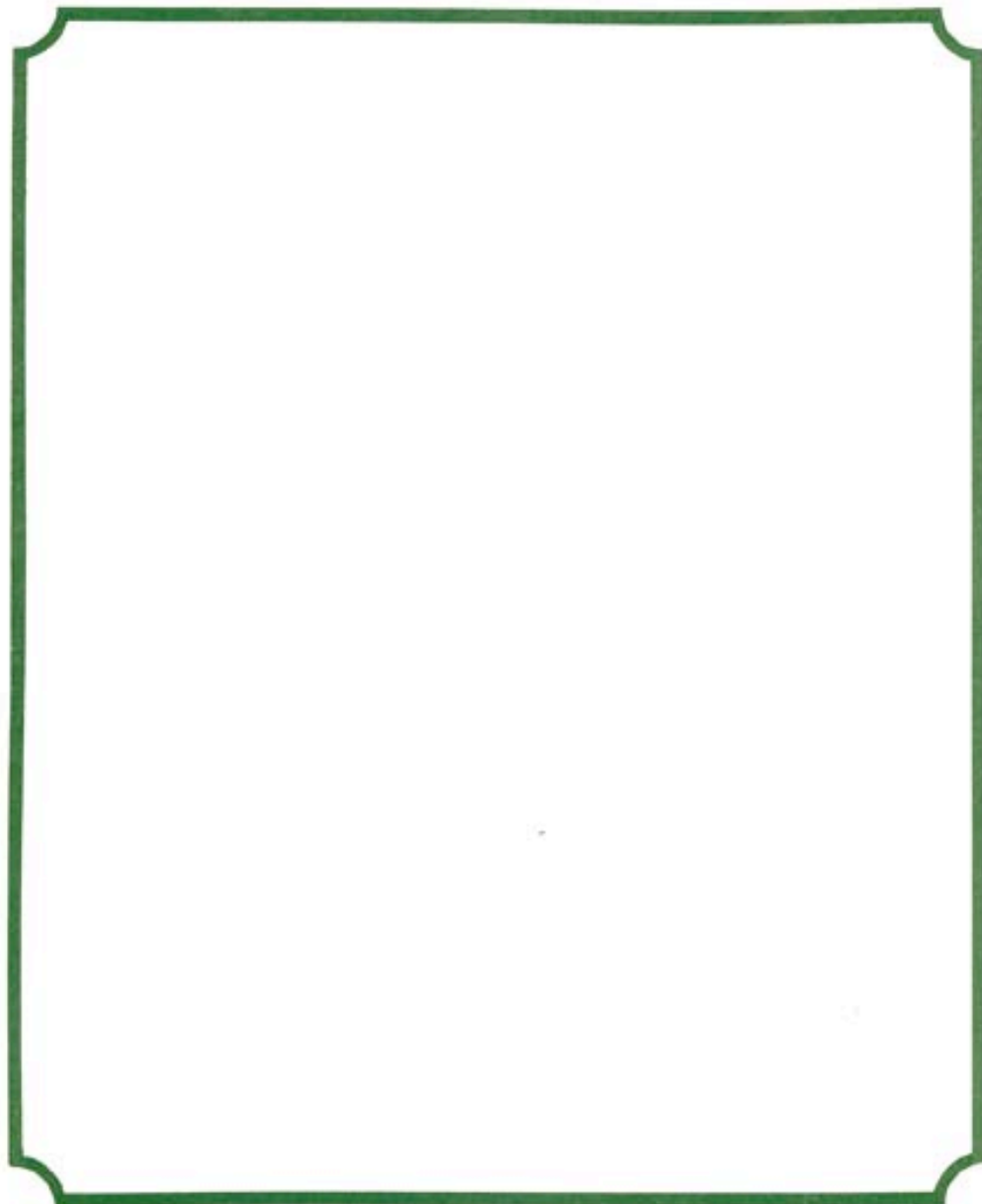


A note about this electronic version--

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ARCHAEOUS



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ARCHAEUS

ARCHAEUS

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EDITORIAL

THE theme of this issue of ARCHAEUS could be “occult influences.” This emphasis has occurred quite by chance. Lest any readers mistake the use of the word occult here, I should emphasize that this usage has nothing to do with mumbo-jumbo spookery or with witches, wizards, and warlocks. Occult has been a perfectly useful term in traditional medicine for some time and means no more than “hidden or obscured from view, invisible.” It is in this sense that the term is used here. The papers by Beck, Puharich, and Schmitt all examine the real and potential effects of such occult influences as found in the electromagnetic domain. Their papers represent different sets of experiences and points of view, but all agree that these neglected and little-understood effects are matters for deep concern.

Occult influences arising from more mysterious regions are the theme of the remaining papers in this issue. Eisenbud’s paper draws our attention to the “meander problem.” How is it that the making of meanders is so ancient, widespread, and typical? What underlying force does it represent? It is said that in the true flamenco, fiery energies arise from the earth itself.

In the floods of life, in action-storms,
I seethe and recede,
Weave back and forth!
Birth and Death,
An eternal sea,
An oscillating weave,
Burning life:
At the whirring loom of Time I weave
The living clothes of the Divine.¹

The phenomena of psi operate in a complex context of incompletely² understood psychological, biological, and physical systems. It may be expected that the investigator of such phenomena will see an indefinite, confusing, and paradoxical picture no matter whether he is conducting “hard” experiments or merely observing. Such is indeed the case. Nevertheless, traditional psi research continues to attempt to design and execute simple and well-defined lab-table experiments in which repeatable, reliable, and “robust” properties of psi are to be revealed. Most of the reliable “properties of psi” revealed in this manner, however, have been of the negative sort—the shyness effect, decline in scores, the “Super-ESP” hypothesis, etc.

IF ONE considers that the fuzzy nature of psi may be irremediable³ it is right and proper to consider more organic approaches; and perhaps, out of such methodologies, some real and positive properties of psi might emerge. One such approach is outlined by David J. Hufford⁴ (see Jerome Clark’s review, this issue); another has been instituted by Jack Houck. The fact of the matter is that the PK party is a scientific experiment Jack’s approach recognizes that, in psi, one is dealing with a complex of virtually uncontrollable biological, psychological, and physical factors.⁵ Under such conditions it is nonetheless possible

to construct a scientific experiment capable of revealing reliable data about the nature of the subject under study. The PK party, like fire-walking, is a kind of psychobiophysical “cloud chamber” ... a space in which conditions make possible the observation of elusive phenomena—not at one’s will and convenience, perhaps, but sooner or later the phenomenon will be clearly observed. If the clear and unambiguous PK event is not soon observed, then, at least, a weight of typical events with an accompanying typical context will develop. As is pointed out by Hufford, such contexts and events have a typical pattern or quality not derivable from the pre-conceptions of the subjects or the investigator. This is evidence.

Jack’s paper, appearing in this issue, demonstrates that certain kinds of hard evidence are obtained from the PK metal-bending “cloud chamber”: anomalous surface changes occur that cannot be accounted for by the “known” psychobiophysical conditions prevailing in the PK party room. Isn’t this the kind of evidence we crave?

NOTES

1. Goethe, J. W. von, Faust, Pt. 1, 11. 501–509. The Earth Spirit is speaking.
2. An understatement.
3. For a critique of the “hard” approach to psi, see Stephen E. Braude, review of Eisenbud’s Paranormal Foreknowledge, Journal of the American Society for Psychical Research 76, 3 (July 1982): 291.
4. Hufford, David J., The Terror That Comes in the Night: An Experience-Centered Study of Supernatural Assault Traditions (Philadelphia University of Pennsylvania Press 1982).
5. In discussing biological effects of electric, magnetic, and electromagnetic fields, H. L. König et al (Biologic Effects of Environmental Electromagnetism [New York: Springer-Verlag, 1981]) make the following observations, applicable, in spades, to the study of psi:

Human beings are, at the very least, a mass of biochemical, behavioral, and psychological interactions. They operate in all modalities all of the time. (p. 166)

... the initial state of a system or person, as well as other environmental parameters (the weather, for example), are continually changing, continually exhibiting both long- and short-term effects. Also to be considered is the location factor, or the location-dependence of a response, which is known to play a major role. In view of the many variables involved, it is no wonder that a specific experiment with a certain person may yield an entirely different result when repeated the following day. This naturally makes it difficult to conduct such experiments—a fact which is known, or should be known, [by] every experienced doctor, psychologist, and biologist, but which sometimes causes problems for the unversed physicist or technician due to his essentially different way of thinking. (p. 139)

6. So badly craved by parapsychologists that not a few have become craven thereby. ...

ARCHAEUS

The term ARCHAEUS (ar-KAY-us) was first used by the great sixteenth-century physician Paracelsus (who, incidentally, founded magnetotherapy) to designate “an invisible spirit ... universal in all things, ... the healer, ... the dispenser and composer of all things.” The Archaeus is “the hidden virtue of nature” and the “invisible sun” in another reference, the Archaeus is “he who disposes everything according to a definite order, so that each comes to its ultimate matter”; further, “The anatomy of the Archaeus is the anatomy of life.”

“OCCULT” INFLUENCES IN HEALTH AND DISEASE

Robert C. Beck, B.E., D.Sc.

THE word occult is defined by Webster’s as “hidden from view,” i.e., not readily discernible by sight, sound, taste, smell, or any other physical senses. While many factors arising from our industrial and urban society have been proved to exert a profound effect on our health and well-being, some lesser-known, physically undetectable influences still go unreported in even the most sophisticated investigations. These could be termed “occult” influences.

Many of the causes of disease that are now understood were at one time “occult.” Before van Leeuwenhoek invented a simple form of today’s microscope, germs, bacteria, and protozoa were all unknown, invisible to the eye of the observer and therefore, by the most rigid possible definition, occult or hidden from view. Before instrumentation improved, when Pasteur was using his microscope to investigate mysterious factors affecting the wine industry in France, the entire field of bacteriology, microbiology, and immunology remained invisible.

There are countless other examples of previously hidden influences that turned out to have effects on health and well-being. Radiation (ionizing radiation) was undetected and invisible until photographic plates were developed, and, later, Geiger-Müller tubes, ion chambers, and scintillometers were perfected.

Until this generation, magnetometers did not exist that would detect microgauss-level signals, which have recently been established to be physiologically significant. Therefore, the presence of many environmental influences such as alterations of mood at the time of the full moon remained in the realm of “occultism.” Schumann resonance frequencies are altered by solar and planetary influences, as ocean tides are affected by lunar position.

Many highly controversial disciplines, such as healing and dowsing, continue to work in the physical universe, in spite of the theories of the “experts.”

History will someday show that human beings, and perhaps all life-forms on the planet, are extremely sensitive bio-cosmic resonators and are physically affected by very subtle energies, including magnetic and electrical fields, which, like bacteria, were originally “occult” and impossible to measure or even detect.

MANY studies have examined in depth the possible health hazards of chemical residues, such as those arising from insecticides, solvents, formaldehydes, ozone, phenols, mercury compounds, lead, asbestos, urethane insulation; and from the production of carbon monoxide. In a number of cases, standards for permissible levels are set by industrial health codes. This brief communication, however, is intended to give an overview of lesser-known factors in the electromagnetic, electrostatic, and acoustical domains that generally remain undetected (and unreported), which have been overlooked by environmental health professionals. Many of these factors are psychoactive.

In addition, very inexpensive detection devices (typically costing from \$50 or less to \$100 to construct) will be suggested, which can easily and reliably detect, trace, and quantitatively measure such psychoactive factors.

Time-Varying Electrostatic Fields

HAMER has proven conclusively that low-frequency E-vector fields (as opposed to B-vector or magnetic fields) in the neighborhood of 3 to 5 Hz can significantly lengthen human and animal reaction times and cause subjective feelings of apprehension, anxiety, and distress.^{1, 2, 3} These fields, artificially generated with very low voltage gradients on the order of 2 V/m, were tested during Hamer's tenure at U.C.L.A.'s Brain Research Institute.

Such fields can be produced in electrostatic-prone environments by movements of dielectric surfaces, corona (brush) discharge from high-voltage power supplies such as are generated in all electrostatic (Xerox-type) office copiers, movement of personnel across nonconductive surfaces such as floors or rugs, and in many other familiar environmental conditions.

In the electronics fabrication industry, electrostatic fields are carefully monitored and controlled to avoid component degradation from exposure to these minute charges, which can cause "punch-through" by arcing in CMOS and FET solid-state devices. Electrostatic field contamination is practically ignored in homes, offices, or automobiles, however, unless it causes mild electrical shocks, such as may be experienced on a dry day after walking across a carpet or removing clothing not treated with an antistatic.

If the resultant fields are of positive electrical sign, the psychophysical effects are compounded, because of the tendency of charged surfaces to strip negative ions from the breathable atmosphere.

Negative-Ion Concentrations

AVAST literature exists on both tested and apocryphal effects of negative- and positive-ion concentrations on human and animal behavior. Ideally, a ratio of 5 parts of negative ions to 4 parts of positive will provide optimal working conditions.

König^{4, 5} has shown the relationships of some neurohormones, such as serotonin, to negative-ion concentrations in the atmosphere. Ciliary activity is enhanced in the presence of negative ions. Briefly, positive ions can produce symptoms of nausea, dizziness, shortness of breath, elevated blood pressure, shortened attention span, irritability, distress, and anxiety in a significant percentage of human subjects. A preponderance of negative ions (excess of free electrons) can have opposite and beneficial effects on perhaps 35% of tested subjects.

Radio-Frequency Fields (Including Pulse-Modulated RF Carriers)

ALTHOUGH U.S. standards permit much higher levels of RF and AF ambient radiation than do Soviet standards, many scientists are coming to the conclusion that nonionizing and nonthermal levels of microwatts per square centimeter can have definite physiological effects. If harmonics, heterodynes, or pulse-repetition rate of modulations occur within the biological windows of from 3 Hz to 30 Hz—i.e., the spectrum of human brain waves—there may be interference with normal biological signal-processing. These effects will be touched upon in greater detail in the section devoted to ELF magnetic fields.

Nonmodulated RF fields have been shown to disrupt biological processes in human beings, animals, birds, and fish, and a vast literature exists on this subject. Pulsed or pulse-modulated carriers can entrain mammalian brain waves. Moreover, the Luxembourg effect demonstrates interactions between local sources of RF and ionospheric polarization,

thus entrainment of all electromagnetic energy in the earth-ionosphere cavity over large geographical areas with very little excitation energy. The effect is demonstrated to be on the order of 100 W.

Devices for detecting and measuring these fields will be described shortly.

Ultrasonic and Infrasonic Acoustical Energy

ULTRASONIC pressure waves, although not perceived as audible “sound,” can cause distress, particularly in women. The source of this commonly present subliminal irritant is usually machinery in which bearings or shafts have become “dry.” A familiar example of a counterpart in the audible range is the baby stroller or the laundry cart; the high-pitched squeal of such machines can carry for hundreds of yards. Multiply this dry-bearing surface noise by hundreds of times in amplitude and several octaves in frequency; you can imagine the effects on human and animal nervous systems. Electrical coronas and pipes carrying fluids and gases under pressure can also produce ultrasonic signals, as can many industrial tools.

Infrasonic (subsonic) frequencies cause corresponding subliminal distress. Crowd-control weapons based on these principles have been tested and are effective in “sickening” subjects. Microseismic vibrations can move magnetic surfaces (such as the walls of steel filing cabinets), which in turn produce measurable and highly psychoactive ELF B-vector pulsations.

Light (Actinic) Energy

MANY studies by Birren⁶ and Ott⁷ tend to suggest that color balance, spectral content, strobing (flicker) rates, UV, and RFI, as well as some unwanted (soft X-ray) radiation from fluorescent lamps can cause psychophysiological reactions.

At specific frequencies, “epileptic flicker-rate” photic stimulation has been demonstrated to drive human occipital evoked potentials into grand mal and petit mal seizures. Some studies suggest aggravation of hyper-activity.

Some of this work has been proven; other portions are still controversial. “Full-spectrum” lamps with enhanced UV are now claimed to be more healthful.

“Telluric” Radiation

The highly speculative subject of telluric radiation is derived from the traditional medical experience that certain areas are “toxic” because of subtle emanations from clay subsoils, underground running water, noxious “ley lines” or standing waves of “telluric” or earth-current emissions.

In China, sites are carefully evaluated by highly respected medicine men called fung-shui doctors. In the Americas, Indian shamans sense livable sites. The Polynesian kahunas map these areas with their ancient rituals. Harvalik⁸ has demonstrated human sensitivity to extremely weak magnetic gradients, presumably from underground streams and/or ore deposits. In all civilizations, such considerations have been evoked for selection of temples, grave sites, and optimal habitations. It has been noted that animals and insects tend to avoid areas sensed as “unfriendly” by shamans.

This practice is highly speculative, as I have indicated, and before the advent of highly sensitive magnetometers (flux-gate and SQUID and NNR devices) it appeared to border on dowsing apocrypha. More recent research (since World War II) tends to confirm a positive correlation of time-varying magnetic fields (Schumann resonances) and local “standing waves” in such locales modified by ground conductivity,

mineral content, and other factors. Direct health effects lack suitable rationale, but are under continuing investigation.

Ionizing Radiation

H

ARD and soft radiation (beta, gamma, alpha, X-ray) and their long- and short-term effects are extensively covered in the literature and will not be reiterated here. Detection involves the use of Geiger counters, ion chambers, dosimeters, spinthariscopes, scintillation detectors, etc.

Ott⁷ has claimed that soft X-radiation (as from home television sets, fluorescent light fixtures, high-voltage vacuum tubes) will produce hyperactivity in children. Until extensively replicated, such contentions must be held to be speculative.

Solid Particulate Matter in the Atmosphere

E

EFFECTS of microscopic spores and pollens have been well documented. Allergic reactions in persons sensitized to such irritants (histamines) are established medically, and there is accepted treatment for hay fever, asthma, and other conditions.

Cat danders, pollens, spores, and certain chemical dusts can trigger gross reactions. Typically, these particles are in the micron-size range and are not removed by conventional mechanical filters. Electrostatic filters (“Precipitron”-type devices, which put an electrostatic charge of kilovolts on incoming air and floating particulate matter, which is then directed through electrostatically charged parallel metallic plates where the particles will accumulate and “stick” by opposite-sign attraction to the walls of the accumulators) and free-ion generators have been demonstrated to be a viable approach to controlling these microscopic irritants and triggers.

Negative-ion generators have been shown to “clear” the air in surrounding areas (up to a 5 ft diameter for a 14 kV emitter) by the simple law of physics that like charges repel one another and are attracted to opposite charges.

The common advertising claim that an ionizer “cleans” the surrounding air is false. The actual physical mechanism involved is that the flood of free electrons emitted by the ion generator tends to collect on any solid particle in the near field. Micron-sized surfaces floating in the air collect an abundance of electrons and become highly electrostatically charged. Since the ionizer supplies charges of only one polarity, usually negative, all populations of particles (dust, smoke, pollens, spores, etc.) will have like signs and will therefore repel one another, while they are attracted to any surface carrying an opposite or neutral polarity—which, by definition, is any wall, ceiling, or tabletop in the vicinity. These highly electrostatically charged particles are attracted to and “stick” to any nearby surface, and this leaves the air with a vastly depleted population of solid contaminants. Nearby surfaces become blackened quite rapidly.

The useful range of a well-designed ionizer is about 3 ft, depending on humidity, metallic surfaces in the vicinity, dielectric surfaces nearby (which, collect charge and then neutralize corona emission of the device), and other factors.

Disadvantages include: the possibility of electrostatic damage to calculators, watches, CMOS devices, etc.; the buildup of potentials on conductive devices and tools, which will give a mild shock if touched; and possible RF interference.

Man-Made Toxic Smoke

P

ERHAPS the single most irritating environmental contaminant, at least to nonaddicts, is cigarette smoke. Toxic effects of “side-smoke” and carbon monoxide have been extensively reported. Damage to optical surfaces and electrical (switch) contacts from monomolecular coatings of tars are well documented.

The problem here is that nicotine is established as the most highly addictive substance known to man, about 4 to 4 1/2 times more physically addictive than heroin and more addictive than opium, morphine, etc. Studies revealing this information have been effectively suppressed by tobacco interests and political lobbies because of the tremendous tax revenues and the criminal interests involved in vending and distribution of the substance.

When Proposition 5 appeared on the California ballot in 1980, to establish nonsmoking sections in public restaurants, the tobacco industry raised a war chest of over \$5,000,000 to defeat the measure.

Although Los Angeles City Ordinance 707 places a fine of \$500 on persons found smoking in movie theaters, the author has never attended a theater where at least a dozen people in the auditorium were not smoking. The simple fact is that addicts simply cannot endure a coast-to-coast plane flight, or an hour-and-a-half movie, or even a meal in a restaurant without at some point craving a “fix.”

Groups developing an injectable or ingestible substitute for smokable nicotine have been roundly suppressed by interests attempting to preserve the myth that people smoke “by choice” and for “enjoyment.” An injectable drug would enable addicts to tolerate a coast-to-coast plane flight, a meal out, or a trip to the theater without having to contaminate the air space of nonaddicts.

Meanwhile, this contaminant can be handled by electrostatic precipitation, charcoal air filters, or at short range by ion-izers. Very compact battery-operated devices could be offered to nonaddicts whose health and concentration are physical-ly threatened by the proximity of the unfortunate compulsive users.

Extreme-Low-Frequency Magnetic Fields

A

VERY recent discovery (mid-1960s) is that time-varying magnetic fields of extreme low frequency (in the range of 3 to 30 Hz) and very low amplitude (@ 10 to 100 μ G), if appearing within a specific window* range, can disrupt psychophysiological functions by interacting with the normal neuronal circadian rhythms.

Indications of hemispheric EEC desynchronization and other symptomatology have been reported by Wever,⁹ König,⁴ Adey,¹⁰ Hamer,¹ Persinger,¹¹ and many others.

In brief, the effects of photic stimulation at the epileptic flicker rate in bringing about grand mal seizures have been well known since the 1930s.

The heart rhythm entrainment provided by small electrical signals from cardiac pacemakers are also well known.

Recently, studies by Persinger,¹² Wortz et al.,¹³ and others have postulated mechanisms by which neuronal entrainment to extremely weak fields can be justified. Consequently, magnetic pulsations are becoming accepted as psycho-active.

Empirical evidence establishes that extreme discomfort can be produced in significant numbers of human subjects with fields in the frequency range of 3 to 6.67 Hz, and that episodes of distress can be triggered by certain other “window” vectors, at the almost unmeasurable microgauss amplitude levels. These fields are easily produced by rotating machinery, moving equipment made of iron or steel (such as fans and blowers that have not been degaussed and thus contain residual mag-

*A product of frequency, intensity, and polarization.

netism because of their presence in the earth's ambient 0.4 G field). They are even produced by microseismic vibrations of steel surfaces such as office furniture or cabinets.

Dangerous conditions can accrue when several pieces of rotating machinery heterodyne to produce beat frequencies falling within windows determined to be psychoactive; and the fact that they are rotating means that polarization will be circular.

The author has determined by extensive field research since the early 1970s that these magnetic fields may be the predominant cause of mysterious "malaise" experienced in otherwise impeccable environments.

Highly Esoteric Factors

RECENTLY, a renewed interest in "psychotronic" technology has surfaced. This subject is highly controversial, except to medical practitioners, who deal with it professionally. Psychotronics more or less fell into disfavor in the early 1960s. Physicians and chiropractors were arrested, and equipment confiscated and destroyed. Raids were condoned by local district attorneys and the FDA. The mid-1970s saw a tremendous resurgence of interest, and the U.S. Psychotronics Association emerged from underground networks.

Many cultures with historical roots and expertise dating back thousands of years believe from practical experience that no dwelling should be occupied before a formal energy-exorcism has been performed by a shaman specialist. Certain religions today still have such specialists in the blessing of houses or performing exorcisms. Tests in the mid-1960s in Great Britain seemed to prove that anxiety, hypertension, and hormone levels could definitely be affected by randomly timed psychic (prayer) "hits" or "blessings" from a distance, performed by radionics or radiesthesia operators working under double-blind conditions.

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PARANORMAL FILM FORMS AND PALEOLITHIC ROCK ENGRAVINGS

Jule Eisenbud, M.D.

A RELATIVELY common effect produced spontaneously on film by persons of known or presumptive paranormal abilities consists of seemingly random curved lines of varying thicknesses, both continuous and discontinuous. These either appear on uniformly dark or black backgrounds or are superimposed on normally imaged persons and scenes, and have been observed—and reported—to occur under optical conditions that could not normally give rise to such effects.

Although there is considerable variation in the shape and density of these effects, they show many features in common. Fig. 1 shows six such “doodles,” or “squiggles,” obtained outdoors on a dark night by the psychic photographer Ted Serios,¹ with no light source in the vicinity

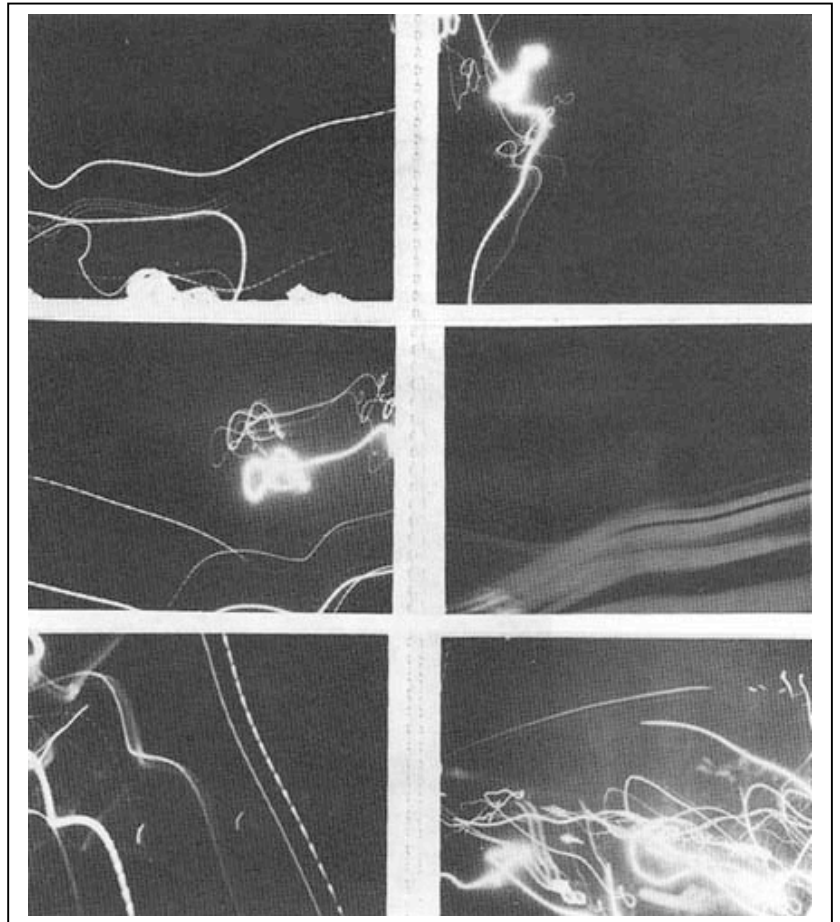


Fig. 1. Examples of Ted Serios’ “squiggles.”

Fig. 2.



Fig. 3.

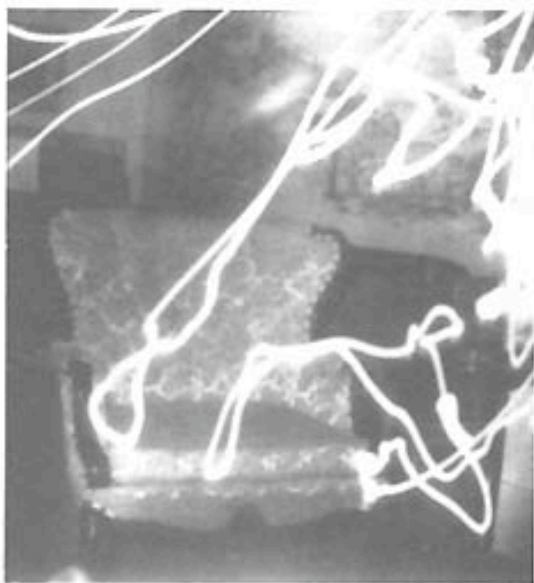


Fig. 4.

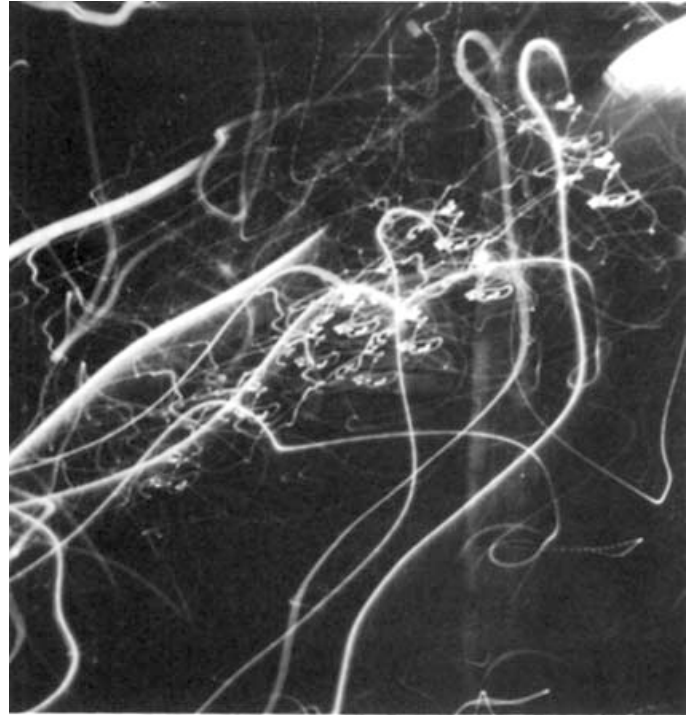


Fig. 5

that could account for them. They were among dozens of similar effects on film observed in 1978 by a Chicago journalist who was working with Ted under my supervision. Similar effects produced by Ted were observed by me under conditions that excluded normal optical mechanisms. Fig. 2 shows a squiggly Christmas greeting from a professional psychic who showed definite indications of presumptively paranormal effects on film when I investigated her some years ago. Fig. 3 shows one of numerous spontaneous effects obtained by another psychic whose unusual photographic images I investigated, and Fig. 4 shows one of many such effects obtained by the extensively investigated psychic Alex Tanous. Fig. 5 shows one of a number of dense squiggles obtained by a paranormally gifted individual investigated by an acquaintance and correspondent. Altogether I have collected several score of examples of roughly similar effects from more than two dozen persons with whom I have either worked in person or corresponded with by mail or over the telephone. (One of my correspondents resides in New Zealand; another, in Japan.) Other examples may be found in books or articles dealing with psychic photography.^{2, 3}

MORE or less similar effects have been produced by persons who have reported some type of visual UFO experience. A number of these, investigated by Dr. B. E. Schwarz,⁴ who referred them to me, have also reported frequent psychic experiences of one sort or another. Fig. 6 shows a paranormal film effect produced by Schwarz's subjects who is legally blind. Fig. 7 shows one of many doodles sent me by a Canadian correspondent and telephone communicator who, over a period of years, has reported them turning up on single frames of Super-8 movie film when she is trying to shoot UFOs. As in this example, her anomalous pictures frequently show sprocket holes over empty frames on either side of the frame showing the squiggles.

Such variation as there is in the effects shown in Figs. 1 through 7 (and in numerous film doodles) can commonly be seen in different examples provided by the same person. They do not appear to depend on the type of cameras and film or the light conditions under which they

were reportedly obtained. Some, as in Figs. 2, 3, and 4, are superimposed over otherwise ordinary snapshots; but in others, the indoor or outdoor scenes that should normally have appeared have been blotted out, as in Figs. 1, 5, 6, and 7.

No hypothesis has presented itself as to the physical, psychological, or parapsychological significance of these phenomena. More or less similar effects can normally be produced by light manipulation or by physical and electronic means, but there is no indication that the persons who independently report such effects—not those who have been observed producing them, at any rate—obtain them by such means.

C

ERTAIN no less enigmatic phenomena bearing a marked configurational resemblance to such photographic effects are the numbers

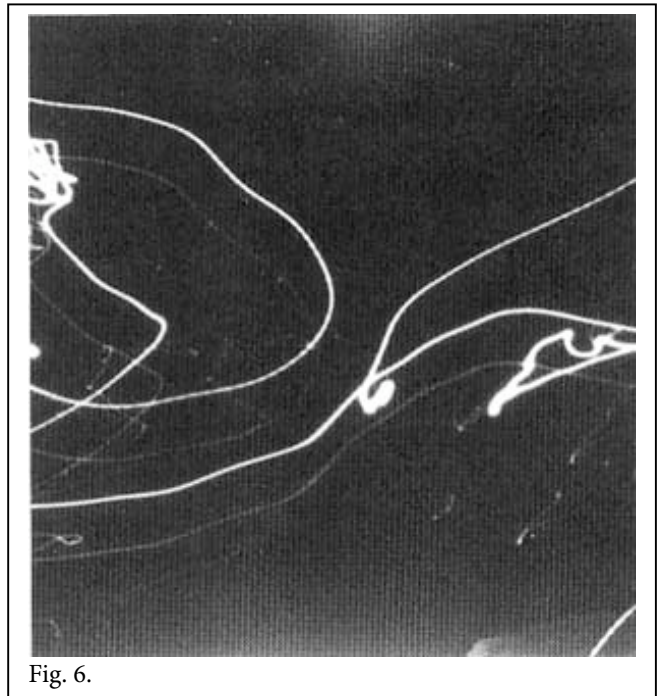


Fig. 6.



Fig. 7. Photograph copyright © 1979, Richmond, B.C., Canada.



Fig. 8. Les Trois Frères. In Breuil, 1952.

of prehistoric rock engravings that look, like nothing so much as random doodles. As shown in Fig. 8, these meanders, as they are called, are often superimposed on the animal forms that abound in the prehistoric caves of Europe. Occasionally the animals are engraved over the meanders. Varying in size from inches to yards, these striated engravings are usually found on cave walls (sometimes in wraparound fashion), limestone slates, nonutilitarian stones, and bone fragments, in most of the 200 or so Ice Age sites that have been investigated in Western Europe and Russia. They are almost invariably found in association with tool assemblages. At times the markings appear to be finger paintings in red or yellow ochre on what must have been soft clay surfaces (Fig. 9). Henri Breuil, the French archaeologist who first described these markings early in this century, named them, appropriately enough, “macaroni,” a term used interchangeably with “meanders.” Not uncommonly, the engravings in stone or the markings in clay were used to outline parts of animals, as can be seen in Fig. 10. Except for this feature, there is little if anything in the markings to which striking correspondences cannot be found with the photographic doodles, and vice versa.

Similar though somewhat less complex markings have been found in several Australian cave sites dated at about 30,000 to 20,000 B.C.^{6, 7, 8} These too are found in association with prehistoric tool assemblages, but they are not superimposed upon animal engravings.

Although many of the engravings have been found at sites used by Cromagnon Man (*Homo sapiens sapiens*) from about 30,000 to 10,000 B.C., there is evidence that they may go back well into the Neanderthal period and even farther. They continued to appear long after, the Ice Age animals had disappeared from Europe and even as late as the Bronze and Iron Ages.



Fig. 9. Peche-Merle. In Breuil, 1952

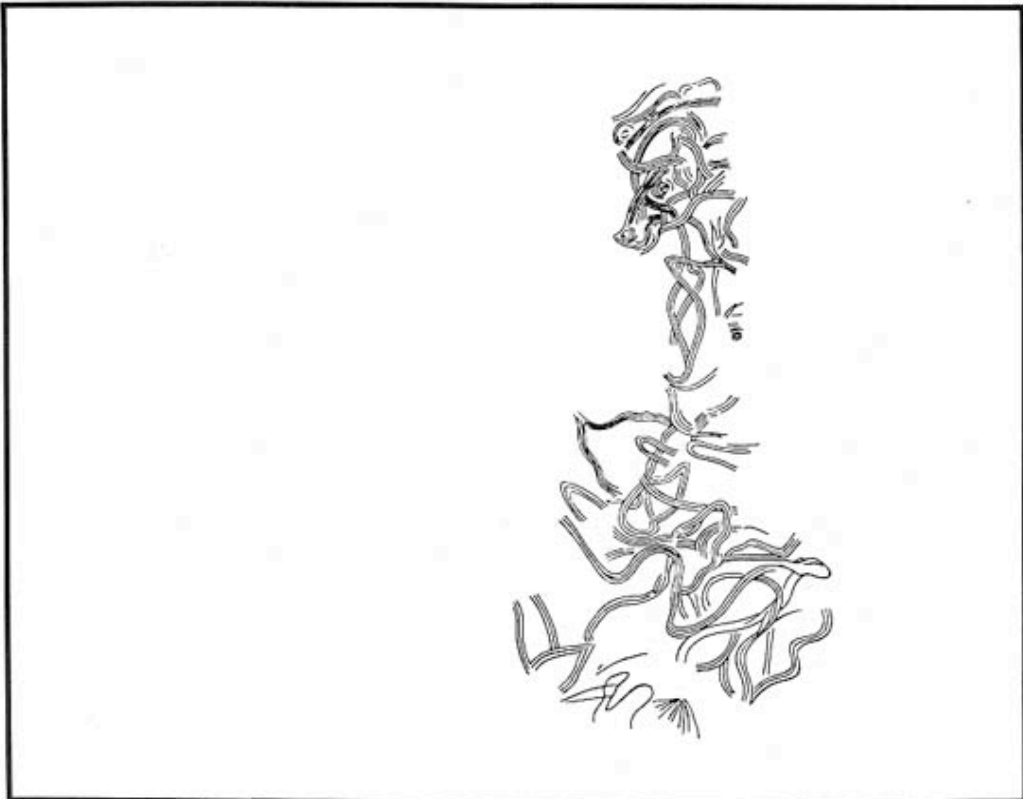


Fig. 10. Altamira. In Breuil, 1952.

Only recently have meanders been given anything more than cursory attention by archaeologists, who have tended to concentrate on the more striking animal art forms found on cave walls. For this reason, perhaps, no hypothesis about the origin and significance of the markings can claim even a handful of adherents. Up to quite recently, in fact, the situation could best be characterized by the assertion of one investigator that “interpretation has barely proceeded beyond regarding [the meanders] as the first ‘doodles’.”⁹ The most widely publicized hypothesis is that of Marshack, who has attempted systematically to decipher the “cognitive, conceptual and symbolic strategies” behind the markings. Hypothesizing that the meanders, far from being random, were formed as a series of intentional sequences from which composite images were built up segment by segment, he feels that they represent the accumulation over millennia of repeated acts of “participatory ritual” having to do in some fashion with water.^{10, 11} He does not attempt to deal in depth with the problem of the widespread distribution of the markings, or of why they so frequently appear superimposed over animals (and vice versa).

Few archaeologists find Marshack’s concepts, evidence, and reasoning persuasive.¹² Since no other hypotheses (such as they are) find particular favor among archaeologists, I feel emboldened to offer several suggested by the photographic data presented here. The first hypothesis is that something like the forms obtained on film surfaces today by psychically sensitive persons were commonly experienced in consciousness by prehistoric man. The second is that, like the sensitives who refer to their doodles and squiggles as “energy forms,” “power bars,” and the like, prehistoric man—or perhaps chiefly his shamans—associated these forms with the source of his belief in his power to affect objects, persons, and events in the outer world mentally, with his magic (at least as we would see it). A third hypothesis is that prehistoric man, by placing these meanders near or superimposed over the animals upon which he depended for his sustenance (and which may have been scarce or hard to capture), symbolically demonstrated his power over them. Inscribing these meanders over and over again could indeed have been part of a participatory ritual aimed at magically giving a message to the animals. “You might as well submit quietly,” the meander would suggest. “Resistance is useless in the face of such power as we demonstrate. Fig. 11 shows a 3.5-inch-wide rock on which the meanders are

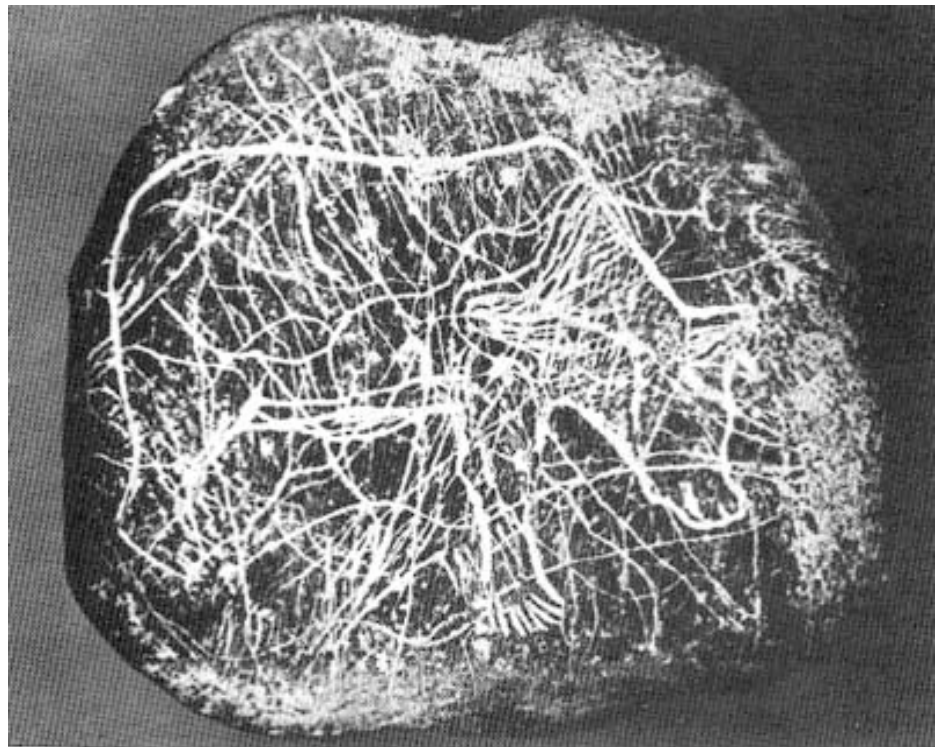


Fig. 11. Courtesy Musée de l’Homme, Paris. In Leroi-Gourhan, 1967.

superimposed on the engraving of a bear. The rock is thought to have been used as a bola for hunting the creature.¹³

These hypotheses are not inconsistent with those of Marshack. They merely complement the latter, insofar as these have validity, within a psychodynamic framework. Similarly, they provide this kind of framework for such things as the superimposition of meanders over the engraving of a woman (dimly seen at the lower right in Fig. 9), the reason for which may not need a depth psychologist to appreciate. These hypotheses are also consistent with one emphasizing the ritualistic significance of the act of touching by which meanders were scribed on the soft clay wall surfaces of certain mana-imbued caves.⁶ (For related archaeological ramifications of the act of touching, see Eisenbud.^{14, 15})

IT NEED hardly be pointed out, however, that it would take a superior type of magic to make two unknowns into a known by this kind of seemingly idle speculation. And I certainly do not wish to fall victim to the fallacy (so well exemplified in the works of certain popularizers of archaeological curiosa) of supposing that morphological resemblances in themselves necessarily indicate similarities of origin and function, particularly when the forms that resemble one another are found on two utterly different kinds of surfaces and materials.

But such resemblances do not necessarily constitute a trap to be avoided at all costs, especially when hypotheses about the origin and function of the meanders are in such short supply, and when few if any details of their basic morphology, including the thick bar-like lines and the broken, or dotted, lines, cannot be matched by examples from the photographic data, and vice versa. In addition, meanders are found in such widely separated places as Europe and Australia, a fact more easily accounted for by the numinous or archetypal nature of the forms in question than simply by cognitive trends or cultural diffusion.

The big question, in any event, is whether there is any reason for supposing that prehistoric man actually did experience anything like the film doodles in some form. It is noteworthy that some persons who produce paranormal film doodles quite independently report visual experiences that seem related to their film forms. Alex Tanous, the Maine psychic, who has obtained a variety of macaroni-like effects on film (Fig. 4), writes: "I see lines in my eyes, yet outside. ... It is a movement in my eyes and this light is sent out ... thin lines unexplainable wiggles. ... At the same time there is a burst of energy in my mind." (Tanous' ellipses.) My Canadian correspondent (Fig. 7) describes what she experiences visually as "lines like spaghetti," and as "like snakes wiggling, feet long. ... I can reach out and touch them." The woman who obtained the picture shown in Fig. 3, who claims to have had major psychic experiences from childhood on and who has produced a variety of presumptively paranormal film images in addition to macaroni-like effects, writes that she sees "clear worms swimming across my field of vision," and that she seems to see these externally. She adds that, with few exceptions, "the lights [she has] seen have been roughly what [she has] photographed." A Massachusetts woman who produces film macaroni by the bushel described to me over the phone what she sees as "squiggles," lines moving "like snakes," or "like spaghetti, but always in motion."

I have come across one person who sees forms externally that are somewhat similar to a common form of the prehistoric macaroni but has never, to his knowledge, obtained anything of the sort on film. He is a young man who has been diagnosed as borderline psychotic and epileptic, mainly because he keeps confounding his doctors with his "squiggles," as he terms them, which are constantly in his awareness as bright, sometimes flashing lines of from inches to a foot or more in length and are always experienced externally in space. (They frequently go out from him to other persons toward whom he has hostile feelings.) He also reports frequent precognitive experiences (which, according to not a few psychiatrists, are *ipso facto* consistent with a diagnosis of borderline psychosis.) It should be noted that the

familiar scintillating lights known as phosphenes (geometrical forms that can be produced by pressure on the eyeballs and by other normal means, including sensory deprivation in dark places) are not experienced as external.¹⁶

It should be borne in mind that there may be a relationship between the visually experienced wriggling forms, the often serpentine prehistoric macaroni, and the snake cults that from ancient times to the present have been associated with sacred and healing rituals. That a fearsome mythological snake is said to guard the entrance to one of the Australian meander cave sites is not necessarily an embarrassment to this conjecture, since the holy and the terrible have frequently been associated from earliest times.

NOTES

1. Eisenbud, J., The World of Ted Serios (New York: William Morrow, 1967).
2. Rickard, R., and R. Kelly, Photographs of the Unknown (London: Book Club Associates, 1980), pp. 78–79.
3. Warrick, F. W., Experiments in Psychics (New York: E. P. Dutton, 1939).
4. Schwarz, B. E., UFO Dynamics (Moore Haven, Fla.: Rainbow Books, 1983), p. 479.
5. Breuil, H., Four Hundred Centuries of Cave Art (Montignac: Centre d'Etudes de Documentation Préhistoriques, 1952).
6. Gallus, A., "Schematization and symboling," in Ucko, P. J., ed., Form in Indigenous Art (Canberra: Australian Institute of Aboriginal Studies, 1977), pp. 368–386.
7. Sharpe, C. E., and K. J. Sharpe, "A preliminary survey of engraved boulders in the Art Sanctuary of Koonalda Cave," Man-kind 10, 3 (1976): 125–130.
8. Walsh, W. P., "Unexplained markings in Kintore and Cutta Cutta Caves, Northern Territory, Australia," Helictite 2,3 (1964): 83–91.
9. Gamble, C. S., "Information exchange in the Palaeolithic," Nature 283 (Feb. 7, 1980): 522–523.
10. Marshack, A., "The meander as a system: The analysis and recognition of iconographic units in Upper Paleolithic compositions," in Ucko, P. J., ed., Form in Indigenous Art (Canberra: Australian Institute of Aboriginal Studies, 1977), pp. 286–317.
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12. See pp. 295–303 in Marshack, 1979.
13. Leroi-Gourhan, A., The Art of Prehistoric Man in Western Europe (London: Thames and Hudson, 1967).

14. Eisenbud, J., "A recently found carving as a breast symbol," *American Anthropologist* 66, 1 (1964): 141–147.
15. ———, "The hand and the breast with special reference to obsessional neurosis," *Psychoanalytic Quarterly* 34 (1965): 219–248.
16. Oster, C., "Phosphenes," *Scientific American* 222 (February 1970): 82–87.

ADDENDUM

Dennis Stillings

The core of writing ... is contained in the spontaneity
of the doodle.
—John W. Cataldo

WHEN I first read Jule Eisenbud's manuscript on meanders some months ago, I became very excited. Several examples of the meander in art occurred to me immediately, in particular Di Biase's *Good Friday Service* (Fig. 3) and several works by Jackson Pollock¹ (Fig. 1; compare Fig. 2). I was also reminded of the sweeping and meandering flamelike effects of "psychic fire" obtained by photographer Gloria Rudolph in *Voudoun Fire*² and also reported by George Meek.³ These visual representations are all very similar in character to the meanders produced by Ted Serios, and they support the idea that people intuitively and psychically perceive a common, underlying pattern and represent it in typical ways.

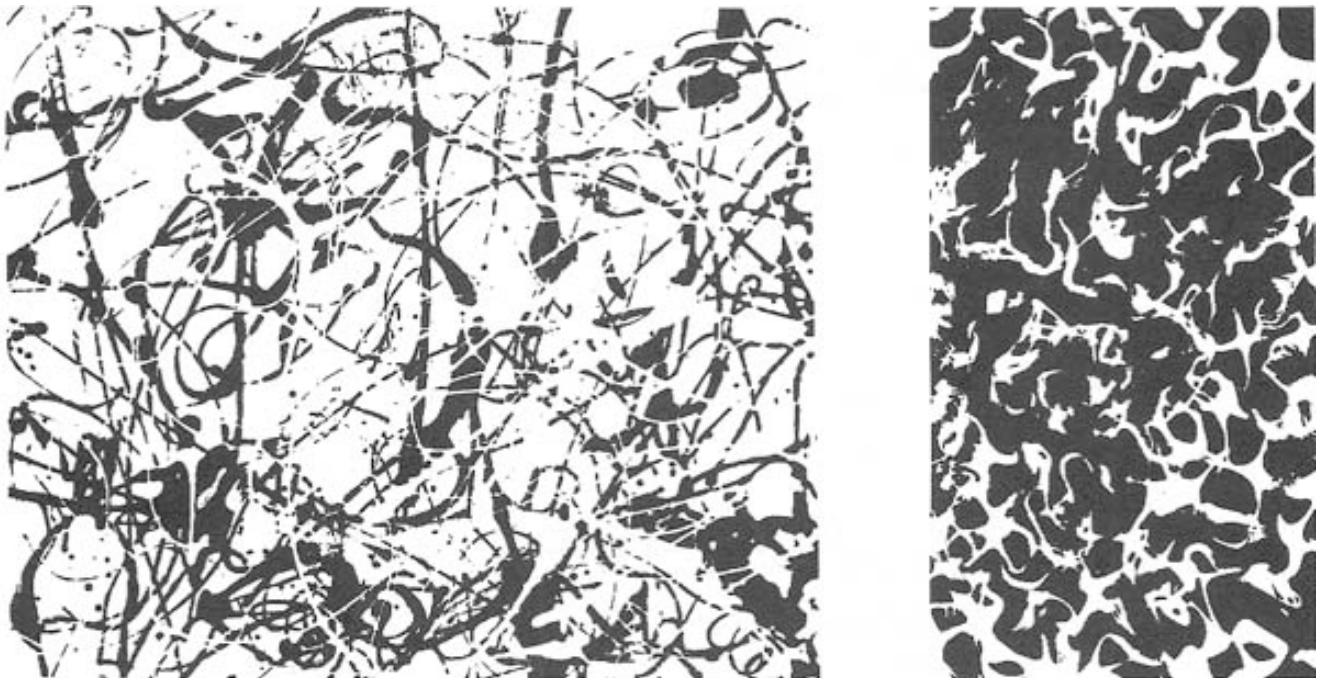


Fig. 1 (left) shows Jackson Pollock's *No. 23*. Compare Fig. 2 (right): vibration pattern made by sound waves in glycerine (microphotograph).

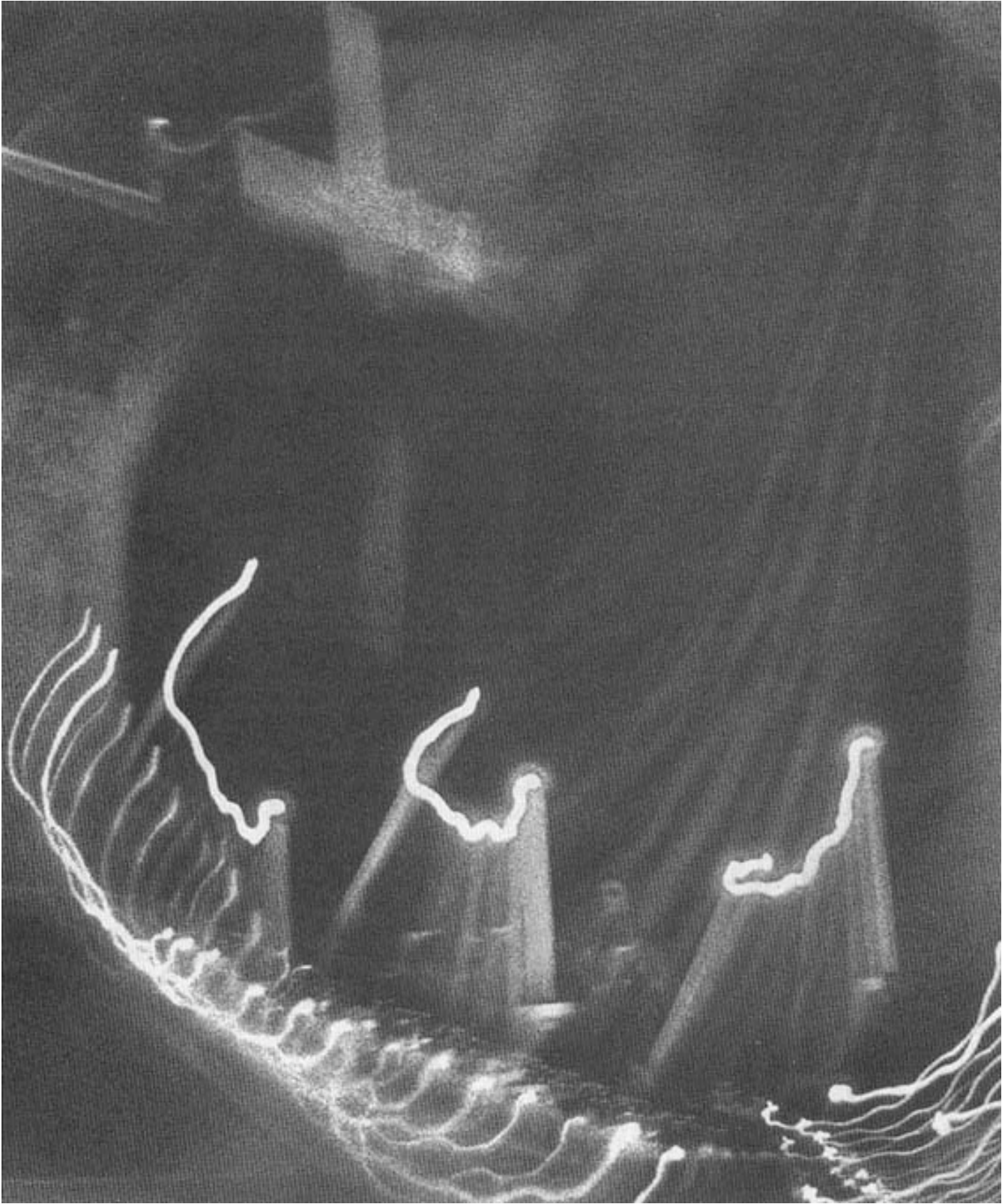


Fig. 3. Michael Di Biase, Good Friday Service (1963). Time-exposure photograph.

These forms seem to appear both by way of direct psychic effects and also by intuitive perception. This intuitive perception of the meander, as Eisenbud states, was, in all probability, as accessible to the conscious mind of prehistoric man as it is now to certain artists and gifted psychics. The difference is, of course, that primitive man probably did not regard these forms as primarily artistic or psychic in nature. They were part of his direct, uncategorized experience.

EISENBUD'S speculation that the meander was used magically to exert power over the associated animal makes perfect sense. It also seems to me that there may be a connection between such magical "power-doodles" and the origins of writing. Perhaps such "power-doodles," nonspecific at first, gradually took on specific forms for each animal and later replaced the object entirely, becoming a magical sign standing for and controlling the thing itself—a pictograph. Certainly the written and spoken word has traditionally been given high magical properties. One finds such an attitude explicitly in ancient China. Of course, the magic quality of words persists even today, and very often, particularly in science, one believes that the essence of a thing has been captured once a word (preferably a multisyllabic Greek or Latin word) has been assigned to it. The word then takes on an energetic life of its own, controlling our perception and thoughts with regard to the named phenomenon. Cataldo is aware of the archetypal and imaginal sources of writing:

The characters of our alphabet were derived from primitive realities and conceptualized into visual equivalents. Forms of notation, image and symbol-making were in use over 135,000 years ago in ritual and ceremonial acts. ...

Images preceded words by centuries and that same energy and sensory vitality that is reflected in root images ... still inherits the twenty-six phonetic signals of our western alphabet. For the first images were painted and sung, and those visual and oral impulses provided a common basis for the development of languages. Every tribe, every culture derived its preferred images from a common root source of natural phenomena and cosmic experiences. The force and impact of language forms is derived from this first sensory and sensuous transaction between people, universal phenomena and the urgent need for human beings to communicate with each other.

Cataldo goes on to note that

many students [of calligraphy], when developing graphic forms for their thoughts, design pictographs. They "draw" a picture of the idea while using the literary text as the shaping medium. Curiously, young children, without cues or instruction, also exercise their expressive needs through

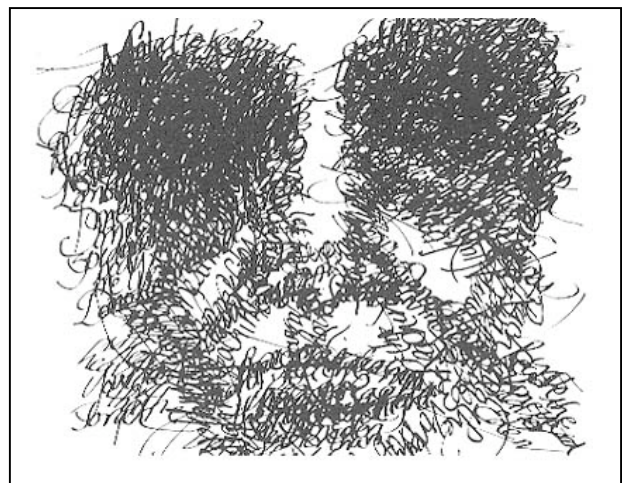
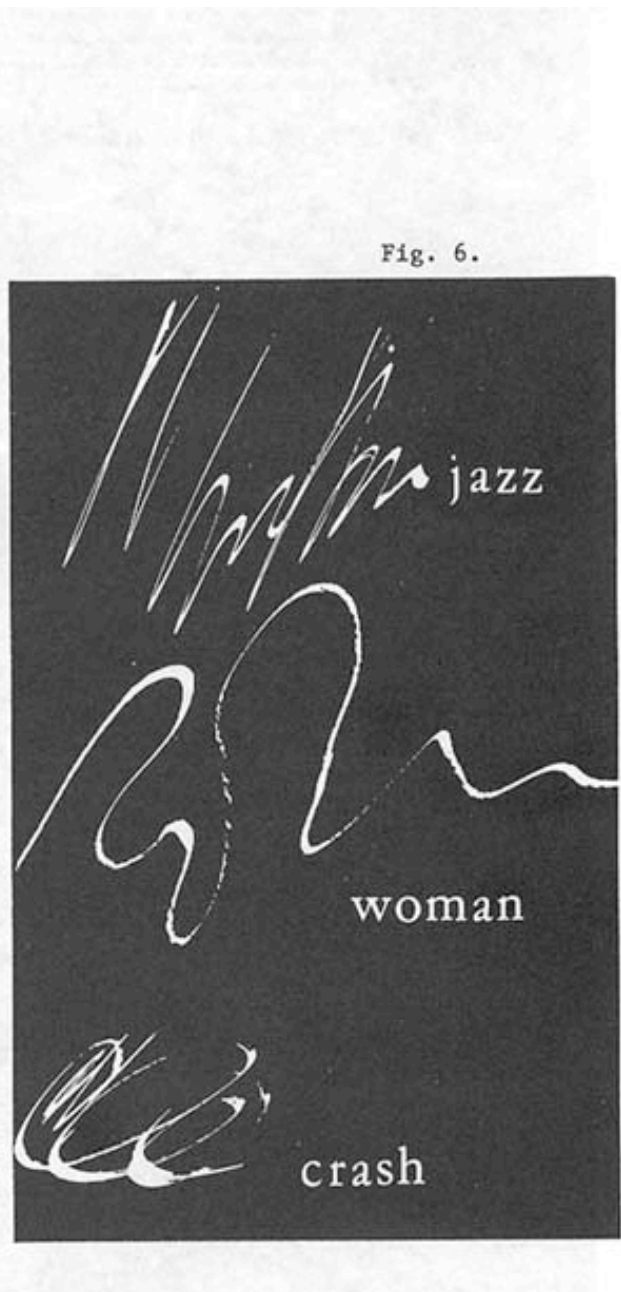


Fig. 4. Detail of Sheila Mann, pictograph based on the "Journal of Leonard Cohen's Father."

pictographs. The phenomenon is unconscious and apparently universal and one in which the abstract symbols (i.e., languages) of all cultures are returned to their first source of image formation and storing.⁵

This tendency is also found in the exercise of trying to make a word “be” the phenomenon it stands for, as in Fig. 5.

Fig. 6 shows the exercise as expressed in more abstract forms.



To return to our original discussion, the primitive meander may well have been a form of protowriting. Such forms have certainly persisted throughout the history of traditional and modern calligraphy and calligraphic exercises, as shown in Figs. 7 through 10.



Fig. 7. A page from Edward Cocker's book (1657).

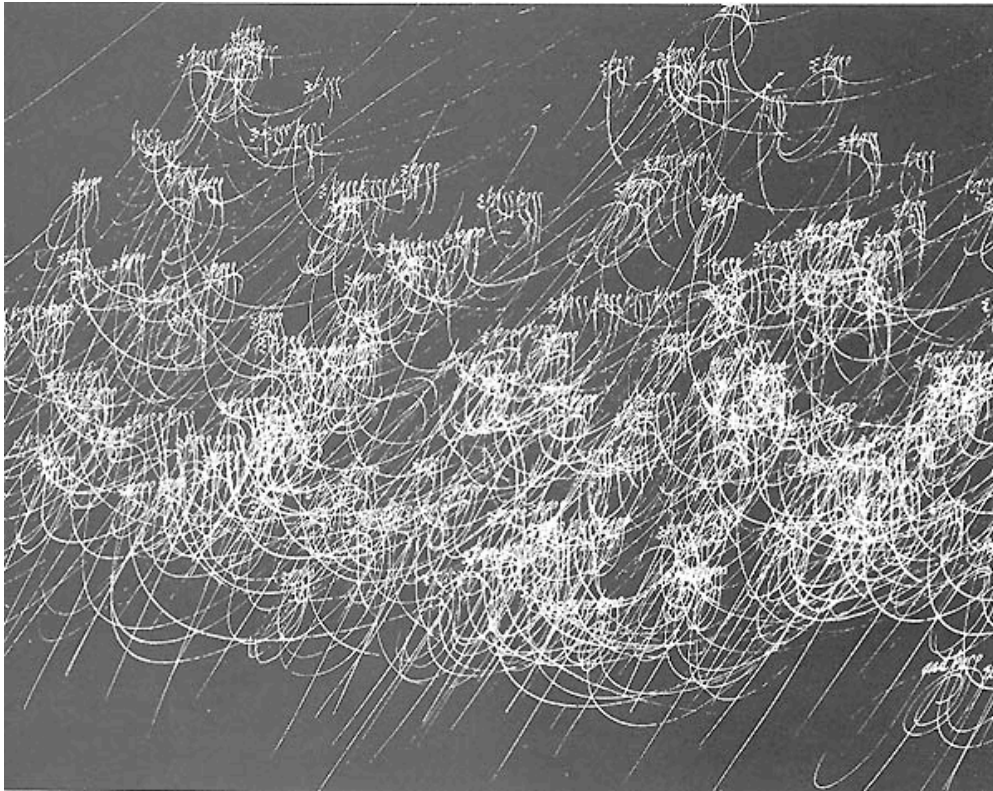
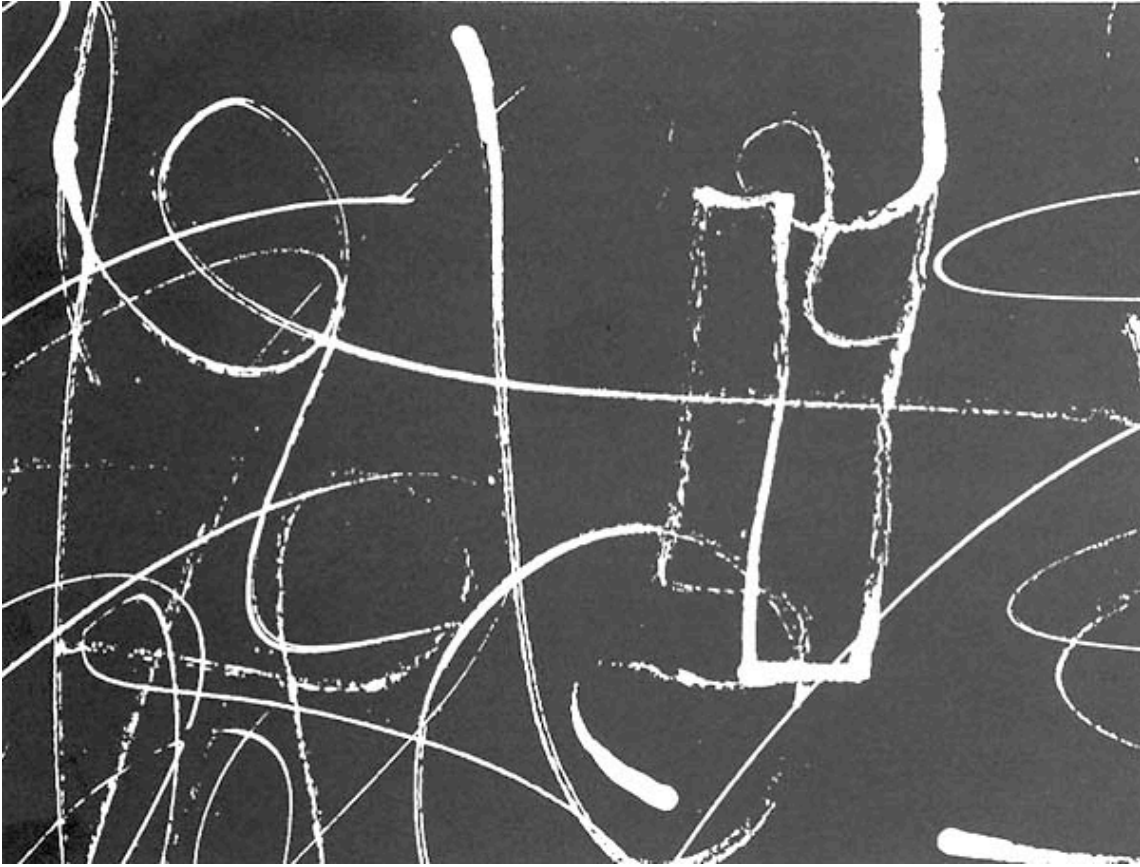


Fig. 8. Gail Kass, Name Event.



Figs. 9 and 10. Spontaneous pen exercises.



THE highly energetic, sometimes firelike quality of these examples of calligraphy bring to mind the oriental concept of *chi*,⁶ the image of the Logos as fire,⁷ and the Pentecostal fires that confer the gift of tongues.⁸ The Word, and words, both spoken and written, seem to crystallize out of a cosmic background of sacred fire, emerging as a formal result of the interaction of consciousness with the underlying energy matrix.

This primordial energy, not always trapped in language, reveals its meandering fire mediumistically through human agents, at times in normal ways, by sharp stick on clay cave wall, or as modern opportunity grants, on the light-sensitive chemistry of film.

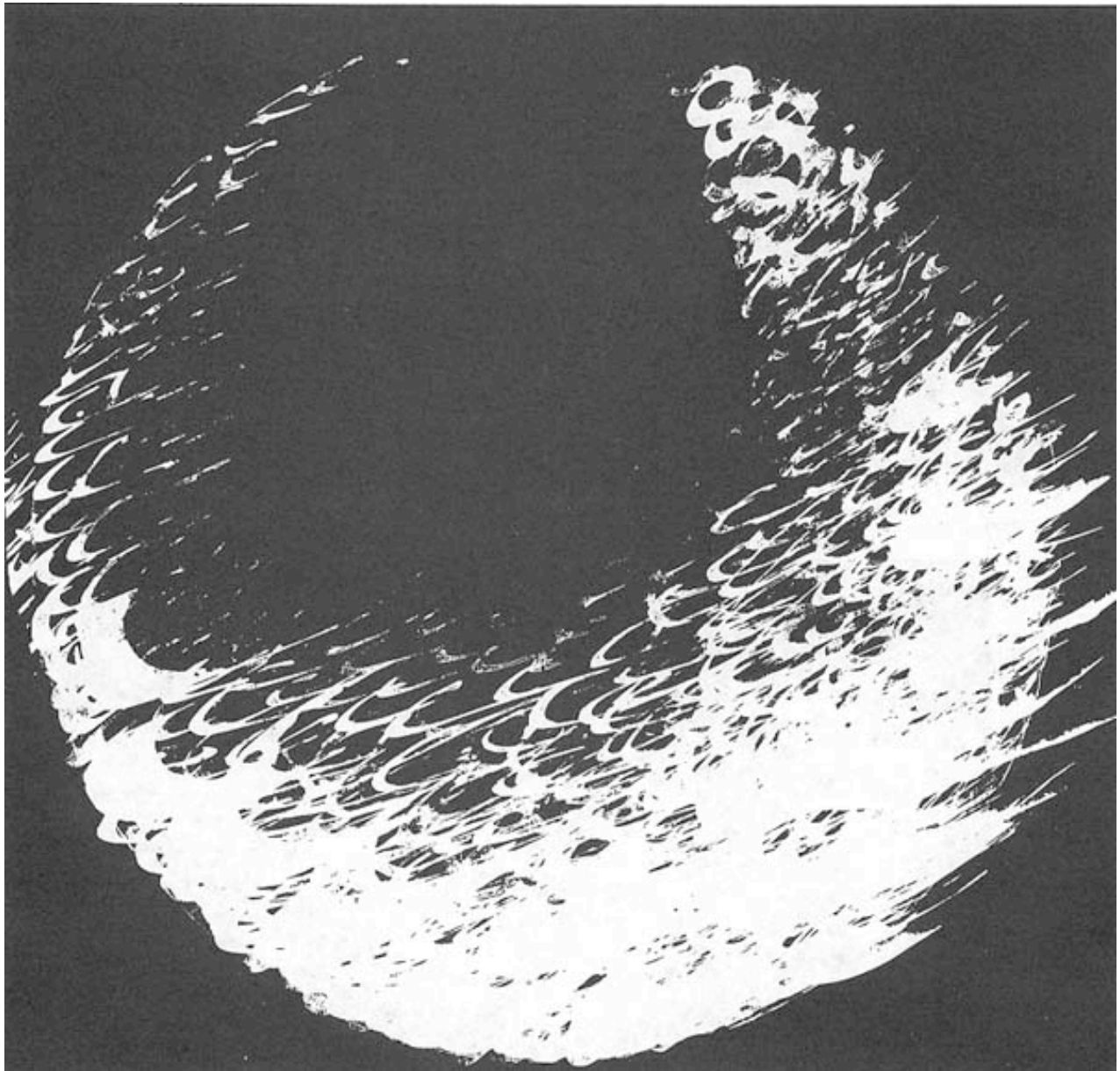


Fig. 11. Martin Grealish, The Moon Comes Up.

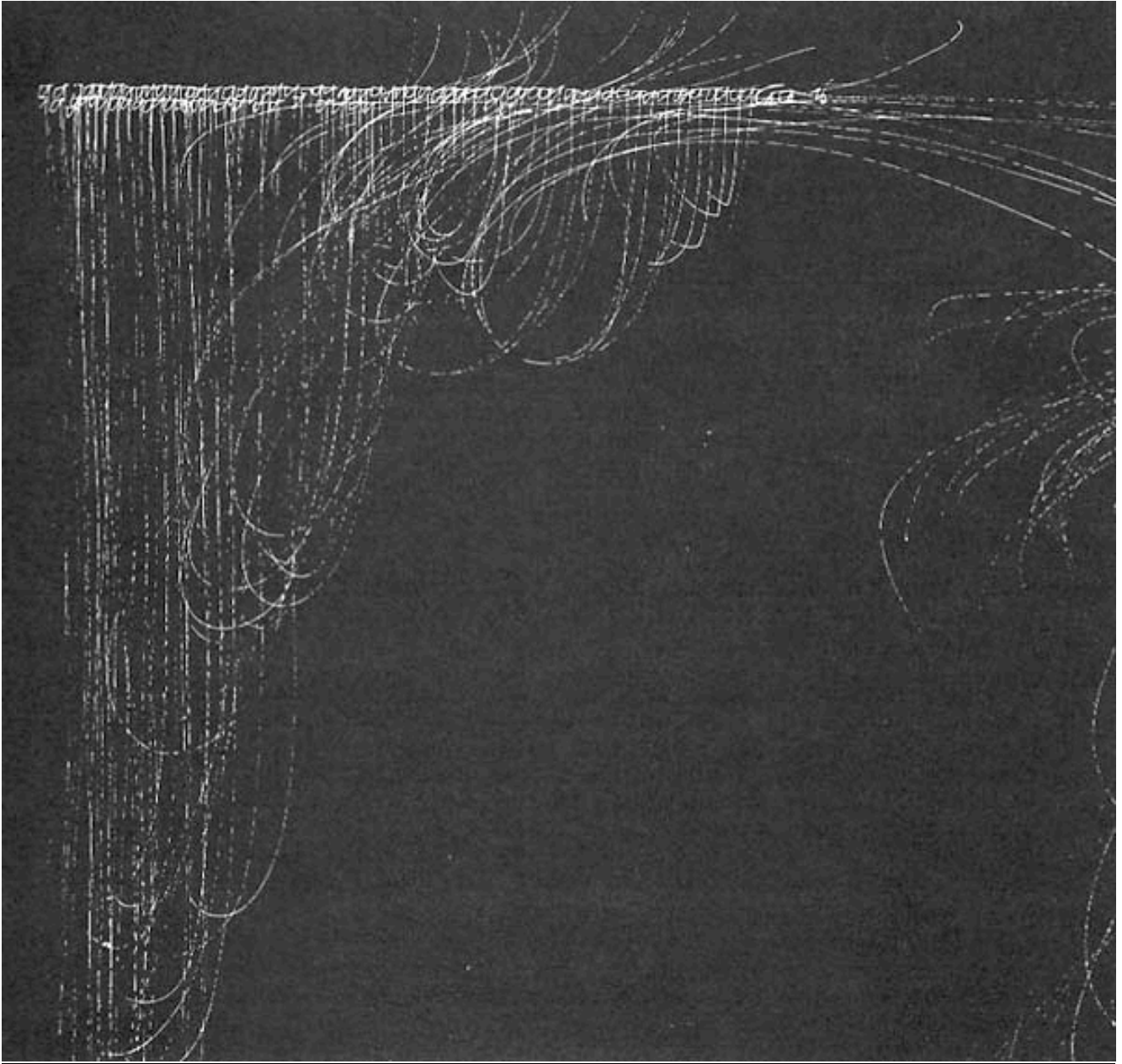


Fig. 12. Isabella Cummings, The Waterfall Exercise.

I believe that the process of thought projection might be carried on independent and apart from spoken or written language. I do not in the least doubt if language had been denied or withheld from man, thought would have been a process more simple, more easy, and more perfect than at present.

—Samuel Taylor Coleridge

NOTES

1. In his book My Painting, Jackson Pollock revealed that he painted in a kind of trance.
2. Denning, Melita, and Osborne Phillips, Voudoun Fire: The Living Reality of Mystical Religion with photography by Gloria Rudolph (St Paul Minn. Llewellyn Publications, 1979).
3. The Magic of Living Forever (Franklin, N.C.: Metascience Foundation, 1982). See especially pp. 9 and 10.
4. Cataldo, John W., Lettering: A Guide for Teachers (Worcester, Mass.: Davis Publications, 1974), p. 6.
5. Ibid., p. 101.
6. Chi is the all-pervading cosmic energy discussed in Chinese philosophy and medicine. It is often represented in art as fiery, meandering patterns of energy.
7. According to Heraclitus, Logos is a powerful and eternal fire. Logos is also the Word: “In the beginning was the Word (Logos)” (John I, 1–15).
8. The connection between the word and fiery meanders is perhaps best made in Acts II, 1–4: “While the day of Pentecost was running its course they were all together in one place, when suddenly there came from the sky a noise like that of a strong driving wind, which filled the whole house where they were sitting. And there appeared to them tongues like flames of fire, dispersed among them and resting on each one. And they were all filled with the Holy Spirit and began to talk in other tongues” (New English Bible).

Illustrations

- Figs. 1 and 2 appear in C. G. Jung, Man and His Symbols (Garden City, N.J.: Doubleday, 1964), on pp. 264 and 265.
- Fig. 3 appears in The Art of Photography, Life Library of Photography (Alexandria, Va.: Time-Life books, 1977 ptg. of 1971 ed.), on pp. 194–195.
- Figs. 4, 6, 9, and 10 appear in John W. Cataldo, Lettering: A Guide for Teachers (Worcester, Mass.: Davis Publications, 1974) on pp. 101, 16, 15, and 26.
- Figs. 5 and 7 appear in Donald M. Anderson, The Art of Written Forms (New York: Holt, Rinehart and Winston, 1969), on pp. 271 and 149.
- Figs. 8, 11, and 12 appear in Cataldo, Pen Calligraphy/Course One (Worcester, Mass.: Davis Publications, 1979), on pp. 73, 24, and 12.

SURFACE CHANGE DURING WARM-FORMING

Jack Houck

DURING 1981, I conducted 12 “PK Parties” in which approximately 85% of the attendees experienced metal-bending with apparent ease. In general, the participants described a short period, typically 5 to 20 s, in which the metal felt warm and was extremely pliable. After this period the metal would again become impossible to bend, as in its normal state. We have named this phenomenon “warm-forming” and have attempted to compile data that helps explain what occurs inside the metal. During the PK Party held April 20, 1981, a steel rod of 0.63 cm diameter appeared to change dramatically in surface color when “warm-formed” by Tim. This rod was submitted to a metallurgical laboratory for analysis. The results are contained in this report.

As of this writing, I have accumulated 9 other specimens that also appear to manifest dramatic surface change when compared with their control rods.¹ These have been warm-formed by 6 different individuals. In all cases, the rods and one bolt are low-carbon steel, coated with zinc. (Steel rods purchased in a hardware store are usually coated with zinc so that they will not rust.) The surface change does not occur on all the steel rods warm-formed at these PK Parties. Those rods that do manifest the surface change have it occur during the 10 to 15 min period when it was being handled by the individual who warm-formed it. Most of the surface change usually occurs near the bend; in a few cases, however, the entire rod surface changed, as did the rod analyzed in this report.

The results of this metallurgical analysis indicate that the surface change effect is limited to the surface of the rod. When magnified, the surface of the warm-formed rod appears much like the surface of volcanic rock, which diffuses light. It appears dull in comparison with the shiny surface of the control rod. A spectral analysis of the surface indicated the presence of chlorine on the warm-formed rod and none on the control rod, even though both rods were handled approximately the same amount. (The warm-formed rod was handled by Tim, and I handled the control rod.)

The best estimate of what happened to the warm-formed rod is that a chemical reaction occurred during the time when Tim was warm-forming it. This chemical reaction could either have resulted from the salt (NaCl) in his perspiration forming zinc chloride or from hydrochloric acid in his perspiration forming zinc chloride. Further analysis is required to determine if either of these chemical reactions will cause this surface appearance and, if so, under what conditions (e.g., temperature, pressure, amount of perspiration, etc.). Let me point out again that this surface change does not always occur when these zinc-coated steel rods are handled, or even warm-formed, by many individuals. Does the rod become exceptionally hot for some people, facilitating the chemical reaction? This question has led to the desire to instrument some rods during the warm-forming process to determine the temperatures involved. Or do a few people have a very high Ph factor in their perspiration?

DURING the December 16, 1981, PK Party, several rods were bent by warm-forming and manifested the surface change. On each of the rods I attached an identification tag with clear tape. These tags

*Metallurgical analysis by Victor Kerlins.

allowed correct identification of the control rod. On several of the specimens, the surface change did appear on the part of the rod that also included the tape. When I peeled back the tape, however, I found that the surface underneath was still shiny and that no change had occurred there. This reinforces the idea that the change results from a chemical reaction between the rod surface and something in the perspiration of the hands of the person doing the warm-forming.

At the April 20, 1981, PK Party, a change in one of the rods seemed to offer clear evidence that something had happened to the rod that could not be explained by physical force. Prior to the party, I prepared a number of steel rods to be warm-formed by participants. The rod discussed here is 30.5 cm long and 0.63 cm in diameter, made of 1018 steel, coated with zinc. It was purchased at a local hardware store. Masking tape, which held the price sticker on the rod at the time of purchase, left a sticky gum, which I removed by applying gasoline to the entire rod. Then I rubbed the rod with 0000 steel wool to make it shiny and clean. I cut the rod into three sections; one was kept in another room as a control rod, and the other two were available for warm-forming at the party. The ends were filed so that nobody would be cut. Tim took one of these rods and warm-formed it during a period of approximately 15 min. He noted that when the rod became warm and was easily malleable, a permanent color change occurred over the entire surface of the rod (not just where the bend occurred). This could not be explained as the effects of physical force.

The warm-formed rod and its control rod were submitted to a metallurgical laboratory for a scanning electron microscope (SEM) analysis of the surfaces of both specimens. A small section was cut off the end of the straight (control) rod in order to fit it into the SEM. Fig. 1 shows both the straight and the warm-formed rods.

F IG. 2 shows the surface of the straight rod magnified 15 times (15X). Two areas were selected for further magnification. These areas are marked 1 and 2. Figs. 3 and 4 show Area 1 of the straight rod magnified 1.15KX and 7.8KX, respectively. The scratches were caused by the steel wool, and some typical surface pitting can be observed. The high magnification was difficult to obtain, and some gold coating was required to achieve sufficient electron densities. Similarly, Figs. 5 and 6 show Area 2 of the straight rod magnified 1.16KX and 7.9KX, respectively. The surface at Area 2 is very similar to that of Area 1. Nothing is unusual about the surface of the straight control rod.

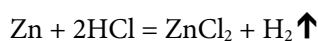
Fig. 7 shows the surface of the warm-formed rod, magnified 23.7X, looking directly at the end (outside region of maximum curvature). Two areas were again selected for further magnification; they are marked 1 and 2.

Figs. 8 and 9 show Area 1 of the warm-formed rod magnified 1.18KX and 8.1KX, respectively. The surface appears dramatically different from that of the straight rod. These pictures are the result of patterns established by the surface reflection of the electrons in the SEM. Because the surface appears to have been drastically altered (compare Figs. 3 and 4 with Figs. 8 and 9), one would suspect that it looks dull to the naked eye, because the light scatters and is diffused by this highly irregular surface. Also note that extremely high magnifications were obtained with no difficulty, suggesting that the electrical conductivity of the surface is very high. Figs. 10 and 11 show Area 2 of the warm-formed rod magnified 1.2KX and 12KX, respectively, which is very similar to the surface in Area 1.

T HE results of this testing prompted many questions. One question was: Does a straight section of the warm-formed rod illustrate the same apparent change on the surface as the bent section? To the naked eye, the straight section of the warm-formed rod appeared to have the same type of dull surface as was apparent on the bent portion of the rod. To answer this question, however, a section of the straight portion of the warm-formed rod was cut and examined with another sec-

tion of the straight control rod. Fig. 12 shows the point where the straight section was taken from the warm-formed rod. (The photograph was taken prior to the section's being removed.) Fig. 13 shows the surface of the control rod section magnified 14.3X. Fig. 14 shows the same section magnified 98X. Further magnification (520X) of that same section is shown in Fig. 15. Points A and B are defined in Fig. 15 by the arrows in the margin. Magnification of Point A to 2.76KX is shown in Fig. 16. Similarly, magnification of Point B to 2.78KX is shown in Fig. 17. These photographs of another portion of the control rod surface are essentially identical to those previously shown in Figs. 2 through 6. The surface of the straight section removed from the warm-formed rod, magnified 14.3X, is shown in Fig. 18. Fig. 19 shows that same section magnified 97X. Further magnification (520X) is shown in Fig. 20. New points A and B are defined by the arrows in the margin on Fig. 20. Further magnification of Point A is shown in Fig. 21, magnified 2.78KX. Similarly, a magnification of 2.78X of Point B is shown in Fig. 22. It can be seen that the surface of the straight portion of the warm-formed rod is very similar to the surface of the bent portion, shown in Figs. 7 through 11. Thus, the SEM shows that the same type of surface pitting occurred over the entire warm-formed rod.

IN AN attempt to understand further what happened to the surface of this rod when warm-formed, an energy-dispersive X-ray diffraction analysis was performed. Figs. 23 and 24 show the spectral lines resulting from that analysis for the control and warm-formed rod, respectively. The peaks are predominantly three zinc (Zn) lines, an iron (Fe) line, and a chlorine (Cl) line. The zinc and iron lines are essentially identical on both spectra. A strong chlorine occurred on the spectrum of the warm-formed rod, however. It is postulated that the source of the chlorine might be the salt (NaCl) contained in perspiration from the hands during warm-forming. The sodium (Na) line would have occurred at 1.04Å and would essentially be swamped by the smallest zinc line, which occurs at 1.1Å. As indicated earlier, Tim handled the warm-formed rod for only approximately 15 mm, and I do not know if his hands were perspiring. The total amount of handling of both rods by human hands is probably nearly identical, however, because I carried both rods around the country prior to the analysis and often handled the control rod. My hands were probably not perspiring when I handled the rod. Another possibility to explain the chlorine line is that zinc chloride (ZnCl₂) may have been formed if hydrochloric acid (HCl) was contained in the sweat of Tim's hands. This is not common, however.



Next, a cross section was taken from both the control and the warm-formed rods and mounted for an X-ray map examination. These sections were polished and mildly etched, using a 2% NITAL solution, which rapidly affects the zinc. The control and warm-formed cross sections are shown magnified 250X in Figs. 25 and 26, respectively. These photographs were taken looking directly down at the cross section. They clearly show the zinc coating over the steel rod. The steel rod is at the bottom of both photographs, and the mounting material is at the top of both photographs. There is a small gap between the mounting material and the zinc coating. If one were to look across the edges of the specimens, the view would appear like that shown in Fig. 27. The etching removed a bit of the zinc coating, causing the slight step as shown in Fig. 27. The purpose of the X-ray map examination was to determine if any zinc had penetrated into the steel case of the rod. Figs. 28 and 29 show the optical picture, magnified 1000X, for the control and warm-formed rods, respectively. It can be seen that zinc did not penetrate into the steel (bottom) on either specimen. Figs. 30 and 31 are the zinc X-ray maps of the control and

warm-formed specimens, respectively. The very dense band (top left to bottom right) shows the concentration of zinc in the zinc coating. The less dense band, directly above, results from reflections in the mounting space. It can be seen that these X-ray maps are essentially identical, further indicating no penetration of the zinc along the grain boundaries of the steel rod.

IN Figs. 32 through 35, the zinc coating was viewed looking toward the steel rod (see Fig. 27 for perspective). Figs. 32 and 33 show this view magnified 248X for both the control and warm-formed samples, respectively. This same view, magnified 2.49KX, is shown in Figs. 34 and 35 for the control and warm-formed samples, respectively. A thin coating on the surface of the zinc plate can be seen clearly. The surface change seems to be only on the immediate surface of the warm-formed rod. This may be a thin layer of zinc chloride on the surface, which appears to have increased or been modified by the warm-forming process.

This report contains some raw data. Many questions still exist as to how the warm-forming process works. It is hoped that the data we have presented here may be useful in further research.

Feb. 5, 1982

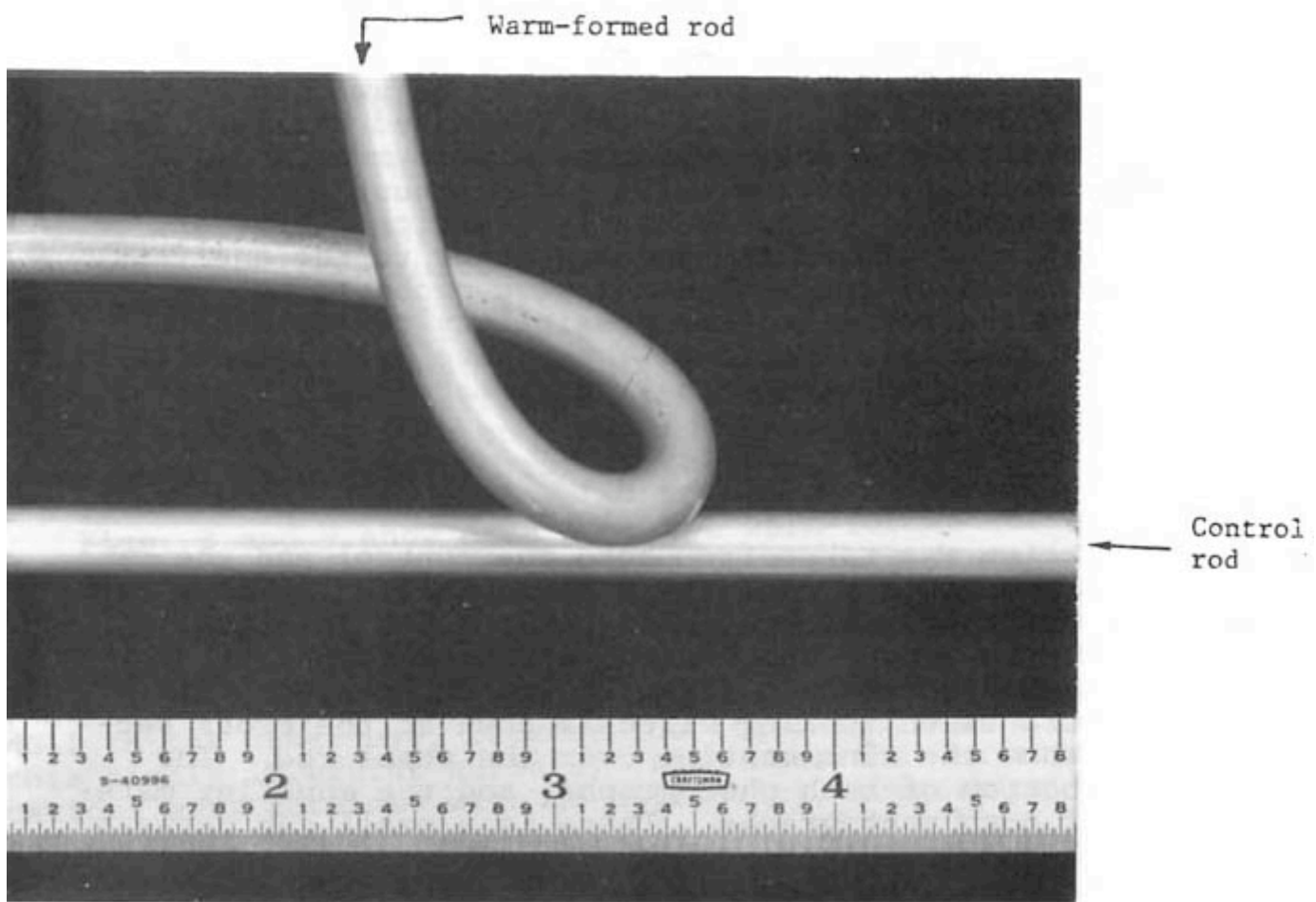


Fig. 1. Apparent surface color difference between control and warm-formed rods

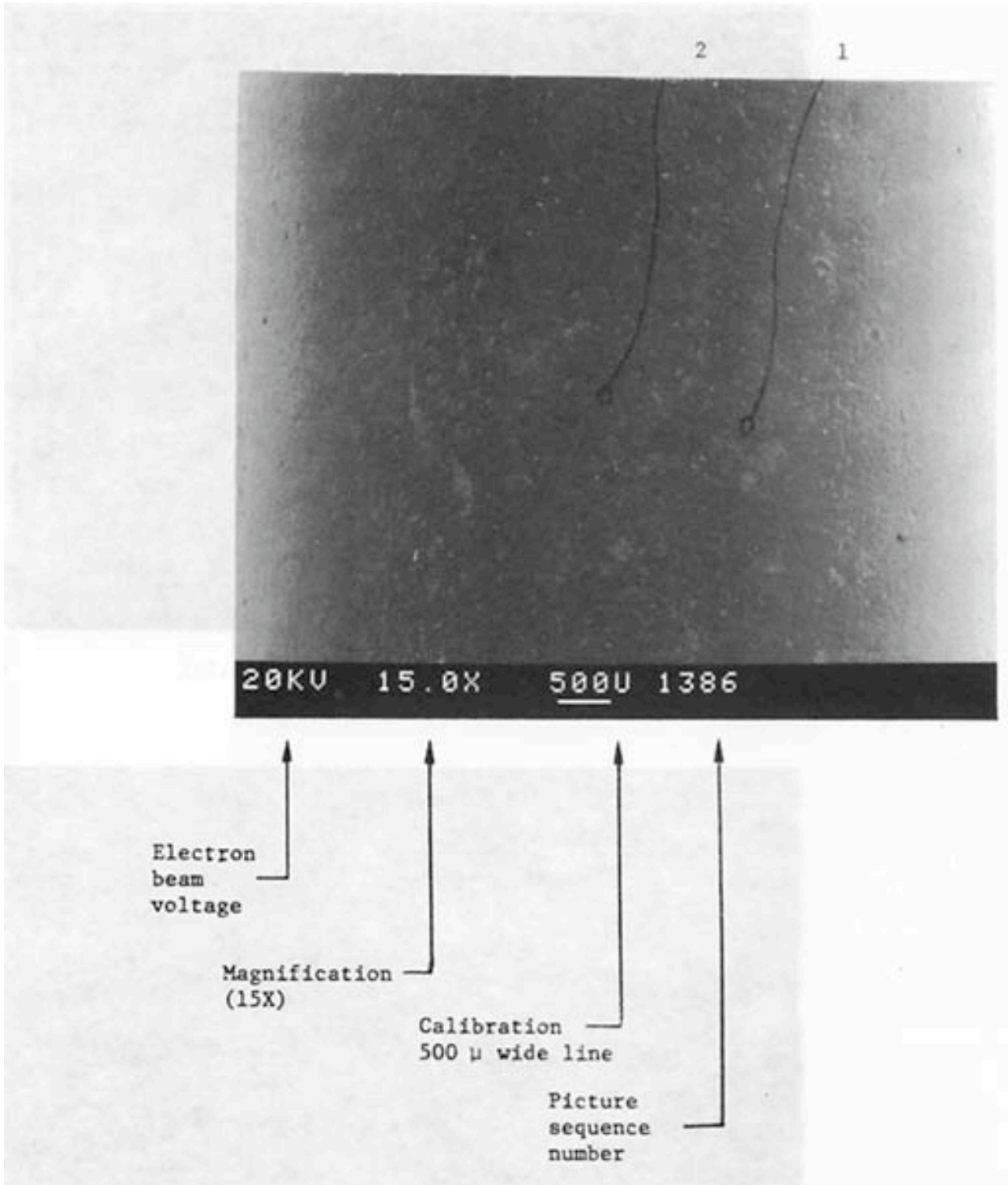


Fig. 2. Surface of control rod at bend (15X). Number definitions indicated by arrows.

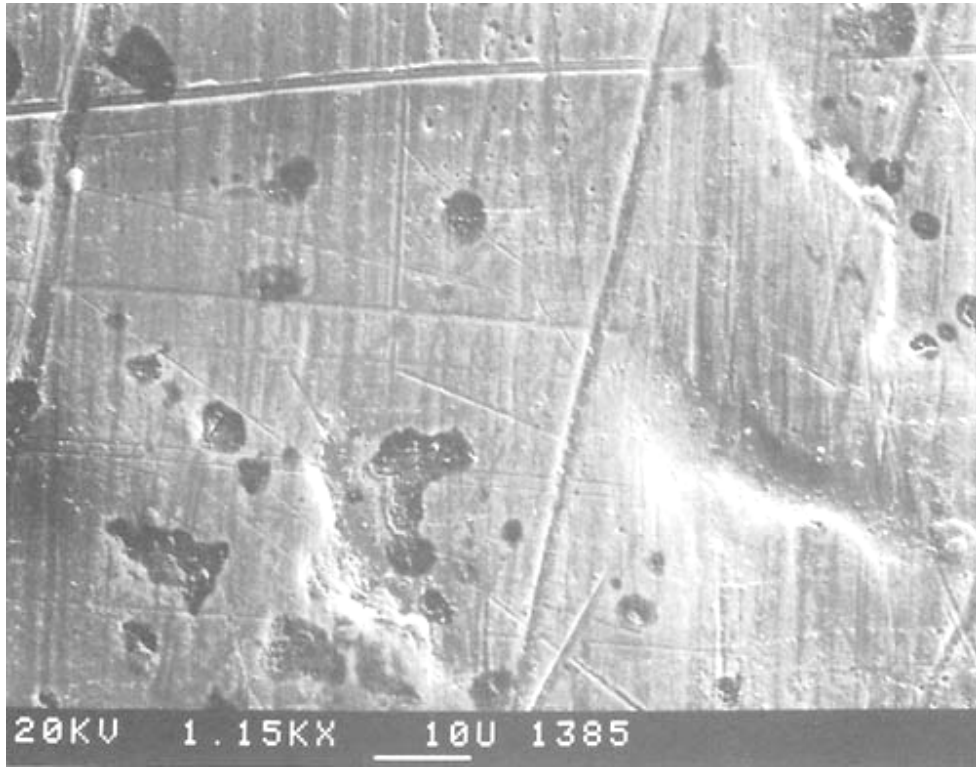


Fig. 3. Surface of control rod at Area 1 (1.15KX)

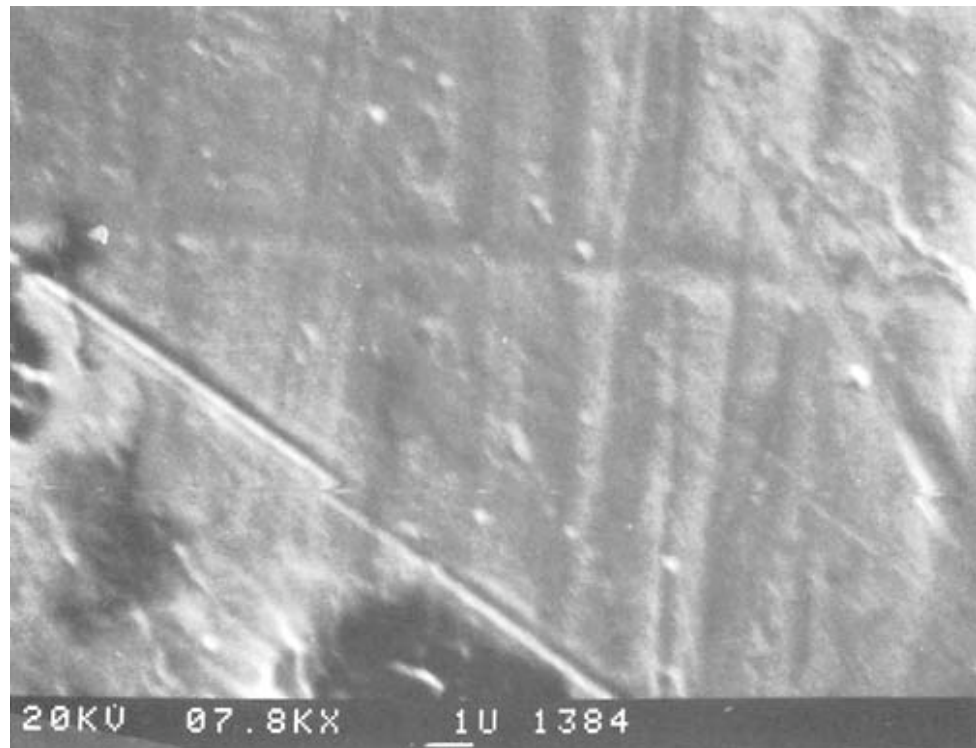


Fig. 4. Surface of control rod at Area 1 (7.8KX)

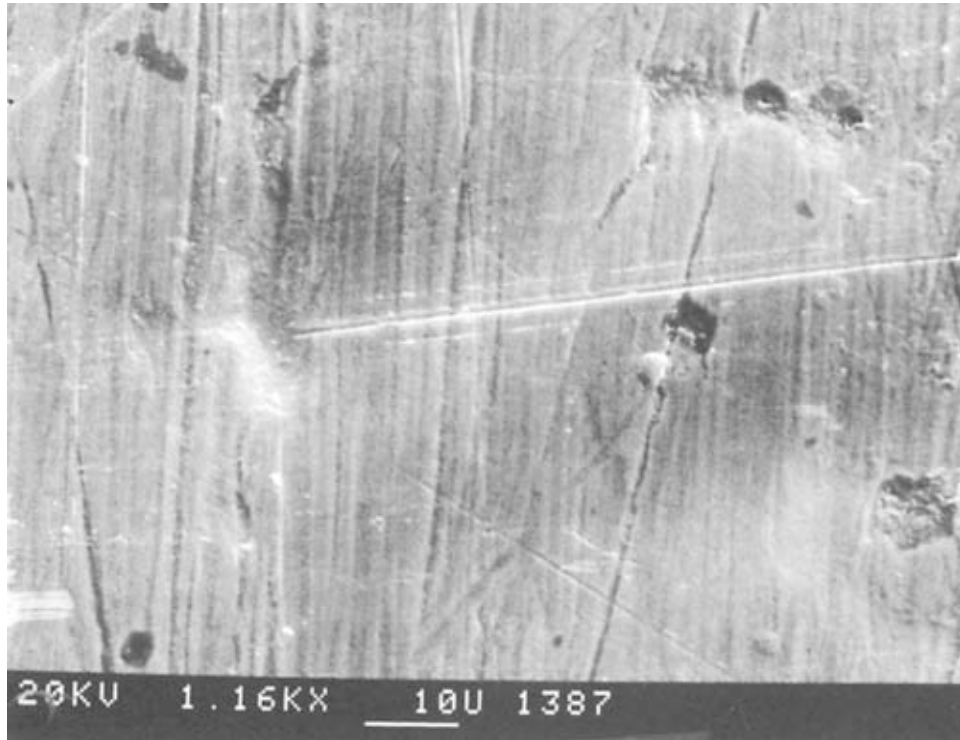


Fig. 5. Surface of control rod at Area 2 (1.16KX)

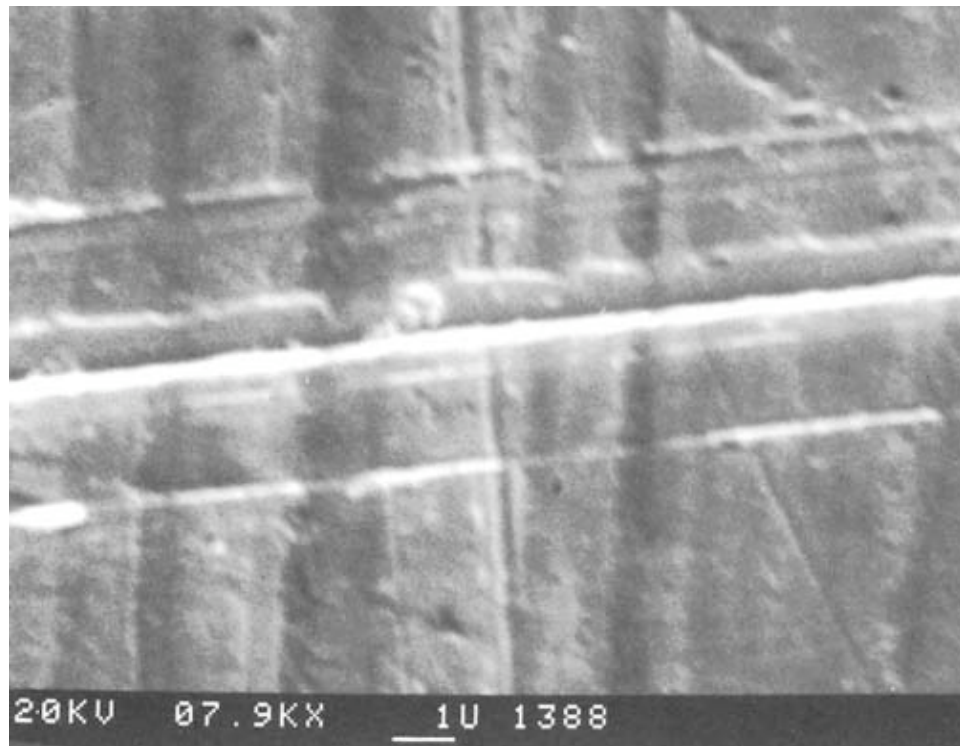


Fig. 6. Surface of control rod at Area 2 (7.9KX)

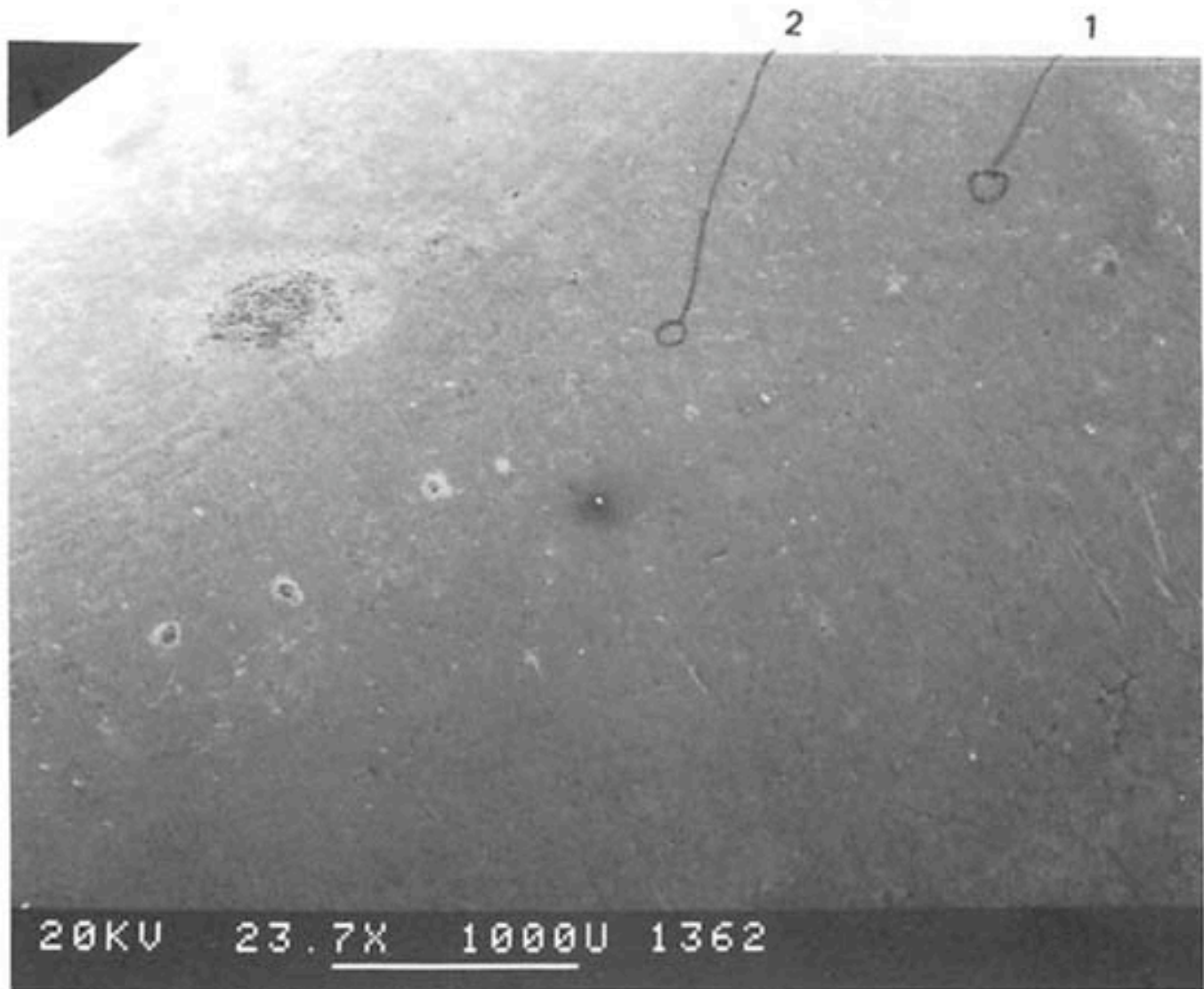


Fig. 7. Surface of warm-formed rod at bend (23.7X)

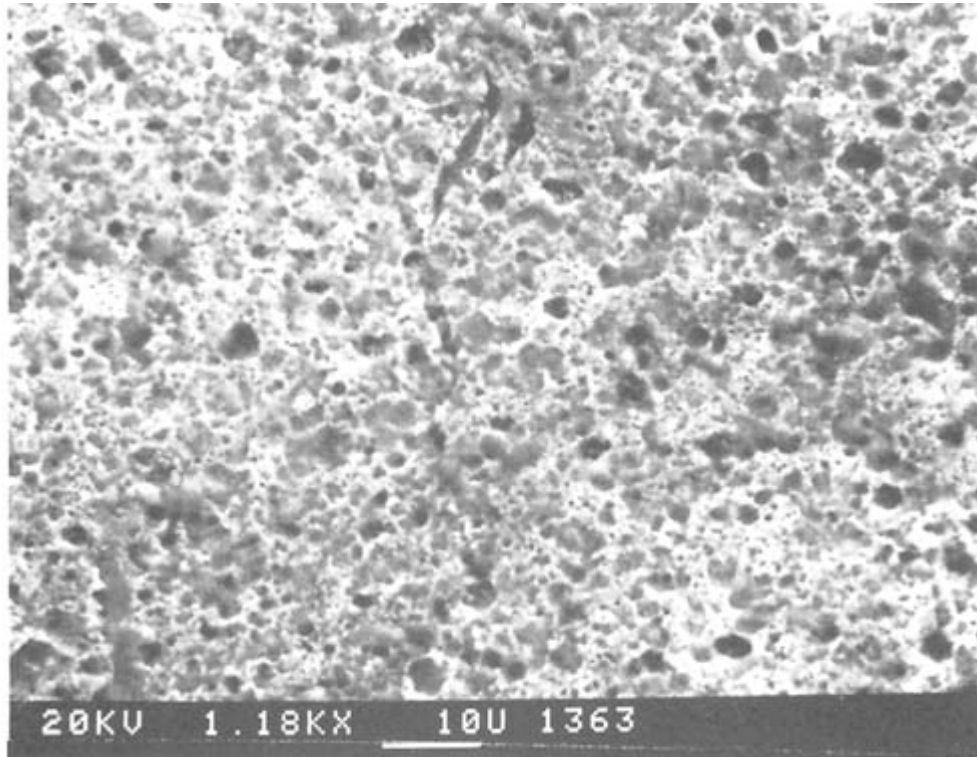


Fig. 8. Surface of warm-formed rod at Area 1 on bend (1.18KX)

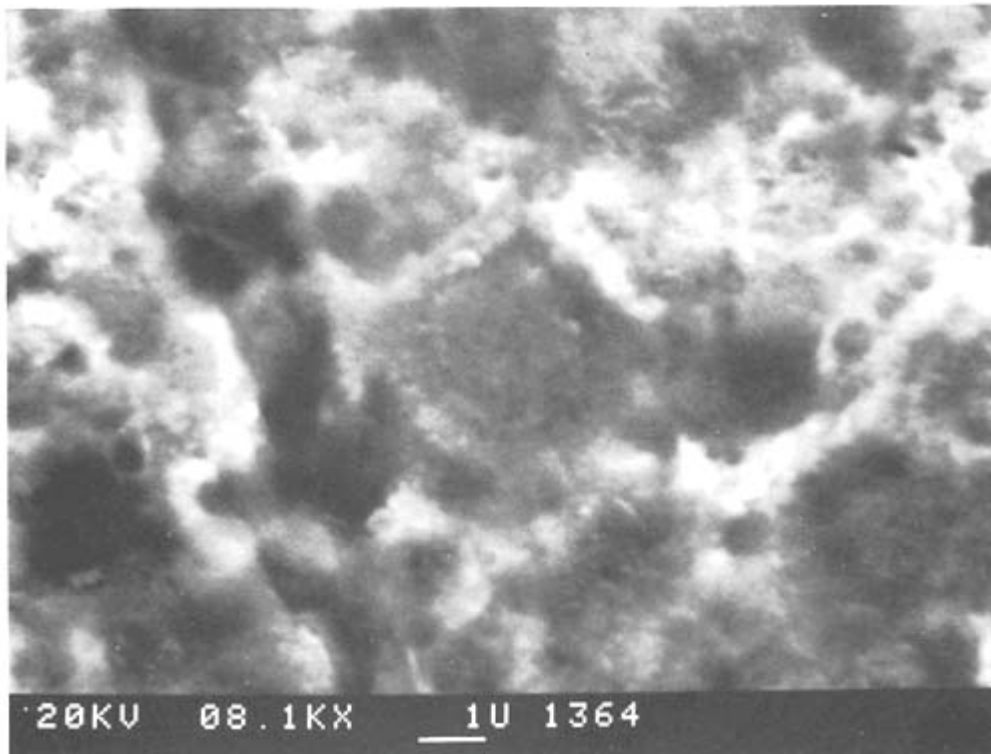


Fig. 9. Surface of warm-formed rod at Area 1 on bend (8.1KX)

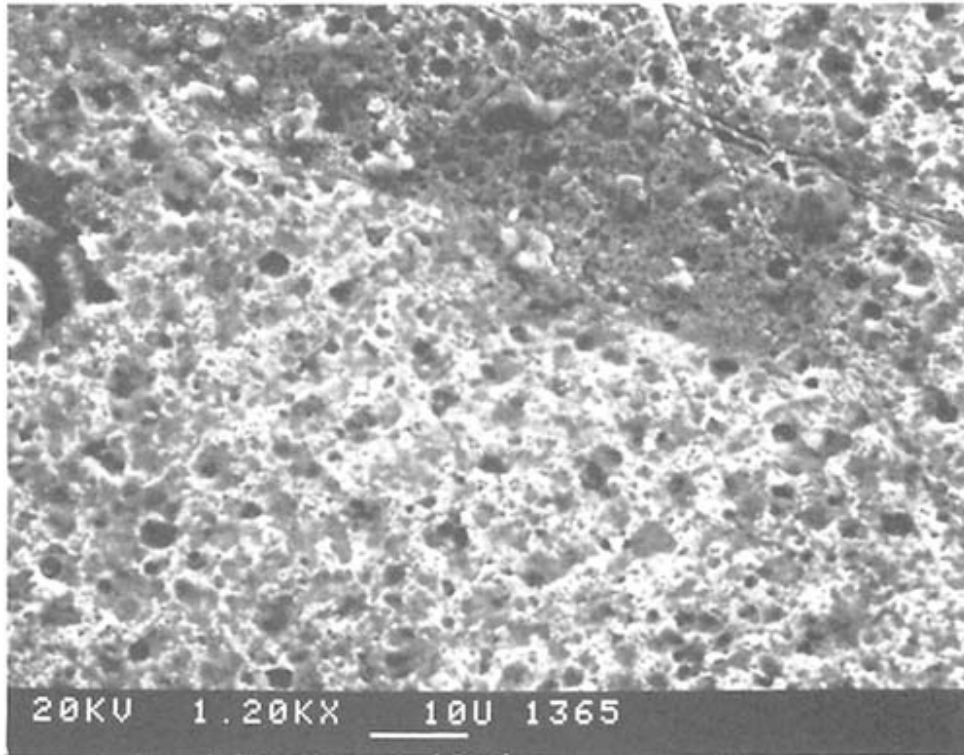


Fig. 10. Surface of warm-formed rod at Area 2 on bend (1.2KX)

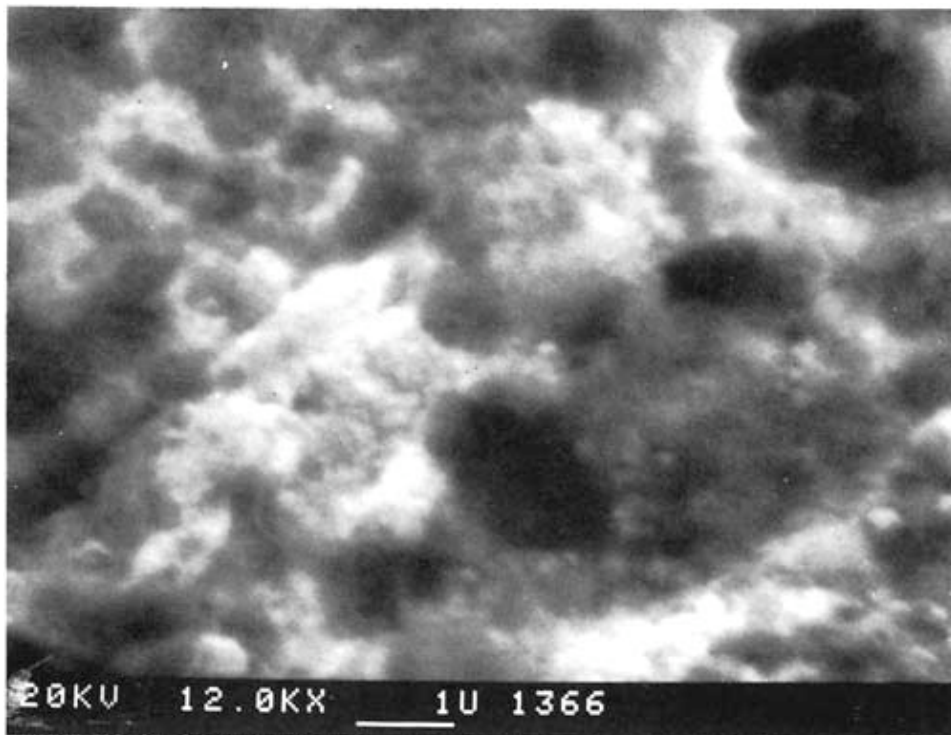


Fig. 11. Surface of warm-formed rod at Area 2 on bend (12KX)

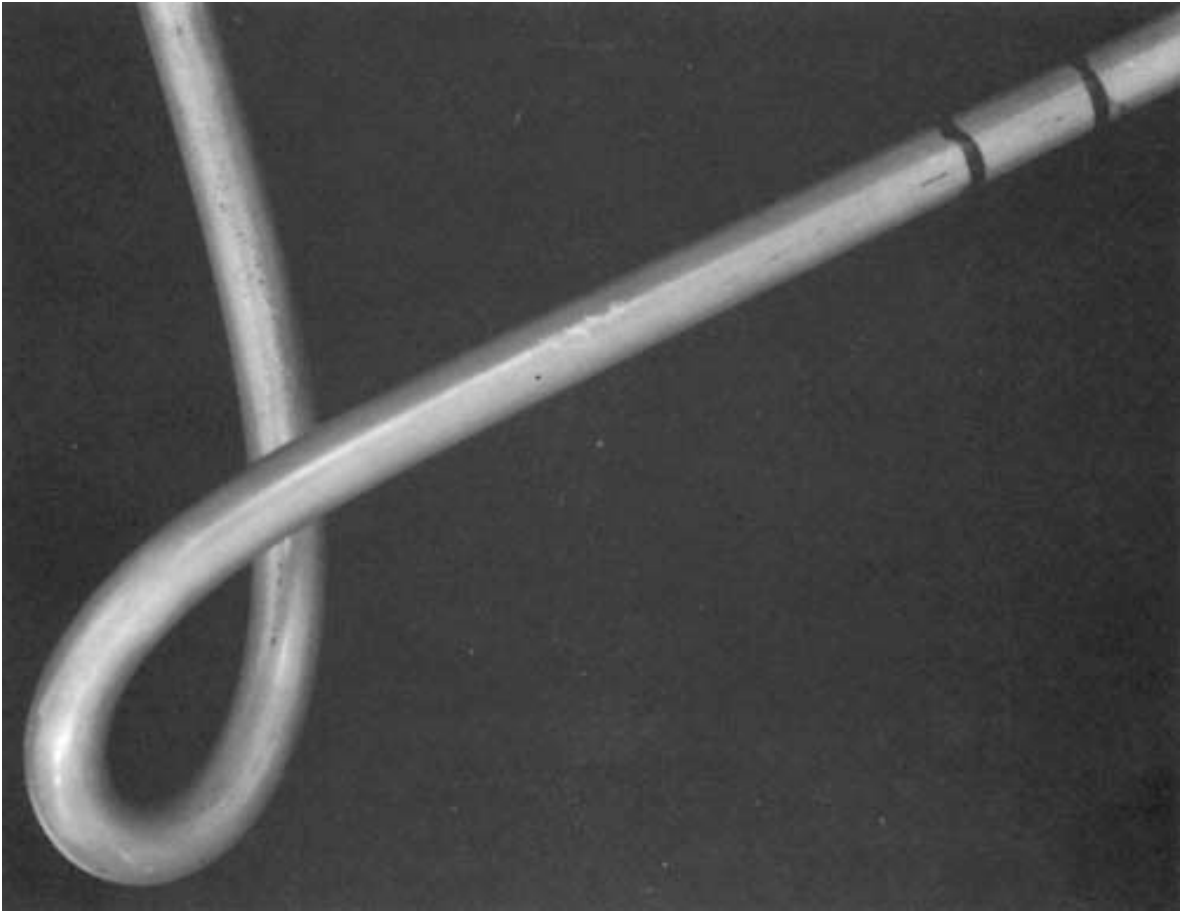


Fig. 12. Section cut for analysis from warm-formed rod.



Fig. 17. Surface of control rod, Area B (2.78KX)

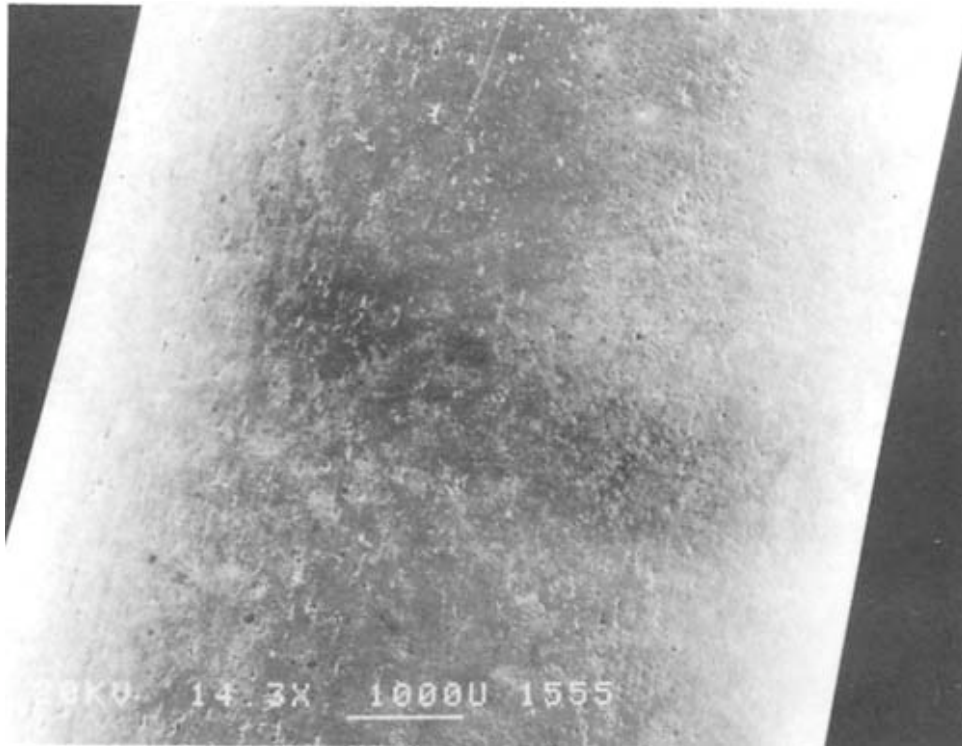


Fig. 18. Surface of warm-formed rod in straight section (14.3X)

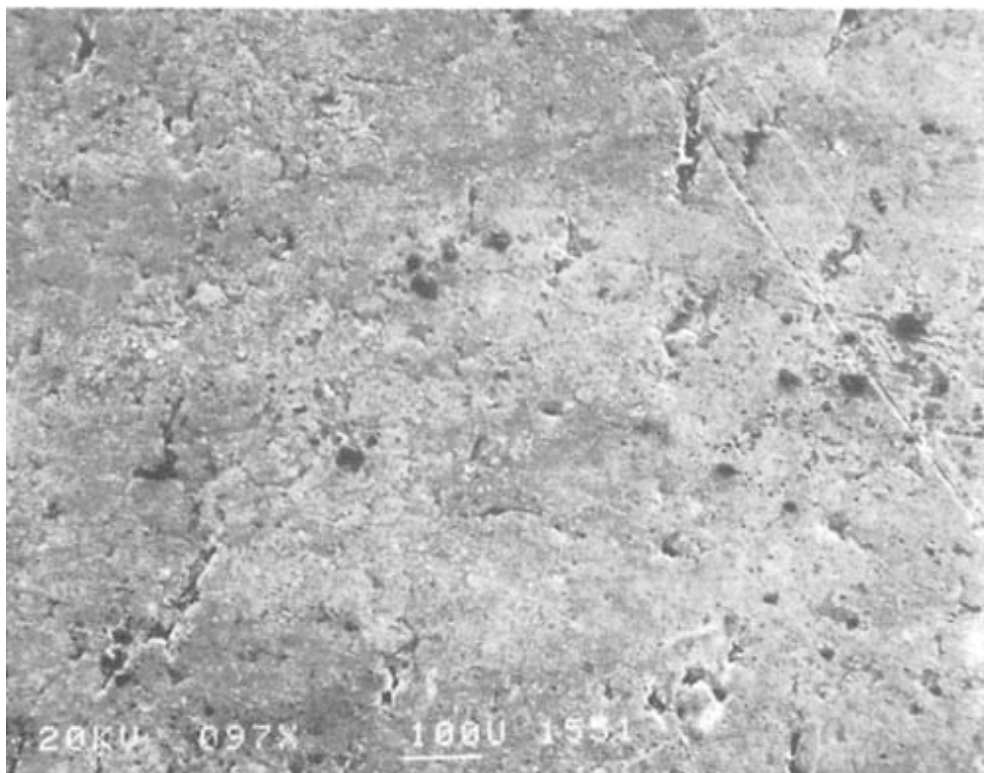


Fig. 19. Surface of warm-formed rod in straight section (97X)

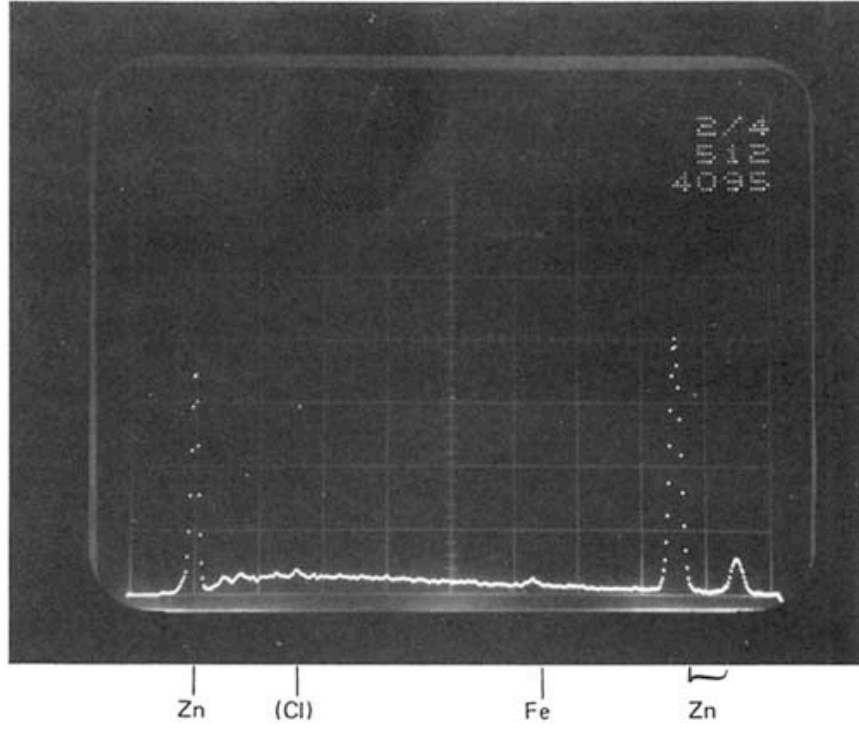


Fig. 23. Spectral lines of control rod surface.

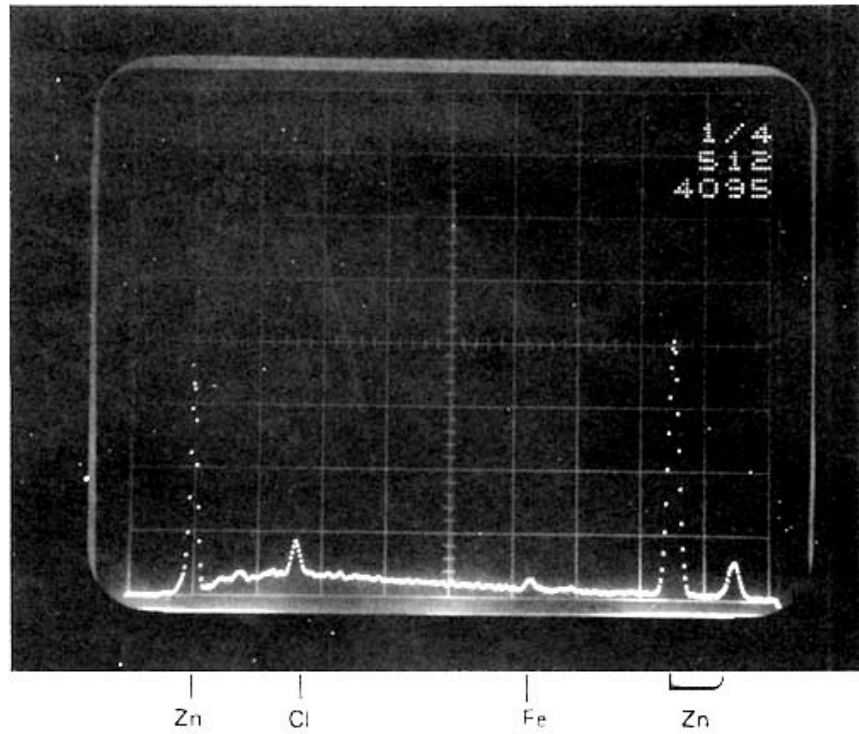


Fig. 24. Spectral lines of warm-formed rod surface, straight section

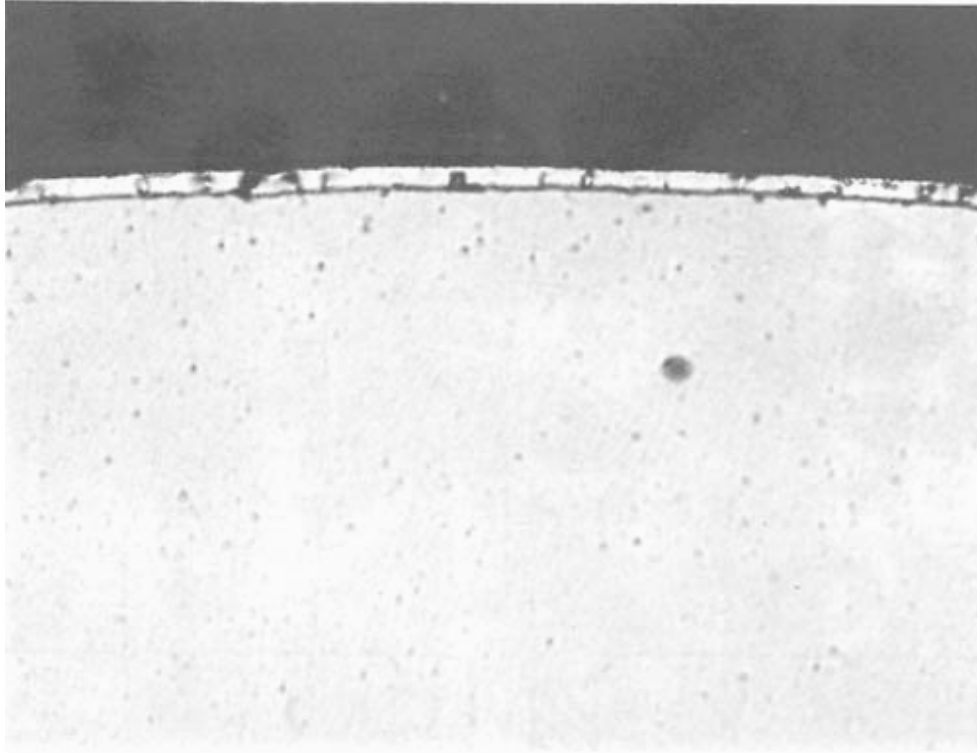


Fig. 25. Cross section of control sample (250X)

Etchant: NITAL

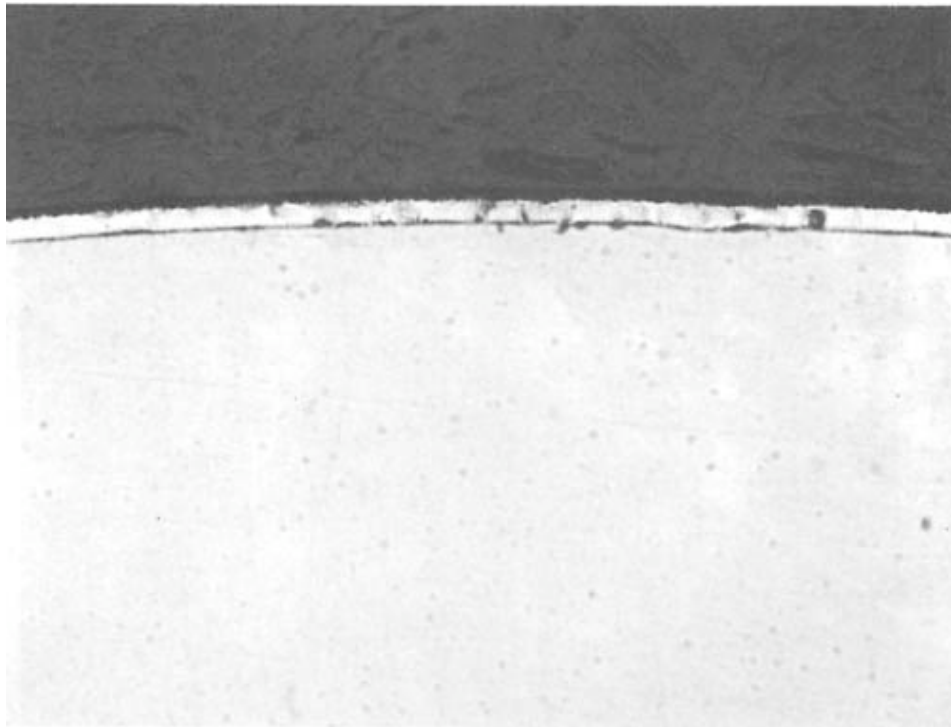


Fig. 26. Cross section of warm-formed sample (250X)

Etchant: NITAL

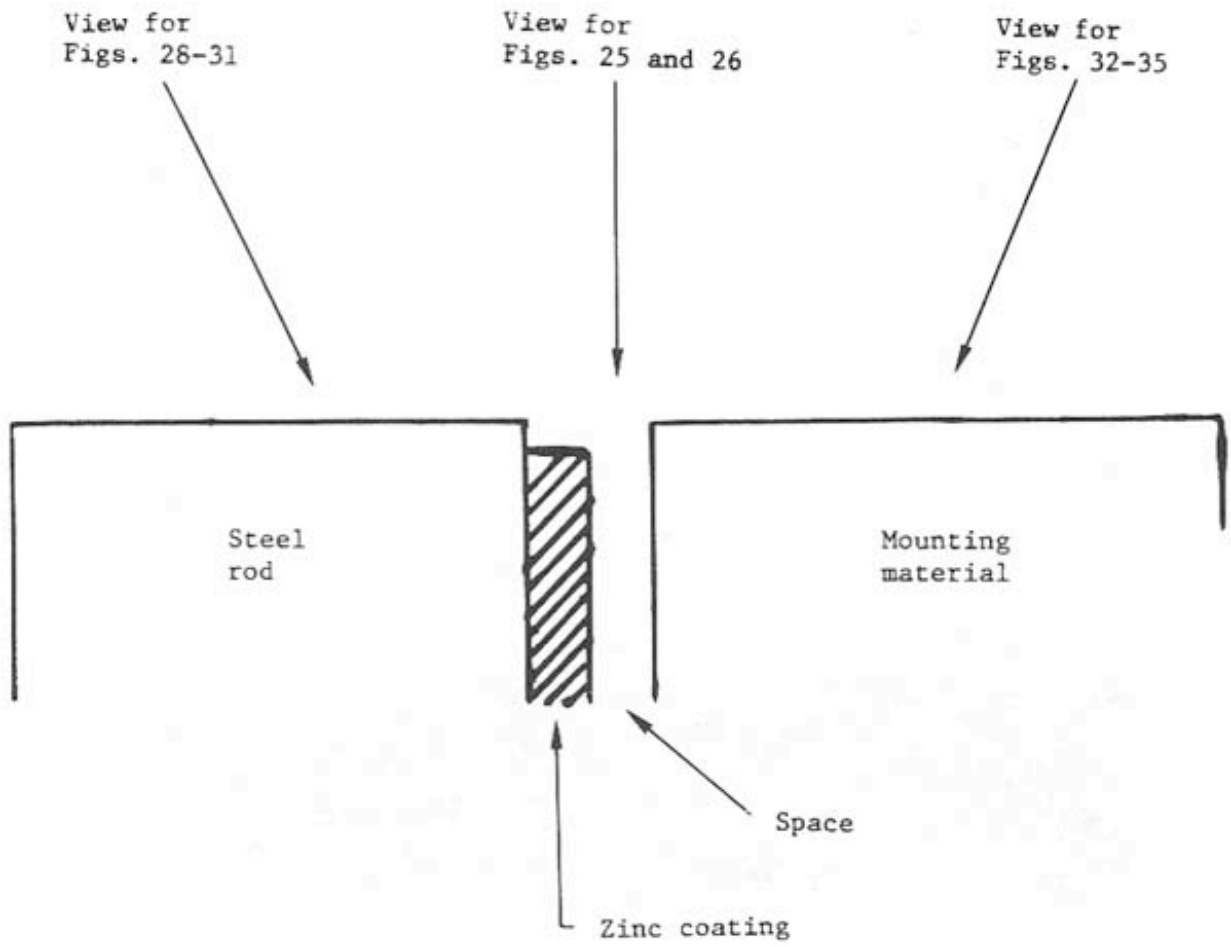


Fig. 27. Side view of mounting.

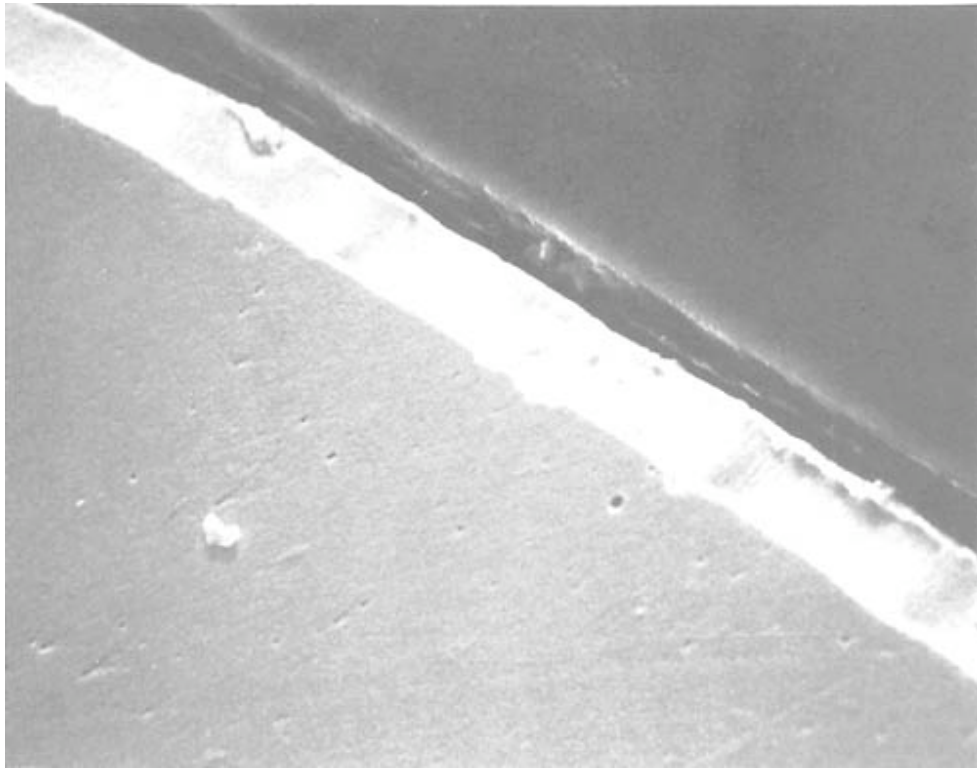


Fig. 28. SEM micrograph of cross section of control rod (1000X)

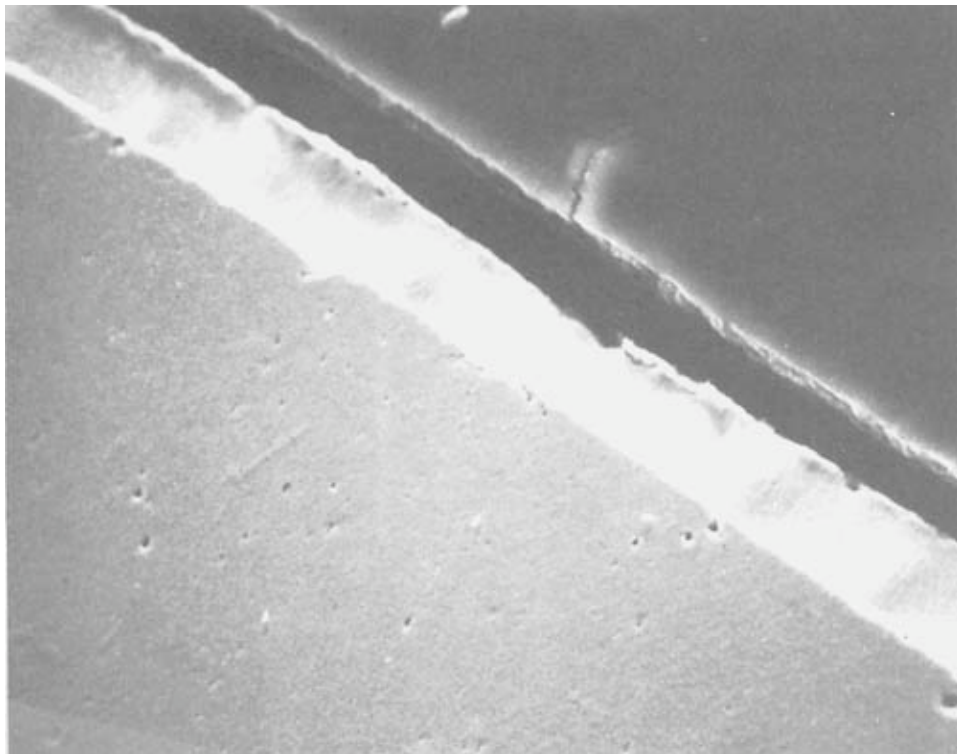


Fig. 29. SEM micrograph of cross section of warm-formed rod (1000X)

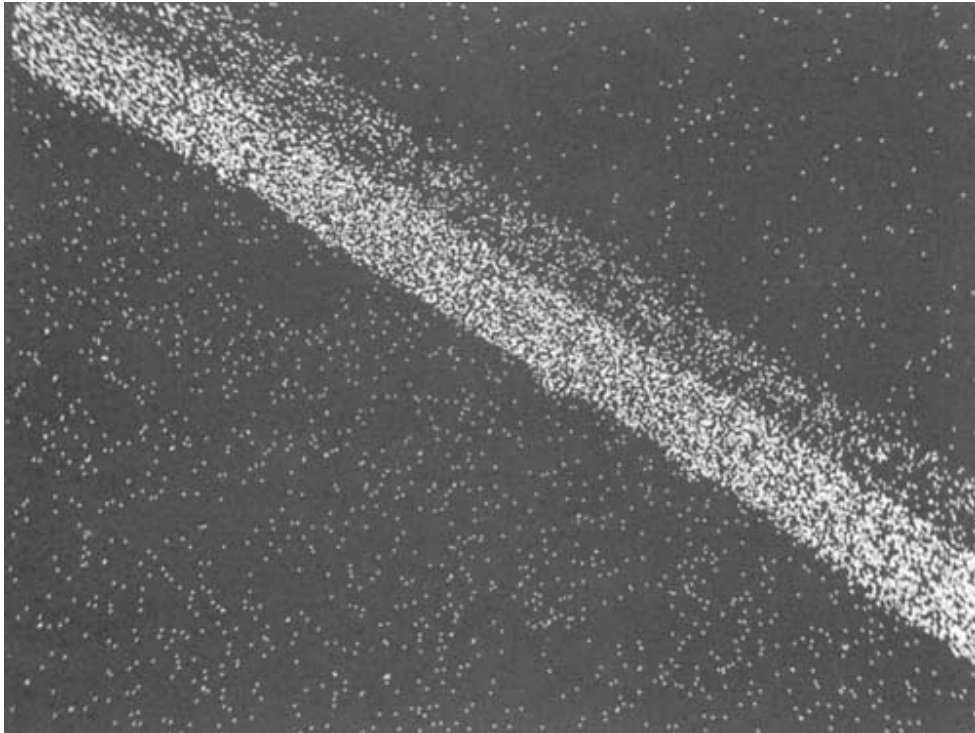


Fig. 30. SEM-X zinc X-ray map of control cross section (1000X)

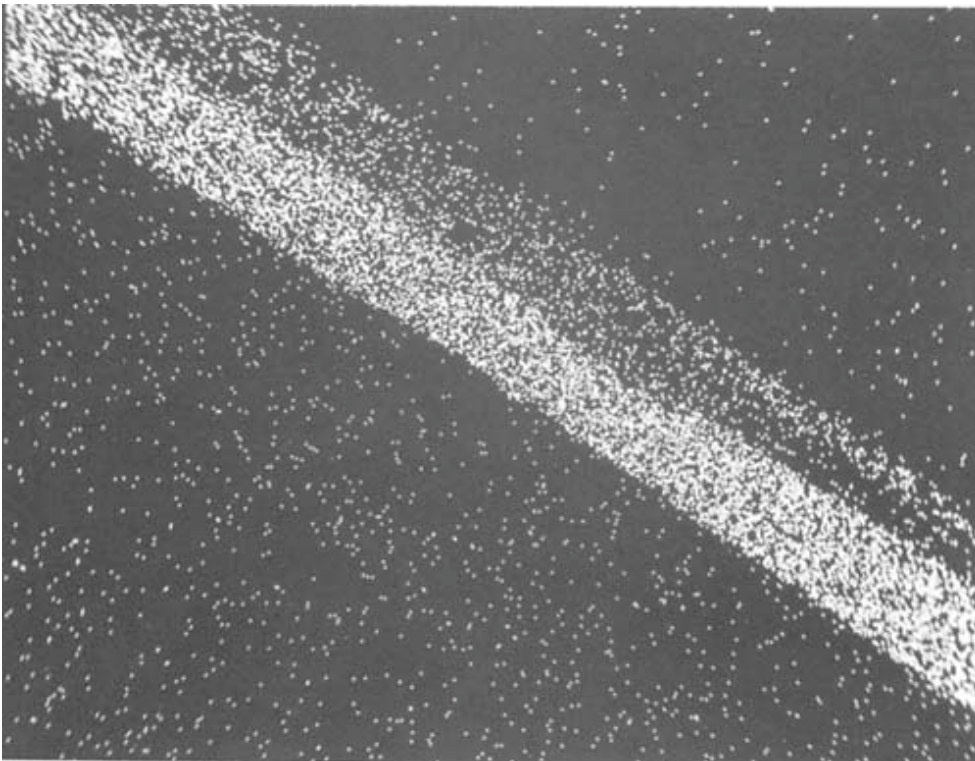


Fig. 31. SEM-X zinc X-ray map of warm-formed cross section (1000X)

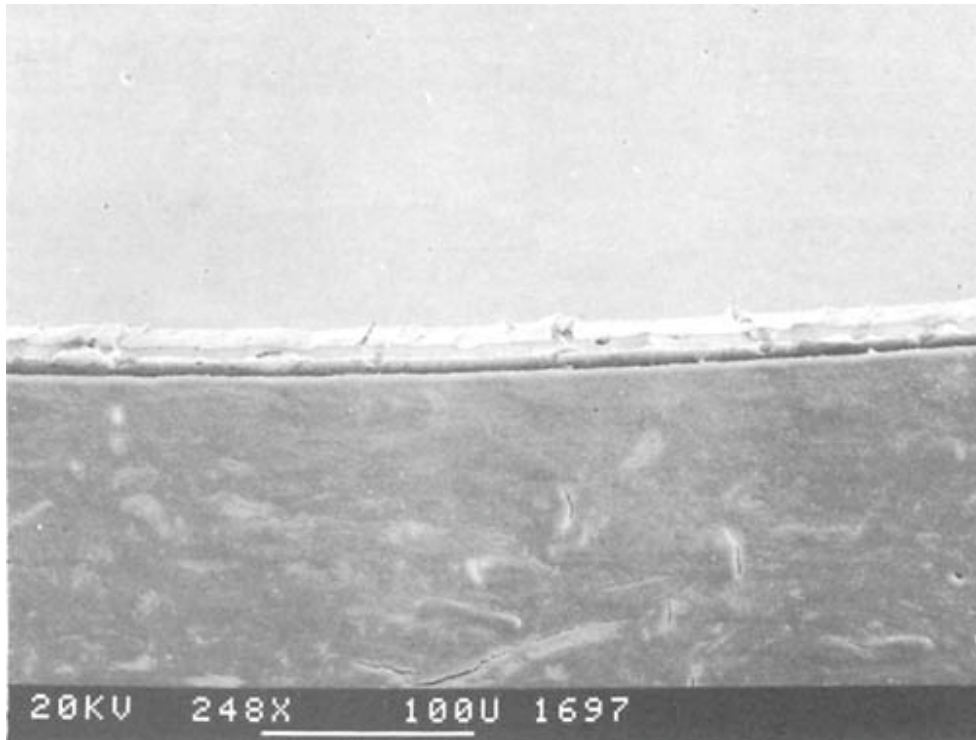


Fig. 32. Alternate view of control cross section (248X)

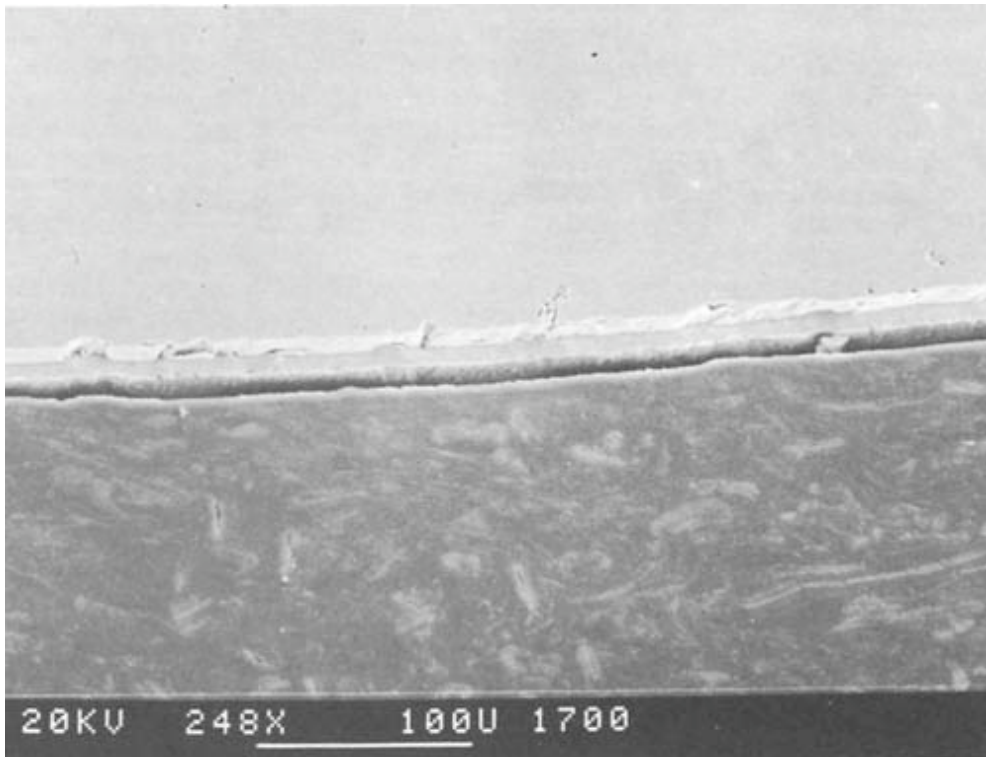


Fig. 33. Alternate view of warm-formed cross section (248X)

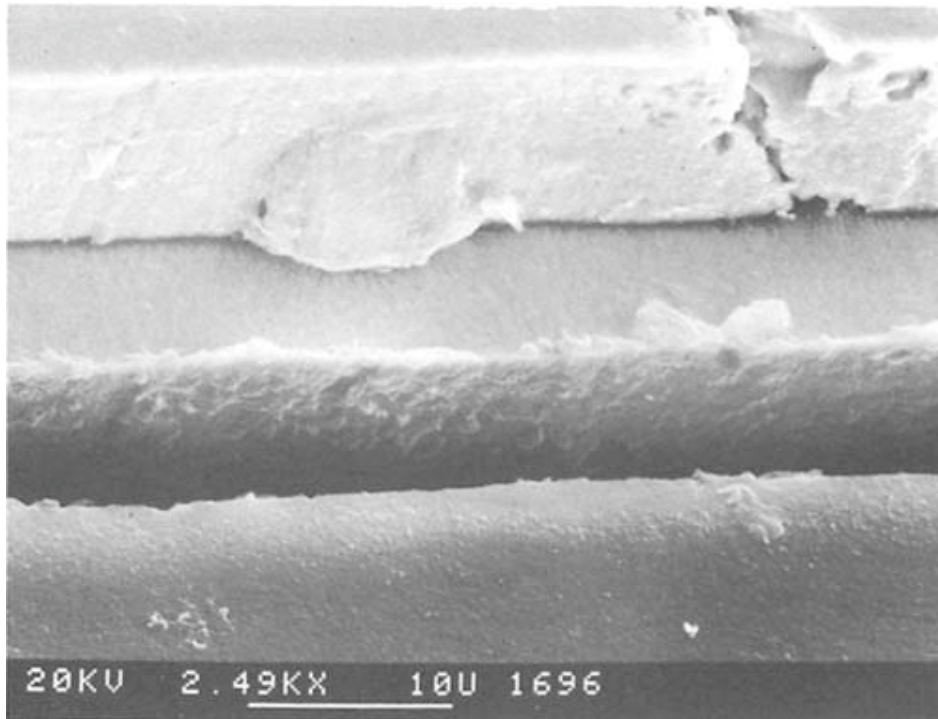


Fig. 34. Alternate view of control cross section (2.49KX)

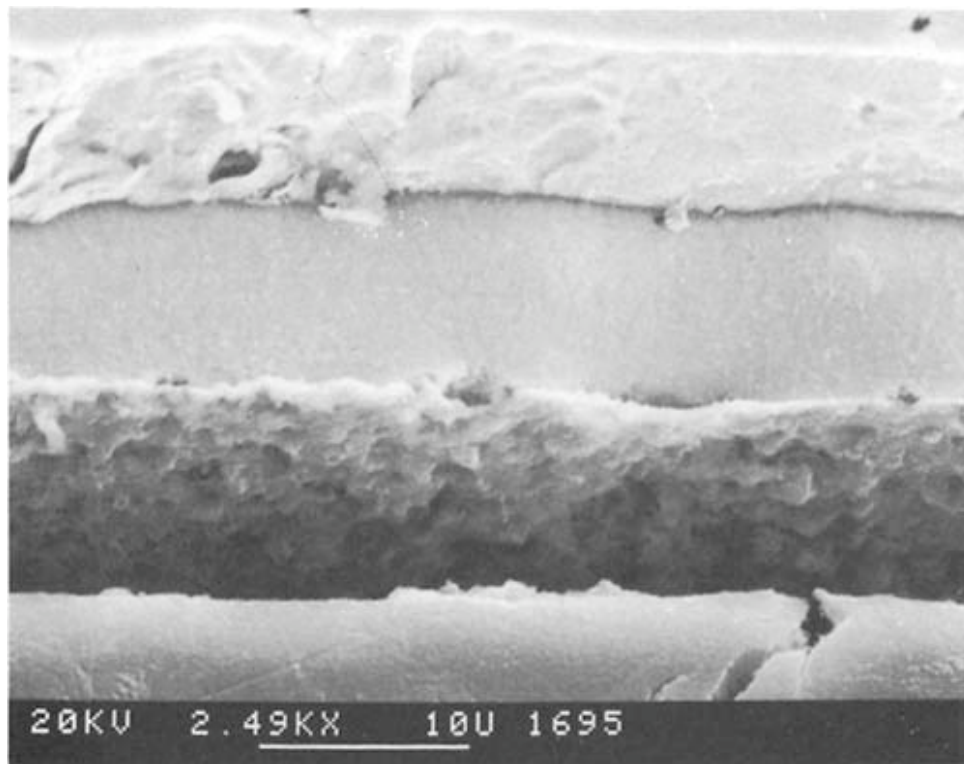


Fig. 35. Alternate view of warm-formed cross section (2.49KX)

CHANGES IN GLOBAL WEATHER AND BIOLOGICAL SYSTEMS, WITH A REVIEW OF THE BIOLOGICAL EFFECTS OF ELF RADIATION FROM TESLA TO THE PRESENT

Andrija Puharich, M.D.

AS WE are all aware, there is something wrong with the weather all over the world at the present time. Everywhere the weather is abnormal, totally out of line. In the United States alone, some 145 weather records were set in the month of December 1983. Over the last decade, many weather anomalies have occurred all over the globe. What is noteworthy is that, in their accounts of weather anomalies, nobody in the weather business, and that includes analysts and forecasters, seems to want to deal with this question of unusual weather in all its ramifications. So that is what I propose to attempt in this paper.

One of the major causes of weather anomalies in recent years has been the El Niño phenomenon, a periodic hot-water effect off the coast of Ecuador and Peru and the northern part of Chile.¹ It has been studied for only about 40 to 50 yr and is not very well understood. In the last 2 yr, starting in 1982 and 1983, El Niño has produced some of the most bizarre weather in recent history, sending high winds, severe flooding, and drought over many parts of the world.

In a section of Polynesia where there is normally one big typhoon or hurricane a year, there were five major typhoons in 1983. For the last few years, great storms have repeatedly buffeted the coast of California as a result of El Niño.

Another effect of the El Niño phenomenon is that Australia has been hit by the worst drought in its history. The ferocity of the weather effects in Australia is highlighted by the fact that a 7000-ft-high wall of dust covered 77,000 mi² of the western part of Australia. In southern Africa, the drought has also been quite severe for 3 yr. It has been so bad that elephants are dying simply because there is no water; and there is extensive drought damage to trees.

Fishing has been absolutely devastated off the coasts of Ecuador and Peru due to this change in the El Niño current, which weakens the normal northerly flow of the water currents and causes temperatures to go too high for plankton to survive. Plankton, of course, is the main food source for the great fishing grounds off the coast of South America. In the Galapagos Islands, the water has been about 12°F. above the normal temperature for this area. The coral underwater has been dying from this increased temperature, and as a result the whole chain of life support is rapidly dissolving at the base.

IWANT you to know that what we are seeing in the last few years with El Niño is nothing new. There is a long historical precedent for this kind of event.

The Mayans² were probably the best astronomers of any of the ancient civilizations that we know about, and they left records of such events, which are in the book called Chimal Pooca. It was first published in 1879 by the American Ethnographic Service, which was set up at that time to take charge of Indian affairs.

Mayan history states that mankind went through cycles of destruction, one cycle every 5168 yr, and says that we have come to the end of the fifth cycle (on March 27, 1981) and are now at the beginning of the sixth.

How the “primitive” Mayans transmitted this kind of high-grade information over these cycles of thousands and thousands of years is the mystery that concerns us. I do not want to go into this in too much detail, because this data is all published. First, the key to how they developed these cycles pertains to their calendar. They did not have one calendar, as we do; they actually had three calendars. The first was called the solar calendar, which was the same as ours. It measures the time it takes the earth to make a single journey around the sun. They computed very accurately that the solar year lasts 365.2422 da. (We caught up with them only about 40 yr ago.)

Their second calendar was a sacred calendar, and we do not know the origin of it. It is a calendar of 260 da. Their month was 20 da. long, and 13 of these 20 da. months made up the calendar of 260 da.

Their third calendar was a Venus calendar. They observed that the planet Venus, which is universally revered around the earth, went once around the earth every 583.805 da. They also observed a very interesting thing, which we have only discovered recently: these three cycles, each of them a different length, therefore a different period on some kind of sine wave function, coincide every 104 yr. (In other words, all points return to the beginning every 104 yr.) This is quite a feat, when you stop to think about it. They also divided the 104-yr. cycle by 2 to get a 52-yr. sacred cycle. In Mexico, for example, there is a place called Cerro Estrelita, where every 52 yr. the descendants of the Mayans still celebrate this event. All the lights are put out in the homes of the people who participate. In Mayan days, all the lights, all the fires in their land were extinguished on this particular day, in order to avert catastrophe. In some unknown way, they related this 52-yr cycle with catastrophe. The actual location of this mountain, Cerro Estrelita, is tied in with the vast pyramidal geometrical complex of Mexico.

IF YOU multiply 52 yr by 100, you get a cycle of 5200 yr, which is where we find a relation to the number 5168. But the Mayans were not willing to settle for a round number. They also calculated the conjunctions of the two biggest planets in our solar system, Jupiter and Saturn, and found that 260 Jupiter-Saturn conjunctions make 5168 yr. Thus, 260 Jupiter-Saturn conjunctions gave rise to the 5168-yr. cycle—after which, according to their forecasting system, the physical sun would cause the destruction of the earth. And they recorded the nature of each of the previous four destructions. According to this system, we have now passed through the fifth sun-period, which ended March 27, 1981; this time then becomes the beginning of a new cycle. It is always at the end of a cycle that the destruction occurs. Now, is there any evidence for this Mayan mythological/astronomical data from modern science that meshes with this picture in any way? There is astoundingly interesting data.

The U.S. National Academy of Sciences’ 1975 report entitled Understanding Climatic Changes³ discusses certain cycles. It states that the evidence, mostly from core samples, gathered all over the world, shows that there is a repetitive glacial cycle of approximately $100,000 \pm 2000$ yr. This constitutes a glacial and an interglacial cycle. That 100,000 yr cycle is divided into two parts: the glacial period, when the earth is covered up with ice and snow, lasting 90,000 yr.; and the interglacial period, which is the period we are living in now, which lasts approximately 10,000 yr. I do not think that any scientist on this planet would question the fact that right now we are at the end of an interglacial period of unparalleled warmth.

The interesting thing about this 100,000-yr. cycle is that it can be related to the 5168-yr. cycle. If you take the 5168-yr. cycle and multiply it by 5, you get a period of 25,820 yr.; this is the number describing the precession of the equinoxes. The spin axis of the earth wobbles, or precesses, over a 25,820-yr. period and comes back to the point of precession origin. So five of these 5168-yr. periods make up one 25,820-yr. equinoctial or precessional cycle.

It is very obvious, if you do a simple calculation, that four of these 25,820-yr. cycles total 103,280 yrs., which is fairly close to the glacial cycle of $100,000 \pm 2000$ yr. There is built into the sediment, into the rocks, into the various types of fossilized life, the record of the glacial cycle, telling us that what is happening now has happened before. When scientists look at earth cores, for example, and measure them at the end of one of these cycles (i.e., 90,000 yr. of glaciation [cold] followed by 10,000 yr. of interglaciation [warm]), they note that we are now at the end of the warm interglacial part of the cycle. The deciduous forest of the warm pluvial period suddenly disappears, and in its place a lot of shrubs appear, and there is evidence of wind-blown dust, all neatly stacked in the core samples.

These changes are part of the natural history of the earth. Unfortunately, mankind's memory is so short that we can barely stretch our historical record back to the beginning of this 10,000-yr. interglacial period. We can trace our history back one 5168-yr. cycle, to the beginning of the Egyptian civilization—and also, probably, of the Chinese civilization, one of the three great civilizations of the ancient world.

We have left out of the historical record the record of the Mayan civilization, which has only recently been uncovered. What I have presented up to this point is simply background data; I don't think there is much question about it. A very profound question arises, however, at this point: What is the real mechanism of the 5168-yr. cycle?

FIRST, note that the Mayans had already observed that 260 Jupiter-Saturn conjunctions brought about the 5168-yr. cycle. We can look at these conjunctions superficially as timing mechanisms: there is something seen in the sky about every 19 yr., a Jupiter-Saturn conjunction, and 260 of these add up to 5168 yr. Somehow this cycle corresponds to what is going on at the end of an interglacial period. We have to look at this 5168-yr. period in another way. It is not only a big clock in the sky; it is a dynamic force. Think of our planet as a ball made up of a central core composed mostly of iron, which is surrounded by a hot liquid inner mantle, and around that is the lithosphere, the thin skin of cool rock that floats on top of the liquid inner mantle. The conjunction of planets sets up a stress in the earth. Some part of this complex could very well be affected by the planetary stepwise torque; there would be a little added stress on each part, and the whole process would cause a large amount of structural dislocation, expressed as earthquakes and volcanic eruptions.

The reason I bring up this possibility is that, because of the El Niño phenomenon, the temperature of the ocean at the Equator in the east Pacific rises dramatically. Calculate how many BTUs or joules of energy it would take to heat up that big a bathtub by 12° F., and you will find that would take a stupendously big furnace. That furnace happens to exist under the sea (see Fig. 1). There are hot strips on the earth. A long hot strip runs down the Ural Mountains, for example, through India and the Indian Ocean. It can be measured at many data points on the earth. This indicates that down in the outer mantle, at a distance of about 400 km down, there is such a long hot strip. Almost opposite that first strip is another hot strip, which is easier to visualize: it runs along the west coast of North America and South America. It runs all the way down from the Yukon Territory to Colombia, Ecuador, and Peru. The third hot strip traverses the length of the east-ern Atlantic, from Greenland to the Antarctic.

Thus the earth has three great heating elements. These put out tremendous amounts of energy cyclically, not constant-ly, and this fits the scheme of nature.

In the central Pacific Basin there is another equatorial running hot spot. This hot spot, originating far down in the mantle, heats the sea surface; this is the source of the El Niño phenomenon. It is not only locally that this heating effect is felt. Its original source is the subduction of the Pacific mantle plate moving under the edge of the American continents as hot material, and it is this subduction that sets

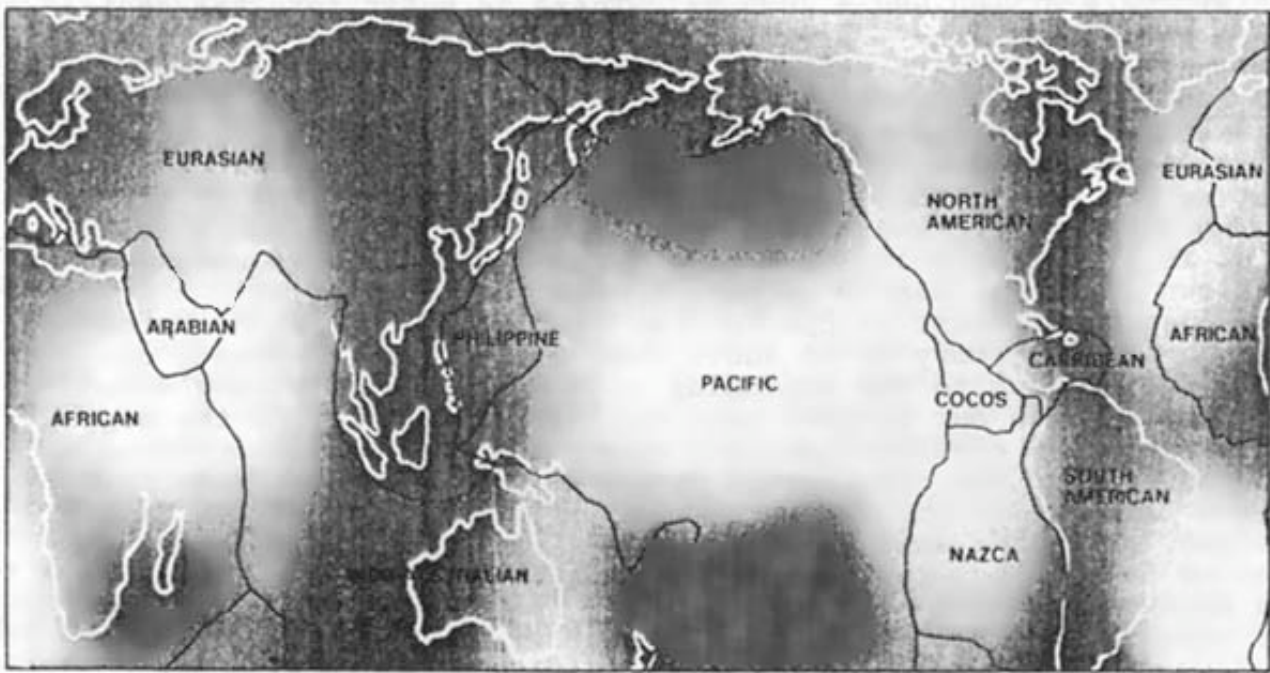


Fig. 1. Analysis of earthquake waves that have traversed the earth's interior reveals the hot areas (light shading) and cool areas (dark shading) on the earth. (The New York Times, March 6, 1984)

up the surface thermal cycle in which the normal west-to-east flow of the ocean and the east-west flow of the atmosphere are reversed. The whole heat engine of the earth is thrown off balance. The heat engine is made up of the trade winds that blow from this equatorial area northward. In our northern continent, the trade wind goes up to the region of Alaska and then turns downward through Canada; on the daily weather report this is known as the jet stream. All this activity brings much hot water vapor into the atmosphere, fueling the heat engine, and brings about these many weather turbulences in the northern hemisphere. But in other parts of the planet, particularly the southern parts—Australia, Indonesia, India, South Africa—it brings about extreme drought. What is normally a high-pressure area here in the eastern Pacific becomes a very low-pressure area off northern Australia. It sucks up all the water vapor that would normally be distributed in the east Pacific, the trade winds are disrupted, and the heat and water vapor are sent northward. These are the basic workings of the heat engine, which is a fundamental phenomenon that must be taken into account.

Let me repeat: there are deep subduction zones in the Arabian-Indian zone and the eastern Pacific zone, which also show hot spots. These hot spots heat up the surface water, which then sends up too much steam into the atmosphere and disturbs the whole heat engine. The heat and water vapor move northward and set up typhoons and all sorts of weather anomalies. So much water vapor is shipped north that there is no water left for the other parts of the planet. This produces a mixture of excess rainfall, with all the dynamics that accompany such rainfall—typhoons, hurricanes, high-pressure areas—in the northern hemisphere, and the severe drought in the southern hemisphere. This is the kind of thing that is happening in the world now.

I AM proposing that every 5168 yr. there is this kind of planetary heating effect, which brings about many climatic disturbances. Along with the atmospheric effects and the effects on the oceans, there has also been a record number of earthquakes starting in 1976-1977; 1976 was the worst earthquake year in recorded history. Over 1,000,000 people were killed, and there was great property damage and all kinds of destruction.

Earthquakes are caused by hot magma coming up below the lithosphere, which will then form cracks in the upper crust. Such sudden cracks and movements in the tectonic plates are a form of stress release. There have been many of these in the last 7 yr. The worst damage was done in the Tang Shan earthquake in China in August 1976. In March 1984, Waverly Persons of the U.S. Geological Survey reported that 1983 also saw a record number of big earthquakes. When magma rises up, the lithosphere forms cracks, just like dough rising in an oven.

Then there is vulcanism: that is, some of that hot magma must escape the confining pressure. Recently, we have had great volcanic activity. El Chichon in Mexico is notable for the amount of sulfuric acid it has thrown up into the atmosphere. It is estimated that there are about 100,000 t of sulfuric acid in the atmosphere now, most of it from El Chichon, some from other sources. Everyone has seen the films on television of Kilauea on Hawai'i spurting off during the past year. Kilauea actually started this big cycle of eruptions on about Nov. 29, 1975, and has been going on since then.

In volcanic activity, sulfuric acid is formed by the release of sulfur dioxide, which mixes with the water vapor in the air to become sulfuric acid. There is also an enormous amount of dust thrown up, which gets into the thermal engine of the earth and fouls it up in ways we do not understand. All these mechanisms also produce a great deal of carbon dioxide (CO₂). This compound is extremely important because, the more CO₂ builds up in the atmosphere, the more a "greenhouse" or screening effect is seen. When the sun's rays come down through the CO₂ in the atmosphere and then reflect upward to escape into the cold vacuum of outer space, the heat rays are reflected back down, and this is a classical greenhouse effect. This effect increases the thermodynamic pressure on the great heat engine of the planet.

Thus there is heat from the magma, heat coming through the cracks in the earth (earthquakes), and heat resulting from vulcanism sending up hot gases. In addition, the solar radiation is being trapped by the greenhouse effect. Thus it is clear that this planet is building up to fever heat.

Since the earth is building up heat, you may ask, why has there been so much cold weather in the northern hemisphere, and why is there so much snow? These questions are answered in the next part of the argument.

THESE abnormal weather conditions are caused not by the absolute temperature on any given point on the planet but by the temperature differential between the cold polar air and the equatorial temperature. For example, if it is 0° F. at the North Pole, and 76° F. at the equator, the difference between these two values is the differential. If the North Pole is cold, the hot vapor and hot air at the equator goes toward it; once it gets up there, it either precipitates as snow or it starts turning around in the form of huge cells of warmed air. It turns downward and eastward, bringing cold air down to the temperate regions. This back-and-forth movement of the heat engine of the earth is what causes abnormally cold weather at those times when there are abnormally hot conditions at the equator. However, this all tends toward equilibrium, what in biology is called a homeostatic effect. I predict that this kind of oscillation of the heat differential between the Pole and the equator will indeed tend toward equilibrium. And my own scientific analysis leads me to believe that there has been such a buildup of heat inside the earth, through all the mechanisms that I have described, that when it reaches a certain point, the heat in the earth is going to start decreasing. In other words, there is going to be a reversal, during which the earth will act as a heat sink to absorb or dissipate unwanted heat. The earth is now beginning the next phase of its cycle, which is the heat-sink phase.

One always thinks of the earth as giving off energy endlessly,

like Mother Earth, who will never stop feeding her children. But there are numerous indications that a reversal point has been reached. One indication will be seen this summer (1984). I have calculated when this should occur. There has been record cold all over the world during the period December 1983 through February 1984. This is the first sign of a reversal from a heat-source planet to a heat-sink planet. Like all cooling things, the planet is not suddenly going to switch to a cool state; there will be little cooled spots here and there all over the earth, depending on the underlying conditions. For example, let us say that hot magma generally rises on the west coast of Ecuador. Now, instead of rising, it will slide back into its little hole (heat-sink effect) and it will pull heat from the atmosphere in with it. This will also cause the atmosphere above it to be cooled. What I am predicting is that during this coming summer, roughly in July, when everything is green and growing, the wheat is about to be harvested and the corn is just getting up to knee-high, we are going to see a very amazing phenomenon. The freeze that happened in Texas in 1983, and in Florida, when the citrus trees froze (1984), were just the beginnings of the phenomenon I am talking about, which will occur this coming summer and will last for several years. At the height of the crop season, there will be sudden freezes, which will have serious effects on our food supply.

THE heavy rainfall during the entire interglacial pluvial period has had a profound effect on the planet, one that is rarely thought about. There is a great deal of scientific documentation on these effects, however. The conclusion is that there has been a continual leaching out and washing away of the trace minerals in the soil all over the planet during the recent interglacial period. This increased pluvial action slowly demineralizes the topsoil, and the result of demineralization, which is what we are seeing now, is the death of the great forests all over the globe. The great Schwarzwald forests of West Germany are dying, and nobody knows why. It has gradually been noticed over the last 20 yrs., but the reports have become serious in the last 10 yr. According to very recent data, the great Appalachian forest chain stretching from Alabama up to the northern tip of Maine, is also dying. Again, nobody knows the reason. "Acid rain" and other disorders are often blamed, but there is no proof. I am suggesting that there is a much deeper mechanism at work than we suspect.

One characteristic of this period, which is the end of the interglacial cycle, is the demineralization of the soil; there is also another factor at work that I do not want to discuss in any detail—ELF.

I have spent most of my time during the last 7 yr., when I first discovered that the Soviet Union was bombarding the planet with extremely low frequency (ELF) signals, which are essentially magnetic waves (B-field) in the frequency range of about 6 Hz up to (according to my most recent measurement) about 18 Hz, in studies of this phenomenon. Anybody can pick up those signals on a shortwave set; you can find them splashing through all the bands from ULF to VHF. A good place to look is about 10.5 MHz, in the 19 m band, and you will hear this rat-tat-tat signal coming through, which sounds like a machine gun. That is the Soviet ELF signal. In 1977, I tried to be a good citizen and alerted the government, contacting specific agencies such as the CIA and giving them the data that I had accumulated. It showed that the Soviet ELF signal is not an over-the-horizon radar, not a new method of communicating with submarines, but is in fact a psychoactive signal: it works on the brain.

We now know that the effects of ELF are very frequency-specific. Using an artificial ELF generator, you can beam a person without his knowledge; you can lock him up in a Faraday cage, a submarine, or a great steel vault. ELF will pass through any kind of material; it is not attenuated by any material known on earth. It will go 1,000,000 m without any measurable attenuation. Thus there is no physical shield against it. This ELF signal at about 6.6 Hz will cause depression,

the classical symptoms of cholinergia, which has been called the “Minnesota March depression.” This is a well-known phenomenon also observed throughout the northern climates.

The Soviets use this frequency occasionally. They also seem to like the 11-Hz signal, which makes human beings very agitated and can lead to riotous behavior. It has caused several blackouts as well. The last one we know of is the July 1977 blackout of New York City, when many people went berserk. A global network of people with whom I am associated monitored the Soviet signal for several days before the event occurred in New York, and Soviets were aiming very specifically at bringing a very powerful signal down the Hudson River for 3 da. before the actual blackout and the riots occurred.

Another frequency—the 8 Hz signal, which is the alpha frequency of the brain—makes one feel very good. In a trained yogin who can go into instant meditation, the brain frequency spectrum peaks at 8 Hz. There is a long, complicated physiological explanation for why this is a good effect and the others, a few cycles away, are very bad. In a recent issue of *Science* is a report⁴ by three scientists from the Naval Medical Research Laboratories at Bethesda, in which they show conclusively, in my opinion, that the frequency ranges that they examined, from 15 Hz to 4000 Hz, acting on cultured human fibroblasts, will cause an activation of DNA synthesis, a multiplication of cell division. (They did not report on the lower frequency ranges that I mentioned; that information is classified.)

The article very clearly states that ELF at the power levels used—from 10^{-5} to 10^{-6} T/s, which is an extremely weak magnetic signal—are mutagenic; that is, they can cause mutations in the cell. The most common mutation that I know of is cancer. So these tiny weak magnetic signals are very frequency-specific and have negative effects. Unfortunately, the U.S. government has classified most of this data.

I AM not laying the blame for unusual weather, earthquakes, or any of these biological phenomena on the Soviets, even though they did initiate the world-wide ELF emissions on July 4, 1976. It has been known since 1954 that the natural resonant frequency of the earth—between the ionosphere and the earth—is 7.82 Hz. Our sun sends out big magnetic plasma waves, which spread throughout the solar system. These waves have a very long period: some have a day-long period; others have a period of several days (see Fig. 2). And a certain percentage of them are in this frequency range of 7.82 Hz. As the magnetic waves come from the sun, the earth acts like a capacitor and traps 7.82 Hz; that is, it filters out the 7.82 Hz waves from the solar plasma coming past the earth. This frequency (7.82 Hz) is present on the planet all the time. It is the frequency that has a powerful effect on living things.

We now know that if the power spectrum of the magnetic waves in the human body peaks at a center frequency (measured by nuclear magnetic resonance techniques, by EEC, and by magnetoencephalogram) of 8 Hz, spreading out around that center frequency up to about 200 to 300 Hz on each side band, that body will be a normally operating physiological system. Why is this so? Because this 8 Hz frequency is the spin-spin coupling constant of the hydrogen atom, especially in resonant hydrogen bonding of DNA. It is the hydrogen bond that resonates at this frequency; this is what keeps the hydrogen bond stable. But if it deviates the least bit from 8 Hz, toward, say, 6 Hz, or goes over 11 Hz, there will be a triggering of DNA replication. And that can have many different effects.

I will give you a small example. I was deeply immersed in this research with a group of scientists, and we wondered why the Soviets had recently shifted their ELF signal from 11 Hz to 18 Hz. We found out that artificially stimulating human beings with 18 Hz is the equivalent of taking about 20 mg of Dexedrine. After about 2 hr, it began to take effect: that is, the subjects began to “speed.” This “speeding” is not due to the mechanism that produces these effects after taking Dexedrine;

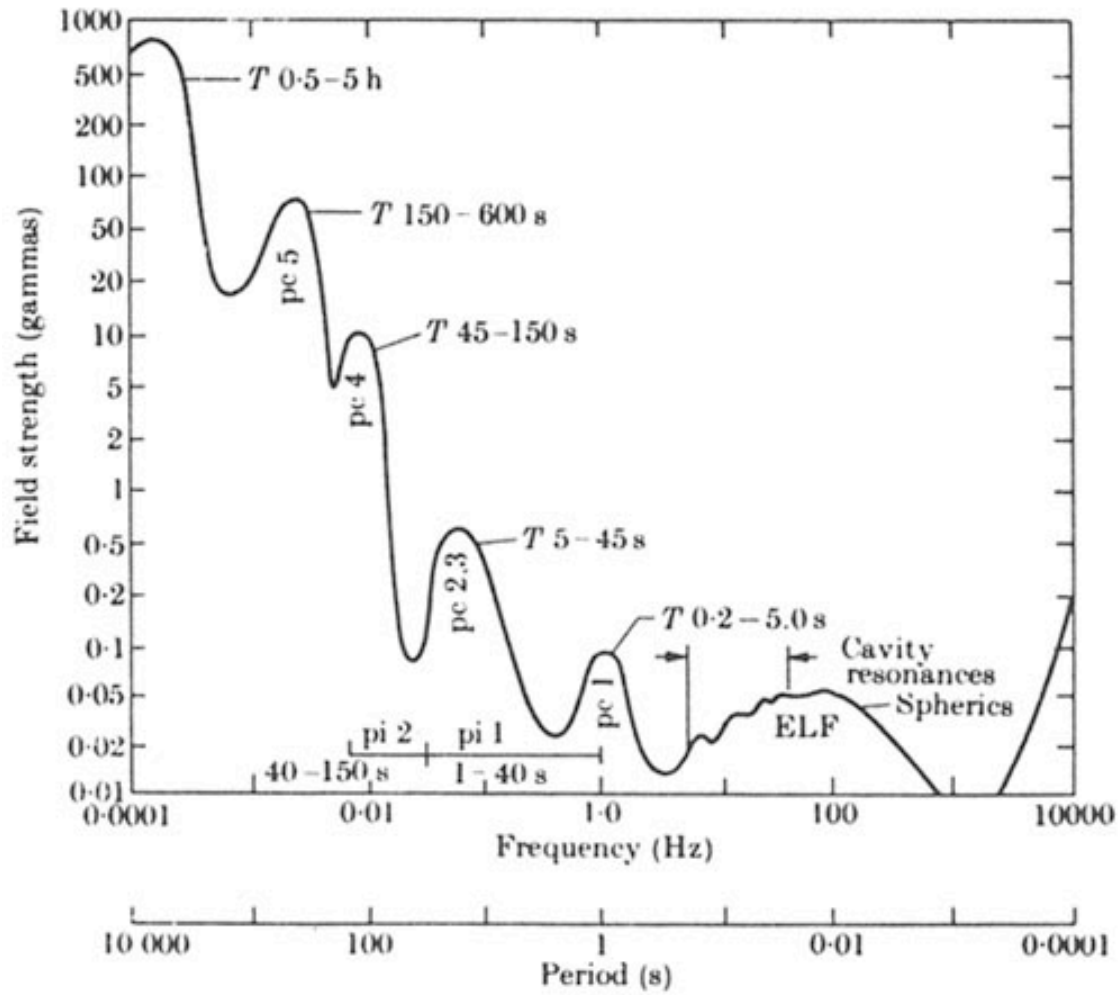


Fig. 2. The electromagnetic frequency spectrum of the magnetic waves emanating from the sun.

it is the result of increased cell division, due to this stimulation of the DNA mechanism at frequencies of between 16 Hz and 18 Hz.

The exact mechanism of the cancer effect may be of interest here. The DNA starts to divide and sends out a signal to the messenger RNA. One of the forms of the RNA goes to the ribosome, which is part of the nuclear mechanism that determines the sequence in which amino acids are put together to produce peptides. Peptides are the enzymes that control most of the body's biochemical mechanisms. It has been found in mice that this is the mechanism that rearranges the order in which amino acids are supposed to be strung together, thus producing unnatural peptides and enzymes. These in turn lead to a mutagenic or carcinogenic action.

I S THERE anything that human beings can do, individually or collectively, to prevent the full working-out of the interglacial cycle in terms of the negative effects on the food chain and the disturbed ELF resonance of the earth's magnetic field?

In answer to this basic question, I say yes. We have enough technical skill, enough knowledge, a sufficient number of giant machines to influence this system enough so that life can go on without too much destruction. There is going to be some destruction; it is going on right now. Just from what we have seen over the last 2 yr., the rate of plant life-loss on this planet is absolutely appalling. The answer is yes—but it would require something that it is almost impossible for human beings to do. It would mean that all the human beings on earth had to stop their quarrels immediately and enter into a cooperative effort, probably over a 10-yr. period, in order to save themselves and mankind. I mean mankind, genetically speaking. If mankind could mobilize in the face of this threat, we could perhaps have the finest and most glorious period of human history.

Very briefly, what would it take to bring about such a miracle? First, I want you to know several facts, from my own data and from those of other people. Buckminster Fuller was a friend of mine, and we had much in common. One of the last statements in June 1983, in Baltimore, before he died, was that mankind had only about 3 yr. left in which to make up its mind as to what to do about the global situation. When a man like Fuller, for whom I have the greatest respect, says something like that, I have to take his opinion seriously.

He was largely influenced in his thinking by John Hamaker of Lansing, Mich., who wrote a book called The Survival of Civilization.⁵

Hamaker's opinion is that we have until 1990. If we do not do anything by 1990, then by 1995 we can start phasing out the process called civilization.

T HESE are pretty heavy ideas, and most people are afraid to face them squarely. What does it take to tackle this to-be-or-not-to-be problem? What I think should be done is to take the following steps:

1. Human beings being what they are, there would have to be a charismatic political leader who took up the torch, someone around whom all of humanity could rally, so as to initiate cooperation among all governments.
2. There would also have to be a charismatic scientific leader, who would be able to persuade most scientists that there is a viable technological solution.
3. The fact that we have tremendous global communication capability through TV and satellites means that we would have to find a cinematographic genius to produce a motion picture equivalent in impact to the recent film The Day After. This would have the effect of alerting and educating most of the inhabitants of the earth.
4. Once some cooperation had begun (and, of course, it is Mission Impossible to think of getting such cooperation underway!), concrete programs could be initiated in the technological area.

Some of these programs are summarized below.

1. From satellite monitoring and other kinds of monitoring, we know that the Soviets have 7 giant operational ELF transmitters, each operating approximately in the 100 MW range. The United States is trying to catch up with the Soviet Union; it has now built 3 ELF transmitters. One is in South Africa, one is in Antarctica, and the third is in Australia, in the Alice Springs area. They are not fully operational; they go on and off the air. All 10 of these ELF transmitters on the earth should be stopped from using the frequencies they now transmit, because they are all bad frequencies for plants, animals, and man. They should all be tuned to the 8 Hz frequency, so as to support plants, plankton, fish, animals, and human beings, in order to stimulate growth, and in order to start reducing the CO₂ or “greenhouse” cycle. The only way to stop the CO₂ cycle is to bring onto the earth billions and billions of trees and plants, which can take in CO₂ from the atmosphere and return more oxygen to the air, in order to lower the present concentration of CO₂.
2. Billions of trees must be kept healthy and growing vigorously in order to take CO₂ out of the atmosphere by storing it in wood.
3. The entire earth should be covered with a dusting of montmorillonite, a chalky powder that contains most of the 72 trace minerals that are required for healthy plant, animal, and healthy human growth. It would help to revive dying forests and would also bring hope to those parts of the planet that have not seen forests for centuries.
4. All use of synthetic fertilizers should be stopped; man should return to labor-intensive organic agricultural methods.
5. Man must somehow cut down all noxious gases and CO₂ emissions from industry, automotive vehicles, aircraft, and ships as soon as possible.
6. The ozone shield in the stratosphere should be restored, in order to protect us from the harmful effects of ultraviolet. The same ELF transmitters now in use can be used to create ozone layers in the atmosphere.
7. Purify and clean all water supplies for man, animals, and plants. There are different ways of purifying water, but the first thing that one must do is to clean up the aquifer. There is a method of changing water by running it through magnetic fields. I have been one of those working on an experiment in Mexico for the last 10 yr., in which water in irrigation tubes is run through a magnetic field, and when the water comes out, its properties are changed. Such magnetized water can be fed to trees, sugar cane, and various vegetable products; and it has been found that within 6 mo there was a doubling of the crop yield without any additional input of fertilizer, nitrogen, phosphates, or other substances. There are also other techniques that have not been tried, which can be used. Dan Carlson has used one of these techniques, which can spread all over the world.

There is very little in this plan that will immediately change the climate in the northern part of the planet. It will take a while to shut down this thermodynamic engine, mainly by slowly extracting the CO₂ from the atmosphere. So plans must be made to relocate those living in the north who are living energy-intensive lives, since it may be very difficult to maintain life when these mini-freezes set in and begin to cut down the food supply. This means that, if people are to be moved around globally—and by that I do not mean simply relocating them from Canada to Mexico; I mean globally—all immigration laws will have to be abolished, or we will never be able to accomplish this.

REVIEW OF THE BIOLOGICAL EFFECTS
OF ELF RADIATION
FROM TESLA TO THE PRESENT

IN 1900, Nikola Tesla was still optimistically trying to chart the long course that man had to work through to find peace. In addition to working out methods to increase human mass-energy, and making his vast contributions to lubricating the retardant forces with teleautomatic science and technology, Tesla contemplated methods of increasing the advancing forces in man's energy equation.

Tesla's analysis is superb. He points out that all the energy sources on earth available to man—coal, oil, wood, waterfalls, tides, wind, solar radiation—come from the sun. Thus the best way to increase the energy contribution of these advancing forces is to capture more of the motive power of the sun, thereby amplifying man's natural energy endowment. This amplification would increase his output of work, whether in terms of his own work, his environment, or his evolution. The onward movement of man would thereby be accelerated. Tesla points out in no uncertain terms how barbarous it is for man to burn up millions of years' inheritance of wood, coal, and oil in a few generations. Man must, he said, find renewable, nondepletable sources of energy.

Tesla then produced a long line of inventions designed to bring about this result. Working at his laboratory in Colorado Springs, he invented an advanced type of steam engine that utilized coal more efficiently; he invented and perfected the best high-pressure steam turbines ever known; he devised apparatus to capture the energy of the wind and the tides. He invented methods of capturing the vast geothermal energy of the earth. He invented solar energy devices that converted sunlight into electricity by day and transformed the sun's radio waves into electricity by night. He invented devices to convert heat directly into electricity—thermo-electric machines. He devised methods to convert magnetism or gravity directly into motive power. And all the electrical output of these inventions was to be transported wherever needed on the planet by means of a grid known as the Tesla Magnifying Transmitter towers.

But he reserved his highest skill and greatest dedication to finding ways to extract energy from what he called the ambient medium—literally, the air and/or vacuum that surrounds us. Today we would call this goal the extraction of energy from zero-point vacuum fluctuation. This process also contemplates penetrating the wall of light, the velocity-of-light barrier, to extract energy from the domain of tachyons, particles exceeding the speed of light at supraluminal velocities. Theoretically, this energy transfer across the wall of light occurs through mini-black holes and mini-white holes—a theory not yet proven, but under active discussion by scientists today.

Tesla outlined the 5 elements that must be mastered to extract energy from the ambient medium. His approach did not contemplate extracting energy from mini-holes (which have a diameter on the order of 10^{-39} cm) but from the regions of vacuum between the planets. By modulating the electrostatic forces around the earth, thereby perturbing the sun, he planned to draw energy from the sun to the earth. His 5 requirements are summarized as follows.

First, he needed a mechanical modulator that would tap the earth to bring out full mechanical resonance. This would produce a sonic wave that bounced from pole to antipole every 108 min. He solved this problem by means of a unique steam engine, which he exhibited as early as 1893 at the Chicago World's Fair.⁵

Second, he needed to develop an air compressor that would liquefy the air in sufficient amounts to run his huge Tesla Magnifying Transmitter (TMT) secondary coil at superconducting temperatures. He worked for a long time at this problem, but it was solved by Dr. Carl Linde, working independently, and Tesla was the first to give him recognition for priority.

Third, he had to perfect the TMT in order to utilize the upper stratosphere and certain layers of the ionosphere as a conductor of electricity. He developed a laboratory bulb model of the earth/ionosphere condenser (Fig. 3). The earth was represented by a central bulb S; the ionosphere was represented by an outer glass globe L. The intervening space represented the atmosphere. The earth S was energized by the TMT and light (radio waves) resonating between the earth S and the ionosphere L in different patterns. A beam of light could be formed in this model.

Fig. 4 shows more clearly how such a beam could be formed; such a beam is called a "standing wave." From point 1 (Riga), an ionospheric electromagnetic wave, moving at the speed of light (c), goes to point 4 (Ottawa). The wave moving from point 1 to point 2 goes from Riga directly into the earth through the hot iron core, where it picks up energy and a velocity $> c$, the tachyonic level, to reach the antipode at point 2. At point 2 much of the energy dissipates into space, and some of it is reflected by scattering around the iron core in the cone shape to point 3. Thus the standing wave SW is formed by velocity-phase interference patterns, producing a magnetic standing wave. This magnetic standing wave can be moved, steered, or made stationary (at any rate desired) by adding another wave to the system (emanating from Gomel, a point not on the map). When the wave from Riga and the one from Gomel are properly phase-locked, the wave SW can slowly sweep around in its great circle route or can be made to stand still over cities like Timmins, Ontario; New York; or Peking. The Soviets have used the region between Timmins, Ontario, and Ottawa, Ontario, very extensively as a human experimental territory, because they had a large spy network in this area ready to report the local effects back to Mos-

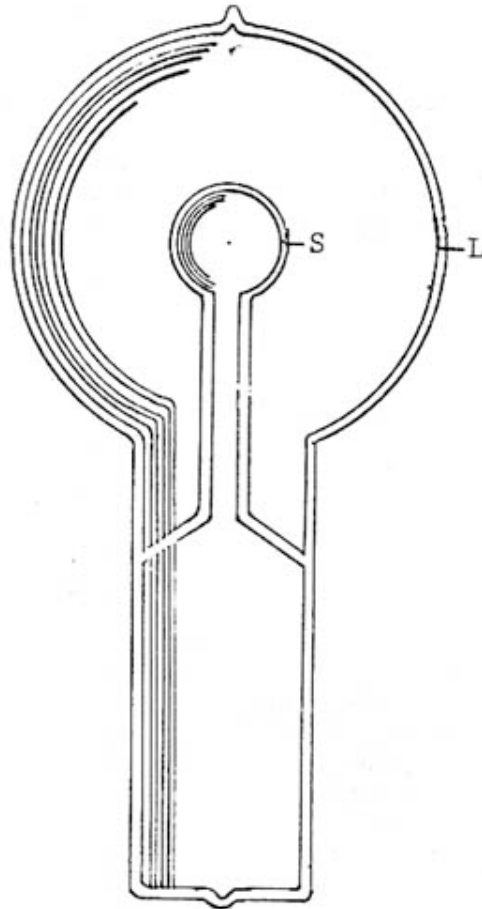


Fig. 3. Laboratory bulb model of the earth-ionosphere condenser.

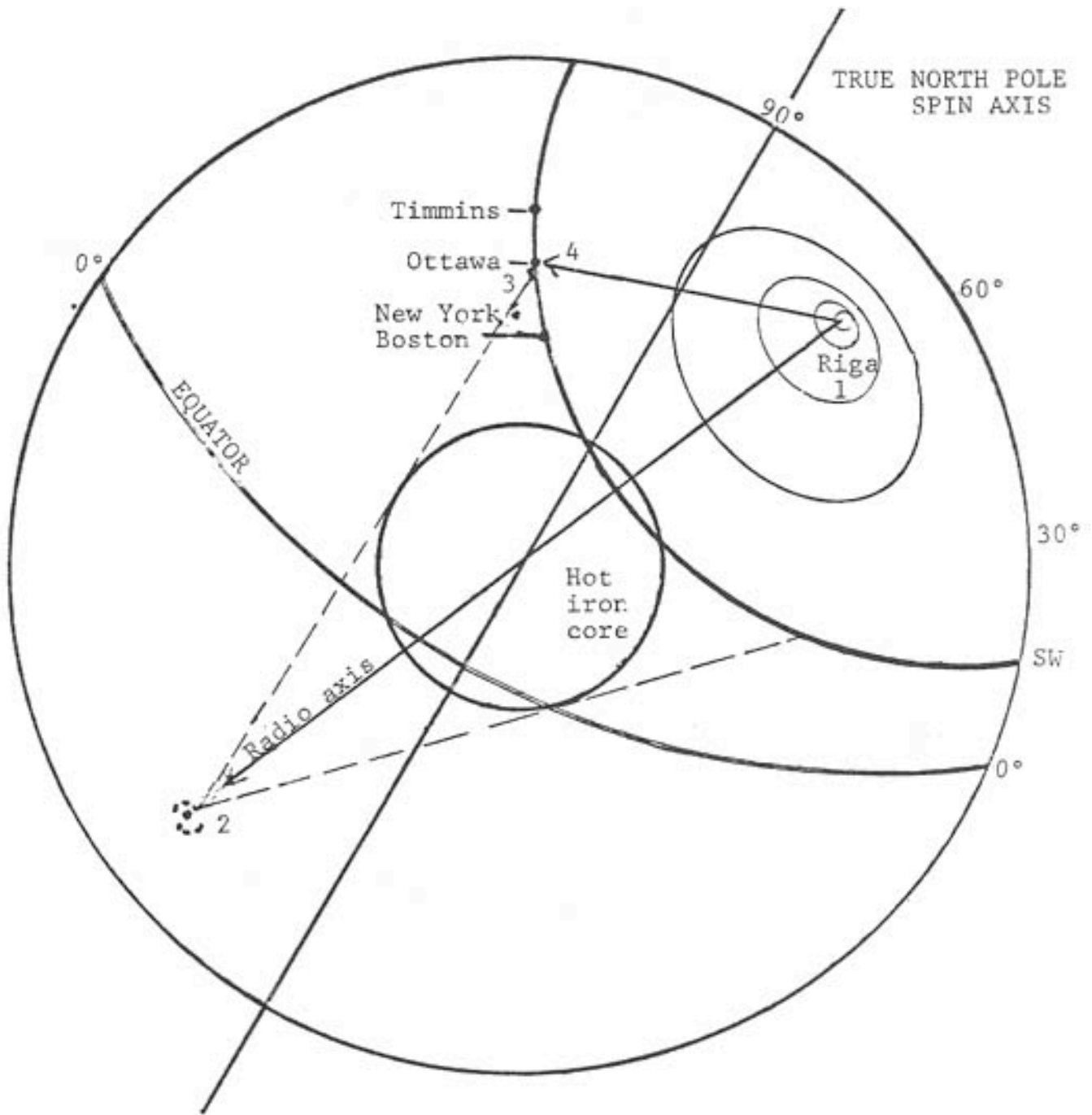


Fig. 4. Formation of a standing magnetic wave. Where earth wave (3) and atmospheric wave (4) meet, a huge standing wave is formed.

cow by secure diplomatic pouch. This spy ring was broken up by the Royal Canadian Mounted Police in February 1978, and 26 KGB agents operating out of the Soviet Embassy in Ottawa were expelled from Canada.⁶

A S WE have already amply demonstrated, this third requirement, that of ionospheric conduction, has been mastered. The Soviets perfected Tesla's model by placing a large satellite in polar orbit with a nuclear power plant of 100 kW aboard to help control the standing-wave pattern. On Jan. 24, 1978, this nuclear-powered Soviet satellite crashed in the Great Slave Lake region of Canada.⁷ It is not known yet whether or not the U.S. government shot it down with one of its Killer satellites. Thus the third requirement involves an electric oscillator (the TMT) that will resonate the electrostatic forces operating between the earth conductor and the atmospheric conductor.

The fourth requirement requires all of Tesla's art of teleautomatics—including the use of computers and satellites to tune the earth to precise resonance to produce the desired effects.

The fifth element requires that this earth-tuning be extended to bring the sun into resonance with the earth.⁸ This would immediately set up a flow of many energies between the two bodies. The trick is to control the flow of energy from earth to sun in perfect balance for life functions. This is not easy, and very little is known about what can happen, should such resonance be achieved.

One of the basic questions on the agenda of science and epistemology has to do with the way in which the fundamental particles—photons, neutrinos, electrons, neutrons, and protons, etc.—are assembled into atoms, how atoms are assembled into molecules; molecules, into living cells; how living cells combine to form a nervous system and a brain; and why, through the brain, a mind appears. This problem has haunted philosophers since the earliest times, and today we are no closer to a solution than we were in the beginning. Our only advantage is that we can, perhaps, state the problem a little more precisely. And that is all that I intend to do here.

O NE of the simplest correlates that we have between the mind and the brain is the existence of electromagnetic (EM) waves emanating from the brain and recorded as the electroencephalogram (EEG). The EM waves recorded by the EEG span the ELF spectrum from 1 to 40 Hz. In 1968, Dr. Joe Kamiya of the Langely Porter Neuropsychiatric Institute proved that humans could be taught to control the EM spectrum distribution of their brain waves consciously.⁹ This was one of the first proofs that the mind (acting as will) could control the EM waves emanating from the matter of the brain. Years earlier, Norbert Weiner and W. Grey Walter had reported that highly trained yogins were able to bring on a specific frequency of the ELF spectrum, the 8 Hz "alpha" frequency, by conscious control.¹⁰

More recent research¹¹ with computer analysis of the power spectra of the EM waves of the EEG shows that highly trained humans who can consciously control their brain waves have a sharp peak at 8 Hz in their EEG spectrum.

Subjects in the group receiving classical conditioning showed a sharper power peak at 9 Hz with a sharp falling-off at the lower end at 6.6 Hz, and at the upper end of the spectrum at 10 Hz. Subjects with the same training, but who were given feedback as to their performance and regarded it as, a learning process, showed a sharp, very high power-peak centered on the curve at precisely 8 Hz. The question is: Why does the human "will" and "mind" consciously drive the EM spectrum to a sharp peak at precisely 8 Hz? There must be some basic mechanism to be explored here.

We can find two clues in nature relating to this underlying mechanism. One lies in the frequency of the magnetic waves that bathe the entire solar system—a macrophysical field in which earth life exists. We can also find a clue at the microphysical level, in the relationship

between the velocities of the proton and the electron. This is important because the proton and the electron combine to produce the first atom, hydrogen. And it is hydrogen that makes up some 90% of the matter of the universe and about 66% of the matter of a living body. We shall examine each of these clues in some detail.

In Fig. 2, we see the EM frequency spectrum of the magnetic waves emanating from the sun.¹² Note that the periods of these waves range from 5.0 h (the period of 1 wavelength of EM energy spanning the diameter of the solar system is 5.5 h at the velocity of light) up to frequencies in the hearing range of man, with a period of 0.0001 s (frequency of 10,000 Hz). The part of the spectrum labeled “ELF, cavity resonances,” which covers the frequency range from 4 to 40 Hz, does not look very distinctive in Fig. 2.¹³ When we magnify this small portion of the solar spectrum, we see some surprising things.

The fundamental frequency is in the 8 Hz range ($7.8 \text{ Hz} \pm 0.2 \text{ Hz}$), while the other frequencies are harmonics. Why does the earth act as a sharp filter for the 8 Hz spectral line? On the curve, the 8 Hz line falls off to a deep valley at 6.66 Hz at the lower end and to a deep valley at 10.80 Hz at the upper end.

There is a profound significance to these curve characteristics. If the EEG of a human being is entrained, either by conscious control, by artificial drivers, such as photic stimulation, or by magnetic waves (B vector pulses) at 8 Hz, the human being experiences a “high”—a sense of extreme well-being. This is the state that the practitioner of yoga strives to attain. It is a poised state of balance and health that reflects the 8 Hz sharp power peak.

If this 8 Hz EEG center frequency is pulled down artificially by photic or magnetic entrainment, the human being’s mood veers toward a depressive state. This is due to the release of cholinergic chemicals into his nervous system. We have found that this lower frequency is centered at around 6.66 Hz. It is this frequency that has been used so intensively by the Soviets in their global mind-control experiments. When the EEG is artificially pushed up from 8 Hz to the upper frequency dip at 10.80 Hz, the human being tends toward an excitatory state, which can lead to riotous behavior. This state is brought about through the release of adrenergic chemicals into the nervous system. Over the past 3 yr, we have never observed the Soviets broadcasting the 8 Hz signal, which is so good and beneficial for man and all living things. They have used only frequencies deleterious to man and living things—6.6 Hz and 10.80 to 11.00 Hz.



WHAT is the underlying mechanism of these powerful effects on the human mind and mood over such narrow frequency shifts? We must very obviously be looking at one of the fundamental control processes of life within this mechanism. Without going into all the reasons here, we can say that biologists know that hydrogen—a proton and an electron—contains some basic life-controlling mechanism. For example, cell or egg division occurs when the hydrogen bonding between each strand of a genetic double helix is released; this is a kind of zipper-opening effect. This “opening” process is controlled by hydrogen, but it can be completely blocked by adding about 28% heavy water to the liquid suspension of the eggs or cells. Heavy water contains a minor variation on the normal hydrogen content of water wherein the hydrogen becomes “heavy” when one neutron is added to it. Thus to the proton and electron of hydrogen is added one neutron to become deuterium, the heavy-water constituent. This small change stops a basic life process—cell division—necessary for reproduction, repair, energy, and healing. The genetic material is not “poisoned” by the heavy water; however, if the heavy water is removed from the suspension and replaced with normal water, cell division resumes. What component of this simple system carries the information bank and controls the information about the life process? What component is the “control rod,” which allows transfer of this information to other atoms and molecules? (See Table 1.)

Table 1. Flow chart relating nuclear spin properties and magnetic moment properties.

Direction of increasing rate of cell division →

-32 Hz -16 Hz 0 Hz	8.00 Hz	16 Hz 32 Hz 64 Hz
<p><i>Factors That Decrease Cell Division Rate</i></p> <p>When cells are placed in H₂O suspensions that contain 27% or more of deuterated water, cell division stops, reversibly.</p> <p>${}^2_1\text{H}_1 = \text{Spin } I = 1, \mu = 0.85$</p> <p>${}^{14}_7\text{N}_7 = \text{Spin } I = 1, \mu = 0.40$</p> <p>${}^6_3\text{Li}_3 = \text{Spin } I = 1, \mu = 0.82$</p> <p>Nitrogen acts as an anesthetic, and Lithium is a cell depressant.</p>	<p style="text-align: center;"><u>NORMAL</u></p> <p style="text-align: center;"><i>Stabilizing Elements:</i></p> <p>${}^1_1\text{H}_0 = I \frac{1}{2}, \mu = 2.79$, and all elements with spin $\frac{1}{2}$ or integral $\frac{1}{2}$ spins with odd number mass and $\mu = 0$ or with spin 0 and even number mass.</p> <p>All proton-proton, spin-spin coupling energies pull toward 8 Hz.</p>	<p><i>Factors That Increase Cell Division Rate; May Lead to Cancer</i></p> <p>Genetic susceptibility Chemical pollution: industrial pollution, automobile emissions, cigarette smoke, food additives, water pollution Ionizing radiation ELF radiation Geographic soil factors Nutritional deficiencies Trace elements deficiency Viruses Cosmic ray flux Neutrino flux Telluric ELF Weak transmutations</p> <p style="text-align: center;"><u>ABNORMAL</u></p> <p>All proton-proton, spin-spin couplings pull away from 8 Hz + or - .</p>
<p>OZONE TREATMENT: →</p>	<p style="text-align: center;">RNA → transferases + tetrahedral forms of H₂O</p> <p style="text-align: center;">↑</p> <p style="text-align: center;">↓</p> <p style="text-align: center;">Normal terminal respiratory chain electron flow restored, also normal rate of cell division</p>	<p>→ Topological singularity initiating local desynchronization.</p> <p style="text-align: center;"><u>ABNORMAL</u></p> <p>Polypeptide and protein transcription errors leading to RBC dedifferentiation and increasing iron losses of:</p> <p>ferritin, ferredoxin, transferrins.</p> <p>Changing electron flow (reversal) and producing chlorophyll, quantasomes.</p> <p>Initiating photosynthesis by the Hill reaction:</p> <p>$\text{H}_2\text{O} + \text{H}_2 = \frac{1}{2}\text{O}_2$</p> <p>$\text{CO}_2 + 2\text{H}_2 + \text{H}_2\text{CO} + \frac{1}{2}\text{O}_2$</p> <p>$(\text{H}_2\text{CO})_n \rightarrow \text{Hexoses}$</p>

I have pondered these questions most of my life and am just now beginning to get some insight into the process. My fundamental postulate is that the proton has a complex inner organization, containing an information bank with all the instructions necessary to build all the atoms and molecules required for structures as complex as a brain. I shall not try to present the idea I have of the detailed workings of this information bank. I have much work to do to complete the design of this proton computer. Preliminary data has already been published on this idea as a theory of “protocommunication.” The postulate states that the proton information is released in quantum form by its orbiting electron.

We can examine, in an elementary way, a basic relation between the proton and its electron. The proton moves at a certain velocity around the proton in its own elliptical orbit. It has been ascertained that the ratio of the velocity of the electron to the velocity of the proton is 8:1. This has been determined by ab initio computer models, through the work of scientists at the IBM Laboratories, San Jose, Cal., headed by Enrico Clementi. This information tells us that it is the nuclear spin properties that determine the magnetic coupling constants (expressed in hertz in the frequency range from 1 to 100 Hz) between particles and atoms. These NMR-determined coupling constants of atoms can be perturbed by ELF magnetic frequencies of artificial origin, causing mutagenesis, and cancer in some cases, in plants, animals and man.

THE energy of the sun, it is believed, comes principally from the hydrogen fusion process, and it is this process that generates the entire magnetic spectrum shown in Fig. 2. This radiation, in my opinion, is radiated by the phase velocity mechanism outlined above, and it is here that we can see a mechanism for a resonance between a living thing—a plant or a brain—and the magnetic waves of the solar protons. What is crucial here is the presence of a filtering mechanism that allows a sharp band of 8 Hz magnetic radiation into the earth biosphere.

There exists such a filtering mechanism, based on a frequency resonance between EM signals generated on earth (either naturally, as by lightning bolts, or artificially), and the Van Allen inner belt of protons surrounding the earth. There is a region above the atmosphere called the plasmasphere, composed almost entirely of hydrogen. The inner structure of the plasmasphere, here called the inner proton belt, shows that the highest-energy protons are in a region that measures 1.5 earth-radii from the center of the earth. If a wave of the right frequency originated at the earth, it would find that this layer of the inner belt protons would mirror the signal perfectly and set up resonance. Or, conversely, a correct wavelength originating at this “mirror” proton belt would resonate with the earth. Is an effect such as an 8 Hz filter mechanism possible?

The ideal full wavelength for an 8-Hz wave is approximately 23,500 mi. A .25 wavelength for 8 Hz is 5875 mi, and this is 1.48 times the radius of the earth. The inner belt of protons can be used to resonate frequencies from 6.66 Hz to 10.80 Hz. This is the filter mechanism most probably used by the Soviets, in addition to the satellite orbiting at the same altitude. (See Table 2.)

Since the solar wind produces particles that have an average kinetic energy 8 times that of the magnetic energy density, we have a constant source to energize the inner belt protons in order to maintain resonance, at a center frequency of 8 Hz. It is now beginning to be realized that such a mechanism does indeed affect the earth’s magnetic field, which in turn affects the weather. In the early 1960s, Dr. Robert Uffen pulled together a lot of data collected since the 1700s, to show that the magnetic flux variations from the sun, known as the 11.1 yr sunspot cycle, had a controlling effect on the fluctuations of the earth’s magnetic field.¹⁶ But his most important finding was that long-term world climatic changes could be correlated with changes in the earth’s magnetic field. This basic discovery was quickly followed by a report

Table 2. Innerbelt proton resonance as a function of wavelength and distance from the earth as earth radii.

<i>Frequency</i>	<i>1 wavelength as circumference</i>	<i>Radius of circumference</i>	<i>= Earth radii</i>	<i>1/4 wavelength</i>	<i>= Earth radii</i>
6.66 Hz	= 27,928 mi	4444 mi	= 1.12	6928 mi	= 1.76
8.00 Hz	= 23,500 mi	3740 mi	= 0.93	5875 mi	= 1.48
10.80 Hz	= 17,222 mi	2741 mi	= 0.69	4305 mi	= 1.09

from Columbia University, which showed that when the intensity of the earth's magnetic field decreases the average world temperature also decreases, and that the reverse was true as well.

These findings were extended by Dr. J. W. King of the Appleton Laboratory in the United Kingdom in 1974. He found that over the northern hemisphere of our planet, the magnetic field strength contour lines match the atmospheric pressure contour lines. The centers of low atmospheric pressure coincide with the centers of highest magnetic intensity. Furthermore, Dr. King showed that atmospheric pressure patterns take the form of a dumbbell shape with a low-pressure area at each end, and that this is matched by a similar contour for the magnetic field. Dr. King's paper established the new science of magnetometeorology, linking geomagnetism with meteorology.

WE HAVE tried to show, in simplified and abbreviated form, how an 8-Hz magnetic wave is a universal factor connecting protons in the brain with protons in the sun, and how the earth and the solar wind serve as a filtering mechanism for the 8 Hz magnetic frequency, which is fundamental to a balanced, healthy state for living things. We have also indicated the mechanism whereby very small plus or minus deviations from an 8 Hz center frequency can induce pathological states in human beings, and most likely in all living things on this planet. It is also very clear that in carrying out their experiments with the Tesla Magnifying Transmitter, the Soviets are exploiting only the pathological effects.

But there is one more effect that nobody has dared to mention. This is the possibility of impressing human thoughts upon the artificial ELF waves as the carrier system. There is no easy explanation for this phenomenon, but I will give a personal experience that may convey the essential idea. In 1961, I met with the late Aldous Huxley and his wife Laura. From them I learned that Laura had a gift for making motions with her hands over sick people, without touching them, and in some cases helping them. One case in particular intrigued me. Laura had cured a patient of a paroxysmal ventricular tachycardia (a sudden and dangerous form of heart racing). I arranged to have Laura and her now-cured heart patient monitored electronically while noncontact hand passes were carried out by Laura. To my great surprise, I found that when Laura's hands were passing about 4 in above the skin of the patient, both she and the patient came into resonance by producing enormous ELF waves in their EEGs at a peak power centered on the 8 Hz frequency. This test was repeated over and over again until I was satisfied that this was a genuine EM induction effect. Others have repeated my work since that me and confirmed it, most notably Dr. Maxwell Cade.¹⁷

Since healing has been observed with a process of 8-Hz EM wave induction, it was logical to assume that precise information transfer had occurred in order to correct the organic defect in the patient. This also meant that, potentially, one could transfer other kinds of information if one knew how to impress thoughts upon a 8-Hz carrier wave. The question now arises as to whether the Soviets have taken this step.

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APPLICATIONS OF HUMAN VOLITIONAL MIND-MATTER INTERACTIONS

Elizabeth A. Rauscher, Ph.D.

FOR the last 12 yr. we have been conducting research on the separation of human awareness and of the action of consciousness from the body location. In particular, we examined the properties of consciousness that appear to transcend time and space and are termed remote perception^{1,2,3,4} and remote interaction of mind, known as psychokinesis.^{5,6} The word psychokinesis is derived from the Greek psyche, “mind,” and kinesis, which means “motion”—i.e., mind-motion.

We have conducted more than 40 remote perception experiments and are currently involved in a series to test certain physical properties.⁷ These experiments involve the apparent acquisition of detailed remote or distant information. Such phenomena also appear to be independent of time as well as space, which we have demonstrated.^{1,7}

We have performed some exploratory studies of the apparent ability of human consciousness to affect materials remotely in a manner that seems to be unique to this type of interaction.⁶ We have looked for a unique signature of psychokinesis (PK), such as may be determined by inorganic sample comparison with a control sample under microscopic analysis.^{6,8} We have also examined in detail the effect of a psychic healer’s treatment on the growth rate and motility (movement) of sterile cultures of Salmonella typhimurium.^{9,10,11}

Summary of Our Healing Research: Healing and Psychokinesis As Negentropic Processes

IN OUR examination of the effects of a healer’s “hands-on” treatment on the growth rate and motility of sterile cultures of Salmonella typhimurium, we found significant results as compared with control cultures and a 6-yr. baseline study. In our study we applied antibiotics and examined the results obtained by a healer (Olga Worrall) in overcoming the deleterious effects of the antibiotics that were applied to the Salmonella culture. We conducted dose-response studies and found that under increased concentration of antibiotic (chloramphenicol and tetracycline) the increased growth rate was lower under healer treatment than it was when we applied lower concentrations of antibiotics. In the 50 baseline studies and in our controls, we found less than 1% deviation in the growth rate over 24 h. for all cases. In all test cases for treated and control samples, redundancy was achieved by the use of multiple test tubes for each condition, allowing us to conduct a full statistical analysis. We found 20 to 120% effective treatment by the healer for the different doses of different antibiotics. Maximum effect was found with 10 µg/ml of chloramphenicol.¹⁰

We also conducted experiments to examine effects on the microstructure of macroscopic PK treatment. Electron micrographs were made of materials treated psychokinetically and compared with micrographs made from controls. The materials were metals and laboratory-grown crystals (each with control materials), and these were examined by 7 crystallographers and metallurgists at 4 national laboratories.^{5,6} Control materials were bent and broken by metallurgists at places equivalent to those on the paranormally affected samples. All control samples displayed normal properties at low and high magnifications, between 400X and 4000X magnification. Paranormally treated samples were found to be affected abnormally.⁸

We determined that materials that contained residual stresses were easier to affect paranormally. We found changes in crystal boundaries and crystal dislocations. The effects were thermodynamic; that is, metals appeared to be annealed. We exposed subjects to two samples of similar tensile strength, one that had been annealed before psychic treatment and one that contained a significant number of internally stressed crystal dislocations. Materials with internal stresses were more readily affected psychokinetically than annealed materials of similar rigidity and strength.¹²

Electron microscope analysis yielded examples of significantly more movement along crystal boundary dislocations as well as apparent annealing in psychokinetically affected materials as compared with controls. Analysis indicates that annealing may be affected by the process of psychokinesis.^{5,6,8} Stresses that are formed within the material when it is initially prepared are released by the mental interaction with the material.

PSYCHOKINETIC interaction with the material appears to release stress (and disorder), increasing the ordered crystal pattern array and apparently decreasing entropy. We hypothesize that the domain of mental interaction of the subject participant increases information in materials utilizing the local available energy stored in the stressed crystal boundary, due to internal crystal dislocations. We relate information and entropy through a law like the Shannon law.¹³ We define this nonlocal negentropic entropy variable as Ω and its associated local energy release as Ω_{L} . Negentropic processes involve systems that are nonlinear and far from equilibrium.¹¹ These systems involve processes that may reconcile psychokinesis and psychic healing with thermodynamics, information theory, and energy conservation (the First Law of Thermodynamics). We can use this formalism to model remote perception as accessing local available energy for specific forms of matter: thus, manipulation by consciousness.

Linear processes are always isotropic as long as the equilibrium state is isotropic. Isotropy is lost in nonlinear systems. In order to maintain a steady-state continuous nonequilibrium condition it is necessary to pump in a continuously negative flow of energy of a magnitude equal to the value of the internal entropy production. This relates to I. Prigogine's model of the manner in which biological systems operate.^{14,15} Prigogine states that in a system that is near steady state, the entropy flux generally cannot be arbitrarily imposed from an external source but becomes a state of the system (is generated inside the system). This issue involves the definition of open versus closed systems. Equilibrium is just one case of a steady-state system, but all steady states are not equilibrium states. The principle of minimum entropy production guarantees steadiness of the steady nonequilibrium state. The entropy does not always increase in these systems.

BOTH conditions concerning the geometric structure of the system and the specific properties of the energy flux, which acts as a source of order, must comply with the criterion set by the thermodynamics of Prigogine. Prigogine uses the term dissipative structure to describe the manner in which certain states with applied or self-generated energy fluxes "dissipate" into a state of increasing order (or decrease in entropy). States that increase in order or complexity are negentropic ($\Delta S < 0$), but they do not violate the Second and Third Laws of Thermodynamics because they are open systems. Dissipative structures do not refute the laws of thermodynamics any more than an airplane flying refutes the law of gravity. One familiar example cited by Prigogine as an example of macroscopic effects dictated by microscopic processes is that of freeway traffic. On an uncrowded freeway, each driver is affected minimally by other vehicles. As the traffic becomes heavier, a point is reached when each driver (micro) is "driven" by the total traffic pattern. The traffic (macro) becomes

a self-organizing system. A “feedback” is formed between the microscopic events and the macroscopic order. Here the density of traffic becomes a key variable in the problem.

IT APPEARS to me that the whole process of psychic healing and PK—or of psi in general—is part of a process common to all self-organizing systems, of which the life process is a prime example.

Some key considerations in our experimental designs are: (1) to enhance the phenomena toward large-scale and replicable results; (2) to elucidate the psychic process and determine physical and psychological conditions; (3) to look for a unique nonmechanical, chemical, or other signal so that we may avoid inadvertent or purposeful manual manipulation; and (4) to examine possible applications of psi in the personal and collective society. We discuss the details of the relationship between the so-termed psychic healing phenomena and psychokinetic interaction. Psi in general is a goal-oriented task, resulting from conscious (or sometimes unconscious) volitional intention, and hence it will be actualized by use of minimum energy, information, and entropy processes. In fact, I believe that there is a mental “least-action principle” (just as there is a physical least-action principle), which we might term Tao. According to this least-action principle, the intention or will is able to actualize the goal.¹⁶ Often people feel they do not actualize what they intend. Even though a great deal of mental information is processed subconsciously, such as psi information, learning and practice can allow us to bring these processes into our own consciousness and that of others.

In the following section, we will enumerate some of the applications of psi, particularly psychokinesis, for one’s personal existence as well as for large-scale social or economic applications. We have discussed these matters at length in another paper,¹¹ and will now consider these ideas in a framework in which psychokinesis and psychic or “faith” healing share the same mechanism of mind/matter interaction but involve different intentions and different target objectives. (In healing, for example, the body is affected; in PK, objects are affected.)

Implications and Applications of Remote Mind/Matter Interactions

AS THE existence of psi becomes more widely recognized and accepted in our society, it will be used more extensively in personal and collective applications. Uses for applied psi have been mentioned elsewhere, such as “seeing” possible accidents while driving and being able to avoid them, activating stalled car batteries, or turning on remote switches by PK. Psychics are already being used in police work and intelligence, and psychic techniques can help reduce the pain of illness or injury. Certainly, other applications will be seen, such as PK-assisted video games (which can teach psi), and there will be other entertainment possibilities. In the sections that follow, I would like to address myself more toward conceptual and philosophical issues.

As people learn about the potential uses of psi and begin to become aware of their psychic perceptions, they will be able to say “no” to unwanted incoming telepathic information, whether random or purposefully directed, and will come to understand that they mentally influence and are influenced by others at all times.

We have demonstrated that remote perception is a learned phenomenon that involves, in the old vernacular, clairvoyance, telepathy, and precognition.¹⁷ J. Houck has shown that psychokinesis is also a trainable process.¹⁸ Psi resides as an innate ability in most people, and if they can bring it to conscious awareness, they can perceive and act upon it and can also adopt the proper mental framework so as to produce psychokinetic effects. This process is somewhat similar to that by which an infant learns how to couple its intention to move its finger with the act of moving it.

Psychic healing and PK are thus extensions of the mind/body interface (or we could call it the intention/ action interface). The mental picture of “drawing in energy” or “channeling energy” seems to flow through one’s body, but it also seems to act as an extended field, passing into others’ bodies to heal them or into metal to bend it. This concept touches upon the whole issue of life force and the mind/body interaction, which we discuss in detail elsewhere.^{11,19} We are, in a sense, mentally connected to the spoon, bar, or random number generator computer system that we are attempting to influence. Mind-to-matter connection is then intentionally created.

Experience with psi leads us to an awareness that there is a real remote connectedness among all people and all things at every instant. (Remote connectedness involves processes of the universe where remote events are correlated.) We are not only our brother’s keeper, but he is also part of us, and we are part of him. There may in fact be a fundamental connectedness that characterizes all the physical properties of the universe. We have dealt with such issues as Bell’s connectedness theorem, Young’s double-slit experiment, and other coherent nonlinear phenomena elsewhere.^{20,21}

The “inequality” of Bell’s theorem by no means provides us with an adequate basis for a model of psi.¹ However, certain aspects of the type of remote connectedness outlined in Bell’s theorem could explain the connection of the observer’s mind and a physical quantum measurement (one that would be registered macroscopically on a dial, for example).²⁰

INSUM, then, by elucidating the mind/body issue, the effects of mind on matter and action, we can learn to see more clearly the manner in which our thoughts can bring about action through intention by the application of psi. The use of psi can give us a better awareness of the source of our thoughts, whether self-generated or emanating from others, which will in turn lead to better health and greater peace of mind. Self-healing can be seen as a result of actual chemical and electrochemical influences stimulated by intention, and we can form a better ability to integrate psychic diagnosis and healing. The use of psi can help us to gain a better understanding of the relationship between what people are saying and what they are thinking. Psychic power can also help us to comprehend the observer/participator role in quantum measurement problems. Enhanced intuitional faculties will be made possible, as will better performance in athletic and mental competition (although I see competition as perhaps not the best way to use the power of psi). Finally, it will help us gain a greater understanding of our human potentialities and possibilities, so that we may learn to alleviate suffering and build a mutually beneficial society.

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LIVING IN MAGNETIC FIELDS

Otto H. Schmitt Ph.D.

WE HUMANS and all our ecologically involved domestic and wild animals, plants, and microorganisms have been living in a steady magnetic field of .5 gauss (G) for many generations, without any obvious evidence that we or the other organisms either know or care about these ambient fields or about the weak temporal and spatial gradients that accompany them naturally or result from our motion around magnetically susceptible materials and naturally occurring currents, lightning strokes excluded.

We have an enormous margin of safety. It can be shown incontestably that steady fields on the order of 10^5 G can disrupt biological processes and that the many thousand gauss-per-centimeter gradients that usually accompany such fields also produce effects. We do not even notice any effects when we apply quite strong AC or DC magnetic fields to our bodies, even to sensitive areas such as eyes, ears, or tongue. It is interesting, however, that we can produce magnetophosphenes by applying rapidly changing fields to suitable brain areas. I vividly remember demonstrating the visual magnetophosphene to myself many years ago by accidentally exciting a Helmholtz coil into which I had stuck my head to examine a vacuum system with full-line voltage on a coil wound for excitation at 1.5 V.

We have learned, then, to think of moderate-strength AC and DC magnetic fields as—to use FDA terminology—GRAS (generally regarded as safe). We have been eating up our margin of safety at an appalling rate, however, in recent years. If we maintain the present exponential rate of escalation of such field strengths of between two and four times per decade, we can reliably predict serious trouble before we get to the end of the century.

There are four major areas of trouble in this inevitable confrontation and at least three arenas in which we should be preparing to make livable compromises or to do battle. Let me address myself to the trouble spots first and then talk about possible remedies.

FIRST, it is becoming cheap, easy, and useful to incorporate magnets and stray electromagnetic field sources into our everyday domestic, commercial, medical, and military devices. This is true from DC (or zero frequency) through power-line frequencies to radio and TV frequencies and on to microwave and radar sources, even into laser ranges (in the devices for reading tags in supermarkets). Loudspeakers and holding devices have large lumps of strongly magnetic material in them, in the latter case in an open circuit. Domestic range-top induction cooking is now with us. Even the small hand-held hair driers pour out fields of up to 40 G or more.

These fields in themselves are probably harmless, but they can be made to do damage if we are ingeniously stupid or careless. We have not yet developed a folklore to protect technically uninformed people, as we have in the case of red-hot coals, unidentified snakes, and razor blades. Almost everyone knows that it is possible to get a very dangerous sunburn while comfortably dozing in bright sunlight, but we have not yet learned to put microwave oven burns in this same class. There has been no time for folk wisdom to emerge by trial and error, and unfortunately we have not developed simple “sniffers” to carry about into likely nooks and crannies and into unexpected source locations

to sense these fields quickly and take appropriate measures.

I had such a “sniffer” made up for me in the lab recently. It measures peak 3 axis rate of slew field change in the range 0.1 to 100 G calibrated in 60 Hz terms. Using this gadget, I have amazed myself by learning how wrong I can be with what I consider my better-than-average intuition for AC fields. I found only 2 to 5 C around the floor cleaners in a hotel, where I had expected perhaps 10 times that much. I have been carrying the device through airport weapon detectors as I travel about and finding 2 to 4 C values, which leaves me a little concerned about patients wearing implanted electronic medical devices. What about book detectors, levitation transport motors, bed vibrators? I found a 40 G hot spot on the overhead in an airplane in which I was flying

What does all this lead to? It means that we must begin to test our environment in terms of the hazards we care about and must get some quantitative data about the likelihood of putting a rarely occurring but strongly effective field in contact with an occasionally susceptible target receptor. It is a strange consequence of some of the new rules designed to protect us from electric shocks that they contribute significantly to environmental field contamination.

YOU may wonder why I used the somewhat unusual calibration units in this little sniffer, described above. I was attempting to draw attention to the neglected design principle of using a calibration that really measures the thing we care about (the rate of flux-cutting that generates emf), not the thing that is easy to measure or define, as average or RMS field strength. I set no great store by this gadget, but offer it as an example that illustrates the principle to which we should turn some effort across the spectrum.

Now, if you accept my analysis of the environmental field situation as one in which spectral utilization or field contamination, depending upon your point of view, is growing and will continue to grow, we can go on to discuss some of the ways in which we can remedy the situation.

We can predict reliably that more and more electronic hardware is going to be installed surgically in and on people and also attached to their exterior motor and sensory systems through what are wishfully being called noninvasive transducers. Microcomputers and “ganglionic” computers are certain to be installed, as soon as they become small and cheap enough. Where these must be powered from implanted chemical batteries, radioactive generators, or metabolic batteries, power drain must necessarily go down, and with this lowering of power level will come increased susceptibility to ambient fields.

A human subject may be quite indifferent to 10,000 C steady fields and to 500 G AC fields, yet be incapacitated, if not annihilated, by his own prosthetic devices failing in a 10 C field.

To make matters worse, some of us want to measure fields well below 1 μ G produced by biological processes that we would like to gauge by these epiphenomenal signals, while others want to use fields of 10 to over 1000 C to control or operate internal systems.

THERE is still another set of vaguely discomfoting, poorly defined phenomena, some more suspicion than fact, that should be carefully investigated, assigned appropriate risk factors as quickly as we can manage, and taken out of the realm of mysticism. It is just possible that man and other animals may thrive a little better in a steady 0.5 C field than in zero field or in a more rapidly fluctuating one or one with large gradients. There are endless anecdotal reports of such phenomena, often supported by experimental data, but only a few are strongly persuasive or point to clean transducer mechanisms. There is conclusive evidence that some fishes have electric current detectors, separate areas for AC and DC, and some of these fishes operate in the nanoamp range, so that detection of inductively produced currents in water is possible.

Let me remind the reader not to expect an organism to respond iden-

tically to presumably identical retest conditions or to duplicate the response of a similar organism. Biological control frequently depends for survival on a diversity of inter- and intra-individual characteristics and changes its response depending upon time of day, previous response, and other factors. In trying to develop reasonable rules of procedure, we should provide for very low-incidence phenomena of great importance as well as high-incidence events of individually small importance.

Let me offer you a case in point from our own experience. We have been doing experiments to determine whether normal people—if you will accept university students and staff as normal people—can tell when they are in a moderate-strength uniform 10 to 15 G 60-cycle field. We note that at the conclusion of these experiments, which take 10 to 30 min each, nearly half of the subjects spontaneously comment on having some kind of headache. Since they were not asked about headaches, the headaches are probably real, but are they due to sitting still for a half-hour, attentively pushing buttons, or does the field enter the picture? A few experiments with 2 subjects, using fake and real fields, showed almost perfect correlation between real fields and headaches, but without at least 100 subjects and 10 trials each, I would remain skeptical.



WE ENGAGED in this lot of field experiments basically to answer two questions: first, can some or all humans consciously detect weak 60-cycle fields? and, second, can they be trained to detect them even though they could not do so initially?*

We got the general answer that individuals do not do much better than chance at this game with either the whole body or only the head in the field. We did discover, however, that some individuals have a remarkable ability to pick up subtle auxiliary clues incidental to the fields, such as mechanical vibration, hum, dimming of lights, etc., and we were forced to very elaborate isolation of these subjects.

We used a large coil system that could produce an 8 ft cube of field, constant to within about 5% in a man-sized central space, and rated for up to 15 G RMS operation. This required some 100 A at 230 V, 60 cycles for excitation, and is power-factor-corrected down to about 19 A with 5500 μ F of paper capacitors. There is also available a small coil system, which is extremely quiet and can produce upwards of 100 C for a head-size space. These systems can be hand controlled or put under complete remote computer control, which even avoids telepathic communication with the operator.

For extreme isolation, we placed our subjects in a “coffin,” which is a monolithic epoxy-bonded plywood-laminated cabinet measuring 2.5 X 3 X 7 ft, which goes down into the big coil system. The door of this cabinet was clamped tight by pumping a mild 2500-ft. altitude vacuum on the door, which sealed the door with over a ton of force and made it very rigid.

In this type of cumulative-probability study, the computer would choose randomly whether to excite the real coils or a fake duplicate set in another room. It simultaneously signaled the subject by means of a light on his hand-held unit that told him to “make a choice.” He decided whether he felt a field or not and signaled accordingly by using a microswitch.

On the display he rated a step up if his choice was correct and a step down if it was wrong. Were he always to choose correctly, the lines on the display would rise at 45°, and if he were always wrong, they would go down at 45°, which would be equally significant. Of course, the 45° lines would rise at the equivalent of $(1/2)^n$ (when n = number of trials), which quickly became enormous. Curved trajectories represented intermediate p values.

* See Tucker, Robert D., and Otto H. Schmitt, “Tests for human perception of 60 Hz moderate strength magnetic fields,” IEEE Transactions on Biomedical Engineering BME-25, 6 (November 1978): 509–518.

But I must not digress too far into our own experiments. Let me now turn to the matter of what we can do to live optimally in this inevitable sea of magnetic and electromagnetic flux.

First, we have to do quite a lot of hard experimental work and paperwork to evolve good metrics that conform with the features to be optimized or the problem areas where amelioration of interaction is needed. If we insist on specifying hazard in terms of field strength, when hazard is primarily concerned with gradients of field or with temporal signatures of field, we can never get clear answers. This development of quantitative language of thought and measurement, which conforms to the desired goal, requires hard, extensive work in the laboratory and in the theoretical departments and is not a pedantic effort toward mere tidiness. It has at present no traditional status and no academic or industrial support.

Next, we need a family of simple, rugged, reliable and not too expensive instruments to measure directly in combined syndromal terms the quantities that are called out in the first task. The little sniffer I described is a caricature of this type of instrument, made to emphasize the lack of problem-oriented instrumentation.

FINALLY, we have the thorniest problem, which is that of substituting good, roughly quantitative optimization principles for the advocacy techniques that now dominate the thinking of our standards, safety, and regulatory policy-making bodies.

It is ridiculous that sheer eloquence should determine where along the line between complete safety and very risky high performance we should operate, yet this is what our standards-making groups are forced into. It is a tribute to their common sense that we do not have more near-idiotic standards.

These groups are being forced to operate as skilled artisans, not as quantitative engineers or scientists. Does anyone recall performance standards that reflected a serious attempt to apply even partially a set of people-oriented optimizing criteria?

It is surprising how closely an outline of a program of health optimization approaches this problem of optimized living in electromagnetic fields. Except for its concern with diagnosis, which for us means problem identification and evaluation, such an outline is completely applicable.

In conclusion, let me summarize.

- (1) We are rapidly increasing our use of magnetic and electromagnetic field-dependent devices and systems in spaces where people come into contact with them.
- (2) People are being fitted with more and more ordinary prosthetic and transductive prosthetic hardware, which is being refined to operate at lower and lower field levels and is therefore increasingly susceptible to interference.
- (3) Human beings as biosystems have intrinsic magnetic and electromagnetic susceptibilities. This fact is only partially understood. Unexpectedly severe individually catastrophic consequences or endemic mild effects are possible as a result of these susceptibilities.
- (4) We lack working language, tools, and instruments to assess biomagnetic effects efficiently.
- (5) We do not have a tradition and working rules for making decisions about these real-life bioengineering policy questions.
- (6) Our regulatory bodies are at present restricted by the necessity of using advocacy techniques to implement optimization efforts.

THE PRIMORDIAL LIGHT: ELECTRICITY TO PARAELECTRICITY

Dennis Stillings

I WOULD like to open with a quotation from Muriel Hasbrouck's essay "The Wings of Hermes":

... true wisdom rises and falls in cyclic waves of human perception. Often it has disappeared, as if destroyed, only to reappear through what seems, each time, to be a new channel, but which may only be a new expression of something "truly known" in some earlier era. This has been particularly the case with every discovery, and rediscovery, of evidence that there is more to man than his body and five senses, and more to life than mere physical existence.¹

In the course of this presentation, we will be examining a seventeenth-century document that not only discusses in detail the existence and nature of the biological energy field, but is also a rich source of early thought on several types of psi phenomena, including dreams, telepathy, out-of-body experiences, synchronicity, and radionics. This work is J. B. van Helmont's *A Ternary of Paradoxes*, written in the first two decades of the seventeenth century and published in an English translation in 1650.² In the meantime, however, let us begin at the beginning.

S INCE the world began, according to the Old Testament account, two kinds of light have existed: the light created in Genesis 1:3, when God says: "Let there be light, and there was light," and the light created in Genesis 1:16: "And God made two great lights, the greater light to rule the day, and the lesser light to rule the night."

So what was the light of Genesis 1:3? This problem was raised and discussed by the Gnostics in the early centuries of the Christian era. Their answer was that upon creation of the sun and moon, this primordial light fled into matter, from which it was to be redeemed. This problem forms the basis of the Gnostic light metaphysics.³

The task of redeeming the light-spirit hidden in matter was also central to the alchemical tradition. The primordial light was identified with Mercurius, the volatile, elusive, by turns deadly and healing god of the alchemical *opus*, who was termed "the revelatory light of nature,"⁴ "light of lights,"⁵ "the universal and scintillating fire of the light of nature,"⁶ the psychopomp or light of the soul,⁷ and the "messenger of the gods."⁸ He is matter and spirit,⁹ positive and negative, male and female.¹⁰

C. G. Jung summarizes these aspects in a manner evocative of images of atom-smashing and particle behavior:

Mercurius consists of all conceivable opposites. He is thus quite obviously a duality, but is named a unity in spite of the fact that his innumerable inner contradictions can dramatically fly apart into an equal number of disparate and apparently independent figures.¹¹

Mercurius, the hidden light in nature, was also termed the *spiritus* (or *anima mundi*),¹² the inner transforming energy of the world.

Virtually coincident with the demise of alchemy, the early technology of electricity arose. Whirling glass globes distilled the ethereal fiery fluid from earth, or sky, or somewhere in between.

This quintessential fire, as it was often called, was found to be really two electricities, positive and negative— or was it one? It moved quickly; it invigorated and traveled the nerves, messengers of the body; it healed; it killed; it could be trapped in a bottle like a genie; it could vanish into thin air.

For years this “new” fire was used as a toy and a parlor game. When Benjamin Franklin flew his famous kite, however, it was apparent to everyone that electricity was a force hidden in nature and that to understand the behavior of electricity in the laboratory was to understand a fundamental force in the world.¹³

At the time of Franklin, in the middle of the eighteenth century, a small group of peculiar individuals in Germany recognized just what this force was. Electricity was the primordial light of Genesis 1:3, the light created before the light of the sun and stars. According to these “electrical theologians,”¹⁴ electricity was the first light. When the “vulgar” light of the sun was made, the primordial light fled into matter and there became the evolving force of creation. It does not take a great effort of comparison to see that the alchemical tradition, moribund by the eighteenth century, had transformed itself into the nomenclature and theory of the new science of electricity.

MERCURIUS, however, is not merely free energy; under other conditions he is constraint and delineation. Mercurius, as spirit of the world, is also the Archaeus. The Archaeus, a term first used by Paracelsus,¹⁵ is the soul-like or psychoid governing principle of living organisms.¹⁶ This idea, of course, goes back to Aristotle’s concept of the entelechy.¹⁷ But in the later alchemical writers, including van Helmont, the idea of a form-giving agent in matter takes on a resemblance to some of the more modern notions of L-fields and morphogenetic fields.

Listen to the hermeticist van Belmont’s own words as he describes the function of the Archaeus. There is first the mighty Archaeus of the World or Macrocosm:

[The Archaeus] is a Spirit which comprehends and cherishes within it self the Sun, and all the heard of lesser stars, a minde or intelligence which diffused through all the limbes or parts of this great Animal, the World, doth inform and regulate the whole.¹⁸

And, in man, the microcosm, the Archaeus is:

... the ... plastick spirit which in the seed comprehends, contrives, and models the whole figure of man ... limns out all the lineaments and accurate adumbration of the parts.¹⁹

The body of man, accepted under that distinct notion cannot give to itself the figure of a man: and therefore hath need of an external sculptor or delineator, which should be secretly ambuscadoed in the material masse of the seed ... yet this, in so much as it is of a material condition, and farre below the finesse of a spiritual nature, cannot derive the plastick or conformative virtue no more from itself, then from the grosse masse of the body: necessary it is therefore, that there be some praecedent or elder principle, which must be wholly and purely immateriall, yet reall, and operative, to which may justly be attributed the power of figuration or delineation, by a sigillary impression upon the Archaeus or Regent spirit of the seed.²⁰

Let us compare these seventeenth-century descriptions with sections from Rupert Sheldrake’s A New Science of Life (published in 1981):

Morphogenesis does not take place in a vacuum. It can only begin from an already organized system which serves as a morphogenetic germ. ... The morphogenetic field can be thought of as a structure surrounding or embedding the morphogenetic germ, and containing the virtual final form;

this field then orders events within its range of influence in such a way that the virtual form is actualized. In the absence of the morphic units which constitute the parts of the final system, this field is undetectable; it reveals itself only through its ordering effects on these parts when they come within its influence.²¹

Sheldrake refers back to the work of Hans Driesch, who

believed that the facts of regulation, regeneration and reproduction showed that there was something about living organisms which remained a whole even though parts of the physical whole could be removed; it acted on the physical system but was not itself part of it. He called this non-physical causal factor entelechy. He postulated that entelechy organized and controlled physico-chemical processes during morphogenesis; the genes were responsible for providing the material means of morphogenesis ..., but the ordering itself was brought about by entelechy.²²

In van Helmont there is an Arch[a]leus influus governing the whole body, but each of the organs, and even the minutest part of an organ,²³ has its own Arch[a]leus insitus. Sheldrake in his 1981 work says:

According to the organismic theory, systems or “organisms” are hierarchically organized at all levels of complexity. In the present discussion these systems will be referred to as morphic units. Crystals, molecules, atoms, and sub-atomic particles are morphic units, as are animals and plants, organs, tissues, cells, and organelles. ...

A higher-level morphic unit must somehow co-ordinate the arrangement of the parts of which it is composed. It will be assumed to do so through the influence of its morphogenetic field on the morphogenetic fields of lower-level morphic units.²⁴

And, finally, again from van Helmont:

Now if any error be in the conformation of the body, in the womb of the Conceprix: that error is not ascriptive to any imperfection of the Image of God; but to the incapacity of the material principles and other external causes, invading the Plastick virtue of the seed, and perverting its exact delineation of the parts.²⁵

Compare this with Sheldrake:

Changes within a system developing under the influence of a particular morphogenetic field can lead to various modifications and distortions of the final form.

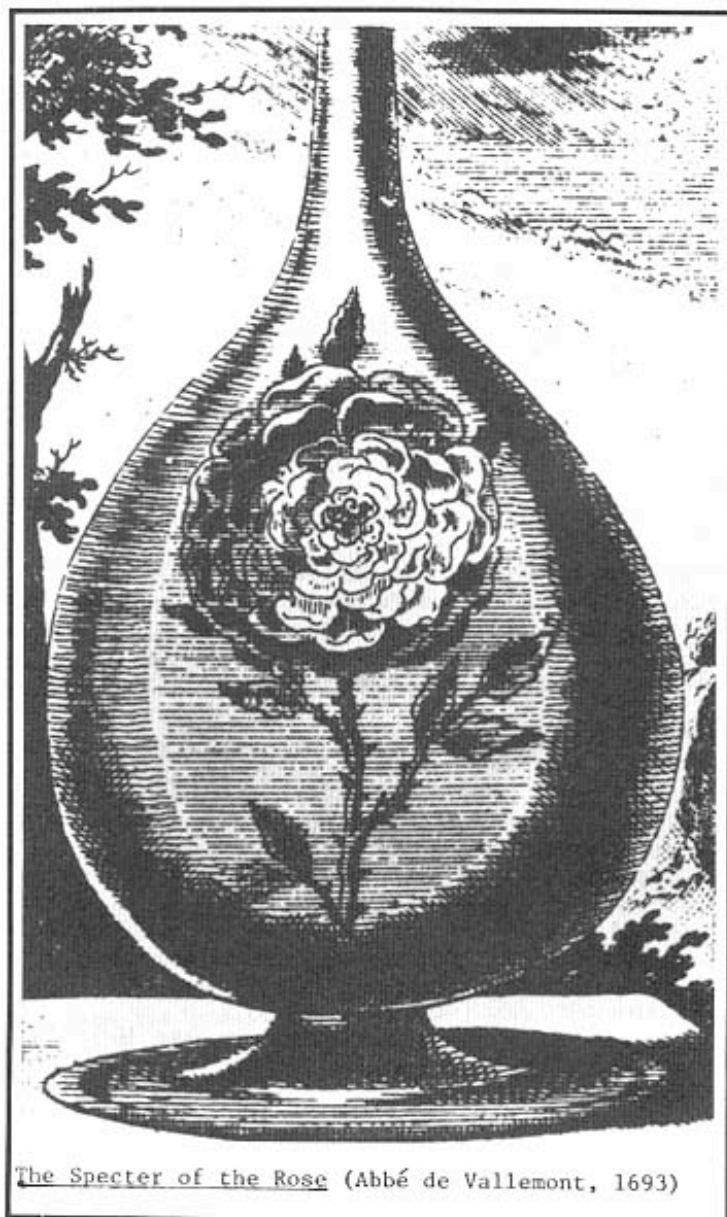
Thus in developing organisms both environmental and genetic factors could affect morphogenesis in two different ways: either by changing the “tuning” of morphogenetic germs or by changing the usual pathways of morphogenesis in such a way that variants of the normal final forms are produced.²⁶

Many more parallels such as these between van Helmont’s Ternary of Paradoxes and the work of Sheldrake, Driesch, and others could be cited.²⁷

TO THIS point the Hermetic philosophers have given us two fundamental concepts: (1) an all-pervading, transforming energy or spirit, named Mercurius; and (2) an ordering field concept, the Archaeus, also traceable to the Mercurius idea. Now, if the old Spagyric philosophers had stopped here, this history would be remarkable enough; but the alchemists went on to try to produce actual plant phantoms.

Here is one seventeenth-century recipe for the process:

Take a flask and put into it the vital essence of the seed of a beautiful rose. Burn this to ashes, imbue it with the morning's dew, collecting enough for a modest distillation. Extract the salt from the ashes and mix it with the distilled dew; seal the bottle with pounded glass and borax. Lay the vessel on fresh horse manure and leave it there for a month. Then expose it alternately to the sunlight and to the moonlight. When the gelatinous matter at the bottom of the vessel swells, this shows that the experiment has been a success. Now, each time you expose your bottle to the sunlight, the specter of the rose will appear in the glass in all the beauty of its leaves and petals. When cooled, it will disappear; when heated, it will appear again; this process can be repeated indefinitely.^{28,34}



T

HE demise of alchemy is generally dated from Robert Boyle's abolition of the system of the four elements in his work *The Sceptical Chymist*, published in 1661.²⁹ Another alchemist, de Givry, however, writing in the early part of the twentieth century, remarks that

the operation of the Philosopher's Stone does not belong to the realm of pure chemistry. The method described with so remarkable a unity of doctrine excludes any idea of research or tentative procedure, and is incompatible with the abundant experimentation involved in modern chemistry, both organic and inorganic. In this method we see the working of an eagerness, an inspiration, and a fertilising and generative element showing that the alchemists had surprised some secret of cellular life [italics mine] which, carried into the metallurgical field, produced effects unknown now. ... It is not then from alchemy, as often stated, that modern chemistry derives, but actually from the erratic work of the Puffers.³⁰

As John Read remarks:

... A distinction is often drawn in alchemical writings between an esoteric alchemy, whose hidden secrets were revealed only to chosen adepts, and an exoteric pseudo-alchemy, which is depicted as the uninstructed craft of mercenary gold-seekers, or "puffers."³¹

Alchemy went into decline for two reasons: (1) exoterically, it failed to transform base metals into gold; and (2) esoterically, it lacked a psychology of the unconscious to account for the fantastic imagery of the work. The former activity, gold-making, was put down by the more enlightened philosophers, but failure in this area, especially after Boyle's attacks, removed alchemy from serious consideration by the rationalistic mind. Since the alchemist also believed that there was a correspondence between inner and outer man, the inability to accomplish the external material transformation did not bode well for an inner transformation. This problem also reduced the alchemical ranks. A psychology of the unconscious might have developed at that time, but the alchemists were pious people and the formulation of such a science would soon have brought them into direct confrontation with the Church.

W

ESTERN consciousness was soon to enter an era of mechanistic materialism lasting to the present day, which would be marked by suppression of the vitalist viewpoint, and by disregarding psychic phenomena, symbolism, and in short anything that smacked of nonmaterial spiritual causes.

One of the consistent characteristics of human psychology is that out of the depths of frustration, at the point of impasse, something new arises. In this case the something new was the science of electricity. Electricity carried on the symbolism of Mercurius, while at the same time being an undeniable physical fact of nature, controllable, predictable to a point, and measurable—but not completely understandable.

The history of electricity shows that it has never been free of a persistent association with psychic phenomena, from the time of Thales, 600 B.C., when amber was said to have a soul, to the present experiments with electrophotography and electromagnetic recording of the Voice Phenomenon.³² Electricity and mental or psychic phenomena are inextricably associated in the popular mind.

Electricity arose from the ashes of alchemy to play the role of psychopomp and to return us to a consideration of earlier spiritual values. Electricity, through quantum physics, showed us a new, spiritual view of matter. Through measuring devices, the electricity of the

body reveals objective facts about mental and physical: states. Through Kirlian photography (electrophotography), electricity reveals the energy body. In all these ways, electricity fulfills its ancient role as Mercurius the guide and mediatrix.

Electricity, however, I believe, is but one relatively well-defined aspect of a more general psychoid energy substance, which is like a cosmic liquid crystal fluid manifesting both energy and form inseparably—the bioplasma.

The intuitive feeling that electricity, per se, is an inadequate candidate for nomination as the universal energy is reflected in the need many investigators have felt to come up with a formulation to describe such an all-pervading energy. Etheric fluid, the odic force, and orgone energy are examples of these concepts. These energies are represented as being relatively regular and as obeying certain laws, while at the same time they are somewhat psychic in nature and need a sort of propitiation. Such conceptions are virtually universal.³³

E

LECTRICAL science has led us to a view of the wholeness of which it is a part; now science will have to contend with the existence of an energy capable of real work within the Archai, the souls of all things.³⁴

NOTES

1. Main Currents in Modern Thought 19,1 (September–October 1962): 24.
2. [van Helmont, J. B., A Ternary of Paradoxes. Of the Magnetick Cure of Wounds. Nativity of Tartar in Wine. Image of God in Man. Written originally by Joh. Bapt. Van Helmont, translated, illustrated, and amplified by W. Charleton (London: J. Flesher, for William Leo, 1650).] We have not been able to trace and establish a date for the original work, but estimate that it was written in c. 1620.
3. Bultmann, Rudolf, “Zur Geschichte der Licht-symbolik im Altertum,” Philologus 97 (1948): 1–36.
4. Jung, C. G., Alchemical Studies (Collected Works, vol. 13) (Princeton, N.J.: Princeton University Press, 1967), p. 210.
5. *Ibid.*, p. 236.
6. P. 209.
7. P. 237.
8. P. 230.
9. P. 237.
10. P. 235.
11. P. 237.
12. P. 212.
13. For a good, well-organized introduction to the history of the development of electrical theory and technology, see Mottelay, Paul Fleury, Bibliographical History of Electricity and Magnetism Chronologically Arranged, reprint of the 1895 London ed. (New York: Arno Press, 1975).
14. For a discussion of these remarkable philosophers, see Benz, Ernst, Theologie der Elektrizität (Mainz: Verlag der Akademie der Wissen-

schaften und der Literatur, 1970). This work will soon be available in translation.

15. In “De quinque entibus morborum,” in the “Paramirum Primum,” 1, 163ff.
16. For an excellent discussion of the Archaeus and its nature in the healing theories of Paracelsus and van Helmont, see Pagel, Walter, “Van Helmont’s Concept of Disease—To Be or Not To Be? The Influence of Paracelsus,” Bulletin of the History of Medicine 46, 5 (September–October 1972): 419–454.
17. [= “the relation of form-giving cause or energy, as contrasted with mere potential existence; esp. such realization in a more or less perfect actuality, as plants, animals, and men, as individuals or as existing species.”—Webster’s New International Dictionary, 2nd ed., unabridged.] The scientists and thinkers who have used the concept of an electrical or “paraelectrical” organizing field are many and important. Leibniz, for example, reworked the Archaeus idea into the Monadology (1714). (See Domandl, Sepp, “Der Archaeus des Paracelsus und die Leibnizsche Monade,” Zeitschrift für philosophische Forschung 31 [1977]: 428.) See also n. 33 below.
18. Van Helmont, op. cit., p. 43.
19. Ibid., p. 56.
20. P. 125. The translator of the Ternary uses the spelling “Archeus.”
21. (Los Angeles: J. P. Tarcher, 1981), p. 76.
22. Ibid., p. 45.
23. Pagel, op. cit., p. 421:

By Archeus Van Helmont understands the “vital principle.” This governs the whole of the organism (Archeus influus) with its seat in the duumvirate of stomach and spleen. Also each of the organs—and even their more minute parts—possesses its own Archeus insitus.
24. Sheldrake, op. cit., p. 73.
25. Van Helmont, op. cit., p. 127.
26. Sheldrake, op. cit., p. 123.
27. Comparisons of a similar nature can be made between van Helmont’s material and the papers by Burr, Ravitz, and Hasbrouck in Main Currents in Modern Thought 19, 2 (September–October 1962), especially in regard to electro-cyclic influences and the influences of planetary positions and moon phases on the biological field.

The following passage from van Helmont (pp. 32–34) has a strong resemblance to many of the most recent formulations:

... every single created nature contains its own peculiar heaven within the spheare of its own dimensions, and holds within it self the rotation or revolution of that heaven, dependent on its seminall Entitie [Archeus].

And from this conspiracy and conjugation of every particular heaven, is it, that diseased men carry an Almanack in their bones, presage foule weather, and the future mutations of seasons.

... every particular creature doth, in its seminall Entitie, posse a particular firmament; by the mediation of which,

superior bodies symbolize, and hold a reciprocal correspondence with inferior.

28. Vallemont, Abbé de, Pierre de Lorraine [1649–1721], La Physique occulte ou Traité de la Baguette divinatoire (1693). Cited in Seligmann, Kurt, The History of Magic (New York: Pantheon Books, 1946), pp. 460–461.

There is evidence that this procedure, or similar ones, were accomplished by more than one alchemist and at much earlier dates. I have not as yet been able to locate the precise references. Of course, such experiments could have a purely symbolic meaning, especially in the case of the Rose; but the specificity of the formula and its nonsymbolic elements argue against this.

Bill de la Warr, working with the Ruth Drown radionics equipment, produced the “specter of the rose” in 1950. Edward W. Russell (Report on Radionics [Suffolk: Neville Spearman, 1973], p. 129) describes the phantom effect:

Soon after the construction of the Mark I Camera, about 1950, it occurred to Bill ... to put a bottle of homeopathic Aconitum Napellus pilules into the Camera and to tune the instrument to the rate of the aconite flower.

When the plate was developed, he was amazed and delighted to find a clear picture of a fully-developed flower on its stem.

He then took a lily seed and tuned the Camera to “potentiality to germination” and the plate yielded a clear picture of a lily bulb. When he tuned the Camera to “potentiality to flower” the plate showed a faint but perfectly-formed image of a lily in flower.

Perhaps the earliest recorded manifestation of phenomena associated with the energy body of a plant is the story of Moses and the Burning Bush (Exodus 3:2-3). The bioplasm of the Burning Bush is energized by corona-type high-voltage electrical discharges commonly found in high country during thunderstorm conditions. Moses, in the archetypal situation of the leader seeking to deliver his people from bondage (starvation, disease, etc.), is the initiator of an exteriorization phenomenon in which the plant bioplasm acts as a transducer, mediumistically relaying a message from the Self.

George Meek, in his recent work on the Voice Phenomenon, discusses the projected work, in which plants and flames are used as transducers.

29. Boyle, Robert, The Sceptical Chymist or Chymico-physical Doubts and Paradoxes (London, 1661). The four elements were Earth, Air, Fire, and Water.
30. de Givry, C., Witchcraft, Magic and Alchemy (London: University Books, 1931), p. 374.
31. Prelude to Chemistry: An Outline of Alchemy. Its Literature and Relationships (London: C. Bell and Sons, 1936), p. 2.
32. The appearance on audio tape of voices not traceable to a normal source.
33. Isaac Newton made the following important formulation:
- ... it is to be supposed ... that there is an aethereal medium much of the same constitution with air, but far rarer, subtler, and more strongly elastic. ... But it is not to be supposed, that this medium is one uniform matter, but compounded, partly of the main phlegmatic body of air intermixed with various vapours and exhalations: for the

electric and magnetic effluvia, and gravitating principle, seem to argue such variety. Perhaps the whole frame of nature may be nothing but various contextures of some certain aethereal spirits condensed ... and after the condensation wrought into various forms; at first by the immediate hand of the Creator; and ever since by the power of nature; which ... became a complete imitator of the copies set her by the protoplast. Thus perhaps may all things be originated from aether.

And further:

... the animal spirits are ... of an aethereal nature, subtil enough to pervade the animal juices, as freely as the electric, or perhaps magnetic, effluvia do glass.

(History of the Royal Society [1675], vol. 3, pp. 249–250, 253; cited in Cohen, I. Bernard, ed., Isaac Newton's Papers & Letters on Natural Philosophy and Related Documents, 2nd ed. [Cambridge, Mass.: Harvard University Press, 1978], pp. 179–180, 183.)

34. A final word on that paradoxical compositum, Mercurius, the bioplasma. We find that the spirit Mercurius, known also as the spiritus seminalis (Jung, Alchemical Studies, p. 213) and the glutinum mundi, the medium between spirit and body in alchemy (Trinick, John, The Fire-Tried Stone (Signum atque Signatum) [Marazion, Cornwall: Wordens of Cornwall, 1967; published in association with Vincent Stuart and John M. Watkins Ltd., London]), is also fundamentally associated with love in all its aspects, from base incest to the mysterium coniunctionis (see Jung, *op. cit.*, pp. 278–279). The sexual history of electricity in practical theory and in literature reveals ample material. These facts point toward love as the dynamis of the relationship between spirit and matter.

It is an old, fundamental fact that the basic human emotions have recognizable and determinable correlates within the structure of matter and the relationships between entities, inanimate and animate. It should also be no surprise that fundamental structures within living things should reveal themselves as persistent psychic images, long before scientific investigation attests to their reality. Even the radical materialist must take this position. The image of the “biological field” is one of these persistent images, and its recurrence in such similar formulations is strong support for the existence of a biological component of revolutionary significance for physiology and medicine.

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BOOK REVIEWS

The Terror That Comes in the Night: An Experience-Centered Study of Supernatural Assault Traditions, by David J. Hufford. Philadelphia: University of Pennsylvania Press, 1982. Pp. xxiv, 278, (1).

Reviewed by Jerome Clark*

T

HE victim wakes up unable to move. As he lies there helpless, he hears footsteps and sees a horrifying form. An invisible force presses on his chest and the terrified victim thinks he is going to die. At last he is able to shake his paralysis, and the eerie attack ends.

Chances are you have never heard of an incident like this—unless it has happened to you. And if it has happened to you, you are not alone. There is reason to believe that one American in every six has had an experience of this kind. But victims seldom report such “supernatural assaults” because they fear that they will not be believed or that they are losing their minds. The experience is so little discussed in our culture that there is not even a name for it.

But in other cultures the same experience is the subject of rich folk tradition. Newfoundlanders, for example, call it the “Old Hag,” “The Rags,” or “Hagging.” The word “Hag” (at least when it was first used in connection with these experiences) referred to “witch”: witches have traditionally been conceived of as ugly old women. A victim of hagging was thought to be hag- or witch-ridden. In fact, the most common expression for the experience in English is “riding.”

Interestingly enough, the original name is one with which we are all familiar: nightmare. “Nightmare,” which to us simply means “bad dream,” once had a far more specific definition; it referred to an incubus or succubus which came in the night to put a crushing weight on a victim’s chest.

The Old Hag is the subject of a major new book, The Terror That Comes in the Night, by David J. Hufford. Dr. Hufford, an associate professor of behavioral science at the Pennsylvania State College of Medicine, uses the phenomenon to address a question that is central to the continuing controversy over the validity of paranormal claims: Do persons reporting firsthand encounters with “supernatural” forces know what they’re talking about?

A

S READERS are well aware, reports of paranormal experiences are not rare. In fact, according to various polls taken on the subject, most people believe they have had such experiences. But the scientists, scholars, and opinion-makers who tell the rest of us what to believe reject such testimony out of hand, “explaining” it as the result of perceptual errors, faulty memories, lies, psychotic episodes, and hallucinations shaped by ideas in the claimants’ cultural environment.

After an in-depth examination of Old Hag accounts, both in cultures in which such beliefs are widely known and in others (ours, for example) in which they are all but unknown, Hufford finds descriptions of the core experience, by those who say they have had it, to be strikingly consistent wherever they occur. Such events are not culturally determined; “recognizable Old Hag attacks of great complexity can and do occur in the absence of explicit models,” Hufford writes.

He then considers psychologists’ attempts to account for the phenomenon and finds them hopelessly muddled. Of one famous psychoanalytic

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study, Hufford says that “one can hardly distinguish the experiences themselves from their interpretations. The lack of scientific precision attributed to popular thought is found here in academic disguise.” The consistent unwillingness of psychologists and other professionals to listen to those persons who have had these experiences has led them to make wild speculations without empirical foundation. “The subject of supernatural belief somehow leads to a lot of forgetting about what constitutes serious scholarship,” Hufford remarks.

“It was just such a rejection of untutored observation that delayed for so long the ‘scientific’ discovery of giant squid, gorillas, meteors and any number of wild and wonderful (but apparently unlikely) facts of this world,” he says. “In those cases, post hoc scientific rationalization was used to explain how people came to believe in such things. Seasoned fishermen were said to mistake floating trees with large root systems for huge animals attacking their boats; farmers were said to have overlooked iron-bearing rocks in the midst of their fields until they were pointed out by lightning; and in this case [the Old Hag experience], ‘children and savages’ were said to have difficulty knowing when they were awake and when they were asleep”—even though the victims, people of all ages, cultures and educational levels, insist they were not “dreaming,” that they were fully conscious when they heard and saw weird things.

Hufford argues that it is high time we take seriously “an experience with stable contents which is widespread, dramatic, realistic and bizarre,” which has been reported repeatedly “by large numbers of our fellow humans.”

Of course, the Old Hag is not the only experience that can be described in this way. Hufford does not hesitate to consider the implications of his Old Hag research for other claims involving strange phenomena. He writes, “I think that the present study has amply demonstrated that at least some apparently fantastic beliefs are in fact empirically grounded.” Unfortunately, most scholars have seemed more interested in explaining troublesome claims “out of existence” than in investigating them. The farther they remove themselves from the data (the accounts of those who have had the experiences), the more exotic, facile, and irrelevant their theories become. Hufford bluntly calls this practice “careless thinking retroactively applied with little regard for evidence.”

AN EMPIRICALLY based, “experience-centered” approach such as the one Hufford uses would show that events like the Old Hag are believed in because they really happen; they are not simply imagined by people who are so stupid, crazy, or credulous that they cannot tell the difference between a popular superstition and a personal experience. Inquirers would learn not to confuse “folk explanation” (for example, the notion that witches are responsible for Old Hag attacks) with “folk observation” (which, as Hufford demonstrates, can be quite accurate, consistent, and scientifically valuable).

Referring to the controversy over near-death experiences, he says, “The writings pro and con ... exemplify the effect of a common metaphysical red herring. ... Almost all editorializing and much of the research have focused on the question of whether these experiences constitute evidence of life after death. Those who oppose such a belief rush to provide alternative explanations that rarely fit the data currently available. Those who advance the experiences as evidence for the belief in life after death tend to dissipate energy that might have been better spent in actual research than on counterarguments about life after death. As a result, very few have focused on a thoroughly empirical study of the experience itself to discover its distribution and frequency, its relationship to other experiences ... and its phenomenology. These are eminently researchable questions, and they do not require any particular metaphysical position.”

Hufford emphasizes that he is arguing neither for nor against the existence of paranormal phenomena. He is, however, advancing an argument

with revolutionary implications: that rational persons are accurately reporting experiences that at least seem to be paranormal and that those who have attempted to explain away such accounts have not made their case or even understood what they are trying to explain. In consequence, scholars have failed to come to grips with a major part of human experience. Hufford quotes sociologist Andrew Greeley, who remarks in astonishment, “Almost a fifth of the American population reports frequent paranormal experiences, a finding that dazzles our social science colleagues as it does us. How could such an extraordinary phenomenon be overlooked for so long? Better yet, why has it been overlooked for so long?”

Can the Old Hag experience be explained in nonparanormal terms? Drawing on the findings of sleep research, Hufford concludes that the “state in which this experience occurs is probably best described as sleep paralysis with a particular kind of hypnagogic hallucination.” In other words, science can explain how someone could wake from sleep, be unable to move, and have a frightening experience. But it cannot explain the strange fact that the contents of the experience are consistent no matter to whom or in what cultural environment they occur. This mystery cannot be solved, Hufford says, “on the basis of current knowledge.”

Fascinating, original, and convincing, The Terror That Comes in the Night is one of the most significant books on the paranormal to appear in years. It is destined, I am convinced, to become a classic.

On Time, by Michael Shallis. New York: Schocken Books, 1982. Pp. 208.

Reviewed by Karen Olness, M.D.

THIS fascinating book, written by an astrophysicist at Oxford University, has as its central thesis that our common assumptions about time are meaningless. New knowledge of physics, in particular Einstein’s discovery of relativity, necessitates a new view of time.

The first chapters of the book describe the theories of relativity and particle physics. The author clearly explains the concept that time does not exist in black holes and that light is timeless. He reviews the discovery of more than 200 fundamental particles in recent decades. Most of these are virtual particles, existing only in the confines of small time intervals. Dr. Shallis emphasizes the antiparticles, which move backward in time, and notes that at the subatomic level time may flow forward and backward. In fact, the idea of flow becomes altogether confused. It is remarkable to think about the tachyon, which can only travel faster than light.

It has often seemed to me as a biological scientist that many scientists accept cause-and-effect relationships as absolute. I would disagree, however. No matter what the biologic question, we can follow the trace of cause-and-effect theory only so far. We eventually reach the quantum world, where causality and temporal sequence cease to operate in what are regarded as normal ways. Shallis very lucidly makes this point in discussing causality and chance. He uses the example of an electric light, pointing out that a causal explanation holds only at the macroscopic level, but that it is not necessarily a fundamental property of nature, but only a useful approximation of what is happening. In discussing action at a distance, such as field theories to explain the force of gravity, he notes that action at a distance eliminates time and hence causality, which becomes very worrisome to scientists. He also reviews Bohm’s work, which shows how hidden causes, not

allowed by orthodox theoreticians, can be reconciled with fundamental quantum theory. It is possible that quantum effects are not due to chance, but are manifestations of a deeper, implicate order of nature. With respect to true randomization of radioactive decay, for example, Shallis cites experiments in which the intention or wish of baby chicks apparently affected a radioactive control randomizer, so that the light to which the chicks were exposed was, significantly greater than it should have been according to random theory.

IN DISCUSSING the meaning of coincidence, the author notes that “coincidence as a temporal phenomenon is a wonderful example of time’s duality.” In discussing coincidence and psi phenomena, he uses examples of precognition, hauntings, and déjà vu and explains them by what he calls “time slips.”

Finally, the book seems best summarized in the author’s own words: “Objective time has gone.” It has gone from relativity, has gone from the quantum world, has gone from cosmology, where scales and redefinitions of time are almost required. Objective time has vanished in the paranormal. Only in the “normal world,” which has been impoverished by our definitions and explanations, which define poorly and explain little, does objective time still hold sway. One thing we must learn is that the time we think we inhabit is neither simple, linear, nor objective. “We are immersed in pools of time and timelessness, in a sea of causality and acausal connections.”

Pilgrim at Tinker Creek, by Annie Dillard. New York: Bantam Books, 2974. Pp. 279.

Reviewed by Cathryn Stewart

ILIKE the world when it isn’t doing anything in particular. It is my cranky contention that if there is spiritual power in the world, it should not be so partial to exotic spaces, accessible only to those who can go chasing after it. The best evidence for a world teeming with angels and demons should simply arise as one learns to pay attention to their presence. Otherwise, I’m not interested.

Annie Dillard’s book Pilgrim at Tinker Creek is a beautiful defense of the essentially inward pilgrimage. “I am no scientist,” says Dillard, but a poet and a walker with a background in theology and a penchant for quirky facts.” She has arranged a life that we would do well to envy; she not only has Tinker Creek and its surrounds to call her own, but apparently a more than adequate library and laboratory as well. She is the person who has actually read all those books you have promised yourself to read someday, from Pliny to Henri Fabre; and if she is no scientist, she knows more about recent work in physical and biological science than any poet or theologian should.

She has come across a book about the first successes with cataract surgery, which at that point suddenly made it possible to give sight to those who had been blind from birth. She tells the story of a girl who, when the bandages were removed from her eyes and she was led into the garden, saw “the tree with lights in it.” It is a scientific retelling of the experience recorded in the Bible of having the scales fall from one’s eyes, so that it becomes possible to see as if for the first time. Although these two instances of regained sight point toward the same experience of spiritual illumination, there is a significant difference that makes the modern version particularly appropriate as the central metaphor for Dillard’s book.

In the biblical account, God acts directly on Saul (who is known as

Paul after the experience) to transform his blindness into sight. A direct relationship is established between the spirit of the person and the spirit of God. Transformation is thus attained through means which do not require the participation of the natural world—in fact, the implication is that the natural world is directly opposed to spirit, and can therefore be only a hindrance to the search for enlightenment.

Dillard's pilgrimage is almost aggressively practical. It is just not her nature to wait for God in that rarified stupor sometimes recommended to the devout. She chooses to incorporate experience and knowledge to the full, however imperfect it may turn out to be.

This sounds like a good approach, very much in the tradition of American do-it-yourself. We will start from the premise that there is a spiritual reality, neatly overstepping tedious worries about the scientific or even rational proof of its existence that have kept the exploration confined to base camp for centuries. If we are willing to allow just this one huge indiscretion, all sorts of new metaphysical territory might suddenly open up. And here the tools of science and rationality are no longer enemies of faith, but can be used to assist the Pilgrim with the raw materials of revelation.

It is tempting to compare Dillard with the more familiar Walden Pond school of American Transcendentalism. Although there are many obvious parallels, they tend to seem less interesting after the first few pages. It is impossible to dismiss her work as merely an attempt to revive what proved to be an untenable idealism. Dillard is asking both more and less of her readers. Her very insistence on a certain degree of scientific detachment precludes the need for the prescriptions and pronouncements that are central to the work of earlier Transcendentalists. She sees what she sees; she does not flinch or spare her readers whatever gruesome details might be involved. In so doing she circumvents the task of redesigning humanity in accord with a romanticized—and largely fictitious—concept of nature as wholly benevolent and wise. It is simply not what the best available data indicate. Dillard concludes that it is precisely the nature of things to be inharmonious, and that the best thing to do for the time being, anyway, is to go along with it ... whatever "it" turns out to be.

Pilgrim at Tinker Creek is not what one expects from people who call themselves poets. Nothing about it is serene or impassive; nothing is toned down to make one feel more secure. On the contrary, she writes from an intensity of experience she seems to live in order to declare. It is a state she equates with innocence. "What I call innocence is the spirit's unself-conscious state at any moment of pure devotion to any object. It is at once a receptiveness and total concentration."

Far from trying to escape the world, Dillard discovers that it is by entering more fully into it that she experiences, paradoxically, the greatest transformations of both herself and her perception of the environment. And the understanding of reality at which she arrives is as paradoxical as are her methods of finding it. Life on the unmanicured banks of Tinker Creek is both harsh and gentle, both senseless and wise. One is as often filled with revulsion as with awe. Dillard finds a power capable of such extremes that she can only honor it.

Convinced as she is of both the immensity and moral ambiguity of such power, it is all the more amazing that she should deliberately lay herself open to the experience of it. Her discipline of "seeing," as she calls it, is not only a very difficult one; it is also potentially dangerous. One must be willing to see whatever reveals itself, and no guarantees are given that the experience will be a positive one.

There doesn't seem to be much chance of protecting oneself, either, for it is precisely this passionate abandon that makes possible for Dillard the extraordinary experiences she records. It may well be that the laboratory safeguards and monitoring devices of more scientifically minded pilgrims do much to insulate them from the very experiences that they seek; that what they gain in validity, they lose in significance; that the experience of ultimate reality is not only not subject to our control, but even antithetical to it.

“The lover can see,” writes Dillard, “and the knowledgeable.” She is both, and it is this double vision that makes her work so compelling. She describes the hard beauty of a monarch migration. She allows herself to wonder at the grotesque horror of a female mantis, which eats its mate as they couple; at the inconceivable mindlessness of processionary pine caterpillars, who will follow their own tracks in a circle until they die of starvation—even if food is placed only a few inches away. She questions the frighteningly wasteful fecundity of nature, in which “a lone aphid, without a partner, breeding ‘unmolested’ for one year, would produce so many living aphids that, although they are only a tenth of an inch long, together they would extend into space twenty-five hundred light years”—all in order that a few hundred may survive.

One grows uneasy at such statistics. Is she perhaps not talking just about insects here? If these atrocities, these blind indulgences, exist in nature, are they not also at work in the complexity of human experience? Fortunately, Dillard’s faith breathes a different oxygen than the rational mind. It is only by surrendering to its mystery that she is able to accept the natural world; it remains, after all the study, rationally incomprehensible.

Living with nature, then, provides Dillard with neither an escape from life, nor programs designed to improve the status quo. Her experience serves only to draw her more deeply into its mystery. She concludes her book by saying, “And then you walk fearlessly... like the monk on the road who knows precisely how vulnerable he is, who takes no comfort among death-forgetting men, and who carries his vision of vastness and might around in his tunic like a live coal which neither burns nor warms him, but with which he will not part. ...” The Pilgrim finds what she seeks, no more and no less. And it is enough.

NOTES ON CONTRIBUTORS

ROBERT C. BECK, D.Sc., is widely known for his instrumentation of altered states, for his development of state-of-the-art medical electrical stimulators, and for his investigation of Tesla electromagnetics. Bob is a consultant to Sondia Corporation and Senior Staff Scientist at Eyring Research Institute, and he has been a consultant to the Navy's Office of Surface Weaponry on the subject of ELF detection. He has designed and built extremely sensitive magnetometers for the Navy. Bob Beck has also served as chief engineer for several electro-optical companies and worked in electro-optics for several aircraft and aerospace firms. He is President and founder of Monitor Electronics Research Corporation and Alpha Metrics Company (1969-), a firm manufacturing ethical biofeedback equipment. He is Executive Director of Biomedical Research Associates and owner of Color Control Company, an audio-visual laboratory. Bob owns the basic patents on low-voltage electronic flash and several patents involving electro-optical systems. He is currently investigating psychophysiology and various electro-medical modalities.

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JACK HOUCK, B.S. and M.S. in Aeronautical and Astronautical Engineering (University of Michigan), has worked as a systems engineer for a southern California aerospace company since 1961. Jack pioneered the technique of psychokinetic metal-bending and developed a conceptual model of paranormal phenomena (ARCHAEOUS 1, 1 [1983]) that has had considerable influence on practical parapsychologists, particularly on the West Coast. Jack Houck also developed the format for the PK party, where "ordinary people" can personally experience psychic metal-bending. Jack will be conducting the hundredth such party on Oct. 6, 1984.

ANDRIJA PUHARICH, M.D., is a physician, research consultant, and parapsychologist. Andrija set up the Round Table Foundation to study the physico-chemical basis for paranormal phenomena as early as 1948. He was research consultant for Mind Science Foundation, Belk Research Foundation, Consciousness Research Foundation, Metro-Goldwyn-Mayer One Step Beyond Productions, Marco Engineering Company, and various industrial and scientific organizations. He was Director of Medical Research, Intelectron Corporation. He is a member of the New York Academy of Sciences, American Medical Association, American Association for the Advancement of Science, and San Francisco Mycological Society. Andrija Puharich invented an orthopedic cast and other corrective devices and holds some 50 patents. In 1971, he decided to free himself from foundations and companies and devote himself to parapsychological investigation. This decision was stimulated by his contact with the Brazilian psychic surgeon Arigo, who died suddenly in an automobile accident in 1971. Andrija subsequently went to Tel Aviv to meet Uri Geller and commenced a series of tests of Geller's strange abilities. Andrija's biography of Geller, Uri: A Journal of the Mystery of Uri Geller, appeared in 1974. In addition to this book, Andrija's works include The Sacred Mushroom: Key to the Door of Eternity (1959) and Beyond Telepathy (1962). Recently, he has been involved in ELF research.

ELIZABETH A. RAUSCHER, Ph.D., has published nearly 100 papers in astrophysics, nuclear physics, basis of quantum mechanics, quantum electronics, and energy systems. She has done considerable work in developing a multi-dimensional closed cosmology for Einstein's field equations, in complex geometry, nonlinear soliton coherent solutions, S-matrix theory, and efficient transmission line design. Elizabeth organized and chaired the Tuesday Night Club (on world religion and philosophy) at Livermore and the "Fundamental 'Fysiks' Group" at the Lawrence Berkeley Laboratory, a group that met to explore "the foundations of physics, and physics and consciousness." She has taught courses in physics, philosophy of science, and science and mysticism at the University of California at Berkeley, Stanford, and John F. Kennedy University. Elizabeth Rauscher's paper "Some physical models potentially applicable to remote perception" was presented at the Frontiers of Physics conference in Iceland and was one of five papers selected to appear in the proceedings of that meeting (Puharich, A., ed., The Iceland Papers: Selected Papers on Experimental and Theoretical Research on the Physics of Consciousness [Amherst, WI: Essentia Research Associates, 1979]).

OTTO H. SCHMITT, Ph.D., Professor Emeritus of Biophysics, Bioengineering, and Electrical Engineering at the University of Minnesota, has been on the University staff since 1939. Dr. Schmitt was official investigator, National Defense Research Commission (1940-1942) and supervising engineer, special devices division, Airborne Instruments Laboratory (1943-1947). He was a member of the advisory panel, Space Science Board, Biology and Psychology (1958-1961); chairman, executive council on bioastronautics, Joint Armed Forces-National Academy of Sciences (1958-1961). He was awarded the Lovelace Award (1960), the Motlock Award (1963), the Wethenill Medal (1972), and elected to the Minnesota Inventors Hall of Fame (1978) and the National Academy of Engineering (1979). He has been a consultant to the U.S. Army Air Force and the Navy. He is a fellow of the American Physical Society, Biophysical Society, American Physiological Society, Aerospace Medical Association, the Institute for Electrical and Electronics Engineers, the American Association for the Advancement of Science, and the New York Academy of Sciences.

DENNIS STILLINGS, B.A. in Philosophy and Mathematics from the University of Minnesota, has spent some 20 years investigating various aspects of the paranormal, in particular its relationship to Jungian psychology. From 1969 to 1980, he developed the collections of the Bakken Library of Electricity in Life, an institution devoted to the study of electricity and magnetism in relation to biology, medicine, and cultural transformation. He has spent the last three years developing the Archaeus Project.

ARCHAEUS