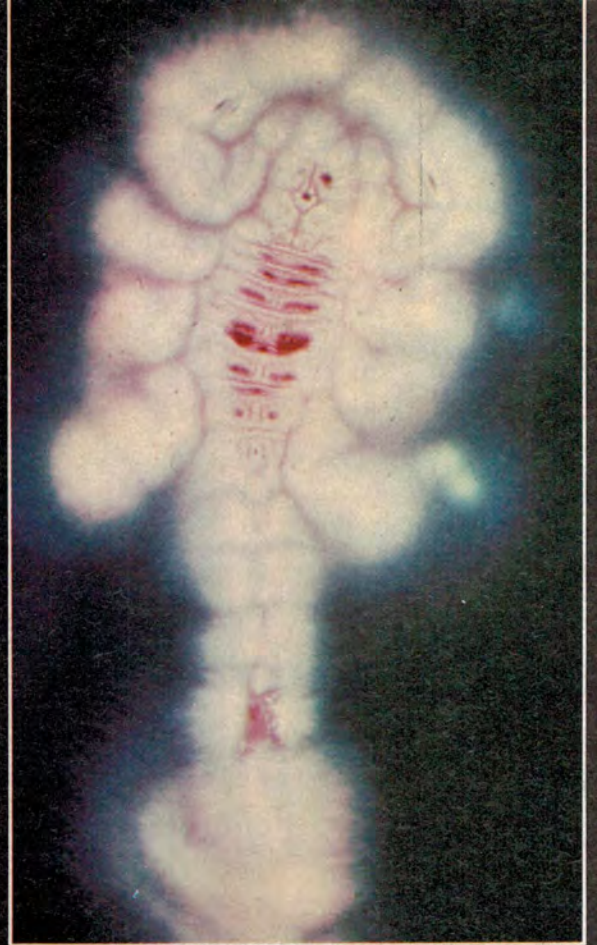
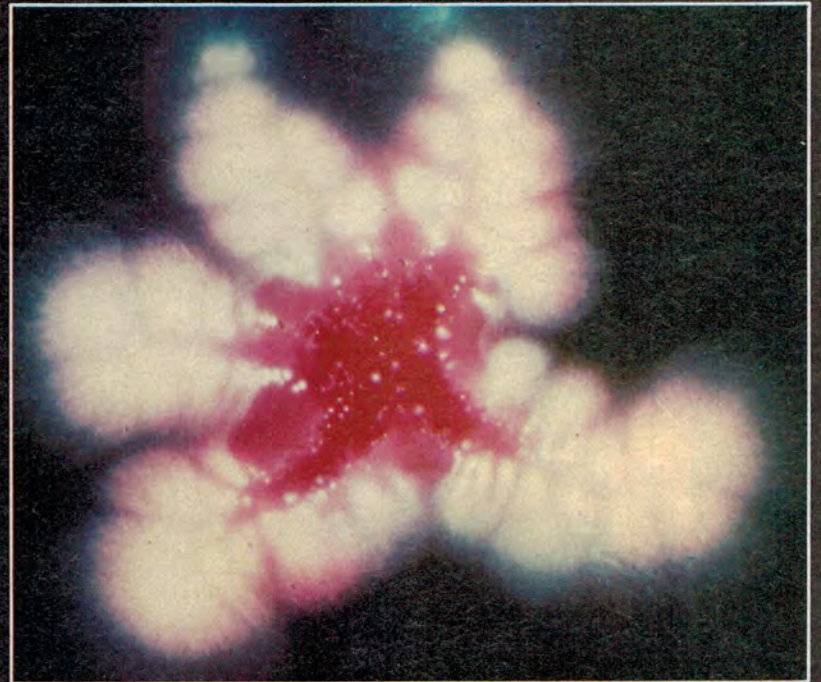


Kirlian photograph of an oleander flower. The flesh of the flower in contact with the photograph film is indicated by the dark portions.



Above: the Kirlian aura of a live scorpion. The dark parts in the centre of the outline are portions of the arachnid's abdomen in contact with the photographic plate.



'Radiation field' of a 'Jewel of the Ocean' starfish. Fine structure of the field is evident at the extremities of the creature.

At left: the Kirlian 'aura' of a seafern.



# Radiation field photography — The Kirlian effect

Is it a real phenomena, or a contrivance? The various 'explanations' range from the mystic to the pragmatic. In this article, Dr Peter Sydenham, writing exclusively for ETI, explores the history and phenomenon of radiation field photography — which may yet become a branch of the biophysical sciences.

IN THE 1850's James Clerk-Maxwell became interested in the "lines of force" (demonstrated by sprinkling iron-filings on magnets) concept established previously by Faraday.

In 1855, when Clerk-Maxwell was twenty-four, he read the first of two papers at Cambridge reporting how he had applied mathematical expressions to Faraday's ideas. This apparently surprised Faraday who wrote, "I was at first almost frightened when I saw such mathematical force made to bear upon the subject, and then wondered to see that the subject stood it so well". At that time this must have seemed just another case of an esoteric mathematician apparently taking things beyond reason. But that was only the beginning of a most significant train of events.

From 1868 onward Clerk-Maxwell again became interested in electricity and magnetism. He sought mental models to explain how action could take place between two separated bodies, as had been stated much earlier by Newton. He developed ideas of a system of whirling vortices that helped him, mentally and pictorially, to visualise the action in magnetic fields.

Knowing, from the work of such people as Cavendish, Oersted and Faraday, that electricity was related to magnetism he tried out his ideas of vortices for electric fields. After some necessary modification he came up with a combined theory relating electricity and magnetism. His abstract visualisations including molecular vortices, whirling wheels, idle wheels and their interaction. He translated his images

into drawings. (Figure 1)

From these mechanical models came his celebrated theory of electromagnetism, published in 1873. Although based on a visual model it was expressed in mathematical form — the Maxwell equations.

The most surprising result of Maxwell's work was that his visual models suggested that under certain conditions there would be created a wave motion, electro-magnetic in nature, that could be radiated through the electro-magnetic medium of space. He had discovered electro-magnetic radiation — at least, in theory.

Although he predicted that electro-magnetic radiation was feasible he was unable to prove this by experiment. And though he wished to verify his theory, it is doubtful he realized the importance of his findings.

Many people then took up the hunt for a practical method to generate and detect the elusive electro-magnetic waves. Over the years 1886 to 1889 Heinrich Hertz, in Germany, was the first to succeed in assembling apparatus (Figure 2) that transmitted the radiation, received and detected it. In the event, his apparatus turned out to be extremely simple. Hertz is said to have declared that, whilst interesting, this knowledge had no real value!

The world had then, for the first time, practical knowledge of an energy regime that was, as such, unknown to man beforehand. Within a decade Marconi had radio systems working and electro-magnetic radiation became an accepted phenomenon of great value.

Previous to the Hertz demonstration, many people had observed unaccountable effects that may well have been naturally generated electro-magnetic

radiation — light, of course, is one. The circumstances of these 'strange' observations were varied and no explanation could be placed on them.

Bearing in mind that today, man has collected many well-documented experiences of other inexplicable happenings it seems reasonable to assume that there may well be other energy fields, or like concepts, yet to be discovered and formalised. Because we cannot sense (that is, detect) a given phenomenon with our natural sense organs, even when aided by sophisticated measuring technology, does not constitute positive proof that it does not exist. Perhaps much of the recorded data of psychical phenomena will one day be explained by the discovery of new physical principles. Certainly the wealth of documented evidence suggests there are many such principles. The 'closed-mind' approach will not make the phenomena go away. ▶

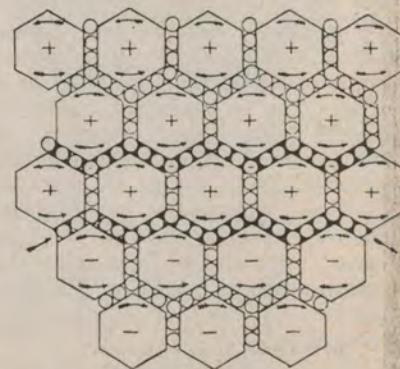


Figure 1. Maxwell used this sketch of whirling wheels and vortices to aid his thinking about the theory of electromagnetism.

The front cover pictures and those at left are all courtesy of Camera Press, London by Cutten/Szumski.



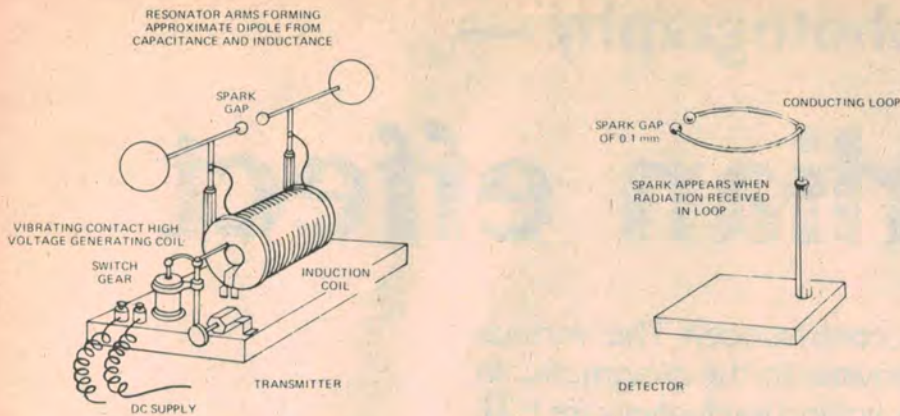


Figure 2. The apparatus used by Hertz to generate and detect electromagnetic radiation was quite simple. The 'classic' illustration is shown here.

### Electro-photography — the Kirlian effect

Two groups of phenomena that have become closer to explanation than most are first the observations and photographic records of mysterious lights and radiations around people and objects — called variously, radiation field photography, electrophotography, Kirlian effect, Human aura, St. Elmo's fire plus other names — and second acupuncture.

The Kirlian effect and acupuncture would seem as related as monkeys to stones but, as will be shown, they do seem to be complementary concepts. First the Kirlian effect.

Belief in the existence of the human aura is very ancient. Mediaeval people distinguished four kinds of aura: 'Nimbus' and 'Halo' that stream from

the head, 'Aureola' that issues from the whole body and 'Glory' which is both kinds combined. These were often featured in paintings; Figure 3 is an example. Others divide the aura into health, vital, Kharmic, aura of character and aura of spiritual nature.

Some people (clairvoyants particularly) claim to be able to see these effects without aids, the colours of the aura indicate the person's emotional and physical state.

The Old Testament bible relates how Moses was involved with a burning bush. Similar flames appeared as the "tongues of fire" that came upon the twelve apostles on the day of Pentecost.

Sharp ends of extended objects — ships masts, yard-arms, church steeples, airplane wingtips — in free air often exhibit this mysterious fire. This be-



Figure 4. Ultra-violet radiation photography looking up to the top of the Eiffel Tower — see text for explanation.

came known at St. Elmo's Fire after the martyred Italian bishop who became patron saint of sailors. Other names used include Castor and Pollux, Dioscuri, Corpusant and Fermie's Fire.

Recently this is said to be static electric discharge — corona discharge. A bluish glow was photographed around Pete Conrad the astronaut, when he landed on the Moon from Apollo 12 in 1970.

We all have, no doubt, experienced being charged-up on dry days. There are recorded instances of people who have the ability to deliver powerful electric charges who also have electro-magnetic properties enabling them to suspend

### PSYCHIC PHENOMENA — a group of unexplained experiences

Psychic science takes in phenomena such as apparitions (manifestation in image and presence form of the living and dead), apports; (solid objects unaccountably brought into closed-rooms), clairvoyance (supernormal mode of perception, resulting in a visual image in the mind), levitation (people and objects floating, in defiance of gravity), materializations (phantoms built-up from an unknown substance in sensitive persons), predictions (of future events), telekinesis (movement of objects without apparent contact), telepathy (thought transference) plus many more.

These experiences go under such names as psychical phenomena and spiritualism which include medium-

ship, extra-sensory perception (ESP) and parapsychology. They include such specific events as automatic writing of messages, spirit photographs and the appearance of poltergeists.

In early times these experiences were accepted as part of life and, presumably to help peoples' peace of mind, they were interwoven into their environment, usually as part of the religion. Witches were those with these paranormal powers.

In the 19th century a general trend was to denigrate these experiences because the highly-developing physical science of these times could not explain them. Rather than undermine the scientific method it was easier to dismiss this area of human experience.

In the late 19th century there began to appear many organised and creditable societies for the furthering

of knowledge in this fringe-science area.

Serious collecting of case-histories began. Several established scientists joined those interested, examples being Lodge, Crookes and Huxley. Many renowned physical scientists and engineers have developed interests in psychic events in their mature working years.

In this century the universities (in the Western World, that is) have become involved. A laboratory for parapsychology was established at Duke University, North Carolina in 1937. The University of Urecht in the Netherlands had a Chair inaugurated in 1953. The Russians have had an active interest for many years.

But there still is lacking a "plausible theoretical framework" that can be used to explain the observed events.





Figure 5. Kendall Johnson's first radiation field photograph was of this leaf. He made it in 1971 using surplus electrical parts in his apparatus.

Figure 3. Right: haloes are one of four forms of human aura. In early times these were shown in many paintings. Shown here is a work called "The Transfiguration" by Fra Angelico (1387 - 1455).

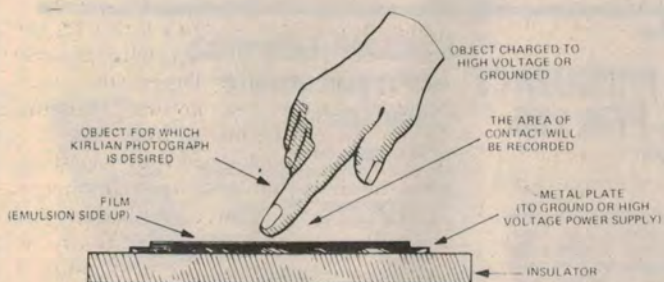


Figure 6. Simple method for making Kirlian photographs of fingertips using static charge built up on the body.

magnetic materials.

Electrical storms have been known to produce images, (a rainbow in one case and pictures of people in others) semi-permanently formed in glass window panes. This is called lightning photography.

In psychic photography, photographs of people - sometimes of people long-departed have appeared on plates. It is suggested that there exists another energy form to electro-magnetic radiation. It is usually called bio-energy, the name coined by Czechoslovakian parapsychologists.

### Electro-photography

Electro-photography is as old as the availability of photographic emulsions that could record the existence of radiations. A case dated 1842 is the oldest - see "The probability of the impossible", by T. Moss published by T.P. Tarcher, 1974.

Yakov Narkevich - Todko showed photographs taken using electrical discharges in 1898.

Figure 4 from a 1926 book by C. Hall "Triumphs of invention", carries the caption "A photograph of the Eiffel

Tower taken during the dispatch of wireless time-signals. The ultra-violet radiations, although invisible to the naked eye, appear luminous on the photographic plate".

This kind of detection has become known as Kirlian photography after release of the work, in 1958, of the Russians Semyon and Valentina Kirlian. At first, interest in the Western World was minimal but it gained followers especially from 1970 onward.

In the West one man responsible for assisting this interest to flourish is Kendall Johnson, who it seems, was the dominant person in the US to obtain Kirlian pictures, (Figure 5), of objects. ("The Living Aura" by K. Johnson, Hawthorn Books, New York, 1975, is a *must* to read.) There were some earlier accounts of success in the US - one was published in 1938.

Having accepted that there is little mysterious in Kirlian photographs, researchers are now concentrating on trying to resolve whether or not the pictures have recorded more than mere electro-magnetic radiation effects. Do they contain evidence of bio-energy? Does some new form of energy exist to

be explained?

### The practice of Kirlian photography

In the simplest form of electrophotography an unexposed photographic film is placed on top of an electrode plate with the emulsion uppermost. Onto this is placed the subject to be photographed - a coin, leaf or person's finger or hand. High voltage is applied to the top of the object and discharged through the object and photo-emulsion to the other plate - Figure 6. Clearly the high voltage source must not be of lethal extent if used directly on the body.

Body-part photographs can be made using the static charge built up on a person who shuffles around on a synthetic carpet in a dry room. The use of any other active voltage source for body-part pictures can be a most dangerous practice. It is strongly advised that you experiment with objects such as leaves, coins, flowers, metal shapes and liquid drops, unless you know about the safe use of electrical sensing equipment in electro-medical applications.



Photographs can be obtained using DC charge, a burst of audio frequency high voltage or a single short pulse. Just about every combination appears to have been tried.

Finding the right combination of film type and speed and source characteristics apparently can be time-consuming as each object will need different settings. Results have been obtained using Tesla coils without and with spark-gaps (in which case RF is generated), Van de Graaf generators, charged capacitors and the charge of a person.

Wei, in a paper in the Journal of Applied Physics, Volume 47, p. 4437-4441 reported using a propriety electric photography set made by Edmund Scientific. This provides voltages up to a maximum of 20W in the frequency range 3-50 kHz. The set allows the user to vary voltage, frequency, pulse width, pulse repetition frequency and time. He also found that a spring-release piezo-electric generator, which supplies a 10  $\mu$ sec pulse of 18 kV, was suitable as a source for his work with metal grids. It

is likely that the larger style piezo-electric gas lighters might suffice. Wei used ASA 3000 film (Polaroid 87) in his work.

Boyers and Tiller (J.Appl.Phys., Volume 44, 3102-3112, 1973) typically used 100  $\mu$ sec pulses of bipolar 1 MHz signal having amplitudes varying from 20 to 100 kV. They derived this by driving an Oudin resonator coil (details given in their book) from a modified radio transmitter. They found that each pulse produced different streamer configurations, these tending to expose the film uniformly when a string of pulses was used as excitation. They also established that the surface composition, smoothness, topography, inter-electrode spacing and parallelism of electrodes were each important factors having bearing on the results obtained. They also experimented with colour films, effects produced depending very much on the method of use and the type of film used.

A description of how to build a simple set of equipment is given in Johnson's book "The Living Aura", mentioned above. Another work "High-voltage photography" by H.S. Dakin, published

by Edmund Scientific Company, Barrington, New Jersey, USA in 1975 provides circuitry details.

Many different arrangements of film and object position have been used. Figure 7 shows a few variations. The film speed number – the ASA or DIN rating – is of little value as the energy exposing the emulsion is quite different from that for which the film-speed rating is assessed. Different films produce different results.

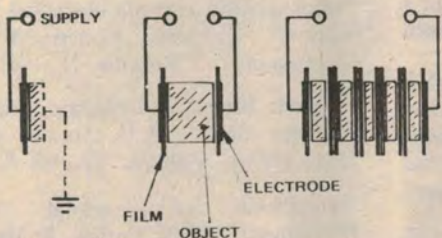
### Defined effects

Many variables exist to alter the characteristics of a Kirlian effect photograph. Even so certain effects appear to have been established giving electrophotography an intriguing nature.

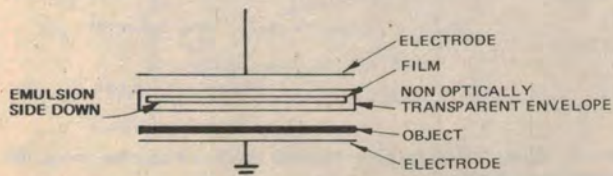
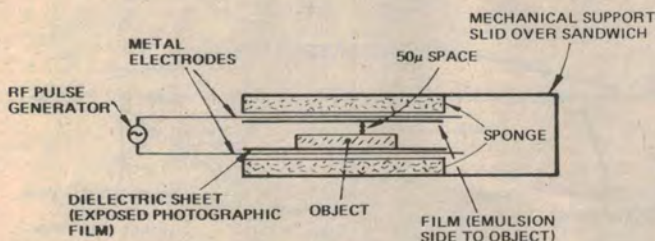
It is said that live leaves and small animals produce a much clearer image, of higher contrast, than when they are dead – the energy image is said to reduce as the leaf loses its life.

Another claim is that a piece torn from a leaf still shows as present in a photograph of the remainder. This is termed the phantom or cut-leaf effect. (This is not to be lightly dismissed, for in the image storage method of holo-

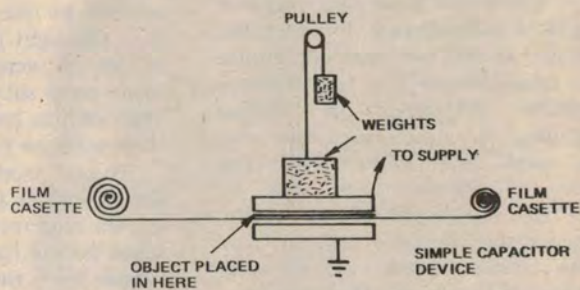
Figure 7. Various arrangements used in radiation field photography.



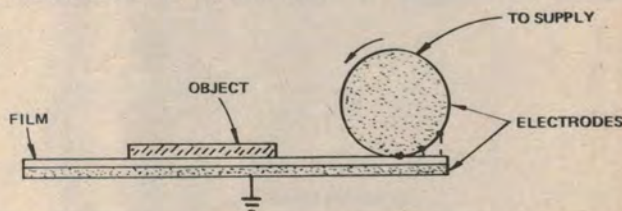
Various techniques used by the Kirlians in Russia.



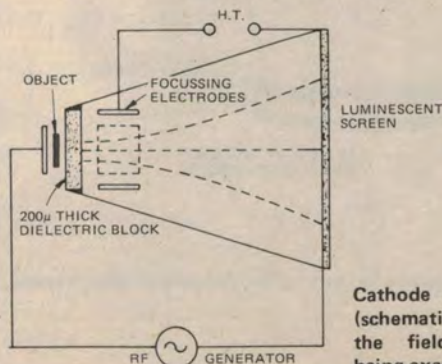
The two diagrams above show various ways of devising an envelope for the production of Kirlian photographs in a lighted room.



Use of roll film to record a Kirlian image. This method requires complete darkness to make the exposure.



A method for producing Kirlian photographs using a rolling electrode.



Cathode ray tube arrangement (schematic only) for picturing the field around the object being examined.



graphy the hologram plate can be broken and any piece from any position will still produce the same 3-D image).

It is also said that psychic healers' finger pads produce a more brilliant image when healing is in process compared with when it is not. As Johnson states: "Do the images show an energy transfer between healer and subject? Is there some informational exchange going on, resulting in the different energy representation of the finger pads".

This also is quite plausible for we accept that information can only be transferred in a physical system when an energy (or mass) carrier exists to convey the data.

Evidence, in the form of Kirlian photographs, has been obtained implying that people with "green-thumbs" have properties that assist repairing damaged plant tissue.

Electro-photographs are certainly artistic and often pleasing to behold. Perhaps they do demonstrate some form of energy unknown to man.

### Kirlian photography and acupuncture

What in the world have electro-photography and acupuncture in common? Why stage an international conference on this joint theme? The first Western Hemisphere Conference on "Kirlian Photography, Acupuncture and the Human Aura" was held in New York City in 1972. Papers were read by authors from the Soviet Union, Canada, France, Japan, United Kingdom, Eire and the United States. Letters were received from Czechoslovakia and other countries.

Kirlian photography is concerned

with the properties of objects to modify and transmit energy fields – which are certainly of electro-magnetic kind – but may also be of some other, yet unexplained, information-linking nature.

Acupuncture is a Chinese art of healing, using needles inserted into the body at certain places called acupuncture points. It is a very ancient art and has been continuously practised, with effect, in the Asian regions.

The Western attitude to medicine and healing has, until recently, been skeptical towards acupuncture because it cannot be adequately explained by Western science. Considerable evidence now proves that there is much about the body that can be controlled. Yogis are able to perform quite amazing variations of bodily function. Somehow the insertion of needles, in various numbers, places and depths can cure many ailments.

Bio-feedback is an apparently 'understandable' technology – a feature was run on this in Electronics Today International in September 1976. Brendan O'Regan, of the Design Science Institute, Washington DC., wrote in 1973:

"Presumably, we in the West believe our senses only as their impressions are verified by the machines we create". It is in this light that Kirlian photography relates to acupuncture as well as to many other subjects – see Figure 8 for a chart of how the Russians have organised their work on psycho-energetics.

Several workers have reported that Kirlian effects are especially intense over known acupuncture points. Furthermore some people have built probes – called tobiscopes – that indicate their position.

It is claimed that acupuncture can be established by moving electrodes

over the body and observing the signal processed by an electro-physiological high-gain amplifier. The extent of the reading is said to also indicate the energy level of that particular acupuncture energy circuit. A 1971 Russian tobiscope, by Adamenko, detects skin resistance changes that are claimed to drop from around the normal 1M down to 50-100 kilohm at an acupuncture point.

Perhaps this article has set you thinking! Equipment to produce radiation field photographs is presently being developed in ETI's laboratory and we hope to publish a project in a forthcoming issue.

### Related reading

Additional to the books and papers already mentioned, the following provide accounts concerned with electro-photography and photography of electrical phenomena.

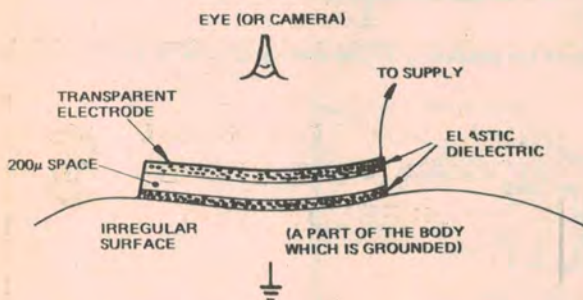
"Psychic discoveries behind the Iron Curtain" S. Ostrander and L. Schroeder, Prentice Hall, 1971.

"Galaxies of life – the Human Aura in Acupuncture and Kirlian photography" S. Krippner, Interface, New York, 1973.

"Photography records electrical phenomenon". Electrical Construction and Maintenance " Volume 75, 86, 1976.

"Instant imaging of electric, radio and acoustic fields" W.G. Hyzer, Optical Engineering, Volume 17, SR-3, 1978.

"Handbook of Unusual Natural Phenomena" W.R. Corliss, Sourcebook Project, Glen Arm, USA, 1977.



Direct viewing of the state of the 'aura' of a living object using a transparent electrode.

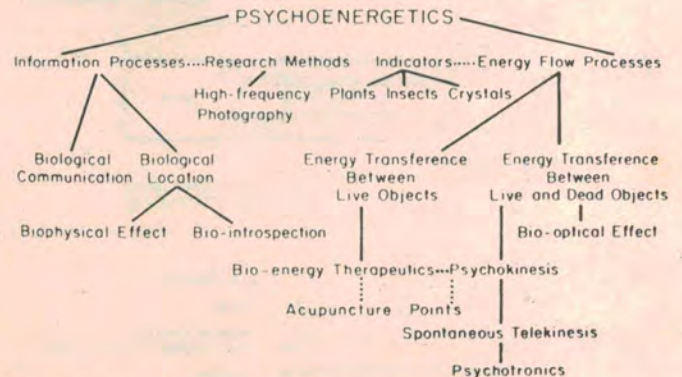


Figure 8. Chart showing how Russian work on psycho-energetics is classified and organised.