SPIRALS

by
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NCAD
Third Year Fine Art
Thesis

SPIRALS

Submitted by
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INTRODUCTION

My interest in spirals started a few years ago when I saw the spiral in the Nautilus shell. Having once seen the spiral, I began to find it in other things. I saw curly hair and fingerprints and leaves chasing one another round and round in the wind. At first the discovery of each spiral was unexpected, but soon I ceased to be surprised and began to look for it in everything I saw -- it was nearly always there.

The research I have done has taken me further and further back in time and the more I found the more interested I became. I "discovered" the ancient matriarchy and found that spirals can be traced back to the Goddess, back to the beginning, which seems to have been a long, long time ago.

Monica Sjoo in her article "The Ancient Religion of the Great Cosmic Mother of All" says that everywhere snakes were associated with the Goddess, and were kept in her temples during the Neolithic cultures. She was represented either as a snake or as carrying snakes coiled around her. The symbol of the spiral or serpent can be found on ancient images of the Goddess. She is never goddess only of fertility and pregnancy but also of death and the dead. There are also many mazes and labyrinths which belong to the Great Mother, a journey through them being symbolic of death and rebirth.

Ancient women, like many animals today still do, used to seek out a special place to give birth. This, as will be seen in the conclusion, also has very strong connections with the spiral.

In "On Growth and Form", D'Arcy Thompson defines a spiral as being a "curve which, starting from a point of origin, continually diminishes in curvature as it recedes from that point; or in other words whose radius of curvature continually increases."[1]

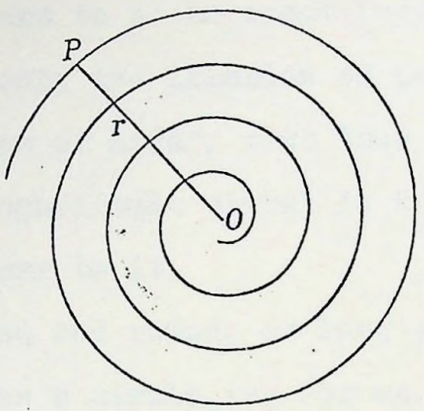

Fig. 72. The spiral of Archimedes.

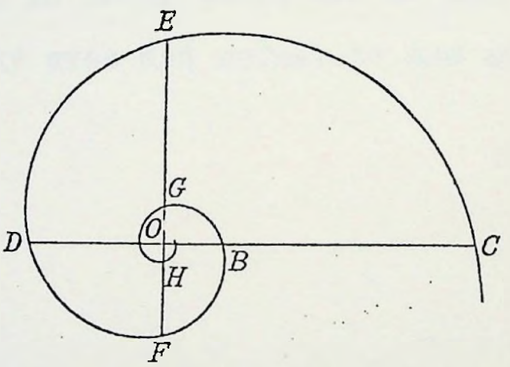

Fig 73. The equiangular spiral.

There are two very perfect but rather different spirals: the spiral of Archimedes, and the equiangular or logarithmic spiral. The helix is not a true spiral as it has no point of origin and does not change its curvature as it grows.

The Nautilus shell appears to be an exact logarithmic spiral, but nature, it seems, gives only the illusion of perfection. Theodore Cook , in "The Curves of Life", says that there is no known example of a perfect logarithmic spiral in a Nautilus shell, although they are all very near to it.

Anything which goes round and round, as long as it does not tread the same path and become a circle is, for me, a spiral. The examples are numerous; in fact, there are so many that eventually I had to shut my eyes and refuse to see any more.

SPIRALS IN ART

This section is made up of pictures of non-natural things which contain the spiral. I am showing the modern ones first and then moving through to the ancient. The reason for this is that primitive people are closer to nature, and to the beginnings of religion and mythology, and in their time the spiral is THE important mystic symbol. Looking at the oldest examples last will link this section to the next, "Spirals in Nature", and to the conclusion. The pictures are randomly chosen but I hope to have at least one from each major country. Each picture here is not individually important: I am showing the group in order to ask, "Look, there have always been spirals in art: why?"

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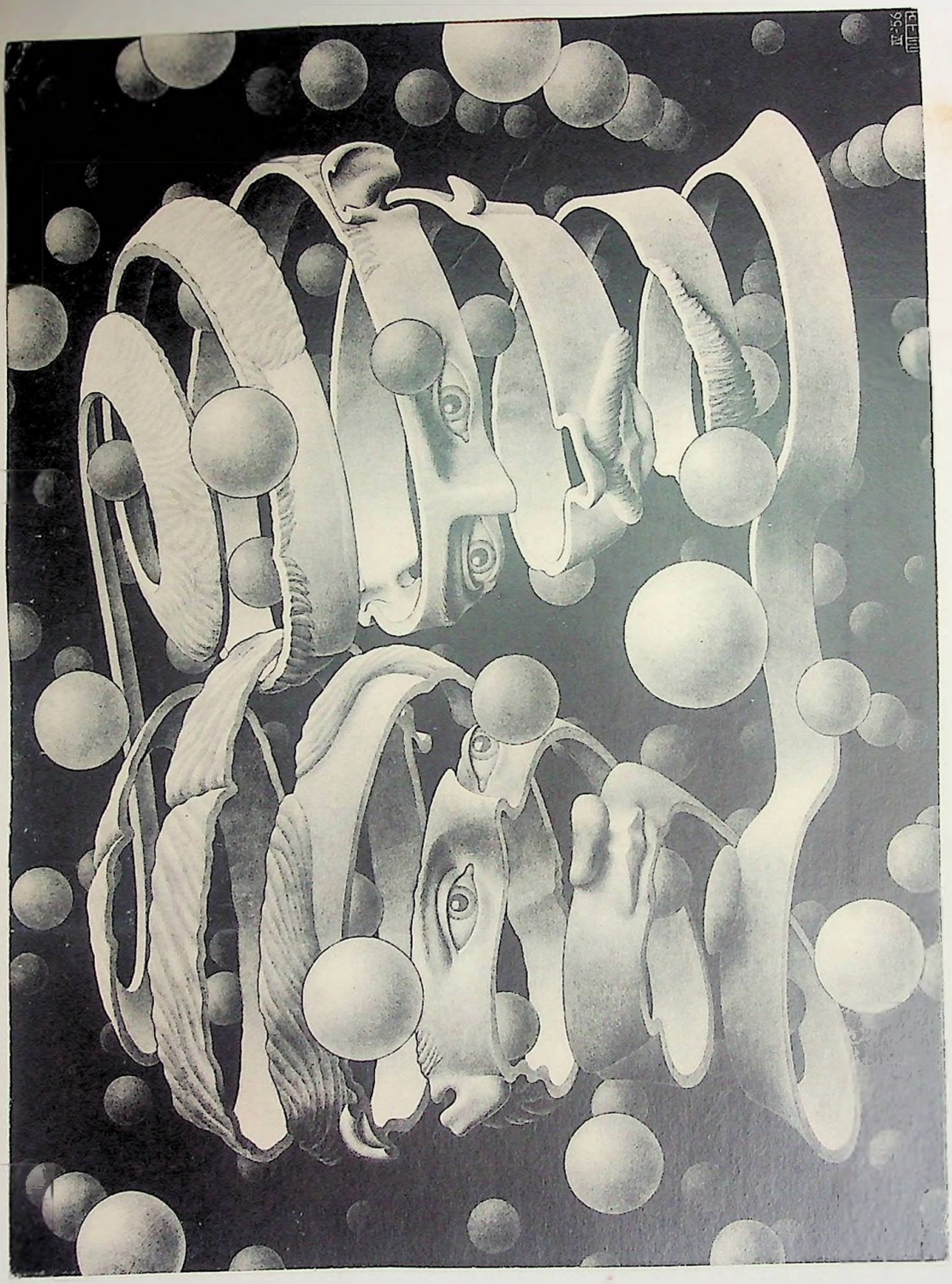


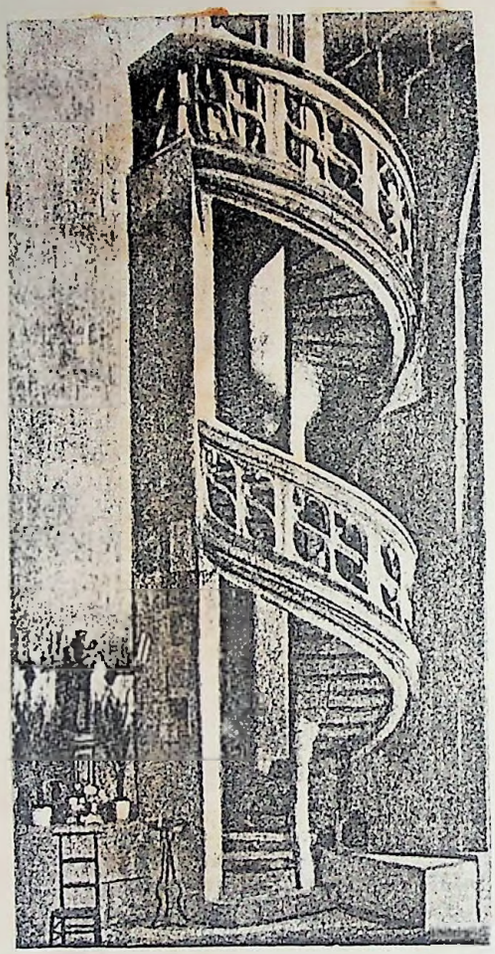
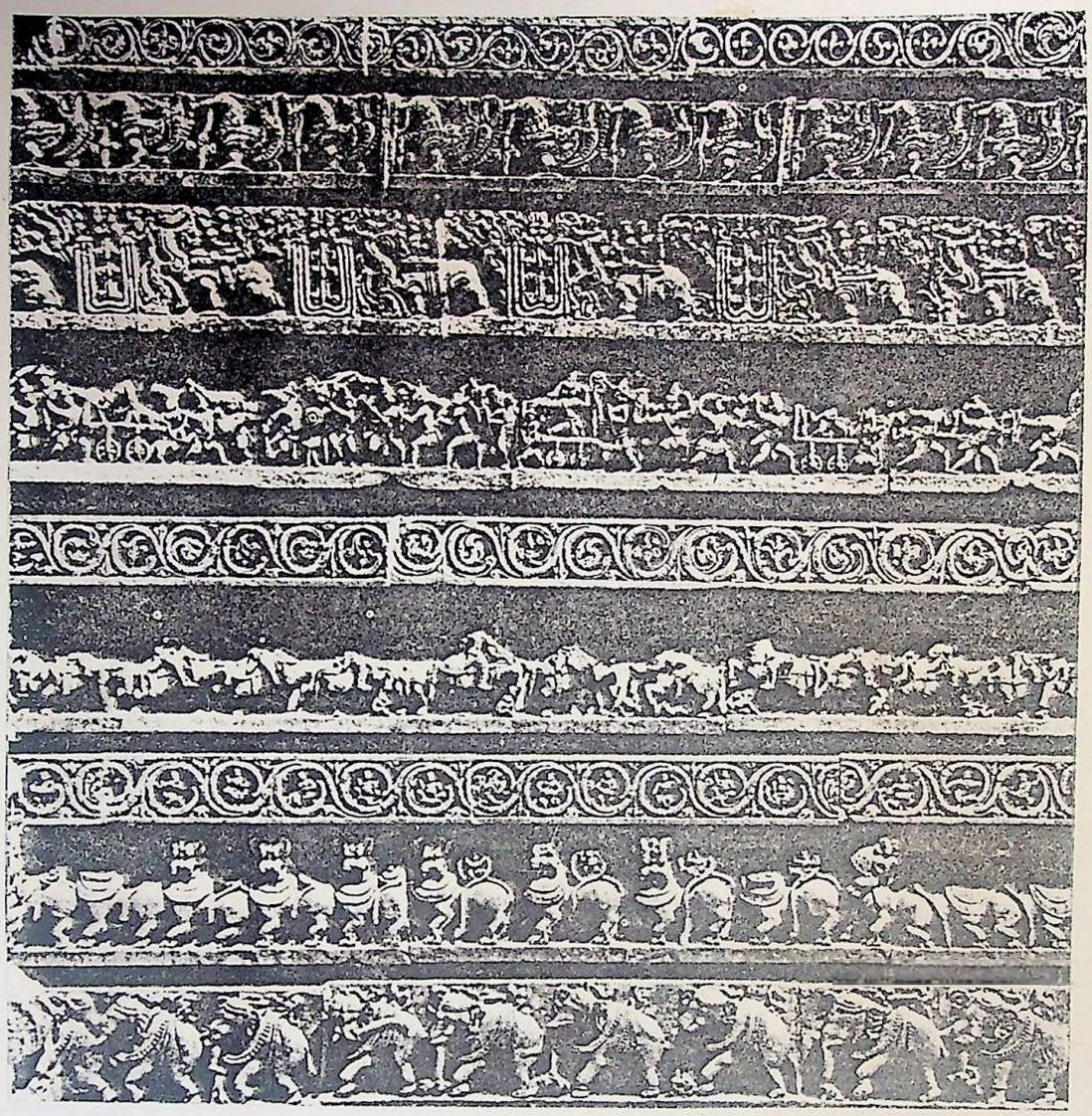
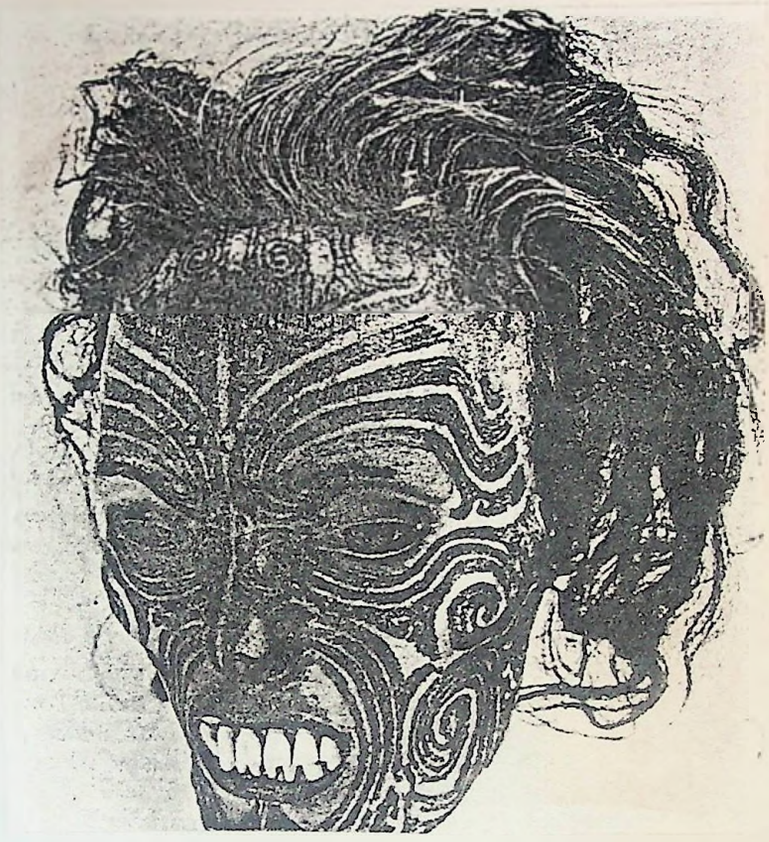


Fig. 317.—Spiral Staircase in the North Transept of Autun Cathedral.





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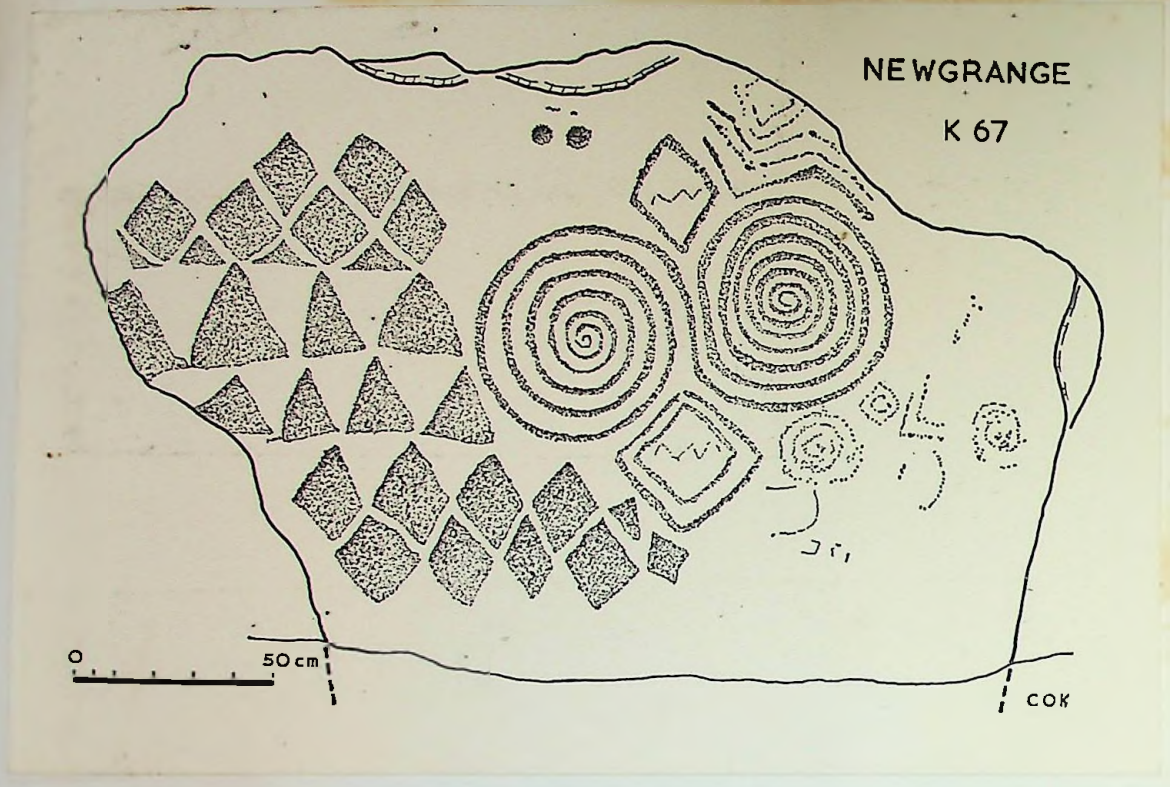
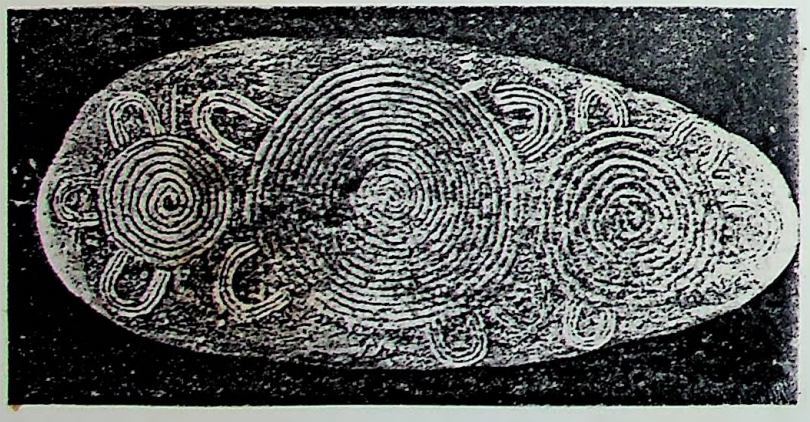
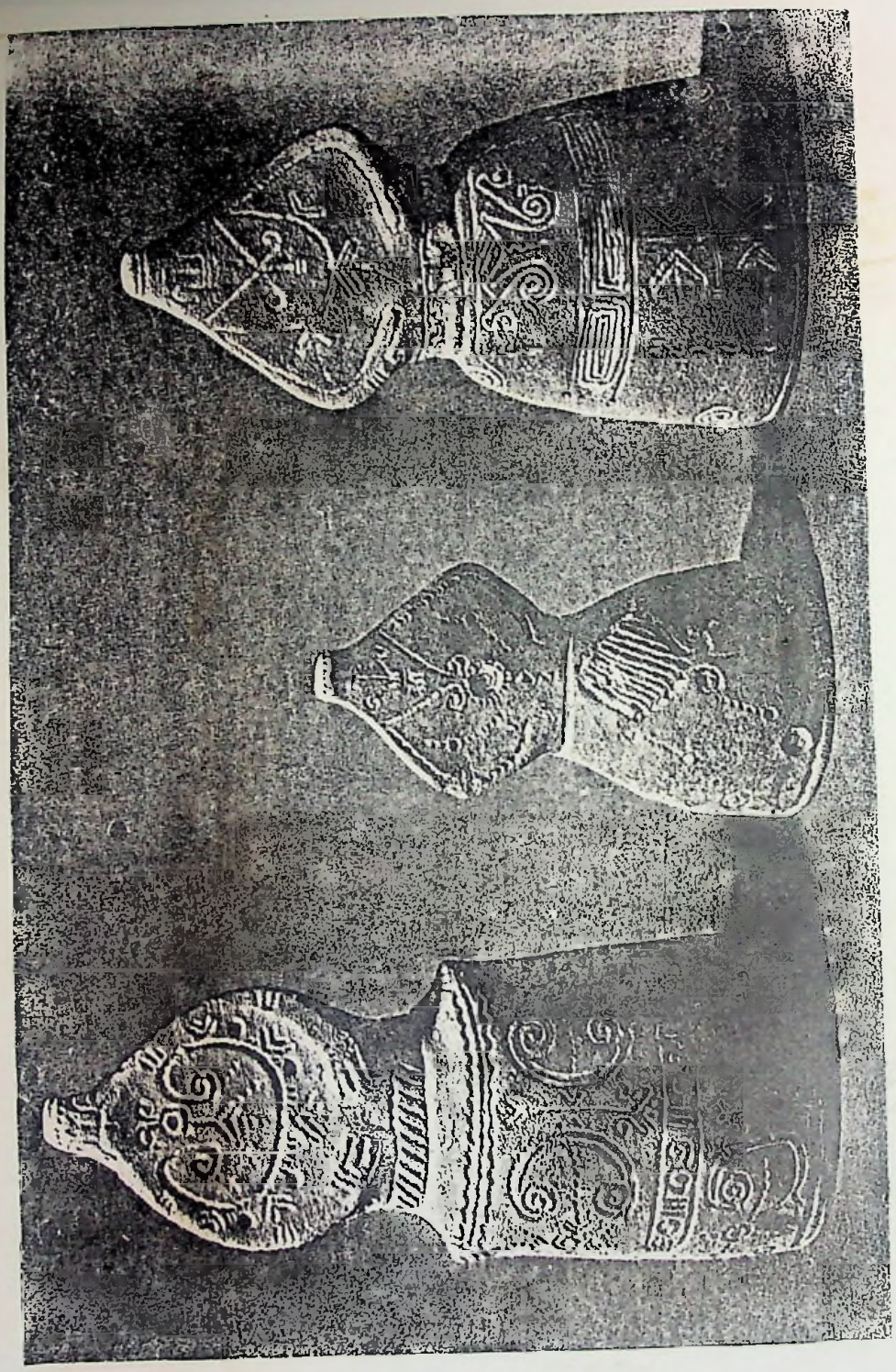
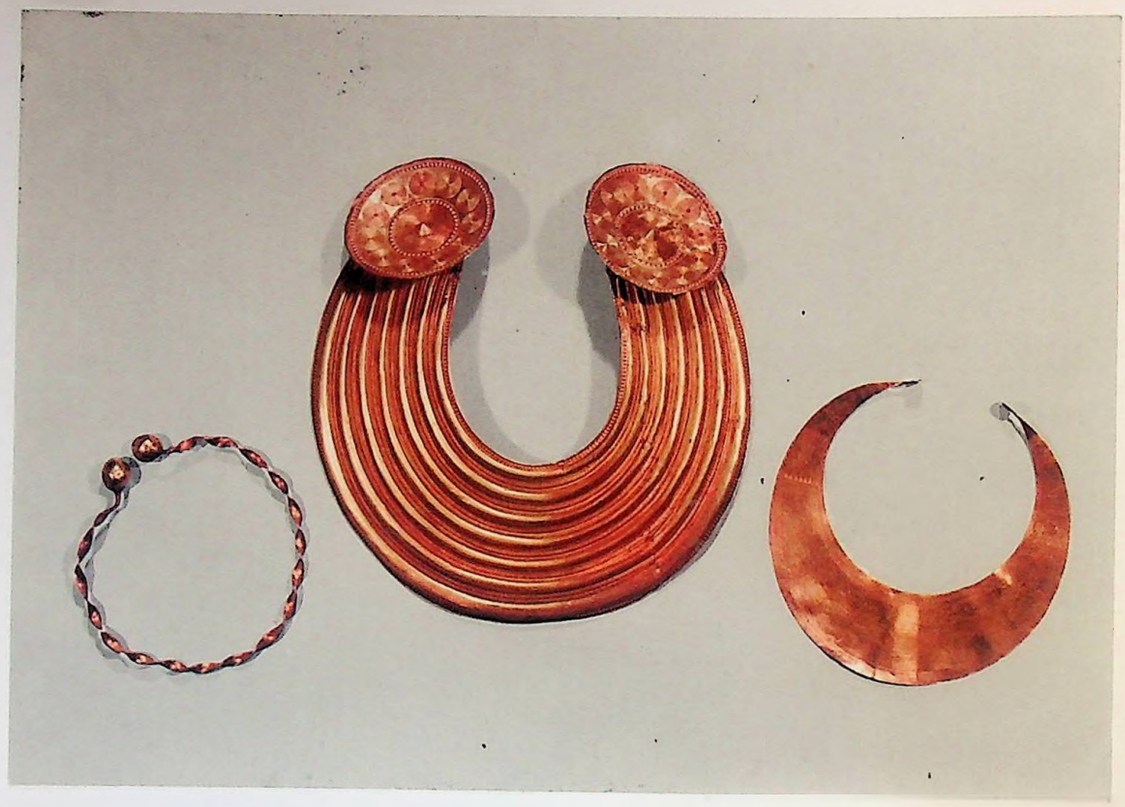
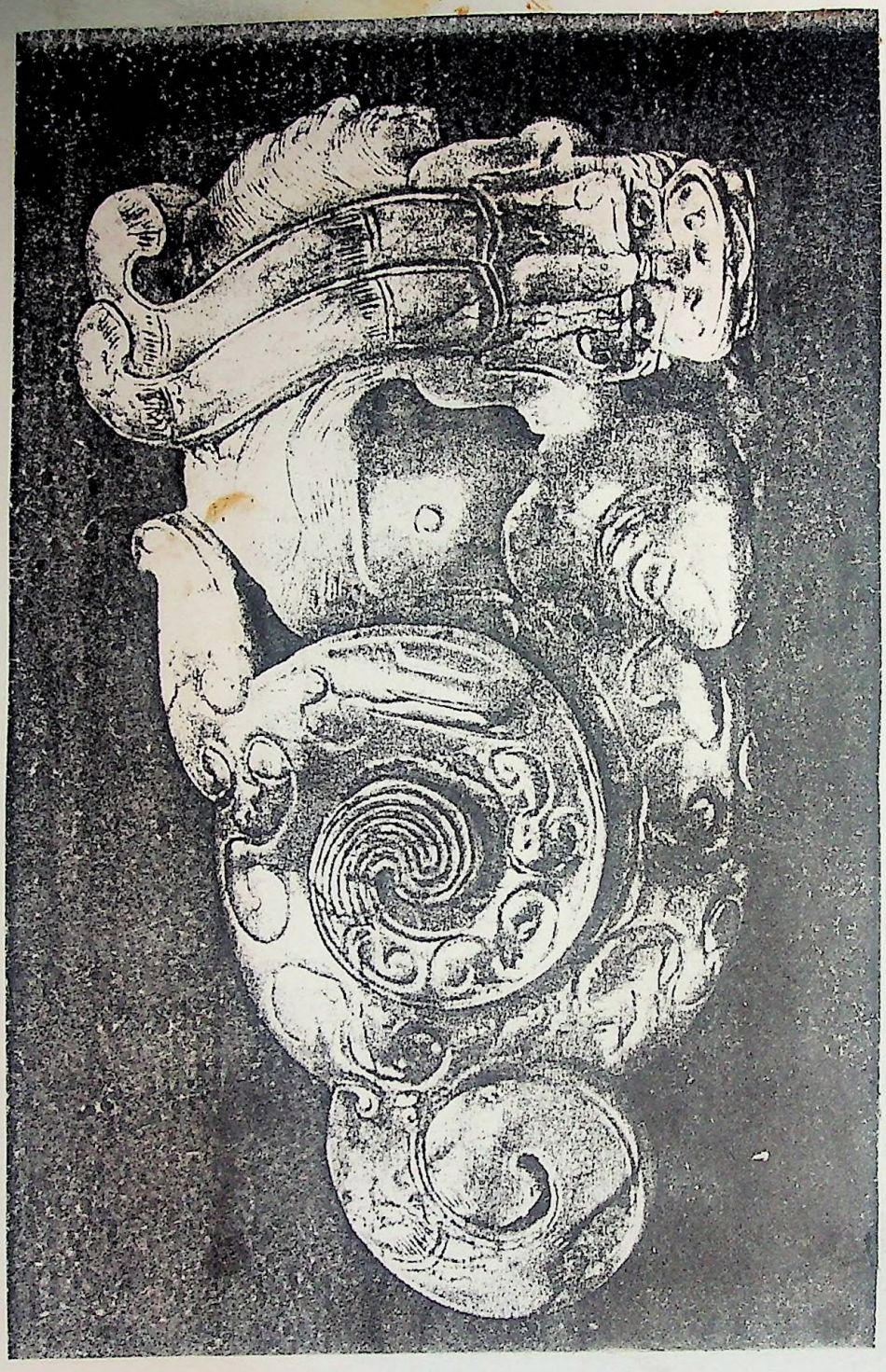
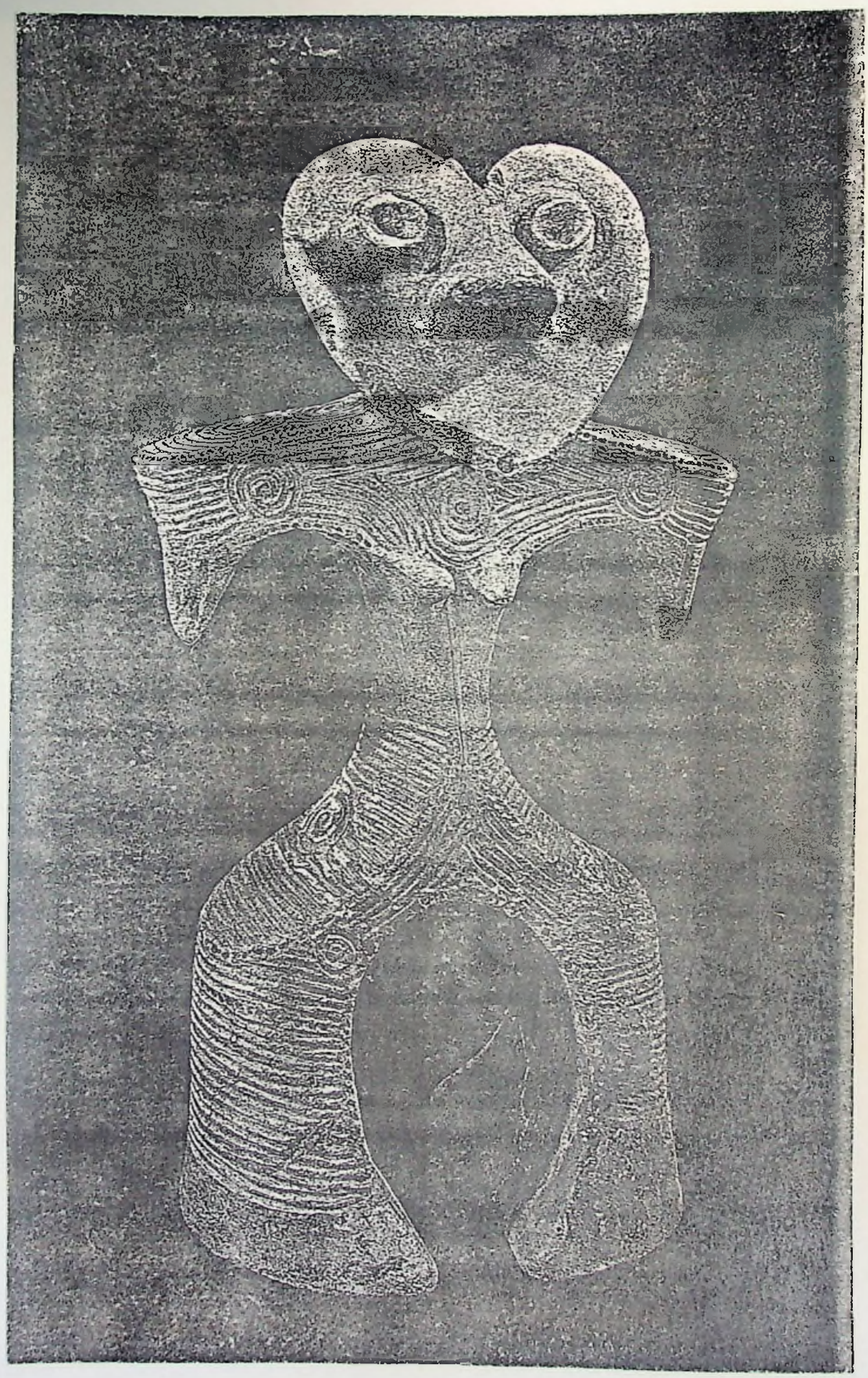












SPIRALS IN NATURE

In nature, I found that spirals fall roughly into two groups: those caused by movement and those caused by growth.

Spirals Caused by Movement

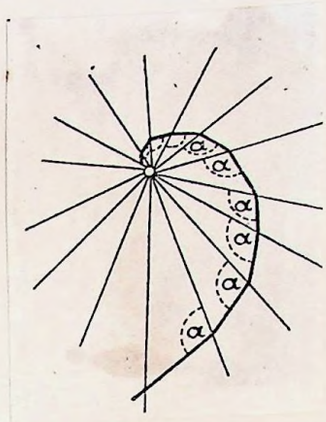
Insects with compound eyes don't look straight ahead, so that, flying towards a light, they take, not a straight path but one constantly adjusted to keep the light at a certain angle. The result is an equiangular spiral.

The photograph of a flying pigeon shows an unexpected spiral.

There are 100,000,000,000 known galaxies in the sky: of these 60% are disc-spirals. This picture shows one of them. The galaxy we belong to is spiral and we live two-thirds of the way out from the centre on one of the 'arms'.

The pattern in a cyclone or hurricance is usually untidy, but a spiral movement can be seen quite clearly. Cloud patterns are enormous and the satellites which continually send back photographs are out in space, 36,000 kilometers from earth.

The picture of the whirlpool is very similar to the last two: conflicting currents and subsurface drainage channels cause it. A whirlpool is produced every time the plug is pulled out of a bath full of water. Beautiful spirals form when a bowl of water is stirred and a few drops of colouring added or, as the picture shows, when cream is poured into stirred coffee.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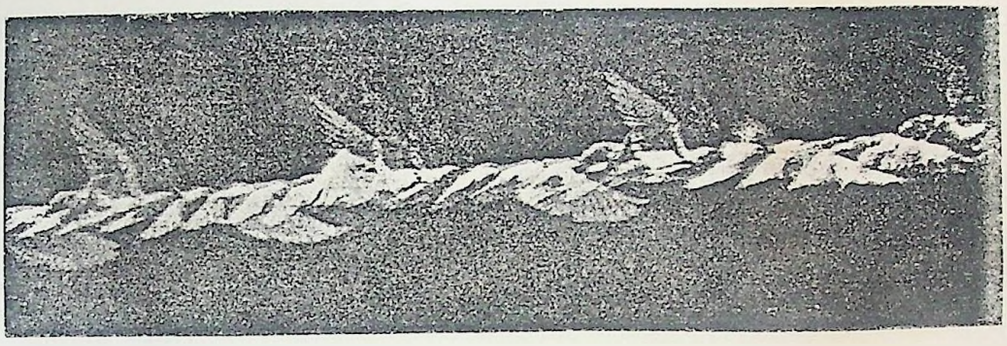
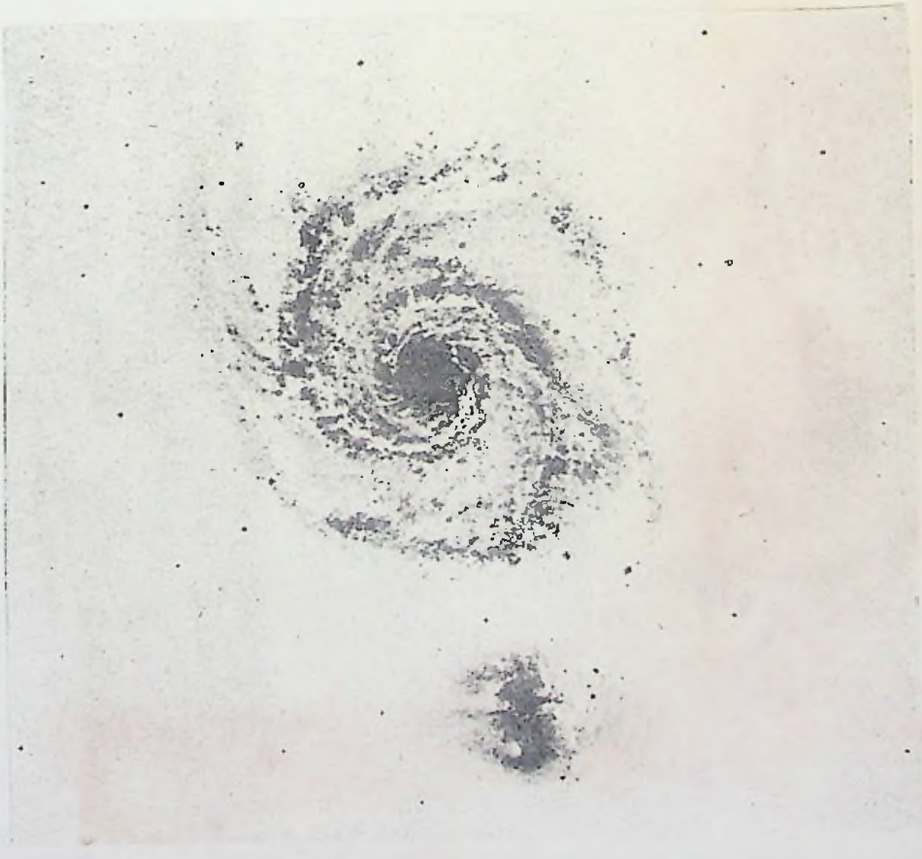




15 A

Reynolds Number

The whirlpool, galaxy, and hurricane are all very similar: they could almost be the same picture.

About ninety years ago, Osborne Reynolds saw and studied this phenomenon, and developed the Reynolds Number. This number "shows how things can change their shape in response to a change in scale, and yet, at the same time, and in seeming contradiction, have the same shape at different scales".[2]

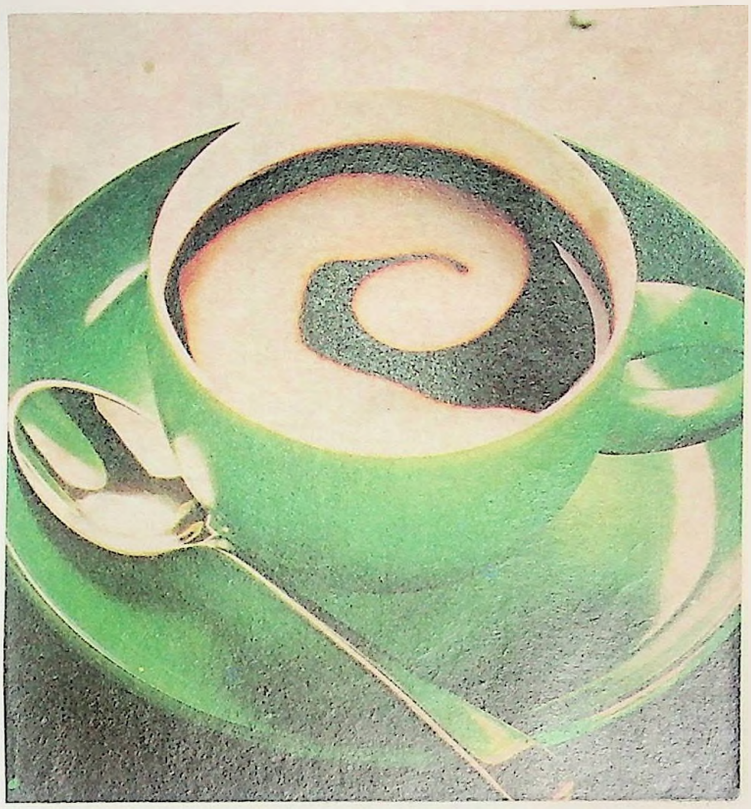
Turbulence, Reynolds found, is directly proportional to velocity, obstacle size, and density, but is inversely proportional to viscosity. He wrote this mathematically as

$$\text{Turbulence (or Reynolds Number)} = \frac{\text{Velocity} \cdot \text{Obstacle Size} \cdot \text{Density}}{\text{Viscosity}}$$

or,

$$R = \frac{V.S.D}{v} \quad .$$

Flows with the same Reynolds Number, or R, look much the same, whereas flows with different R look quite different. We can combine different velocities, obstacle sizes, densities, and viscosities in different ways, but if we get the same R we get the same general appearance.



Vortex Street

Behind a rock or canoe paddle in a stream two oppositely swirling eddies can often be seen. On a larger scale it can be found behind a bridge abutment in a fast-flowing river, where the two eddies rhythmically peel off first one side then the other before flowing downstream.

The same thing happens in air as in water. Vortices in a vortex street peeling away from an obstruction with a frequency between 50 and 20,000 hertz cause us to hear melodious hums and whistles: for example, the sound of the wind through wires.

Spirals Caused By Growth

Horns

The horn and the snail shell, unlike many other organisms, are partly old and partly new. The shell, like its inhabitant, grows in size but does not change its shape. This may be illustrated by looking at a little shell through a magnifying glass: it is the same as a big one. The small Nautilus shell grows to the size of the big one not by expanding in all directions but by growing at one end only.

The horn and shell, although they belong to the living, are not themselves alive. They are by-products of the living animal as is hair and nail, and the parts, once formed, are incapable of change.

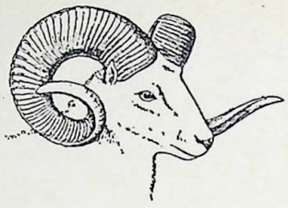
The logarithmic spiral is found in the hard parts of organisms and never in the soft, fleshy, actively growing parts. Shell-less molluscs are never spiral: the snail is spiral but not the slug; the snail is curved by the shell, never the shell by the snail. The many structures which show the logarithmic spiral (the Nautilus shell, elephant tusk, beaver's tooth, and the cat's claws, for example) all accumulate rather than grow.

In a slightly different way, this is also true of the spirally arranged florets of the sunflower: "here again we are regarding serially arranged portions of a composite structure, which portions, similar to one another in form, differ in age; and differ also in magnitude in the strict ratio of their age. Somehow or other, in the equiangular spiral the time-element always enters in".[3]

There are two different types of spiral horns: that of the rhinoceros and that of the hollow-horned ruminants.

FIG. 20.
Spiral Curve.

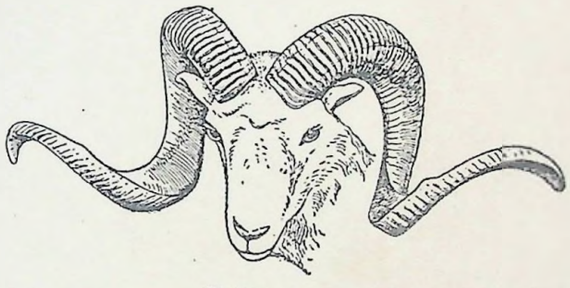
A. Highland Ram.



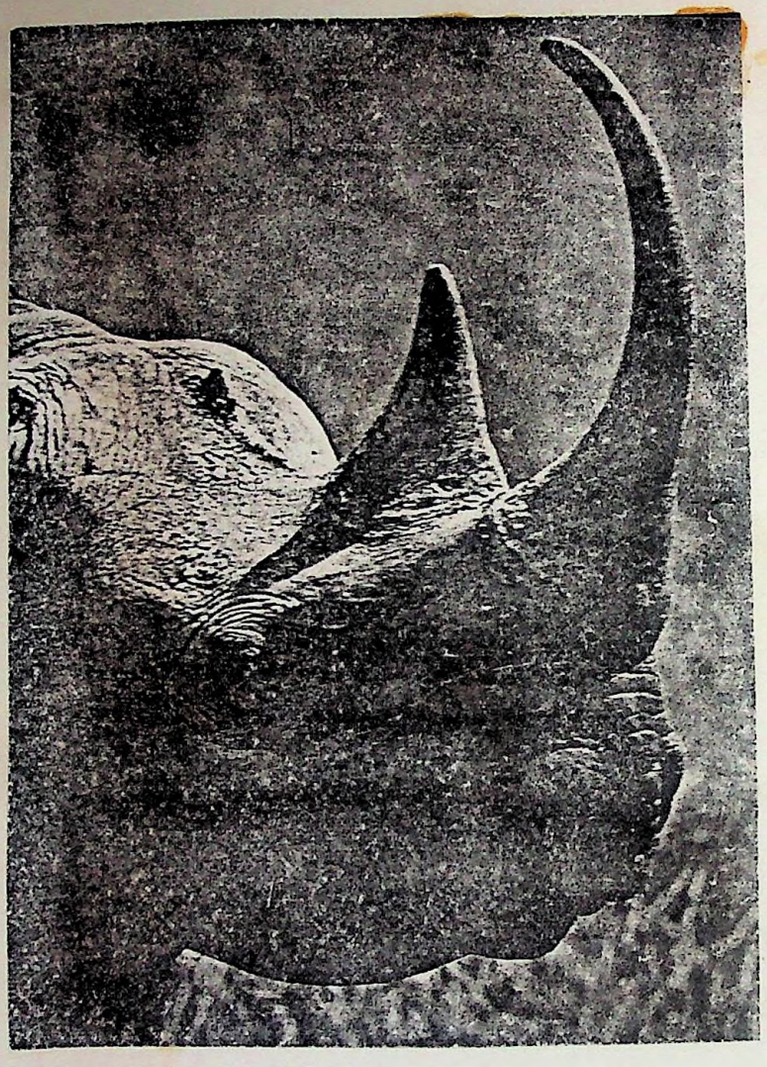
E. Argali.

B. Merino Ram.

C. Alaskan Bighorn (*Ovis nivicola*).



D. Pamir Sheep.



Rhinoceros horns are made up of a mass of consolidated hairs, continually added to by the living tissues at the base. This horn is a logarithmic spiral; but except in the larger horned species (great white rhino), this is not always clear as the horn is so small. As the rhinoceros has only one horn, or, if two, one is behind the other, the horn does not bend to left or right but keeps completely central. The horns curve backwards pointing towards the animal's tail, or, in other words, the rate of growth diminishes as we go back, causing the curve in a single horn, and the smaller size of the second of two horns.

The hollow-horned ruminants -- sheep, goat, ox, antelope -- have two horns, one on each side of the head. These curve in such a way that each is the mirror image of the other. Many of these animals have logarithmically spiral horns: for example, some of the large wild goats and certain antelopes. In other cases, particularly the male musk ox, the horn is not developed in a continuous spiral curve but changes its shape as growth proceeds. Some horns are practically straight while others are very twisted. It is generally recognised that the thicker the horn, the greater will its spiral curvature be. Horns can be very heavy: ram horns often weigh 60 pounds the pair. This great weight, however, does not hinder the animal in any way, the horns being perfectly balanced on either side of its head.

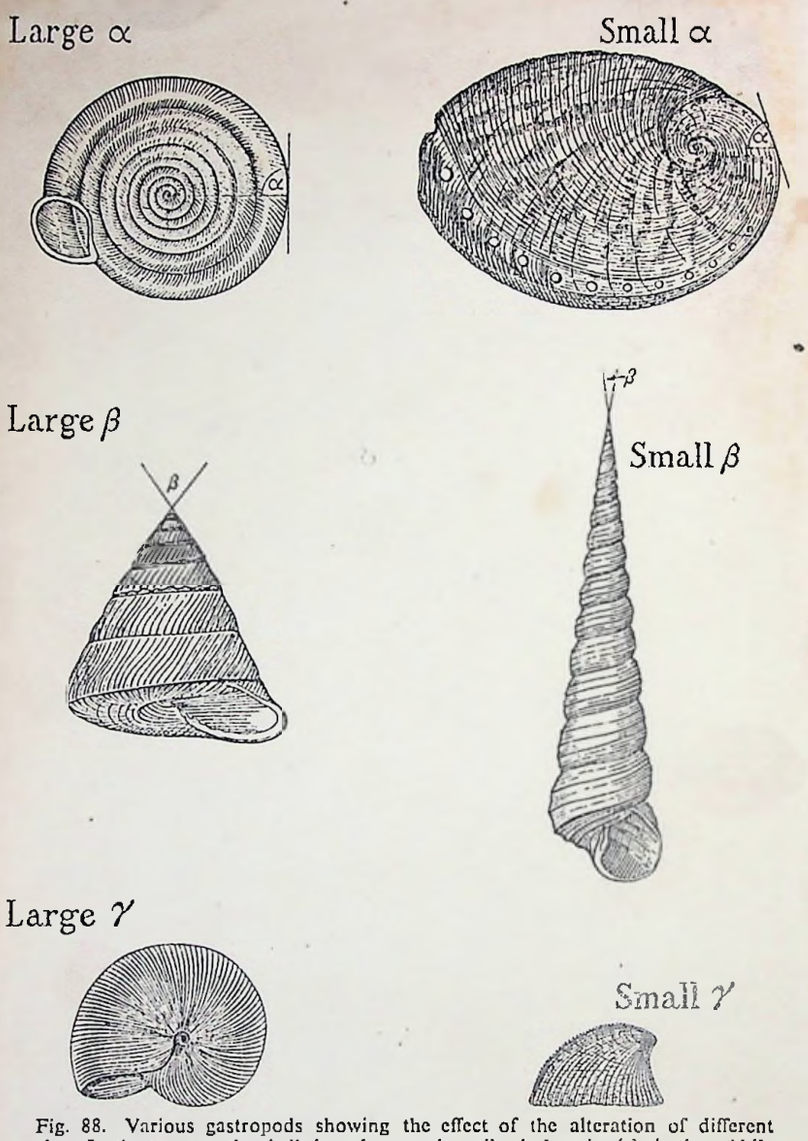


Fig. 88. Various gastropods showing the effect of the alteration of different angles. In the top row the shells have large and small spiral angles (α); in the middle row they have large and small enveloping angles of the conical ends (β); in the bottom row there are large and small angles of retardation (γ) which govern the extent to which the whorls overlap. From J. C. Chenu.

Shells

Shells are found virtually all over the world, and range in size from tiny ones like the foraminifera to huge ones with the sound of the sea inside them. The shell is an ancient structure, as many fossils prove. Most shells are spiral. These pictures show just a few examples of the different spiral forms they take.

The Nautilus shell, cut to show the logarithmic spiral and the creature which lives inside .

The page from "On Growth and Form" shows how shells which look different are basically the same, with merely a difference in angle.

The foraminifera is just one of the tiny creatures which make up plankton.

The first shell fossils found are from the Palaeozoic Era -- 600 million years ago.

FIG. 202.—YOUNG SPECIMEN OF POLYSTOMELLA MACELLA. × 60.

FIG. 201.—NONIONINA STELLIGERA. × 60.

FIG. 205.—CRISTELLARIA CALCAR. × 25.

FIG. 206.—DISCORBINA GLOBULARIS. × 75.

FIG. 203.—DISCORBINA OPERCULARIS. × 100.

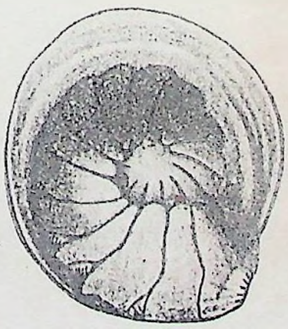


FIG. 204.—CRISTELLARIA CULTRATA. × 15.

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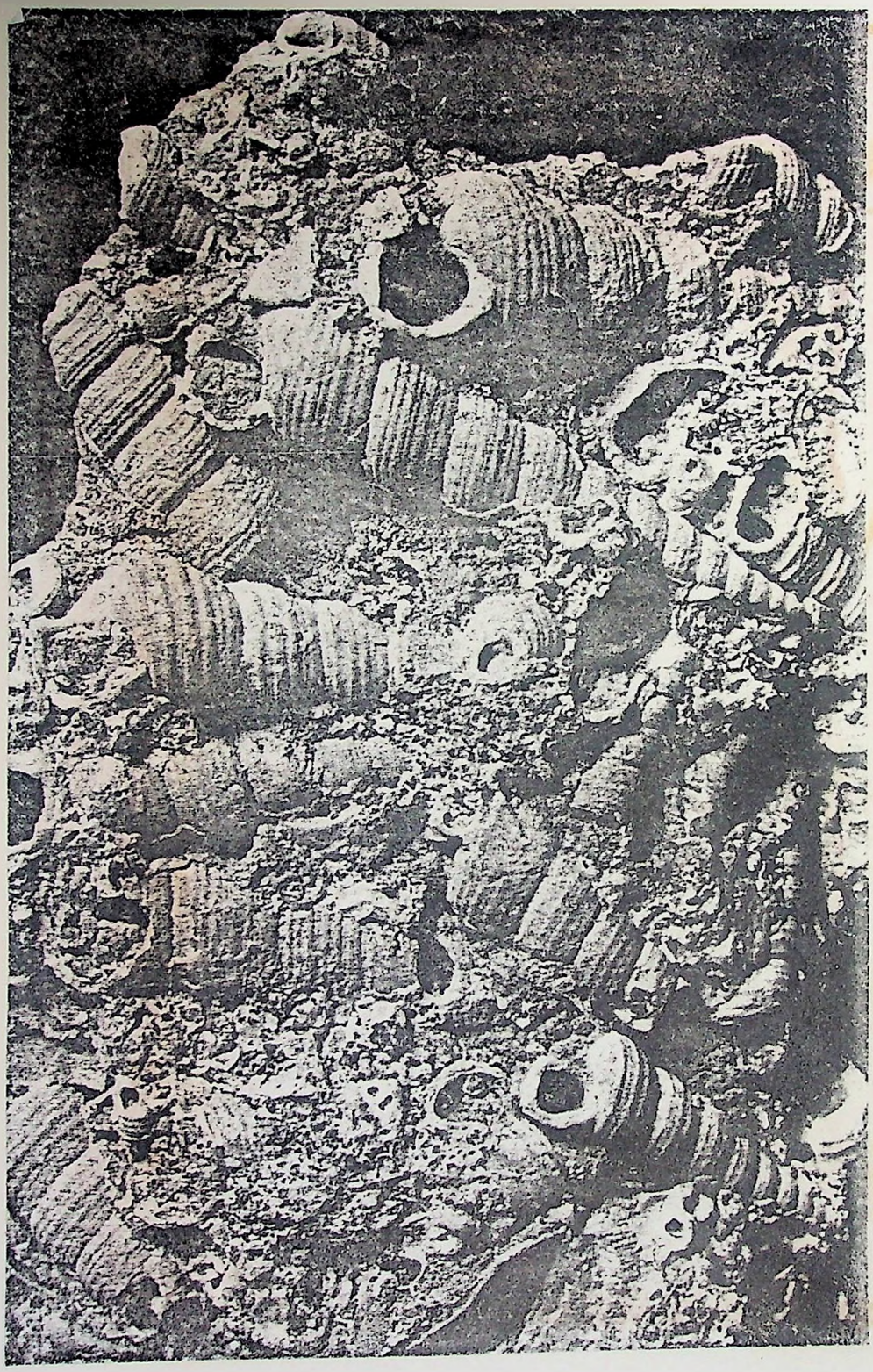


FIG. 201.—NONIONINA STELLIGERA. × 60.

FIG. 90.—SECTION OF RARE FORM OF VOLUTA VESPERTILIO (LEFT-HAND OR DEXIOTROPIC).

FIG. 91.—VOLUTA MUSICA.

FIG. 88.—SECTION OF CERITHIUM GIGANTEUM.

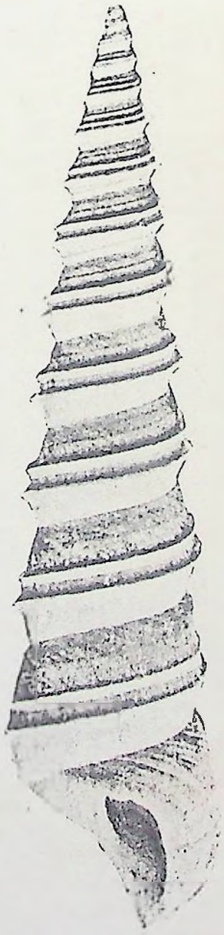
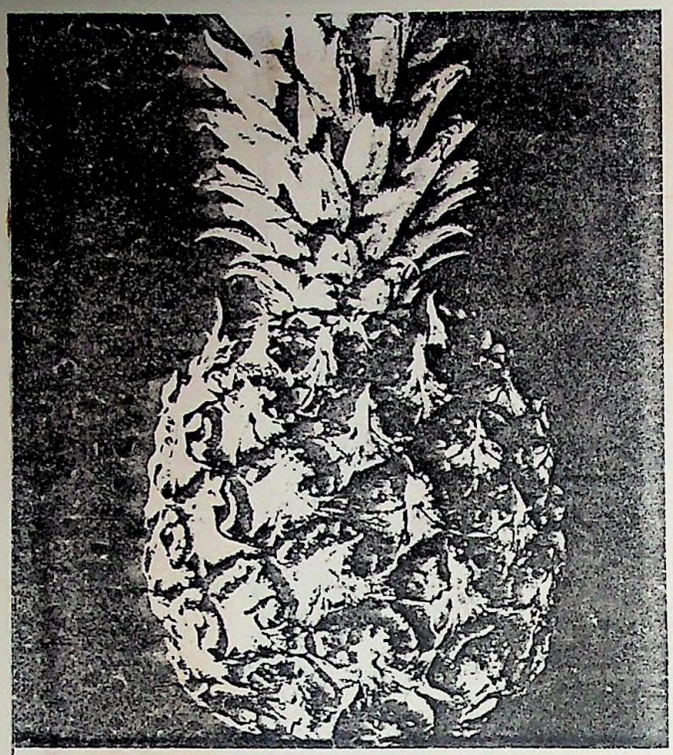


FIG. 89.—TURRITELLA DUPLICATA.



Phyllotaxis

As new leaves grow, they spiral around the stem of a plant. The spiral turns as it climbs and the amount of turning from one leaf to the next is the fraction of a complete rotation around the stem. This fraction always relates to a number series derived from the golden mean.

Daisies, pine cones, pineapples, cacti, and many other plants contain not only nearly perfect logarithmic spirals but this strange number series as well. It is called the Fibonacci Series, as it was introduced into Europe through the translation of an Arabic text in the 12th century by a merchant and mathematician called Pisano Fibonacci.

The numbers in the series are: 1,1,2,3,5,8,13,21,34.....
Each number is the sum of the two preceding.

Take a look at a sunflower centre or a pine cone, and now at the diagram of Araucaria Excelsa. Curving clockwise are 8 spirals; and anti-clockwise there are 13: both numbers found together in the Fibonacci Series progression. Daisies have 21:34; pine cones, 5:8; and sunflowers have a huge number. Whatever the number of spirals a particular species may have, it is always taken from the Fibonacci Series.

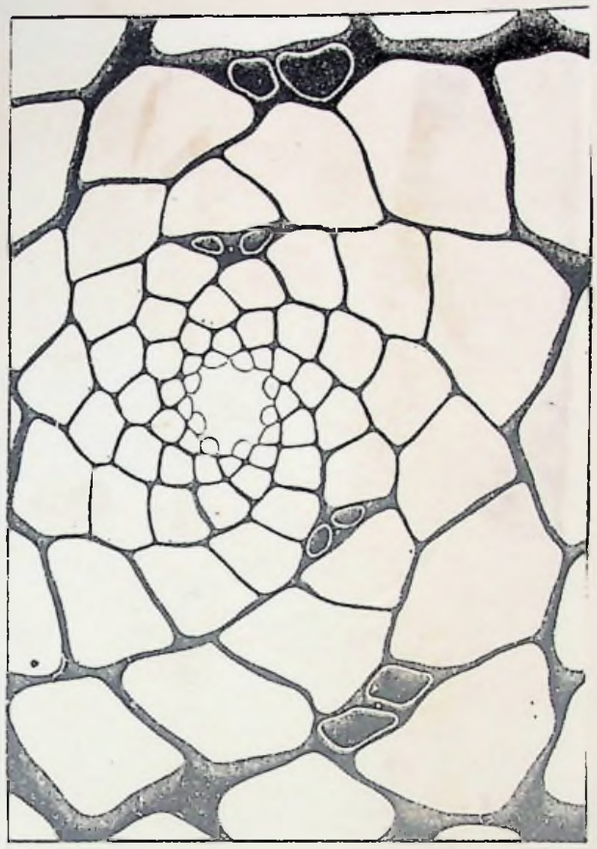
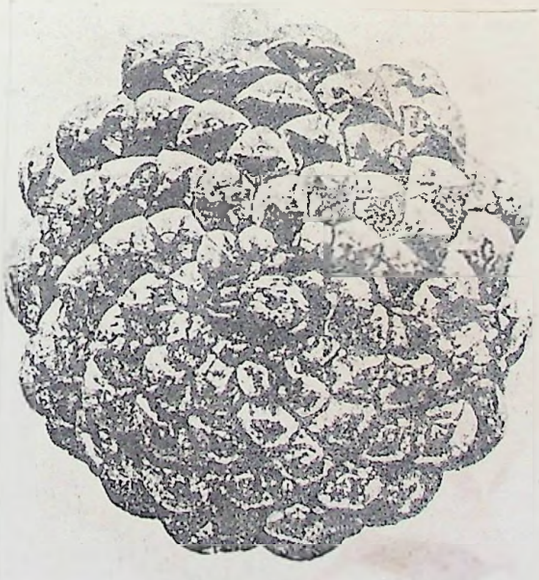
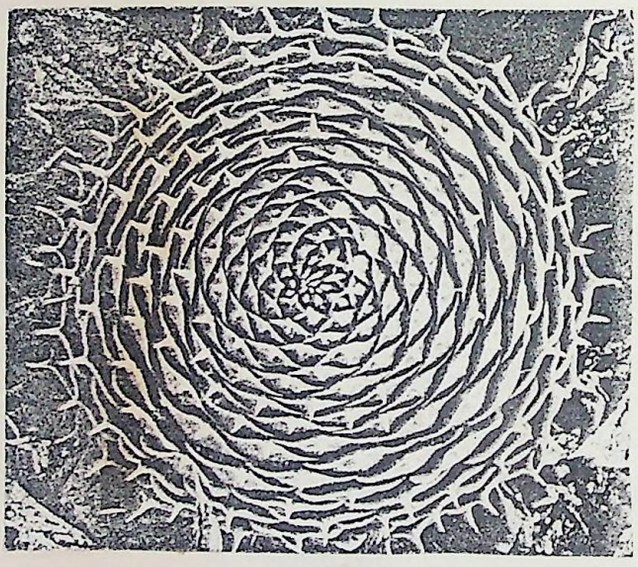
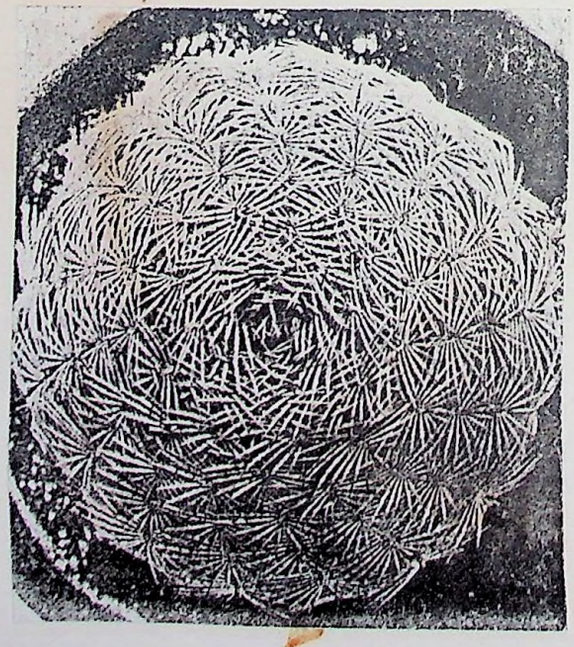


FIG. 146.—DIAGRAM OF ARAUCARIA EXCELSA.







Left and Right-Handed Spirals

"The leaves that curl counterclockwise on the left side of the frond of the sago palm, are opposed by clockwise curls on the right side. Storms spiral counterclockwise above the equator, and clockwise below..."[4]

Siamese twins are enantiomorphs, or mirror images of each other: if one has his heart on the left and is right-handed, the other will have his heart on the right and be left-handed. Sugar also come in left- and right-handed forms, with left- and right-handed bacteria to eat it -- each bacteria taking only its own form of sugar. On a small scale such as acids and proteins, nature seems to favour the right-handed varieties; but on a larger scale, the spirals go either way. For example, the split tendril of the grape can spiral in any direction. The direction of the spiral of the snail's shell is determined by genes and, although for each species either way can occur, there is always a predominant direction.

"The faith that for every righthanded spiral there is a left raises an interesting cosmological question. Physicists have shown that every elementary particle has an enantiomorphic twin, an antiparticle of opposite charge...The antiparticles can, in theory, combine to make antielements, antiworlds, and even antilife. If we assume antiparticles to be as numerous as their enantiomorphs, ...then we must ask where all the antiparticles have gone."[5]

CONCLUSION

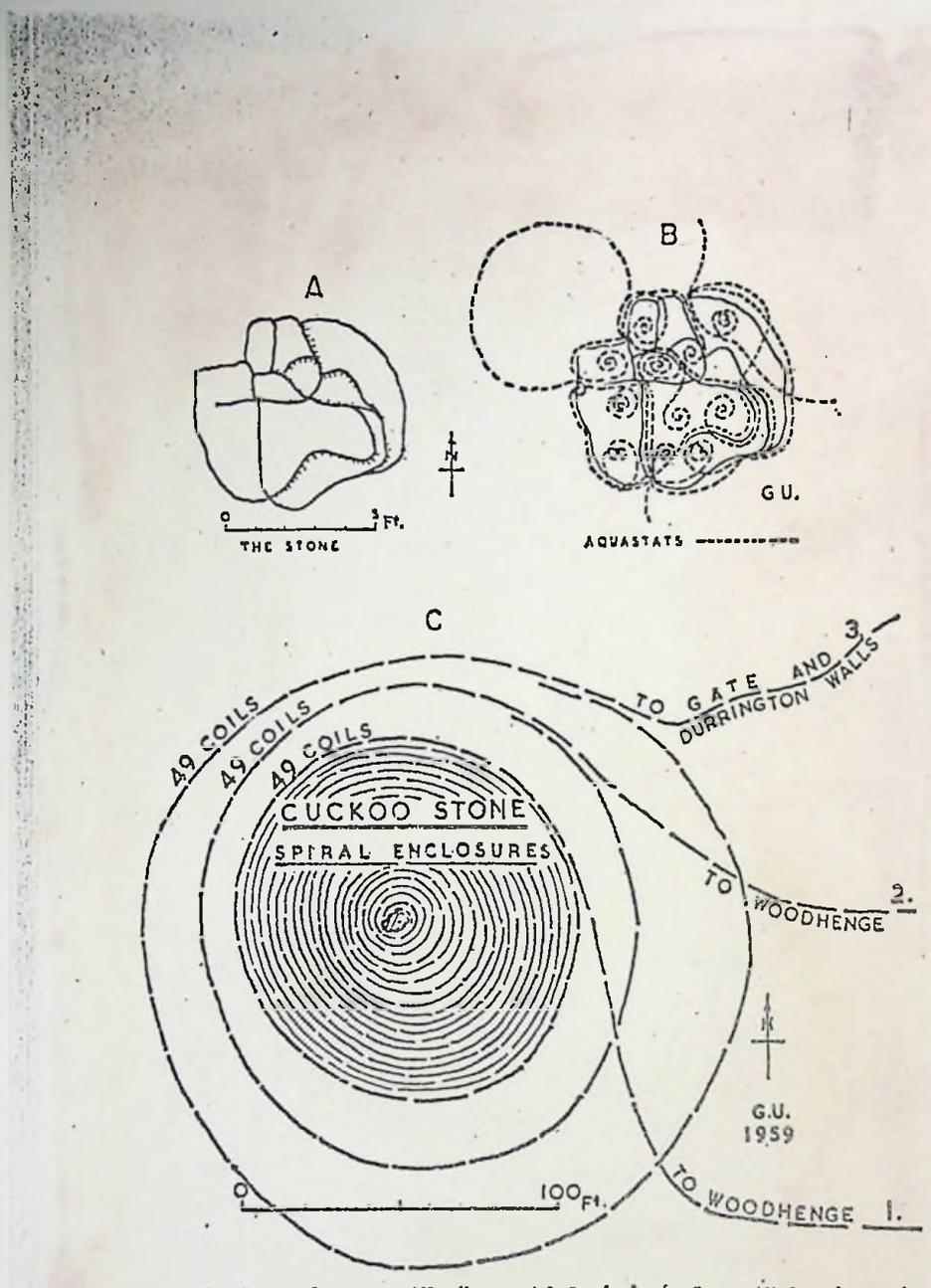
There are all these spirals, all over the world, and from every age. Nature is full of spirals. Why?

I have a theory: it is one of my own. It came, not from years of scientific research, but from one fact. The universe is made up of galaxies and many of them are spiral. Our galaxy is spiral and this shape flows through everything we have: so, within a spiral galaxy the spiral is the basic shape. Within other shaped galaxies, whatever that over-all shape may be will determine the basic shape of life therein. Simple, logical, and probably wrong.

Towards the end of my research, I read Guy Underwood's "The Pattern of the Past". He made some very important discoveries about spirals, and answered some of the questions raised, at the same time as causing many more to be asked. One of his main interests was archaeology, a highly respectable occupation, and another was water-divining, a subject surrounded by doubt and unbelief. He successfully combined the two.

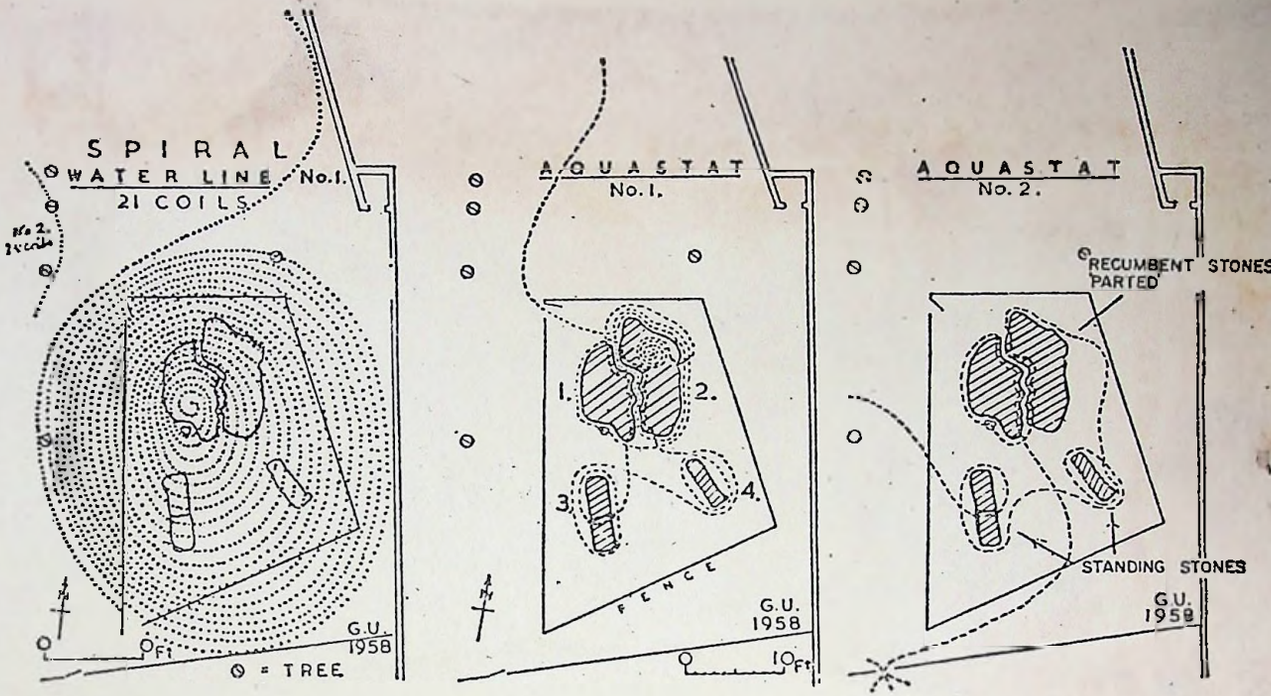
A water-diviner locates an underground stream by perceiving a line of influence above it which causes his rod to move. The influence which affects the water-diviner has never been investigated by scientists. Guy Underwood calls it the "Earth Force" and describes five of its main characteristics: it appears to come from within the earth and to cause a wave motion perpendicular to the earth's surface; it has great penetrative power; it affects the nerve cells of animals; it forms spiral patterns; and it is controlled by mathematical laws involving principally the numbers 3 and 7.

The line known as the water line or stream band is the line which many people can feel. Fewer people can feel the two other lines which take independent tracks and are, as Guy Underwood



25 The Cuckoo Stone near Woodhenge, (*A*) Cracks in the Stone, (*B*) Superimposed Aquastats with Spirals terminating in each unbroken segment of stone, and (*C*) Protective Enclosure by Spirals.

26 The Cove, Stanton Drew, Somerset.



states, readily distinguishable in other respects. He calls them "aquastats" and "track lines" and includes these two with the water line in the term "geodetic lines".

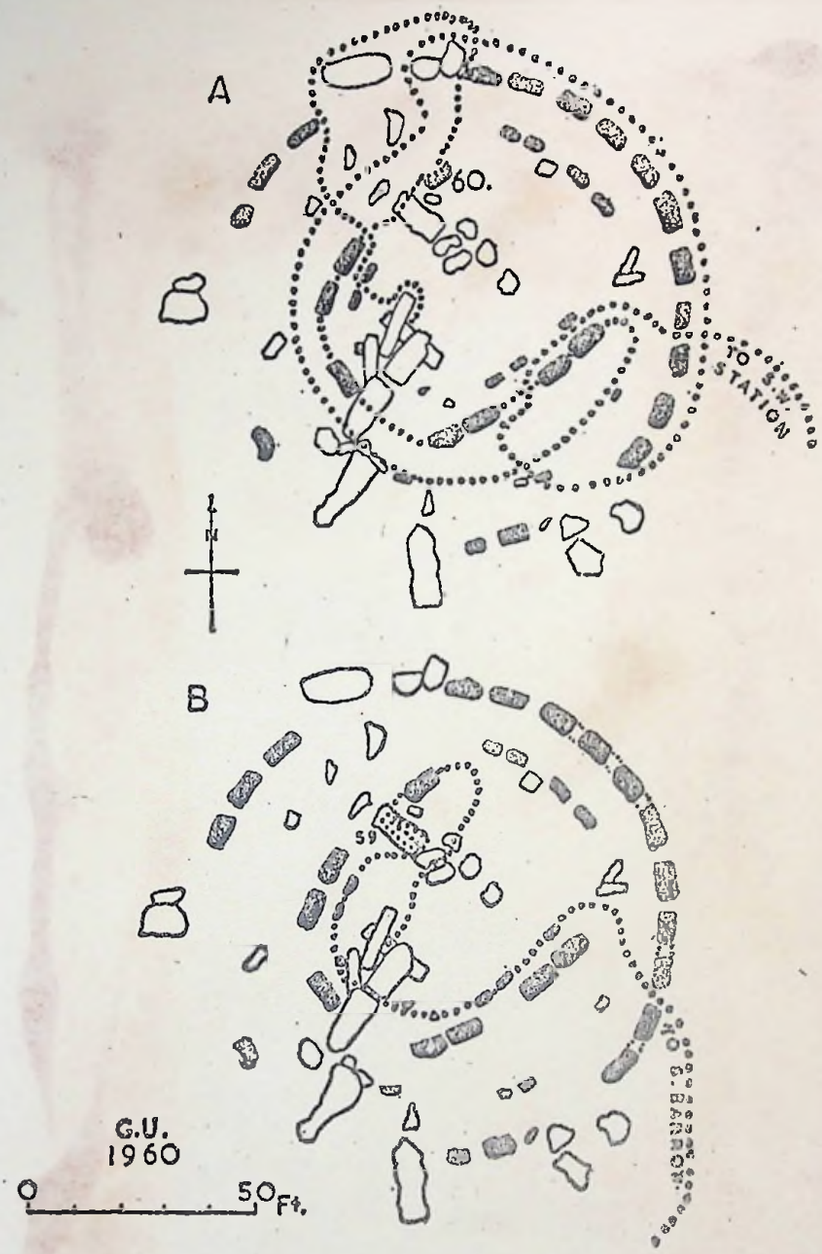
Another important feature is the "blind spring" which is the point at which the primary lines (water line, aquastat, and track line) converge, and from which they emerge. It is around these springs that the converging lines take a spiral course. They enclose the spring and, after numerous coils, terminate upon it. These "primary spirals" are almost invariably left-handed from the outside to the centre.

Primary spirals are usually 10-15 feet in diameter, but some are over 2,000 feet. Two feet spirals are the smallest which remain still possible to identify. One of the most remarkable and important characteristics of primary spirals is that the number of their coils is governed by the number 7. Forty-nine coils (or seven squared) would appear to be the limit.

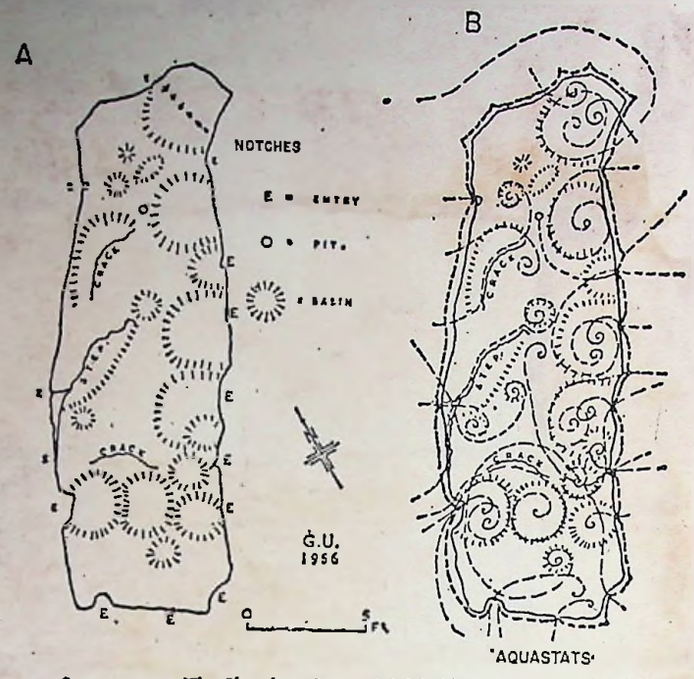
It is interesting that the Earth Force produces two such mystic and ancient figures as the spiral and the number 7. This is very possibly the origin of both.

All prehistoric monuments are enclosed by the spirals produced by one or more springs, and it is therefore reasonable to assume that whoever so placed them knew and used the earth force. The blind spring was the spiritual centre of the site while the spirals gave it protection.

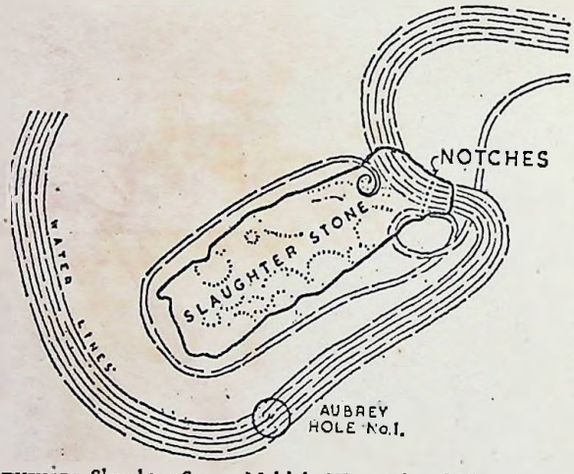
The phenomena are so varied, complex, and also invisible (I have used only the simplest examples: some even change slightly with the moon phases) that the priests -- druids! -- evolved a system allowing the initiated to recognise events and systems otherwise obscured to outsiders. They did this using mounds, banks, ditches, stones, dolmens, stone circles, walls, terraces,



37 Stonehenge: Alignment of Horseshoes, (*A*) Great Horseshoe, (*B*) Little Horseshoe.



44 STONEHENGE: The Slaughter Stone, (*A*) Markings, (*B*) Geodetic Lines.



45 STONEHENGE: Slaughter Stone, Multiple Water Lines indicated by Notches.

36 STONEHENGE: The Geospiral.

roads, pits, and ponds in varying arrangements. Thirty kinds of topographical markings were used by ancient man, each one signifying a different geodetic phenomenon or pattern.

Monoliths or menhirs are isolated standing stones which usually stand over important blind springs. These would then have been recognised as holy places, and their stones would have provided assembly points where people could carry on their business under divine protection and guidance.

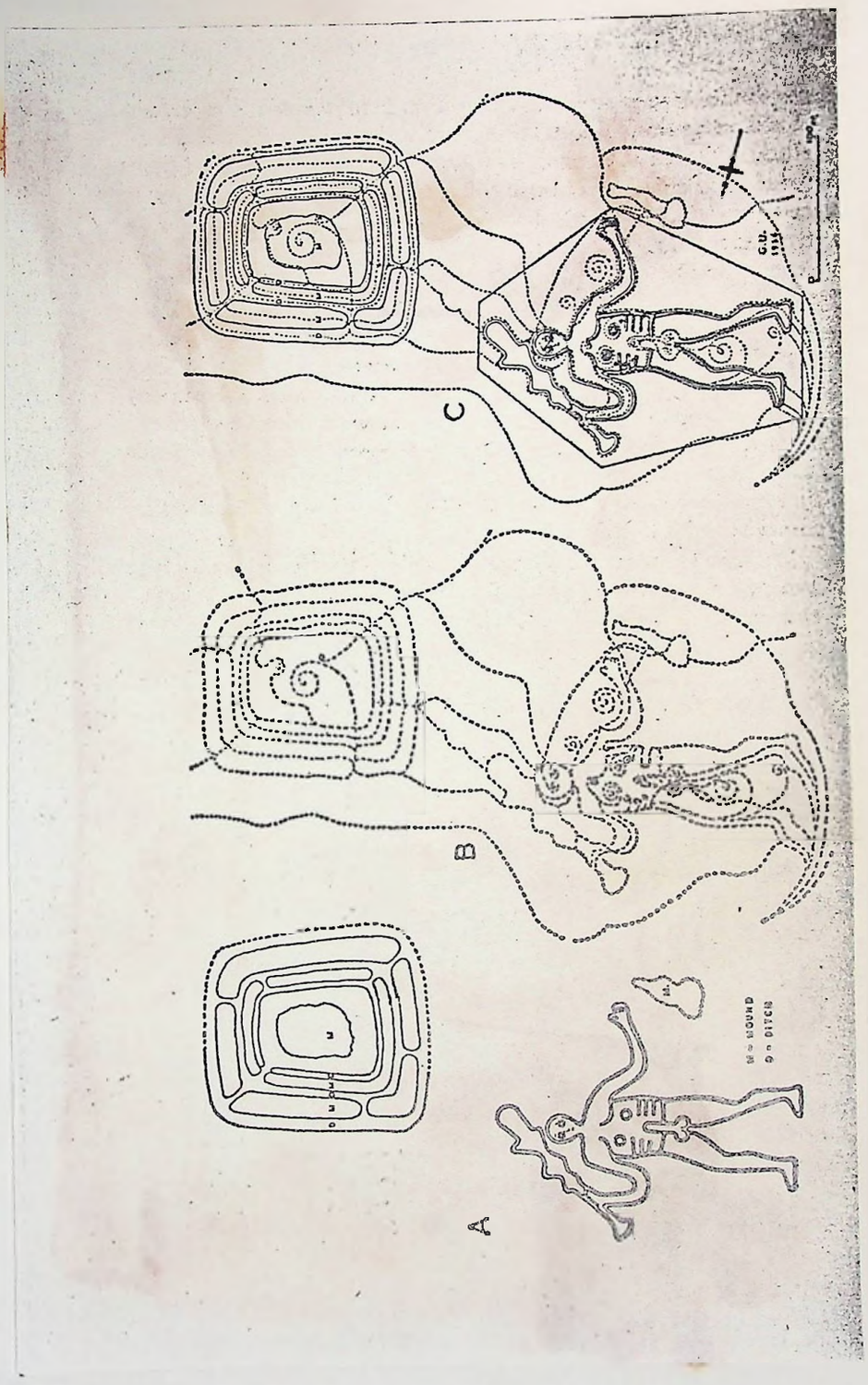
Stonehenge is a very important and impressive place, and as Guy Underwood lived nearby, he spent a lot of time working on it with his divining rod. There are many 'explanations' for Stonehenge but usually they agree on one point, that it needs to be restored and tidied to look the way it originally did when constructed. He does not think so. Underwood has been around every stone and has found a line or spiral or spring to prove that each is now in its correct position. He has examined not only the plan of Stonehenge, but each individual stone as well.

The altar stone is cracked and has another 'fallen' stone lying across it, which is supposed by many to have caused the crack. Geodetic lines show that they were carefully placed and that the crack is deliberate.

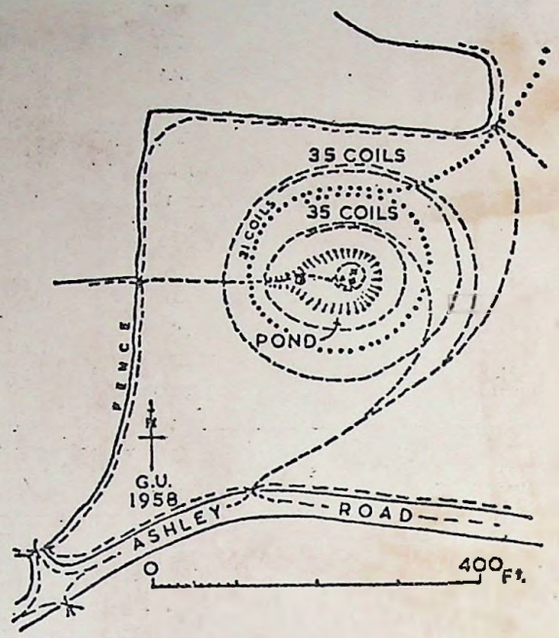
The pictures show that the slaughter stone was not carelessly marked, but that each marking is there for a reason.

The Cerne Abbas Giant is a huge human outline cut in the turf on a limestone hillside in Dorset. Guy Underwood's research shows that this figure was drawn by following some of the geodetic lines in that area. The same is true of the White Horse of Uffington.

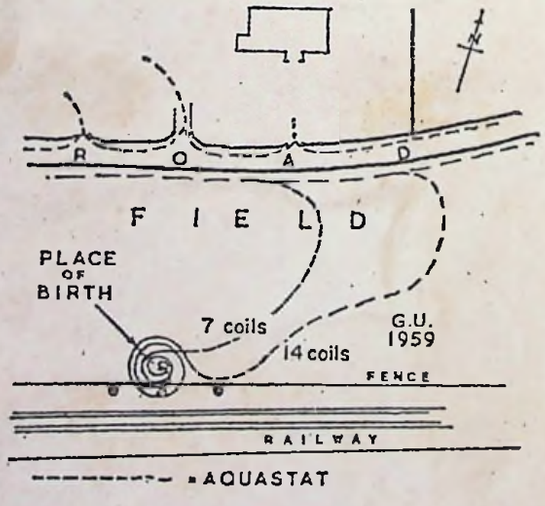
Animals, it would seem, are sensitive to geodetic lines. On summer evenings, groups of gnats dance; and their dances always take place over blind springs. Field entrances were placed


C
B
A
M = MOUND
D = DITCH

34 A



22 Dewpond at Winsley, Wiltshire.



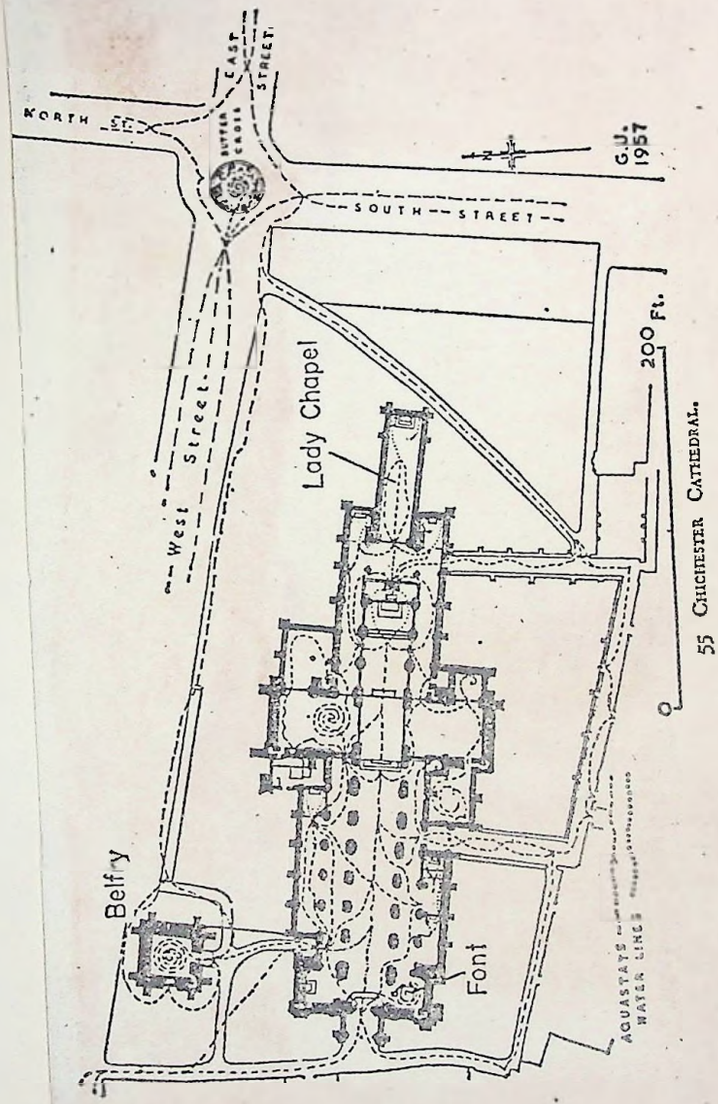
13 Birthplace of a Calf.

over a blind spring from one or more track lines or aquastats branched into the field: this functioned as a natural signpost for cattle.

When animals are about to give birth, many kept in enclosed places attempt to break out to find the right spot. Dogs and cats become restless and will often give birth somewhere other than the place which their owners have prepared for them. All such chosen places occur naturally on blind springs. Ancient women had that knowledge, too: the fact that birth places occurred at a point enclosed by spirals must have been a powerful factor in making the spiral such an important symbol. There is some indication that the spirals found on blind springs either ease labour or produce healthier offspring, or both.

Many isolated trees have been found to be growing on a blind spring and among those which are affected either in germination or in shape are the willow, the apple, the yew, the cedar, the elm, mistletoe, and the hawthorn: all of which trees were regarded as sacred. One loop of a water line around a tree usually produces one-half of a complete turn of the trunk in about 7 feet of height.

What we now understand about Freemasonry would indicate that the secret ceremonies and ritual involved are derived originally from some knowledge based on geodetic lines upon which masonry and building in general were founded. Everything about this secretive organisation points towards knowledge of the geodetic lines as being the secret. This knowledge is important because by building on lines which are already give, the construction will be in harmony with the landscape. Churches and cathedrals, as well as smaller buildings such as baths, cowsheds, and even the shape of gardens and enclosures were the concern of the Freemasons up to a few hundred years ago.



55 CHICHESTER CATHEDRAL.

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At Chichester Cathedral, hardly any line is straight, any two lines parallel, or any angle a right-angle. This is because the designers and builders, the most important of whom were Freemasons, were concerned chiefly with fitting the building into the lines provided by nature.

Geodetic phenomena are still a mystery. As far as I know, Guy Underwood is the only person who has devoted an entire lifetime to a study of the subject. However, now that "The Pattern of the Past" has been written and read by many people, someone else may take up where Guy Underwood has left off, examining more sites and other related phenomena around the world.

For me, the question "Why is the spiral so important in religions and in ancient art?" has been answered. I'm still left with the question "Why is the spiral?" Maybe I'm right about those galaxies.

FOOTNOTES

1. "On Growth and Form", D'Arcy Thompson, Cambridge University Press (1961), page 172.

2. "Patterns in Nature", Peter S. Stevens, Peregrine Books (1976), page 56.

3. "On Growth and Form", page 175.

4. "Patterns in Nature", page 83.

5. "Patterns in Nature", page 84.

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