

Tuesday 14th February 2012

“The Tetrahedral Construction and its Metamorphosis in the Kingdoms of Nature?”

By John Blackwood

This is the hypothesis that a single primary form goes through a series of discrete and unique transformations that dictate the guiding basis for the *forms* of each distinct kingdom. Some “windows” were offered yesterday evening through which I believe the beginnings of this hypothesis can be developed. I will recap through summary and questions that emerged for me from this approach so far.

Summary so far...

That there are four kingdoms I have found to be a useful idea – and the four ...essences which I have characterised as *measure*, *morphology*, *mien* and *meaning* can help with this approach as they typify these essences in more than just name. It is the *form* of the expressions of nature that give us the most immediate information and how we meet what we meet when we meet it. If form is to be a primal consideration then it may help to start with the most basic geometrical form, the tetrahedron. Examining a basic tetrahedron we find that the *line* is somehow very special among the three elements. So I looked for the line gesture in the external phenomenal, and found it to my satisfaction in the human, in the animalic and in the vegetative – but struck problems with the mineral. Of particular note is the fact that the successive kingdoms displayed a mutual *perpendicularity* of the spinal element – until we arrive at the mineral. But these lines were seen to have two points or more properly, foci, at significant junctions in the body plan strung along the spines. Harder to see were the two planes in these lines – and I’m still working on this – where were they? So points and planes were the lines inhabitants. *Between* these points, geometrically speaking, were to be found rhythms and measures. There are three of these – growth, step and circling measures. How did all this connect with that very simple form of the tetrahedron, and what *kind* of tetrahedrons were they?

Earlier literature

My starting point was to realise that the connection had already been made. This was in seventies of last century where **Lawrence Edwards** had written up much of his work in a magazine, *Mathematics Physical Correspondence* (or MPC) edited by Stephen **Eberhardt**.

In connection with the current work, MPC Issues 2 + 3, 1972/3 includes *Three Archetypal Scales* by Eberhardt, MPC Issue 6, 1973 includes, *Crystallinity, Form and Symmetry* by Eberhardt, and *Path Curves in one and two dimensions* by Edwards, MPC Issue 7, 1974 has p16 *Path curves in three dimensions* by Edwards, MPC Issue 8, 1974 has p18, *Plant Buds Forms as Invariants of Path Curve Transformations* by Edwards, MPC Issue 10, 1974 has on

p 9, *Representations of the Projective Plane* by Nick Thomas, MPC Issue 12, 1975 on p 10 has *Path curves in the Plant Kingdom Measurements and Calculations* by Edwards, MPC Issue 13, 1975 has *An Approach to the Lemniscate Path of the Sun and Earth* by Nick Thomas, and MPC Issue 16, 1976, p13 has *The Pivot Transformation* by Edwards. Other later issues dealt with the *imaginary*. Much of this was brought together in *The Field of Form* by Edwards in 1982 (published by Floris Books, Edinburgh).

This tetrahedron form was definitely to be found in *one* of the kingdoms through the work of **Lawrence Edwards**, and before him the work of the individual that Lawrence studied with namely **George Adams Kauffman**, and prior to that I suspect **Rudolf Steiner** must have talked on these themes with **George Adams**.

Lawrence Edwards work (1912-2003)

What Edwards came to, in particular, is that the form of the plant, the vegetative world, was dominated by what he called a *semi-imaginary tetrahedron* (more on this later in these notes). Within this framework wove the path curve systems that could describe many aspects of plant form. What did this tetrahedron appear like? Last night I described one line associated with the plant, a physically visible vertical real line. If Lawrence's tetrahedron were true then this implied, of necessity, another line – perpendicular to the vertical stem. But it had to be infinitely far away (or a very great distance). Viewed from any side this would appear as a cross (two skew lines). He had elaborated this aspect intensively in his work. For those interested they should obtain his work, *The Vortex of Life*, published by Floris Books, Edinburgh, 1993, this was an elaborated edition of the 1982 work mentioned above.

Work of Lawrence Edwards

Tetrahedrons for all the Kingdoms?

The question that arose for me was that *if* a particular tetrahedron gave the architecture of the *plant* world there must be (presumably) a basic tetrahedral form for *all the other kingdoms*. There would surely be something inconsistent if there was not a seamless transition, however radical, from one kingdom to another – and presumably through all four visible kingdoms. Lawrence had once said to me that he had not seen the all-real tetrahedron in nature. This made me wonder if such a tetrahedron might be the tetrahedron of choice for the mineral world. We would also have to posit the possibility of a tetrahedron of some other kind for the animalic.

Once over the hurdle of a *single* visible line in each kingdom, it was a no brainer to suggest a further line for other tetrahedron types. So there had to be *two* principal lines, one *visible* (in part) and the other *invisible* – just like the plant architecture, as supposed by Edwards. I thought to attack the idea of a *mineral* tetrahedron first.

Tetrahedron – of the first kind (the mineral)

If this was to be an all-real tetrahedron, how was it supposed to manifest? I called it a “Tetrahedron of the First Kind”, believing that a second kind, third kind and even fourth kind might arise. Lawrence had found (in my opinion), the tetrahedron of the second kind, already.

The cosmic *all real* tetrahedron

I imagined a vast tetrahedron (of the first kind) of huge cosmic scale. Initially I thought of it as an equilateral tetrahedron, with all four faces as equilateral triangles, made up of six infinite straight lines and four static, fixed points, each of them infinitely far off. Also its orientation was non-specific – it could be at any angle in the cosmos and was just so for any and all specific individual crystals in the earth sphere. It also had to include within its possibilities *equal steps* along internal lines and *flat planes* within it and *mutually perpendicular lines* all within its central compass. Why was this so? Because many single crystals, I imagined, were built from atomic fragments (atoms to some) that were all precisely the same, and when aggregated (crystals do not grow) formed overall forms such as isometric, tetragonal, orthorhombic arrangements, the crystal forms as crystallography knows them.

The question arose for me – how could I model this magnificent monster that encompassed at the very least the fullest extent of the solar system? A scale model was obviously impossible – but could one sort of cheat? It was of importance to see how forms might develop in the midst of it – the external reaches being impossible to reach anyway since they had to be infinitely far off (or near so).

The first thing I did was to imagine that the points at infinity on its straight lines were *not* at infinity! If they were at infinity then the spaces between each distant point along them would be equi-spaced. However they were imagined as a mere one meter apart. And this meant that *locally* the distances could be almost equal, while those near the points became smaller and smaller. This could be done quite systematically as the spacings along the lines all became *growth measures* (shown below).



Then I took the middle of each of two of the skew pairs of perpendicular lines and joined these with a line. These pairs are perpendicular to each other as the tetrahedron here is equilateral (size does not matter).

And the line joins of all the three skew pairs lead to three intersecting lines at a single point smack in the middle of the cosmos – or rather in the middle of this particular *equilateral* tetrahedron.

The peculiarity that was immediately self evident was that the three lines were mutually perpendicular. Abstracting this central patch gave a neat

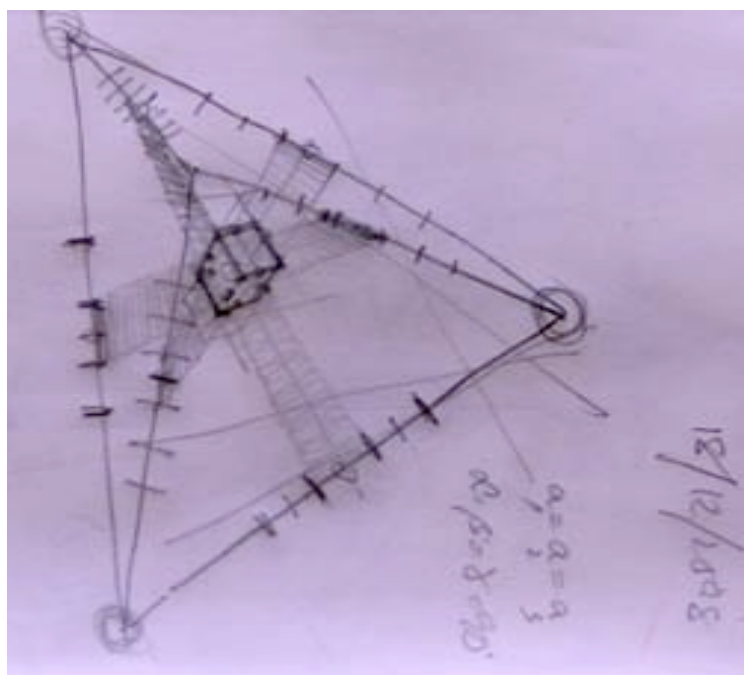




picture of how we usually imagine Cartesian axes to be arranged! Here it became apparent that such a central set of axes, on a cosmic scale, could be thought of as the field structure that might provide the basis for the crystalline.

For, as mentioned earlier, the tetrahedron we choose has to allow for a number of mutually orthogonal architectures, salt cubic crystals and the like.

A rough sketch indicates what is meant here. I have sketched the equilateral tetrahedron with its three mutually perpendicular lines. Inside there is drawn a cubic form (isometric crystal?). The cubes planes have been extended far, far beyond the cube. These could be the equivalent of the path curve surfaces for *this* tetrahedron. And we notice a slight twist in these surfaces. Could the apparent flatness embrace a slight curve when the system is at a cosmic scale? Would this be testable?



Even more interesting is that these three principal surfaces of the cube are then able to be seen as unified in a sense. If one surface is taken back to the

cosmic tetrahedron it interacts with *two* of the skew pairs of lines.

What does *one* such surface appear like? In my model the red surface generated by the strips of red card were (let us say) in the yz plane, z being vertical in this case.

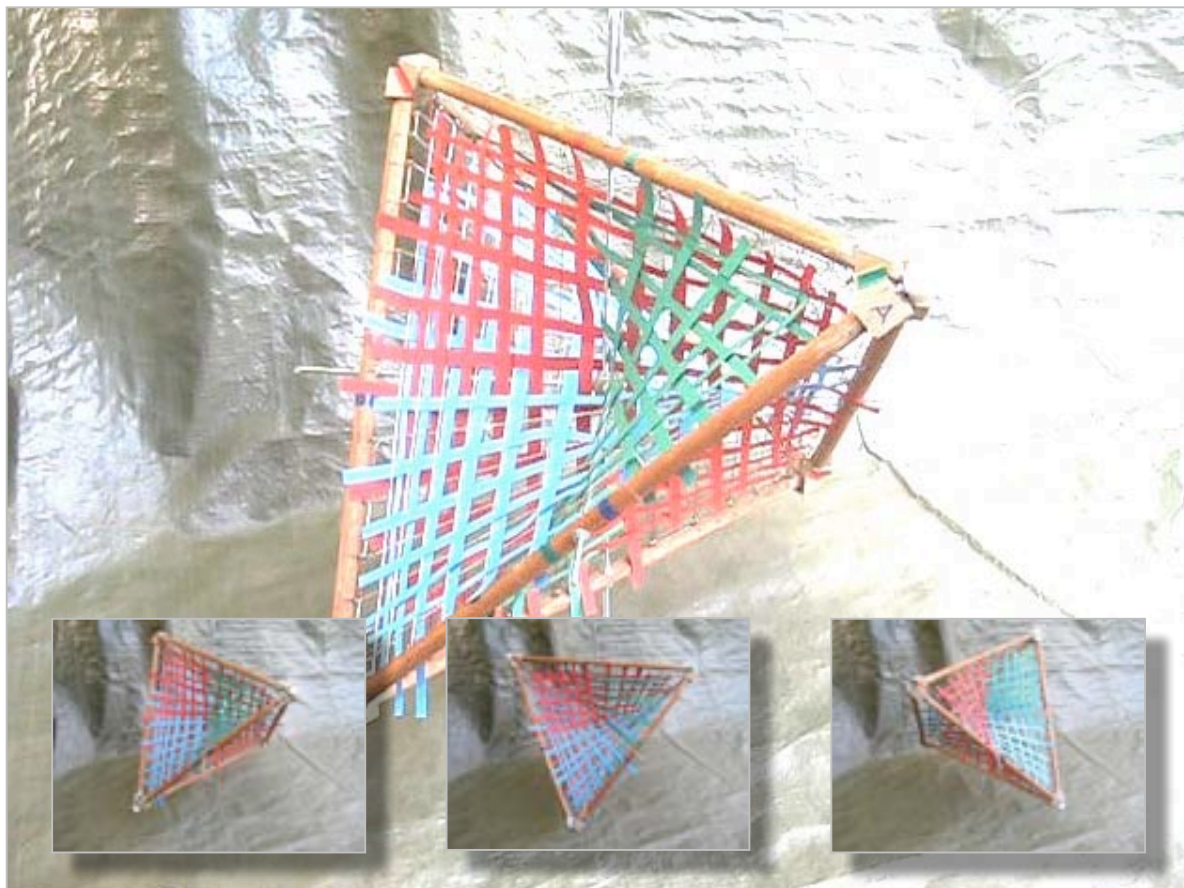
Expanding this plane away from the centre it then becomes a beautiful symmetrical curved surface, curving



towards *four* of the lines of the tetrahedron.

But each surface of the planes intersecting the cube does this. So we find the *three* surfaces weave into each other. There must be a huge significance to this. The implication is that each surface of the cube (or tetragonal, or orthorhombic etc) is intimately and geometrically bound to its orthogonal neighbour. Somehow each of the separate surfaces is at the same time a single surface!

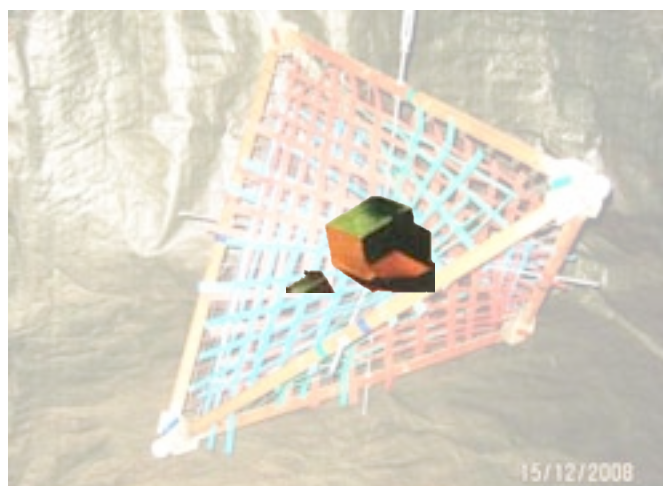
This can be seen on the model after I inserted the three surface planes into it – which all turned out to be intersecting saddle surfaces (red, blue and green strips)!



This unifying aspect must be explored much more some time!

The montage at right suggests only how we might imagine a cubic crystal system as being embedded in this cosmic complex. This is the rectangular prism of iron pyrites.

This also hints at how we can imagine the *non* orientation of this tetrahedron of the first kind. To obtain a framework for another



pyrites crystal in the same mass all we have to do is turn the entire cosmos a wee bit! A few different *orientations* of this cosmic tetrahedron would give all the pyrites crystals in such an untidy agglomerate (as below). I had always wondered how these perfect crystals could be oriented so haphazardly – this might give a clue to this. When the crystal seed locks on to the path curve system it must progress in an orderly fashion, aggregating in a way determined by the field of form for this particular mineral. Nor should we forget that such a crystal is really arrays of two intersecting *tetrahedra* of iron and sulphur (FeS_2).



The tetrahedrons of the second kind, the semi imaginary, belong to the vegetative, the plant kingdom. This was one of **Edwards** major contributions to this morphological research.

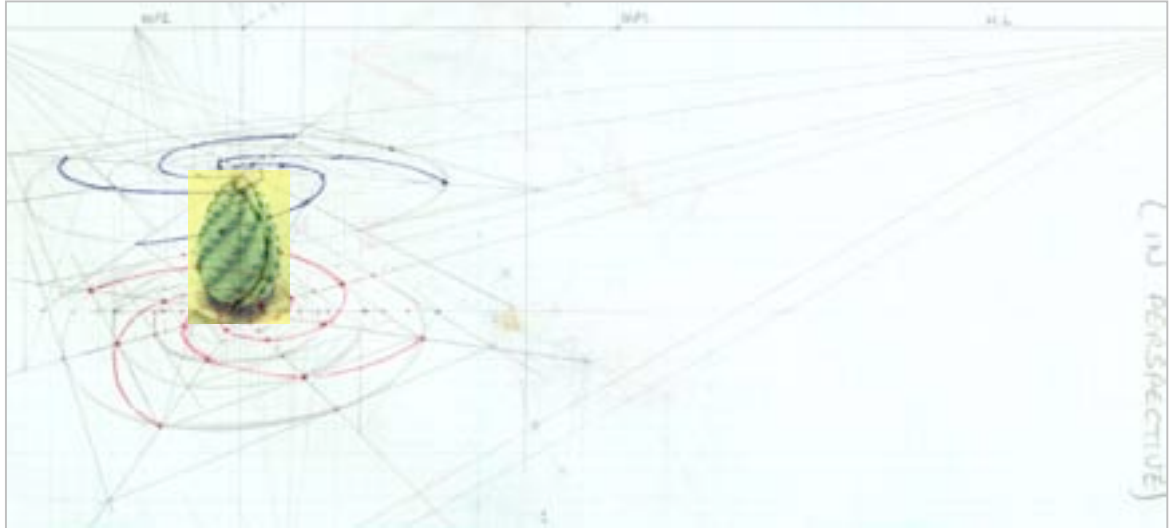
Tetrahedrons of the Second Kind (the Plant)

I will not spend much time on this (others may) as Edwards has written it up extensively in the literature referred to. I remember him saying to us that he used to tell his school students that the pine cone was one of these forms, a semi imaginary tetrahedron. But his work took a whole new turn when he decided to actually test this! This he did and tested very widely, discovering amazing things about hearts, buds and planets in the process.

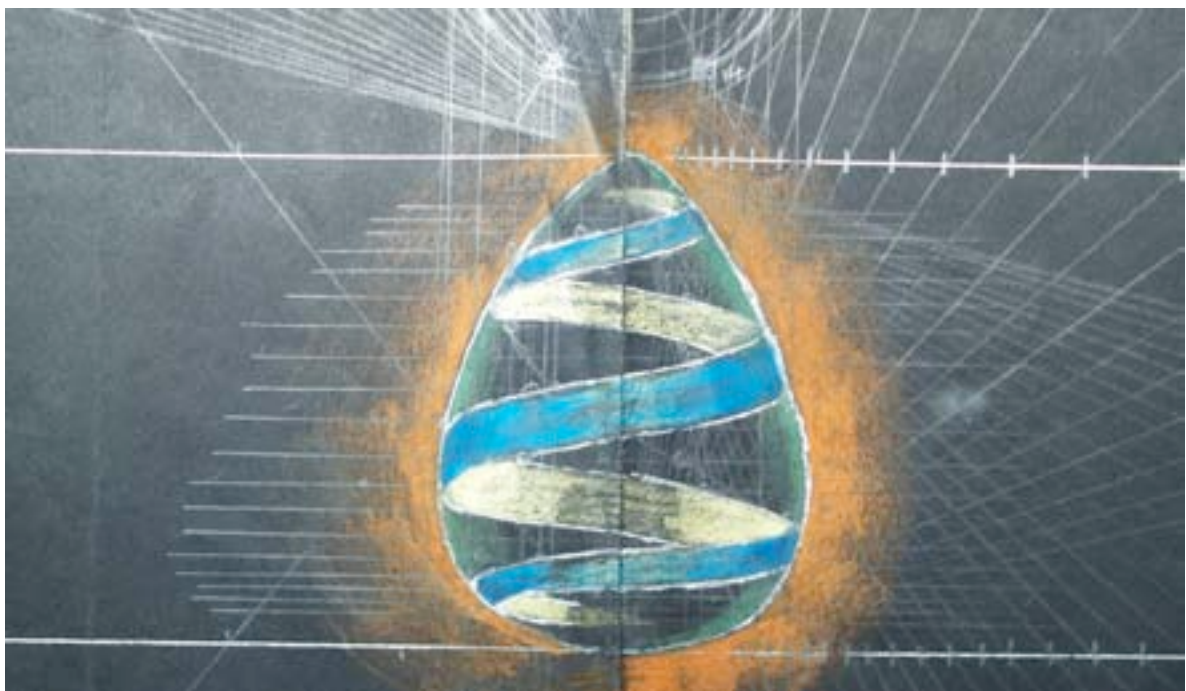


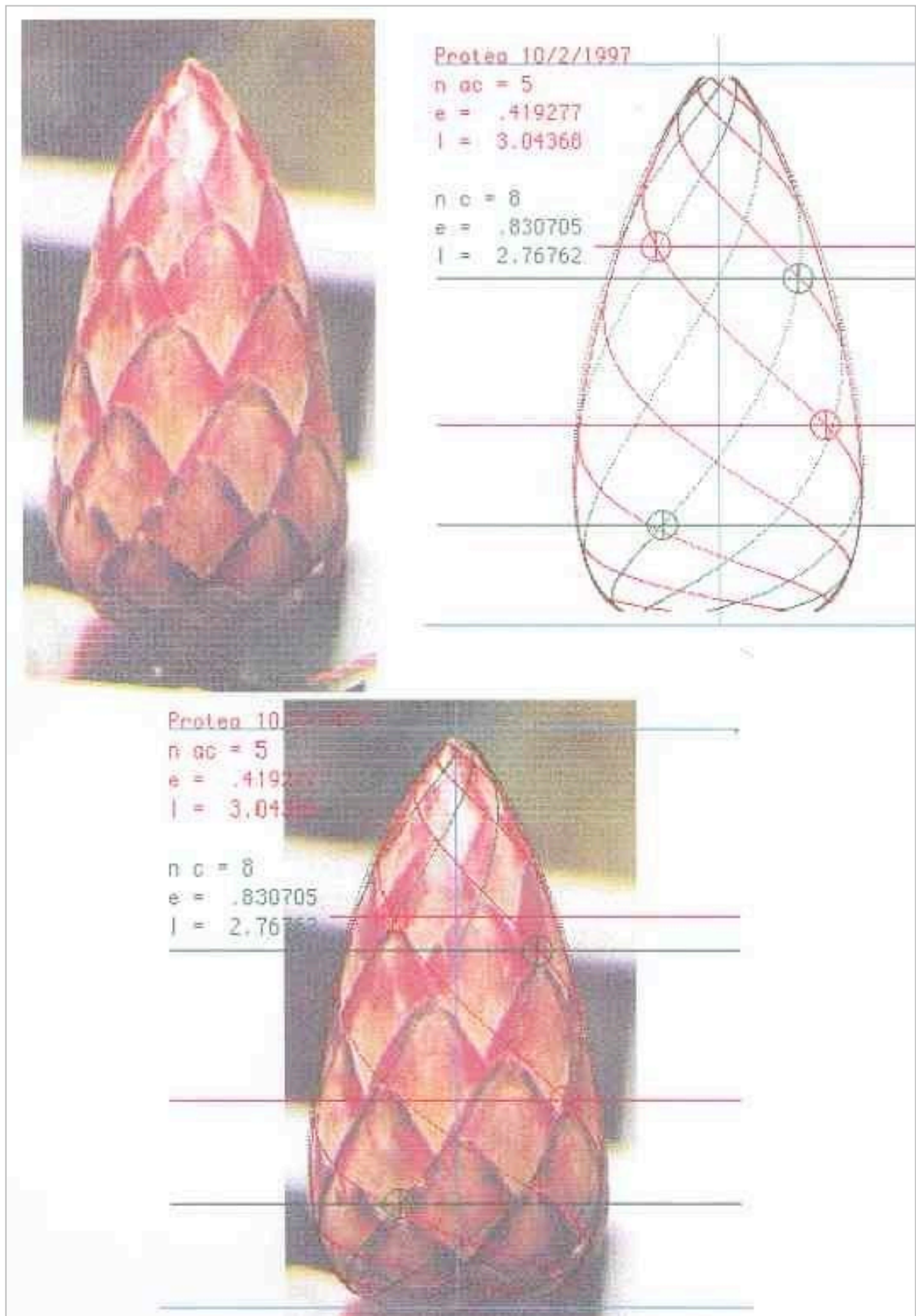
So the special tetrahedron that Edwards did extensive work with and fruitfully will be described briefly, and that is the one that has to do with the living, the vegetative, the plant world.

This particular world of form has *radial* symmetry as its keynote, and embraces convex surfaces and spiralling structures – a giant step away from the forms present in the mineral world. Hence this tetrahedron was one where not all the key elements were at infinity, but some had become *local* (as I think of it) and others *imaginary* (or in motion).



Above is a first sketch I did when Edwards visited Australia in 1976. Overlaid is a spiralling bud form belonging to nature – just to give an idea of how this schema works. My own personal confirmation came much later when I studied a protea of some sort. The sketch below shows something of the method of drawing such forms and next page was an analysis.





Tetrahedrons of the Third Kind



The application of this core idea will also be applied to the *early* animalic (as far as this has been explored to date). This is another huge step, a leap, beyond the living and reaches (just a little I believe) into the conscious, the sentient and the mobile – in other words – the animal kingdom. Early representatives of this kingdom are the fishes. What kind of tetrahedron could possibly be the basis for the fishy architecture?! I considered the possibility of turning the plant tetrahedron through ninety degrees (the stem becomes the spine) and *all* the significant elements are now local, the line at infinity of the plant having now come also to the local and immediate. Was this 90 degree thing becoming habitual?

I hope to explore this a little more in the fourth talk.

Is there a Tetrahedron of the Fourth Kind at all?

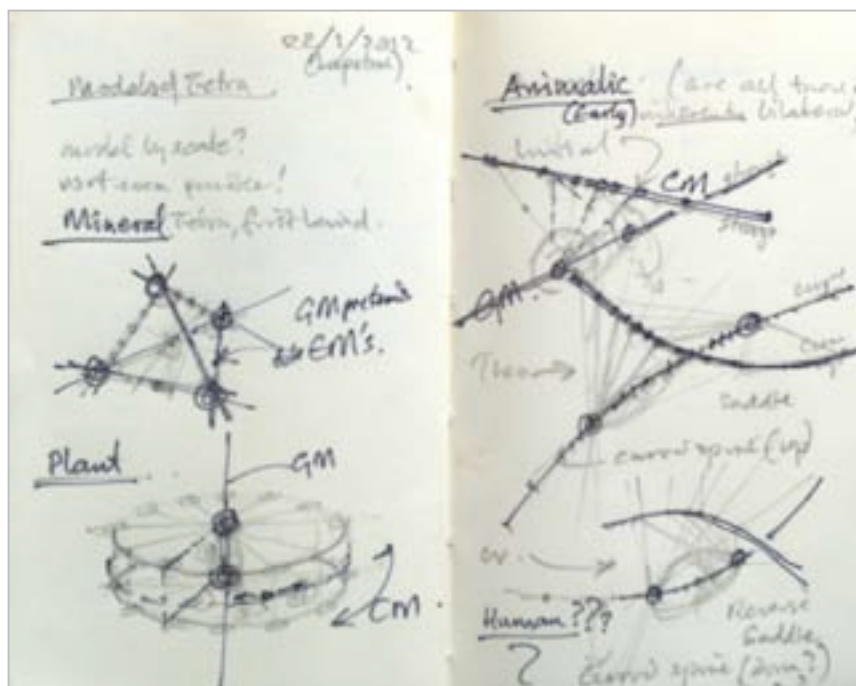
The fourth kingdom, the human, is still very much the subject of the most tentative research. That there are four kingdoms (not just three) is a determinative and core part of this *form* hypothesis – which sees four distinct steps from the *dead* (calcite and cobalt), to the *living* (cabbages and casurinas), to the sentient (carp, crocodile, cows and cats) thence to the spiritual (criminal or Christ imbued). Uprightness is the formative, morphological, clue to this last kingdom, that is, us! Perhaps this will eventually lead to some grasp of the Fourth Kind of tetrahedron ...

Summary sketches of some of these tetrahedral frameworks

It is of interest to note the various *measures* presenting in each kind of tetrahedron:

In the **mineral** (first kind of tetrahedron) there are only *equal measures*. But these are a special case, in *this* case, of a *growth measure*.

In the **vegetative** (second kind) there is a *growth measure* of points in the vertical line, a *circling measure* of points in the horizontal line at infinity, and four *geometric measures* in the four moving lines (as special cases of growth measures).



I believe the **animalic** (third kind) *starts* with a kind of repetition of the plant tetrahedron, but what *was* the line at infinity comes in much closer now. So we would still have a growth

measure (now approx. horizontal) for the spine, four *growth measures* as bridges between infinite and local, to the *circling measure* in the now local line, again at right angles to the spine.

But then it has to progress beyond mere vegetative repetition. I have wondered whether what were straight lines could become curves as suggested in the two lower sketches at right. In one case we would get a saddle structure, in the other (lower) the opposite to that – which may have a formal name but I know it not. I also believe a three fold differentiation needs to somehow enter, reflecting *in space* the cognitive, affective and wilful, albeit as yet *without* self consciousness. And there must be specific forms (of great variety) in which it can do this yet all embedded as possibilities in a tetrahedron of the third kind.

The human (is there a fourth kind)?

– I still have little idea of what this might be, except that the spinal line is now at ninety degrees to the animalic spine and that the two real lines might just become close enough to be incident. The consequences of this cross like structure are beyond me at the moment!

