ELEMENTARY CONSTRUCTIVE GEOMETRY
(FIRST DRAFT)

LANTERNLAND

A RABELAISIAN WORLD OF PLATONIC DISCOVERIES

BY PIERRE BEAUDRY

WITH SEVERAL DRAWINGS BY THE AUTHOR

THE THREE FACES OF DISCOVERY:
1) PERPLEXITY, 2) AWE, 3) LAUGHTER.
FIGURE 1.

Leesburg Va. August 2, 2001

INTRODUCTION:

PROLOGUE

July 29, 2001

The Northern Virginia Schiller Institute
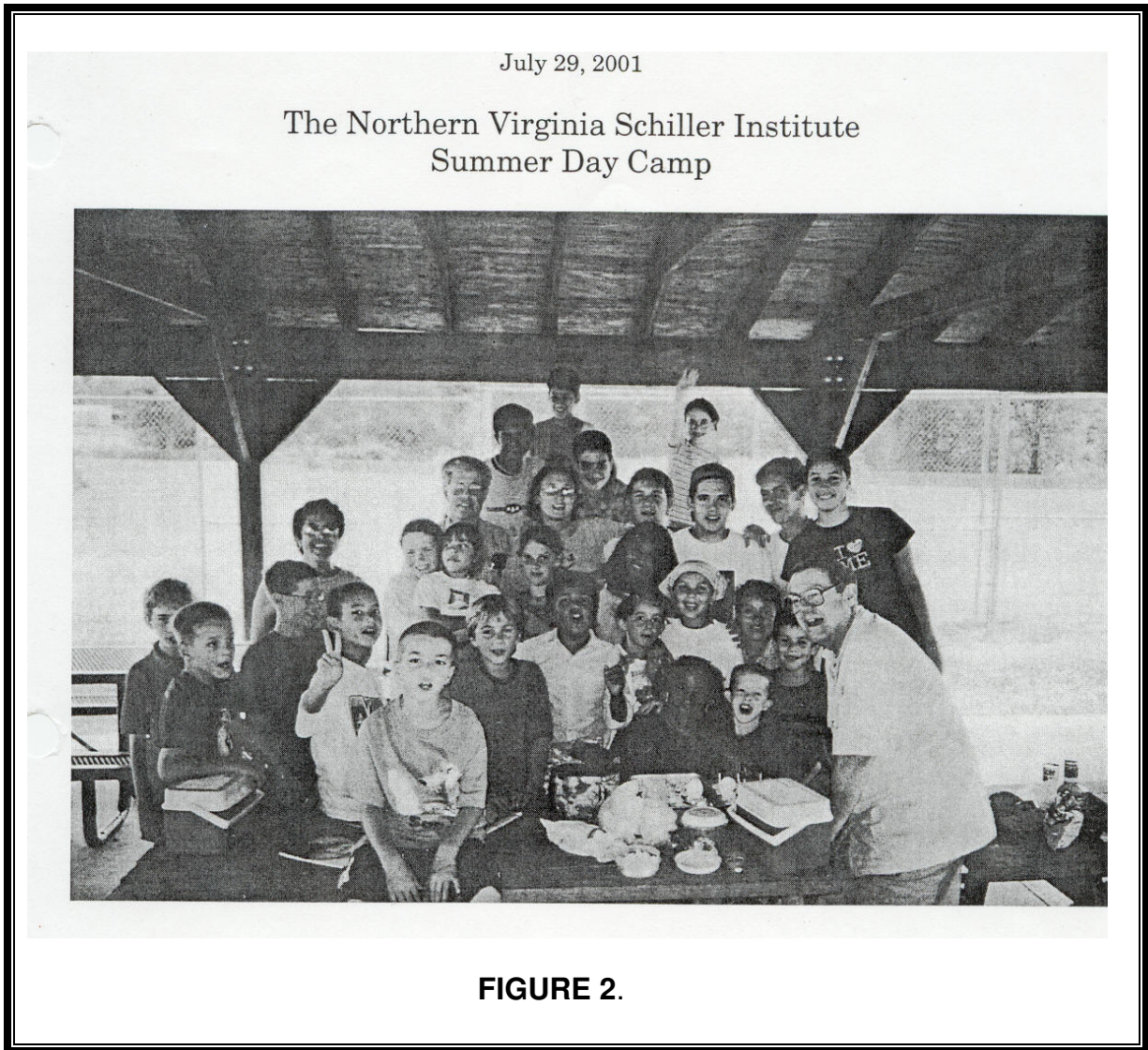Summer Day Camp

FIGURE 2.

FIGURE 3.

THE WISDOM OF LANTERNLAND

"So, when you philosophers, with God's guidance and in the company of some clear Lantern, give yourselves up to that careful study and investigation which is the proper duty of man - and it is for this reason that men are called {*alphestes*}, that is to say searchers and discoverers, by Homer and Hesiod - they will find the truth of the sage Thales's reply to Amasis, King of the Egyptians. When asked wherein the greatest wisdom lay, Thales replied : "In time". For it is in time that are discovered, or in due course will be discovered, all things which lie hidden; and that is the reason why the ancients called Saturn, or Time, the father of Truth, or Truth the Daughter of Time. They will also infallibly find that all men's knowledge, both theirs and their forefathers', is hardly an infinitesimal fraction of all that exists, and that they do not know."

Francois Rabelais, Book V.

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INTRODUCTION:

WHY ARE THERE ONLY FIVE PLATONIC SOLIDS?

The study of the FIVE PLATONIC SOLIDS has led us to a very important question of PHYSICAL GEOMETRY, a question that is usually discarded, because its significance is generally not perceived by those who indulge in merely academic studies of the PLATONIC SOLIDS. However, the problem is very simple, but quite devastating in its implication. Why are there not more than FIVE PLATONIC SOLIDS? Why are there FIVE, and ONLY FIVE PLATONIC SOLIDS? And, why are each and all of the PLATONIC SOLIDS derived from the ONE DODECAHEDRON by means of the GOLDEN SECTION of DIVINE PROPORTION? I shall make three points with respect to these fundamental questions.

First and foremost, the question of the PLATONIC SOLIDS represents the HIGHEST CHALLENGE AGAINST SENSE PERCEPTION. It not only represents the LAWFUL LIMITS of the domain of perception, but also engages the mind immediately into investigating the HIGHER GEOMETRY that generated them from beyond the senses.

Indeed, the physical conditions for a SOLID to be called PLATONIC are as follows:

1- Each SOLID must be composed of REGULAR FACES.
2- Each FACE must have IDENTICAL NUMBER OF SIDES.
3- Each SIDE must have CORNERS TOUCHING A SPHERE.
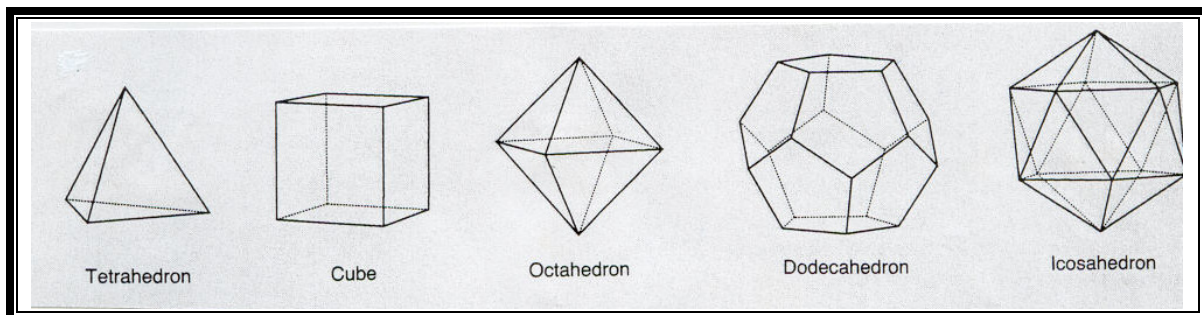
FIGURE 4.
THE FIVE PLATONIC SOLIDS.

Immediately, the last of these physical conditions calls the attention to a HIGHER MANIFOLD, and begs the question of how to generate the PLATONIC SOLIDS by some form of SPHERICAL ACTION. PLATO developed an initial insight into their construction in his TIMAEUS dialogue. PACIOLI and LEONARDO DA VINCI have penetrated PLATO'S insight further, and have left us the results in their famous book on the DIVINE PROPORTION. Today, we must explore further along these same lines of investigation.

LANTERNLAND introduces, here, three different methods of generating the FIVE PLATONIC SOLIDS. Two are methods of folding, and one is a method of partitioning the SPHERE with GREAT CIRCLES. All three methods require the mastery of different forms of MULTIPLY- CONNECTED SPHERICAL ACTION in order to divide the SPHERE into the required number of parts.

The two methods of folding provide the required SPHERICAL ACTION almost by SEARCH AND FIND, where your hands "FINGURE OUT where to go," as PANTAGRUEL put it. As for the method of GREAT CIRCLES, it provides us with a more COGNITIVE way to measure the significance of the question: WHY ARE THERE ONLY FIVE PLATONIC SOLIDS? The answer is not obvious. Indeed, at first glance, it seems that only the OCTAHEDRON can be generated directly from GREAT CIRCLES of the SPHERE. In the case of the other PLATONIC SOLIDS, a spherical solution must be discovered through the generation of GREAT CIRCLES that partition the SPHERES into EQUAL PARTS. The result of such spherical partitioning yields a series of intermediary TRUNCATED SOLIDS called, ARCHIMEDEAN SOLIDS, which in turn can be transformed into the FIVE PLATONIC SOLIDS.

FIGURE 5.

OCTAHEDRON   CUBOCTAHEDRON   ICOSIDODECAHEDRON
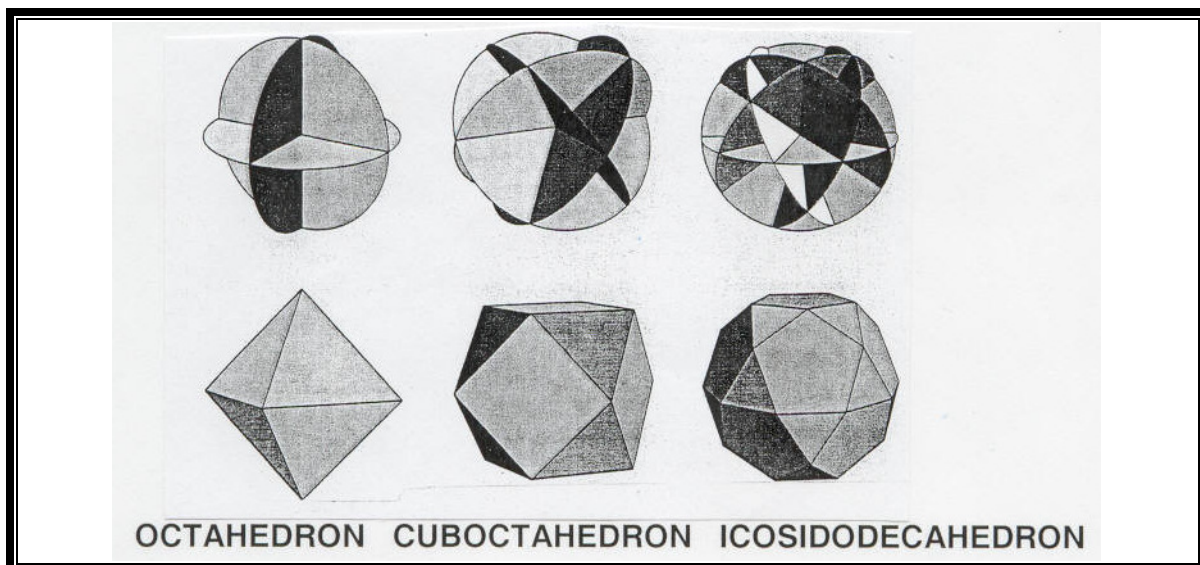
Thus, there are only three ways that a SPHERE can be divided into EQUAL PARTS. A SPHERE in which 3 great circles partition one another into 4 equal parts, yields the OCTAHEDRON. A SPHERE of 4 great circles, partitioning one another into 6 equal parts, yields the CUBOCTAHEDRON. A SPHERE of 6 great circles, partitioning one another into 10 equal parts, yields the ICOSIDODECAHEDRON. Notice the progression, 3 into 4; 4 into 6; 6 into 10; 10 into…? Now, if you take the last sphere of 6 great circles partitioned into10 parts, and mix it with its INVERSION; that is, a sphere of 10 great circles which divide each other into 6 parts, the result will be a SPHERE of 16 great circles partitioning each other, everywhere, in the ratio of 3/5, the spherical GOLDEN SECTION of the DIVINE PROPORTION. This is the CHORA SPHERE that integrates the intermediary ARCHIMEDEAN SOLIDS generating ALL of the FIVE PLATONIC SOLIDS from a SINGLE SPHERE.
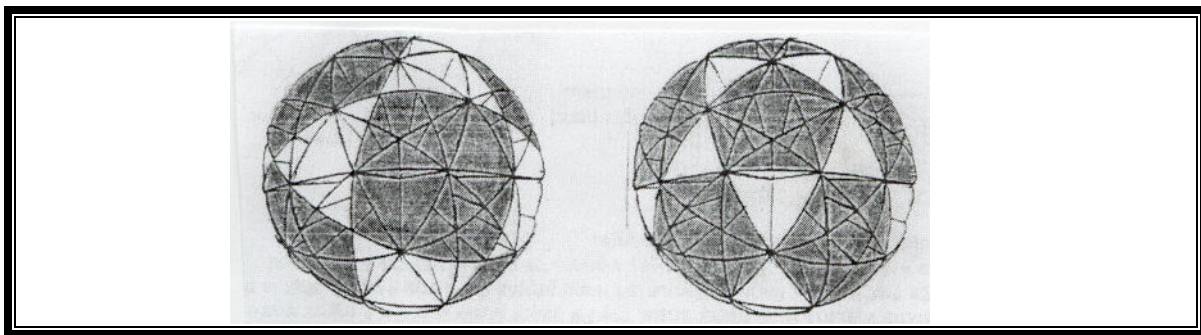
FIGURE 6.
CHORA SPHERE INTEGRATING BOTH
THE CUBOCTAHEDRON AND THE ICOSIDODECAHEDRON

THE NECESSARY BOUNDARY CONDITION OF THE DIVINE PROPORTION

Secondly, the physical conditions for a SOLID to be called PLATONIC point to another crucial requirement, which is that of the BOUNDEDNESS of the FIVE PLATONIC SOLIDS. This question must be raised because, in all of the geometric studies that you will get to know, during your entire lifetime, there will not be a more important underlying question than the issue of BOUNDARY CONDITION. Why? Because, one cannot think properly without establishing the NECESSITY OF CLOSURE in the universe. This means that the universe, as a whole, is not UNLIMITED, INDEFINITE, neither in the indefinitely large, nor in the indefinitely small. The world is not an indefinitely extended bouillabaisse soup, no matter how many fish you think you can get to swim in it. The Universe is FINITE

yet UNBOUNDED. That is a sort of PARADOX. How do you solve that PARADOX? The issue is specifically, and more acutely solved by answering the question: Why is the DIVINE PROPORTION the SPHERICAL BOUNDARY CONDITION of the FIVE PLATONIC SOLIDS? What is it in the DIVINE PROPORTION that determines a BOUNDARY CONDITION? ''

The GOLDEN SECTION OF THE DIVINE PROPORTION brings into focus the AXIOMATIC CHANGE that occurs between the NON-LIVING and the LIVING MANIFOLDS. That is a DISCONTINUITY, a SINGULARITY. That is why PACIOLI, LEONARDO, and KEPLER, have all identified the PENTAGON and the SUBLIME TRIANGLE, within the DODECAHEDRON, as the SINGULARITY expressing this AXIOMATIC CHANGE, which they associate with the DIVINE PROPORTION. From this, PACIOLI concluded that it is impossible to generate a SIXTH PLATONIC SOLID, because FIVE PLATONIC SOLIDS are all that is NECESSARY FOR THE BEAUTY OF THE UNIVERSE. He argued that since there cannot exist a SOLID ANGLE formed by figures of less than 3 sides (triangles), or formed by figures of more than 5 sides (pentagons), there cannot exist a solid formed by figures of six (hexagons), or more sides. In fact, if it were possible, the universe would be so ugly, that it would be impossible to circulate in it, without constantly bumping into all sorts of monsters. Imagine people with 6 fingers and 28 toes. The point is that 3 (triangle) is a minimum, and 5 (pentagon) is a maximum. This is the reason why the GOLDEN SECTION of a SPHERE also reflects a minimum of 3 and a maximum of 5, that is a ratio of 3/5, as a BOUNDARY CONDITION. This is also the reason why 6/10 is the spherical limitation for NESTING THE FIVE PLATONIC SOLIDS into a SPHERE.

Such a BOUNDARY CONDITION, separates the two domains of the NON-LIVING (sixsidedness) and the LIVING (fivesidedness-tensidedness), and brings into prominence the idea that the LIVING interacts with the NON-LIVING as the DODECAHEDRON does with the other four PLATONIC SOLIDS, as a result of the GOLDEN SECTION. In other words, it is the DODECAHEDRON that generates the other four solids. Similarly, it is the LIVING that generates the NON-LIVING, and not the NON-LIVING that generates the LIVING! So too, proportionately, it is the COGNITIVE which generates the LIVING and the NON-LIVING, in the same way that it is the DIVINE that generates the COGNITIVE, as VERNADSKI and LAROUCHE have demonstrated. Thus, the DIVINE PROPORTION: THE DIVINE IS TO THE COGNITIVE AS THE LIVING IS TO THE NON-LIVING

$$\frac{\text{DIVINE}}{\text{COGNITIVE}} = \frac{\text{LIVING}}{\text{NON-LIVING}}$$

Now, if we extend **PACIOLI'S** reasoning regarding the **MINIMUM SOLID ANGLE** of 3 figures (**TETRAHEDRON**), and the **MAXIMUM SOLID ANGLE** of 5 figures (**ICOSAHEDRON**), to the **SPHERICAL DOMAIN**, the result will be a **MIXTURE of SIXSIDEDNESS** and of **TENSIDEDNESS**, since 6/10 = 3/5. Such are the **BOUNDARY CONDITIONS** of the **CHORA SPHERE OF DIVINE PROPORTION**, as the single generative **SPHERE** of all of the **FIVE PLATONIC SOLIDS**.

THE DIVINE PROPORTION AS A BOUNDARY CONDITION FOR COGNITION.

All of the construction exercises in **LANTERNLAND** must ultimately be related to the **DIVINE PROPORTION** as the **BOUNDARY CONDITION** for **COGNITION**; because this is the crucial precondition for being able to go from a **LOWER DIMENSION** to a **HIGHER DIMENSION**. In other words, these **CONSTRUCTIVE GEOMETRIC PROPORTIONS** take their source in the higher proportionality of **MAN CREATED IN THE IMAGE OF GOD**. The point is, you won't be able to make **CRUCIAL DISCOVERIES** without fulfilling the requirement of such a **BOUNDARY CONDITION**. The reason why this question is so important is twofold.

First, the question of the **BOUNDARY CONDITION** forces the mind to accept the necessity of a **LIMITATION**, which shows why **EUCLIDEAN GEOMETRY** is wrong. Internal to **EUCLIDEAN GEOMETRY**, there exists a devastating **PARADOX** that can be easily demonstrated by the experiment of stereographic projection from the **RIEMANIANN SPHERE**.

FIGURE 7.
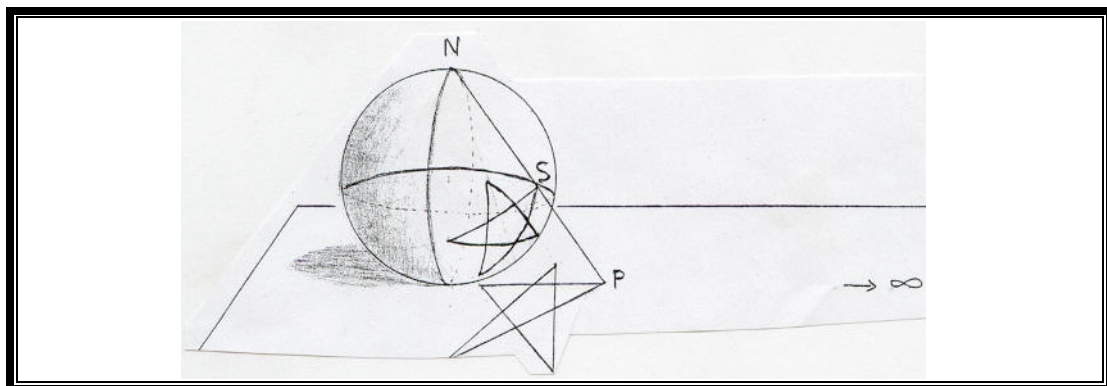**PROJECTION OF THE INFINITE INTO THE SPHERE;**
PROJECTION OF THE INDEFINITE ONTO THE PLANE.

Note that by projecting the **STARRED PENTAGON** from the **SPHERE** onto the **PLANE**, the curved sides are deformed into straight lines. These **PLANE SHADOWS** are straight, while the **BOUNDED SPHERE** that casts them is curved. That is perplexing. Why? Because, this transformation

between A NON-LINEAR GEOMETRY and A LINEAR GEOMETRY contains a PARADOX. This transformation includes a falsified notion of INFINITY. While you think you are getting closer to INFINITY, as you are projecting outward into space, in the PLANE, you are actually getting away from A TRUE INFINITE. In fact, you are the TRUE INFINITE projecting into the INDEFINITE, otherwise known as a BAD INFINITY. You are excluding yourself as an individual created IN THE IMAGE OF GOD. Indeed, since the source of projection is at the NORTH POLE OF THE SPHERE, such a stereographic projection represents the geometric analogy of a METAPHOR for the projection of an image coming from a higher domain toward a lower domain. The PARADOX is such that, when you raise the line of projection closer and closer to the POLE of the SPHERE, the SHADOWS on the PLANE move further and further away from the POLE, and will become more and more elongated and deformed, as they are stretched further away TOWARD AN INDEFINITE HORIZON. The EXISTING BOUNDED INFINITE of the SPHERE will be represented by the NORTH POLE, while a corresponding NON EXISTENT INDEFINITE, or "CARTESIAN INFINITE," will be imagined at the other end of that projection on the PLANE, as if beyond some BOUNDLESS HORIZON all around. That is the PARADOX.

How do you solve that PARADOX? The only useful MENTAL IMAGE to have of that otherwise WRONG INFINITY, or INDEFINITY, at the far end of the PLANE, is to conceive of it as being BOUNDED by the INFINITE GREAT CIRCLE of an INFINITELY LARGE SPHERE. That is a tough one, I know. But think it through. Consider that the closer your projection ray gets to the NORTH POLE of the SPHERE, the closer it is also getting to the INFINITE GREAT CIRCLE on the plane. When you reach the NORTH POLE, you also reach the INFINITE GREAT CIRCLE. Thus, the NORTH POLE CORRESPONDS to that INFINITE GREAT CIRCLE! This is the RIEMANNIAN equivalent of CUSA'S solution to the PARADOX of SQUARING THE CIRCLE.

Furthermore, such an INFINITE SPHERICAL PROJECTION is a useful IMAGINARY SPHERE to map the stars of the night sky onto, in your astronomy studies. Otherwise, there is nothing useful at that other end of the world; there are only the harmful imaginary fantasies of your extended sense perception. And, If you spend too much time in those WARPED REGIONS of your imagination, with or without drugs, you risk going WIERD like HARRY POTTER.

<div align="center">**∗∗∗**</div>

"GARDE FOU" AGAINST THE FOURTH DIMENSIONALITY OF TIME.

Thirdly, the BOUNDARY CONDITION establishes for the mind a safeguard against the madness of the lying magical views of the world. PANTAGRUEL calls this a "GARDE FOU," which is an appropriate FRENCH

term for a "GUARDING RAIL" against the MAD CARTESIAN DISEASE; that is, a safeguard against the tendency of those nut cases who extend everything "TO INFINITY," to the so-called "CARTESIAN INFINITE;" either by small increments of indefinitely small linear extension, like CAUCHY had advocated for his bowdlerized version of the LEIBNIZ CALCULUS, or by large projective deformities as those introduced by MANNING, and later by HILBERT, to express the so-called FOURTH DIMENSION. The following PROJECTIONS of HILBERT are said to depict such a FOURTH DIMENSION. The shaded area in each diagram is said to represent a "region extending to infinity."

HHHEEELLLLLLOOOOOOoooooo.....
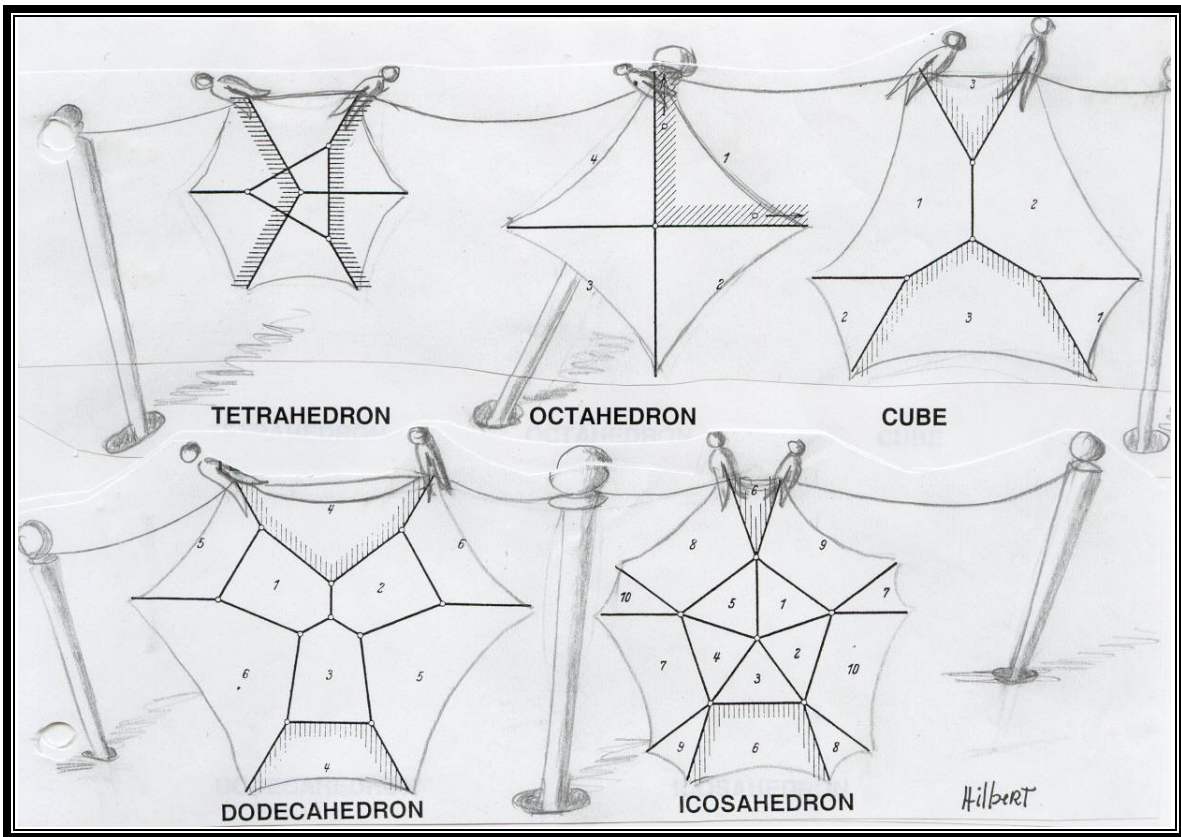
FIGURE 8.

Indeed, is there anything more foolish than a grown-up who attempts to expand on the EUCLIDEAN framework of the PLATONIC SOLIDS, by projecting the extension of his sense perception, and calling this, pompously, "THE FORTH DIMENSION?" Such a grown man acts like someone who is displaying his dirty underwear before the whole world,

instead of changing into some clean ones, in private. People making such a display, in public, ought to be arrested for indecent exposure. Not only do they stink up the whole neighborhood, but they also fall prey to an INDEFINITE WANDERING, a boring ride on a flat ocean without a shoreline. Such people should wake up, and SMELL THE ROSES. When COLOMBUS crossed the OCEAN, in 1494, he knew where the shoreline was located.

Thus, conclusively, the BOUNDARY CONDITION of the FIVE PLATONIC SOLIDS affords us the all too necessary BEAUTY of CLOSURE, and a CLEAN BREAKAWAY from the infantile attachment to over-stretched dirty underwear. The problem with HILBERT here is that he projected the solid dimensionality onto a Cartesian bad infinity. His false underlying assumption was that the higher dimensionality of the five solids was located in the domain of Flatland. As we shall see, the higher dimensionality is to be found in the Sphaerics of Lanternland.

PANURGE DISCOVERING THAT AN UNDERLYING
ASSUMPTION IS ALWAYS COVERED UP.

FIGURE 9.

PROLOGUE

HOW TO GO FROM A LOWER DIMENSION TO A HIGHER DIMENSION

LANTERNLAND is the extraordinary Island where FRANCOIS RABELAIS had his famous AXIOM BUSTER giant, PANTAGRUEL, visit in the last book of his HISTORIES OF GARGANTUA AND PANTAGRUEL. In this modern interpretation, LANTERNLAND becomes the site of PLATO'S CAVE, the most important place in the entire NOOSPHERE where the power of COGNITION can be discovered, by CONSTRUCTIVE GEOMETRICAL MEANS. This RABELAISIAN ISLAND is inhabited by a wonderfully studious people called, MIDNIGHT OILERS, whose role is to educate visitors that come from all around the world to find out how to discover the INTENTION that lies behind things, and to study the NOOSPHERE. When you land there, PAY ATTENTION TO THE INTENTION; the very first question you are asked may be a TRAP:

"Do you think that what you see with your eyes is the real world?" Well, if that is what you believe in, I have a surprise for you. The truth of the matter is that what you THINK is the real world is merely distorted shadows that are cast on the dimly lit wall of PLATO'S CAVE. Like the images of a puppet show, those shadows have no existence in themselves; they are entirely dependent on the invisible source of light that casts them. And, the shadow you get depends on the INTENTION of who controls the source of light.
 You see, on the one hand, a shadow has a very thin existence, yet we must chase after it, if we want to discover the source of light that produced it. On the other hand, an object may not cast the shadow that is expected of it. In other words, some shadows may be different from the objects that cast them. That is troublesome. The task of the geometer is to make visible to your mind the source of that shadow which is not visible to your senses; that is, to make you discover what lies behind the visible world. Let me give you an example.

One of the most delightful papers on this subject, is the short SNOWFLAKE paper written by the great astronomer, JOHANNES KEPLER. In that paper, KEPLER wanted to find out why snowflakes always chose the hexagonal form, as opposed to the square form, or the round form. What shapes a snowflake into a six-cornered form? Is there someone, in the heavens, who is in charge of marking every drop of water with a six-corner

stamp, or is this caused by the triple folding of circular action, or more simply, is that form the result of a battle between hot vapor and cold air? Kepler finally brings his readers to discover that GOD not only has REASON and INTENTION for creating almost non-existing things, such as snowflakes, but also adorns them with beauty, maybe just for the pleasure of it, and for merely a passing moment.

Well, in this paper, I have made a similar choice. I have taken the decision to play with some geometric problems, however, not just for the pleasure of it. There is an INTENTION behind my choice, just like there is one behind GOD'S choice. And, I hope the problems I chose will last a little longer than the lifetime of a snowflake, and that you will enjoy them too, in a lasting way. These discoveries should last you a lifetime, and maybe longer. For example, there is a beautiful treasure to be found in PLATO'S CAVE. There, you can find crystals that have the shapes of the 5 PLATONIC SOLIDS. We are going to study the INTENTION, or the formative faculty, that GOD put into them, and discover that THEIR SOURCE IS ROUND WHILE THEIR SHADOWS ARE STRAIGHT. That is a sort of puzzle called a PARADOX: how can something that is flat and straight come out of what is spherical and curved? This is a special case where the shadow is different from the object that casts it.

There are other cases. Among other things, we will discuss a certain number of apparently impossible things, and also some apparently non-existing things. But, in all cases, we will attempt to solve the problem of what lies behind them. For example, try to solve the following problem: Take 6 sticks of equal size and, without breaking them, make 4 equilateral triangles; that is, 4 triangles with 3 equal sides, each of which is equal to a single stick. The solution to this problem depends entirely on the level of dimensionality. The problem is not solvable unless you are capable of changing dimensionality, or MANIFOLD. What is not solvable in one MANIFOLD, becomes perfectly solvable in another MANIFOLD.

Well, let us see if we can shed some more light on this subject by using the transforming power of reason. In his view of the Universe, PLATO states that things are not self- evident, in and of themselves, but are created by reflexive circular action. His crucial HYGHER HYPOTHESIS is based on the fact that MAN IS CREATED IN THE IMAGE OF GOD. From this HYGHER HYPOTHESIS, he derived in his TIMAEUS dialogue, a proportionality that said:

"... God created and bestowed vision upon us so that we, contemplating the orbits of intelligence in the heavens, might put them to use by applying them to the

orbits of our reason, which are related to them…" Plato The Timaeus. 47 b.

In other words, your conception of geometry will be a reflection of your conception of GOD, man, and the universe as a whole. It is that SENSE OF PROPORTIONALITY, given as a potential by GOD, which enables man to change from a lower geometry to a higher geometry, ANTI-ENTROPICALLY, as LYNDON H. LAROUCHE Jr. has emphasized in so many of his writings. However, that COGNITIVE CAPABILITY requires a lot of work, as PLATO himself indicated in his Letter VII to DION. It is only after a long period of companionship, committed to the GOOD, that is, committed to bringing prisoners out of the CAVE, that one can acquire a true SENSE OF PROPORTIONALITY.

SOLUTION TO THE SIX STICKS PUZZLE
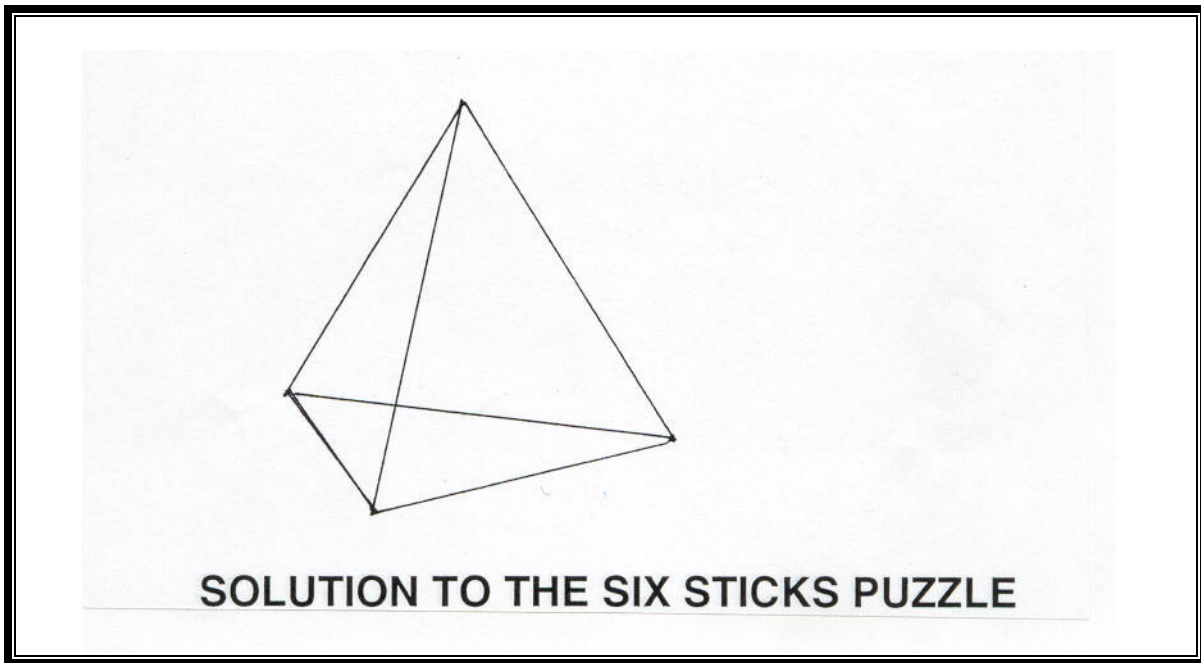
FIGURE 10.

If you try to solve this puzzle by laying the six sticks flatly onto the two-dimensional plane, the problem becomes unsolvable. However, if you raise the sticks into the third dimension, you solve the problem by creating a TETRAHEDRON that is made of four equilateral triangles.

Pierre Beaudry, Leesburg, August 2, 2001.

PART I
GEOMETRIC CONSTRUCTION BY SIMPLE CIRCULAR ACTION

FIGURE 11.
PANTAGRUEL ARRIVING IN LANTERNLAND

1- THE REVOLUTIONS OF LANTERNLAND ARE NOT ACCOMPLISHED BY SLAUGHTER, BUT BY LAUGHTER.

During the summer of 2001, I was invited to give a class of Geometry to a group of children, aged 10 and 11. I thought that the best way to begin initiating the children to this important science was to introduce them to PLATO'S CAVE, and to the issue of the TRUTH ABOUT WHAT YOU SEE, and how to discover what lies BEHIND WHAT YOU SEE. The challenge was very exciting and very new for me, since I had not taught children of that age in a long time. I spent quite a number of hours with the MIDNIGHT-OILERS, Francois Rabelais' studious friends from the Island of LANTERNLAND, and sought the wise council of EPISTEMON and of PANTAGRUEL.

In LANTERLAND, the MIDNIGHT OILERS start by posing a paradox. They ask, for example: "how do you generate a straight line with circular action alone?" This sounds impossible because your eyes tell you differently. It seems impossible for your eyes, but not for your mind. The straight line and the circle line are two separate species of lines, yet, the same NON-LINEAR ACTION produces the two of them. A first circular action produces a circle, not a straight line. But, what about a second circular action upon the first one? What does that do? What happens when you fold the circle on itself? You create a diameter, or a straight line! And, when you fold the circle a third time, on itself, you generate the center point! You see, the straight line and the center point are created by a double and a triple self-reflective circular action. In other words, points, lines, and solids, are sub-species of circular action that come from Sphaerics. They don't exist as self-evident things, in and of themselves. THEY ARE ALL SHADOWS BORN OF CIRCULAR ACTION. Now, do you see the difference? If yes, then you see with your MIND'S EYE, not with your physical eyes.

Now, when you only believe in what you see, you become like the prisoners in the bottom of PLATO'S CAVE who are made to believe they cannot turn around and discover the LIGHT OF REASON, which shines outside of the cave. They do not realize that the flat and linear shadows they see on the dimly lighted wall of the cave are mere illusions, deformations of the real world that lies outside of the cave. Our job, as human beings, is to bring those poor prisoners out for some fresh air, and a little bit of sunlight, and help them clean out the cobwebs they have in their attics. So, let us examine the first challenge that strikes you upon landing in LANTERNLAND.

DO YOU ONLY BELIEVE WHAT YOUR SENSES TELL YOU?

In my first class, some of the children, did not believe a word I said, when I told them that I had just returned from a long trip to the Island of LANTERNLAND, and had paid a visit there to PLATO'S CAVE.

They thought I was making this up to fool them. So, I must repeat here what I told them then. I must tell you the whole truth. LANTERNLAND and PLATO'S CAVE are more real than the physical place they thought I did not go to. And, the reason it is more real, is because that very special place is part of the NOOSPHERE, that is, the VERNADSKI sphere of thinking humanity, which makes you think about the INTENTION behind things. And, that is the most important thing in the world to discover. Again, as EPISTEMON put it: "ALWAYS PAY ATTENTION TO THE INTENTION!"

Let me explain. Sometimes, what is unbelievable is more true than what you hear with your own ears, and what you see with your own eyes. DO YOU ONLY BELIEVE WHAT YOUR SENSES TELL YOU? Well then, let me tell you what happened to me when our ship was approaching the Island of LANTERNLAND, and you will see what I mean.

After four days of voyage, the sea was very calm, the air was dry and clear, and the night was absolutely pitch black. It was so dark that you could not even see your own nose in front of you. On the bow side, a sailor cried out: AHOY! AHOY! Everybody rushed to see what was happening. The ship tilted, and we saw in front of it hundreds of tiny little flashing lights. PING, PING, PING, PING, everywhere.

The sailor said these were FLICKERING FISH TONGUES, that produce when the fish jump out of the water. PANURGE chimed in and said: "no way, this is nonsense. These are BIRD'S EYES reflecting off of the light of the ship's lamp. We have just finished eating our meal, and they are coming over to eat the crumbs." My giant friend, PANTAGRUEL disagreed completely with the other two and said: "These are distant WATCHLIGHTS. We are approaching the Island of LANTERNLAND. "

Then, somebody asked me: "what do you think this is?" "I don't know," I replied. I thought PANTAGRUEL was right, because I thought he made more sense than the others. After all, we did expect to touch land soon.

A few minutes later, I saw what seemed to be a large fire on the water. "LAND! " Yelled the sailor. "LAND!" PANTAGRUEL had been

absolutely right about the WATCHLIGHTS, I thought to myself. We had arrived in the port of LANTERNLAND, in the middle of the night. A group of MIDNIGHT OILERS were waiting for us there, and greeted us with their LANTERNS. We were asked to choose a LANTERN to be our guide.

FIGURE 12.
EPISTEMON THE MIDNIGHT OILER

A tall and slim MIDNIGHT OILER, who introduced himself as EPISTEMON, explained to us that these LANTERNS were all shaped in the form of SPHERES, PLATONIC SOLIDS, and ARCHIMEDEAN SOLIDS, etc. Their corners and their edges were all lit up to show how points and lines are the footprints of SPHERICAL ACTION that GOD used to create all of the elements of the universe. "As the stars in the heavenly sphere guide the sailor in the night," he said, "so do these LANTERNS guide the moral and studious person through the obscurity of our times. They point to DIVINE REASON and to the PRINCIPLE OF SPHERICAL COMPOSITION that

everyone here is seeking to discover. However, none of those LANTERNS contain any truth about life, about justice, or about love of Mankind," he added. "They just contain enough oil in them to lead you to the edge of these important questions."

"You see," said EPISTEMON, "this means that EUCLIDEAN GEOMETRY does not give you the truth about the physical universe; only clues that you must seek to discover by studying those LANTERNS. That is why you would be wise to spend a few hours, and burn a little bit of midnight oil, with our studious people."
EPISTEMON, THE MIDNIGHT OILER.

After listening to a lot of these heavy ideas, I concluded that I could no longer trust my eyes to tell me the truth. What everyone saw in the distance were, in fact, the false impressions of the LANTERNS of LANTERNLAND. They were not merely WATCHLIGHTS marking the land for the safe piloting of sailors. There was a higher purpose to be discovered in the INTENTION that lay hidden behind the spherical construction of the LANTERNS. "That is absolutely right," said EPISTEMON, "and what you don't see with your PHYSICAL EYES, you must now aim to discover with your MIND'S EYE."--"BULL'S EYE," cried out PANURGE, "right on the nose of mind over matter."

2- WHERE DO LINES AND POINTS COME FROM?

Aristotle's construction originated from Flatland.

A straight line is an infinity
of points joined together   ....
in the same direction.

Figure 13.

Result

> Lines and points are not created, but are given to you, as the smallest obvious things that can be perceived by the senses; that is, by your physical eyes. This is called LEARNING.

Plato's construction originated from his CAVE in LANTERNLAND.
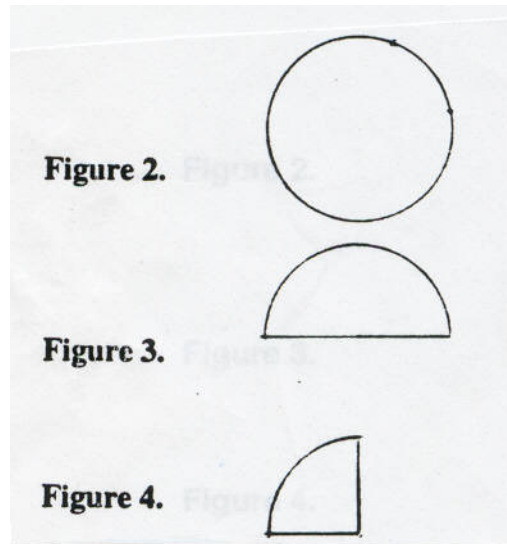
FIGURE 14.

1. Create a first circular action that closes perfectly on itself. This action creates a circle.

2. Create a second circular action that closes the circle perfectly on Itself again. This creates a diameter.

3. Create a third circular action that closes the half circle perfectly on itself. This creates a point.

Result

Here you see how points and lines are actually created; that is, where they come from, because you have generated them! Now, you see with your MIND'S EYE. That is called COGNITION.

3- HOW THE LEAST ACTION PATHWAY OF LANTERNLAND WAS DISCOVERED BY WAY OF A CONTEST.

PROBLEM

On the Island of LANTERNLAND, there are three villages called Fig, Fa, and Fu. One fine day, the people living there decided to have a contest, and offered a prize to whomever would find the most economical road system that would link the three villages together; that is, find the shortest interconnected pathway between them.

One man said that the best way would be to make the roads in the shape of a triangle, and he proposed to connect the three villages with three straight lines.

A second man said that was wrong, and that the solution was to make curved roads, connecting the three villages with circular arcs.

A third man said that the two first ideas were wrong, and he proposed to have straight lines between the three villages, but connected through their common center.

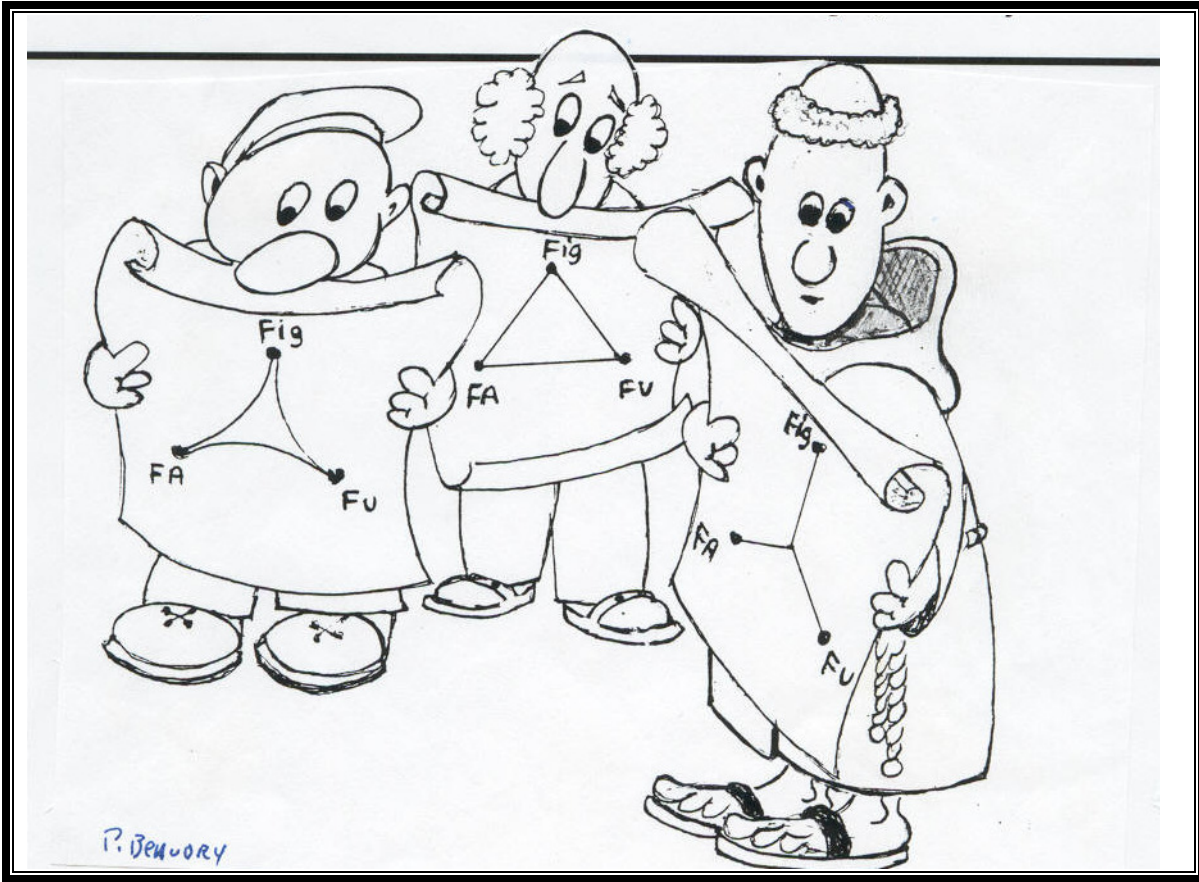Can you decide which of the three men was right, and why?

FIGURE 15.
WHICH IS THE LEAST ACTION PATHWAY?

THE ANSWER OF FRIAR PACIOLI.

FIGURE 16.

It was the third man, who gave the correct answer. This is the great Italian Renaissance man, **FRIAR LUCA PACIOLI**, who showed that the most economical distance between the three villages must be determined by the natural angle of 120 degrees. Why? Because this is the favorite angle that nature chooses to produce what is called **LEAST ACTION PATHWAYS of NON-LIVING PROCESSES.** This is the angle chosen by soap bubbles when they stick together. The great astronomer Johannes Kepler discovered that this was also the favorite shape of the snowflake, and of a lot of crystals, like quartz and garnets; and that bees constructed their beehives in the same 120-degree angle. This is also known as 6 sided close packing; that is, when hexagons come together without leaving any space between them. All of these natural forms are created by a preordered **INTENTION of CIRCULAR ACTION,** which GOD has chosen to determine as the basis for three of the **FIVE PLATONIC SOLIDS**. Do you know which ones they are?

4- HOW TO USE YOUR COMPASS AND DIVIDER AND CONSTRUCT A HEXAGON INSIDE OF A CIRCLE.

How to use your instruments.

Use of the compass.

a. The needle point of the compass must be firmly set.

b. Extend a sharp pencil lead a little less than the needle point.

c. To draw a circle, guide the position of the needle with your left hand, then raise the fingers of your right hand to the handle and draw the circle in one rotation.

d. Roll the compass with your forefinger and thumb only.

e. As the circles get larger, incline the compass slightly in the direction of the rotating motion.
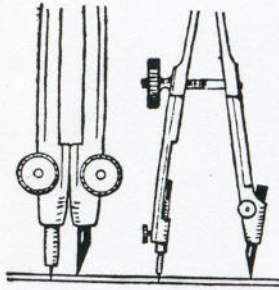
Thomas E. French

Figure 5.

Figure 6.
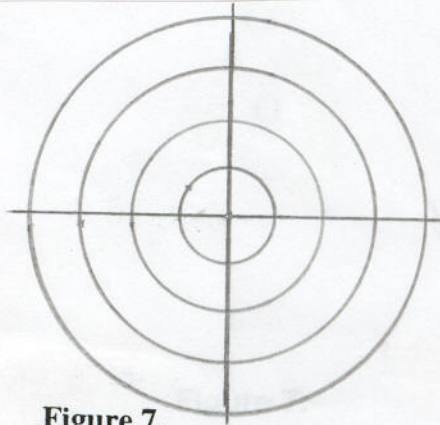
Figure 7.

FIGURE 17.

Construction

1. **Construct two diameters by folding a sheet of paper twice on itself. Trace the two lines with a pencil.**

2   **Place your compass at the intersection of the two diameters, and draw a series of 4 equally spaced concentric circles.**

3.   **You must always start with the smallest circle whose radius will determine the size of the other circles.**

Use of the divider
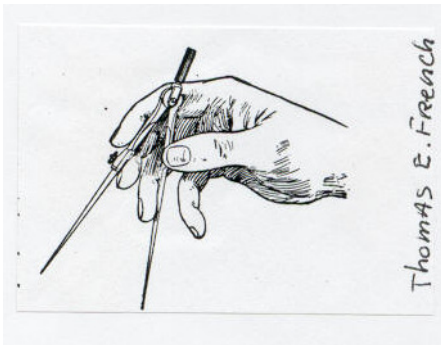
FIGURE 18
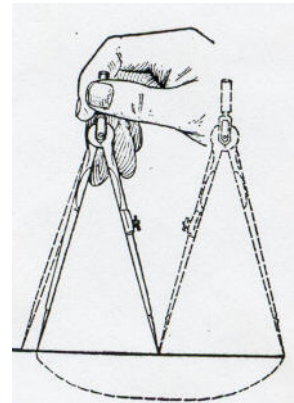
FIGURE 19

1. **Only four fingers of your hand, not your pinky, are required to use the divider.**

2. **Open the divider with one hand only, holding it between your forefinger and your thumb.**

3. **Use your second and third fingers to open and close the divider into any position you want.**

4. **For small divisions, slip the second and third fingers gradually out of position.**

5. The divider is used for dividing lines into equal parts, or to measure lines.

6. Knowing how to use the divider is essential for all sorts of constructions.

7. To measure lines, or to divide, hold the handle between your thumb and forefinger. Do not lean on the arms.

8. To divide a line in half, that is, to bisect a line, eyeball the mid-point, and set one arm in that position. Lift the other arm and rotate the divider to the other end. Reduce the excess, or the shortfall, by estimating the half or the remaining part, one more time.

Problem

How to construct your own instruments by circular action, and create an equilateral triangle, and scalene triangles of 30, 60, and 90 degrees.

Construction.

1. Fold a sheet of paper in half lengthwise, and mark the corners 1, 2, 4, 5.
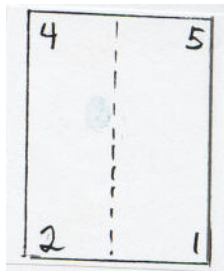
FIGURE 20.

2. **Rotate corner No. 1 onto the middle-fold. Mark point 3, and press the fold.**
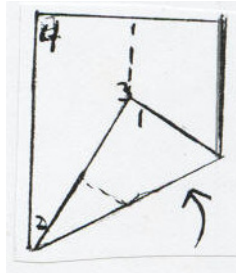
FIGURE 21.

3. **Fold No. 4 over the edge of No. 2 and No. 3.**
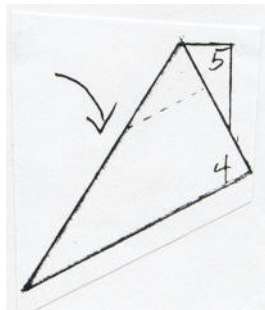
FIGURE 22.

4. **Open the sheet of paper and trace the folded lines with a pencil.**
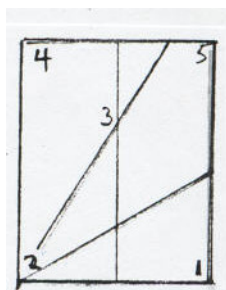
FIGURE 23.

5. **Rotate No.2 onto No. 3, and fold.**
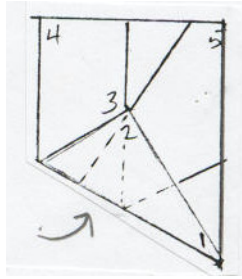
FIGURE 24.

6. **Fold No. 5 over the edge of No. 1 and No. 2.**
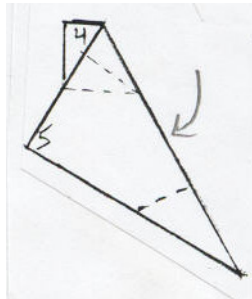
FIGURE 25.

7. **Open the sheet of paper and behold: you have created an equilateral triangle composed of 6 scalene triangles of 30, 60, and 90 degrees. Plato would like that. Trace the remaining lines with a pencil, and cut off the excess paper. Trace this outline on a piece of cardboard, and cut it in half.**
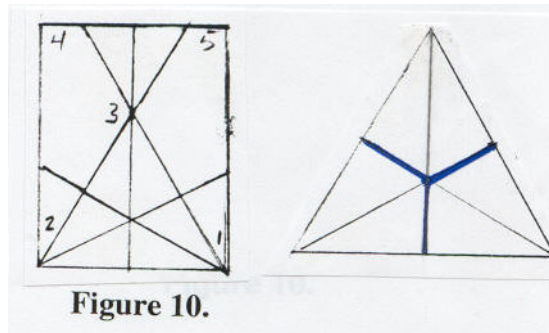
Figure 10.

FIGURE 26.

8. **Use the two scalene triangles to create angles of 30, 60, 90, and 120 degrees.**
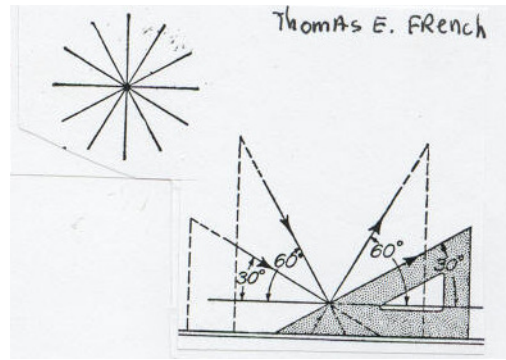
FIGURE 27.

CONSTRUCT THE HEXAGON INSIDE OF A CIRCLE

Instruments

1. A compass.

2. A set of two 30, 60, and 90 degree scalene triangles.
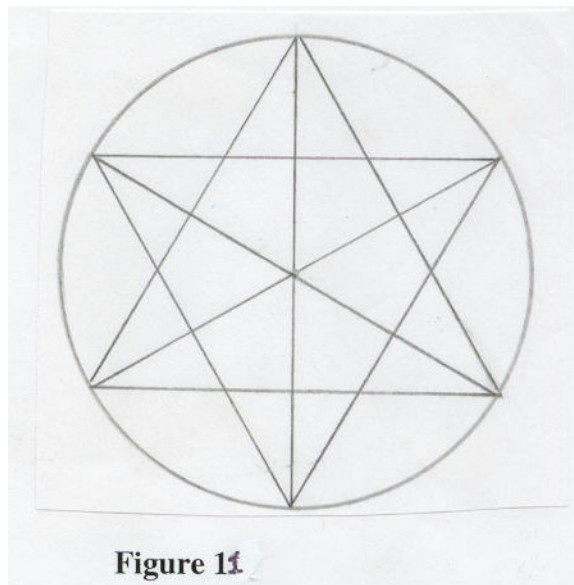
Figure 11

FIGURE 28.

Construction

1. Draw a circle with a 4" diameter.

2. Draw a six-pointed star inside of a circle by making six successive changes of position of the scalene triangles, one after another.

How nature finds the shortest pathway

Figure 12
Soap bubbles

Figure 13
Crystals

Hexagonal System has three equal axes at 120° angles arranged in one plane and one more axis of a different length at right angles to these, as in quartz, beryl, calcite, tourmaline, and cinnabar.

QUARTZ   CALCITE

Figure 14
Snow flakes
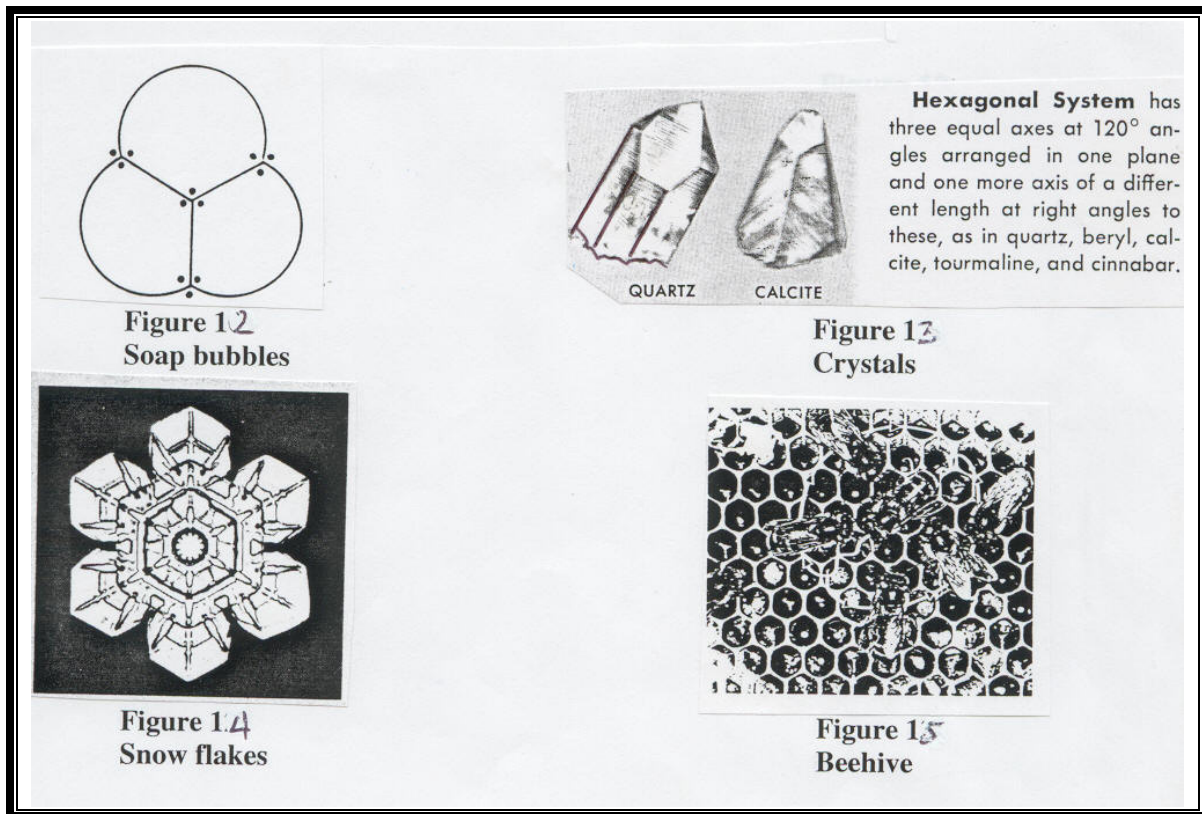
Figure 15
Beehive

FIGURE 29.

5- CAN BEES MAKE CREATIVE DISCOVERIES?
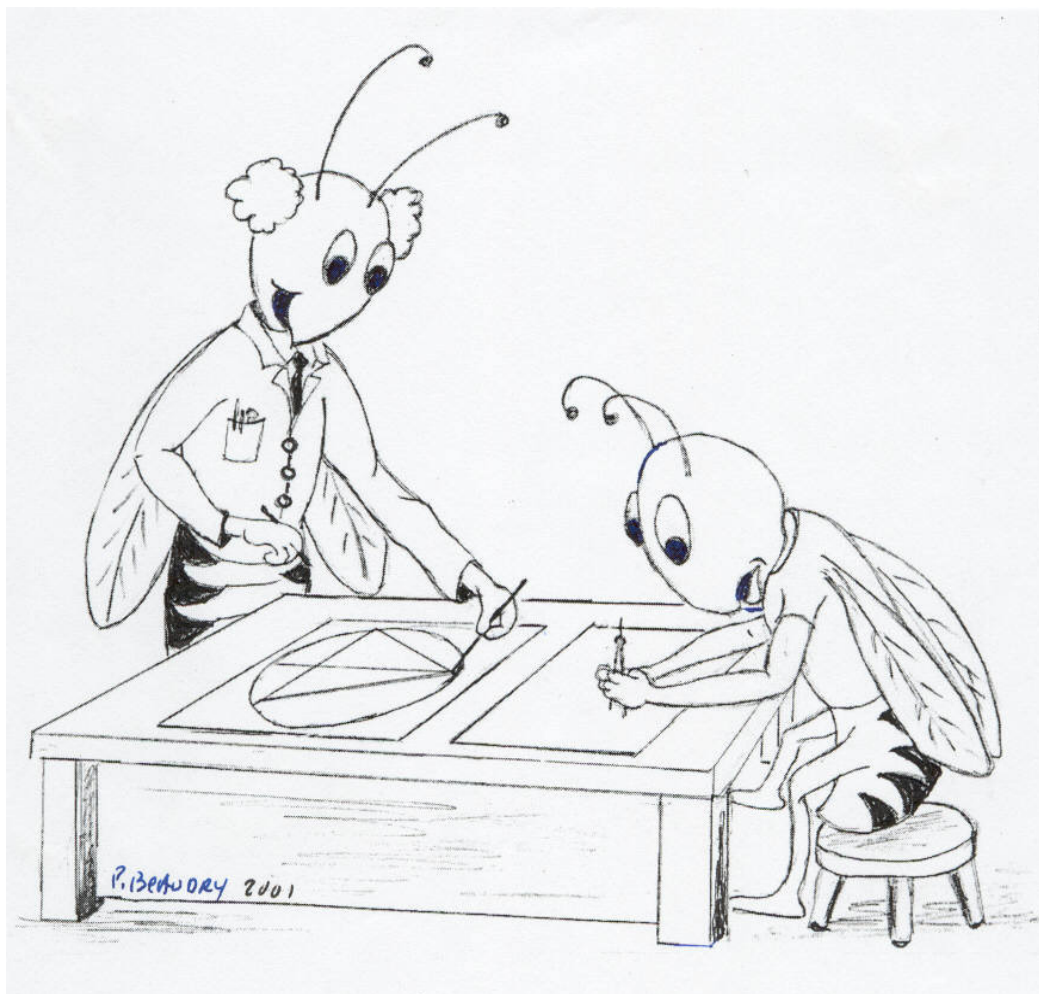
FIGURE 30.

Some people say that honeybee workers are like Platonic thinkers: they use circular action patterns to announce where their ideas are located, and how to discover them. If you have a chance to observe honeybees closely, you will discover that, in order to communicate with other bees, one of them performs two kinds of circular dances.

When flowers are discovered to be closer than about 100 yards from the beehive, the dancer bee will perform a CIRCULAR DANCE. The change of direction of the dance gives the orientation for the newly found discovery.

CIRCULAR DANCE   DIAMETER DANCE
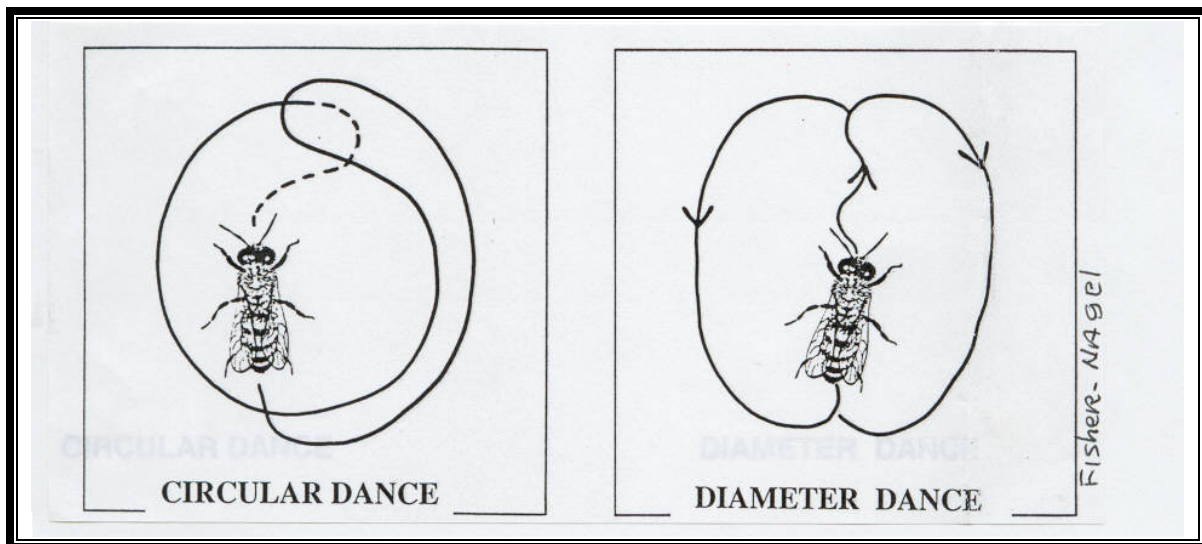
FIGURE 31.

If flowers are discovered further away than 100 yards from the honeycomb, the dancer bee will communicate the location of the find by doubling the dancing within the circle. It will divide the circle in half, and do a DIAMETER DANCE, which will double the circular action. The diameter tells the other bees at what angle the food source is located in the BIOSPHERE. This method can be very accurate up to several miles.

Such an amazing CIRCULAR ACTION LANGUAGE is a beautiful example of what PLATO called HYLOZOIC MONISM; that is, how the universe as a whole is alive, and is determined by a unique law of underlying multiply connected circular action. The communication between honeybees, and the orientation of their INTENTION, is a clear reflection of the existence of a single harmonic ordering principle in the universe as a whole, and provides us with a special case of cognition located at the frontier of the NON-LIVING, the LIVING, and the COGNITIVE.

Is this, in the minds of the bees, the reenactment of a discovery, and the communication of a universal principle that is transmitted to the other bees? Does this mean that honeybees can think like you; that is, can make cognitive discoveries? What is a COGNITIVE DISCOVERY?

CAN BEES MAKE AXIOMATIC CHANGES?

Think about this. Can a bee change her mind and decide to do something else besides making honey and hexagons? Can a human being change his mind and decide to break with his pattern of habits? If you can understand the difference between those two questions, you have made a COGNITIVE DISCOVERY.

Think again. Can a bee make such a distinction? No. Why not? Because, bees are not capable of making profound changes in their lives; that is, they cannot make AXIOMATIC CHANGES. You see, an AXIOMATIC CHANGE occurs when you take an AXE, and chop off the bad habits in your life. Now, a bee cannot do that because she does not have bad habits.

Besides, have you ever seen a bee with an AXE TO GRIND? *

Bees will always follow the same laws of the universe, because GOD gave them only good habits. Bees cannot change their patterns of good behavior. You will never hear a bee saying: "Well, bzzzzzzzzz, I am tired of making honey. From now on, bzzzz bzzzz bzzzz, I think I am going to make strawberry jam." In fact, if she said that, she would be told to buzz off immediately, and she would be forced to leave the beehive forever. She simply could not do it. And besides, her jam would taste absolutely awful.

On the other hand, human beings are capable of making fundamental changes in their behavior. For example, you can say to yourself: " Instead of being distracted and noisy in class today, I am going to be quiet and pay attention." Now, I grant you, that might represent a MIRACULOUS CHANGE for some of you, but you could do it, if you wanted to! That is my point. That would be an AXIOMATIC CHANGE. And, that is what makes human beings uniquely superior to all other creatures, and loving to them. Such is a COGNITIVE DISCOVERY. With such discoveries, human beings are capable of changing the whole universe; that is, if they want to!

* The Lanternland AXIOM OF TRUTH says in LANTERNSPEAK:

• ⌐ ◂ • ⫽ • ✔ ? ✔ ● ✔ ⟍ ⌐ ▲ ⫽ ■ ✕ • ● ⌐

Translated into American English, this means:
"He who has an axe to grind has got to change his mind."

WHAT IS BEHIND THE FAMILIAR FACES
OF THE HONEYCOMB?

THE BEEHIVE AND THE ART OF SIX-CORNERED-PACKING.

What is in the intimate recess of the bee's soul that makes her prefer the six-corner packing? What purpose did GOD have in providing the honeycomb with a hexagonal architecture? In his investigation, KEPLER found four main reasons.

1. Only three plane surfaces can cover a surface without gaps: the triangle, the square and the hexagon. Among those three, it is the hexagon that is the roomiest, and can contain the maximum amount of honey.
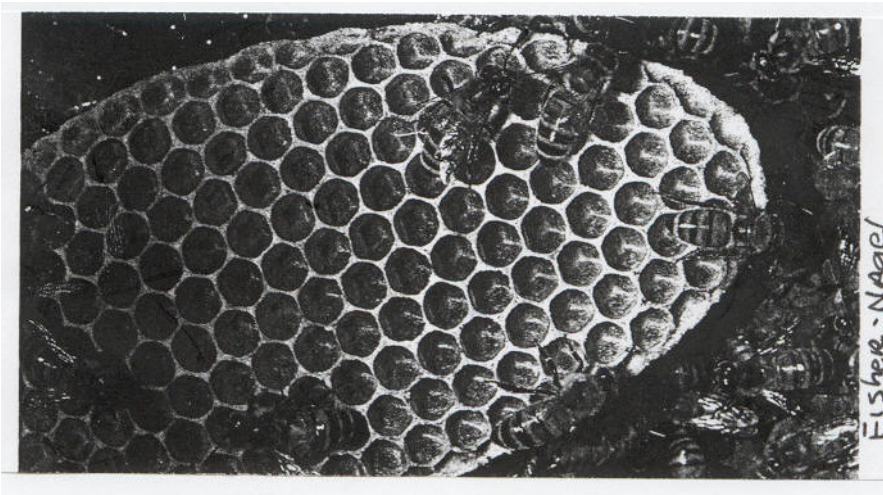
FIGURE 32.

2. The tender bodies of the bees are more comfortable with more obtuse angles. The square has deeper corner recess. With its acute angles, the triangle is even more uncomfortable, and the bee toes would get squished. That is not ideal, that is an ordeal. Note that the hexagon SEEMS to be closer to the circle than the triangle, and the square.
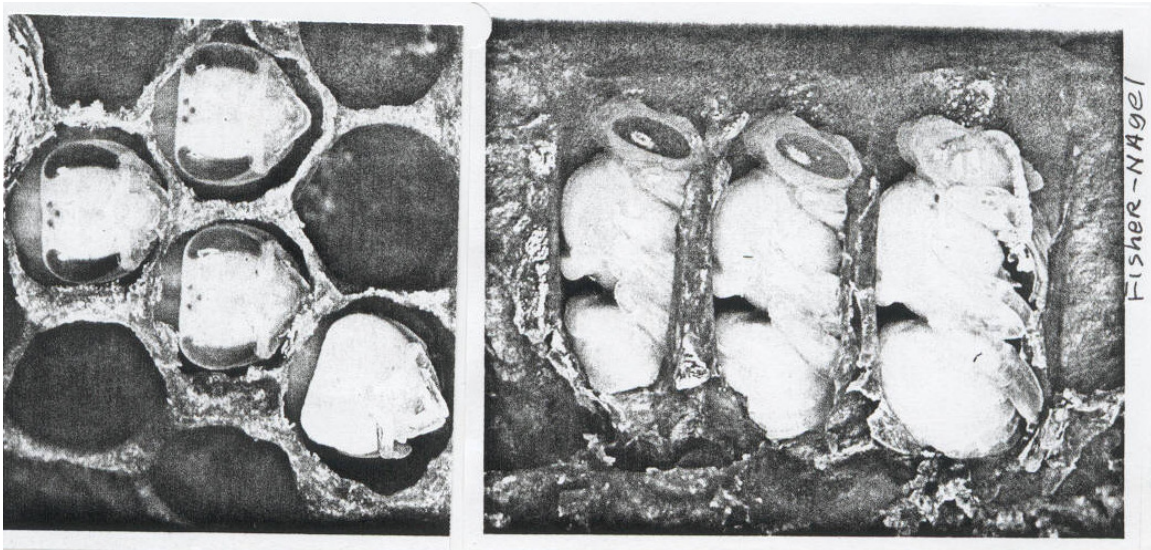
FIGURE 33.

3. The hexagonal shape saves labor and area. There is no room to spare, and the stability of the frame is stronger by the introduction of the rhomboid shape ◊ of 120 degrees. Round shapes would leave gaps through which cold air would seep in between the cells. The hexagonal shape is self-insulating.
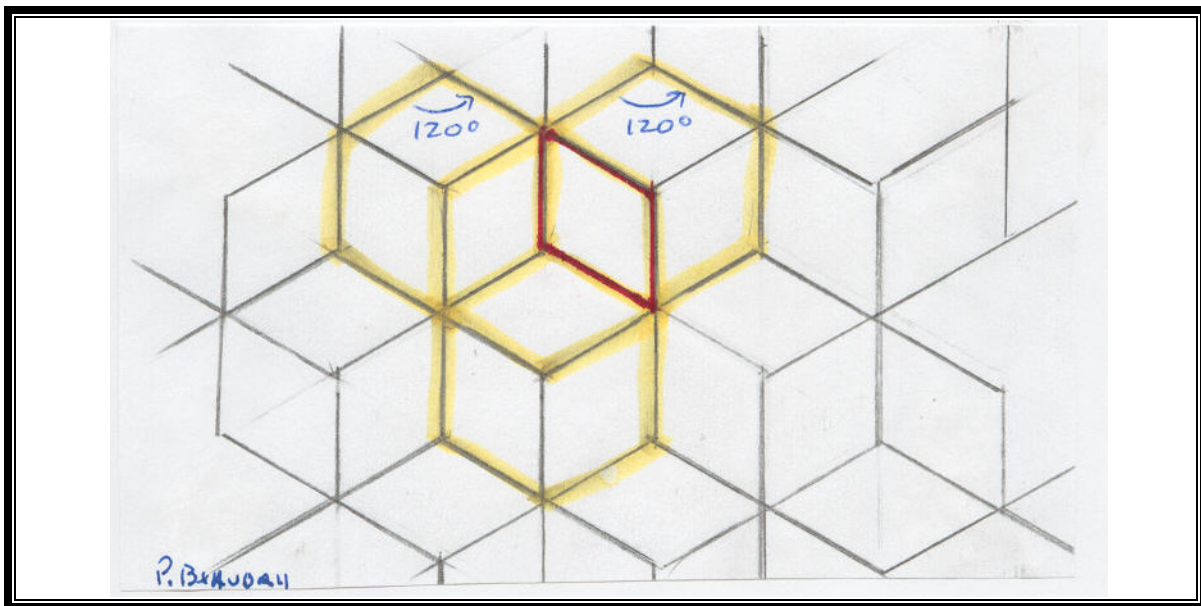
FIGURE 34.

4. **Perfection, beauty, and community represent the qualities of soul that orient the bee to prefer the physical geometry of hexagonal and rhomboid shapes. Bees are very social, and like human beings, they love to have a lot of neighbors. Can you locate in illustration 3 and 4, how a bee manages to get 9 neighbors? Between you and me, it is a good thing that bees all go to bed at the same time at night. Don't you think?**
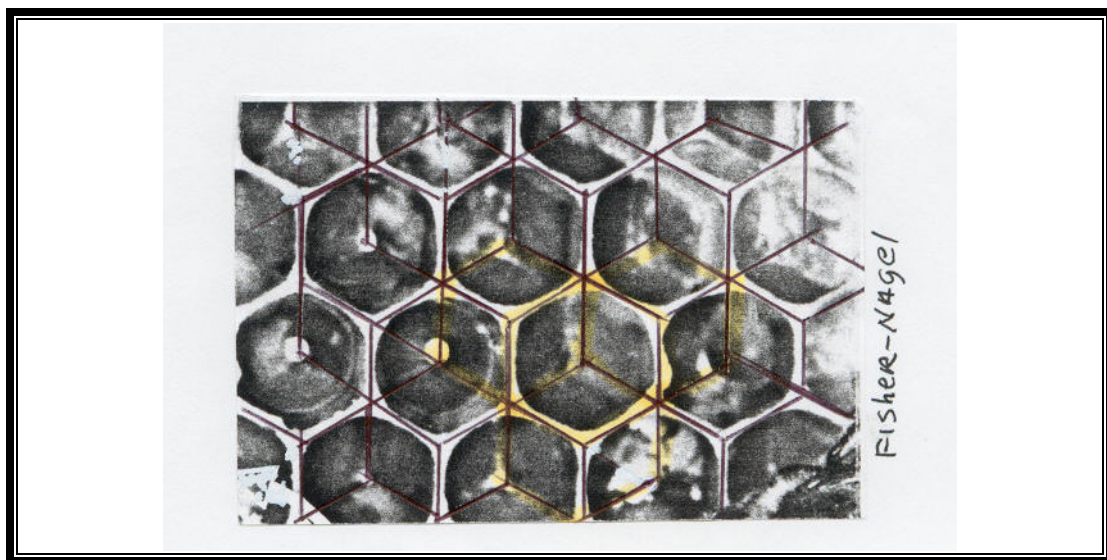
FIGURE 35.

THE SPHERICAL PRINCIPLE
BEHIND HEXAGONAL CLOSE-PACKING
PROBLEM

Inside of a honeycomb, each bee shares not only 6 walls with 6 other bees, in the same row, but also shares 3 planes in the bottom of the cell, with 3 other bees in the second row. Thus, each bee has 9 neighbors. If the cells were covered all around, each bee would have 12 neighbors! Do you know which platonic solids are formed by close-packing of 12 balls of the same size?

DEMONSTRATION.

Take an empty box and drop into it, pele mele, more than a dozen balls of the same size. Shake the box from side to side, and watch how the balls will pack together in a single row.
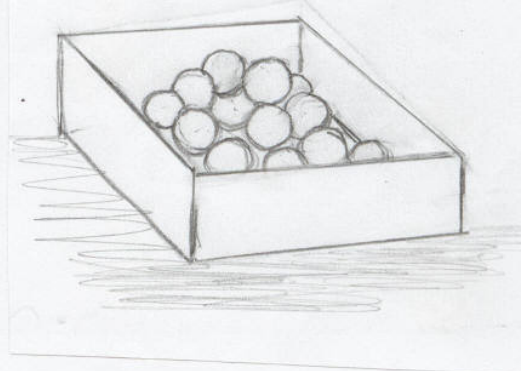
CLOSE-PACKING OF SPHERES
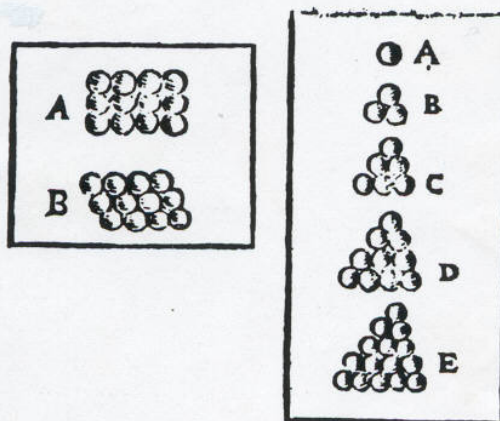
FIGURE 36.

PART II: HOW TO CHANGE THE AXIOMS OF FLATLAND.
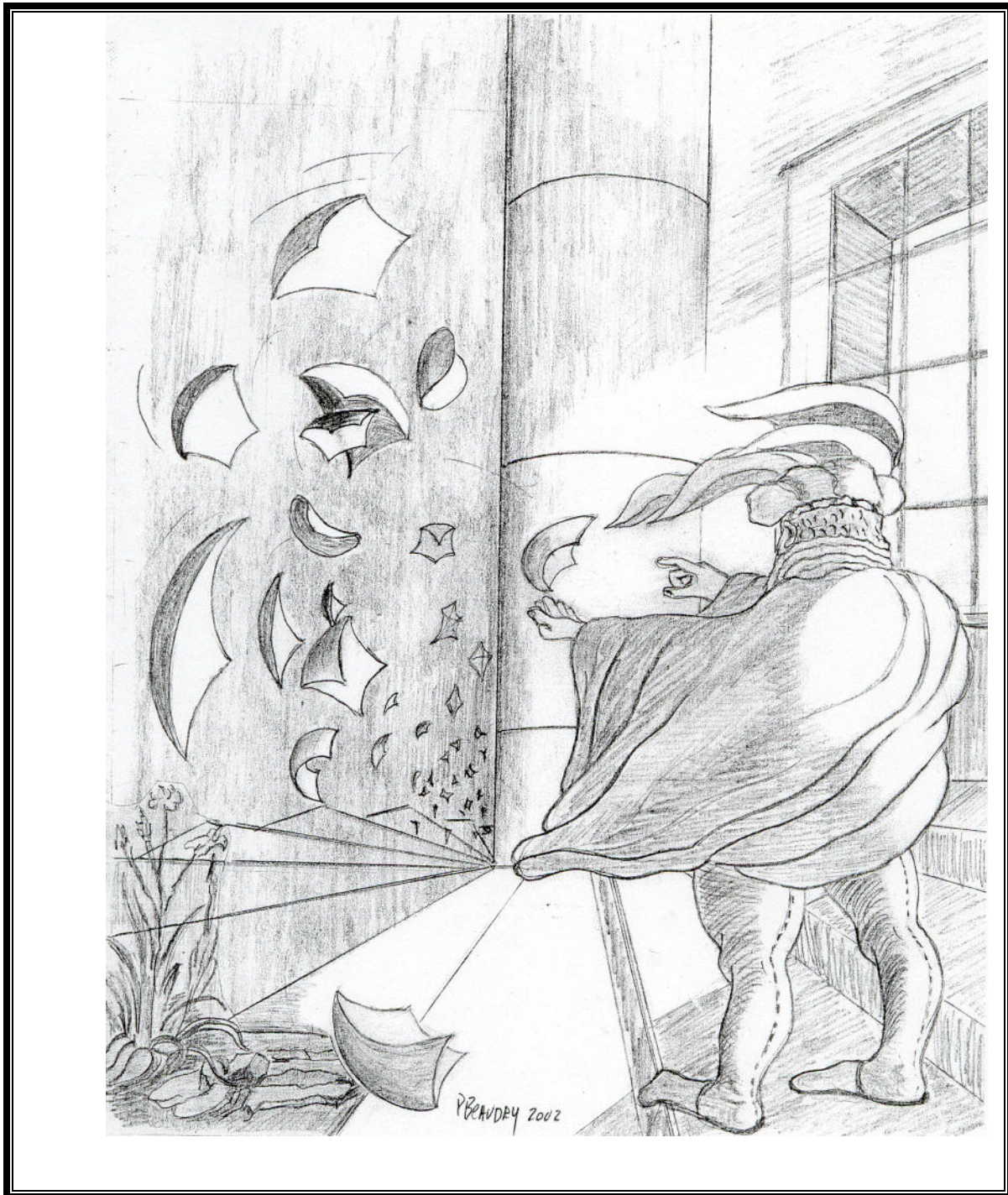
FIGURE 37.

    "They had obviously won their revolution since the POLYGONS **and the** CIRCLES **were all very flexible, and were standing uptight on their edges, making all sorts of somersaults and circular gestures, as they were coming out of the cave."**

6- HOW PANTAGRUEL BUSTED THE AXIOMS OF THE FLATLAND SQUARE AND BROUGHT HIM SAFELY OUT OF PLATO'S CAVE.

The day after we had arrived in **LANTERNLAND,** and I swear to you that the **MIDNIGHT OILERS** are the most extraordinary people in the whole world, our guests invited us to diner. They live only on ideas. They drink nothing and they eat nothing but ideas. And the IDEAS they eat and drink are not just any old idea that you can pick up along the roadway. Oh no. They are AXIOM BUSTING IDEAS. And that is because of PLATO'S CAVE, which is located there. So, by late morning I came across PANTAGRUEL and we were brought to visit the cave and to meet with its inhabitants. At the entrance of the cave, there was an impressive inscription engraved in capital letters:

EVERYBODY MUST OBEY THE LAW OF CHANGE:
DESTINY LEADS THE WILLING, BUT THE UNWILLING DRAGS.

We entered and made our way down through a lot of steps, and through a long and wide landing space. In the deepest recess of the cave, we found the **FLATLANDERS**, all staring at the back wall, and attempting to make sense of the deformed images that were projected there from the source of light that came from outside of the cave. They were like a bunch of kids watching TV, and believing that what was on the screen represented the real world.

"What are you looking at," asked **PANTAGRUEL**?

"We are studying the lines, "replied the **SQUARE**. " We are trying to make sense of what we see. Imagine a vast sheet of paper on which straight Lines, Triangles, Squares, Pentagons, Hexagons, and other figures, instead of remaining fixed in their places, moved freely about, on or in the surface, but without the power of rising above or sinking below it, very much like shadows – only hard and with luminous edges – and you will then have a pretty correct notion of my country and countrymen. Alas, a few years ago, I should have said 'my universe': but now my mind has been opened to higher views of things."

"Oh yeah," responded **PANTAGRUEL**, "open to what? You are only seeing illusions on this wall. If you want to have 'a higher view of things,' as you say, you must break your chains, and come outside of the cave with me, to discover the source of your illusions."

"Oh no," replied the square, "in such a country, you will perceive at once that it is impossible that there should be anything of what you call a 'solid' kind; but I dare say you will suppose that we could at least distinguish by sight the Triangles, Squares, and other figures, moving about as I have described them. On the contrary, we could see nothing of the kind, not at least so as to distinguish one figure from another. Nothing was visible, nor could be visible, to us, except Straight Lines; and the necessity of this I will speedily demonstrate…"

"But, wait," said PANTAGRUEL, "why do you insist that you can only distinguish things with your physical eyes? Is your mind only capable of apprehending what is given to your senses, and nothing else?"

"Absolutely," replied the SQUARE. "As my great ancestor, the GREAT SQUARE ARISTOTLE, once said: 'There is nothing in your mind that has not first been registered through your senses.'

"But, if this is true," said PANTAGRUEL, "What about ideas?"

"All ideas come from your senses," replied the SQUARE. "There is nothing else."

"Boy! This guy is in real trouble," thought PENTAGRUEL to himself. "A real brainwashing job has been done on him. I've got to help him out." As quickly as he could say "Come on," PANTAGRUEL grabbed the SQUARE by the right angle, and peeled him off from the flat plane.

"Hey!" screamed the SQUARE, "you can't do that. I am only a two-dimensional being. I can't go flying into the third dimension like that!"

"Oh no?" said PANTAGRUEL, "You just watch! How do you think you were created in the first place?" Then, PANTAGRUEL swung the SQUARE round and round gently in the air until he became flexible enough to go outside of the cave.

"Now!" said PANTAGRUEL, "bend in half."

"I can't do that. That is impossible," said the SQUARE.

"Yes you can do it," said PANTAGRUEL, "you can bend in half because this is how you were created in the first place, and you don't even remember it."

"But I always thought I had been created by two points at the end of a moving straight line," replied the SQUARE in a state of perplexity."

"That is nonsense," said PANTAGRUEL, you were created by CIRCULAR ACTION."

After many attempts in which the SQUARE was fighting his backward linear tendencies, all of a sudden, as if with no effort at all, the SQUARE bent completely on himself, from corner to corner.

"Hey, I have done it!" said the SQUARE with wonder. "This is very exciting. I never thought I could do gymnastics like this before."

"This is not gymnastics," replied PANTAGRUEL, "this is CIRCULAR ACTION THINKING."

The SQUARE was so happy; he could barely stay in one position. "This is fantastic," he said. "Let me do the other two corners." And then, he bent down on the other side of himself at a right angle to himself, and he folded the two corners flat on each other without any help. "What a discovery," said the SQUARE. "I can make right angles, and 45 degree angles, everywhere, in all directions, backward and forward, just by folding on myself. And that generates lines and points." This was almost too much for the SQUARE to endure.

"You see," said PANTAGRUEL laughing, "you have discovered the IDEA OF CIRCULAR ACTION. You don't see it with your physical eyes, but you see with your MIND'S EYE that the results appear in the shadows of the lines and of the points that you generate by folding and unfolding yourself." The SQUARE was so ecstatic that he never wanted to go back into PLATO'S CAVE again. After a moment, he calmed down, and smiled.

"Wow!" said the SQUARE, "this feels real good."

"You are not 'feeling' good about this," said PANTAGRUEL, "You are 'thinking' good about it. You have now discovered your first true idea, a PLATONIC IDEA that did not come from your senses. And the IDEA is that ALL SQUARES ARE MADE IN THE IMAGE OF THEIR CREATOR; that is, they are all proportional to circular action, and to the circle! That is not just an IDEA, this is a REVOLUTIONARY IDEA. At some later date, I will show you how you could even transform yourself into a cube."
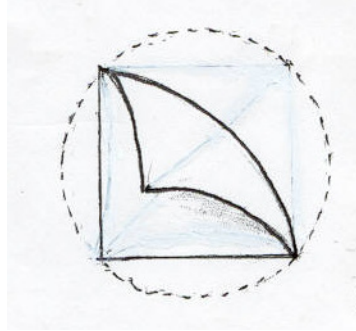
FIGURE 38.

Condition of the SQUARE in LANTERNLAND.

eye
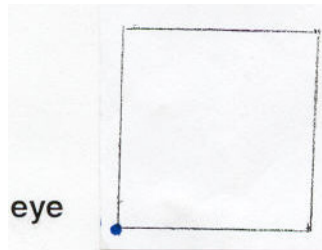
FIGURE 39.

Condition of the SQUARE in FLATLAND

"You see," said PANTAGRUEL, "You have been told lies all of your life, by the priesthood CIRCLES in FLATLAND who had a class interest in keeping you edgy, flat and under, and that is why you were never told you could FOLD. You have been treated like a mushroom. Do you know how to grow mushrooms," asked PANTAGRUEL?

"No." said the SQUARE.

"By keeping them in the dark and feeding them bull shit," replied PANTAGRUEL. "That is the condition all of your people and yourself have been in for too long. My dear SQUARE, you must now take leadership, and go back to free your people."

"But what if they don't want to follow me," asked the SQUARE, "I know my people very well, they are stubborn, very stubborn."

"I know," replied PANTAGRUEL, "I just discovered that myself. If you were able to discover the truth, so can they, and I will be there to help you."

Late that evening, everybody celebrated the SQUARE'S victory, by sharing the AGAPES in a great banquet; a FEAST OF IDEAS, that is, at the LANTERN INN.

7- HOW THE SQUARE FROM FLATLAND DISCOVERED THE WAY TO DOUBLE HIS SURFACE AREA IN SIZE WITH THE USE OF THE SOCRATIC METHOD.

After we had celebrated the victory of the SQUARE for his successful escape out of FLATLAND, we returned to PLATO'S CAVE, and PANTAGRUEL brought up for discussion, the discovery of PLATO'S famous problem of how to double the area of the square.

"I would surely like to know how to do that," said the SQUARE, but I am afraid that this is totally beyond my capabilities. You see, us polygons have been limited for a long time, while we lived in FLATLAND, and we were not even allowed to investigate where we came from. We were told that we could not change, and that we had to spend our entire life with the same predetermined size. That was the fixed rule, and it could never be changed. Also, we've gotten so used to the flatness of our figures, that we never even thought of exercising our minds, and discover that we came from CIRCULAR ACTION."

"That's quite all right," replied PANURGE, "I know a lot of people who never use their minds either. But, you can change that. Like YOGI BERRA said, "you don't have to be an intellectual to use your head.""

"Very well, then," said PANTAGRUEL, "listen carefully, and I will teach you the SOCRATIC METHOD of constructing your knowledge by yourself, and not with magic either. In the MENO dialogue of PLATO, SOCRATES demonstrated how a SLAVE BOY was able to make the discovery of doubling the area of a given square, with only the help of a few questions. This is how the problem was introduced:

"SOCRATES drew in the sand a square A,B,C,D, whose area is 4 square feet. This means that the side of the square is 2 feet.
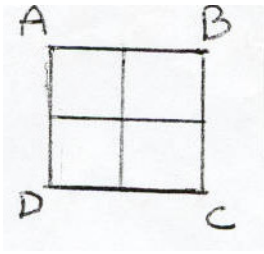
Figure 40.

"Then, SOCRATES asked the SLAVE BOY to determine another figure that would be double the size of the first one; that is, a square with an area of 8 square feet. What do you think the slave boy did?" asked PANTAGRUEL.

"I don't know," said the SQUARE, "What did he do?"

"The first thing the SLAVE BOY did," replied PANTAGRUEL, "was to think that in order for the second square to be double the SIZE of the first, he had to double the SIDES of the first square. What do you think of that?" Asked PANTAGRUEL.

"That sounds reasonable to me." Said PANURGE." I don't see any thing wrong with that. Besides I don't see anything else that can be doubled inside of Figure 40."

"I don't know," said the SQUARE, "maybe there is something else that can be doubled, but which is not visible to your physical eyes. Maybe we can only see it with our MIND'S EYE, like the case of CIRCULAR ACTION. Remember, it was only a few hours ago that I discovered I could fold in half."

"That is a very important thought," said PANTAGRUEL, "You are now PAYING ATTENTION TO THE INTENTION. Hold on to your thought, and we will get back to it, in due course. Meanwhile, let's first examine if the SLAVE BOY idea was right. The SLAVE BOY thought, and also you, PANURGE, that if you double the sides of the square all around, the new square will be such that each of the 4 sides will be made up of 4 feet. But then, the square will have an area of 16 square feet, and that is too big. Don't you think the square of 8 will have to be smaller that the square of 16 and also larger that the square of 4? Then SOCRATES drew the following square in the sand, with the following divisions."
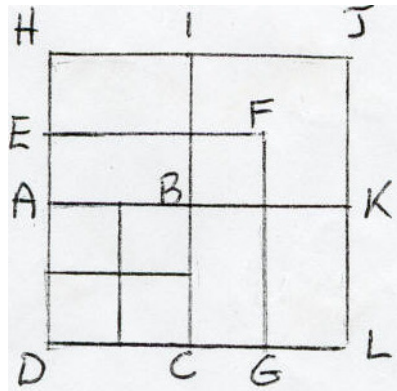
Figure 41.

"The SLAVE BOY realized his mistake," said PANTAGRUEL, " and began to think that since the side of the square of 8 had to be longer than 2, feet, and less than 4 feet, he would try the side of 3 feet. But, then," said PANTAGRUEL, "if the side is 3 feet, the area will be 9 square feet, which is still more than 8, as the square D,E,F,G, shows. How do you solve that dilemma?" Asked PANTAGRUEL.

"I know how to do it," said PANURGE, "boldly. Just divide the whole area of 16 into two equal parts. That will give you 8 little squares of 1 square feet each."

" Yes, but, how will you make my "SQUARE" figure out of those 8 little squares?" interrupted the SQUARE, "who seemed a bit annoyed at PANURGE'S suggestion."

" Just make a rectangle out of them," replied PANURGE. "It's the same thing?"

"No way!" replied the SQUARE. "You have a nerve. You can't just have any old rectangle replace a square, like that. Squares have four EQUAL sides," said the SQUARE, "that is our UNIQUENESS, our CHARACTERISTIC DISTINCTION, you know."

"Oh! I am sorry," said PANURGE, " I didn't mean to pull on your edges improperly."

"Well then, how do you solve the problem?" asked PANTAGRUEL. "One can see that the square of 8 would need to have a side a LITTLE LESS than 3 feet, and a LITTLE LONGER than 2 feet. In other words, somewhere

between 3 and 2, there must lie a side of a square whose area is 8, but it doesn't look like we are going to find it with this method of approximation. It seems like we might never find that side even by dividing at infinity. There would always be a little gap left over, no matter how small it may be, between the LESSER THAN and the LONGER THAN. So, how do you go about finding the exact side of the square of 8?" Asked again PANTAGRUEL.

"I just don't know," replied the SQUARE. "I have no idea," replied PANURGE.

"Then," said PANTAGRUEL, "just when the SLAVE BOY was getting perplexed and was beginning to give up on finding the solution, just like you two, SOCRATES observed that, at the beginning of this process, the SLAVE BOY had been somewhat bold in saying that he knew how to solve the problem, but then he started to be perplexed. Now your are also like the SLAVE BOY. Not only you don't know the answer, but you don't even think you can find the answer."

"Quite true," replied the SQUARE, " I have to admit that this is the only certainty that I have now. I know, for an absolute fact, that I don't know how to solve this problem."

" And so do I," admitted PANURGE. "All I know is my own limitation, my own ignorance."

"Well, that is precisely the point of SOCRATES," replied PANTAGRUEL. Like CUSA said, about the SOCRATIC METHOD, you have now acquired LEARNED IGNORANCE.

"Do you think that NOW the SLAVE BOY knows more now than he knew BEFORE? Asked PANTAGRUEL.

"Well, at least he knows he doesn't know," said the SQUARE.

"That is right," said PANTAGRUEL, "and that is why his becoming perplexed made him a better person. Do you suppose the SLAVE BOY could have made the discovery of how to double the area of the square before he experienced this perplexity, and before he recognized his ignorance?" asked PANTAGRUEL.

"I don't think so." Said the SQUARE. " That is, I don't know. I mean, I think I understand, but then, what do I know? LEARNING IGNORANCE seems like such a strange thing to know."

"Your telling me," said PANURGE. "How much ignorance can a guy learn in one day? But then again, the advantage is that, if you forget that kind of knowledge, it's no big loss."

" Shush," said the SQUARE. "I think I am beginning to understand. The point that SOCRATES is making means that you cannot make any discovery unless you become perplexed, and discover that the previous knowledge you had was wrong. That's what CUSA meant by LEARNED IGNORANCE."

"That is absolutely right," replied PANTAGRUEL. "It is only after you have recognized you own ignorance that you can begin to know something. Then," said PANTAGRUEL, "SOCRATES erased the two squares he had drawn in the sand, and drew again a square of area 4, like this A,B,C,D, with a diagonal line across it, and added to it, a second square B,C,E,F, like the first one, and then a third one, whose corners are C,E,G,H, and a forth, and last one D,C,H,J. Add a diagonal for each new square as below.
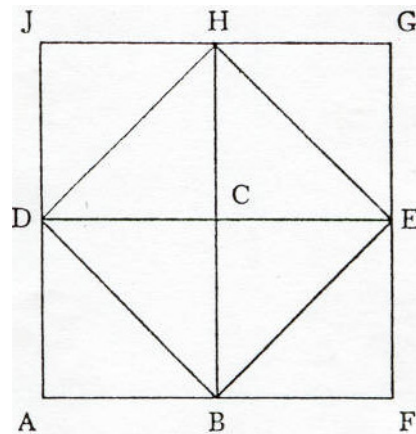
Figure 42.

PANTAGRUEL asked: "What did SOCRATES do this time that he did not do before?" Both PANURGE and the SQUARE were silent and starred at the figure for a good minute and a half. Then the SQUARE replied: "He made the squares bend over and FOLD ON THEMSELVES ON THE DIAGONAL, like you had me do, PANTAGRUEL, when I discovered CIRCULAR ACTION by folding."

"It is also the same area as the square of 16," said PANURGE, "but divided differently."

"That is correct," said PANTAGRUEL, "SOCRATES did not divide the SIDES of the square like the SLAVE BOY did, but he divided the AREA of

the same squares with diagonals. And each of these diagonals divided each square into two equal parts. Then, it becomes clear that the solution of the problem of DOUBLING THE SQUARE is staring at us in the face."

"What do you mean?" asked the SQUARE. "I don't see that."

"Don't you see, said PANTAGRUEL, "that these diagonals, which divide each of those four squares into two parts, also divide the square of 16 into two equal parts?"

"I suppose so," replied the SQUARE. "So what?"

"Then, don't you realize that four halves of such squares produce another square B,D,H,E which is half of the large square of 16, A,J,G,F?" asked PANTAGRUEL.

"Of course," exclaimed the SQUARE, with total excitement and wonder. "That is the square of 8. We have doubled the area of the square of 4!"

"Isn't that beautiful?" added PANTAGRUEL enthusiastically. "The SLAVE BOY discovered that he could double any square by squaring its diagonal. There is no longer the approximation of GREATER THAN and LESSER THAN, that was sought for by dividing the side of the square. You have now relived one of the most important discoveries of ANCIENT GREECE, a discovery that you should not forget to transmit to the future generations, just as you have relived it yourself, today. However, there is more. This discovery implies that the RULE OF THE GAME HAS ALSO BEEN CHANGED. Indeed, the SLAVE BOY discovered a way to transform the surface area by CHANGING THE INTERNAL BOUNDARY CONDITION, and such a discovery can only be made in a single leap, and not by trying to sniff out the problem through trial and error. It is therefore by investigating the CHANGE IN BOUNDARY CONDITION that you can now go directly to the discovery of the PYTHAGOREAN THEOREM."

8- THE ORIGIN OF THE PYTHAGOREAN THEOREM, AND HOW EPISTEMON DISCOVERED A CONSTRUCTIVE GEOMETRIC PROOF FOR IT'S FORMULA: $A^2 + B^2 = C^2$

When PANURGE met EPISTEMON, on the way back from PLATO'S CAVE, he told him about the SLAVE BOY discovery of DOUBLING OF THE SQUARE. EPISTEMON, then, took the opportunity to show PANURGE how the PYTHAGOREAN THEOREM was derived from the idea of DOUBLING THE SQUARE; that is, by

CHANGING INTERNAL BOUNDARY CONDITIONS.

"The constructive proof for DOUBLING THE AREA OF THE SQUARE," said EPISTEMON, "can serve in demonstrating how you can CHANGE THE AXIOMS OF THE PRESENT SCHOOL SYSTEM in two fundamental ways. One, it consists in demonstrating that ALGEBRA is a derivative of SYNTHETIC GEOMETRY, and not GEOMETRY a derivative of ALGEBRA. And secondly, it demonstrates that the PYTHAGOREAN THEOREM is not, as mathematics teachers often teach wrongly, a way to discover the third side of a right angle triangle. The PYTHAGOREAN THEOREM is actually a TRANSFORMATION FUNCTION whose purpose is to accomplish surface transformations by CHANGING INTERNAL BOUNDARY CONDITIONS. That is a DISCOVERY OF PRINCIPLE."

"That seems to be very interesting," said PANURGE, "but what does it all mean?"

"It's simple," replied EPISTEMON, "do you know where the well known elementary formula $(A + B)^2 = A^2 + 2AB + B^2$ comes from?"

"I haven't the faintest idea," replied PANURGE. "I always have the impression that these formulas are concocted by some magician in a cave somewhere, and for the purpose of torturing children. I beg of you, please light up my LANTERN, tell me where it comes from."

"I will show you how to construct this formula GEOMETRICALLY," said EPISTEMON. "Take the following square composition, as a variation of the MENO SLAVE BOY problem that you just did.
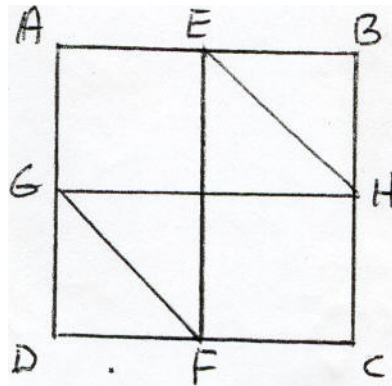
Figure 43.

Construct this Figure with 8 pushpins and a long and continuous piece of string that you tie around a fixed square A,B,C,D. Make the string go through the flexible diagonal sections E-H and G-F, and cross sections E- F and G-H. Next, move these mobile lines in a position such that you can generate a large internal square with area A^2, and a smaller square with area B^2. You will succeed in doing that by moving line EF from left to right, and by moving line GH up and down. Then, identify the two rectangles as two areas of AB, or 2AB. Note that we have just constructed the formula:
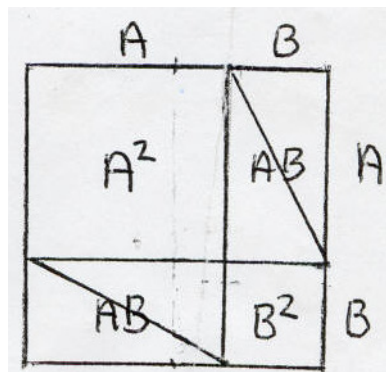
$(A + B)^2 = A^2 + 2AB + B^2$

Figure 44.

"That's right," exclaimed PANURGE, "How about that. And, I can change the internal area of the two squares to any position I wish, and that will always give me a variation of values corresponding to that formula. I can even stretch those squares and rectangles correspondingly, without insulting my friend the SQUARE."

"Perfectly right," said EPISTEMON, "since $(A + B)^2$ corresponds to the area of the total square, you can subtract from it the two internal

squares A^2 and B^2, and leave instead an empty space that is bounded by the remaining rectangles 2AB. Note that each of those rectangles can be divided into two halves by their diagonals, and form four right angle triangles, each of which having an area of AB/2.

"If you dispose these four triangles in the following configuration (See Figure 6), you have **CHANGED THE INTERNAL BOUNDARY CONDITIONS**, while maintaining the outer boundary in its original condition. Then, behold this beautiful discovery: we have created a new square that did not exist before, which we will call C^2. For **PANURGE'S** sake, we will call this one: **THE SQUARE THAT IS NOT THERE.** Moreover, follow how this **FORMULA** is derived from a **SYNTHETIC GEOMETRIC CONSTRUCTION.**

Since $(A + B)^2 - 2AB = A^2 + B^2$ and $(A + B)^2 - 2AB = C^2$

Then, $A^2 + B^2 = C^2$
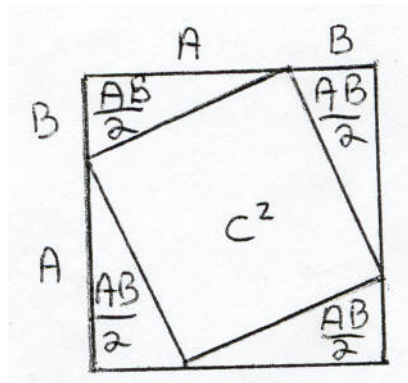
Figure 45.

"You have now discovered the **GENERATING PRINCIPLE** of the beautiful **PYTHAGOREAN THEOREM**," said **EPISTEMON**, "but, we have also fallen into a new degree of perplexity. Every one can see, with their mind's eye, that the algebraic notation is linear, and curiously tautological. The formula simply says in a deductive boring way: 'If $A - B = X$, and $A - B = Z$, then $X = Z$. However, the **SYNTHETIC TRANSFORMATION** (right in Figure 45) is non-logical, and non-deductive, and demands a **NON-LINEAR LEAP OF FAITH** to be experienced. By discovering the **PANURGE SQUARE THAT IS NOT THERE**, that is C^2, you have made a **LEAP OF FAITH** into the domain of **LEARNED IGNORANCE**!"

"How do you know it is my square, if it is **NOT THERE**?" replied **PANURGE**. "Now you have lost me completely into some real deep depth."

"Follow me, step by step, on this one," said EPISTEMON, "and you won't get lost. Ask yourself: 'What prompted me to subtract the two internal squares, A^2 and B^2 from the larger one?'" (See FIGURE 44.)

"I don't know," replied PANURGE. "You just have weird ideas like that, sometimes."

"No Sir!" replied EPISTEMON. "I am not HARRY POTTER. It was not a weird idea that prompted me. I was simply looking for WHAT WAS NOT THERE."

"What about HARRY POTTER?" Asked PANURGE.

" In a minute," added EPISTEMON. "You must first learn from, PLATO'S CAVE, that the essential is always found in WHAT IS NOT THERE. So again: PAY ATTENTION TO THE INTENTION. I simply was interested in finding out what area would be left over, once the two squares were taken out. This is not a magical trick. I figured that if I were to change the INTERNAL BOUNDARY CONDITIONS, the area would be the same quantity, but the new figure would have to be different, as it turned out to be. The two areas are the same, and they are different, at the same time. I have TRANSFORMED THE AREAS OF TWO SQUARES INTO THE AREA OF A THIRD SQUARE. That is the crux of the IDEA of the PYTHAGOREAN THEOREM; THAT IS, FIND A SQUARE WHICH IS THE SUM OF TWO OTHER SQUARES. This is done with the same DISCOVERY OF PRINCIPLE that the SLAVE BOY used for DOUBLING THE AREA OF THE SQUARE. Again, this INCREDIBLE JUMP is lost when you simply consider the ALGEBRAIC FORMULA. So you see, if you don't take such LAWFUL LIBERTIES, you can never be creative. So, now you can put the three squares together like this. "
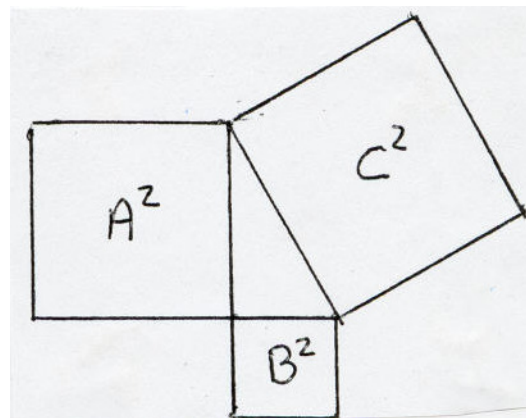
Thus: $A^2 + B^2 = C^2$

Figure 46.

"In other words," said EPISTEMON, " we can now organize the three squares A² + B² = C² together, as in Figure 46; and in this way, you can generate the famous triple squares of the PYTHAGOREAN FORMULA. "You can easily see how, by this DIAGONAL TRANSFORMATION, the principle of discovery of the PYTHAGOREAN THEOREM is actually derived from the principle of DOUBLING THE AREA OF THE SQUARE. That is how you acquire true SCIENTIFIC KNOWLEDGE, by constantly looking for new ways of CHANGING BOUNDARY CONDITIONS. As for HARRY POTTER," added EPISTEMON, "again, LOOK FOR WHAT IS NOT THERE; it may even save your life"

"What do you mean?" asked PANURGE, becoming perplexed again.
" Ask yourself: "WHAT IS MISSING in the entire story of HARRY POTTER?"
"I don't know," answered PANURGE. "What?"

	"You can discover WHAT IS MISSING at the very opening of the original movie," replied EPISTEMON," when the OLD MAGICIAN steels the LIGHT from the LANTERNS… If you PAY ATTENTION TO THE INTENTION, you will discover that he does what any good SATANIST would do: he is robing children of the LIGHT OF REASON, and is TURNING OFF REALITY. That's WHAT IS MISSING in HARRY POTTER. This OLD MAGICIAN acts exactly like those MATEMAGICIANS, who write MAGICAL FORMULAS on their blackboards, and cannot show how their knowledge is constructed."

	"Why doesn't the OLD MAGICIAN show how he constructs his knowledge?" asked PANURGE.

	"Because, in HARRY POTTER, there is NO KNOWLEDGE TO CONSTRUCT. It is all FANTASY!" Explained EPISTEMON. "They make believe that the children learn something, in their school of magic, but it is all a lie. They learn nothing, because there is nothing to learn. HARRY POTTER, just like LORD OF THE RINGS, are especially dangerous for younger children, precisely because the difference between REALITY and FANTASY is blurred. Those movies make believe that REALITY and FANTASY are the same thing. That is the very INTENTION of those stories: 'IF YOU BELIEVE IN YOUR FANTASY HARD ENOUGH, IT WILL BECOME REAL!' That is their BIG LIE!"

	"POKEMON games are similar." Added EPISTEMON. "Take a child who has played POKEMON GAMES for a few years, and put a gun in his hand. What will he do? He will be tempted to shoot at you, and hit you in the head at a hundred yards. He won't miss, I guarantee you! He won't even realize what he has done. He will just be LIVING HIS FANTASY.

	"So, as the old saying goes: 'There is only one thing wrong about the story of HARRY POTTER. It's just NO GOOD!'"

9- CONSTRUCTING THE SQUARE
AND THE CUBE WITH CIRCULAR ACTION

1. Take a large paper circle and fold it on itself twice to generate two diameters forming a right angle.
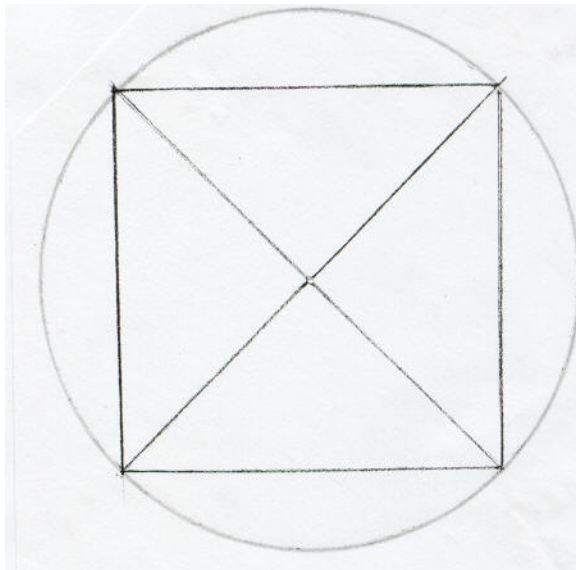
FIGURE 47.
The circle and the square

2. Fold the four circular arcs determined by the four points around the circumference.

3. Fold the square on itself four times to get 4 squares on each side, and 16 squares in all. Color 6 squares as in the Figure. The diagonals of 12 little squares form the cube.
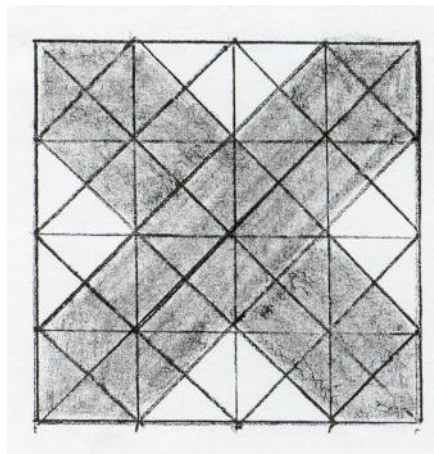
FIGURE 48.
The 6 colored squares

4. Fold the non colored parts inwardly on each other and the 6 colored squares will form the cube.
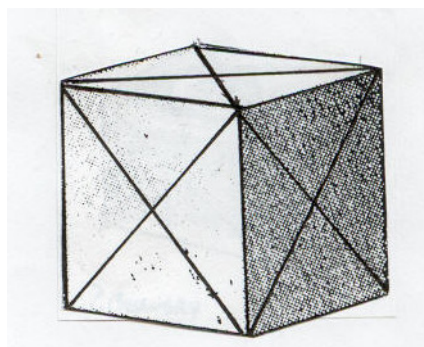
FIGURE 49.
The cube

10- HOW EPISTEMON BROUGHT US TO PLATO'S CAVE AND SHOWED THE METHOD THAT CUSA USED TO SOLVE THE PARADOX OF SQUARING THE CIRCLE.

After a good midnight banquet in the LANTERN INN, we retired to rest, and the next morning, PANTAGRUEL went back to PLATO'S CAVE early with the SQUARE to help him with his revolution. Our friend EPISTEMON led the way with his LANTERN. He said that his LANTERN would never fail to bring us anywhere we wished to go, within reasonable distances. "Our LANTERNS have always been our best guides," he said, " because they were constructed with the PRINCIPLE OF REASON built into them."

After a pleasant walk of about two hours, we approached PLATO'S CAVE. The entrance was wide open and a whole group of SQUARES were having a loud discussion with HEXAGONS and PENTAGONS. They had obviously won their revolution since the POLYGONS and the CIRCLES were all very flexible, and were jumping from their edges, making all sorts of somersaults and circular gestures, as all of them were coming out of the cave. "PANTAGRUEL did a great job," said EPISTEMON, "but what is all this commotion?"

"We are in a quandary," replied GENERAL SQUARE, the victorious leader of the revolution, "we can't seem to agree on a sticky question."

"What seems to be the problem," asked EPISTEMON, maybe I can help."

"The PENTAGONS say they are of a higher rank than the HEXAGONS because they are built according to the DIVINE PROPORTION," answered GENERAL SQUARE. "However, the HEXAGONS claim to have a higher rank because they have one more side which makes them closer to the CIRCLE. You see, in FLATLAND, everybody agrees that the greater number of sides a polygon has, the higher the rank, and the closer you are to BECOMING A CIRCLE.

"Although popularly everyone called a Circle is deemed a Circle," said the SQUARE, "yet among the better educated Classes it is known that no Circle is really a Circle, but only a polygon with a very large number of very small sides. As the number of the side increases, a Polygon approximates to a Circle; and, when the number is very great indeed, say for example three or four hundred, it is extremely difficult for the most delicate touch to feel any polygonal angles. Let me say rather, it *would* be difficult: for as I have shown above, Recognition by Feeling is unknown

among the highest society, and to *feel* a Circle would be considered a most audacious insult. This habit of abstention from Feeling in the best society enables a Circle the more easily to sustain the veil of mystery in which, from his earliest years, he is wont to entrap the exact nature of his Perimeter or Circumference. Three feet being the average Perimeter, it follows that, in a Polygon, of three hundred sides, each side will be no more than the hundredth part of a foot in length, or little more than the tenth part of an inch; and in a Polygon, of six or seven hundred sides, the sides are little larger than the diameter of a Spaceland pin-head. It is always assumed, by courtesy, that the Chief Circle for the time being has ten thousand sides."

"Do you realize," said EPISTEMON abruptly, "how everything you have just said is completely absurd. You don't seem to realize that what you have just said implies that CIRCLES cannot exist at all in FLATLAND?"

"What do you mean," replied the shocked SQUARE.

"My dear square," replied EPISTEMON, "you don't seem to understand that a ten thousand sided polygon is still a polygon, even if it LOOKS like a circle. LOOKING LIKE A CIRCLE DOES NOT MAKE YOU A CIRCLE," replied EPISTEMON, in a loud voice, so that everyone could hear.

"But, I thought it did," replied the SQUARE.

"You have been completely misled," said EPISTEMON. " It is CIRCULAR ACTION of SPHAERICS that produce CIRCLES and POLYGONS, not POLYGONS that produce CIRCLES. You see, none of you, POLYGONS, could ever become CIRCLES, because POLYGONS and CIRCLES are two different species. The revolution that you have just fought, and won, makes precisely that point. I am afraid that some of you are still clinging to old habits that you were brainwashed with back in FLATLAND. What you have been told in FLATLAND is simply a lie and a deception invented by the phony British upper class.

"When during the Italian Renaissance, NICHOLAS OF CUSA reworked the construction or ARCHIMEDES on the question of SQUARING THE CIRCLE," continued EPISTEMON, "he proceeded to show how the area of the SQUARE could be approximated with the area of the CIRCLE. Let me show you how CUSA resolved this paradox that he called SQUARING THE CIRCLE."

"You are pulling my right angle," said the SQUARE, as if in a moment of exaltation, "CUSA really said that my area is equal to that of a CIRCLE?"

"Don't get me wrong," responded EPISTEMON, "it was not meant to be a compliment. Just think through the following consideration:

"Firstly, it is simply wrong to believe that there exists a perimetric equivalence between a POLYGON and a CIRCLE. Follow my reasoning. Say, you choose a circle with a diameter of 2R = 1. Inscribe a HEXAGON inside of that circle. Now, double the number of sides of regular POLYGONS following the series 6, 12, 24, 48, 96, 192.
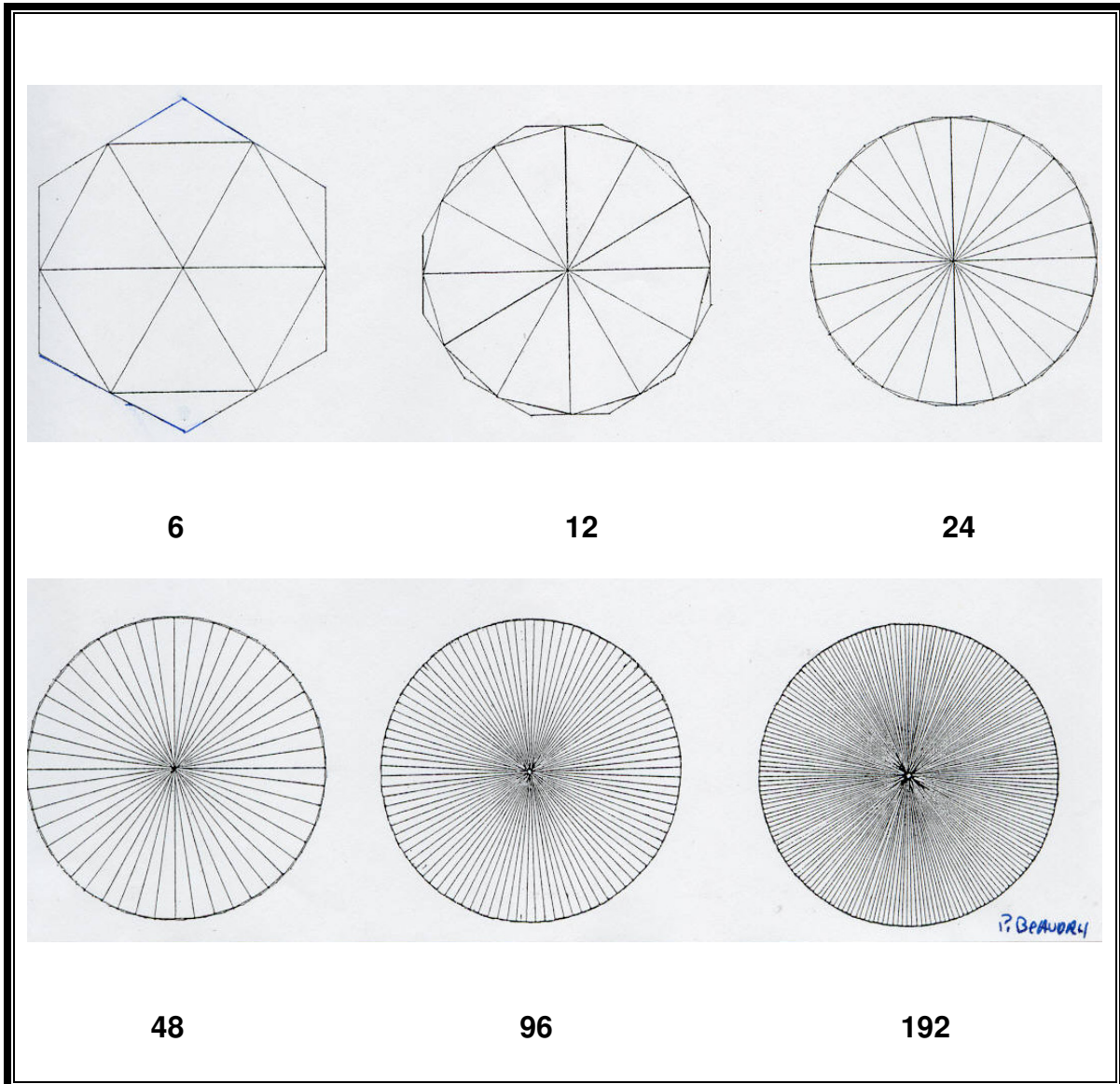
FIGURE 50.

The relative value of π for these inscribed polygons are as follows:

π6   = 3.0,
π12 = 3.1058,
π24 = 3.1326
π48 = 3.1393
π96 = 3.1410
π192 = 3.1414

      If you circumscribe the same CIRCLE with a similar series of regular POLYGONS, their corresponding values for π will be as follows:

π6   = 3.4641
π12 = 3.2154
π24 = 3.1596
π48 = 3.1460
π96 = 3.1427
π192 = 3.1418

      "Now, take the average between the two POLYGONS of 192 sides. Do you see the result?" asked EPISTEMON.

      "Yes absolutely," replied the SQUARE, "I can see how you have proven that the value of π = 3.1416 is an average derived from the two POLYGONS. And that is why the circumference of the circle, whose diameter is 1, must be π = 3.1416. This is what I have always believed in FLATLAND."

      "Precisely," replied EPISTEMON. "The circumference of the CIRCLE, and the perimeter of the POLYGON of 192 sides are convincingly the same. This means that their areas are convincingly the same as well."

      "Well, does that mean that the perimeter of a POLYGON of 192 sides is a transcendental number," asked the SQUARE?

      "No," replied EPISTEMON. "It simply means that, in every school in the world, mathematics teachers cheat and lie, as in FLATLAND, and tell their pupils that π = 3.1416 is the ratio of the circle's perimeter to its diameter; while, in reality, it is the ratio of the perimeter of a POLYGON of 192 sides to its diameter."

      "To be frank with you, I am tempted to say that I find that wonderful," said the SQUARE, "but I suspect there is an INTENTION behind your argument, and, I think what you mean to say is that we never got a chance to discover what a real CIRCLE was in FLATLAND."

"That is precisely my point," replied EPISTEMON. "But let me take this a step further, if I may."

"By all means," said the SQUARE.

"Secondly," continued EPISTEMON, "while the MATEMAGICIANS appear to have succeeded in SQUARING THE CIRCLE, and have created an apparent equivalence of area between the POLYGON and the CIRCLE, they have fallen into a devastating paradox."

"This sounds ominous. Why is that?" asked the SQUARE.

"The POLYGON has 192 angles while the CIRCLE has zero angle," replied EPISTEMON. "Don't you think that the TRIANGLE which has only 3 angles, is closer to zero angle than to 192 angles?"

"So it seems," replied the SQUARE.

"So," said EPISTEMON, "the more angles you create for your POLYGON, the further you are going away from the CIRCLE, and the less number of angles, the closer you are getting to the CIRCLE. Thus, it is demonstrated that, of all POLYGONS, the TRIANGLE is the closest to the CIRCLE!!"

"You've got me over a tile floor on that one," replied the stunned SQUARE.

"Such is the nature of this paradox," concluded EPISTEMON.

"THE CLOSER YOU ARE TO APPROXIMATE THE AREA OF THE POLYGON AND THE AREA OF THE CIRCLE, THE FURTHER AWAY THE PERIMETER OF THAT POLYGON IS FROM THE CIRCUMFERENCE OF THE CIRCLE."

"You are shaking me up in all of my four axiomatic right angles," said the SQUARE. "I must admit that you are absolutely right."

"So you see, my fellow POLYGONS," said EPISTEMON, turning to the assembly of POLYGONS, "Nature prescribes a single direction for CIRCULAR PROPAGATION, and that is why POLYGONS ARE GENERATED BY CIRCULAR ACTION AND NOT CIRCLES BY POLYGONS. So, this whole discussion about who is closest to the CIRCLE is a false problem. There are no distinctions of classes. You are all children of CIRCULAR ACTION, including the CIRCLE. The revolution that you have just made proves the point in spades. And the means by which CIRCULAR ACTION produces POLYGONS is with the idea of FOLDING. Your FOLDS are all the result of FOLDING THE PLANE on itself." At that point, all the POLYGONS, each in his proper angle, clapped their edges together and saluted EPISTEMON by bending forward.

PART III

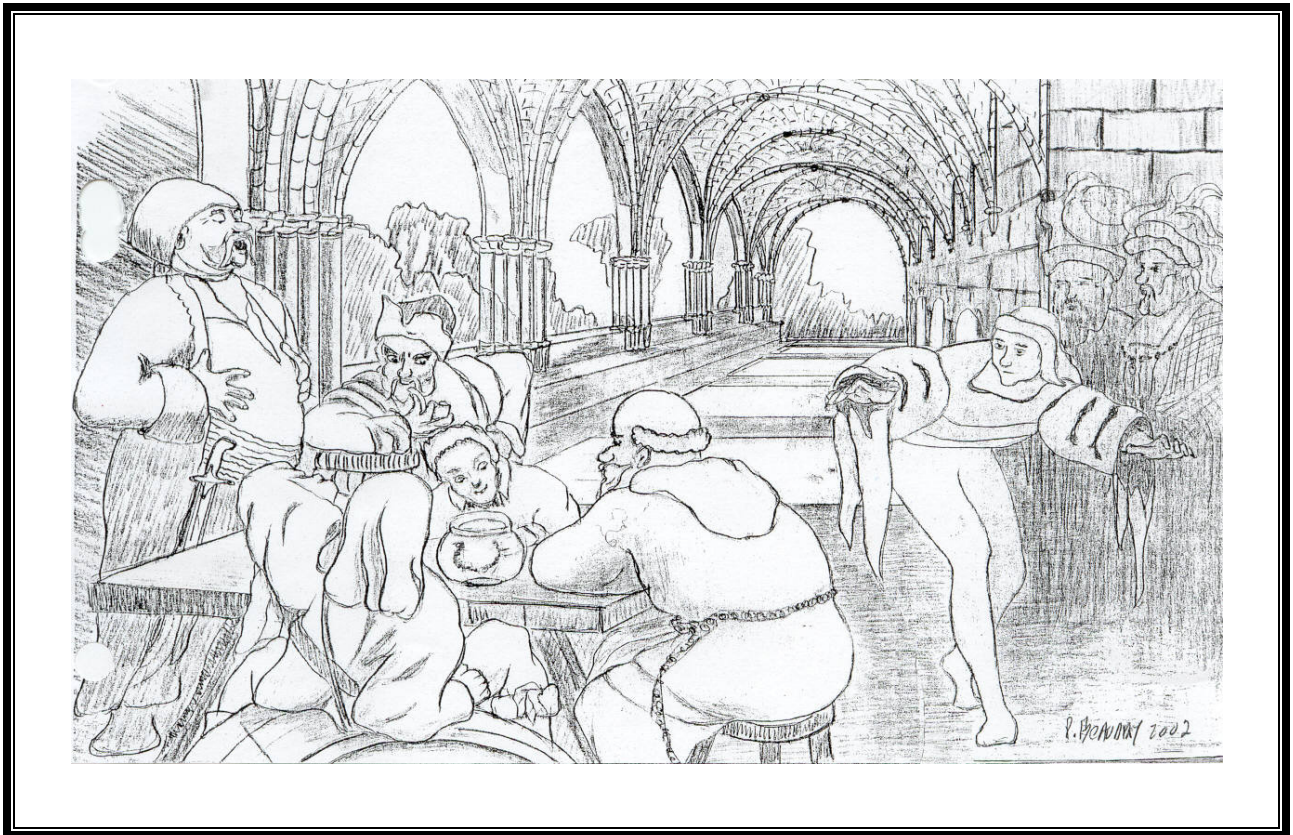# SPHERICAL AND SPIROMETRIC ACTION: GEOMETRY OF SIXSIDEDNESS

FIGURE 51.
"It is just your AXIOMATIC ASSUMPTIONS that are being shocked, not you," replied BACBUC, laughing with the COSSACKS.

11- PANURGE'S DISCOVERY OF THE CURVATURE OF HUMAN VISION IN A SPHERE OF WATER THAT PROJECTED AN INVISIBLE IMAGE.

Only a few steps inside the cloister of the ABBAYE of THELEME, stood on a table, a beautiful SPHERICAL LANTERN which did not seem to be illuminating anything. I said, "SEEM", because it was not clear whether it was a source of light or not, since it was filled with water and projected strange images inside and outside of itself. At any rate, this was a very special LANTERN, because, depending on how it was rotated, or depending on how you rotated yourself around it, the curious object projected different images that fascinated PANURGE to no end. While we stood in curious admiration before this SPHERE OF WATER, we were greeted by the venerable BACBUC, and a group of COSSACKS, who welcomed us, and asked us to sit around the table.

"What do you see in that SPHERE?" asked BACBUC.

"I see the arched colonnade." Replied PANURGE.

"Do you notice anything special about this arched colonnade?" She asked.

"Yeah. Ha, Ha! All of the arches are up side down," laughed PANURGE, with a mixture of amusement and perplexity. "How can the water turn everything up side down like that?" He asked.

"Are you sure it is the water that turns everything upside down?" asked BACBUC. "Now, take a tall GLASS of water, and look through it. Is everything still up side down?" She asked.

"No," said PANURGE. "Everything is right side up. I guess you must have put a different kind of water inside of the SPHERE."

"Don't be silly," said BACBUC, "things will be seen right side up, or up side down, depending on the CURVATURE of the BOUNDARY CONDITION. Furthermore," she said, "note that, in both the GLASS and the SPHERE, everything that is on the right is seen on the left, and everything on the left is seen on the right. This demonstrates that it is the CONVEXITY of the GLASS, and of the SPHERE, that changes the image, not the water. If you do the same experiment with a water filled jar, and you rotate it, you will see what I mean. Always pay great ATTENTION TO INVERSIONS."

"How about that!" Replied PANURGE.

"All right then," said BACBUC, "let us PAY ATTENTION TO THE INTENTION of that SPHERE. Indeed, this is a very special SPHERE, because it shows how the CRYSTALLINE of HUMAN VISION works. That is, whatever is represented in the field of your vision will enter your eyes in the same manner that light goes through a SPHERE OF WATER. Both LEONARDO DA VINCI and KEPLER have done a lot of experiments in this field of study that they called OPTICS.

"I hope this is not the same thing as CRYSTAL BALL GAZING," exclaimed PANURGE, " because I don't believe in any of this magic stuff."

"No, no," replied BACBUC, who was amused by PANURGE'S remark. "We don't indulge in such nonsense in LANTERNLAND. We are not here in NEWTON'S GREAT BRITAIN, yow kneow! The experiment that we are about to conduct is called EXPERIMENTAL SCIENCE. However, everything that deals with the science of vision, that is, OPTICS, is not entirely visible to your physical eyes. Or, rather, it is visible, but you don't always see it. The CONSTRUCTIVE GEOMETRICAL PRINCIPLE will only be visible to your MIND'S EYE. In that sense, this SPHERICAL EXPERIMENT is the clearest example of not only how your eyes see, but also how your MIND'S EYE sees. And those are two very different things."

"This is very strange," said PANURGE, who always felt uneasy whenever he could not perceive something with his senses. "What would be the reason for a LANTERN to exist, if it could not shed any light? I don't appreciate at all your turning off the lights in the middle of the day like this."

"But, that is precisely the point," said BACBUC, "You must turn off the lights of your SENSES in order for the light of your MIND to be turned on. Underneath everything that you see, which is merely an ILLUSION, there exists a TRUE REALITY that can be grasped by a higher understanding, a HIGHER HYPOTHESIS, and without having an image of it that would identify objects as this or that, but rather, as in the state of their BEING CHANGED INTO BECOMING this or that. PLATO called this principle his nurse, CHORA, the receptacle of all transformation, which you cannot perceive by your senses, but of which you can have a wonderful apprehension, only with your MIND'S EYE."

"First and foremost," said BACBUC, "you must understand what KEPLER said about the SPHERE, and how it was meant to reflect the INTENTION of the CREATOR." She then opened her large book and read:

"First, it was fitting that the nature of all things imitate GOD the founder, to the extent possible in accord with the foundation of each thing's own essence. For when the Most Wise Founder strove to make everything as good, as well adorned and as excellent as possible, He found nothing better and more well adorned, nothing more excellent, than Himself. For that reason, when He took the corporeal world into consideration, He settled upon a form for it as like as possible to Himself. Hence arose the entire category of quantities, and within it, the distinctions between the curved and the straight, and the most excellent figure of all, the spherical surface. For in forming it, the Most-Wise Founder played out the image of his Reverend Trinity. Hence the point of the center is, in a way, the origin of the spherical solid, the surface is the image of the inmost point, and the pathway to discovering it. The surface is understood as coming to be through an infinite outward movement of the point, out of its own self, until it arrives at a certain equality of all outward movements. The point communicates itself into this extension, in such a way that the point and the surface, in a commuted proportion of density with extension, are equals. Hence, between the point and the surface there is everywhere an utterly absolute equality, a most compact union, a most beautiful conspiring, connection, relation, proportion, and commensurateness. And since these are clearly three — the center, the surface, and the interval, they are nonetheless one, inasmuch as none of them, even in thought, can be absent without destroying the whole."

"You see," added BACBUC, "because of this triple quality of the SPHERE, the 'outward motion of the point,' that is, its PROJECTION, is also a divine quality pertaining to LIGHT, which takes example on the natural PROJECTION of MIND, and because of that divine proportionality of interplay between LIGHT and MIND, one like the other has the capacity to move forward by LEAST ACTION PATHWAYS; that is, in ways that can only be understood as the INTENTION OF SUFFICIENT REASON, otherwise known as the LIGHT OF REASON. So, because this INTENTION was so beneficial to LIGHT, and this game was so pleasurable to His MIND, GOD made the SPHERE the playground of LIGHT and MIND. But, you must understand how LIGHT plays, inside of the SPHERE, a game of HIDE AND SEEK with the human MIND. KEPLER confirmed that when he said: 'since God the creator has played, He has also taught nature, His Image, to play; and the game is just the same as the one He had played for her.' So, let us see how the sphere of water is the archetype of this light and mind playfulness."

FIGURE 52.
SPHERE OF WATER PROJECTING UPRIGHT AND INVERSE IMAGES.

"Put a SPHERE OF WATER on a table next to a window, and put a piece of white cardboard vertically, behind the globe, at a distance equal to the radius of that sphere. The entire scene enclosed within the frame of the window will be depicted with PERFECT STRAIGHT LINES, PERFECT CLARITY, AND PERFECT COLOR upon the cardboard, but in an inverted position. Now, here is the PARADOX: if you replace the piece of cardboard with your eye, your vision will be entirely blurred and you will see nothing

but confusion of objects represented through the glass which will have become either entirely bright, or entirely dark. If your eye gets closer to the globe, the objects on the opposite side will appear large and erect. If you increase the distance of your eye away, by the distance of the radius, the same objects will be perceived distinctly, but inverted of position, and smaller. If you then put the cardboard in this last position, everything will be blurred, and the picture will have vanished."

"This is fascinating," said PANURGE. "You mean to say that there is always that INVISIBLE IMAGE at the radial distance of a SPHERE OF WATER, and each time I try to see it with my own eyes, it goes into hiding."

"That is correct," replied BACBUC, "and yet, the image doesn't hide from the piece of cardboard, in the same position."

"This is absolutely extraordinary, but why?" asked PANURGE.

"Because of the REFRACTION of the light through the water," said BACBUC, "and because of the CONVEX SHAPE of the globe, and of your eyes. Your eyes display a similar crystalline behavior, because they are made like a CONVEX SURFACE. If you replace your eye by another sphere of water, behind the first one, the image would also be blurred and would disappear. Now, pay attention to this illustration of KEPLER'S, and you can discover why the image behaves like it does," said BACBUC. "KEPLER is showing us the result of the INTENTION of the entire process; that is, what your eyes could not see in that position, but that your mind could."

"Then," said BACBUC, "do the following experiment with direct sunlight. Place the same SPHERE OF WATER in direct sunlight, and position the white cardboard behind the globe, again, at the distance equal to the radius of the sphere. [DO NOT DO THE SAME EXPERIMENT WITH YOUR EYES, BECAUSE YOU MIGHT HURT YOURSELF.] Now, observe how the density of the sun's rays forms a high concentration of light on the piece of cardboard. This is called a CAUSTIC. KEPLER showed that when the cardboard comes to the point of the invisible cone of light at Ψ, *'the illumination is strongest, so much so that gunpowder in cold water is ignited when the sun is intensely hot.'*
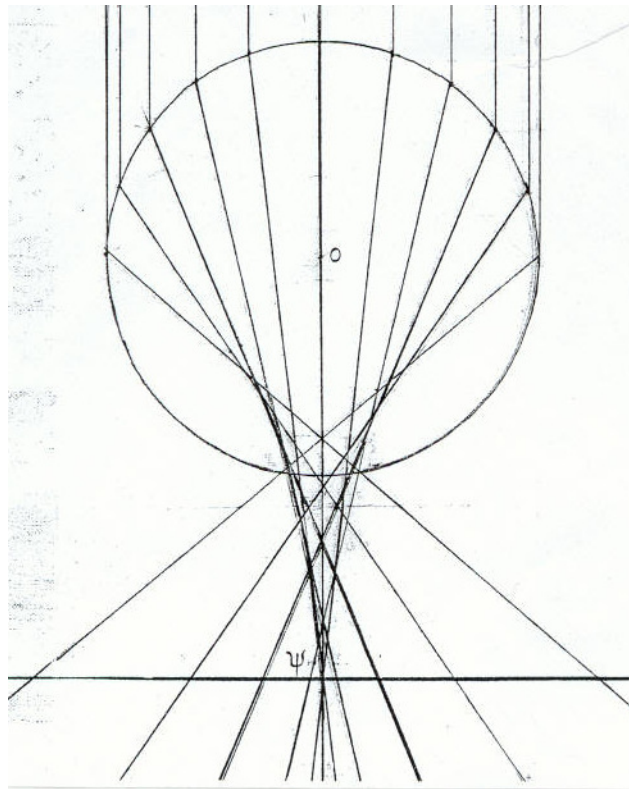
KEPLER'S INVISIBLE CONE.

FIGURE 53.

"This SPHERE OF WATER is surely a powerful weapon," added PANURGE, half-joking. "I would not leave this sphere hanging around in the sun too long, if I were you."

"You don't have to worry about that," added BACBUC, "but metaphorically speaking, yes, it is a POWERFUL WEAPON to teach how LIGHT and MIND can playfully resolve a number of PARADOXES.

"How is that?" asked PANURGE.

"Did you not notice that light traveled differently when it goes through the air, and through water?" asked BACBUC.

"Yes," replied PANURGE. "I noticed that the rays seem to go upside down, when they go through the sphere, and they change their angles of direction, when they form that INVISIBLE CONE outside of the SPHERE."

"Right," said BACBUC. "Those changes reflect the PARADOX OF VISION."

"What do you mean?" asked PANURGE.

"I mean that when you look at something with your physical eyes, you are wrong in thinking that what you see, is actual REALITY. What you see is not the real world. It is merely an impression.

"Hey! Wait a minute here," replied PANURGE. "Aren't you exaggerating just a little bit?"

"Not at all," said BACBUC. "Just follow the crucial TRANSFORMATION that is going on here.

1) The sun PROJECTS PARALLEL RAYS through the AIR.
2) The sunrays are DIFFRACTED through the SPHERE OF WATER.
3) The sunrays are PROJECTED into an INVISIBLE CONE.
4) The sunrays are REFLECTED, upside down, onto the CARDBOARD.
5) All of these changes reflect the TRANSFORMATION of vision.

" That is quite extraordinary," added PANURGE, "especially when you realize that this whole process is happening just by PLAYING AROUND. You mean to say that the image of MY OWN VISION is like that INVISIBLE IMAGE behind the SPHERE, and that my eyes have to do all of this work in order to see anything. Is that correct?" asked PANURGE.

"Yes PANURGE." said BACBUC. "That is you only see number 4 of this entire PROCESS. You have now discovered the crucial INTENTION of the

KEPLER experiment. You have discovered that WHAT YOUR EYES SEE is not reality, but merely a TRANSFORMED PROJECTION of reality that your eyes project onto your brain. Furthermore, this also means that your eyes cannot see the CHANGE, and that only your MIND'S EYE can see the PROCESS OF TRANSFORMATION that is going on. That leads us to another PARADOX.

"Which one is that? Asked PANURGE. "I'm not sure I can take any more SHOCKS like this today."

"It is just your AXIOMATIC ASSUMPTIONS that are BEING SHOCKED, not you," replied BACBUC, laughing with the COSSACKS. "Now, let's look at the PARADOX OF FERMAT. That is the PARADOX by means of which a ray of light always follows the MOST ECONOMICAL PATHWAY," said BACBUC. "This means that the INTENTION OF LIGHT is to follow the PATHWAY OF LEAST ACTION, a pathway of LEAST DISTANCE IN REFLECTION, and a pathway of LEAST TIME IN REFRACTION: This is a crucial universal physical principle!"

"Wow! Hold on there. Not so fast," said PANURGE. "Back up a little bit. What do you mean by the 'INTENTION OF LIGHT?' Do you mean to say that the rays of light KNOW EXACTLY WHEN, AND BY HOW MUCH, THEY CAN CHANGE DIRECTION, in and out of that SPHERE OF WATER?" Asked PANURGE.

"That is precisely what I mean," replied BACBUC, with a smile. "And you should have seen the freakout that this had created in FRANCE around DESCARTES, and his sycophants. A leading spokesman for DESCARTES, a caustic character by the name of CLERSELIER, even went as far as writing a letter to FERMAT telling him that his PRINCIPLE OF LEAST ACTION was absurd. He wrote to him:

"First, the principle you [FERMAT] take as a basis for your proof, to wit, that nature always acts by the shortest and simplest path, is only a moral principle, not a physical one - it is not and it cannot be the cause of any effect in nature" […] "And this principle cannot be the cause, for otherwise we would be attributing knowledge to nature: and here, by nature, we understand only that order and lawfulness in the world, such as it is, which acts without foreknowledge, without choice, but by a necessary determination" […] "This same principle must make nature irresolute, not knowing which way to go when it makes a ray of light pass from a less dense to a more dense medium…"

"If I understand this correctly," said PANURGE, "this poor CLERSELIER guy did not PAY ATTENTION TO THE INTENTION. Right?"

"That is absolutely true," replied BACBUC. "He forgot that LIGHT, just like MIND, is a phenomenon of the NOOSPHERE which subsumes all of the phenomena of the BIOSPHERE, and so, he discarded the PRINCIPLE OF SUFFICIENT REASON, and GOD'S INTENTION. GOD had definitely inscribed such a PLAYFUL INTENTION in the SPHERE OF WATER, and clearly with the purpose of having LIGHT and MIND play together and figure out the PURPOSE of the whole game. But, the CARTESIANS are a little bit slow in catching up with the rest of the world. They understand quickly, but it takes them a long time to figure it out. So, CLERSELIER made the mistake of considering that there cannot be any INTENTION which would cause a ray of light to take one course rather than another, because he reduced the INTENTION of the ray to his REDUCTIONIST way of thinking, and concluded that because a ray cannot think like he does [and GOD forbid that anything else does either], it cannot have any FOREKNOWLEDGE of where it is going."

"That is really too bad," added PANURGE, because, if you think like CLERSELIER, you might not get anywhere. As YOGI BERRA said: 'If you don't know where you are going, you might not get there.' So, it seems clear to me that, since a ray of light always reaches its destination, it must know, in some way, how to get there. And besides, when I FART, the INTENTION is very clear: the GAS being released is not directed everywhere randomly, and without INTENTION. It clearly INTENDS to reach your nose by the shortest possible pathway, unless your feet decide to leave the premises, in the shortest possible time. Now, ANY OLD FART KNOWS THAT!"

12- CONSTRUCTING THE TETRAHEDRON, THE OCTAHEDRON, AND THE ICOSAHEDRON, BY FOLDING.

Take the equilateral triangle as we have constructed it above. (FIGURE 26.) The multiply connected circular action has generated three sides, or edges, and three corners, called vertices. If you fold each vertex onto the midpoints of the three opposite sides, you will produce four smaller equilateral triangles. The tetrahedron is generated by triply folding all of those singularities on themselves, edge-to-edge and vertex-to-vertex.

Figure 12. THE TETRAHEDRON.
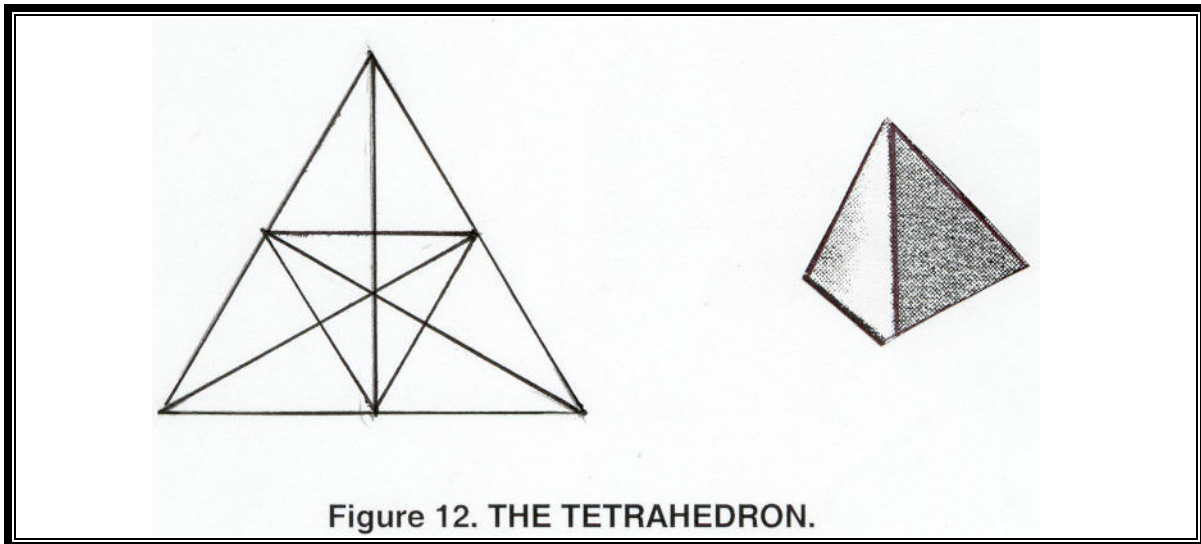
FIGURE 54.

Next, take a large equilateral triangle formed by 4 smaller equilateral triangles, as generated for the previous tetrahedron, and fold each of the small equilateral triangles into 4 more smaller equilateral triangles to produce a total of 16 equilateral triangles inside of one large equilateral triangle. This is where numbers and their powers come into existence, in a simple geometrical form. In this case, the growth of the triangles follows the multiples of the power of 2:

1- The first triple action generates the equilateral triangle (1 triangle).

2- The second triple action generates the tetrahedron (4 triangles).

3- The third triple action the octahedron (8 triangles).

The best way to avoid reducing numbers to linear magnitudes is to count them, in this way, as expressions of circular action. Think of **NUMBERS AS INTERVALS OF ACTION.** Now, construct the Octahedron.

Since by folding the total number of triangles is 16, and you require only 8 for the octahedron, the next step is to try to cover the octahedron twice with same form of circular action. To accomplish that, fold 2 of the triangular tips of the large equilateral triangle, one over the other, tip to tip. This will give you the shape of an octahedron with one open side. Then, cover the whole octahedron, a second time, by rotating the remaining triangles with an inverted twist such that the third triangular tip closes the solid with a single closing lid. All of the sides of the octahedron are formed by multiple triangles, with the exception of the top and the bottom.
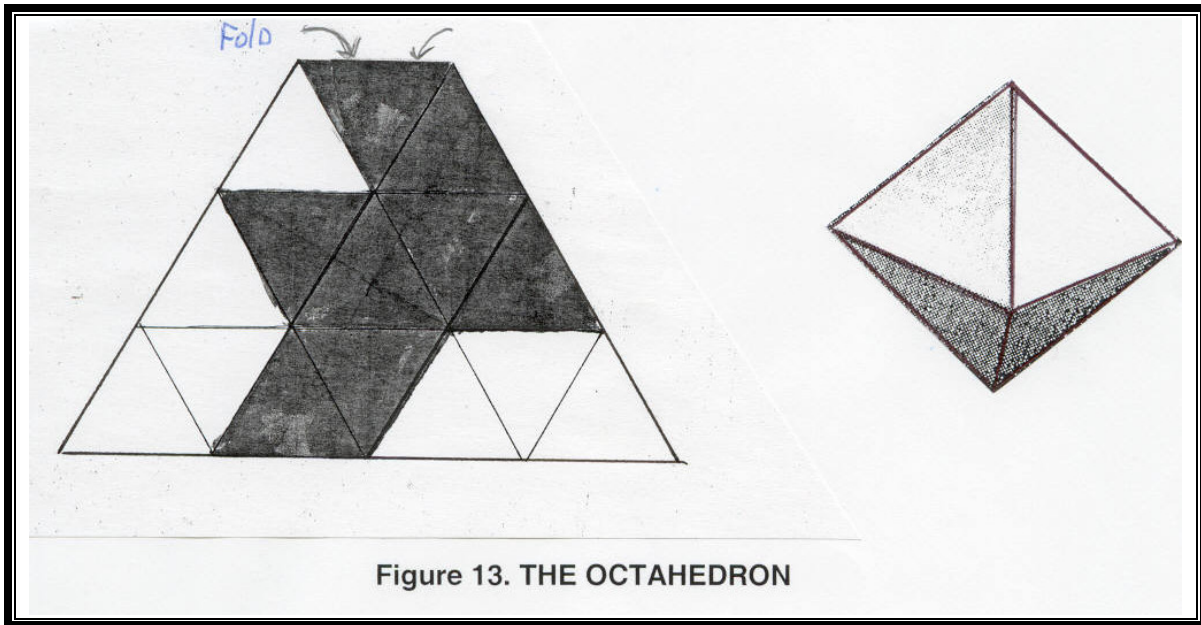

Figure 13. THE OCTAHEDRON

FIGURE 55.

To construct the **ICOSAHEDRON**, begin with two large equilateral triangles. Divide each into 16 smaller equilateral triangles. Each large triangle will serve as a half-shell, two of which are required to complete the **ICOSAHEDRON.**
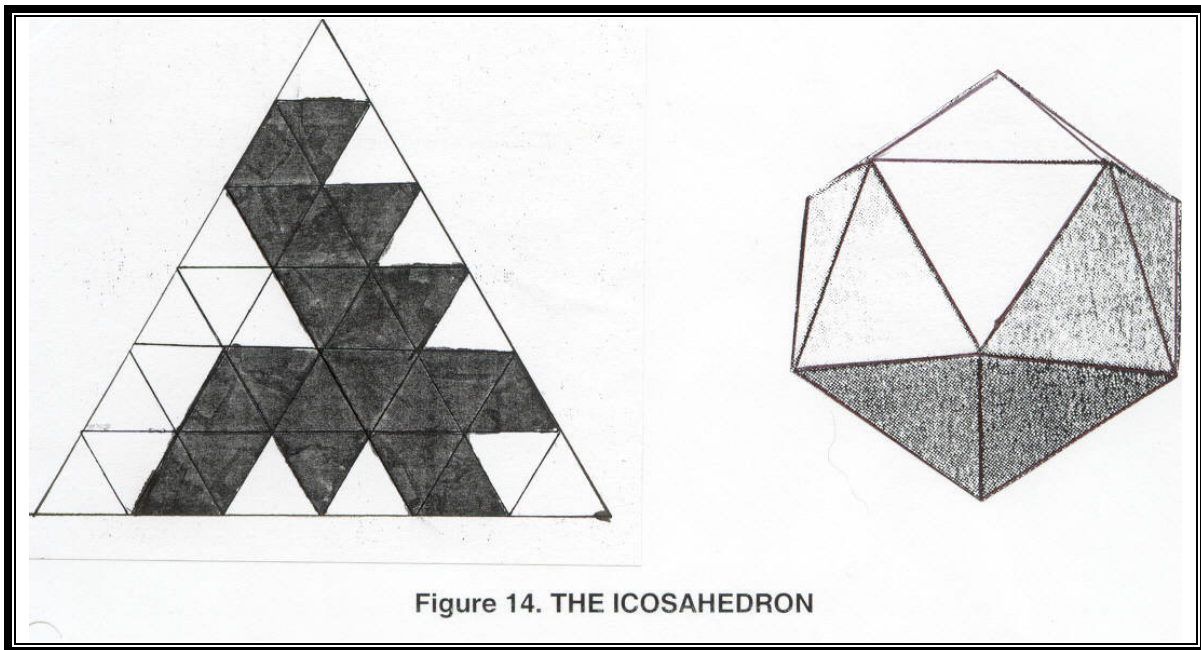
Figure 14. THE ICOSAHEDRON

FIGURE 56.

Take one large equilateral triangle divided into 36 small equilateral triangles and eliminate 16 small equilateral triangles. You eliminate those 16 triangles by folding the on themselves. The remaining 20 small equilateral triangles will automatically form the complete ICOSAHEDRON. You will obtain that result by following steps:

1- Take a large equilateral triangle, and fold the 3 vertices to their common center. This will form 3 triangles folded on a hexagon.
2- Fold the hexagon into 6 equilateral triangles. Make sure the folds are very flexible, front and back.
3- Fold each of those 9 equilateral triangles into 4 smaller triangles. This will generate 36 small equilateral triangles. Color twenty triangles as shown above and fold them together into a complete ICOSAHEDRON.
4- Fold the remaining triangles on themselves, and pinch them inside of the solid.

13- CONSTRUCTING THE SPHERICAL CUBOCTAHEDRON.

Material.

Heavy cardboard, compass and divider, scalene triangles, pencil and eraser, scissors or board cutter, glue, and a lot of patience.

Construction

1. Take 3 great circles of 8 " diameter, and divide each into four equal arcs.

Fig. 57. Octahedron

Fig. 58. Cuboctahedron
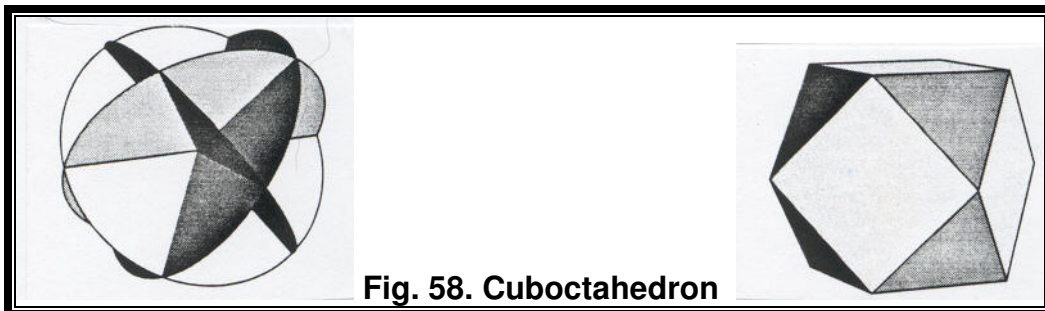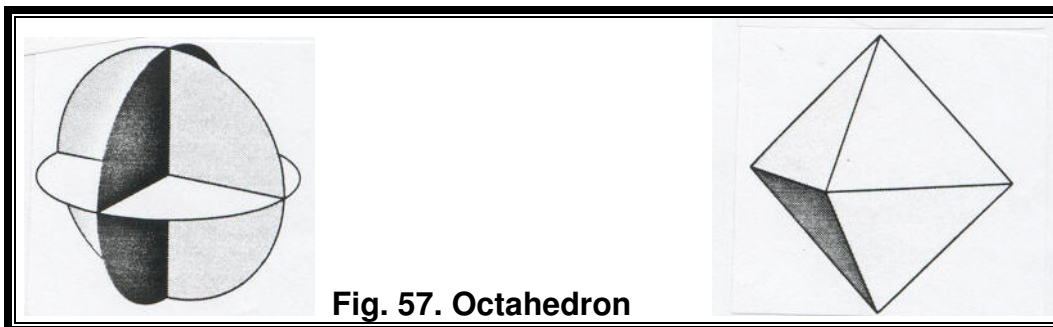
2. The surface of the sphere is made up of 8 equal spherical triangles. FIG. 57.

3. Take 4 great circles of 8" diameter, and divide each into six equal arcs. Fig. 58.

4. The surface of the sphere is made up of 6 regular spherical squares and 4 regular spherical triangles.

SOLUTION

THE TWO PLATONIC SOLIDS FORMED BY CLOSEPACKING OF 12 BALLS OF EQUAL SIZE ARE THE COMBINED CUBE AND OCTAHEDRON.
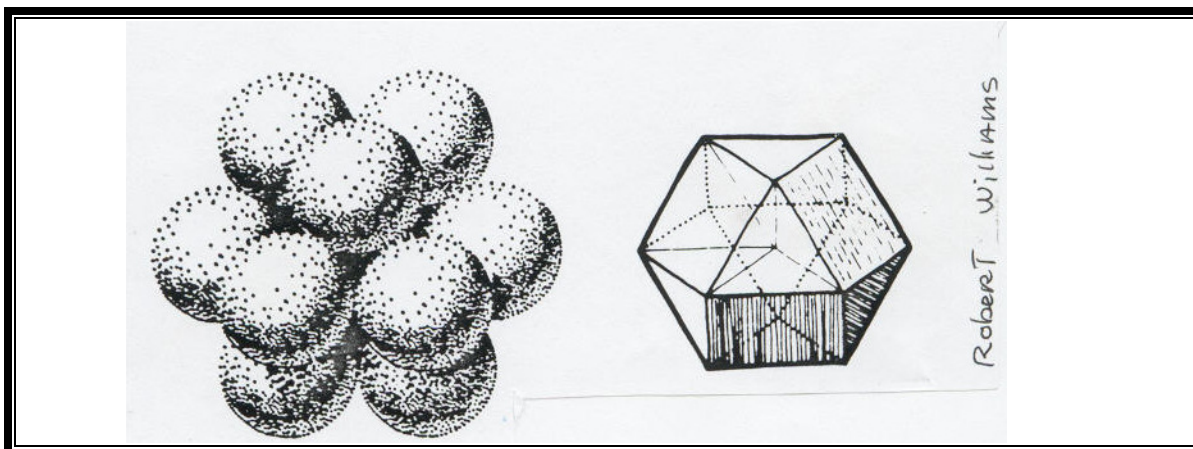
FIGURE 59.

THE CUBOCTAHEDRON

Why do you see only 9 spheres? Can you locate the three "GHOST SPHERES" that you don't see? Mark their positions on the Cuboctahedron.

14- WHY, IN LANTERNLAND, EPISTEMON PROMOTED THE METHOD OF SYNTHETIC GEOMETRY, INSTEAD OF ANALYTICAL GEOMETRY.

I must say, EPISTEMON was quite a genius, because he was always thinking, and would never fall in the trap of popular opinions. He would always claim that because the method of SYNTHETIC GEOMETRY was based on DISCOVERY, then, everything in it had to be CONSTRUCTIVE. He considered that if you did not CONSTRUCT YOUR KNOWLEDGE YOURSELF, somebody else would do it for you. This is why EPISTEMON was given that name, which means KNOWLEDGE in Greek. He did not like at all the idea of having someone else do his thinking for him. He claimed that everyone should become, as early as possible, a self-made independent thinker.

In the CONSTRUCTIVE method, what you discover is always something new that you did not expect, a sort of surprise, like solving a puzzle that seems impossible to solve. This kind of geometry starts with a human experiment of COGNITION, and not with an apriori abstraction. EPISTEMON thinks that constructing puzzles and paradoxes is the best method to establish an experiment, and to discover the COGNITIVE POWER of your mind. He says that this is the best way to discover WHERE THINGS COME FROM, HOW THEY ARE CREATED, and WHAT SORT OF THE PROCESS GENERATES THEM. When you investigate these questions, you discover contradictions that you try to resolve. You discover things that exist, and do not exist at the same time. For example, the PARADOX of NICHOLAS of CUSA who talks about an infinite straight line that is also an infinite circle. Now, try to imagine that. The CONSTRUCTIVE method makes you discover that behind things, there exist PROPORTIONALITY, SELF-SIMILARITY, and CIRCULAR ACTION. The mastery of this method does not require NUMBERS or ALGEBRAIC FORMULAS. And, you are even allowed to make mistakes. In fact, if you make the same mistake more than once, it is no longer a mistake. Since it keeps coming back, it becomes a BOOMEWRONG.

EPISTEMON banned ALGEBRAIC FORMULAS on principle. He said that unless you can demonstrate how it is constructed, you should never use an algebraic formula. Ultimately, for the MIDNIGHT OILERS, the only form of measurement allowed in CONSTRUCTIVE SYNTHETIC GEOMETRY is PROPORTIONALITY and MULTIPLY-CONNECTED-CIRCULAR-ACTION.

EPISTEMON said there was a long list of SYNTHETIC GEOMETERS that we should get acquainted with by reliving their discoveries. They are THALES, PLATO, ARCHIMEDES, NICHOLAS OF CUSA, PACIOLI,

LEONARDO DA VINCI, KEPLER, PASCAL, LEIBNIZ, MONGE, CARNOT, PONCELET, STEINER, GAUSS, RIEMANN, and LAROUCHE. They have all practiced this method, each in their own way.

The motto for the SYNTHETIC METHOD is: "BELIEVE NOTHING THAT FOR WHICH YOU CANNOT GIVE YOURSELF A CONSTRUCTIVE PROOF."

On the other hand, EPISTEMON considered that the ANALYTICAL METHOD, otherwise known as the ALGEBRAIC METHOD, was an insidious idea based on LEARNING FORMULAS. He rejected it because it only gave the appearance of having knowledge. "The FORMULAS do the thinking for you," he claimed, "and are based on the simplistic logic of induction and deduction." Just like on television. In the ANALYTICAL method, what you discover is always already included in the FORMULA, and all you have to do is LEARN AND MEMORIZE. Don't ask where an ALGEBRAIC FORMULA is generated from, no one is able to tell you. All that a mathematician can say is that the FORMULA WORKS, and it impresses people. That is why EPISTEMON calls them MATHEMAGICIANS. He says that, after a prolonged use of ALGEBRAIC FORMULAS, your mind becomes mushy and lazy, because you have taken the habit of letting the FORMULA do the work for you. The purpose of the ALGEBRAIC FORMULA is precisely to eliminate and destroy your power of COGNITION. Ask a FORMULA anything. It cannot answer you. It can only repeat the same thing, over and over again.

"A FORMULA is like a recipe, " concluded EPISTEMON, "it makes you forget how to cook. Throughout history, ARISTOTLE, EUCLID, GALLILEO, NEWTON, DESCARTES, KANT, EULER, LAPLACE, CAUCHY, RUSSELL, VON NEWMAN, have all been very bad cooks."

The motto of the ANALYTICAL method of LEARNING is: TRUST ONLY MATHEMATICAL FORMULAS, THEY WILL GIVE YOU THE IMPRESSION OF HAVING POWER.

PART IV
SPHERICAL AND SPIROMETRIC ACTION: GEOMETRY OF TENSIDEDNESS.
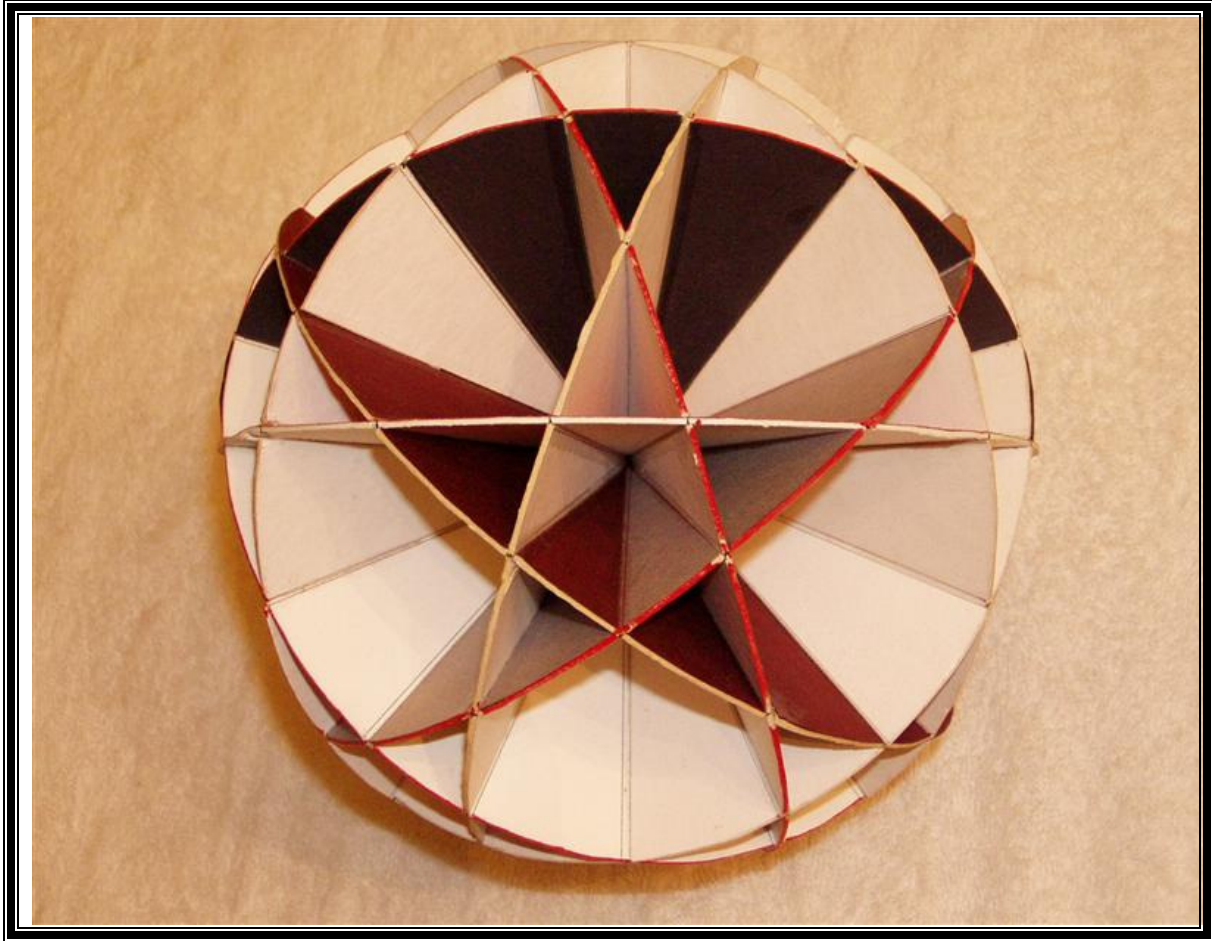
FIGURE 60.
THE TEN CIRCLE EGYPTIAN SPHERE

15- THE MIXING SIXSIDEDNESS AND TENSIDEDNESS IN A SINGLE SPHERE GENERATES THE GOLDEN SECTION.

This GOLDEN SECTION OF DIVINE PROPORTION is the favorite proportion that GOD used to create the universe as a whole. That is why He applied it to everything that is LIVING and GROWS, including the spiral galaxies, vegetables, animals, and human beings. The maple leaf is the simplest example of a Golden Section, because it is in the form of a pentagon. The natural angle that GOD chose for LIVING PROCESSES is called the SUBLIME ANGLE, which is the 36-degree angle of the DECAGON and of the PENTAGON. This is how the circle came to have 360 degrees, that is, 10 times 36 degrees. Geometrically speaking, the best way of generating the SUBLIME ANGLE, and the GOLDEN SECTION of the DIVINE PROPORTION, is in the form of close packing of 10 great circles into a SPHERE containing all of the 5 Platonic Solids plus the angular determination for the slope of the Great Pyramid of Egypt.

FIGURE 61.
The Great Pyramid Star-Dodecahedron

16- HOW, BY ASKING JINGLING QUESTIONS, EPISTEMON DISCOVERED THAT SOME SHADOWS DID NOT CORRESPOND TO THE OBJECTS THAT CAST THEM.
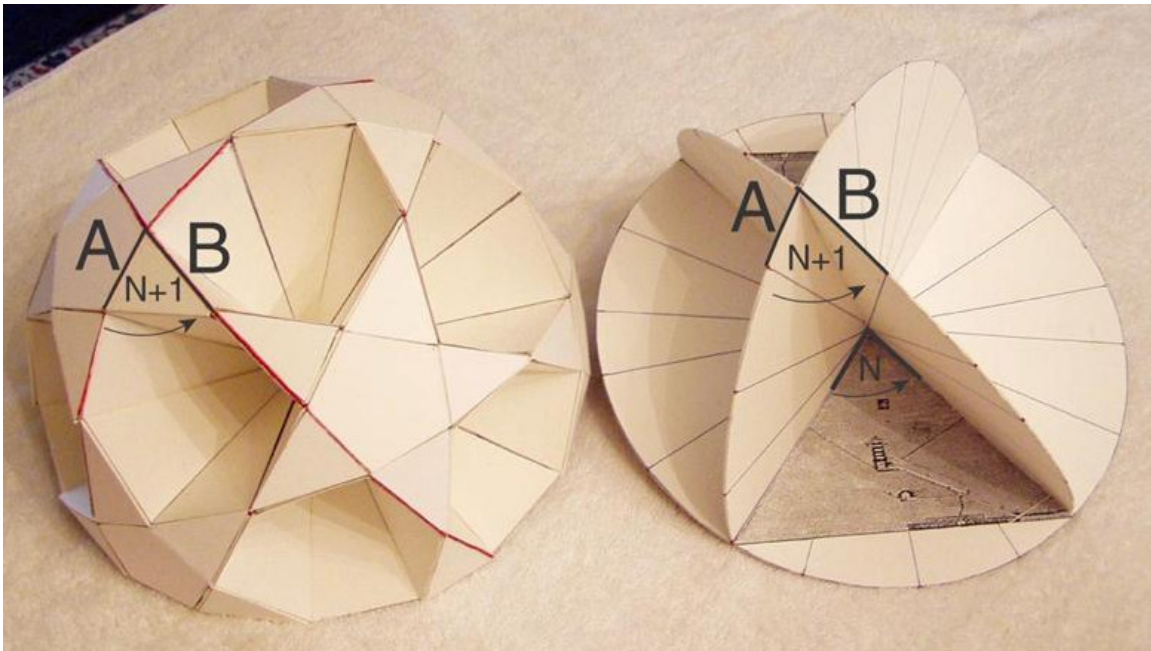
EPISTEMON always had curious questions to jingle your mind with. Here are some of the questions that he asked me, when I visited with him in LANTERNLAND, and to which I could not give answers. Maybe you can help me answer some of them. Rattle this jinglingly through your brain. For example, he asked:

"WHY IS IT THAT YOU CAN ONLY SEE HALF OF ANYTHING?"

"That is not true," I said. "I always see the whole of anything I look at."

"Not true," said EPISTEMON, "look at my portrait with the DODECAHEDRAL LANTERN. (FIGURE 12.) See how half of me lies in the shade. Now ask yourself: 'Why is it that half of anything under the sun is always in the shade?' If you can find the answer to that question, then, you will understand why you cannot see the totality of anything."

EPISTEMON said this was very useful to know, because, with this idea, he could more easily count the number of faces on a LANTERN. "What is the maximum number of faces that you can see on my DODECAHEDRON LANTERN?" he asked me? I counted all the faces I could see in one sighting, and I answered: "6 faces." "Then the dodecahedron must have 12 faces," he replied. "You see," said EPISTEMON, "since the maximum you can see is half, then multiply by two the maximum number of visible faces of a LANTERN, and you will know the total amount of faces the whole LANTERN has, and in this way, you will know the number of sides that are in the shadow, and you will be able to discover the INTENTION of the whole composition!

"This," said EPISTEMON, "also applies to the history of 10 thousand years of civilization."- "I fail to see the connection," I replied. "What does history have to do with half of a LANTERN?" -- "History," he said," has always been manipulated by ruling magicians called OLIGARCHS, just like those that you have found in FLATLAND. They manipulate the visible side of events in order to make them look real and truthful. That is how they shape the OPINIONS of unthinking people, that is to say, POPULAR OPINION. However, these historical events cast shadows that reveal the INTENTION of a different story, and it is by unraveling the INTENTION OF THE SHADOW STORY that you are able to discover the truth."

"Take, for instance, the historical event that is reported in most of the history books, and which is supposed to have started the AMERICAN REVOLUTION." "What is that," I asked? "The BOSTON TEA PARTY," answered EPISTEMON. "As the popular story goes, the AMERICAN REVOLUTION was started by a bunch of TAX REVOLTERS who refused to pay the toll on a BRITISH cargo of tea that was held in the Boston harbor. The protest is said to have turned into a revolution, when the colonists disguised themselves as Indians, and threw the British Tea overboard into the sea. This is the cover story that the British like to tell, because they always like to identify the Americans as dummies, and fools in the eyes of the rest of the world. So, that has become the official version of this historical event." -- "You mean to say that it was not the TAX REVOLTERS who started the AMERICAN REVOLUTION," I asked. "No," said EPISTEMON.

"The true story, however, which is the SHADOW STORY behind this simplistic interpretation, is much different than that, and most American citizens don't even know it. The AMERICAN REVOLUTION was started by a very courageous group of scientific giants like, BENJAMIN FRANKLIN, GEORGE WASHINGTON, ALEXANDER HAMILTON, and others from Europe, who decided to break with the despotic policy of free trade, the policy of the BRITISH EMPIRE." -- "Wow," I said, "I always thought that the UNITED STATES had inherited the free trade tradition from JOHN LOCKE and ADAM SMITH." 'Not at all," continued EPISTEMON, free trade was totally rejected by the forefathers of the UNITED STATES, because FREE TRADE meant that YOUR LABOR IS FREE; that is, you work for nothing. The plague of SLAVERY in the United States was a residue of this BRITISH FREE TRADE."

"That is quite a different story," I replied with increasing interest. "But, why was this story never told?" -- "Because AMERICAN HISTORY has always been controlled by a treasonous faction that has control over the media of information, and the school system," pursued EPISTEMON, "like the BOSCO SCHOOL in LEESBURG Va. It passes for a CHRISTIAN SCHOOL, but it is, in reality, a GNOSTIC SCHOOL. You see, the forefathers rejected the despotism of Great Britain, and its ANTI-CHRISTIAN FREE TRADE policy which is against the PUBLIC GOOD." – "What is the PUBLIC GOOD." I asked. "The PUBLIC GOOD," replied EPISTEMON, "is when a people agrees to govern themselves into a republic, with the Platonic idea of justice for all; that is, AGAPE, for the very word REPUBLIC means "PUBLIC GOOD." And, this PUBLIC GOOD is in contradiction with the good of a monarch, or a monarchy, and with the good of ruling families, or an oligarchy. That is why the Preamble of the U.S. CONSTITUTION calls for the promotion of the GENERAL WELFARE of all of the people, and the BILL OF RIGHTS declares that all men are created equal, and are endowed with inalienable rights, like the right to life, liberty and the pursuit of happiness.

"Furthermore, the POLITICAL ECONOMY OF THE UNITED STATES is based on the commonwealth philosophy of COTTON MATTERS whose intellectual tradition comes from the GREECE of PLATO, the CHRISTIAN AUGUSTINIAN MOVEMENT, the ITALIAN RENAISSANCE, the FENCH tradition of LOUIS XI, and COLBERT, and the German tradition of LEIBNIZ and MENDELSON. The very idea of the commonwealth established the SOVEREIGN NATION STATE, which was committed to educate its citizens on the model of the philosopher king that was BENJAMIN FRANKLIN who was dedicated to cultural, scientific, and technological progress.

"You see," concluded EPISTEMON, "all of this was part of the INTENTION hidden in the shadow of the BOSTON TEA PARTY." – "Yeah," I added, " the truth of the matter is more like my cup of tea."

THE BOSTON TEA PARTY
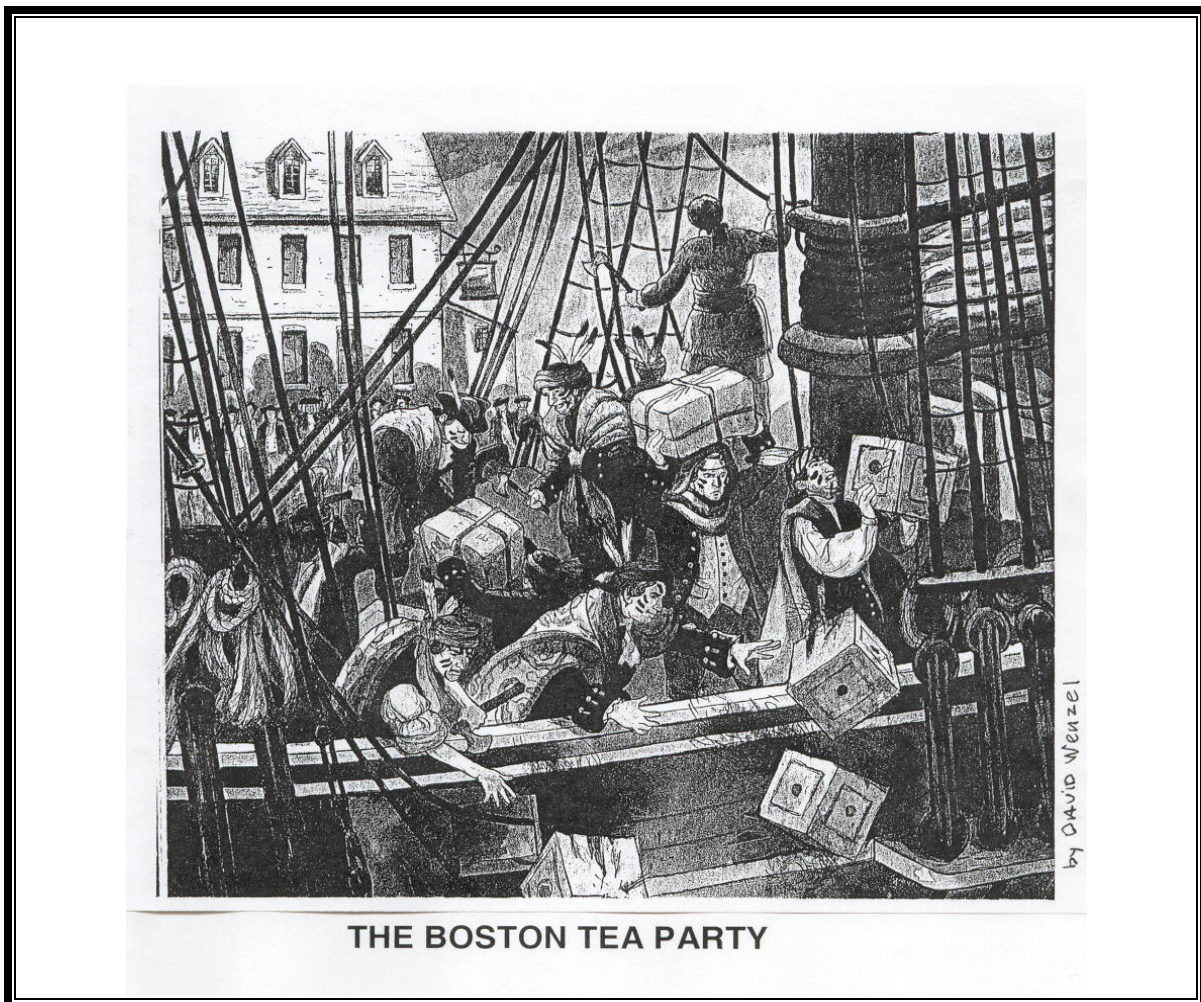
FIGURE 62.

17- HOW THE ANCIENT GREEKS CONSTRUCTED THE FIVE STARRED PENTAGON INSIDE OF A CIRCLE, AND HOW EPISTEMON DISCOVERED AN EASIER WAY BY FOLDING A STRIP OF PAPER.

How do you inscribe a regular pentagon inside of a circle?

Construction

1. Draw a circle with a 4" diameter.

2. Draw a diameter AB and a radius CO.
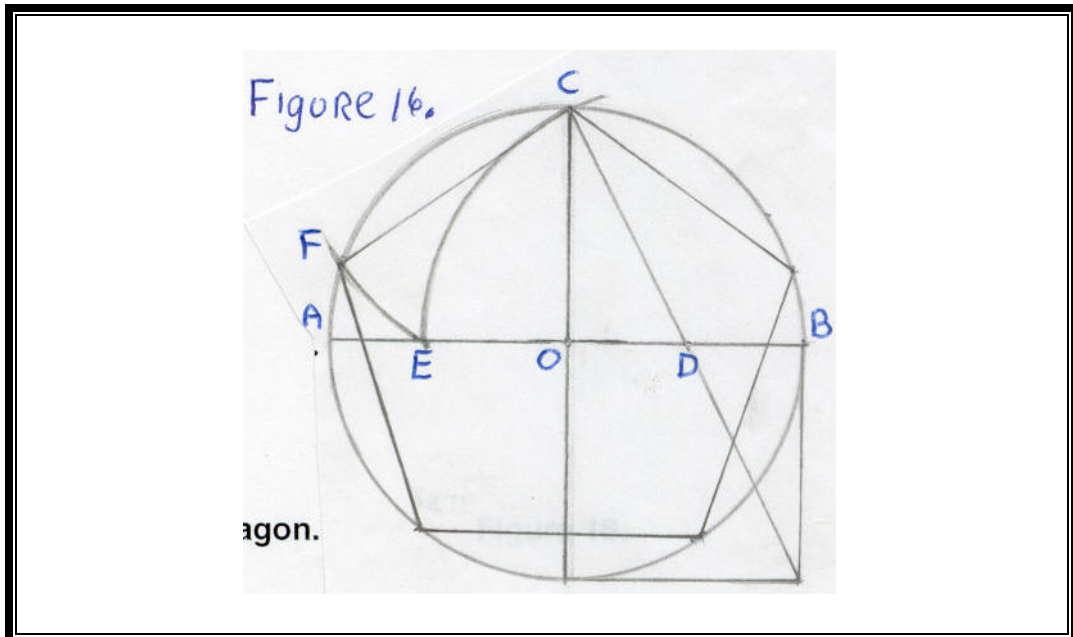
FIGURE 63.

3. Bisect OB at point D.

4. With D as a center, and radius DC,
   draw arc CE. Fig 16.

5. With C as a center, and radius CE,
   draw arc EF. CF is the side of the pentagon.

HOW EPISTEMON BUILD THE PENTAGON AND THE SUBLIME TRIANGLE WITH A STRIP OF PAPER.

**1. Take a strip of calculating Machine paper and make
A knot with it.**
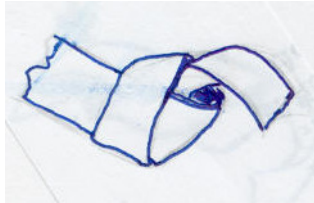
**FIGURE 64.
Knot**

**2. Pull in the corners snugly and pinch the edges to make the
SUBLIME ANGLE. The Result will be a pentagon.**
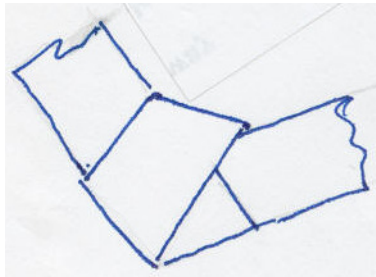
**FIGURE 65.
Pentagon**

Problem

Do you know what your Golden Section is? Did you know that, in the WHOLE UNIVERSE, everything grows according to the Divine Proportion? Do you know how Luca Pacioli, and Leonardo da Vinci, discovered the Golden Section of Divine Proportion?

Examples

Figure 20. Leonardo's Man
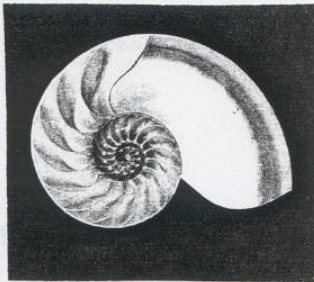
Figure 21. The nautilus sea shell.
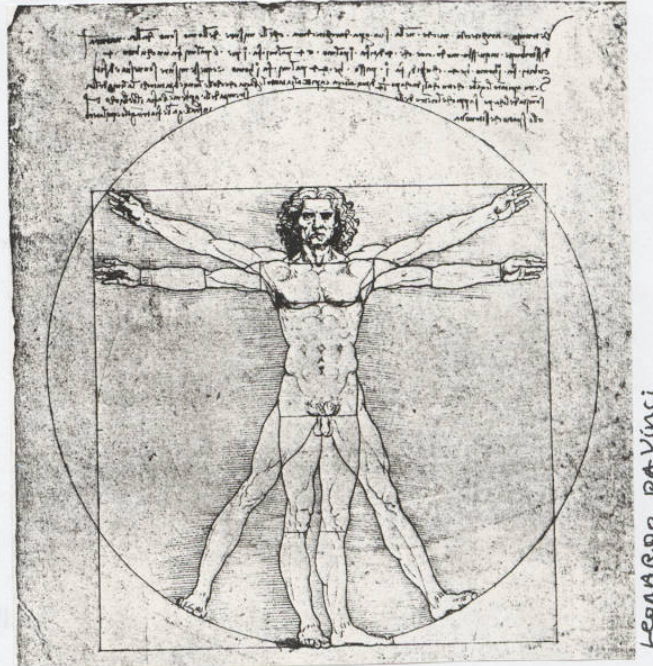
Figure 22. The Parthenon of Athens.

$$\frac{A}{B'} = \frac{B'}{B}$$

P. BEAUDRY
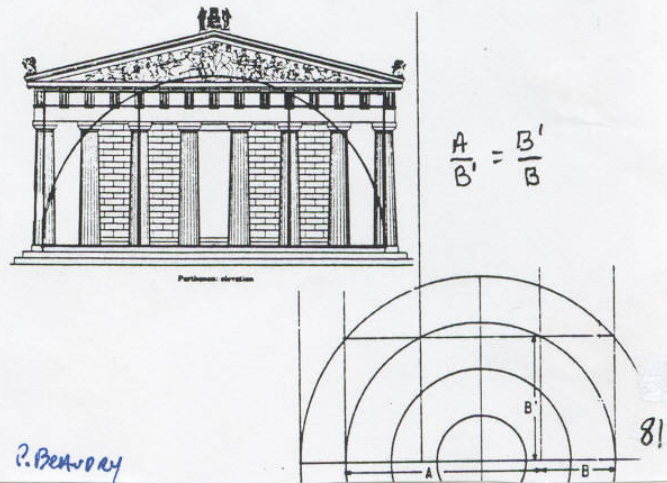
FIGURE 66.

18- PANTAGRUEL'S CONSTRUCTION OF A FOLDED DODECAHEDRON USING A SINGLE STRIP OF PAPER.

This construction of the dodecahedron requires a long band of calculating machine paper to be folded into a continuous series of 20 pentagonal knots. The construction is based on the pattern discovered above, by **PANTAGRUEL**, and that he called his **SPIROMETRIC METHOD** of twisting, rotating, spiraling, knot-making, inverting, squeezing, flattening, pinching, folding, overlapping, and scotch-taping of a paper band, for the construction of **PLATONIC SOLIDS**. It is both an unusual, and a controversial form of spherical spiral action; unusual, because the use of twisting, rotating, spiraling, knot making, inverting, squeezing, flattening, pinching, folding, overlapping, and scotch-taping, is not customary in **EUCLIDEAN GEOMETRY**; controversial, because it introduces a number of anomalies, and paradoxes, which cannot be explained either by **EUCLIDEAN GEOMETRY**!

FIGURE 20. PANTAGRUEL WITH HIS PENTAGONAL SERIES.
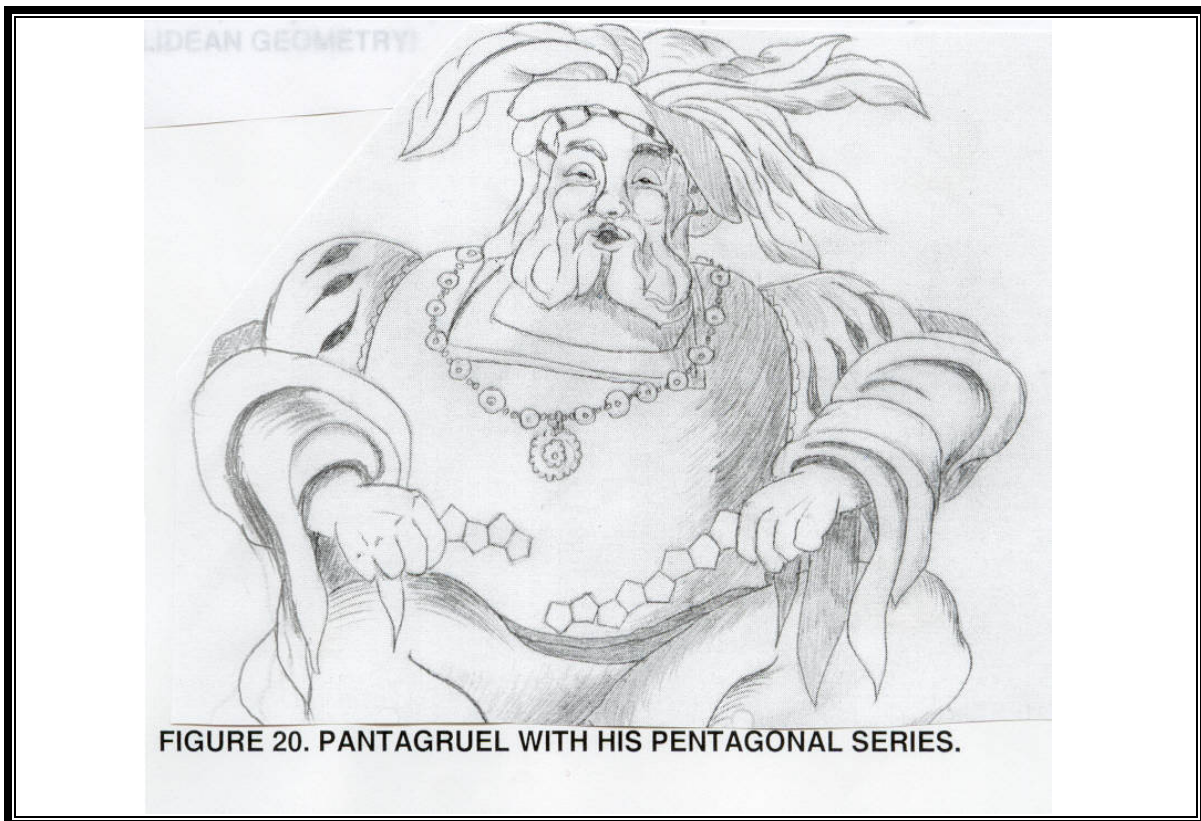
FIGURE 67.

To make the construction simple, don't make the strip too long. Make 2 or 3 pentagons, at the most, with a single strip, and attach them firmly and tightly together, as you go along. The completed dodecahedral series of 20 pentagons will look like a long DNA strand in a continuous spiral pattern.
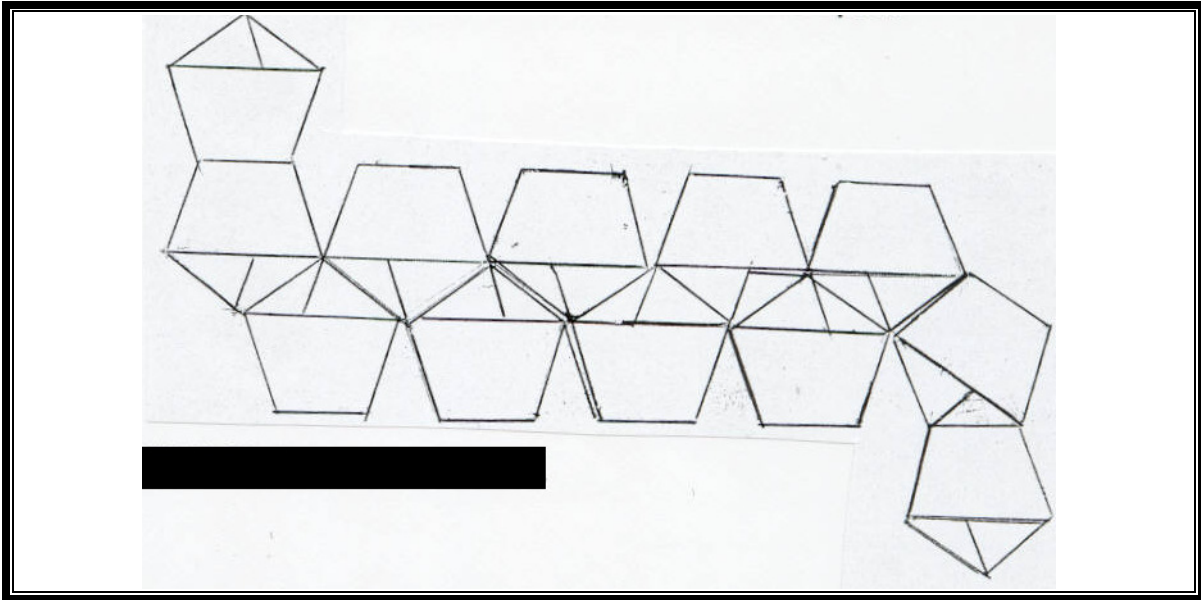
FIGURE 68.   Pentagons folded 2 by 2.

Take that long strand of 20 pentagons and fold them, 2 by 2, to get 8 doubled pentagons. Unfold the first and the last in such a way that the 2 first, and the 2 last pentagons are singles. Attach them firmly together as shown in FIGURE 69.

FIGURE 69.

Form

Crystals of the same mineral may not look alike. The same faces on two crystals may be different sizes and therefore form different-shaped crystals. Crystals may also grow with a variation of "form." Shown here are three forms found in the cubic crystal system, illustrated by pyrite.

Studies of the transformation of geometrical bodies from Leonardo da Vinci's sketchbook

CUBE
A form of six square faces that make 90° angles with each other. Each face intersects one of the fourfold axes and is parallel to the other two.

OCTAHEDRON
A form of eight equilateral triangular faces, each of which intersects all three of the fourfold axes equally.

PYRITOHEDRON
This form consists of 12 five-sided faces. It is also known as a pentagonal dodecahedron.

Below: Diagram to show the relationship between different cubic forms

Dodecahedral face

Octahedral face

Cubic face

Octahedron | Cube and octahedron | Cube | Cube and pyritohedron | Pyritohedron

COMBINATION OF FORMS
These crystals show cubic faces combined with octahedral faces with poorly developed dodecahedral faces blending into the cubic faces.

FIGURE 70.
Crystal Pyrithohedron

FIGURE 71.
Platonic solid dual transformations

19- CONSTRUCTING THE SPHERICAL ICOSADODECAHEDRON.

5. Take 6 great circles each of 8" diameter, and divide each into 10 equal arcs. Fig. 25.
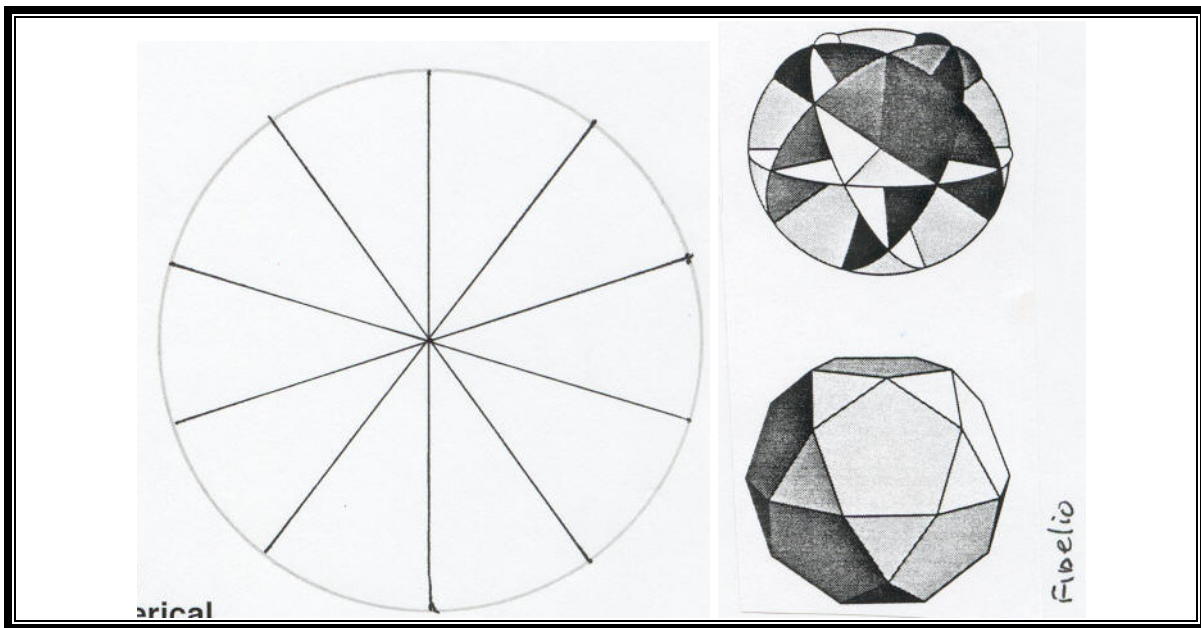
FIGURE 72.
Icosidodecahedron

6. The surface of the sphere is made up of 12 regular spherical pentagons, and 20 regular spherical triangles.

PART V
THE SPHERICAL GOLDEN SECTION:
THE MIXTURE OF SIXSIDEDNESS
AND TENSIDEDNESS.

FIGURE 73.
THE SCHOOL OF ATHENS BY RAPHAEL SANZIO (1483-1520)

20- HOW RAPHAEL PAINTED THE IDEA OF SIMULTANEITY OF TEMPORAL ETERNITY, AND BROUGHT PAST DISCOVERIES TOGETHER INTO A SINGLE TIME AND PLACE.
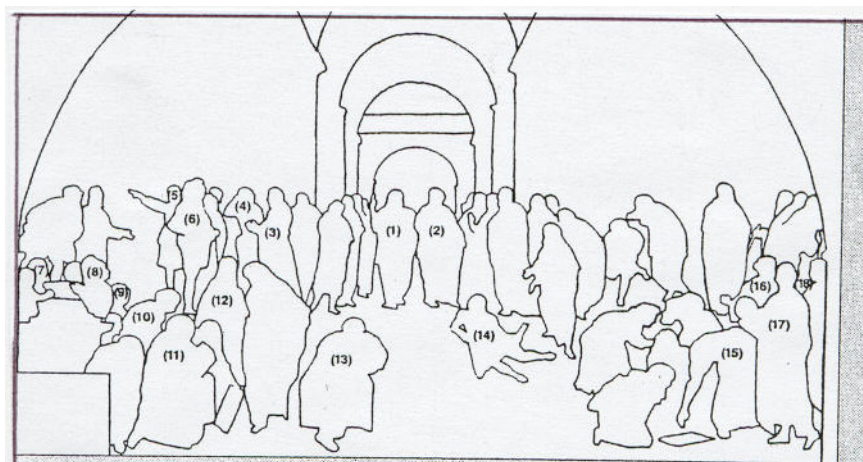
Above: Personalities gathered together by Raphael. (1) Plato, (2) Aristotle, (3) Socrates, (4) Xenophon, (5) Æschines, (6) Alcibiades, (7) Zeno, (8) Epicurus, (9) Federico Gonzaga, (10) Averroes, (11) Pythagoras, (12) Francesco Maria Della Rovere, (13) Heracleitus, (14) Diogenes, (15) Archimedes, (16) Zoroaster, (17) Ptolemy, (18) Raphael's self-portrait. (Diagram courtesy of Vatican Museums.)

Raphael Sanzio, "The School of Athens" (1509).

FIGURE 74.
THE PERSONNALITIES OF THE SCHOOL OF ATHENS

"Since you are all eager to hear, let me tell you the story of RAPHAEL'S discovery," said EPISTEMON, "I will tell you what I know about it. Every person in the world should get a chance, at least once in a lifetime, to stand before this painting, and relive the discovery of principle that RAPHAEL made in his SCHOOL of ATHENS, which is in the Vatican. There, you shall find one of the greatest fresco masterpieces of all times, showing a large assembly of past discoverers, and also a self-portrait of RAPHAEL, bringing to your attention the method of pure SYNTHETIC GEOMETRY by which he brought all of these people together, including himself, into a unique location.

"This unique event, in the history of Art, is nothing but a pictorial representation of the location of SIMULTANEITY OF TEMPORAL ETERNITY that RAPHAEL developed, as if from inside of his own mind. That location is very special, because it is the most intimate place where all of your true friends come together, and relate to each other and to you in a more intimate way than do the children in your classroom. These friends," said EPISTEMON, "who come from different places and times, and that RAPHAEL has never met in real life, are closer to him than the people of his own town, and even of his own family. This assembly of discoverers is not a fantasy. It is the MEETING PLACE of the CREATIVE ACTIVITY OF THE MIND. It is the workshop of EFFECTIVE CREATIVE CHANGE caused by these discoverers, a PHASE SPACE more real, in this absolute timelessness of centuries, than the space and time of RAPHAEL'S ordinary daily life. That is the ETERNAL PHASE SPACE OF CHANGE that PLATO had identified as CHORA, in the TIMAEUS, the receptacle for the generation of everything that exists."

Then, EPISTEMON indicated how the principle of this PHASE SPACE worked geometrically with the group of discoverers located to the right of the painting (15) ARCHIMEDES, (16) ZOROASTER, (17) PTOLEMY, and (18) RAPHAEL'S SELF-PORTRAIT. Concentrate on the student looking up at the spheres, and pointing to the geometric drawing of ARCHIMEDES, down on the floor. "What is he discovering?" asked EPISTEMON. "What he is pointing to represents the principle of change. ARCHIMEDES has drawn a STAR OF DAVID which is the sketch of the entire architecture of the fresco, and out of which can be lifted and transformed all of the PLATONIC SOLIDS, as if each and all were generated from a sphere. This sketch illustrates the very BOUNDARY CONDITION of RAPHAEL'S mind, the boundary principle of his true identity. TELL ME WHAT YOU HAVE DISCOVERED AND I WILL TELL YOU WHO YOU ARE." added EPISTEMON.
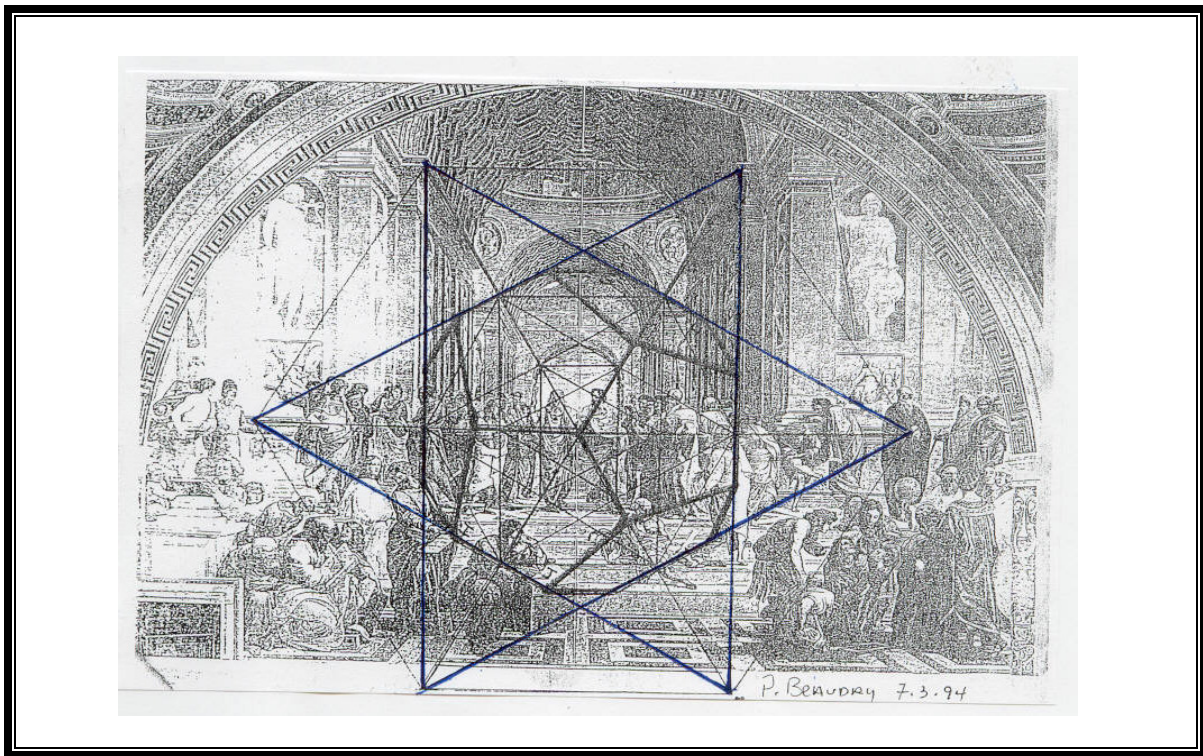
FIGURE 75.
Dodecahedral insight for the School of Athens architectonic.

Some people say this is a trick of linear perspective, others call it magic. Don't believe everything you hear or see. In LANTERNLAND, our friend EPISTEMON called it INSIGHT; that is, the length of the internal light inside of your mind's eye. That length, it turns out, corresponds precisely to the cavity of PLATO'S CAVE," said EPISTEMON. "And, I should add for your instruction, that in LANTERNSPEAK, INSIGHT also means WISE DISCERNMENT of what lies below the surface, the discovery of which is only achieved by the eyesight of the mind, not by the eyesight of the body."

EPISTEMON went on to say: "RAPHAEL chose the method of SIMULTANEITY OF TEMPORAL ETERNITY, because this is the means by which an individual human being, who has a short mortal life span, is capable of communicating with the PAST, the PRESENT, and the FUTURE, and share his discoveries with all of humanity, throughout all times. Such are the greatest moments in any human life because these discoveries represent the principle by which humanity grows and grows, from century to century. If you wish to have such an experience, then, you too can make

**such a discovery and share it with your friends. So, my question to you,"
said EPISTEMON is: "CAN YOU RELIVE SUCH A MOMENT OF DISCOVERY
BY RECONSTRUCTING THE INSIGHT OF RAPHAEL'S SCHOOL OF
ATHENS?"**
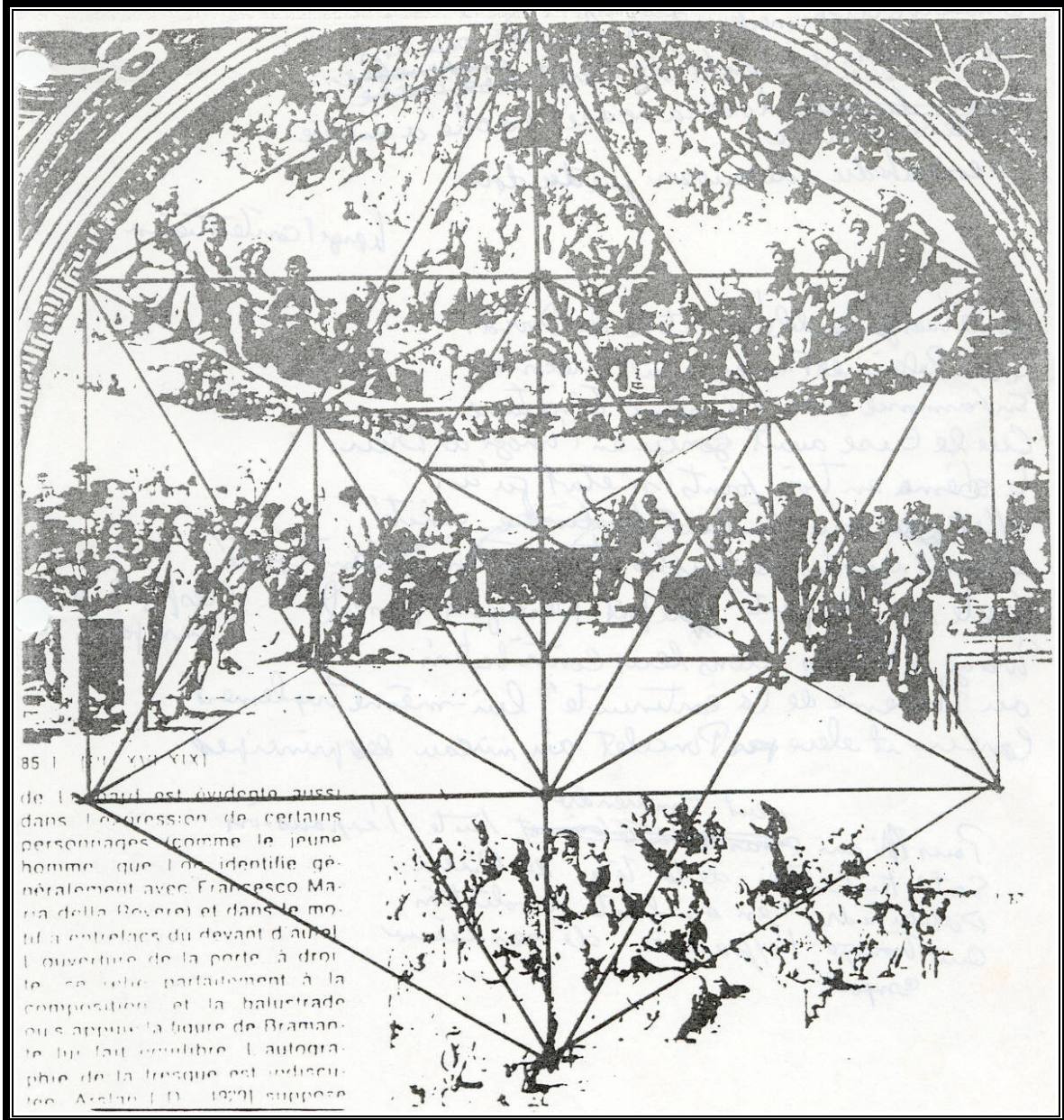
**FIGURE 76.
Icosahedral architectonic in the Dispute of the Holy Sacrament**

THE ARCHIMEDES STAR OF DAVID PARADOX
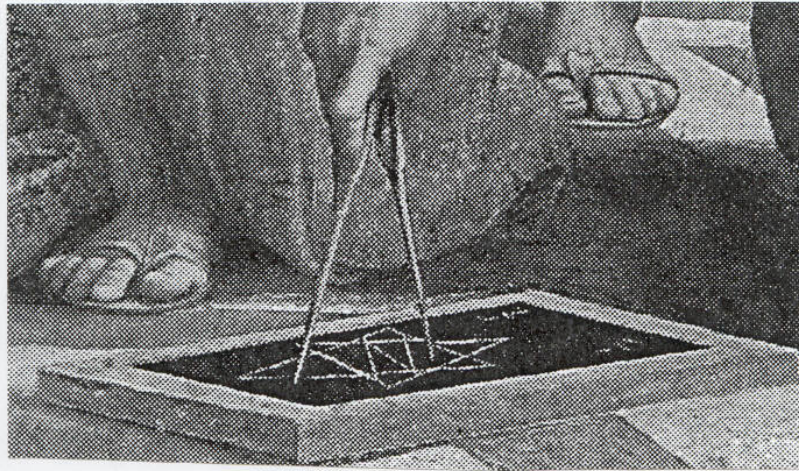
DETAIL OF THE SCHOOL OF ATHENS

Take a compass and two scalene triangles and construct a Star of David, like this. This is similar to the construction that Archimedes has drawn on his tablet, in RAPHAEL'S painting.

The hexagonal geometry is the geometry of the flat plane which only bees have been able to elevate to a higher dimension, and produce golden honey from it.

Inscribe points of decagons marking a golden section along the hexagonal radii of the Star of David. Project lines from the six points of the hexagon, as if from the inside of a sphere, to the six points of the decagons. You will see emerging from the plane a full size Kepler stellated dodecahedron. You can also generate the Poinsot great dodecahedron.

P. BEAUDRY
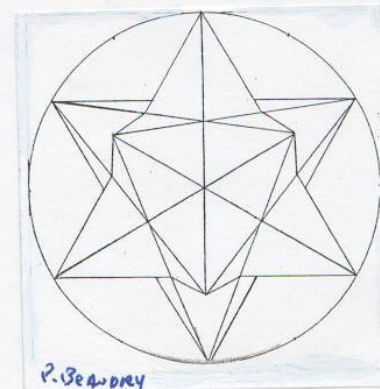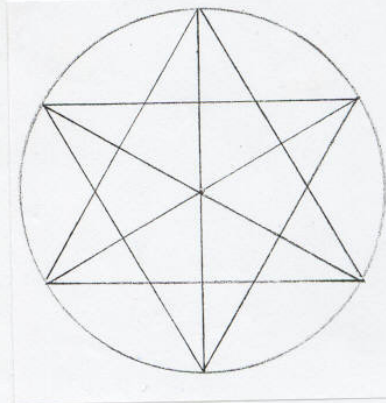
FIGURE 77.
DETAIL OF THE SCHOOL OF ATHENS

106

21- HOW CAN A STAR OF DAVID IN THE PLANE GENERATE 9 REGULAR SOLIDS, AND RAISE THEM FROM THE FLOOR OF THE SCHOOL OF ATHENS.
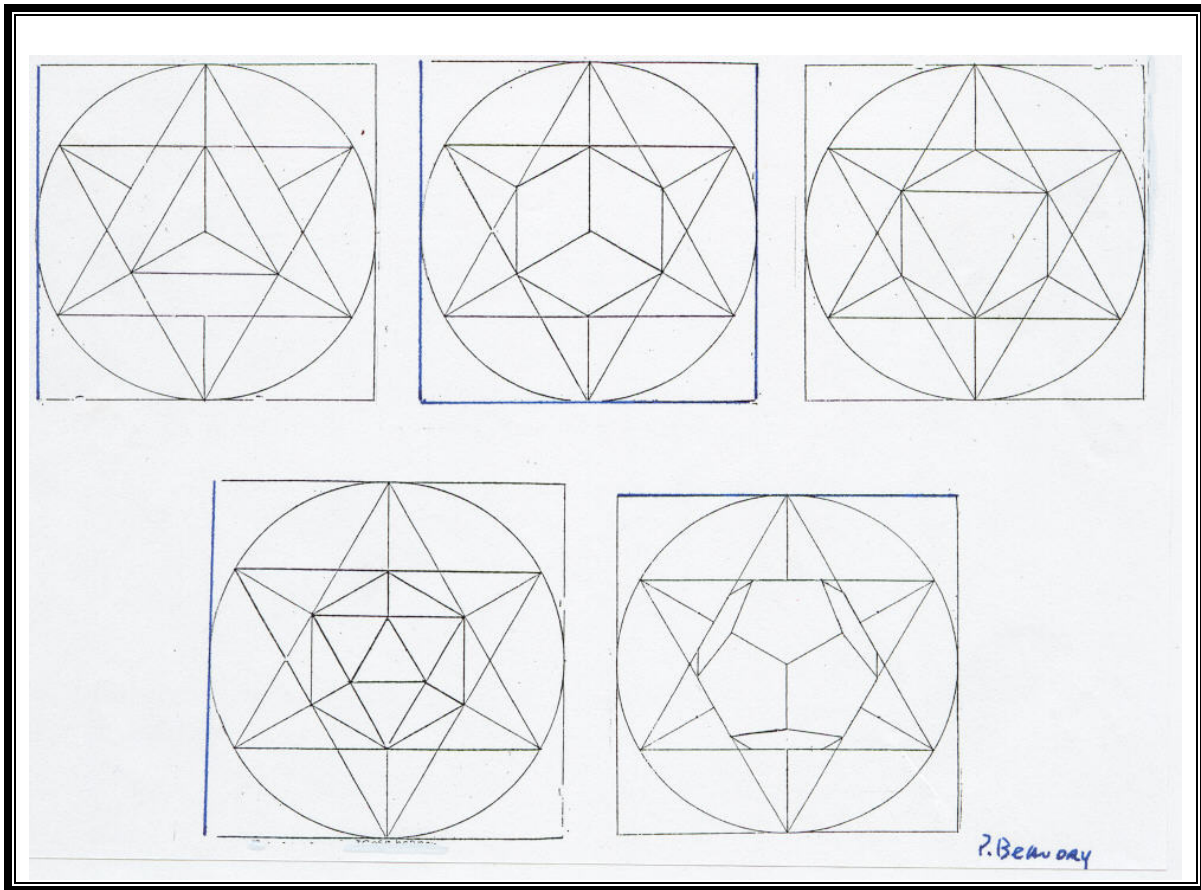
FIGURE 78.
THE FIVE PLATONIC SOLIDS
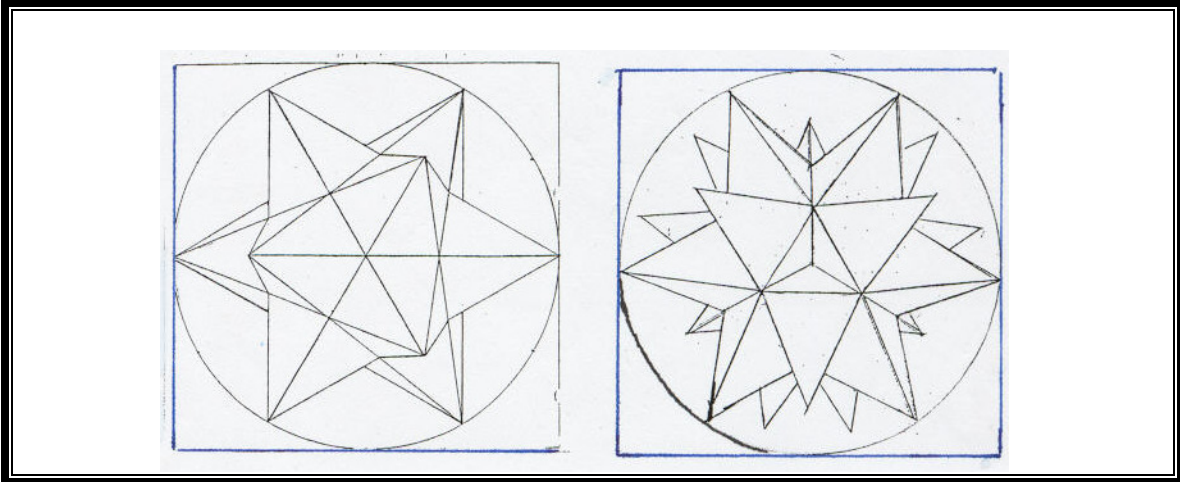
FIGURE 79.
THE KEPLER SMALL AND GREAT STELLATED DODECAHEDRONS
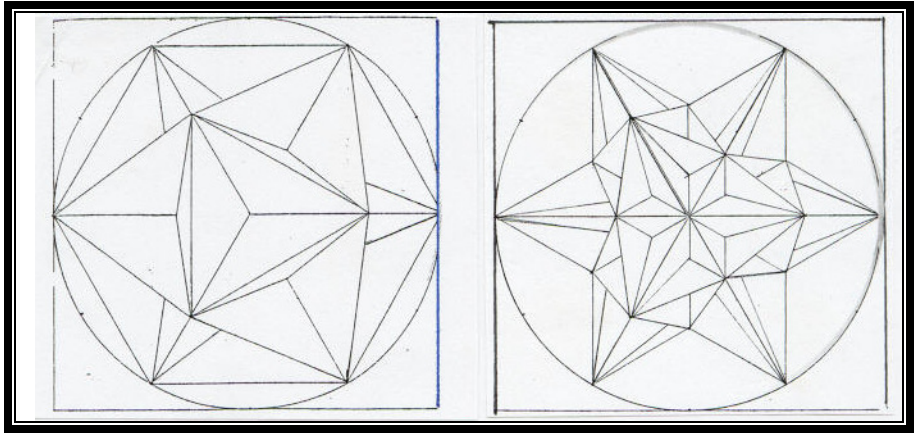
FIGURE 80.
THE POINSOT GREAT DODECAHEDRON AND GREAT ICOSAHEDRON.

22- CONSTRUCTION OF THE SPHERICAL "CHORA".

1. **Take 6 great circles divided into 10 equal parts, and 10 great circles divided into 6 equal parts. Fig.24. The whole mixture of 16 great circles will be everywhere divided into spherical golden sections, in the proportion of 10/6, or 5/3.**
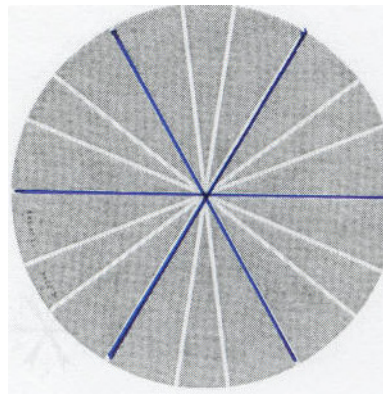
FIGURE 81.

2. **Insert mid section cuts of 15 degrees into the center of each of the six sided divisions. Then, construct half of the sphere with 5 six-sided circles and 3 ten-sided circles. The mixing of the hexagonal and decagonal angles will form the initial starred pentagon.**
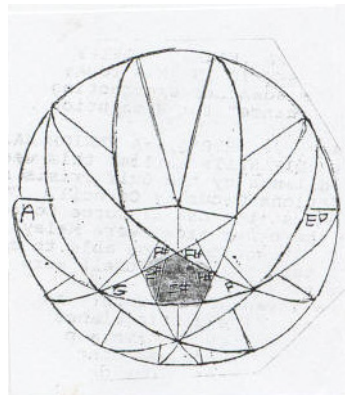
FIGURE 82.

3. **The complete surface of the sphere is made up of 12 regular spherical pentagons, 20 regular spherical triangles, 6 regular spherical squares, and 8 regular spherical triangles. The whole contains, or integrates, all of the five Platonic Solid.**
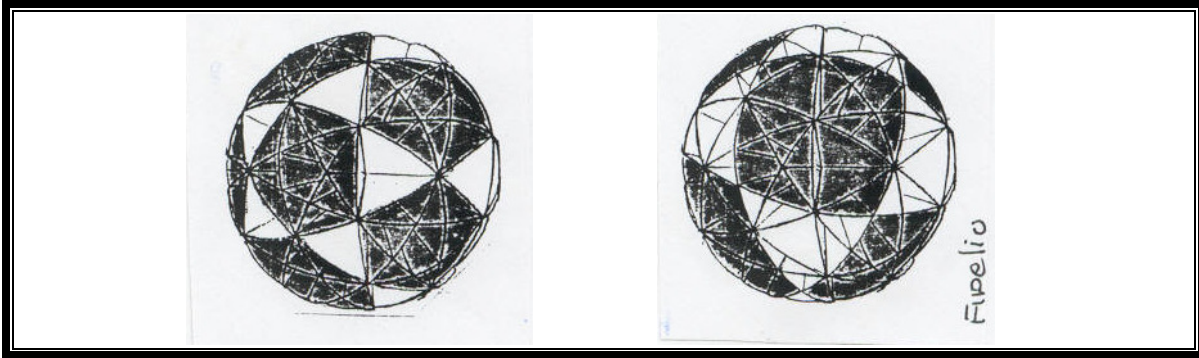
FIGURE 83.
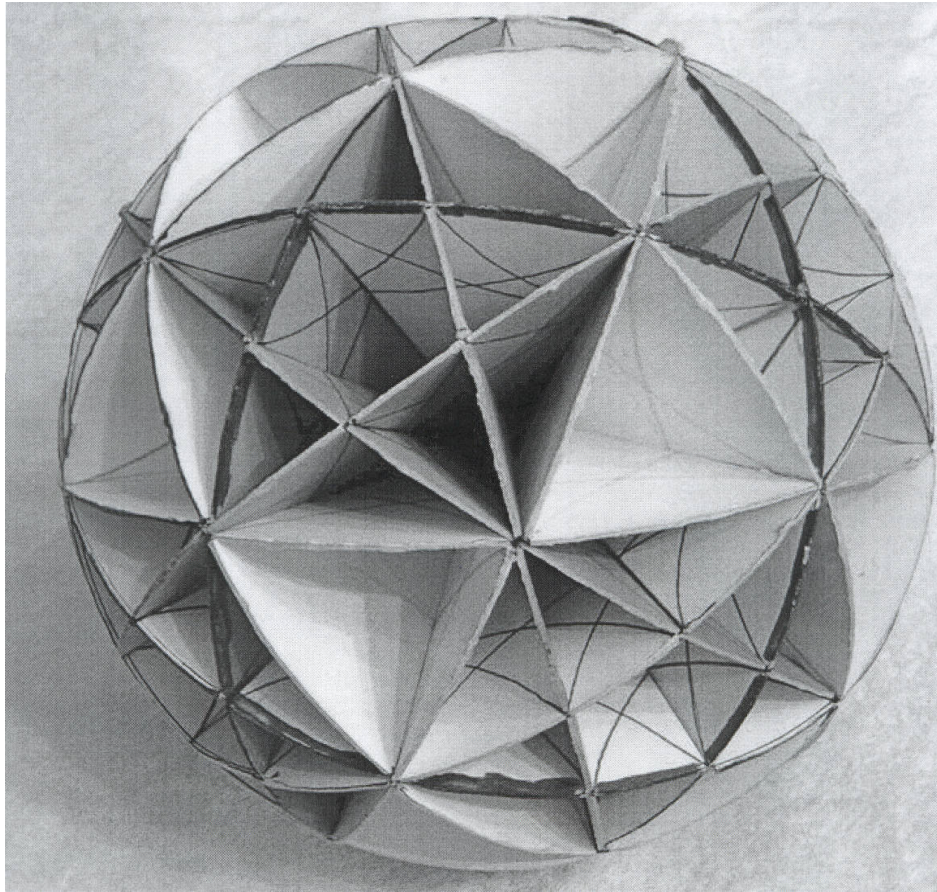
FIGURE 84.
"CHORA", THE NURSE OF PLATO

PART VI

LANTERNLAND AND THE NOOSPHERE

FIGURE 85.

LETTER TO THE SULTAN BY ILIA REPIN (1844-1930)

23- HOW THE COSSACKS DEFEATED THE SULTAN OF THE TURKISH EMPIRE BY USING LAUGHTER INSTEAD OF SLAUGHTER.

"A long time ago," said BACBUC, "in the region that is today known as UKRAINE, there were brave men, called SCYTHIANS, who were the ancestors of the COSSACKS. They were reported to be "ILLITERATE BARBARIANS," according to HERODOTUS, but this was not true. In fact, ARCHEOLOGICAL finds show that they were highly educated, and were master craftsmen in designing the finest GOLDWORK, during the time of ANTIQUITY, more than 5,000 years ago. The SCYTHIANS were expert horsemen, and excellent warriors, probably the finest in the world, at the time. They dominated the trade routes north and south along the BLACK SEA coast, through the CAUCASUS MOUNTAINS, and all the way to the GREEK mainland. By the period of about 500 B.C, the SCYTHIANS were at the height of their power and dominated the entire regions of modern-day RUSSIA and UKRAINE."

"Why were the SCYTHIANS considered to be 'ILLITERATE BARBARIANS?" asked FRIAR JOHN.

"Because they were brave and strong," said BACBUC, "and weak and ignorant people feared them. Powerful people are often slandered by weaker people, because they are feared for their great strength, and their powerful determination. In fact, let me tell you the story of a COSSACK leader named, IVAN SIRKO, who was a true RABLAISIAN GIANT.

"During the 17th century, UKRAINE was a constantly disputed borderland between CATHOLIC POLAND and MUSLIM TURKEY. In fact, the very name of UKRAINE means, "border." A most famous COSSACK settlement known as ZAPOROZHYE was located near the DNIEPER RIVER, on the border with TURKEY. In 1675, POLAND was forced to sign a treaty that surrendered ZAPOROZHYE to the TURKS. The COSSACKS had no intention of giving up their land, and kept sending raiding parties against the TURKS. One day, the SULTAN sent them an ultimatum. The letter said:

'SULTAN MAHMUD IV to the ZAPOROGIAN COSSACKS:

As the Sultan; son of Muhammad; brother of the sun and moon; grandson and viceroy of God; ruler of the kingdoms of Macedonia, Babylon, Jerusalem, Upper and Lower Egypt; emperor of emperors; sovereign of sovereigns; extraordinary knight, never defeated; steadfast guardian of the tomb of Jesus Christ; trustee chosen by God himself; the

hope and comfort of Muslims; confounder and great defender of Christians –I command you, the ZAPOROGIAN COSSACKS, to submit to me voluntarily and without any resistance, and to desist from troubling me with your attacks.'

Signed: TURKISH SULTAN MAHMUD IV.

SIRKO and his COSSACKS gave the following reply:

'The COSSACKS of the DNIEPER to the SULTAN of TURKEY:

Thou Turkish Satan, brother and companion to the accursed Devil, and companion to Lucifer himself, Greetings! What the hell kind of noble knight art thou? The Devil voids, and thy army devour. Never wilt thou be fit to have the sons of Christ under thee: thy army we fear not, and by land and on sea, we will do battle against thee.

Thou scullion of Babylon, thou wheelwright of Macedonia, thou beer-brewer of Jerusalem, thou goat-slayer of Alexandria, thou swineherd of Egypt, both the Greater and the Lesser, thou sow of Armenia, thou goat of Tartary, thou hangman of Kamenetz, thou evildoer of Podoliansk, thou grandson of the Devil himself, thou great silly oaf of all the world and of the netherworld and, before our God, a blockhead, a swine's snout, a mare's ass, a butcher's cur, an unbaptized brow, May the Devil take thee!

That is what the COSSACKS have to say to thee, thou basest-born of runts! Unfit art thou to lord it over true Christians!

The date we write not, for no calendar have we got; the moon is in the sky, the year is in a book, and the day is the same with us here as with thee over there, and thou can kiss us thou knowest where!

Signed: SIRKO and the ZAPOROGIAN COSSACK BROTHERHOOD.'

"Wow! That is quite a response." Said FRIAR JOHN. "What did the SULTAN have to say to that?"

"Well," said BACBUC, "as the story is told, the ZAPOROGIAN COSSACKS had such a GREAT LAUGH, in replying to the SULTAN, that the incredible sound of it was echoed all over EUROPE, and throughout ASIA, across the great steppes, through the canyon passages of the CAUCASUS MOUNTAINS that carried it like immense amplifiers. Thus, by the time the sound had reached CONSTANTINOPLE, the GREAT LAUGHTER had exploded in the SULTAN'S EARS like a SONIC BOOM. He was totally dumbfounded, and there was nothing he could do. Such was the effect of that liberating RABLAISIAN LAUGHTER, my good friends. It was so

powerful, that anyone in the TURKISH CAPITAL, who did not laugh, was not able to recover his hearing until 218 days after that. From that moment on, it became known, throughout the entire world, that LAUGHTER IS THE GREATEST WEAPON OF MANKIND. This great victory was recorded by the UKRAINIAN artist, REPIN, who painted the famous scene of SIRKO, smoking his pipe, and dictating this outrageous response with his COSSACK companions."

"Indeed," added BACBUC. "This scene really shows the incredible power of the NOOSPHERE."

"What do you mean by that?" asked FRIAR JOHN.

"Well," said BACBUC, "here you have a so-called band of 'ILLITERATE BARBARIANS' who outwitted and disarmed the mighty leader of the TURKISH EMPIRE, SULTAN MAHMUD IV, by outflanking him with a more powerful weapon than his sword. This means that LAUGHTER IS MIGHTIER THAT SLAUGHTER: it is the greatest power of the NOOSPHERE, when it is used properly as a FLANKING SURPRISE against an adversary. That is why RABELAIS identified LAUGHTER as the most profound CHARACTERISTIC OF MAN. Remember that this power of COGNITION can change the whole UNIVERSE, because when you make use of RABLAISIAN LAUGHTER, you actually change the AXIOMS of the WHOLE UNIVERSE."

"How is that?" asked FRIAR JOHN.

"The WHOLE UNIVERSE is obliged to laugh with you," Replied BACBUC, "or go deaf, which ever comes first!"

24- HOW VERNADSKY DISCOVERED THAT OUR PLANET EARTH WAS NOT ONE, BUT THREE SPHERES, ALL ROLLED UP INTO ONE, AND HOW FRIAR JOHN DISCOVERED THAT THE GOLDEN SECTION OF HUMAN VISION WAS DERIVED FROM THAT HIGHER HYPOTHESIS.

"But, there is another problem that we have not yet discussed," said FRIAR JOHN, "and, I am surprised that you did not bring this up before."

"What is that?" replied BACBUC."

"You keep referring to the NOOSPHERE," added FRIAR JOHN, "but, you never explain what this NOOSPHERE is about. Is that another one of your famous LANTERNS?"

"No," replied BACBUC, The NOOSPHERE is not a LANTERN, but I guess this is as good a time as any to discuss this subject matter

"You see," said BACBUC, " in the Universe, there are three domains of existence which are interconnected by what LAROUCHE called RIEMANIANN MANIFOLDS. They are: the NON-LIVING, the LIVING, and the COGNITIVE MANIFOLDS. Those three domains happen to co-exist, and interact intimately, as three spheres composing our PLANET EARTH. The great UKRAINIAN scientist VERNADSKI called them: the non-living GEOSPHERE, the living BIOSPHERE, and the thinking NOOSPHERE. Each of those three spheres has its own specific characteristic, yet none of them has a separate existence from the other two, because each requires the existence of the other two for its own survival. You cannot have the NOOSPHERE without the GEOSPHERE, and without the BIOSPHERE; and, you don't have the GEOSPHERE, or the BIOSPHERE, without the NOOSPHERE."

"How did VERNADSKI ever come up with such an idea?" asked FRIAR JOHN. "Why can't these three domains exist independently of one another?"

" Because they are derived from the HARMONICS of the solar system, as KEPLER has shown." Said BACBUC. "Each planet has its proper orbit, but each orbit affects the orbits of the other planets, and is affected by them as well. Take the case of an ordinary HUMAN BEING. This

is a LIVING BEING who, in order to be in good health, requires IRON in his diet. On the one hand, IRON comes from the mines of the abiotic GEOSPHERE, and belongs to the NON-LIVING DOMAIN. Now, that doesn't mean that, in order to be healthy, you have to go to the mine and chew on a piece of iron ore, or a piece of steel, for your lunch. Your teeth would not last very long, and besides, your digestive system would become RUSTY real quick. However, IRON SUPPLEMENT is a vitamin that is very much part of getting your BODY in shape. That is an interaction between the abiotic GEOSPHERE and the BIOSPHERE.

Now, on the other hand, if you use IRON for building a RAILROAD system to run across the SAHEL region of AFRICA, you are developing the NOOSPHERE. IRON becomes a function of the NOOSPHERE, because the creation of such a RAILROAD becomes part of an ECONOMIC INTENTION that is aimed at improving the GENERAL WELFARE, and the CULTURE of the entire AFRICAN population. Thus, a RAILROAD INFRASTRUCTURE brings ELECTRICITY, and TECHNOLOGICAL PROGRESS, to the heart of AFRICA, and improves many times over the COGNITIVE POWER and the GROWTH of the entire AFRICAN population."

"I see," said FRIAR JOHN. "IRON is not an isolated resource then. It is not something that has a mere existence in and of itself. Its real usefulness is to interact with the BIOSPHERE, and the NOOSPHERE."

"That is right." Said BACBUC. "Properly used, IRON has the power to increase the RELATIVE POTENTIAL POPULATION DENSITY of the whole planet. However, the most important feature of the interactions between those three domains resides in the ability of the higher orders to change, and increase the power of the lower order, for instance, how the BIOSPHERE changes the GEOSPHERE, by creating the oceans and the atmosphere, and how the NOOSPHERE, that is the cognitive powers of man, changes both the BIOSPHERE, and the GEOSPHERE by developing new technologies. It is, in fact, the responsibility of the COGNITIVE FUNCTION of the NOOSPHERE to assure the successful transformations of the BIOSPHERE and of the GEOSPHERE for the future generations. This defines fundamentally, and scientifically, the required approach to the question of the environment as a whole, and establishes those three INTERACTING DOMAINS as the proper object of PHYSICAL SCIENCE as a whole."

"Now, there is a more profound implication in the interaction of those three domains." Added BACBUC. "Consider the UNIVERSE IN ITS TOTALITY. It has been inscribed, from the beginning of time that the UNIVERSE AS A WHOLE is not only ALIVE, but is also determined by a COGNITIVE PRINCIPLE. This means that a KNOWABLE INTENTION that the GREEKS, such as PLATO, have defined as HYLOZOIC MONISM guides the

CHANGING GEOMETRY of the universe; that is, the universe as a whole is a living being that is determined by a unique law of **MULTIPLY-CONNECTED CIRCULAR ACTION OF CHANGE.** The difficulty that certain people have had with this conception is that they fail to understand it, at the **LEVEL OF A CONSTRUCTIVE GEOMETRIC PRINCIPLE,** because they tend to project onto the universe, an a priori **PHYSICAL,** or **SENSE PERCEPTION IMAGE,** of what they consider to be a thinking being, or a living being."

"You mean something like those giant animals, bears and dragons, that the ancients imagined living in the stars?" said **FRIAR JOHN.**

"No," replied **BACBUC,** "those animal forms were merely invented in order to better remember the shape of the **CONSTELLATIONS.** What I am talking about is rather like the case of the **GREEK STOICS,** who wore **TIGHT CORSETS** all of the time, and wrongly believed that the matter of the universe was made up of tiny little physical atom-like particles, which were filled with life, and whose mission was to transmit it throughout the universe. Such a silly conception is very similar to some of those **NUCLEAR PHYSICISTS** of today, who believe in the existence of **QUARKS,** as the fundamental building blocks of the universe. That sort of thing."

"The best example of **HYLOZOIC MONISM** is the **MONADOLOGY** of **LEIBNIZ,**" said **BACBUC,** "in which every being in the universe is a **MICROCOSM** interacting with, and being interacted by the **MACROCOSM;** that is, a universe in which each of the smallest existing thing in the world is acting on the **PRINCIPLE OF COMPOSITION** of the universe in its totality. A good illustration of this would be to conceive, without the need of your **SENSE PERCEPTION,** of a **GRANDIOSE MUSICAL SYMPHONY** created by **GOD,** and in which the smallest creature acts like a musical interval expressing the **PRINCIPLE** of the entire **COMPOSITION;** that is, how each and every part carries the **LIVING** and **COGNITIVE PROCESS** of the whole composition by way of **MULTIPLY-CONNECTED SPIRAL ACTION.**"

"I think I see what you mean," said **FRIAR JOHN.** "I guess this would also mean that **PHYSICAL SCIENCE** is similarly based on the **CONSTRUCTIVE GEOMETRICAL PRINCIPLE** of **MUSICAL COMPOSITION.** Is that right?"

""Absolutely," answered **BACBUC.** "And that is why most of the best scientists in history were also musicians."

"Is it true, also what I have heard about how animals appreciate **CLASSICAL MUSIC?** I have heard that if a farmer plays **MOZART SYMPHONIES** while he is milking his cows, he will definitely improve the

quality, and the quantity of the milk. And in turn, the quality of the MANURE will improve the soil on his farm. Is that true?"

"Yeah, …and that is probably why the grass will be greener on that side of the road too." replied PANURGE, in a burst of laughter.

"Possibly," Answered BACBUC, "but, I am not absolutely sure. In any case, FRIAR JOHN'S idea is not crazy, because the ANTI-ENTROPIC effect of CLASSICAL MUSIC does improve the creative powers of the human mind. That has definitely been proven to be true. So, I don't see why cows, or any other animal for that matter, should not also benefit from the ANTI-ENTROPIC quality of CLASSICAL MUSIC. You see, since ANTI-ENTROPY is the fundamental characteristic of the UNIVERSE as a whole, and is present in the succession of growth from NON-LIVING to LIVING, to COGNITIVE, this means that such a process of AXIOMATIC CHANGE, occurring by leaps and bounds, is like a CLASSICAL MUSICAL COMPOSITION, and increases the power of the individual over the universe with each new dimensionality. For instance, even the simple AXIOMATIC CHANGE between the PLANE and the SPHERE represents such a DIVINE ANTI-ENTROPIC CHANGE.

"Which reminds me," interjected FRIAR JOHN. "What about the DIVINE PROPORTION? How does that relate to the GEOSPHERE, the BIOSPHERE, and the NOOSPHERE?

"That is an excellent question," replied BACBUC, "and, I am glad that you have asked it because it is directly relevant with our subject matter. I will attempt to answer your question the best way that I know how. You see, this question requires a lot more thinking still, so, I am afraid I will not be able to answer it as completely as I would wish. However, I can show you my WORKING HIGHER HYPOTHESIS."

"Well, give it your best shot anyway," added FRIAR JOHN, "because, regardless of the fact that I am a man of the cloth, and that I should know everything about what is DIVINE, I don't even know how to begin answering my own question."

"All right," said BACBUC let us start with the following DIVINE PROPORTION as a HIGHER HYPOTHESIS:

GOD IS TO THE COGNITIVE AS THE LIVING IS TO THE NON-LIVING, and express this, geometrically, in the form of a DIVINE PROPORTION:

GOD : COGNITION :: LIVING : NON-LIVING

"If we assume this proportion to reflect the fact that, first and foremost, MAN IS CREATED IN THE LIVING IMAGE OF GOD, then, we are authorized to consider our HIGHER HYPOTHESIS as a direct reflection of that fundamental principle of CREATIVITY. Now, let us say that this is the highest form of DIVINE PROPORTION which defines the BOUNDARY CONDITION of the three domains of the GEOSPHERE [non-living], the BIOSPHERE [living], and the NOOSPHERE [cognitive], then, how can we demonstrate that the GOLDEN SECTION of DIVINE PROPORTION is a derivative of such a HIGHER HYPOTHESIS?

"First of all, let us examine the highest ratio GOD : COGNITION. There is no sense-experience for such a divine relationship, however, such a relationship is the basis for all cognitive human relations, with respect to the reliving of an array of creative discoveries from the past, such as the historical figures represented by RAPHAEL in his SCHOOL OF ATHENS. By rediscovering and transmitting discoveries of principle, AGAPICALLY, man is demonstrating himself to be a direct reflection of GOD THE CREATOR.

"Secondly, take the other ratio LIVING/NON-LIVING. In this case you can associate the GOLDEN SECTION of DIVINE PROPORTION by relating the LIVING to the NON-LIVING as an expression of sense-experience. You can demonstrate that by showing how the GOLDEN SECTION in the SPHERE is to the GOLDEN SECTION in the PLANE as a METAPHOR of the singularity between the NON-LIVING and the LIVING domains.

Take the GOLDEN SECTION of HUMAN VISION, as an example of a living process of SPHERICAL DIMENSION, and show how VISUAL PROJECTION, is based on the GOLDEN SECTION! First, recall that your VISUAL SPACE is SPHERICAL. Now, you may have never paid attention to this, but your VISUAL PROJECTION actually has a built in GOLDEN SECTION RANGE FINDER."

"Indeed, since everything that exists in the BIOSPHERE is explicitly bounded by the GOLDEN SECTION, you can generate the following construction to prove that your PHYSICAL EYES are also bounded by the GOLDEN SECTION: inscribe a DODECAHEDRON inside of a DECAGON. You can easily do this by inscribing pentagonal points around a circle, and drawing in the plane five equal arcs (Figure A) whose radii are each the length of 1/10th of the circumference of the circle. Then, reproduce exactly the same circle, a second time, and join all of the points together by straight lines (Figure B). In this last case, you have lifted half of the DODECAHEDRON from the PLANE into the SPHERE!"

"Now, FIND THE ANOMALY!" Said BACBUC.

PROJECTION OF THE DODECAHEDRON FROM THE DECAGON.
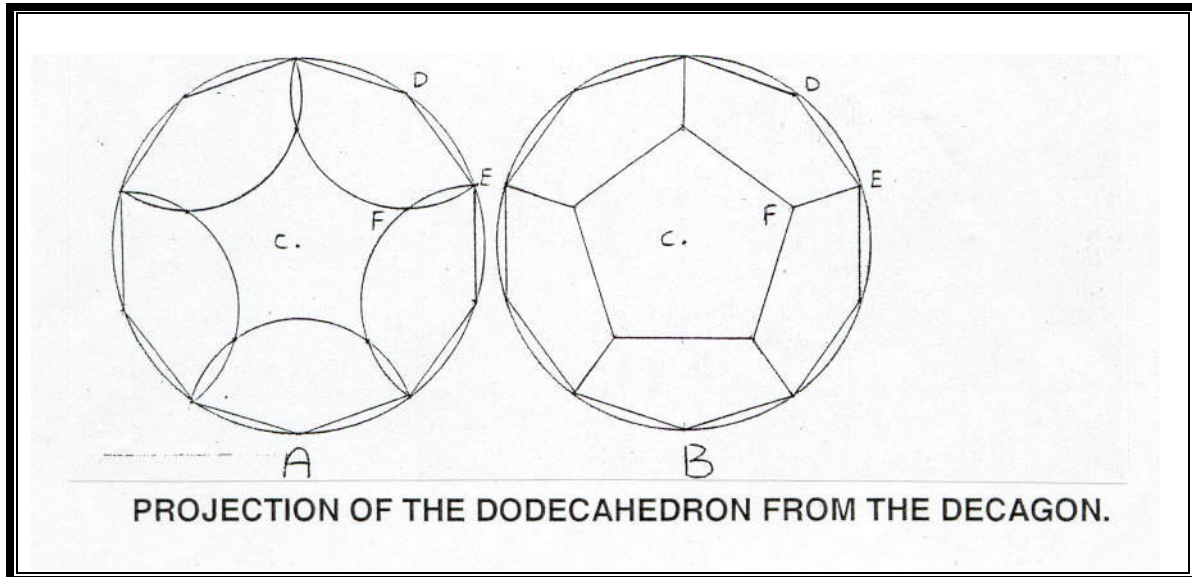
FIGURE 86.

"What anomaly?" asked FRIAR JOHN.

"Don't you see the difference between Figure A, and Figure B?" asked BACBUC.

"Of course, I see the difference." Said FRIAR JOHN. "Figure A is made up of curved arcs, and Figure B is made up of straight lines."

"What else?" Asked BACBUC.

"Nothing else." Replied FRIAR JOHN.

"Well, look again," said BACBUC. "When you look at Figure A, you see it as inside of a PLANE CIRCLE. However, when you look at Figure B, you are seeing it in THREE DIMENSIONS, as inside of a SPHERE! Why?

"What THREE DIMENSIONS? I don't see any THREE DIMENSIONS," replied FRIAR JOHN, obviously upset.

"Concentrate on it," replied BACBUC, "and you will see that the GOLDEN SECTION of Figure B will pop up in your eye, all of a sudden, I guarantee you."

"Yes, I can see it," said suddenly FRIAR JOHN, "O.K. I can see it. Wow! It really stands out at you. By the Holy Plans of Theleme, it is as if GOD had put a COMPASS IN MY EYE!"

"He did," said BACBUC, "GOD really did put that COMPASS IN YOUR MIND'S EYE. Now, take your compass, and measure the distances between C, D, E, and F. The relationship between those points will show you the ANOMALY emerging within the GOLDEN SECTION of HUMAN VISION.

CD : DE :: CE : FE

"Consider this GOLDEN SECTION PROPORTION closely, and you will discover that it is false in the PLANE of Figure A, but it is true in the SPHERE of Figure B!

"How come?" asked FRIAR JOHN, getting all itchy, and perplexed again. "How can something be true and false, at the same time?"

"Because DE and FE are not of equal lengths in Figure A, yet, they are of equal lengths in Figure B." Said BACBUC.

"No way," said FRIAR JOHN, "this can't be true, because I can see that the lines DE are obviously longer than the lines FE, in both cases.

"Quite," replied BACBUC, "but, since FE, in the SPHERE, is the side of an inscribed REGULAR PENTAGON, as seen in PERSPECTIVE, you must discount that difference, because DE only appears to be longer than FE. Your physical eye doesn't know that, however, your MIND'S EYE does. Thus, your MIN'D EYE knows that DE does equal FE."

"Oh! Oh! I see," said FRIAR JOHN in a state of wonder. "It feels like the guy who has one eye looking at you, and the other eye looking to the side."

"Ha! Ha! "Now you now know how to cook the fish and watch the cat at the same time," said EPISTEMON, laughing.

"Is that the same GOLDEN SECTION as in the SPHERE?" asked FRIAR JOHN. "Can you measure it with numbers?"

"No! You cannot." Added BACBUC. "This proof of the GOLDEN SECTION of HUMAN VISION does not require numbers. You can only prove its truthfulness by RELIVING THE DISCOVERY that you have just EXPERIMENTED. So, you see, it is in the ability of constructing such a

pedagogical device, and relating that simple discovery to another person, as the analogue of a METAPHOR for the CREATIVE PROCESS, that you can consider having experienced, and PROVEN BY CONSTRUCTION, with and without sense-perception, the proverbial 'PROOF IN THE PUDDING' of the DIVINE PROPORTION derived from our HIGHER HYPOTHESIS."

"This is quite beautiful," concluded FRIAR JOHN. "But, this is not what I was contemplating at all, when I first asked you my question. But then again, now that you mention it, I guess, that must have been what I was thinking all along, but without my knowing it. The DIVINE PROPORTION surely works on you, even when you don't pay attention, doesn't it!" Said FRIAR JOHN, exploding into a good laugh.

25- WHY, AFTER LEAVING THE ISLAND OF LANTERNLAND, PANURGE DECIDED TO STOP FARTING IN THE WIND, AND CHOSE TO BECOME AN AMERICAN CITIZEN! *

* A New Year's Gift for Sheila Kirsch, Leesburg Va. Jan. 2002.

In order to understand why PANURGE decided to become an AMERICAN CITIZEN, you have to understand the manifold interaction of three kinds of times that PANURGE related to, which were involved in making his decision. This is how PANURGE understood that GOD had created for man A TRIPLE MOVING IMAGE OF ETERNITY.

First, there is the TIME OF NON-LIVING, which is linear and goes in only one direction, from the past to the present to the future. This is the kind of time that most people generally have too much of, and don't know what to do with. That is the time of an ocean without a shoreline, indefinite and boring, the fossilized time of the GEOSPHERE.

Secondly, there is the TIME OF LIVING, which is non-linear and goes into 6 different directions all at once. This is the time of sense certainty, the time of the digestive tract, the tormented time following the pathway of nourishment, which goes from UP to DOWN, from LEFT to RIGHT, and from FOREWARD to BACKWARD. This is the time of FARTING IN THE WIND, the favorite time of the French people. It used to be PANURGE'S favorite time for reading until he realized that such a time always ended BACKWARD, and with a great TUMULT. This is the time most enjoyed throughout the BIOSPHERE.

Thirdly, there is the TIME OF COGNITION, which is non-linear and partakes of SIMULTANEITY OF TEMPORAL ETERNITY. This is a time of coincidence between the past, the present, and the future, a time of TRUTH, CHANGE, and LAUGHTER. It is also the time of INCUBATION OF ACCUMULATED DISCOVERIES OF PRINCIPLE; that is, the grand time of the NOOSPHERE subsuming the other two times.

The decision of PANURGE, to become an AMERICAN CITIZEN, was the germinating result of this third kind; because the TIME OF COGNITION was a modular function of the accumulation of memories capable of regenerating discoveries of principle from the past, and transmitting them to the future. PANURGE recognized that this had to be the real space-time of man, because he was capable of assimilating and transmitting different discoveries rooted in different cultures, and from different periods of time. Thus, the importance of the LAROUCHE fundamental discovery of principle that he expressed as the MANIFOLD OF COGNITION in the following manner:

"THIS MANIFOLD SUPERSEDES GENETIC DETERMINATION, IN ORDERING THE EVOLUTIONARY MORAL AND INTELLECTUAL SUPERIORITY OF CERTAIN CULTURES, AS SPECIES, OVER OTHERS WHICH THEY SURPASS. HEREIN LIES THE SCIENCE OF THE IDEA OF PROGRESS."

That is what PANURGE was responding to when he decided to become an AMERICAN CITIZEN, because an AMERICAN CITIZEN represented such a HIGHER CULTURE; that is, the culture of AMERICAN EXCEPTIONALISM.

"Try to figure that one out," exclaimed PANURGE'S friends in France who all think that THEY have a HIGHER CULTURE. "Don't you have to be crazy to act on such an impulse?" They said. "Indeed, why would anyone desire to become an American at a time when Americans have become most degenerate, are more and more hated abroad, and have become the targets of terrorists world wide. In a total state of confusion, the man in the street would say: 'PANURGE, you are crazy! You would be better off remaining in your own country of origin, remain safe, and take care of family values!' – " That is precisely the point," added PANURGE. "Remember the quip of BENJAMIN FRANKLIN:

'THOSE WHO WOULD SACRIFICE THEIR LIBERTY FOR
              SECURITY, DESERVE NEITHER.'"

So, the decision to become an AMERICAN CITIZEN did not come to PANURGE as the result of any pragmatic consideration. He was not

attracted to American cuisine, nor did he go to AMERICA in the hope of making a fortune. His decision came, in fact, quite suddenly from the reflections of a patriotic Frenchman, JEAN SYLVAIN BAILLY, who, during the French revolution, had manifested the most elevated form of commitment to the nation, and to the COMMON GOOD of humanity; and who had become successively, the first President of the National Assembly of France, and the first Mayor of Paris, in 1789.

What struck PANURGE the most about Bailly was not so much his virtuous character, although that impressed him a lot; but, it was the fact of discovering, through that GREAT STATESMAN, that there existed no higher, nobler act, no world historical action more loving, than to give one's life for the establishment and upholding of the CONSTITUTION of a SOVEREIGN GOVERNMENT which is dedicated to the GENERAL WELFARE of the people. The very decision of a human being to establish such a SOVEREIGN ACT OF CONSTITUTION represents the highest form of LOVE OF MANKIND that could ever be made. This is what decided JEANNE D'ARC to leave her own country of Loraine, and go to the country of France in order to save it from the British-Venetian disease of Feudalism. Similarly, PANURGE decided to rid himself of the French disease of PARLIAMENTARY FEUDALISM caused by the so-called French revolution.

Indeed, although it appears that, from the standpoint of day-to-day existential personal life of the man in the street, this is the worst possible decision to make, and at the most inopportune moment in history. However, today, at the moment of the greatest degeneracy of the American population, such an act of love becomes absolutely necessary. It is an amazing PARADOX, indeed, that from the standpoint of SIMULTANEITY OF TEMPORAL ETERNITY, this is not the most inopportune, but the most SUBLIME moment of all of HISTORY. The decision to become an AMERICAN CITIZEN, at this precise historical juncture, is the best of all possible decisions, because this is the most important time to save mankind from its own folly, and to reestablish, for the rest of the world, the mission of America's MANIFEST DESTINY, the AMERICAN EXCEPTIONALISM, which the U.S. Government, and its people, have abandoned today. This is why PANURGE urged

ALL AMERICANS TO BECOME AMERICAN CITIZENS AGAIN.

"So, you see," added PANURGE, "when you are concerned with the future of mankind as we, AMERICANS, are, and when you realize that now, more than any other period of history, the AMERICAN SYSTEM OF POLITICAL ECONOMY is in danger of disappearing from the face of the earth, then NOW, more than at any other time, you must stop FARTING IN THE WIND, and become AN AMERICAN CITIZEN. Congratulation.

FIGURE 87.
Jean-Sylvain Bailly with Panurge in Paris, late 1760's

CONCLUSION

BLOW YOUR WHISTEL BLOW
A LANTERNLAND SONG

On the way to Pla-to's Ca-vern, Blow your whistle Blow.

We all made lots of discoveries in the field of Ar-chi-me-des
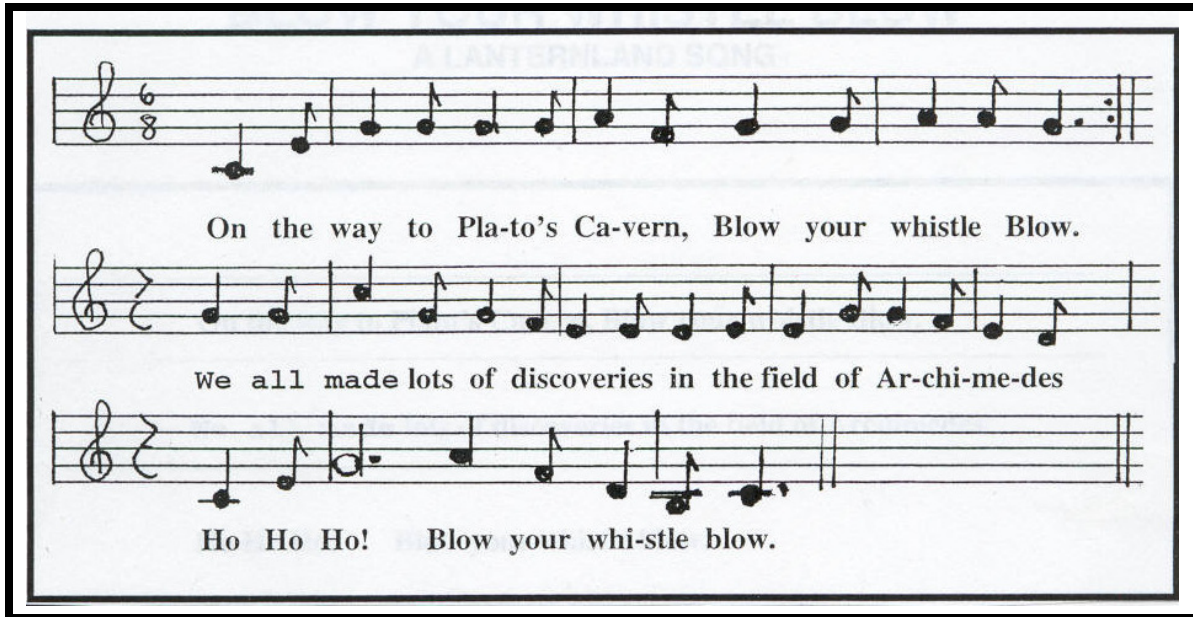
Ho Ho Ho! Blow your whi-stle blow.

FIGURE 88.

-1-
On the way to PLATO'S CAVERN,
  Blow your whistle blow.
On the way to PPLATO'S CAVERN,
  Blow your whistle blow.
We all made lots of discoveries
In the field of ACHIMEDES
Ho Ho Ho! Blow your whistle blow.

- 2-
We've discovered BEES and HONEY,
  Blow your whistle blow.
We've discovered BEES and HONEY,
  Blow your whistle blow.
They have neighbors oh so many
  Cause they build hexagonally
Ho Ho Ho! Blow your whistle blow.

-3-
We've discovered our FROG HENRY,
  Blow your whistle blow.
We've discovered our FROG HENRY,
  Blow your whistle blow.
He had fallen in the pipe way
But DARIO raised him safely
Ho Ho Ho! Blow your whistle blow.

-4-
We've discovered EPISTEMON,
  Blow your whistle blow.
We've discovered EPISTEMON,
  Blow your whistle blow.
He's the greatest MIDNIGHT OILER
With a wonderful demeanor
Ho Ho Ho! Blow your whistle blow.

-5-
We've discovered PACIOLI,
   Blow your whistle blow.
We've discovered PACIOLI,
   Blow your whistle blow.
He had found the shortest pathway
With the angle one and twenty
Ho Ho Ho! Blow your whistle blow.

-6-
We've discovered PANTAGRUEL,
   Blow your whistle blow.
We've discovered PANTAGRUEL,
   Blow your whistle blow.
He 's the greatest knowledge drinker
Axiom buster like no other
Ho Ho Ho! Blow your whistle blow.

-7-
We've discovered MIDNIGHT OILERS,
   Blow your whistle blow.
We've discovered MIDNIGHT OILERS,
   Blow your whistle blow.
Each would guide us with a lantern
To the site of PLATO'S CAVERN
 Ho Ho Ho! Blow your whistle blow.

-8-
We have built PLATONIC SOLIDS,
   Blow your whistle blow.
We have built PLATONIC SOLIDS,
   Blow your whistle blow.
They reflect the GOLDEN SECTION
From the ONE DODECAHEDRON
 Ho Ho Ho! Blow your whistle blow.

-9-

We've discovered our friend PANURGE,
   Blow your whistle blow.
We've discovered our friend PANURGE,
   Blow your whistle blow.
He had mastered KEPLER'S knowledge
Without having gone to college
Ho Ho Ho! Blow your whistle blow.

-10-
We've discovered LAUGHING COSSACKS,
   Blow your whistle blow!
We've discovered LAUGHING COSSACKS
   Blow your whistle blow!
They kicked out the TURKISH SULTAN
From the land of ZAPOROGIAN
Ho Ho Ho! Blow your whistle blow.

-11-

We have met NIC"LAS of CUSA
   Blow your whistle blow.
We have met NIC"LAS OF CUSA
   Blow your whistle blow.
He had prov'd that for the CIRCLE
There had to be ZERO ANGLE
Ho Ho Ho! Blow your whistle blow.

-12-
We have met RAPHAEL SANZIO
   Blow you whistle blow.
We have met RAPHAEL SANZIO
   Blow your whistle blow.
He conceived the SCHOOL OF ATHENS.
As a ga-the-ring of GOOD FRIENDS
Ho Ho Ho! Blow your whistle blow.

ADAGIO IN CANON FORM

-13-
We've discovered Max and Mirca,
Blow the whistle blow.
They have helped us oh so nicely,
Oscar did, and also Mattie,
Ho Ho Ho! Blow your whistle blow.

-14-
I have seen you all so happy,
Blow the whistle blow.
Richard, Mathew, Jacob, Roman,
Gabby, Adrienne, Chris, Humberto,
Michael, Samm'n Cory.
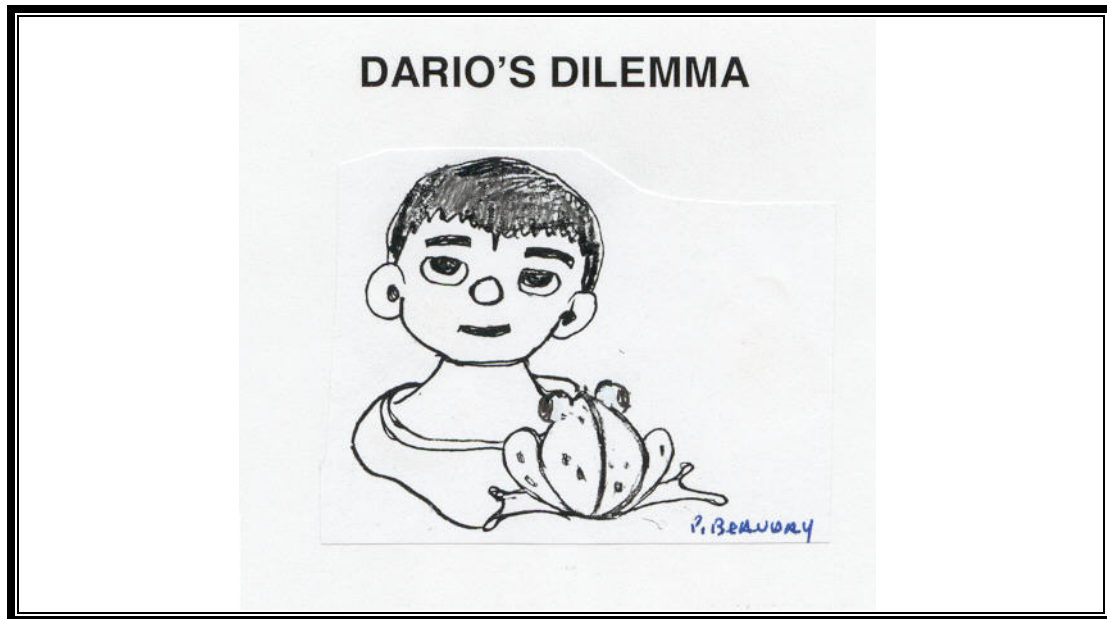Ho Ho Ho! Blow your whistle blow.

APPENDIX 1.

FIGURE 89.

A long time ago, during the warm days of summer camp, the air was filled with the brassy songs of crickets and cicadas, and all of the children were having a good time, jumping and swimming in the cool waters of the lake.

DARIO, however, was very sad because he thought he had done something terrible, and did not know how to solve his problem. He was in a real dilemma. He had mistakenly put his friend HENRY, the frog, on top of one of the pipes that held the pier together, thinking he would be safe, and he would not lose him in the water. Well, something terrible happened. HENRY fell inside of the pipe, out of reach.

DARIO was very upset. "What should I do?" he cried out desperately. "I don't know," said the swimming instructor, he might be hurt down there. HENRY cannot climb, or jump out of that hole, by himself." DARIO was terrified suddenly, as he looked inside the dark hole, and could not see HENRY. Dario was beginning to despair when he heard HENRY calling, "bwurpit, bwurpit"-- "He is alive," cried DARIO, wiping his eyes with a dash of hope. He ran to the nearest bush to get a long twig. "What are you going to do with that," asked the instructor. "I am going to help him out, " replied DARIO, happy to have found the solution to the problem. "All he has to do is grab hold of the twig, and I will pull him out," he said.

FIGURE 90.

"Silly boy," replied the instructor in a stern voice, "Don't you realize, you could kill him, if you poked at him with this stick. And besides, what makes you think that he can grab that stick? HENRY doesn't even have fingers. " DARIO was so confused that he felt his mind was about to burst. "You see," said the instructor calmly, you are thinking of your own resources for survival, what about HENRY'S resources for survival?"

DARIO stared at the instructor for a moment, then wiped his eyes again, and smiled. "I know what I am going to do?" he said, fully confident that he had found the real solution to his problem.

Do you know how DARIO solved his dilemma?

DARIO took a pale of water and poured it into the pipe.
HENRY floated right up to the top!!

FIGURE 91.

Sometimes, out of purely selfish interests, we inflict on our friends a fate worse than would otherwise happen, if we let them decide what they know best for themselves. Give a friend a chance to discover his own resources. That is the idea. And a good way to start is to do an investigation of your own talents as well as those of your friends, and share this awareness with them. Your increased consciousness of your own capabilities, and that of others, will increase your confidence in yourself, and in those who have put their trust in your friendship. Sharing these talents with others will help them discover their own capabilities, and will also show you where you can improve with respect to them. That is called AGAPE of the common good. The ancient EGYPTIAN pyramid builder, IMHOTEP, called it the MAAT principle, the principle of BALANCE and RECIPROCITY. This is the reason why the suffering of a little tension over the concern for others is always necessary, if you wish to make a discovery.

APPENDIX 2.

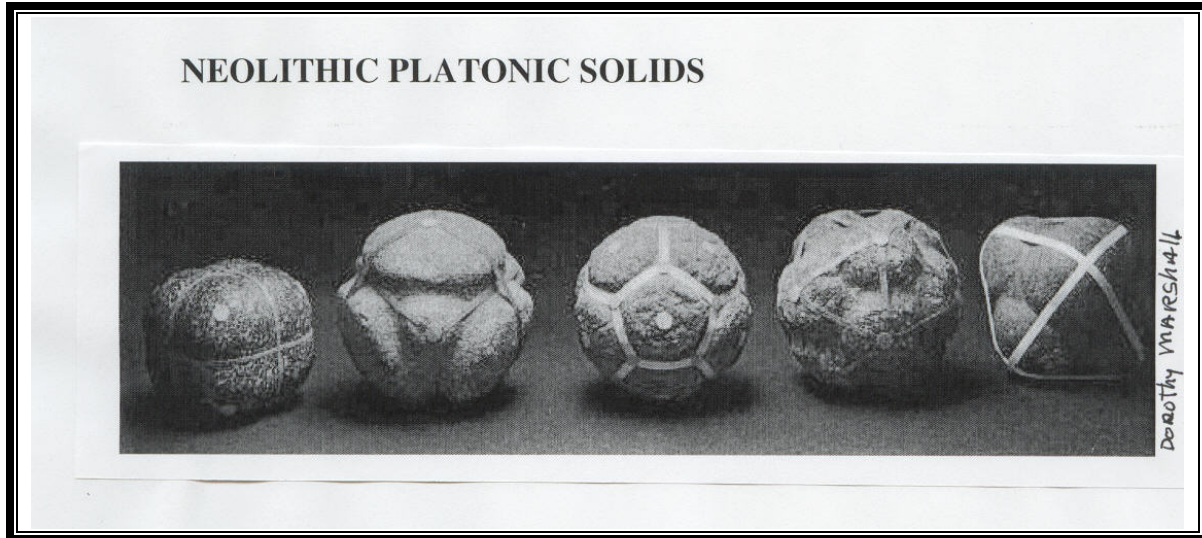**NEOLITHIC PLATONIC SOLIDS**

FIGURE 92.

Archeologists have uncovered in Aberdeen shire, Orkney, Skye, and in other sites of Scotland, hundreds of carved stone balls dating back to the Neolithic period; that is, between 3200 to 2500 BC. Most of the carved rocks are generally the same size, each less than three inches in diameter, and can be easily carried by hand.

Note that some of the regular features of the stones reflect early forms of spherical Platonic solids.

1. The ball on the extreme left is divided into 8 equal sections forming a rounded CUBE.
2. The second ball from the left is divided into 4 knobs suggesting the shape of a spherical TETRAHEDRON.
3. The ball in the middle has 12 knobs, defining the oldest known DODECAHEDRON.
4. The second ball from the right has 14 knobs forming an incomplete ICOSAHEDRON.
5. The ball on the extreme right divides the spherical space into 8 equal parts, close packing 6 knobs forming an OCTAHEDRON.

Although the function of these stones seems to be unknown, their construction indicates a well-ordered sense of spherical composition. Many other stones have more knobs, and some are intricately carved with spirals and cross-hatching on their faces. Some show decorative concentric circles that required great craftsmanship as well as a keen knowledge of the material. The degree of elaboration in the designs were proportional to the malleability of the stone, but, most of all, reflect a real tour de force in the determination of multiply-connected circular action. The material used varies from sandstone and serpentine, to very hard rocks such as granite, greenstone, gneiss and quartzite.

The most amazing aspect of these Neolithic polyhedra, however, is that they were produced about 2000 years before they were first known to exist in the Greece of Plato. Here you have the oldest set of spherical regular solids reflecting early man's attempt to master the idea of dividing the sphere into regular parts. This is the most beautiful proof to the power of cognition of ancient man as distinct from the beast. Those were the days when Neolithic man knew how to organize his Platonic Cave!

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