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Part 2

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THE POSSIBLE EXISTENCE OF LIFE ON THE SUN, AND ON SOME OTHER STARS IS PRESENTED IN THIS ARTICLE. ADMITTEDLY, THE HYPOTHESIS SOUNDS BIZARRE AND NONSENSICAL. SUCH IS THE NATURE OF NEW DISCOVERIES IN THIS ARTICLE, I WILL TRY TO SHOW THAT THE PROPOSED POSSIBILITY GOES FAR BEYOND IDLE SPECULATION AND THAT IT IS A RATIONAL CONSEQUENCE OF THE PRESENT STATE-OF-KNOWLEDGE. THE HYPOTHESIS IS BASED ON CAREFUL AND LENGTHY STUDY OF DIVERSE SUBJECTS AND IT WILL CHALLENGE NOT ONLY OUR KNOWLEDGE ON THE SCIENCES AND THE ARTS; BUT ALSO THE ESTABLISHED COMMON SENSE OF OUR TIME. THE STATE-OF-KNOWLEDGE TODAY IS SUFFICIENTLY ADVANCED FOR US TO BE ABLE TO VERIFY THE FANTASTIC POSSIBILITY, TO COMPREHEND ITS REALITY, AND HOPEFULLY, TO COPE WITH IT; IF IT TURNS OUT TO BE TRUE. IF (AND WHAT ANOTHER BIG IF) THE HYPOTHESIS IS ON THE RIGHT TRACK, THEN THE IMPACT ON HUMANITY WILL BE PROFOUND.

6. THE CONVECTION ZONE OF THE SUN

The presence of a convection zone on the Sun, or on other heavenly bodies, is very important for the development and evolution of life. Such zone provides a medium where the elements of matter can be mixed and combined into simple and, eventually, complex molecules. In this section, we will take a closer look at the convection zone of the Sun, at the conditions, circumstances, and composition of that zone.

Solar phenomena are complex and have been studied from a distance of 150 million kilometers. Measurements and speculations from such a distance can at times be suspect. In the following descriptions I have tried to present as many different views as possible, while maintaining brevity.

6.1. Size

The size, or depth, of the convection zone on the Sun was estimated early this century to be between 20,000 and 200,000 kilometers. A recent estimate of the size of the convection zone is

given "At approximately 0.86R., the gas properties have changed to such an extent that the gas above is convectively unstable and turbulent convection occurs." (15). By this estimate, the convection zone is some 97,000 kilometers thick. The size of the convection zone is extremely important to the task at hand, for when it is combined with the density of matter in the zone, the behaviour of matter is altered considerably due to high pressure.

6.2. Temperature

The temperature distribution in the Sun is considered odd. Instead of continued decrease in temperature outward from the core, the temperature starts to climb to very high values beginning around the photosphere layer. One thing is certain, that is, the temperature reaches a minimum at the top of the convection zone. Recent measurements and estimates of temperatures in the visible portions of the Sun are in agreement with values obtained earlier this century.

The temperatures in the photosphere layer, at the top of the convection zone, and in the sunspots regions are approximately:

Photosphere	6,000 ⁰ K
Sunspots	4,000 ⁰ K

A temperature of 3,700⁰K was measured for a very dark sunspot (16). These values vary slightly due to activities on the Sun, intensity of sunspots, and method of measurement. The 2,000 degrees difference between the photosphere and the sunspots is due to the intense magnetic fields associated with the sunspots. The effect of a strong magnetic field on matter is that of imposing order and organization, a cooling effect. It is noted here that the minimum temperatures recorded for the Sun are sufficiently high to melt, boil and evaporate almost all substances used on Earth and to, even, break down many molecular and atomic bonds. These thermal agitation effects occur due to high temperatures. The melting and boiling temperatures, as is well known, can also be altered by changing the pressure as will be discussed later.

6.3. Density

The casual statement is often made that the Sun is "a ball of gas", or "a ball of fire." As the Sun is mostly composed of the two lightest elements, hydrogen and helium, the statement leaves one with the impression that matter in the Sun is gaseous and tenuous. This is only true of the outer layers of the Sun's atmosphere. As we descend into the interior regions of the Sun, the density of solar matter begins to rise reaching a very large value in the core region. The density of matter in the core is estimated at about 160 gm/cm³, compared with some 13 gm/cm³ value for the inner core region of the Earth. The average density of the Sun is about 1.4 gm/cm³ which is slightly greater than that of

water at sea level. At intermediate regions in the Sun, intermediate densities exist.

The density of matter in the upper layers of the convection zone is very thin. In the photosphere, Gibson estimates the density of matter in the order of 4×10^{-7} gm/cm³, ten times the density of terrestrial air at sea level. This latter value is not very certain as the inner regions of the convection zone are inaccessible to our measuring instruments. Of course the solar gravitational pull on matter in the convection zone plays an important role in setting the density of matter in that zone. The Sun's gravity at the surface is about 27 times the terrestrial gravity at sea level, and is capable of retaining a denser atmosphere than that of the Earth's. The one atmospheric pressure, at sea level on Earth, is due to 10 kilometers of air with an average density of 0.001 gm/cm³. It is obvious that intense pressures must exist in the lower regions of the convection zone, when the size and density estimates given above are considered. The intense atmospheric pressure in the lower regions of the convection zone is the first important factor which will play a major role in making a solar biosphere possible.

6.4. Sunspots and Magnetic Fields.

The most prominent feature on the Sun, as observed from the Earth, is the sunspots cycle. The most important characteristic of the spots is the unusually strong magnetic fields and the apparent lower temperatures within them. The science of sunspots is elaborate and lengthy. It deals with the origin, development, and behaviour of the spots, their observed effects on the Sun's atmosphere their effects on our planet, and their influence on interplanetary space. We only need to take a brief look at the spots' activities within the Sun and the magnetic fields associated with them.

The strength of the magnetic fields in the sunspots seems to be related to the size of the spots. The larger the spots, the greater the magnetic fields. In the umbra region, the field strength is approximately 4,000 gauss, compared with less than 1 gauss force field on Earth. A polar magnetic field, similar to the terrestrial magnetic field, was also observed in the Sun. This field is only about 1 gauss in strength. Recently, localised and strong fields have been observed outside of the sunspots regions, "...as we look at smaller and smaller areas on the sun, we see evidence of finer and finer magnetic fields with higher and higher strengths" (17).

The spots are centres of dynamic activities. Flow of matter in the vicinity of the spots have been observed and recorded. Just below the surface of the spots, matter is observed to flow away from the centre of the spots, while above the surface, matter is observed to flow toward the centre of the spots. These, and other, observed phenomena, led to the conclusion that the magnetic fields of the spots extend below the photosphere layer, and into the convection zone. The sunspots and their associated magnetic fields are believed to be generated in the subsurface regions of the Sun, "The magnetic field of a bipolar spot appears to be pushed up from below..."(18) and "It looks as if the maximum field strength represents a property of the subsurface" (19). C.E. St. John suggested earlier that the flow of matter in the sunspots is analogous with terrestrial tornadoes. (20).

How do spots originate? Some scientists proposed that the intense fields are the result of magnifications of the general magnetic field in the Sun (21). Others proposed that the intense magnetic fields originate in the outer corona, and then travel inward forming the spots in the

process (22). The most attractive explanation for the origin of the intense magnetic fields of the sunspots is the differential motion theory (23). Here, it is proposed that a frozen-in longitudinal magnetic-field line is wound-up into meridional force lines. The different rate of rotation of the interior of the Sun enhances the strength of the field. The convective motion of matter in the convection zone is said to cause magnetic "tubes" to twist, resulting in "ropelike structures which further increase the density of lines" (24), and, of course, the magnetic fields.

There are many other details known about the sunspots and the magnetic fields of the Sun.

The important aspects of these which we need in developing the possible existence of a biosphere and, hence, life on the Sun are the following:

- (1) Intense magnetic fields, of the order of 4,000 gauss, and greater, are present in the convection zone of the Sun.
- (2) The magnetic fields originate, develop and propagate in the convection zone.

The strong magnetic fields in the Sun, along with other factors, play an important role in the reduction of "entropy" of solar material, thus allowing matter to form simple and complex molecules, as will be discussed later.

6.5. Solar Hydrodynamics

The hydrodynamic flow of matter in any cosmic body is essential for the initiation, development, diversity, and evolution of life. Looked at under low magnification, the surface of the Sun, with the exception of the sunspots, appears to be a relatively quiet surface. Closer look with modern, larger and more discriminating telescopes shows that the whole surface of the Sun is subject to dynamic activities and flows having hydrodynamics character-

istics, "There are numerous examples of hydrodynamic flow on the Sun ... the vortical motion in sunspots and the associated Evershed Effect, the vertical currents in the granulation, and rotation of the sun, the motion of prominences and dark flocculi, the proper motions of sunspots in latitude and longitude ... the drift of filaments towards the poles of the Ca atmosphere, and others" (25).

The flow of matter is observed and confirmed in all visible layers of the Sun. In the photosphere, and at the top of the convection zone, irregular pattern of cellular granules, which are observed to continuously appear, break up, coalesce with other granules, or disappear in a short period of time, is evident, "To scientists who study fluid and gaseous motions, these cells betray the presence of convection, as in the case of turbulent, billowing clouds or bubbles in a boiling pot. Convection in the photosphere carries hot gas upward in globs or cells; these granules radiate some of their heat energy and then sink back down"(26).

The hydrodynamic flow of matter occurring in the Sun resembles phenomena that occurs on Earth. Large masses of matter rise in the convection zone, radiate heat energy, condense, and then rain down onto the surface. This describes an atmospheric ocean similar to that on Earth. The similarities between the terrestrial and solar atmospheres, in terms of hydrodynamic activity, is inescapable, "Large cells or fluid elements well up to the surface, radiate away their excess heat, and split apart as the cooler gases flow back down around their outside edges."(27) "The convection cells that are formed are similar to thunderstorms in our own atmosphere"(28) and "Granulation and supergranulation are both convective phenomena with which we have every day experience such as building cumulus clouds or ascending smoke columns" (29).

The hydrodynamic activities in the Sun extend into the outer atmospheric layers, the chromosphere and the corona. Matter in these layers is highly ionised, yet it also exhibits hydrodynamic behaviour. In the case of the corona, for example, "not all of the material which enters the corona through the chromosphere eventually leaves the sun in the solar wind especially during periods of peak activity when flare puffs, surges, sprays ... sporadically eject material from the surface. This material will sometimes condense into regions of locally higher density and lower temperatures and rain back down toward the photosphere. Because this plasma is highly ionised, it will flow along the field lines, outlining them and producing some graceful and elegant structures" (30).

6.6. Abundance of Elements

The Sun is mostly composed of hydrogen and helium, the two lightest elements. The exact composition and distribution of the elements in the Sun are not known, however, several approximate values are available for the abundance of these and other elements, and are in general agreement. It is estimated that the Sun is composed of 75 per cent hydrogen and 23 per cent helium. Hydrogen and helium make up about 98 per cent of the mass of the Sun.

The next group of elements, in terms of abundance, on the Sun are the remaining, and essential elements of life, carbon, nitrogen and oxygen. These three elements make up about $1\frac{1}{2}$ per cent of the solar material. The remaining atoms make up the last $\frac{1}{2}$ per cent of the Sun's mass. The last group of elements is usually headed, in terms of abundance, by such atoms as calcium, potassium, sulphur, magnesium, and iron. These atoms are also essential ingredients in the recipe of life as witnessed here on Earth.

A casual glance at these percentages leaves one with the impression that the Sun is gaseous and tenuous in structure. The state of matter (solid, liquid, gas or plasma) in the stars, planets or interstellar space is dependent on pressure, temperature and density. How do these conditions influence the state of matter in the Sun is discussed in the next section.

The abundance of hydrogen and helium and the rarity of the other elements on the Sun must not mislead us into abandoning the quest of establishing the possible development of life on the Sun. The Sun is very massive, and two per cent of its mass (more than 6,000 Earth masses) is more than sufficient to form a myriad of complex biological structures under the proper and chance conditions. Actually there is no need for even distribution of the elements of matter for biological molecules to form, or for life to develop and evolve. As witnessed here on Earth, there is lopsidedness in the composition of living organisms (99 per cent H, O, N, and C), the composition of the life supporting crust (74 per cent by weight O and Si, or 93 per cent by volume O), the composition of the life supporting atmosphere (99 per cent O and N), or the possible cradles of life, the oceans (97 per cent H and O). The mass of the life supporting biosphere on Earth (atmosphere, hydrosphere, and crust) is but a very small fraction of the total mass of the Earth.

The thermal agitation caused by the minimum temperature on the Sun is sufficient to cause the ionisation of many elements. If the level of thermal agitation on the Sun can be continuously reduced, then the following sequence of event is possible:

(1) Formation of neutral atoms by recapture of free electrons.

- (2) Formation of simple free radicals: CO, OH, NH, CH etc in accordance with built-in atomic tendencies.
- (3) Formation of molecular chemical compounds: H₂O, CO₂, CH₄, NH₃ etc in accordance with the laws of chemistry.
- (4) Formation of the life-building-blocks: amino acids, purines, fats etc. in accordance with the laws of biochemistry.
- (5) Formation of the giant organic molecules: DNA, RNA etc., in accordance with discoveries of genetic engineering and microbiology.

And, in line with the unified cosmic evolutionary process which was discussed in Section 3, eventually, enzymes, cells, tissues, and advanced organisms.

Are there mechanisms in the Sun which result in the reduction of agitation of matter to the point of allowing the formation of neutral elements, free radicals, chemical compounds, and the more complex molecules? Apparently, the answer is yes. Actually, a part of the sequence described above is already proven through observation. For example, atoms in the neutral state have already been detected on the Sun, "Menzel's study comprises 27 elements besides hydrogen and helium, most of them observed in the neutral and the ionised states" (31)

How about simple free radical molecules? The presence of these molecules in the Sun is, also, already proven. "According to Babcock (1945) the following free radicals have been identified in the solar spectrum: OH, NH, O₂, CH, CN

SiH, M_gH, C₂, TiO, M_gO, CaH

....Goldberg et al (1952)

found four infra-red CO bands and proved their solar origin" (32) and, "From the intensities of the molecular lines, Hunaerts derived the concentrations for C_2 , CN, CH, OH

and NH, and from these the abundance of H, C, N and O" (33)

These simple molecules, which have already been detected and observed in the solar spectrum, are the stepping stones to the precursors of the living organisms, such as, water, ammonia, methane, and other molecular hydrocarbons. The solar origin of the simple molecules is already proven. How about the more complex molecules and compounds, the precursors of living organisms? Here, observation becomes difficult. The more complex the molecules are the larger are the number of spectral lines and the more complicated are the lines' characteristics. There are indications that some of these may be present in the Sun, "By 1888, Langley had obtained a continuous record of the solar spectrum from ultraviolet cutoff at 0.3 μ to a long wave limit of 55.3 μ . This map is remarkable for its wealth of information, considering the low dispersion and resolution. For example, the map shows not only the strong bands of H_2O and CO_2 at 1.4 μ , 1.8 μ , 2.7 μ , and 4.3 μ , but also weaker bands of N_2O , later discovered by Adel (1939), and CH_4 , later found by Migoete (1948)" (34).

The presence of water, methane, carbon dioxide and similar molecules on the Sun is not as certain as the case of the simpler molecules. This is due to the possible telluric origin of some of the spectral lines detected in the solar spectrum, "The atomic lines identified up to 3.6 μ are due to elements known to be abundant in the sun's atmosphere. Most of the lines are telluric, produced by well-defined band systems such as H_2O , CH_4 , N_2O , CO_2 and isotopes" (35).

Is it possible that organic compounds can be synthesised from the neutral atoms and simple molecules which have already been detected on the Sun? The Sun possesses sufficient amount of matter and energy, and had enough time to synthesise the elements of matter into a prolific aggregate of organic molecules.

There is no reason to believe that the Sun, and the stars, lack organic molecules, or the requirements for their development. These molecules have been detected in almost every major corner in the observed universe, "Conditions conducive to the preservation of organic compounds in the universe are found in settings as diverse as the interstellar medium, comets, interplanetary dust, meteorites, and the atmospheres of the outer planets and satellites" (36). The only major cosmic bodies which are missing from the above list are the stars. Yet, matter in the planets, comets, meteors, interplanetary and interstellar space is not independent of the stars. All share a common origin. If organic molecules are present and detected in most of the major bodies in the observed universe, then, it is indeed possible that these same molecules exist in the stars, the cradle of terrestrial and planetary matter.

The fundamental ingredients of living molecules, namely matter, energy, and time are abundant to the fiery globes. The major obstacle to the formation and development of simple and complex molecules in the Sun lies in the prevailing solar conditions, particularly, the solar temperatures. At the minimum solar temperature recorded, disorder prevails, molecular structures are torn apart, and the atoms are ionised. The essence of animate and inanimate molecular

structures is order and organisation of the basic building blocks, the atoms. The solar temperatures appear to preclude such order and organisation and, hence, the possible formation of matter in the solid and liquid states.

In this section, I have briefly described the prevailing conditions in the convection zone of the Sun, as we know them today. If only the temperatures are considered then, it is obvious that the development and evolution of life, as we know it is impossible. But, when the prevailing conditions in the Sun are considered together, a new possibility arises. The pressures, densities, magnetic fields and gravity in the convection zone of the Sun present the possibility of formation of molecular structures through restoration of order and organisation to the solar material. The first stages of the process towards life's formation on the Sun, namely, the formation of simple molecular structures, are already proven experimentally, "Much remains to be done on molecular spectra. Some bands, such as CN, CH, C₂, NH and OH, appear in de-

tail in the solar spectrum. Heads of a number of other bands can also be identified with certainty." (37) The remainder of these processes, which could have led to the formation of life on the Sun, are discussed in the next sections.

7. SOLAR BIOSPHERE

Life on Earth is concentrated in a thin life-zone, the biosphere. It is at the boundaries of the terrestrial crust, hydrosphere, and atmosphere that most living organisms and structures reside. The prevailing conditions in this zone, such as, pressure, temperature, and gravity allowed for the formation of a global Darwinian pond which has been conducive to the maintenance and growth of life. Sufficient amounts

of hydrogen atoms were captured by the oxygen atoms, in the formative stages of our planet, to form the terrestrial cradle of life, the oceans. The combination of temperature, pressure, and density allowed the formation of water in that most essential state for the development and proficient growth of life, the liquid state. The terrestrial convection zone played an essential role in the formation of varied forms and shapes of living structures by mixing, mingling, combining and blending of the life building blocks on Earth.

The granules, supergranules, and other solar hydrodynamic phenomena discussed in the previous sections bespeak a solar convection zone, a solar mixing bowl. The presence of hydrogen and oxygen atoms bespeak the possible formation of water molecules. The abundance of the basic elements of life (hydrogen, oxygen, nitrogen and carbon) bespeak the possible formation of the life-building-blocks, and the simple organic molecules.

The possible formation of molecules structures, living or otherwise, in the Sun is served a fatal blow by the intense solar temperatures. Can liquid water, for example, exist in the 4,000°K, or more, temperatures within the solar convection zone? Are there mechanisms in the Sun which allow for the formation and maintenance of a global Darwinian pond, vis-a-vis the terrestrial pond? If we can show that a liquid water pond can exist on the Sun, then, the possible development and evolution of solar life can be envisioned to proceed in accordance with the fixed laws of Nature, which have resulted in the formation and maintenance of life here on

Earth. The laws of physics, chemistry, biology and their respective branches need not be altered to support the possible existence of solar oceans.

Substances exist in one of the three states of matter, solid, liquid and vapour or gas. Another phase of matter is the plasma state which occurs at extremely high temperatures, when a gas becomes completely ionized. The state of matter depends on temperature, pressure, and density.

A sample of ice in an isolated container will melt, boil, and evaporate when subjected to rising temperature. Continued heating of the enclosed sample will agitate the water vapour molecules further resulting in dissociation of water vapour molecules into the constituent elements, hydrogen and oxygen. Further increase in temperature will result in significant agitation and the stripping of the electrons from their atomic orbits. The isometric (constant volume) process described here is reversible. When the liquid sample is cooled it changes to ice. When the vapour is cooled, it returns to the liquid state. The reversible isometric process for the ice sample is shown in the diagram. The change of phase is explained by changes in atomic and molecular bonding forces, and the forces of vibration which tend to tear the molecules and atoms apart.

Pressure has the opposite effect from temperature. An enclosed water vapour sample at, say, $1,000^{\circ}\text{K}$ consists of water molecules, H_2O , in a high state of agitation. If this sample is subjected to a cooling isothermic process, i.e. pressure changes at constant temperature, the vapour sample will condense into liquid state and, eventually, into a solid, or ice, state at the $1,000^{\circ}\text{K}$ temperature.

The two processes described above were formalized for ideal gases by the scientists Boyle, Charles, Gay-Lussac, Avogadro, and others. Real gases and sub-

stances approximate the behaviour of ideal gases at low pressures.

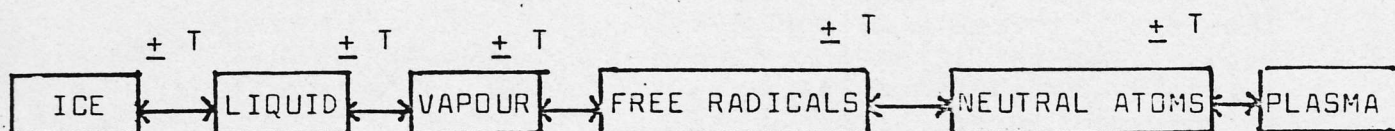
Water under a pressure of one atmosphere at sea level on Earth, boils at 100°C , (373°K). The boiling temperature of water increases when pressure is increased, and decreases when pressure is decreased. In a pressure cooker subjected to a pressure of two atmospheres, water boils at 121°C (394°K) (38). At the top of Mount Everest, air pressure would have dropped to less than $1/2$ atmosphere, and the boiling point of water is less than 80°C (253°K). The boiling temperature of a liquid is the "temperature at which its vapour pressure is equal to the external pressure." (39)

If a water sample is subjected to high pressure such that the boiling temperature is at $1,000^{\circ}\text{C}$, then, just before boiling the sample under consideration is in a liquid state possessing many of the properties of liquid water which is heated to, say 99°C at sea level on Earth. The chemical composition of the hot sample is necessarily H_2O . To the inquisitive terrestrial observer, the water sample is a scorching hot substance.

The selection of the convection zone in the Sun as the possible abode of solar life is obvious. The hydrodynamic flow of matter in this zone constitutes the global mixing bowl for the elements of matter, the life-building-blocks. What can we say about the state of matter in this zone, and if the hydrogen and oxygen atoms in the Sun combine to form water molecules, can this water exist in a liquid state?

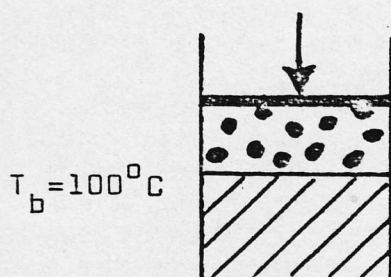
Given the estimated size of the convection zone in the Sun (about $100,000\text{km}$) and the density of matter in the lower region of the zone (about 0.01 gm/cm^3) it is obvious that tremendous atmospheric pressures (compared to the terrestrial 1 Kg/cm^2 pressure at sea level) exist at some distance within the convection zone. Even if an

SOLAR WATER: HEAVY, HOT AND GLOWING

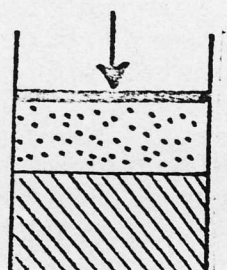


P = 1 ATM

P = ATM (X VERY LARGE)



- o ATOMS AND MOLECULES LOOSELY ARRANGED
- o DENSITY 1 gm/cm³
- o FAMILIAR LIQUID WATER
- o FAMILIAR ICE I



- o ATOMS AND MOLECULES RE-ARRANGED IN A MORE COMPACT CONFIGURATION (KEEPING THE SAME RELATIVE POSITIONS).
- o MORE DENSE
- o MUCH HIGHER INTERNAL ENERGY DUE TO TEMPERATURE
- o HEAVY, HOT GLOWING, AND MOLTEN LIKE LIQUID WATER.
- o HEAVY, HOT, GLOWING, AND FIRE-LIKE ICE X.

Liquid Water At High Temperature.

order of magnitude error is made in the estimate of both the size of the solar convection zone and the density of matter within it, significant atmospheric pressures must be present in the unseen bottom layers of the zone. In this context, liquid water can exist in a star, such as, the Sun.

The same argument can be applied to other substances, thus showing that other molecular structures can exist in the liquid and solid states in the Sun. In proposing this possibility, I maintain that the chemical and biological processes within the Sun are similar, though not identical, to terrestrial chemistry and biology. When two hydrogen atoms and one oxygen atom combine in the Sun, they will form one and only one kind of substance known to us as water. And

so on with one carbon atom and two oxygen atoms forming carbon dioxide, one carbon atom and four hydrogen atoms forming methane, one nitrogen atom and three hydrogen atoms forming ammonia molecule, and so on.

The solar substances must necessarily be similar, but not identical, to terrestrial substances. The general properties of solar substances will differ, at the microscopic and macroscopic levels, from the terrestrial substances. The differences will be found in the different conditions prevailing in the two globes. Solar liquid water, for example, may behave, at the macroscopic level, as terrestrial ocean waters behave. As the difference between the two lies in the higher temper-

atures and pressures, we should expect the following:

(1) The internal energy of solar substances to be much higher than their terrestrial counterparts, as the internal energy of a substance is function of temperature only, and not the magnitude of pressure (40). It follows from this that electrons in solar atomic substances can jump energy levels much easier than do electrons in similar terrestrial substances, thus resulting in absorption or release of energy. The release of energy of the many electrons leads to the apparent glow of a substance as the glow of the electric stove, or electric heater, elements. The colour of glow depends on the temperature so that a red glow is perceived about $2,000^{\circ}\text{C}$, yellow glow at about $5,000^{\circ}\text{C}$, and blue glow at about $20,000^{\circ}\text{C}$. If liquid water forms at the minimum solar temperature, due to the high pressures in the convection zone, then the solar water sample will appear to the human observer to glow, not unlike the fiery molten lava flowing from a volcano on Earth. And so will all other solar substances, solid and liquid, will appear to terrestrial observers to be glowing self-luminous, and fire-like.

(2) At the extremely high solar pressure, the atoms will rearrange themselves in a more compact configuration. Under the influence of extremely high pressures, "the atoms will snuggle up to one another just a little bit, keeping their same relative position" (41). Whereas two hydrogen atoms and one oxygen atom, in a terrestrial water molecule form a 104.5° angle, this angle may be slightly small or slightly

greater for solar water. Solar substances must necessarily be more dense than their terrestrial counterparts.

The existence of a "solid inner Sun" is a possibility which has not escaped scientific attention. The variations in rotational speed of the Sun's visible surface does not preclude the possibility that a "solid inner Sun" is rotating at a faster rate than the visible region. Another solar observation which bespeak a solid inner Sun is that of the angular momentum of the Sun. When calculated from the observed rate of rotation and the estimated solar mass, the angular momentum is found to be smaller than anticipated. "A basis for this speculation is that, if the solar system had condensed from a rotating gaseous cloud, the Sun should have 200 times the angular momentum it would have if it rotated with only its observed surface velocity. Also, a very careful measurement by Dicke (1970) indicates that the sun has an oblateness of 5×10^{-5} which could be accounted for by the centrifugal forces of a rapidly rotating solar core" (42). Faster rotation of a solid Sun or a solid region within the Sun may explain the discrepancy and provide for a solid region on the Sun. Such region can be a lower border surface for the convection zone. There are other indications which point to the possible existence of solid surface beneath the visible surface of the Sun. The lithium atom, for example, has been detected, though in small amounts, on the Sun. This indicates that matter in the solar atmosphere does not circulate into the core and intermediate zones. If such

circulation occurs, the lithium atoms would be consumed in the extremely high temperatures postulated for the inner Sun. Further experiments and studies are needed to verify this contention.

To be continued.

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Sir - While it is premature to comment on Ali F. Abutaha's hypothesis, I must point out some errors in the first installment of his article (Vol.3 No.2)

I refer to his list of solar parameters:

1. While it is accepted that the Earth is about 4.5bn years old, it is also known that the Sun is older still. A figure of 5bn years is usual.
2. The mean distance to the Sun is about 150×10^6 km (100 times further than Abutaha's distance)!
3. The symbol for gram is 'g' not 'gm'.
4. g/cm^3 is not an SI unit (prefer kg/m^3)
5. 'gauss' is not an SI unit (prefer tesla)
6. Temperature data available to me do not entirely agree with stated temperatures. In particular several sources give the core temperature as only 10m degrees.

Steuart Campbell,
Edinburgh.

STEUART CAMPBELL

ABSTRACT

EARLIER VIEWS OF A NATURAL UFO MECHANICSM ARE MODIFIED AND IT IS PROPOSED THAT THE MAGNETIC FIELD OF JUPITER PROVIDES AN EXAMPLE OF A MECHANISM THAT MIGHT EXPLAIN THE CHARACTERISTIC DISCOID SHAPE OF UFOs. THIS THEORY IS COMPARED WITH A FAMOUS UFO REPORT.

INTRODUCTION

In an earlier article⁽¹⁾ I proposed that a UFO⁽²⁾ is a natural phenomenon similar to if not identical with ball lightning (BL). In particular I proposed a mechanism by which the basically spherical phenomenon could show an equatorial flange, so resembling the classical "flying saucer." I proposed that the discoid form was caused by the extremities of the closed dipolar field attempting to accommodate themselves to the surrounding magnetic field of the Earth. Now, I am sure, this is the wrong cause; the Earth's field is much too weak to have any direct influence on the shape of the phenomenon, which, by nearly all accounts, has a very strong magnetic field. However, in the article I did note the resemblance of the shape of Jupiter's magnetic field to the shape of a discoid UFO, and I wondered what lesson that held for the solution of the UFO problem. We may now understand what Jupiter teaches us.

THE JOVIAN MAGNETIC FIELD

Much has recently been discovered about Jupiter's magnetic field from the exploration by the NASA spacecraft.⁽⁴⁾ Pioneer 10 and 11, and Voyager 1 and 2. The magnetosphere of Jupiter is probably the largest structure in the solar system. It is flattened into a large dish about 15 million km in diameter; if it were visible, its width would appear four times the

diameter of the Moon as viewed from Earth! The field is generated by strong electric currents flowing in the metallic hydrogen of the planet's inner layers, and it is over ten times stronger than the magnetic field of the Earth. Close to Jupiter the field is quadrupolar and octopolar, but beyond about 20 Jupiter radii, it is dipolar and more or less confined to a single plane which cuts the equator of the planet. This magnetodisc extends up to about 100 Jupiter radii and appears to be caused by trapped charged particles being thrown outwards by the massive centrifugal "force"; the magnetosphere rotates with the planet (about 10 hours). It is thought that the inner Galilean satellite Io is the source of the sulphur and oxygen ions which fill the magnetosphere. These particles cannot escape from the field, but they do distend it into a discoid⁽³⁾.

A NATURAL 'FLYING SAUCER'

In my earlier article, I pointed out that the shape of magnetic fields is not a function of size, and I claimed that all rotating magnetic dipoles have the same discoid form. Clearly this latter claim can only be true if the dipoles are rotating rapidly and contain charged particles.

If in fact UFOs are BL, then it is highly probable that charged particles will be present. Most theories of BL accept that it consists of a plasma of such ions, and in some theories there is a rapidly rotating electromagnetic field. This field is both electric

producing a strong electric gradient which may be responsible for the formation of the ball by trying to expel the ions, and magnetic, producing the dipole field. In some theories the magnetic field is trapped inside the ball, and only leaks faintly outside it. However, occasionally the field may be so strong that its influence is felt well outside the ball. Expelled ions will be influenced by the magnetic field, in fact they will spiral out along the magnetic field lines, only to be drawn back to the ball as the field lines loop back. However, their return will be resisted by the electric pressure and they must be trapped in the magnetosphere of the ball. In the case of Jupiter, the particles can return to the planet via an equatorial plasma sheet, and particles gain tremendous energy in this circulation. It may be that a similar mechanism operates in BL, and that the thin disc sometimes reported is the plasma sheet. Although the whole mechanism has very little mass, the ions are probably rotated at a very high speed, and this speed results in a high centrifugal effect on them. The result must be that the shape of the magnetic field is distorted equatorially, with maximum distortion at the equator, resulting in the classical discoid shape. What Jupiter can do on a giant scale, BL may do on a small scale.

Jupiter's magnetosphere is invisible, and it must be that BL's magnetosphere is usually invisible (although magnetic effects have often been reported in the vicinity of BL). However, in some circumstances, this magnetosphere may become visible, so revealing the discoid shape. If BL does consist of an evacuated cavity in which ionization takes place (as in some theories), then the expelled ions must be replaced by normal (unionized) air, which cannot be affected by the electric field. It is considered that the ions will be formed from ionization of the nitrogen and oxygen molecules in the air, but the air also contains small amounts of other gases (carbon dioxide, water vapour, etc) and dust. Now the

electronic potential of the BL may not be high enough to ionize all of these atoms, and those that are not ionized will drift in the plasma, gradually being pushed by ionized particles and radiation pressure towards the surface. There must come a point where the pressure balances atmospheric pressure, and there the neutral particles will become trapped, to form a "skin" on the BL. As more and more neutral particles accumulate, this "skin" must become denser and more opaque, and the BL is likely to collect substantial amounts of dust and organic matter near the ground. It cannot be coincidental that dark UFOs are usually seen on or near the ground. In particular, carbon atoms (from CO₂ and organic molecules) will cause the "skin" to become dark, even black, and the degree of blackness will be an indicator of the age of the BL. If the centre of the BL is still luminous this light will filter out through the "skin" where it may, perhaps through holes ("portholes") where magnetic field lines prevent the formation of the complete "skin." At some stages of the formation of the "skin" the surface, which might be only one atom thick, may reflect light in daylight (so resembling polished metal) or take on the grey appearance of aluminium. In this way, the extended discoid form of the BL may become visible and appear as a "spacecraft."

AN OBSERVED DISCOID?

Although we ought to be sceptical of the authenticity of alleged UFO photographs, there are few reasons to dismiss Almiro Barauna's photographs of the UFO seen by him and at least 100 of the crew of the Brazilian navy ship Almirante Saldanha in January, 1958 near Trindade Island in the South Atlantic. Certainly GSW in the USA have found no evidence that the photographs were faked(5). Barauna's photographs were all overexposed, but nevertheless the symmetrically discoid form can be seen. While the object did

not reveal any characteristics which would unequivocally identify it as a spacecraft, it did conform to the natural theory expounded here. Indeed, it was described as both "dark grey" and "bright." In fact it seems that, although it was grey overall, it flashed brightly when the interior light could be seen through the holes in the "skin." Since the sky was overcast, it could not have reflected the light of the sun. The Brazilian navy later computed the size at 37 metres diameter, and the speed at over 250 m/s (560 mph). Barauna reported that the object flew like a bat, i.e. it oscillated vertically as it moved along; such a movement is characteristic of BL.

CONCLUSIONS

The natural theory still looks good, in fact now that it is modified it appears to offer an even more adequate explanation for UFOs. It appears to justify the view that BL can appear as a large discoid with varying degrees of opacity. The theory can now explain metallic or dark grey UFOs with holes (which might appear merely as a row of lights at night).

Recent exploration of the outer solar system (where some expected to find the aliens they thought responsible for UFOs) has probably given us a clue which will lead to a full explanation of the natural mechanism previously only known as BL.

Now that the natural theory has been expressed in this form it appears to offer a reasonable explanation of the Trindade Island UFO event, and to vindicate the report. Sr Barauna's photographs may be more valuable than was thought - they may be some of the few genuine UFO photographs in existence.

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- (2) Defined here as "A real object or phenomenon seen in the sky or on or near the ground or underwater but apparently capable of flight, which science cannot yet identify as any known object or phenomenon."

(This is a revision of the definition given in my article "What Is A UFO?" in JTAP Vol 2/1 (May, 1981), pp 3-7)

- (3) For discussion of this topic, see: J.H. Piddington, Cosmic Electrodynamics (1969) Sect. 10.2 "Jupiter and its magnetosphere"; J. Van Allen, et al, "Energetic electrons in the magnetosphere of Jupiter" and E.J. Smith, et al, "Magnetic field of Jupiter and its interaction with the solar wind", Science, Vol.183 No.4122 (1974 Jan 25); K.W. Behannon, et al, "Magnetic field experiment for Voyager 1 and 2", Space Science Reviews, Vol 21/3 (1977 Dec); NASA, Voyager Encounters Jupiter (1979), p.40; Gary Hunt and Patrick Moore Jupiter (1981) pp 19-21.
- (4) A summary of the Voyager results exists in the BUFORA library. This is a 17 page fact sheet produced by MOTOROLA Ltd.
- (5) "The UFO Handbook" Allan Hendry, Sphere Books Ltd., 1980, page 209 "The Hynek UFO Report" J. Allen Hynek, Sphere Books 1979 pp 246-251.

CORRECTION TO A CORRECTION

The correction which appeared in the April, 1984 JTAP (Vol.3 No.2, page 116) was itself incorrect.

The correct sequence for Volume 3 is Vol.3 No.1 (August, 1983), Vol.3 No.2 (April, 1984) and Vol.3. No.3 (October, 1984).

Part 2

THE PRESENT THESIS PRESENTS AN ATTEMPT TO INTEGRATE TWO SETS OF DATA: THOSE OF PARAPSYCHOLOGY (PSYCHICAL RESEARCH) AND OF UFOLOGY, ON A MORE PRECISE AND COMPREHENSIVE SCALE THAN HAS HITHERTO BEEN ESSAYED. THE AUTHOR IS A FORMER CHAIRMAN OF THE PSYCHICAL PHENOMENA COMMITTEE OF THE SOCIETY FOR PSYCHICAL RESEARCH, AS WELL AS A MEMBER OF THE (PROFESSIONAL) PARAPSYCHOLOGICAL ASSOCIATION. HE HAS UNDERTAKEN THIS TASK WITH THE HELP OF A GRANT FROM THE RESEARCH ENDOWMENT FUND OF THE SPR., WHICH HAS RECENTLY (1979) ADMITTED UFOLOGICAL STUDIES AS FALLING WITHIN THE PERVIEW OF ITS OBJECTS AND STUDIES. AFTER A BRIEF DISCUSSION OF THE MAIN THEORIES WHICH HAVE BEEN ADVANCED IN VARIOUS QUARTERS, SOME TWO DOZEN OR MORE SPECIFIC ASPECTS HAVE BEEN INTER-RELATED WITH A VIEW TO THROWING A LIGHT ON THE UFO ENIGMA, IT IS NOT PROPOSED, HOWEVER, TO OFFER A "SOLUTION" OF ITS WHOLE SPECTRUM BY THE WHOLESAL APPLICATION OF INTER-FACIAL COMPARISON. RATHER WE SHOULD AIM AT ENCOURAGING A PROCESS OF VIGOROUS CROSS-FERTILISATION AND EXCHANGE OF IDEAS BETWEEN TWO DISPARATE AND LARGELY INDIFFERENT GROUPS. POINTS OF CONTACT ARE ALMOST INEXHAUSTIBLE. THESE ARE NOW ONLY SCRAPED AT THE SURFACE OF WHAT MAY BE REGARDED AS VIRGIN SOIL IN THE PRESENT PIONEER WORK. NOT ONLY IS THERE AN OVERLAP IN METHODOLOGY AND TAXONOMY, BUT THE VERY PHENOMENA (ANOMALIES IN THE WIDEST SENSE OF THE WORD) BEAR STRIKING RESEMBLANCES - WITH OCCASIONAL EQUALLY STRIKING DIFFERENCES!

6. THE EPILEPSY CONNEXION

"Underlying similarities" in Poltergeist cases and grand mal have recently been discussed by William Roll (1977.192). An earlier reference to the subject by Owen (1964.348ff). Persinger thinks that there is a possible connexion between the UFO experience and epilepsy: seizures are precipitated by a number of startling stimuli such as significant emotional experiences of various kinds (SCHWARZ 1980.22). Among these Persinger includes Close Encounters involving both auditory and visual hallucinations. The EM column hypothesised by Persinger attracts close observers as semi-conductors and electronic systems: the resulting imagery could be sufficiently vivid and realistic to

be experienced as "real", i.e. objective events with generally excessive autonomic responses (HAINES 1979.414). Persinger moreover thinks that random changes in luminogenic potentials might be interpreted by a process of anthropomorphism as signs of intelligence and communication, while the resulting paralysis with altered states might suggest floating or OBEs. Morbid (such as epileptically induced) hallucinations in which humanoid figures speak without movement of the lips would be misinterpreted as "telepathy."

In the case of "temporal lobe epilepsy apparation" reported by a Scottish psychiatrist (McHARG 1976.120) occasional "re-stimulation of paranormal experiences" in connexion with such

attacks is suggested. PLAYFAIR (1980.62) wonders whether the Enfield case could be linked to an epileptic member of the afflicted household, but there seems to be little to connect them.

7. APPARITIONS

According to the less-than-helpful definition of the Concise Oxford Dictionary "apparitions" are "appearances" especially (as) of "supernormal beings" or "ghosts". Apparitions according to our reading may be appraised at various levels. The broadest spectrum would embrace "sensations" of invisible and intangible "presences" and, perhaps, some of the more vivid varieties of hypnagogic and hypnopompic visions. All these are common among perfectly healthy persons, and the question "Have you ever seen a ghost?" may after all be as tricky to answer as "Do you believe in ghosts?" a question we are specifically warned against by H.H. Prince in his preface to Tyrrell's APPARITIONS. Apparitions, it should be remembered, run the whole course from two-dimensional presentation to physical embodiment. Small wonder Frederick Myers complained that "ghosts" are "probably one of the most complex phenomena in Nature" - which could have been said as convincingly of the UFO enigma. He further commented on their fragmented and "apparently meaningless" nature, a remark which again applies equally to the other subject-matter in hand: to be sure, a so-called "sceptic" (SCHEAFFER) vociferously dismissed ufology as "failed science" on the grounds that UFOs behave like ghosts! (ROHRER 1980). It may even be argued that apparitions are not necessarily images at all. Physical research records vague patches of "phantom" lights, "clouds" and "shadows" (GAULD 1979.357; cp ZURCHER 1979.53), as well as the impressive "Scotch mist" witnessed with Rudi Schneider (GOLDNEY 1980). An example of a two-dimensional tableau apparition on a polished surface

is the well-known case of Captain Towns (TYRRELL 1953.51) which recalls the process of scrying or crystal-gazing. Probably a similar mechanism explains the "army tank" seen in the clouds of the Ohio sky (TIMMERMAN 1980.2). Humanoids, a comparatively new type of apparition (although suspiciously reminiscent of elves and fairies of old; VALLEE 1970; and even more of the older SF) seem at first sight unrelated and irrelevant to the study of "ghosts" as revealed by Victorian and later collectors of authentic cases (e.g. GUERNEY 1886). Firstly, they appear in conjunction with apparent space vehicles (UFOs); closer inspection however shows that this is not necessarily so, the link between the two being more tenuous than one would expect from a superficial study of the facts. Secondly, and more seriously, humanoids are often grotesque archetypes of folk-lore rather than plausible images of humans, and not even necessarily of human appearance. Unlike "ordinary" apparitions, they usually appear in twos (BANCHS 1980.65). In Webb's and ZURCHER's monographs (1976;1979) they are depicted as characters straight out of a children's comic with "gray, wrinkled skin", claws and similar bewildering features. Some are average height; more are dwarves, with a sprinkling of giants; just as there is no standard size of apparitions, though the latter are said to affect a maximum degree of realism (TYRRELL). Humanoids also appear in the guise of ordinary mortals, whether adult or juvenile (BANCHS 1980.66). In a landing case remarkable also for physical traces (STANFORD 1978) a policeman noticed and described two small figures in overalls which he assumed to be "kids" in trouble. But some humanoids are ill-defined in shape with particular emphasis on the eyes

to the point of "witness obsession" (ZURCHER 1979.54; WEBB, 1976.58). At Tedworth an amorphous figure stared at a percipient "with two red and glaring eyes" (GAULD 1979,58). So also at Charlottenburg (GAULD 1979.149) a little girl was scared by an apparition with gleaming, fiery eyes; a less characteristic feature among psychic phenomena. Often humanoids

are described as possessing slanting Oriental eyes. Mrs Symonds' Stockton (Ga) monsters had two big saucer-like eyes reflecting a reddish light (DAVIS 1978.154); the body was badly defined, the bottom parts being particularly indistinct*

Cornell Hart's study of the subject from a theoretical point of view (HART 1956) enumerates a number of features most of which as well be seen, are shared by the apparitions of the UFO syndrome (humanoids). These include:

A. SUGGESTIVE OF ORDINARINESS

- (1) Full figures (rather than mere faces; heads or busts)
- (2) "Solid" "real"; humanoids are suspiciously (from the ET point of view) human. They frequently suggest figures based on stereotyped astronauts as regards appearance and mode of employment, such as sampling (WEBB 1976.68)
- (3) Dress in "ordinary" clothes; humanoids have been mistaken for children and mechanics.
- (4) Seen collectively: high-strangeness cases, however, tend to involve single witnesses (LAWSON 1980.844), although according to Phillips (STORY 1980.266) two or more occur in 52 per

* Ufologists have voiced the complaint that humanoids "resemble us both too much and too little to be 'real'" (UPIAR Vol.111 No.1.14)

- (5) cent of reports
Seen repeatedly; humanoids keep their promise to "return."
- (6) Perceived tactually: as in "abductions" etc (e.g. CAMPBELL 1980.43).

B EXTRAORDINARY FEATURES

- (1) Sudden, inexplicable appearances or disappearances: the hallmark of the UFO.
- (2) Invisibility to some. This applies to UFO sightings (RANDLES 1979.200; HENDRY 1980.14), but apparently not to sightings of humanoids.
- (3) Disappear completely within approximately 30 minutes. UFOs are of limited duration (WEBB 1976.110) and disappear suddenly like "ghosts." 43 per cent last from 1-5 minutes; only nine per cent are seen for more than 60 minutes (STORY 1980.266)
- (4) Pass through physical matter: humanoids occasionally (STORY 1980.19)
- (5) Glide instead of walk; humanoids floating "just above the ground" have been reported (WEBB 1967.2).
- (6) Rise into the air without physical contact (cp human levitation; HASTED 1981.ch.21): humanoids float (cp no. 5, and WEBB 1967.60) or levitate (ZURCHER 1979.148).
- (7) Communicate mysteriously, humanoids talk to contactees by "telepathy" (see Ch.12). WEBB 1967.34; ZURCHER's two alleged cases (p.166) seem irrelevant.
- (8) Self-luminous: very commonly alleged of UFOs, and of the majority of "French" ufo-nauts (ZURCHER 1979.144).
- (9) Accompanied by other apparitions: humanoids are seldom seen singly (WEBB 1967.52).
10. Accessories involved: applies to (simulated) equipment (ZURCHER 1979.146) not to mention the "ship" (UFO) itself.

C. EFFECTS ON THE PERCIPIENT

- (1) Travelling without one's volition: in the (nowadays common) reports of "abductions".
- (2) Passing through space: "travelling" in the UFOs by abductees.
- (3) Finding oneself suddenly at a distance: "time-lapses" with subsequent amnesia (e.g. FULLER 1967)
- (4) Cataleptic states: Ufonauts "paralyse" percipients (ZURCHER 1979 121ff).
- (5) An additional (i.e. not in HART 1956) effect with profound implications, less applicable to the apparition syndrome than to other psychic experiences such as OBEs. These may result in religious, conversion-like states: this also occurs occasionally with CEs (STORY 1980.305ff) (GANSBERG 1980). Discussing some elements of the religious experience, James wrote that "treating these as purely subjective phenomena ... we are obliged on account of their extraordinary influence ... to class them amongst the most important biological functions of mankind." (HARDY 1980.4)

In a similar vein, and equally applicable to the subject in hand, HARDY (1980.32) says "It is not easy to assess (sensory or quasi-sensory experiences judged solely in terms of subjective/objective polarity. It would be, for example, just as unwise to accept all accounts of "visions" (sc. apparitions) as referring to events as publically verifiable as those of our normal sense experience, as it would be to dismiss them altogether as mere hallucinations, fantasies, or delusions." These problems - especially with reference to witchcraft, were already under review in the Renaissance (ANGLD 1977).

It has been customary to regard

apparitions as strictly non-physical (TYRRELL; GREEN). Scholars however, have not been unaware that this view makes for difficulties with collective cases, which some (e.g. GREEN 1975) try to circumvent by stressing dissimilarities in description of the shared experience. It is true that these occur and in both disciplines (cp. e.g. ZURCHER 1979.264). Even more embarrassing are the problems raised by the physical, non-hallucinatory aspects of the spectral syndrome which are all too often simply ignored; they arise, moreover, in exacerbated form in connexion with the contiguous phenomena of materialisations and UFO sightings, whether with or without attendant humanoid presences. This basic dimension has remained conveniently outside most writers' frame of reference. Lately, however, Gauld has faced this dilemma, describing the apparent evasive manoeuvres of para-psychologists as seeming "tortuous and incredible" (GAULD 1979.177). Hauntings and Poltergeists (in so far as the two can be disentangled) involve not only imitative sounds without actual disturbance of objects, but tangible physical telekinetic displacements with accompanying sound effects that are amenable to mechanical recording. Humanoids sometimes appear as autonomous entities rather than mere hallucinatory stimuli.

How "real" are UFO-type apparitions? By comparing accounts by naive (?) and imaginary contactees under hypnosis with those who genuinely claim such experiences, a strange pattern of identity emerges (LAWSON 1980A). We do not know why; neither should we ignore some significant differences. At any rate, the close similarities between the "true" and the "false" militate against the extra-terrestrial hypothesis, suggesting, on the contrary, links with the paranormal, as well as with Science Fiction (MEHEUST 1978)). Both kinds of

data have a common denominator: there is no "really conclusive evidence" that they are "what they appear to be" (WALLIS 1979.323; .323). In other words, UFOs are no more manned spaceships from other galaxies (as seen on television) than apparitions are spirits of the dead. Of course, not all reports, however sincere, are acceptable at face value, quite apart from occasional hoaxes. There is, e.g. the "Ersatz Poltergeist" (perhaps, more correctly, "Ersatz haunting"), when imaginative people project images onto shadows falling on uneven walls (ROLL 1972.99), with a generic resemblance to Rorschach blots and "Rauidve" voices. In the case under discussion, they were significantly perceived differently by different inhabitants of the "haunted" house in question. While hauntings with genuine psi components appear to be relatively common, the vast majority of the hundreds of thousands of "UFO sightings" are illusory.

Reports of humanoids are sometimes precariously linked with those of UFOs by association of ideas. In the well-investigated Kelly (Kentucky) Close Encounter, there was some doubt the validity of the UFO sighting, but none as to the presence of strange monkey-like creatures resisting gun-fire. The chief investigators (DAVIS 1978) list six types of association between humanoids and "spacecraft":-

- TYPE A Humanoids observed only inside UFO;
- TYPE B Humanoids observed entering or leaving UFO;
- TYPE C Association inferred only (UFO in neighbourhood)

TYPE D Association circumstantial (activity reported)

TYPE E No Association

TYPE F Voices and communication only.

The preconception that humanoids are occupants of UFOs (as opposed to their frequent association with them) clearly does not hold; there is rather a generic tie with fairies and apparitions as understood by folklorists and parapsychologists. The facile assumption that close encounters (CEs) are basically identical with night lights (NLs) is also open to doubt. Nor is it certain that CEs are merely NLs seen at close quarters or at another time.

Lately Michael Persinger (HAINES 1979) once more has set CEs within the context of geophysical, tectonic processes ("earthquake-related luminosities") with well-defined masses and fireballs. He refers to numerous reports of glows which feature on the least suspect photographs. However that may be, it is true that illusion is the order of the day in this subject: in America advertising planes are habitually hailed as UFOs conceived in conformity with their archetypal image (HENDRY 1979.91)

As far back as 1964 an attempt had been made in different quarters (LAMBERT 1964.280) to rationalise apparitional figures in terms of vortices rendered visible by precipitating moisture into column-shaped clouds, or alternatively by picking up particles of dust and sand. Persinger's horizontally moving vortices are said to travel at a man's normal walking pace, giving

rise to the impression of a misty figure 5-6 feet in height and interpretable as a humanoid, though in one of his own cases a spherical, luminous body moved in excess of this speed (399).

Misty, indistinct images seen out-of-doors would hardly be acceptable in evidence to experienced investigators as either humanoids or bona fide apparitions. It is curious to note in passing that the vortex field turns up in connexion with Poltergeists also (ROLL 1972.150).

Luminous ghosts presuppose drains polluted by decaying organic matter if seen in or near buildings. As such pollution is now rare in our cities. Lambert argues that modern apparitions are less likely to take the form of indistinct grey coloured

shapes. In fact, both types continue to co-exist. At the beginning of this chapter we insisted on the great variety of phantom encounters. Both kinds are recorded in the Joller case (GAULD 1979.7) where one of the children saw the phantom figure of a small child side by side with more indistinct shapes. Vague stimuli are known to have a tendency to be interpreted in terms of the more familiar by a process of assimilation. This applies a fortiori to spontaneous cases in which one is taken unawares by anomalies of an unnerving nature: apparitions are accepted as flesh-and-blood intruders in the first instant; but on more mature reflection it is realised that burglars have no ready access to properly secured rooms (as when e.g the door is locked). They are even less likely to make their escape through bedroom walls! An almost classical instance illustrating this psychological mechanism is narrated by a Canadian writer (BRANDAN 1980.

23f). As a child, she tells us, she woke up one night to see a figure sitting on her bed. Although it was of an adult, she at first "mistook" it for that of another child, a cousin with whom she was sharing her room. In spite of the supposed evidence of her own eyes, she persisted in the belief that she was seeing that girl. In her own illuminating words, "I tried resolutely to turn it into something (sic) or somebody familiar." Mrs Brandan here somewhat naively assumes that perceptions of apparitions are either "correct" or "incorrect," in spite of the absence of an objective criterion (cp. GREEN 1975.45). This observation also applies to the UFO experience as long as there is no absolute certainty that a physical object is involved. For the same reason we must reject Persinger's sweeping demand (STORY 1980.263) that "people's reports" are to be "excluded" on account of the quirks of human behaviour.

Analogous to the assimilation of psi effects UFOs are interpreted as haystacks, overturned cars, farm-tractors and similar common or garden commodities (CRAMP 1966.247). The object's eventual bizarre behaviour finally shatters the observer's original complacency inducing an "escalation of hypotheses" a process also noted with other, unrelated, anomalies (WALLIS 1979.296). In one case, an aircraft turned out to be a "large shining ball" while in another case from the same source "birds" were found to be disc-shaped and accordingly reassessed (NICAP 1964.29)

A common variant (Tyrrell's "ideal" type of apparition) strikes a chord of realism and conformity with everyday experience. Such ghosts are often mistaken (at least initially) for "real" people, whereas humanoids are as a rule readily recognised

as out of the ordinary because of their grotesque features and size (dwarves; giants).

8. MATERIALIZATIONS

No more dramatic instance of this alleged phenomenon is on record than the materialisation of "Katie King" in Crookes own home through the mediumship of Florence Cook (MEDHURST 1972). Nothing quite like it has ever happened either before or since. If we can believe the unretracted testimony of Sir William Crookes, OM, FRS - and taking into account the corroboration of his wife - a beautiful young woman materialised for prolonged periods of time, allowing herself to be touched, examined and photographed by one of the most renowned scientists of modern times, Though acceptable on the evidence to at least one leading expert (ZORAB), so bizarre an affair has not escaped hostile probing, it being alternatively suggested that Crookes was either covering up a scandal or, marginally more convincingly, that he was suffering from an unspecified, undiagnosed form of megalomania (HALL 1962; MEDHURST, 1972.5). Others, however of no mean stature, have attested basically comparable miracles (e.g. RICHET 1905). It is true that materialised phantoms tend to be transient, ephemeral, and evanescent (though to a much lesser degree than apparitional figures), and that some are described as truer to nature than others in morphology, texture and behavioural patterns. On the other hand, the evidence for materialised limbs (hands, arms, etc) is unequivocal (CASSIRER 1978; cp. humanoid foot-prints, ZURCHER 1979.105); and, if limbs, why not full figures?

UFOs and their purported occupants are no less versatile in fading in and out at the very shortest notice. Their movements recall the unorthodox trajectories of the Poltergeist.

The generic resemblance extends to apparitions, levitation and teleportation. No wonder contactees who correspond to the Central Parties of Poltergeists (or, epicentres, HASTED 1981.166) - have been cast in the role of physical mediums (HAINES 1979.129). However that may be "phantoms" (i.e., apparitions and materialisations) on the one hand, and humanoids on the other, are internally inconsistent: at one time they elusively shun all human contact, while at another they obtrusively invade one's privacy, causing terror and extreme distress. Visible to the naked eye, and of usually solid aspect, humanoids are lucifugous (ROGO 1980.205.231). They successfully avoid capture, and too close observation is also sometimes objected to by the "control" of physical mediums. Apparitions as described in our literature recede from physical contact, in contrast to the solid materialised forms of yesterday's seance-room with their more objective to white light. UFOs thus share another characteristic with psi-manifestations: the "shyness effect," which makes for unpopularity with the bulk of the scientific fraternity who prefer phenomena on tap. If it is of the nature of the UFO phenomenon to be "elusive and clandestine" (HENDRY 1980.8), so also it is of the nature of psi. Selected audiences are favoured (as by physical mediums); sunlight is avoided at "landings" (ZURCHER 1979.61). Neither obliged investigators by performing at fixed times, though this has frequently been done by physical mediums, e.g., the Schneider brothers. The PK-like effects by which cars are stalled and electronic apparatus temporarily put out of action are of the essence of ufology. UFOs are reported as shooting up and disappearing into thin air without so much as a "by your leave": alternatively they simply render themselves invisible. They change their shape or divide into several

units, suggesting that they are not manufactured objects but rather provisional or temporary structures (ZURCHER 1979.108).

The ambivalence of the visual psychic construct which at one time presents aspects of subjectiveness to the point of amounting to a mere illusion or delusion, while at another it is equally obviously endowed with the characteristics of a physical being, is also very much in evidence in the paradoxical humanoid syndrome. The "extra-terrestrials" who put on such a brave front of landing in their space shuttles to abduct selected men and women on earth are basically nearly as insubstantial as dream figures, whereas in their alternative guise as strange monsters in remote Kentucky (DAVIS 1978) they are able to terrorise a whole household and resist gun-bullets by which, however, they are knocked over! Physical traces they left none, although, they are often reported in incidents involving "landings." In spite of their notorious elusiveness, there is, nonetheless, a considerable "wealth of information" which cannot be ignored (STORY 1980. 263ff). Nor is it possible to laugh off the numerous examples of EM interference with cars and electronic equipment (STORY 1980. 111) or their physical traces.

Occasionally one hears of materialised animals in connexion with mediums. Franek Kluski specialised in this rare phenomenon (GELEY 1927.266). A strange creature, half human, half simian, materialised with Kluski and was dubbed Pithecanthropus by the sitters, who included Gustave Geley, a noted psychical researcher. It smelled like a wet dog, and is described as friendly. The harmless creatures attacked by a trigger-happy American hunter also emitted a strong odour. A direct hit seems to have been scored on one, but it disappeared under mysterious circumstances as if unharmed,

much like the Kentucky creatures (BOWEN 1977.159; cp. BURCHER 1979. 52).

9. EROTIC FANTASY

Incubus and succubus are well-known concepts of a by-gone era, basic to Witchcraft (THOMAS 1971); Reginal Scott (ANGLO 1977.116) aptly ridiculed both, denouncing their "beastlie and bawdie" implications, in the 16th century. In the following century, Richard Bovet gave an illuminating account of erotic fantasy (OWEN 1964.195) concerning a young and sexually frustrated footman who, awake in his bed one night, was assailed by two beautiful phantom women. Much physical distress was caused by this ghostly encounter; their presence coincided with a bright light turning night into day, such as might easily be attributed to a UFO in our own time. Moreover, a very thick fog emanating from his room was observed by outsiders, suggesting that his experience was not perhaps as wholly hallucinatory as might otherwise have been assumed. A distinct mist of obscure origin, but apparently paranormally engendered has been described by Mrs K.M. Goldney as occurring during a sitting with Rudi Schneider (GOLDNEY 1980). In some UFO cases people have reported envelopment in a thick mist (OLIVER 1980.13; ZURCHER 1979.264).

Antonio Villas Boas is a household name among ufologists, his alleged abduction being one of its earliest classics. The relevant feature of this case is his explicitly described seduction by a female humanoid of extraordinary beauty (BOWEN 1977.216f). Boas seems to have proved a less reluctant victim than his earlier counterpart, and complained of no ill effects as a direct result of his adventure. There is also a report of a psychologically based case (ROGO 1976.83) where a middle-aged man endured a "sexual influence" exerted on him by a female apparition at night, due (we are

told) to guilt and frustration.

10. ECTOPLASM AND ANGEL HAIR

An aura of mystery surrounds both of these disparate purported substances. The former is associated with the phenomenon of materialisation, though it is not to be assumed that all physical mediums producing materialised forms did so via ectoplasm. As far as our records show, it is not attested with two of the greatest, Home and Palladino, but very much so with Helen Duncan and the enigmatic "Margery" (PRICE 1933.161; BIRD 1928). "Angel Hair" is described in the latest study of the subject (ACCETTA 1980.32) as supposedly "quite unstable." According to the standard NICAP publication (NICAP 1964.99) it is in most instances nothing more esoteric than gossamer, or cobweb of ballooning spiders, erroneously connected with UFO sightings. Indeed, this seems to be the general informed opinion (RANDLES 1979.134; HENDRY 1979.80).

Some, however, have been less confident in this wholesale attribution to mundane causes, and there is a case on record where the material in question is said to have evaporated or otherwise vanished from a firmly closed jar (NICAP 1964.99; cp. STORY 1980.19ff). Again, in 1959 two UFOS were observed at Evora (80 miles East of Lisbon). This sighting was followed by a "rain of white, gelatinous substance" ("Fibralovina") Microscopic examination revealed the presence of an "apparently unknown microbe" (OLIVER 1980.17).

The name "ectoplasm" is due to the Nobel Prize Winner, Charles Richet, a keen student of psychical phenomena (RICHET 1923). Besterman echoed von Gulat-Wellenburg's complaint about its internal inconsistency in Schrenck-Notzing's description of the substance as simultaneously evading and withstanding light (CASSIRER 1966.120). Dingwall's hopefully crucial test with "Margery" (1926) failed to produce unequivocal results, but the same scholar's ob-

servations with Stella Cranshaw (PRICE 1973.108) was more conclusive, or at any rate, more convincing. Harry Price reported (1933.202) a chemical analysis of the Duncan ectoplasm which was found to consist of, among other things, white of egg and stale urine, but one would wish for a re-valuation with the advantage of modern scientific methods. Schrenck's inconclusively analysed a substance produced by a medium which he called "teleplasm," another word for "ectoplasm" (1920.250)

11 ESP

Humanoids are described by some writers as conversing with contactees by means of "thought transference," "telepathy" or "mental telepathy." This terminology, presumably designed to impress, rebounds on the way user by revealing a fundamentally erroneous out-dated conceptualisation of the functions and limitations of ESP. It comes as no surprise to learn that "telepathic extra-terrestrials" originated with Adamski, whose books abound in occult pretensions. George Adamski, known world-wide as the first of a long line of self-advertising contactees (EVANS 1974.144.148), acquired his education on hamburger-frying stands. Frank Edwards, an American journalist who was acquainted with him, described him as "a man of meagre scholastic attainments" (1966.80), though admitting his powerful imagination. While it may be true that ESP is a form of communication, no message of more than a single word has ever been conveyed in this fashion in the laboratory. Even at this low level of achievement the evidence is precarious (WASH 1980). This notoriously unreliable process works at a subconscious level (HASTED 1981.215). The idea propagated by pulp-writers that ESP is a

viable alternative to conventional communication transcending the limits of language is an unfounded confabulation. The nearest approximation to the mythical concept of humanoid mastery of ESP impressing messages on humans - allowing for reservations regarding length and accuracy - is the less than impressive "supralingual" telepathy reported by Ian Stevenson (1974). It is also said that mothers have "telepathic rapport" with their offspring, but admittedly only during the first few years of a child's life. To evoke "telepathy" as a vade-mecum without being aware of its severe limitations as a practical tool is a dangerous undertaking with serious consequences for the unwary. The absurdities to which this can give rise are well illustrated by an article in "Paris Soir" (Herbert 1981.27). It claims that "Soviets outstrip the USA in the field of establishing contacts with extraterrestrial civilisations by means of transmitting thoughts into space, which work is facilitated by telepathic test transmissions to Russian cosmonauts in orbit." In spite of "Pravda's" denunciation of this claim as "stupid and disgusting"(sic!), "telepathic" communication with extraterrestrials continues to be a popular topic of the Soviet press.

In mitigation it might be argued that this loose usage merely presents an attempt to describe an experience by percipients who seemed to be able to communicate without articulation. As such, it could be said, the experience has some parallels in the extraordinary feats of communication on record in Poltergeist cases. Thus at Bristol mental questions were correctly answered, even when put in Latin and Greek (which was not normally understood). This case is not unique (GAULD 1979.120). It has been assumed that mediums derive veridical information about clients

and their affairs from "super-ESP", a hypothesis characterised by one scholar (OSIS 1979) as "that strange invention which shies like a mouse from being tested in the laboratory but, in rampant speculations, acts like a ferocious lion"

Healing has been part and parcel of the psychic scene from the beginning (PODMORE 1902). Accounts of cures by contact with UFOs (notably the case of "Dr. X" HAINES 1979.126) may imply a process involving non-verbalisation by those assuming intent rather than accidental result or coincidence. Evidence for PRE-COGNITION has also been claimed (STORY 1980.100.180; ZURCHER 1979.216).

12. HYPNOTIC REGRESSION

Regression under hypnosis has been attracting increasing attention in recent years, to judge by the number of publications on the subject. To the parapsychologist the interest centres almost exclusively round the alleged recall of "previous lives" or "incarnations." But whereas reincarnation has gained scientific respectability as a branch of serious study (e.g. WOLMAN 1977.631ff), the technique currently employed by some psychologists to aid recall of previous "incarnations" - as opposed to spontaneously recalled data - has not found favour with the parapsychological establishment; no reference to it will be found in Wolman's monumental compendium (1977).

On the other hand, many ufologists set great store by this technique in attempting reconstructions of UFO abduction cases involving loss of time and amnesia, while others are critical of this method as a means of obtaining "repressed" information. The latter have drawn attention to the fact that experiments show how easily details of ET kidnaps are fabricated by hypnotised people (LAWSON 1980.A&B). It is thus unnecessary and far-fetched

to assume that alien intelligences have programmed human minds to forget incidents which nevertheless seem to yield to earthly probing techniques such as hypnotic "regression" (STORY 1980.181).

13. LUMINOSITIES

Unexplained lights, whether in the sky or indoors (illuminating "flying saucers"; haunted houses; seances) are a common feature of both disciplines as well as of mysticism. According to pre-scientific conceptualisation they are miracles within a religious or, alternatively, demonic setting (ANGLO 1977), while to the Spiritualist they signify "spirit lights", particularly with Stainton Moses and D.D. Home (FODOR1966.207f). Even the Pentecostal lights of the Acts of the Apostles have pagan and later parallels. Father Suarez, a Portugese priest and renowned divine, was observed levitated, in deep prayer, surrounded by a "blinding light" (THURSTON 1951.166). A (less spectacular) mystery light was seen during a more recent London Seance (CASSIRER 1968), similar to the "strange lights" in a house in North Carolina (ROLL 1972.64ff). There is, in fact, a veritable embarasse de richesse regarding luminous phenomena, and a considerable volume could be dedicated to that subject alone. Luminosities in the heavens, particularly at night, may present insuperable difficulties to precise interpretation, and some ufologists, notably J.B. Olmos of Spain, have virtually abandoned that particular vague aspect of the UFO syndrome, whereas others (e.g. LAWSON) consider it of the very essence. Even when photographed by presumed reliable persons not much is learned for lack of definition. The more distinct lights observed by many during the Irish and Welsh revivals are well-attested (FRYER 1905), and

their resemblance to, if not identity with, UFOs has been pointed out, particularly with reference to the famous sightings at Fatima (VALLEE 1977.148f). At Tedworth "great lights" entered the bedroom causing stiffness of the eye-lids, and a similar effect is alleged to occur in UFO cases (VALLEE 1977.180ff). The lights are not uncommon in hauntings, which frequently feature luminosities and balls of light (GAULD 1979.178). Lang's Cock Lane and Common Sense contains many references to mysterious lights throughout the ages, while most recently we have claims that Blue Harary leaves his body during OBEs as a shaft or ball of light which may then be visible at some distance (ROGO 1976.70). UFOs come in many colours, some are dazzlingly bright like "welding torches" others with a soft glow. Their whole spectrum in all its multi-coloured aspects is ably set out by the American engineer and physicist, James. M. McCampbell (1973.21ff).

14. ODOURS

It may be considered appropriate or at least unsurprising that even the most superior extraterrestrial technology (McCAMPBELL 1973.39) has not yet eliminated unpleasant odours. An American business man, Beauford E. Parham, describes a "gigantic top" that departed with a "strong odor...like embalming fluid." (LORE 1969). An olfactory dimension of the Poltergeist is also occasionally in evidence: at Tedworth a sulphurous, offensive smell pervaded one of the rooms (GAULD 1979.47), while according to OWEN (1964.240) a German Poltergeist announced the termination of foul smells; however Owen possibly misunderstood the enigmatic words "Stinck Beschluss." In any case, odours of a strong and varied kind frequently occurred with the one-time famous physical medium Stainton Moses. The majority of these were of an agreeable nature,

but not always. Significantly, a powerful smell of ozone sometimes heralds the production of physical phenomena in the seance-room (ROGO 1976.65); a possible change in ozone levels is also indicated in connexion with OBE-experiments according to the same source, and could be taken as a pointer to the energy source. To return to the Victorian medium (a one time Council member of the SPR), some of Moses's more objectionable odours were pungent, causing severe inflammation of the eyes (FODOR 1966.277). Similar reported effects on UFO observers - especially in CEs - are traditionally attributed to radiation, although it has to be admitted that the evidence for radio-active UFOs could be more clear-cut (HENDRY 1979.240).

The subject under discussion seems to have escaped the attention of the contributors of the valuable Encyclopedia (STORY 1980) but not that of the pro-ETH writer McCampbell, who gives an exhaustive list of the various unpleasant smells associated with UFO sightings, including those of a sulphurous kind believed to be of a diabolic origin in less enlightened ages (McCAMPBELL 1973.40). Haunted houses are sometimes similarly afflicted by sporadic odours. This was experienced by the writer and others in Mrs Bowles's house at Winchester. An "infernal odour" at one time indicated to a Christian saint the unwelcome presence of witches and warlocks (LANG 1896.104), the counterpart to the familiar "odour of sanctity" (THURSTON 1952.222ff).

15. AUDITORY ASPECTS

Reference has already been made to the acoustic element of apparitions and UFOs, both of which can be at times be heard as well as seen. The so-called Direct Voice of Spiritualism is a controversial, though hardly negligible, feature of this subject of our enquiry of more than ordinary interest. It is defined by the Encyclopedia (FODOR 1966.92) as "an isolated voice in space without visible source of

agency" (? origin). It occurs in a number of well-attested Poltergeist cases and, more rarely with physical mediums. (One such medium (ABBOTT 1908) was discovered by a sceptical investigator to speak through her ear!) In a spontaneous instant (GAULD 1979.310) a young woman explained how a curious buzzing sound or vibration near her head preceded paranormal physical phenomena. An inexplicable buzzing, later replaced by more regular "foot-steps" (heard and taped by the writer on two occasions) was the sole but impressive phenomenon in an Enfield restaurant (CASSIRER 1975). UFOs depart with a roar and various other assorted noises (McCAMPBELL 1973.46ff): a humming sound is characteristic (VALLEE 1975.182): contemporary accounts speak of a buzzing or humming of the "Fatima UFO." By contrast, the most common acoustic psi effects (raps, knocks, or foot-steps; often as a means of communication or at least intelligence), are absent from the ufological scene.

16. UFOLOGY STRUCK DOWN

No study of so contentious a subject as ufology would be complete without reference to its "debunkers", whose "natural" explanations are often only superficially reasonable. Parapsychology also suffers from detractors in the persons of those who are constitutionally dissatisfied with any kind of evidence, and who manage to combine sublime scepticism with supreme ignorance and conceit. Allison (WALLIS 1979) quotes the opinion of a scientist who at least frankly admitted his prejudice against the entire subject. In many unadmitted cases - the vast majority - bias is only too painfully obvious.

Ufological data can be treated in two basic ways. They

can either

- (a) be dismissed as the worthless drag of a "leaky bucket" and discarded as unrelated trifles; or
- (b) be studied analytically in "bundles of sticks" (ROLLO 1967).

Menzel, the Harvard astronomer chose (a). UFO reports, he explained, are not to be taken seriously except as a "modern myth." They are to be "shot down" collectively on the grounds that as "each case is a separate item ...it seems highly dangerous to suppose that one can add data from another case, unless one is absolutely sure (my italics) that they concern the same phenomenon" (SAGAN 1972.141). Although there is a measure of truth in this cautious assessment, it might nonetheless be thought that the risk is worth taking. Menzel forgot that Science deals in probabilities, being innocent of final "proof" (MORRIS 1980.433). In isolating the data, they cease to be amenable to meaningful analysis and scientific study. Analogously, Psychical Research traditionally lumps together similar-looking effects in its two main "dust-bins", "mental" and "physical" phenomena. The same observations apply to Oberg's criticism. Oberg argues that the anomalies in question are a hodge-podge which does not require explanation when, in actual fact, there are significant patterns by which to relate them to each other (WESTRUM 1980). Other abrasive charges under section (a) include Philip Klass's plasma umbrella, which disposes of the UFO phenomenon by a blanket interpretation in terms of physical causes, just as Poltergeists have been summarily dismissed in some quarters by being ascribed to geophysical factors (LAMBERT 1955.49ff).

The late Edward Condon, author of the Condon report on UFOs (CONDON 1969), caused justified dismay by awarding equal or superior ratings to weak cases, to the exclusion of in-depth study of stronger ones (STORY 1980.80). Such tactics are not unknown to parapsychology, which Condon summarily condemned without serious research into the subject (WALLIS 1979.279; MORRIS 1980.433f.).

Much inferior material has found its way into print in such intractable subjects as parapsychology (psychical research) and ufology, but by and large the best critic and exposé of fraud and trash is usually the expert in his own field rather than the outsider "who knows it all." Thus Ufology has found its own debunker of much that is illusory and unsound in the person of Alan Hendry (1979), Professor Hynek's chief collaborator at his Center for UFO Study at Evanston, Ill.

(TO BE CONTINUED)

The following errors in Part 1 of this feature (JTAP, April, 1984) have been pointed out by the author.

Page 108 line 2. For "physical" read "psychical."

Page 121 col.2 line 35 For "Stringfellow" read "Stringfield."

Page 123 Col.1 lines 36-40 Should read: "To take a hypothetical example derived from the sceptic's postulate, believers in revenants could be tempted to recognise them in Mr Lambert's amorously vaporous voices"

SATURDAY, 3rd NOVEMBER, 1984

TRIBAL REACTION IN AFRICA TO UFOs- CYNTHIA HIND

Mrs Hind, MUFON's field investigator in Africa will discuss the reaction of rural tribesmen who, without any knowledge of the UFO phenomenon as it is understood in the west are now describing many of the events (Cells, physical traces, entities) with which ufo-logists in the USA and Europe are familiar.

Mrs Hind has lectured in many parts of the world and is a widely respected authority on UFOs. Her book UFOs AFRICAN ENCOUNTERS was published in 1982.

SATURDAY, 1st DECEMBER, 1984

- AGM at 6.30pm followed by:

UFOs: THE TRIPLE CONSPIRACY- JENNY RANGLES

"What" asks Miss Randles, BUFORA's Director of Investigations, "is the relationship between science and the UFO phenomenon?" For 40 years governments have employed scientific advisors to control their top secret UFO research. These scientists have even been involved in the manipulation of public attitudes to UFOs. An extensive and dramatic hoax has been perpetrated by governments in cahoots with their advisors on both the public and the rest of the scientific community.

The true extent of the UFO mystery has been suppressed but scientists are now beginning to grasp the truth.

VENUE: London Business School, Sussex Place, Outer Circle, Regents Park, LONDON, NW1 at 6.30pm.

INVESTIGATOR TRAINING

Serious UFO research and investigation calls for some formal training if significant data is to be collected. UFO enquiries to date have been based to varying degrees, on the old, rather suspect USAF Sighting Report Questionnaire.

With this in mind some European researchers have concentrated on a witness-based study culminating in a test questionnaire devised by Dr. A.G. Keul, called "THE UFO ANAMNESIA TEST." This test gives important indicators to the direction UFO research and investigation should be heading. The onus is on investigators to be aware of this radical shift in thinking.

To enhance awareness BUFORA's research and investigation sub-committee has sanctioned a series of Workshops in three centres, one of which, was held in London in July. The second Workshop will be held on SATURDAY, OCTOBER 27th, 1984 at the PATTEN ARMS HOTEL, Parker Street, WARRINGTON (adjacent to Warrington railway station) beginning at 1pm. There will probably be a further course in 1985.

There will be no correspondence course attached to the Workshop no formal examination and no specialist knowledge or entry qualifications. The Workshops will be open to all members over 18 whose thinking is flexible enough to consider a non-physical approach to the UFO enigma.

The Workshops will be run jointly by ASSAP/BUFORA and this should benefit both since the UFO Anamnesis Test appraises the way we view reality when influenced by powerful and unusual stimuli. Although the Test is simple to administer, it calls for delicacy and a great measure of witness empathy.

ASSAP/BUFORA members wishing to join a course should contact their respective Training Officer or BUFORA's Training Officer: KEN PHILLIPS, 13 Falcon Avenue, Springfield, Milton Keynes MK6 3HG (TEL: 0908 678870).

Aims and scope of the Journal

Research and investigation into unidentified flying object (UFO) phenomena has progressed from the early days of wild speculation into an area where scientific analysis and evaluation methods can be applied to a number of specified areas.

It is realised that ufological research is subject to a great deal of speculative comment, much of which lies on the boundaries of current scientific thought. Many existing scientific institutions accept limited discussion of UFOs and related phenomena where it has some bearing on their discipline. The Journal of Transient Aerial Phenomena (Journal TAP) offers a forum for scientists and researchers to present ideas for further discussion, results of investigations and analysis of statistics and other pertinent information.

Journal TAP aims to meet a wide range of discussion by incorporating an approach with breadth of scope, clear and topical comment conducted with scientific rigour. It intends to offer a truly international forum enabling researchers throughout the world to publish results in an authoritative publication which should serve to further knowledge of the cosmos and benefit mankind in so doing.

Notes for contributors

The Editorial Board will be pleased to receive contributions from all parts of the world. Manuscripts, preferably in English, should be submitted in the first instance, to the Editor-in-chief, 40 Jones Drove, Whittlesey, Peterborough, PE7 1UE, United Kingdom.

Manuscripts should be typed double-spaced on one side of A4 size paper with wide margins and submitted in duplicate. While no maximum length of contributions is prescribed, authors are encouraged to write concisely.

The author's name should be typed on the line below the title. The affiliation (if any) and address should follow on the next line. The body of the manuscript should be preceded by an abstract of around 100 words giving the main conclusions drawn.

All mathematical symbols may be either hand-written or typewritten, but no ambiguities should arise.

Illustrations should be restricted to the minimum necessary. They should accompany the script and should be included in manuscript pages. Line drawings should include all relevant details and should be drawn in black ink on plain white drawing paper. Good photoprints are acceptable but blueprints or dyeline prints cannot be used. Drawings and diagrams should allow for a 20 per cent reduction. Lettering should be clear, open, and sufficiently large to permit the necessary reduction of size for publication. Photographs should be sent as glossy prints, preferably full or half plate size. Captions to any submitted photograph or illustration should be appended and clearly marked.

In the interests of economy and to reduce errors, tables will, where possible, be reproduced by photo-offset using the author's typed manuscript. Tables should therefore be submitted in a form suitable for direct reproduction. Page size used should be A4 and width of table should be either 10.5 cm or 22 cm. Large or long tables should be typed on continuing sheets but identifying numbers should be placed on the upper right-hand corner of each sheet of tabular material.

Reference to published literature should be quoted in the text in brackets and grouped together at the end of the paper in numerical order. A separate sheet of paper should be used. Double spacing must be used throughout. Journal TAP references should be arranged thus :

- (1) Jacques Vallee: 1965. *Anatomy of a Phenomenon*, vii, Henry Regnery, Chicago.
- (2) David Haisell: 1980. Working Party Report, *Journal TAP* 1/2, pp36-40

With the exception of dates which should be presented in the astronomical convention viz : 1977 August 06, no rigid rules concerning notation or abbreviation need be observed by authors, but each paper should be self-consistent as to symbols and units, which should all be properly defined. Times however should be presented in astronomical form using the 24 hour clock and Universal Time (UT) where possible. If local time is used, this should be specified viz 19h 15 GMT.

The Editorial Board shall have the right to seek advice from referees on suitability for publication and may, on their recommendation, accept, seek revision of or reject manuscripts. If considered unsuitable for Journal TAP, the Editor-in-chief reserves the right to forward manuscripts to the Editor of *Bufora Journal* for consideration. The Editor-in-chief's decision will be final.

Book reviews and letters for publication will also be considered.

Where permission is needed for publication of material included in an article, it is the responsibility of the author to acquire this prior to submission. All opinions expressed in articles will be those of the contributor and unless otherwise stated, will not reflect the views of *Bufora*, its Council or the Editor-in-chief.

C O N T E N T S

SOLAR AND EXTRATERRESTRIAL LIFE
- A NEW HYPOTHESIS (Part 2)

ALI ABUTAHA

JUPITER AND THE NATURAL THEORY
OF UFOs

STEUART CAMPBELL

TOWARDS A PSI/UFO INTERFACE

MANFRED CASSIRER

BUFORA MEETINGS - NOVEMBER-DECEMBER, 1984