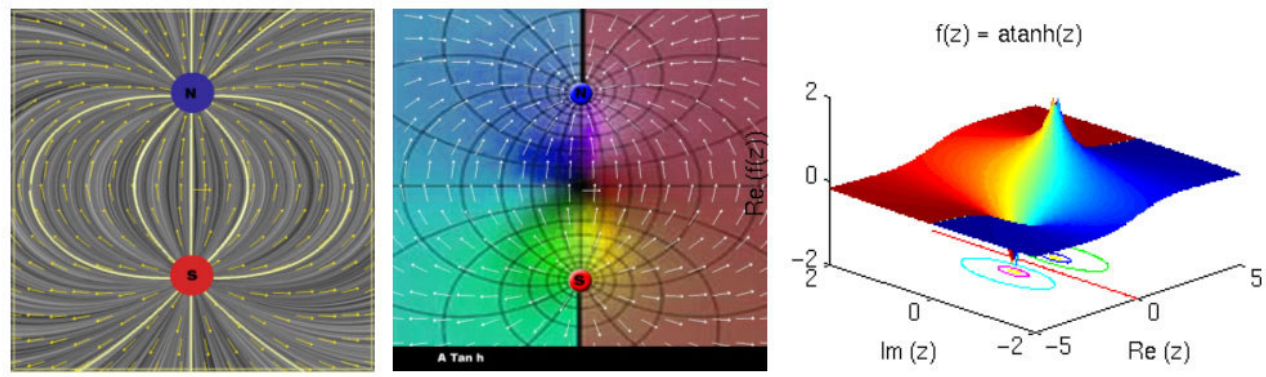
Visualization was half the approach taken to figure out the outer brain was a dipole. So it's time to try the inner brain, which is rather different to say the least. Not all electromagnetic systems look similar. The earth for example has classical spherical north / south pole with inner midline toroidal zones, central convergent core area, and outer toroidal layers of atmosphere *(see section introduction to dipoles. (1))* From the spherical evolution theory it is proposed that electromagnetism is trying to fulfil it's natural spherical shapes. It's also proposed later in this section that complex limbic system neurology arises not just from developing and growing strange random pieces from mutation, but mutation which is consistent with a whole electromagnetic system. It's proposed that the limbic system is a complex quadrapole. This will require breaking it down, to it's bare form. To begin with the following example shows what happens when a toroid pulled by a charged midline, such as a quadrapole undergoes a simple force such as shear occurring due to lack of space in the bottom half of the brain, as the top half evolves to become spherical.



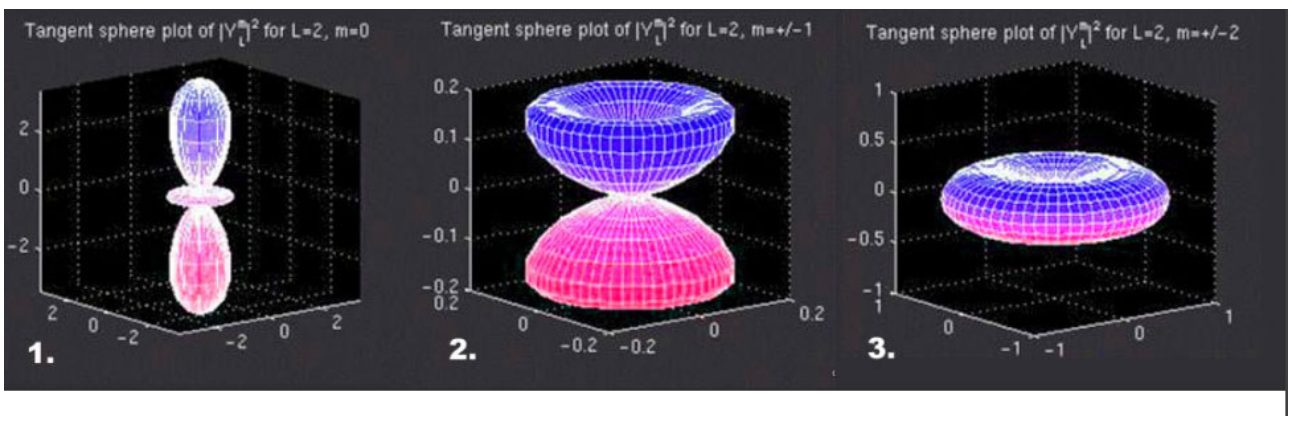
The basic toroid shape in a 3d modeller. *(Top right and left boxes in fig above)* are given a basic shear command which tugs the structure from below *(bottom left in fig above*). A pull like this would occur when a toroid is pulled within a normal quadrapole. *(refer to diagram follwing this)* The model then has the area subtracted where the Jaw and spinal column occupy and allow no space, resulting in an area resembling the right lateral ventricle. *(bottom right in fig above)* The subtract command basically just pulled out 1/3 of the toroid. This command in the modeller did not tell us what will really happen in an electromagnetic system. This resulting shape would be prone to it's own and surrounding forces to compensate and have to go somewhere, so the space frustration arrives at the horns which appear at the rear of the ventricles. Looking at the ventricles, and other brain regions the question has to be to what degree is electromagnetism, getting it's way and the agendas of life using this or vice versa.

5.2 DIPOLE SHAPES WITH VISUAL MATHEMATICS

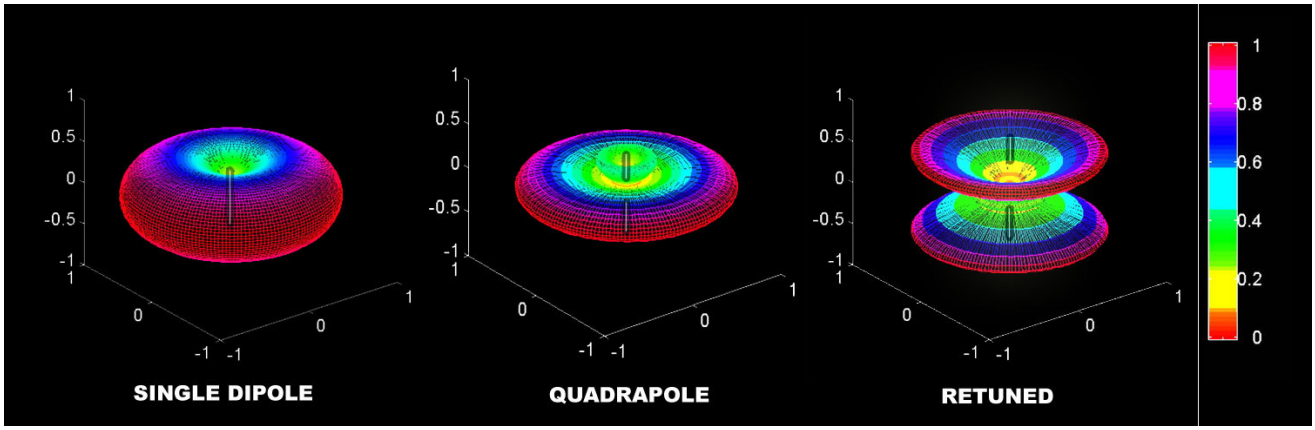
Mathematics which can be used to define electromagnetic fields are tangents. This section reveals how these most basic mathematical functions can be used to describe, explain and rebuild existing neurology to create a whole system template as a conceptual basis for exploring the dipole aspects of the brain. .



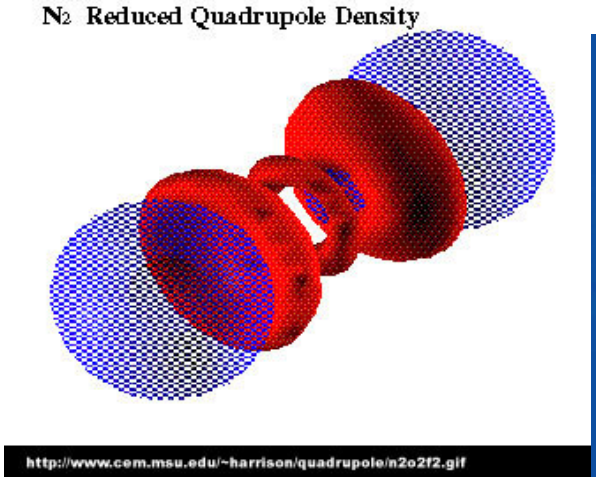
LEFT : Electromagnetic field pattern showing reverse energy flows for north and south. MIDDLE : Function A tan h plots the magnetic lines. (overlaid on previous diagram) RIGHT : 3d plot shows peaks for north and south.

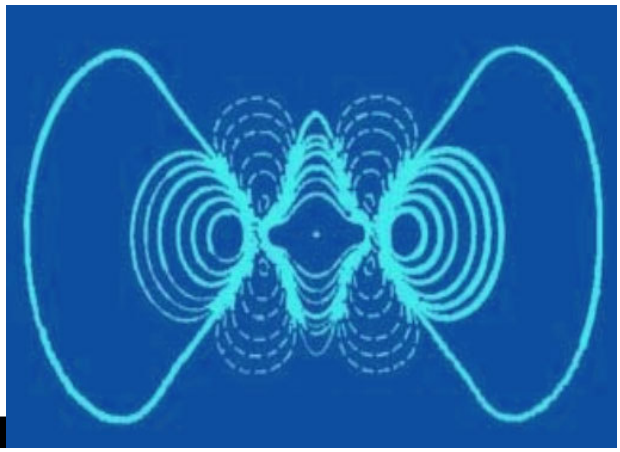


These basic tangent functions produce common spherical shapes which can be used for rebuilding a spherical brain model. It should be noted that tangent is not special in this respect. These can also be produced by Cos and Sin functions. *(1 in fig above)* This represents a basic structure of dipole systems. North and south projections with a toroidal midline. *(2 in fig above)* The inverted sphere is the next most common structure. *(3 in fig above)* The Toroid.



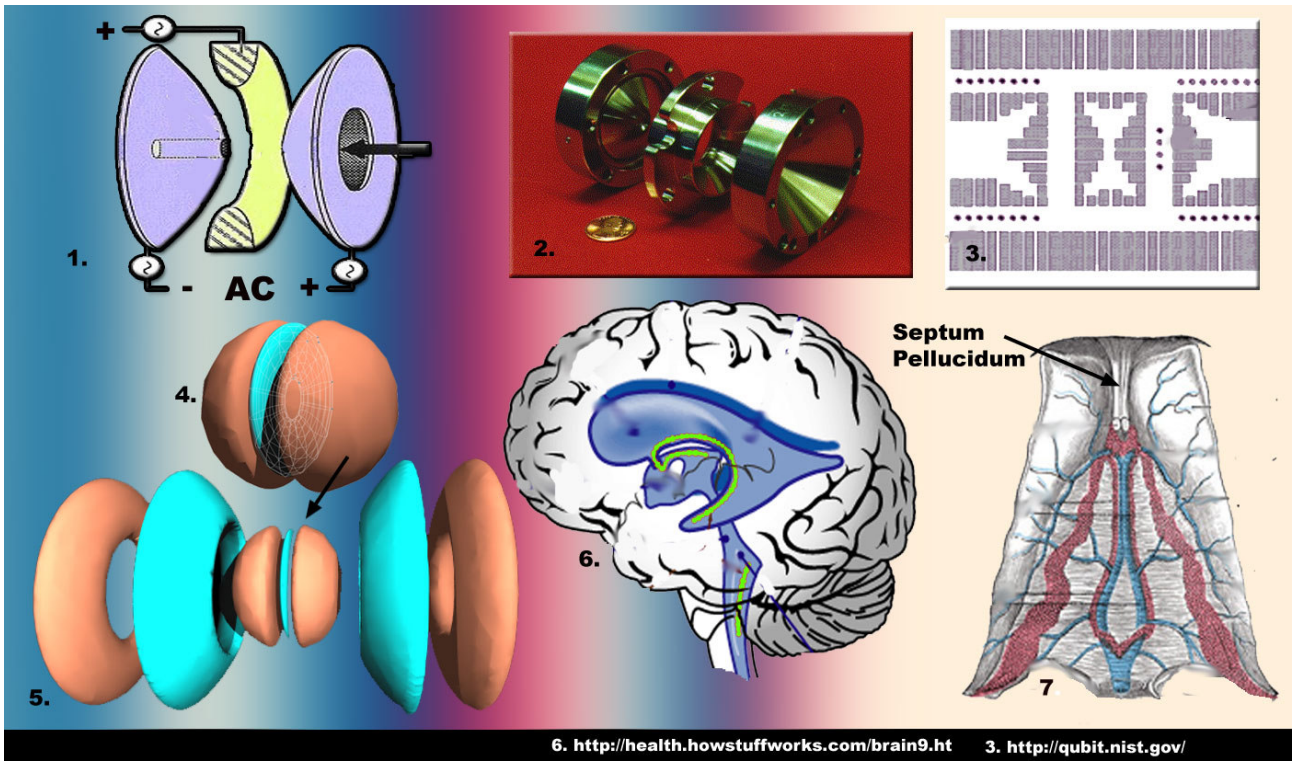
The limbic system will be proposed as being a linear Quadrapole. The images above are from engineering simulations used in the design of dipole antenna. A single source produces a dipole toroid *(Note rode in fig above in centre of single dipole)* A double source produces complex shapes which interact with each other. These is a quadrapole. Note the inverted projections as well as the toroid, *(Quadrapole in image above)* These projections occur on both side of the quadrapole. Finally different tunings or variations in current and magnetic field can extrude the quadrapole to these shapes.





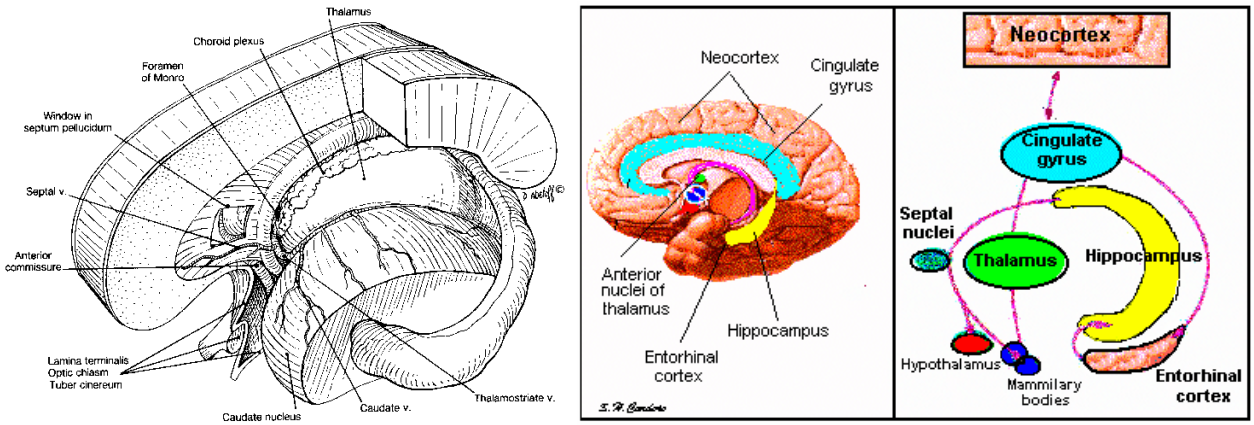
These images above are examples of linear quadrapoles from electromagnetic simulators. *(A linear quadrapole has two positive and negative poles within the same axis.)* Electromagnetic simulators plot 3d, plan view and animations to predict complex electromagnetic behaviour. The 3d shapes, are similar to those defined by spherical tangents. Note that the bigger red circles are toroids which are under pull force Some complicated electromagnetic systems go through structural cycles which produce a sequence of patterns as they push and pull at each other with many poles. This gives an opportunity to look at different patterns. RIGHT: Electromagnetic quadrapole systems can look very different from dipoles. Next these quadrapoles, will this will be explored for the ventricles in the limbic system.

5.3 CORRELATING THE LIMBIC SYSTEM WITH A LINEAR QUADRAPOLE



Quadrapoles systems play a big role in science. Spectrometers which do chemical analysis have quadrapole shape to trap ions using magnetic fields. *(1 in fig above)* This is an example of an ion trap device. There are two end electrodes on either side of a ring electrode. The ring is an engineering represntaion of a toroid. The end electrodes represent the inverted shapes from the examples given previously. *(3 in fig above)* are we building computers in the image of the brain ? Latest breakthrough in hard to control quantum computations uses a quadrapole ion trap *(2 in fig above)* Real engineering examples. Note how the end caps represent the inverted spheres. It's proposed that the limbic system operates like and has quadrapole features. *(4in fig above)* This is a spherical representation of the thalamus and third ventricle. *(neuron matter areas are brown and ventricular grey) (5 in fig above)* This has been expanded, within the spherical framework. The thalamus is in the centre in between two lateral ventricles. *(blue)* Finally on either side caudate nucleus has been fully rotated. The lateral and third ventricles have visually similarities to quadrapoles. Looking at the real ventricles. *(6 in fig above)* The areas in green are choroids plexus. These produce the electrolyte CSF fluid. There are in either lateral ventricle. The lateral ventricles are separated however by the septum pellucidum. *(7 in fig above)* Do the right and left lateral ventricles have different amounts of positive or negative ions ? No research could be found regarding this, although they do produce varying quantities of sodium, bicarbonate and chlorine for CSF fluid homeostasis. When the septum is stimulated. Electrode Stimulation of the septum separating the two lateral ventricles induces orgasm. (24) Also an incomplete septum results in epileptic seizures (25, 26) which are believed to be connected to a neural feedback circuit between hippocampus and cerebellum. (27)

Unlike the dipole which pretty much tends to spread it's wings, the quadropole is centrolineal. The engineering uses described above, are to control or separate small particles. What happens in the septal areas concurs. It pumps out a clock which can slow down and unify a great deal of the limbic system and limbic cortex



LEFT : Septum exposed *(window highlights this in diagram)* showing connection to fornix / hippocampus. RIGHT : Updated papez circuit. Driven by the theta clock.

5.3.1. INNER QUADRAPOLE AND DEEPER MENTAL STATES

In section 4 the cortical toroidal area was correlated with the cingulate gyrus. *(see diagram above RIGHT)* Hippocampal theta (4-10 Hz) oscillation represents a well-known brain rhythm implicated in spatial cognition, attention and memory processes., (35, 37, 36) also hypnotic states (33) and high theta in mindful meditation (34) Cutting of the fimbria fornix *(see left diagram above)* results in memory impairment.

Moving farther left in the diagram above is the septum which provides the pacemaker neuron clock for these frequencies, (37) in particular so called "H-channels" were found which produce the high frequency component. (38) seen in meditation, which as mentioned in the previous section on torque involves the whole cingulate area or toroidal integration from the dipole view.

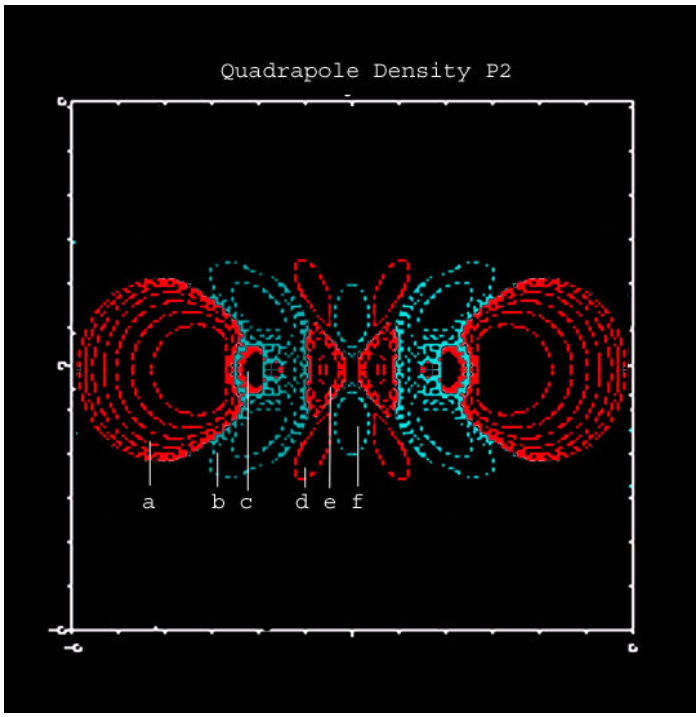
This clock is found round the "papez" circuit. which describes a limbic system loop for emotion and attention. *(see right diagram above)*

"An electro-oscillographic study of the hippocampus, thalamic anterior nuclei and cingulate and pericingulate cortical areas was performed in the rat during the wakefulness-sleep cycle. High voltage (usually from 100 to 200 microV) theta waves, oscillating at regular frequencies from 6 to 10 Hz, were found to occur simultaneously in all of these components of the Papez circuit during attentive behavior and dreaming." (32)

Both epilepsy and orgasm are highly energetic states. If lateral ventricles have different charges and are thinly joined by septum to a papez feedback loop. Perhaps temporary short circuits by stimulus to septum between the two ventricles could be a plausible answer for some kinds of epilepsy. The septum is absolutely vital. The result of developing with no septum is severe : Learning difficulty, seizures, blindness, hormone deficiencies :

"Absence of the septum pellucidum (ASP) is a rare disorder characterized by abnormal development of a thin membrane located at the midline of the brain. The disorder usually occurs with other cranial abnormalities. Individuals with ASP may experience vision impairment or blindness. They may also have coordination problems and hormone deficiencies that result in short stature. Intelligence is usually affected and learning disabilities are common. The disorder usually manifests early in life, often as a consequence of discovering other abnormalities. Symptoms include involuntary eye movements, a wasting of a part or parts of the body, and short stature. Seizures and inappropriate behavior may also occur."

5.4 GOING FURTHER STILL



How far can correlations be taken with the limbic system and quadrapoles ? LEFT : This is standard pattern from a linear quadrapole *(adjusted visually with an amplitude reduction in the red areas.)* It's an image output from an animated series, run by an engineer. It has nothing to do with the brain. Bue represents positive regions and red negative. It looks totally different from a dipole. The poles are not at opposite ends like north and south poles, but intertwined within the same axis.

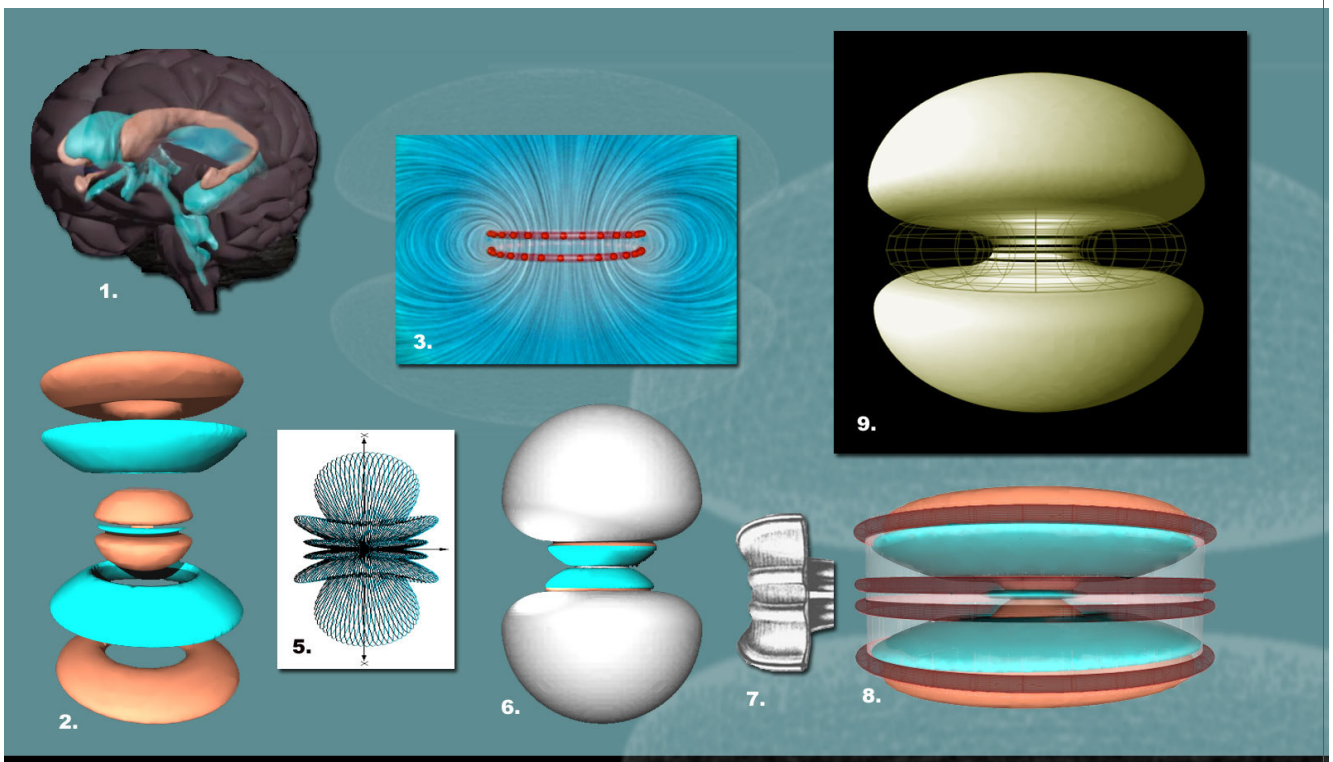
To illustrate limbic correlations, in blue denoting half the active part of the quadrapole.are three toroids which correspond to the lateral and third ventricles. From this perspective, the limbic regions are split, but not lateralized like the cortex. Evolutionary history tells us that the initial reptile brain was the cerebellum. This is not split and lateralized.
Everything in red comes from the thalamus (e) round that are the caudate nucleus (d) Hippocampus is not considered part of the limbic system in a spherical model. next to this Globus padillus (c) and its subsections which are obscured by (b). (a) would be the thalamic cortical projections.

Brain Segment	Shape	Squewed	Neuron structure
3rd Ventricle	Toroid	Flattened	N/A
Thalamus	Hourglass	Compressed	Loop influenced
Inner Ventricles	Toroids (2)	Sheared	N/A
Caudate Nucleus	Toroids (2)	Sheared	Hourglass penetration
Fornix / hippocampus	Toroids (2)	Intact	Toroid
Globus Pallidus	Hourglass	Sheared and flattened	Loop influenced and Hourglass penetration
indusium griseum	Toroids (4)	Intact	N/A

Table contains all major neurological structures adjusted for spherical brain model.

5.5 REBUILDING A SPHERICAL BRAIN

It's now possible using the 3d modeller to build a complete spherical brain which accounts for all major neurology, using only the basic dipole, quadrapole components of toroids, toroids sheared to inverted lobes, hourglass isotope structures *(standard symmetrical spherical dipole shapes)* and sheared hourglass isotopes which look simiar to pairs of sheared toroids, but are joined.



Dipole translation of neurological structures

(1 in fig above) The basic brain limbic system. This is compromised from the spherical model by a tensegrity type pull of limbic shapes into the temporal lobes either due to the missing quarter occupied by the jaw and / or the evolutionary advantage of memory caused by magnetite leaking from the ventricles into the hippocampus.

(2 in fig above) This stack of shapes is an exploded view of the previously shown limbic system devoid of jaw gaps and magnetite pull abstractions from the Cerebellum and hippocampus. At the very centre is a flattened toroid (blue) which is the central 3rd ventricle. Running through the centre of this and on either side is a compressed hourglass isotrope forming the thalamus *(brown).* Surrounding that the lateral ventricles *(blue)* which are sheared toroids. Fitting into the ventricles a complete Caudate nucleus, a sheared toroid *(brown).*

(5 in fig above) A reminder of a similar quadrapole structure. This image is taken from a standard simulation of a radio Dipole antenna, illustrating both the hourglass and the effect of shear compression when multiple isotropes occupy the same space.

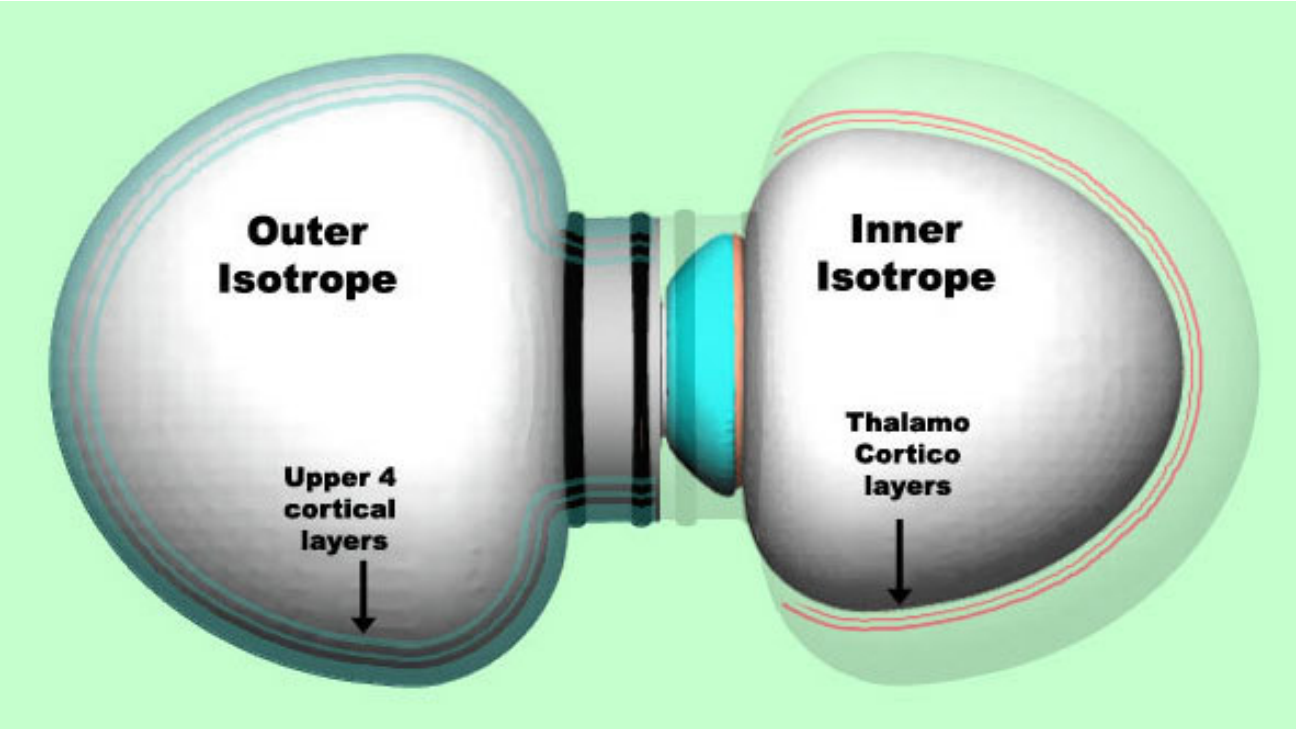
(6 in fig above) Back to rebuilding the brain, the limbic region from fig 2 is reassembled and enclosed within the white matter axons running from the thalamus, through the caudate nucleus forming an hourglass shape *(white in fig)* . Limitations of the modelling system used here need to be allowed for. Globus Pallidus has been left out. The fully curved details of outer grey matter are also absent.

(3 in fig above) This is a simulation from MIT which shows an inside view of toroid and field lines. These are quite common engineering mockups. They also help backup the next part which shows how aspects of what the corpus callosum would be in the spherical brain model represent this.

(7 in fig above) A reminder of what a section of the indusium griseum looks like. This is in fact the other side of the hippocampus and runs these toroid like tubes round the corpus Callosum (in a real brain).

(8 in fig above) For the purpose of modelling a spherical brain, the hippocampus piece which winds into the temporal lobe will be removed and replaced by a complete set of toroids surrounding a now tube like Corpus Callosum.

(9 in fig above) A complete brain widened in the centre. To reveal the usually hidden longitudinal fissure. The white matter from the corpus callosum is now wrapped round the proposed inner limbic system isotrope modelled previously. *(6 in fig above)*



Above : The final result, Inner and outer isotropes together. Is the the electromagnetic structure of the brain. A linear Quadrapole within a dipole ? The next section finds a mathematical correlation between the two.

6 "GOLDEN MEAN" CORRELATES THE INNER AND OUTER ISOTROPES

As a final section to one based on putting together something from what can be seen. I will present a raw piece of data which tells us that the inner and outer isotropes are related to each other by an increasingly well known mathematical ratio. The Golden Section: a+b/a = a/b.
The ratio a/b = 1+5½ /2 = Phi = 1.618034....

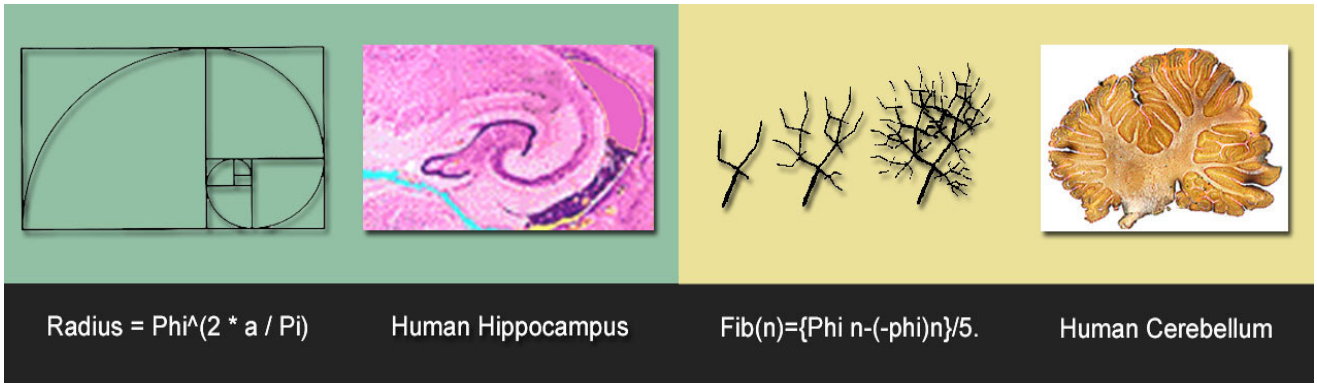
From general reading the recursive irrational phi is gaining acceptance as the value of life's structure, originally deriving from Euclidian mathematics. It is related to Pi. Studies find it in countless complex systems including Botany, DNA, heart EKG spectrums and now appearing through this study of brain neuron structure and with other researchers in EEG signals.

"during active imagination in ASC-2 the EEG power spectrum profile both of anticentral and retrocentral zones statistically followed the function l/f. ***The attracter of spectrum subdominant frequencies (delta, teta, alpha and beta-1) was the ratio 1,61± 10%*** *(fig.1, table 1).* ***This ratio is well known in literature as "golden section****". It should be noted, that a similar structure of EEG spectrum was discovered earlier during modelling a positive mental state [11], and fractal l/f fluctuations in EEG spectrum were considered as the reflection of the general mechanism of biological integration of functional cortex systems and their harmonization"* (8)

More specifically

"The metric of brain waves can always be understood as a superposition of n harmonics times 2 F, where half of the fundamental is the golden mean F (= 1.618) as the point of resonance." (9)

The first paper (1) proposes magnetite as the active resonance source within the brain. Magnetite structures itself on a phi ratio. *(see fig above)* Specifically the brain structures near to the choroid plexus are Hippocampus, thalamus, cerebellum for the lateral third and fourth ventricles respectively. Hippocampus and cerebellum have tested positive for a higher degree of magnetite presence than normal distribution. (6, 7)



Recursion is already known to be an intrinsic property of magnetic fields. (13,14,15,16) Is this evident in what we can see ? The Cerebellum and hippocampus have resonance structures. And both are defined by unique properties for specialised information processing in mathematics and memory storage respectively.

The cortex has the appearance itself of magnetic domains. (1) As mentioned previously the thalamus itself has the isotropic appearance seen in linear quadrapole representations.

6.1 RATIO OF INNER TO OUTER ISOTROPE IS PHi

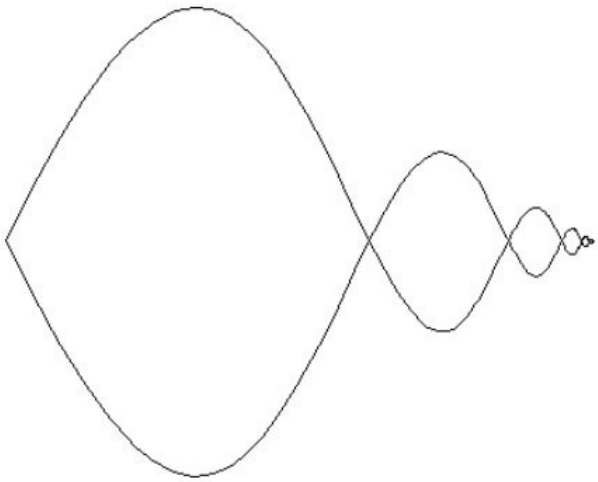
The following volumes of Neuron densities are taken from computed brain segmentation. McConnell Brain Imaging Centre Montréal Neurological Institute, McGill University

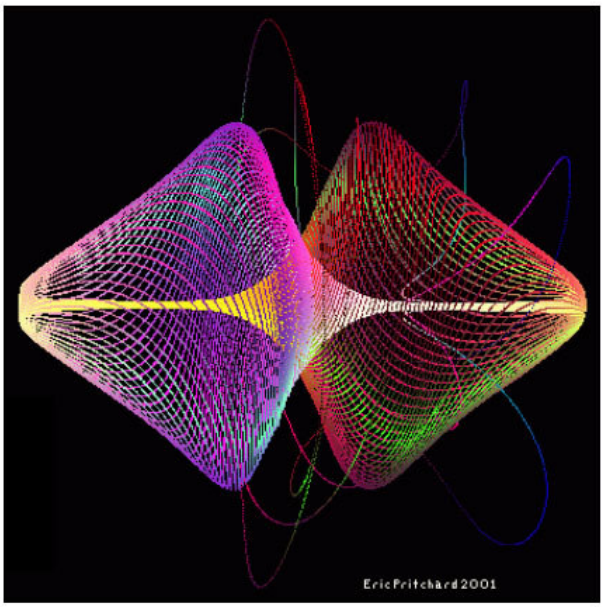
BRAIN SEGMENTS	Volume in (cm3)	Cube Root of Volume	Calculation Label
GREY MATTER			
Total Cortical grey matter	814	9.38	TCG
Sub Cortical grey matter	54	3.80	SCG
Cerebellum	97	4.60	
Total Neuron Volume	965	9.88	TNV
WHITE MATTER			
Total Internal capsule + fornix	178	5.63	IWM
Corpus Callosum	180	5.65	OWM
Total remaining white matter	565	8.27	RWM
FLUIDS			
Sub arachnoid CSF + 4th ventricle	316	6.81	CSF
4th + lateral ventricles	24	2.76	INV

Ratio of outer to inner brain grey matter using :

Phi = AC/AB where AB is TNV – SCG and AC = TNV

Phi = 9.88 / 6.08 = **1.625** *(Which is near to Phi = 1.618034 +/- 0.025%)*

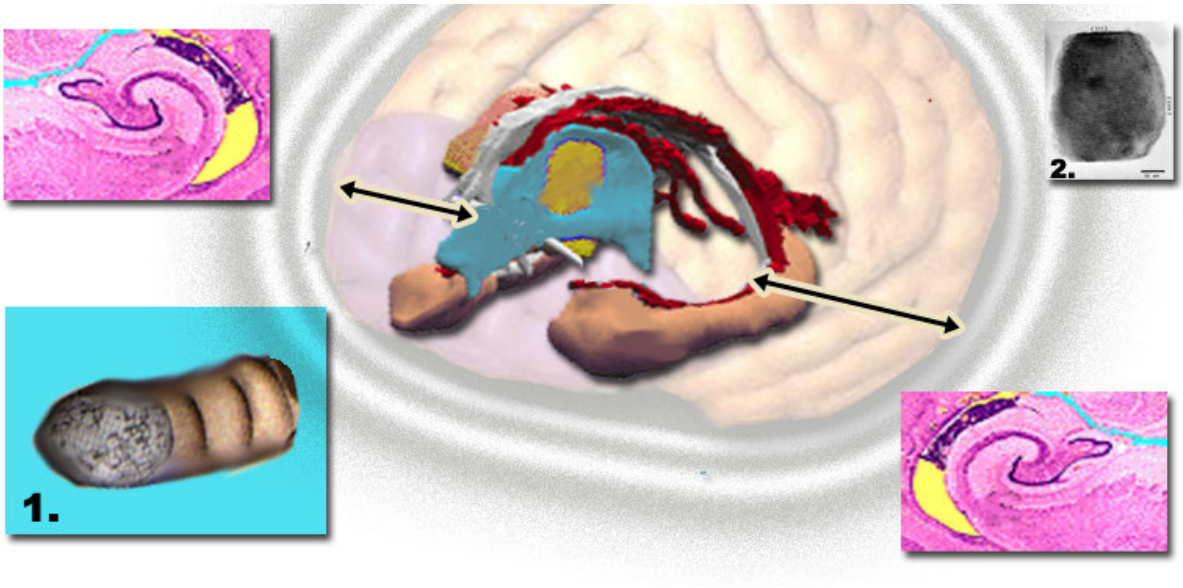




LEFT : Golden mean wave, self similarity. RIGHT : Attractors by eric Pritchard, is a good visualization to represent the essential basic formula for the thalamo cortical relationshiop.

6.1.2 ISOTROPE FIELDS INTEGRATE AT THE HIPPOCAMPUS

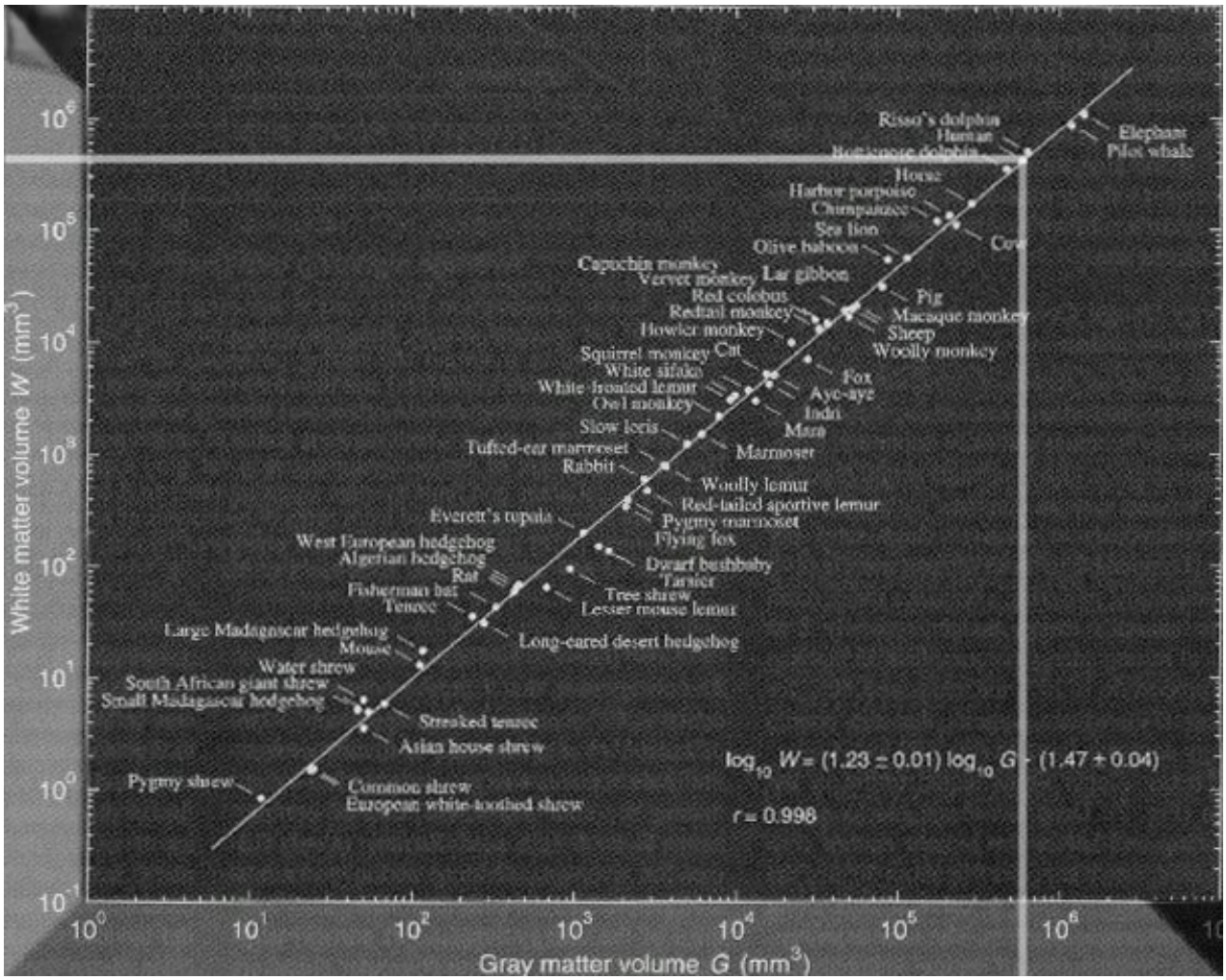
The following diagram illustrates an idea for how the inner and outer isotrope magnetic fields, integrate fully at the coiled hippocampus.



ABOVE : The hippocampus is a focal point for memory. This is lined with a choroids plexus, *(red in figure above)* which is the presumed area of magnetite production. (1) This area is then caught between two similarly charged intense magnetic fields, between it's inner choroid plexus and the magnetite of the outer cortex. *(arrows in figure above indicate the area between these)* This magnetic pressure between these two areas, explains why the hippocampus is coiled, (1 in figure above, and left and right images) and why this is focal zone for feedback in epilepsy. *(2 in figure above, magnetite from the hippocampus)*

6.2 ANOTHER VITAL WHOLE BRAIN RATIO

There is another ratio that is not so prevailent and ought to be given it's place. In fact I feel a little guilty. At the time of re-writing this the end of the second of four sections, I have already written the final two which are solely dedicated to structural evidence for a dipole within neurons. That was the best way to write, so it would be easier later. It sort of went like. Draft one. Dipole neurology, then this section and then another outline which set out with the ambitious task of reconciling a trip through hameroffs 12 brain levels, and trying to figure out what was the structure and what the was the missing non-descript part. The structure I would call the resonant half, and the non-descript part the quantum half. That project had to be scrapped, then sections of it got re-devoured and were put through the second draft of this. Now I sit back and reflect, I asked what have I done ? The final two sections of this project, are purely about neurons. That is where all the evidence for structure is. I did mention previously strange similarities with midline white matter structures to man made quantum machinery. I realised not enough space had been given to white matter after seeing the following table.



"Cortical white and gray matter volumes of 59 mammalian species are related by a power law that spans 5 to 6 orders of magnitude. The line is the least squares fit, with a slope around 1.23+/- 0.01 (mean +/- SD) and correlation of 0.998. The number of white matter fibers is proportional to the gray matter volume.; their average length is the cubic root of that volume. If the fiber cross section is constant, then the white matter volume should scale approximately as the 4/3 power of the gray matter volume. An additional factor arises from the cortical thickness, which scales as the 0.10 power of the gray matter volume." (155)

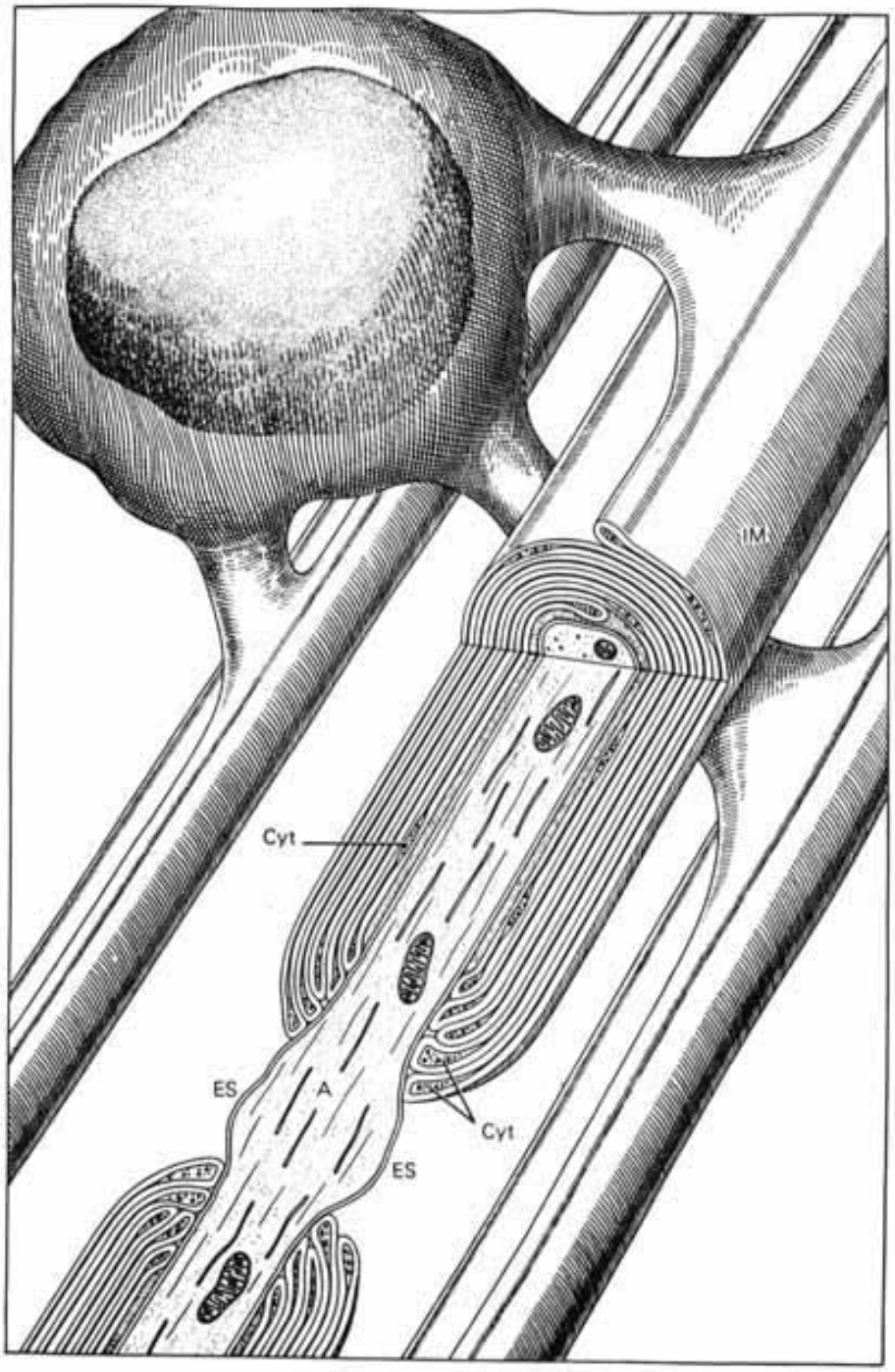
Yes another constant throught neurology it seems. But related to scale. From the previous table. Total white matter is 923, grey matter 965. Which correlates with the graph. The lines highlight human. Neurons take over the processing business with a point percentage. 51% grey matter, 49% white matter.

This is a great trouble to me. I had intended to research how the whole brain operates as a system, yet ignored detailed research into 49% of it. The problem is the white matter has very little which reveals definite structures and processes. When looking at a thalamo cortical axon where could you say this part says something about the thalamus and this the cortex ? There was some research available about representation of gap junctions within white matter. If there is a place for that elusive macroscopic quantum factor, I would predict the hot spot for that would occur right in the middle of the corpus callosum, where I stated previously it look very much like a bloch wall.

White matter still represents 49% of the mammalian system. It has remained selected for. Females have more of it. Men less. (29) Two of our most profound illnesses autism (30,31) and schizophrenia let us see what a brain is like when it is robbed of either grey or white matter. Many spiritual (quantum ?) and creative states have been associated with schizophrenia, and many highly mathematical and analytical revelations with autism. Jesus and Einstein would fit well as heroes who triumphed over either. Guess which for which.

The next two sections are devoted to evidence for a dipole within grey matter neuron chemistry. I would hope I have done what I set out to do. I found push in neuron chemistry of the right brain, and pull within the neuron chemistry of the left brain. This does not mean the brain system is a push pull neuron system, just that the grey matter reveals the tensegrity chemistry within structure. Where this leaves the white matter, is in middle ground, connecting everything between the very different inner and outer brain, and in between all the push and pull of the intra and inter hemispheres.

What will be coming next is less fun than these first two sections, but a pre-requisite attempt to provide evidence. The project is split this way because, I had a reason to bring the balance of the brain system, to how I wrote and went about looking into, thinking and presenting. Because I have not been able to represent the elusive white matter, the 49% of the system, and since the whole system is what this has been about. The final page of this section is dedicated to representing this in a fitting manner.



White matter myelination taking place by schwann cells (big blob). This creates nodes all along the axon.

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