the Skeptical Inquirer

THE PHYSICS OF FIREWALKING
Heat, Hype, and Hoopla

The Myth of Alpha Consciousness
Fox Sisters Revisited
Ganzfeld Experiments: An Appraisal
Saguaro UFO Incident

VOL. X NO. 1 / FALL 1985 $5.00
Published by the Committee for the Scientific Investigation of Claims of the Paranormal

the Skeptical Inquirer

THE SKEPTICAL INQUIRER is the official journal of the Committee for the Scientific Investigation of Claims of the Paranormal.

The Committee for the Scientific Investigation of Claims of the Paranormal

Fellows of the Committee

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Subscriptions, change of address, and advertising should be addressed to: THE SKEPTICAL INQUIRER, Central Park Station, Box 229, Buffalo, NY 14215-0229. Old address as well as new are necessary for change of subscriber's address, with six weeks advance notice.

Inquiries from the media and the public about the work of the Committee should be made to Paul Kurtz, Chairman, CSICOP, Central Park Station, Box 229, Buffalo, NY 14215-0229. Tel.: (716) 834-3222.

Subscription Rates: Individuals, libraries, and institutions, $18.00 a year; back issues, $5.00 each (vol. 1, no. 1 through vol. 2, no. 2, $7.50 each).

Postmaster: THE SKEPTICAL INQUIRER is published quarterly. Spring, Summer, Fall, and Winter. Printed in the U.S.A. Second-class postage paid at Buffalo, New York, and additional mailing offices. Send changes of address to THE SKEPTICAL INQUIRER, Central Park Station, Box 229, Buffalo, NY 14215-0229.

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Journal of the Committee for the Scientific Investigation of Claims of the Paranormal
Vol. X, No. 1 ISSN 0194-6730 Fall 1985

ON THE COVER: photograph by Kimberly Willis, Physics Department, UCLA.

News and Comment

Ganzfeld Studies: First Detailed Appraisal Finds Serious Flaws, No Evidence of Psi

IN THE 11 YEARS since publication of the first "ganzfeld" ESP experiment in 1974, reporting pro-psi results, a series of similar experiments have been published in the parapsychological literature. Parapsychologists and others have considered these to be among the strongest scientific evidence for the existence of extrasensory perception.

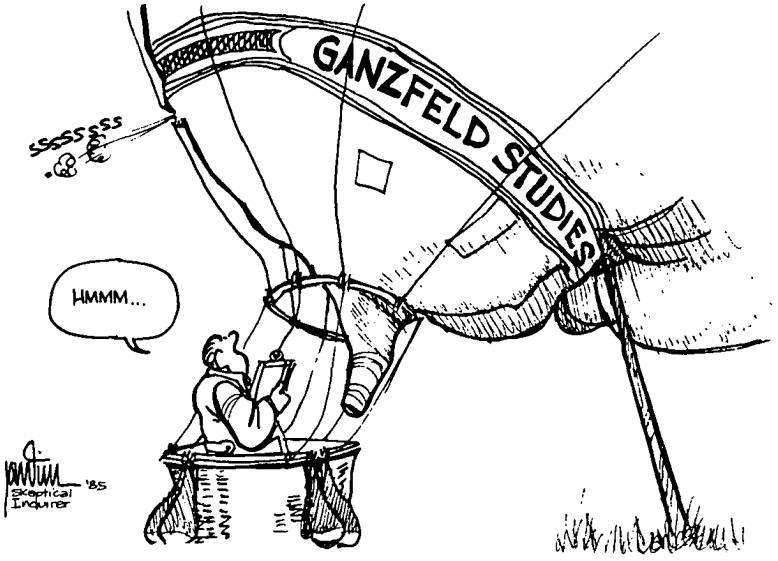
Ganzfeld experiments are based on the idea that sensory deprivation is conducive to the manifestation of psi abilities. The research subject is generally isolated from visual and other sensory contact. Then various experiments are carried out to test the subject's ability to perceive outside information.

For instance, a person undergoing perceptual deprivation might be asked to "receive" an image from a photograph randomly selected from four photos and being concentrated on by a "sender" in another location. While doing so he might be requested to verbalize his thoughts, feelings, and images. Afterward, the subject and, in some cases, independent judges would be asked to assess the degree of correspondence between the picture and the subject's imagery. Positive results from a number of such experiments have been presented as evidence for psi.

The first detailed scholarly evaluation of the ganzfeld studies has now been published. The critique, prepared over a period of several years by psychologist (and CSICOP Executive Council member) Ray Hyman, of the University of Oregon, gives little comfort to proponents of the ganzfeld experiments as the best hope for proving psi abilities exist.

". . . I believe that the ganzfeld psi data base, despite initial impressions, is inadequate either to support the contention of a repeatable study or to demonstrate the reality of psi," Hyman concludes in his 47-page critical appraisal, published in the March 1985 *Journal of Parapsychology*. "Whatever other value these studies may have for the parapsychological community, they have too many weaknesses to serve as the basis for confronting the rest of the scientific community. Indeed, parapsychologists and others may be doing themselves and their cause a disservice by attempting to use these studies as examples of the current state of their field."

The journal follows Hyman's analysis with an equally detailed



response by parapsychologist Charles Honorton disputing many of his conclusions. Honorton carried out the first reported ganzfeld ESP experiment in 1974, and his subsequent ganzfeld studies include some of the most positive (pro-ESP) results.

Hyman had been asked to prepare a critical appraisal of parapsychology. Rather than attempting to take on the whole field, he looked for a systematic research program that parapsychologists considered especially promising. It needed to consist of a series of studies carried out by a variety of researchers. He chose the ganzfeld psi studies. Respected investigators had conducted them. Hyman was intrigued by their claims that significant psi scores had been achieved in more than half of the experiments and that the studies had been conducted with a high level of sophistication and rigor.

Hyman sought Honorton's cooperation. Honorton felt it important to have an outside critic like Hyman assess the ganzfeld literature. He supplied Hyman with a copy of every reported ganzfeld study he knew of.

As a result, Hyman evaluated all 42 studies reported from 1974 through 1981. Honorton classified 23 of them as having achieved significance as evidence of psi. This amounts to a claimed replication rate of 55 percent.

Hyman prepared a preliminary critique, which he presented at the combined meetings of the Society for Psychical Research and the Parapsychological Association in Cambridge, England, in August 1982 (*SI*, Winter 1982-83). As a result of comments on that paper by Honorton and others, he prepared a new and more systematic analysis of the data.

Hyman focused on two questions: (1) Does the data base, taken as a whole, supply evidence for psi? (2) Does the ganzfeld psi study yield evidence for psi that is replicable?

The basic index for these questions is some measure of hitting or target-matching compared with a chance baseline. This, Hyman noted, creates special problems; assumptions about chance levels and probability distributions take

on a great burden.

He divided his critique into four phases:

—Rechecking the "vote count."

—Assessing the actual opposed to the assumed level of significance.

—Assigning procedural flaws to the studies.

—Analyzing correlations among flaws, positive effects, and significance.

The "vote count" check assessed whether the studies claimed to be successful really amount to 55 percent of the total. Hyman found a lot depends on how studies containing multiple conditions are divided up. He found, for instance, that a study counted as one "successful" replication could be viewed "with equal justification" as adding one successful and 11 unsuccessful replications to the total.

Then he considered the "file-drawer" problem. How many ganzfeld studies have been conducted but not reported? Surveys have identified other studies, and their inclusion tends to lower the success rate.

The important question here was whether there was evidence for biased reporting—specifically, is there a possibility that only those experiments that begin with a string of successes end up being reported? "It is [easy] to imagine that a large number of experimenters . . . might have begun conducting some trials and then abandoned the study when the first few trials turned out to be unpromising. On the other hand, a few of these exploratory ventures might have started with initially successful trials, encouraging the experimenter either to continue or to stop and write up the result as a successful replication."

Is there any evidence for such a suggestion? Yes, Hyman says. He found a tendency for the studies with the fewer trials to have a higher proportion of significant outcomes. "The most obvious conclusion is that such a strange relationship is due to selective bias. It suggests a tendency to report studies with a small sample only if they have significant results."

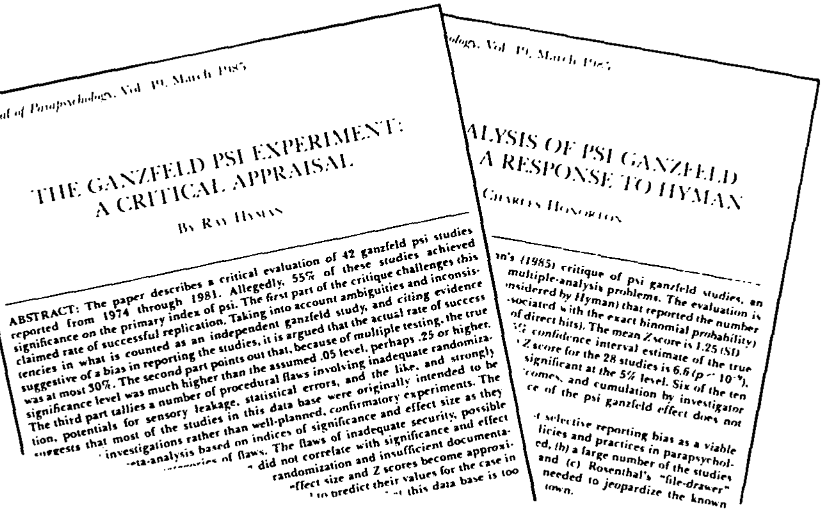
Another, related bias Hyman calls a "retrospective bias." "This is the tendency to decide to treat a pilot or exploratory series of trials as a study if it turns out that the outcome happens to be significant or noteworthy." He found two studies in the data base that were clearly retrospective and strong circumstantial evidence of four others.

Next Hyman considered whether the chances of getting successful results in ganzfeld ESP studies without invoking psi are really as low as psi proponents suggest. The studies varied widely in variables and in the questions being asked. Notes Hyman, with some understatement, "Many confusing questions arise about what probability levels to assign to the various tests of significance."

Generally, a ganzfeld experiment is taken to show evidence of psi if the statistics indicate there is no more than a .05 probability that the results are due to chance. Hyman's various analyses found that the probability of obtaining at least one significant outcome per experiment was instead .24—"over four times the assumed level of .05."

The discrepancy results from the use of multiple indices—the availability of several different ways of getting "hits" without their being included in the probability estimates. Hyman found that more than half the studies he evaluated "clearly used multiple indices without taking this into account in computing their statistical significance." Multiple indices was but one of six categories of multiple testing he checked the studies against. Forty percent of the studies, for instance, used multiple baselines; 64 percent used multiple groupings.

Using this kind of analysis, Hyman found one study that had increased the probability of getting successful results



Ganzfeld debate: Hard-hitting critique, spirited rebuttal.

"almost surely beyond .50." In other words there was a better than 50-50 chance of getting a positive, "pro-psi" result just by chance. "Indeed, if we consider the eight intervening practice conditions, the chances of coming up with a significant outcome are well over .80! And this is just one of the many studies in this data base that exhibit such complex options either explicitly or implicitly."

Hyman found that the actual rate of successful replication is less than 30 percent. "And the arguments in this section strongly suggest that this rate of 'successful' replication is probably very close to what should be expected by chance given the various options for multiple testing exhibited in this data base."

Hyman then turned to procedural flaws in the studies. He found that 36 percent of them used improper randomization procedures, 55 percent used only a single target (which allows various chances for sensory leakage), 24 percent allowed contaminating feedback, 38 percent of the published studies (and 81 percent of the unpublished ones) gave inadequate documentation, 24 percent had inadequate security, and 29 percent appeared to use erroneous statistical procedures.

Hyman says he was very conservative in assigning these flaws. Those that were not too common or depended on suspicions or hard-to-objectify criteria he did not count. "In any case the existence of so many elementary defects in this data base is both disturbing and surprising. Only two studies were entirely free of the six procedural flaws. And if we include multiple-testing errors, not a single study in this data base was flawless.

"It is important to realize that the defects being discussed are not obscure or subtle. Rather, I suspect that a typical parapsychologist would spontaneously list them as being unacceptable in a psi experiment."

Are these defects important? Yes, Hyman believes, in two ways. First, they are a symptom of something seriously wrong. When studies put forth as among the field's strongest evidence of psi have so many elementary deficiencies, it is a sign that quality control is lacking. There are so many problems with these studies in fact that Hyman

told the SKEPTICAL INQUIRER he believes most were informal exploratory studies that were reported only because they gave positive results. No one knows how many exploratory studies giving null results have been carried out for each one giving a positive result. This is an old problem in parapsychology. Until it is solved, it makes the statistical case for psi almost meaningless.

Second, the tendency to get stronger results correlates with greater presence of experimental deficiencies. Hyman examined the pattern of relationships among indices of success and various flaws. He compared the presence of flaws in each study with its outcome. The flaws concerning randomization, feedback, documentation, and statistics seemed to correlate with three different measures of significance. "The more likely a study was to be assigned any of these flaws, the more likely it was to be classified as significant." A similar but weaker pattern was found in the size of the effect reported by the study.

Hyman told *SI* he doesn't contend that there is a one-to-one correspondence between a flaw and a positive outcome. "I argue that it's not any one defect alone. Probably they work in combination."

"Whatever the reasons, the 42 studies in the present data base cannot by any stretch of the imagination be characterized as flawless, and I suspect that most of them were not well planned," Hyman concludes. "The current data base has too many problems to be seriously put before outsiders as evidence of psi."

In the concluding section, Hyman offers a number of suggestions by which the Parapsychological Association and others could establish guidelines for what should constitute an adequate confirmatory study. (The Council of the Parapsychological Association has now commissioned a study group to develop just such guidelines. Hyman has accepted an offer to serve on the committee.) Only if a large body of studies meeting such rigorous guidelines can be accumulated should the scientific community have any obligation to take notice, Hyman concludes.

In Honorton's 41-page response to Hyman's analysis, he presents his own meta-analysis of ganzfeld research, which he says eliminates the multiple-analysis problems Hyman criticized. He disputes the view that selective-reporting bias has anything to do with the positive results reported in the literature. He contends that, contrary to Hyman's assessment, no significant relationship is found between study outcomes and measures of study quality. He also disagrees with some of Hyman's assignments of flaws. "Is there a significant psi ganzfeld effect?" Honorton asks. "I believe my evaluation of direct-hits studies justifies an affirmative answer to the question."

Hyman will prepare a rebuttal to Honorton's response for a future issue of the *Journal of Parapsychology*. He points out that Honorton, in his response, concentrates only on Hyman's correlation analysis while ignoring the larger issue. "He ignores the fact that *all* the experiments are flawed. In ten years, why hasn't anyone done them right? He hasn't faced up to that." Hyman's published evaluation included all ganzfeld studies published through 1981, but he says he hasn't seen one reported since then that avoids the problems he cites.

Hyman's is the most detailed critical analysis of the ganzfeld ESP studies ever done. Constructive in intent, it is nevertheless sobering, even damning, in result. It is clear from Honorton's spirited rebuttal that the controversy will continue. But parapsychologists who hoped that ganzfeld ESP studies would at last achieve the scientific demonstration of psi have been

given a good dose of the kind of critical scrutiny their claims will have to face and overcome. If future studies can pass that kind of test, then they would deserve the attention of outside scientists; if not, it appears that oblivion is their destiny.

—*Kendrick Frazier*

Koestler Appointment Goes to Robert Morris

THE ENDOWMENT of a chair in parapsychology by writer Arthur Koestler and his wife Cynthia in the will left after their joint suicide in 1982 set off a small storm of academic controversy in Britain. Was the study of parapsychology a proper activity at a university? Oxford and Cambridge expressed no interest in the £500,000 bequest and eventually the Arthur Koestler Chair of Parapsychology was established at Edinburgh University. (See Martin Gardner's "Koestler Money Down Psi Drain?" *SI*, Fall 1984.)

Now, after a long search for the best candidate, Edinburgh has selected an American parapsychologist, Robert Morris, to occupy the post. Morris, senior research scientist at the School of Computer and Information Science at Syracuse University, is expected to begin on January 1, 1986.

Morris, 42, is a well-known parapsychological researcher in the United States. He is generally respected by both proponents and critics of the field. President of the Parapsychological Association, he received his Ph.D. in animal social behavior at Duke University and has published papers in that field as well as detailed scientific assessments and popular critical accounts of paranormal claims.

(Longtime *SI* readers may recall Morris's critical investigative review of *The Amityville Horror*, Spring Summer


UNIVERSITY OF EDINBURGH

KOESTLER CHAIR OF PARAPSYCHOLOGY

1978. In it, he revealed crucial discrepancies between the book and the facts and outlined 12 basic problems facing spontaneous investigations in parapsychology. He was also an invited speaker at CSICOP's international conference in Buffalo, N.Y., in October 1983. He spoke of a possible "residue of useful information" in experiments on ESP, referred to his "high tolerance for ambiguity," complained of some of the more emotional criticisms of parapsychology, and called for intelligent criticism and active cooperation between critic and researcher.)

The Koestler chair is the only professorial post for parapsychology in Britain. It will be in the Psychology Department. "Given the unique nature of this appointment, Dr. Morris faces a considerable challenge," said John Burnett, principal of Edinburgh University. "He is well equipped to meet that challenge and cope with the wide public interest his research program will attract."

The university had drawn up a list of 30 applicants who it indicated had

appropriate qualifications in the field of psi research. It narrowed that list to 8 before selecting Morris. He will receive an annual stipend of £18,000.

"While occupying the Koestler Chair," Morris told the SKEPTICAL INQUIRER, "I intend to promote parapsychology as an interdisciplinary problem area, seeking to understand as best it can the causative bases of the human experiences commonly labelled as 'psychic.' Such understanding may lead us in major new directions, and we must be prepared to accept this. It most certainly will lead us, at least in part, to a better understanding of the means by which we infer causal connections between ourselves and our environments, including means by which we can be deceived.

"Parapyschology is not a belief system, and should not be practiced as such by those who would make strong claims about the nature of psychic experiences in the guise of science but without adequate scientific support."

—*K.F.*

Southern California Skeptics Fast-Rising Star in LA

IN NINE SHORT months, the Southern California Skeptics (SCS) has become the fastest-growing local skeptics group. SCS has already achieved a membership of 700 and has received favorable reports in almost every major newspaper in the country. SCS spokesmen have been interviewed on more than 50 radio talk-shows around the country. The requests for SCS representatives to speak to newspapers, radio and television shows, club banquets, and schools continue to come in at an impressive rate.

SCS monthly meetings and lectures, held at the California Institute of Technology, have featured such distinguished speakers as magician James Randi, Harvard professor Stephen Jay Gould, Bermuda Triangle expert Lawrence Kusche, CSICOP chairman Paul Kurtz, UFO expert Robert Sheaffer, and Drs. Bernard Leikind and William McCarthy, experts on firewalking.

For its April lecture, SCS held a demonstration of the physics of firewalking on the Caltech sports field. It included a demonstration and voluntary audience participation. Approximately 1,000 persons attended and 125 of them barefooted over the 1,400° F coals. Newspapers in Southern California carried front-page stories and pictures about the demonstration, and reports were aired on CBS and CNN national news the following week. The *Los Angeles Times* followed this with an enthusiastic editorial about SCS in their Sunday edition, headlined "Go Skeptics!"

Aside from the letters we have received from doctors, college professors, psychologists, and high school teachers, thanking us for our efforts, we have had many letters and phone calls from believers who changed their minds after hearing common sense from us. One man, for example, who had been attending a local firewalking seminar read our explanation in his local newspaper. He called to thank us for setting him straight. Probably the most grateful were the two callers who were saved from investing $3 million in a perpetual-motion machine.

One of our main goals is to reach children at the junior-high and high school levels. SCS is proud of the successful visit by one of its speakers to a class in a San Fernando Valley high school where the teacher, Joe Feinstein, is an unabashed supporter of paranormal claims. He had been making his views known in his high school "Introduction to Sociology" classes, where he believes "a new type of thinking is required in today's world." SCS asked to present a different point of view to his class. Mr. Feinstein agreed.

Feinstein wrote to SCS giving the results. "After spending 15 weeks presenting a wide array of psychics, graphologists, and parapsychologists of all descriptions, you totally annihilated all their efforts in 40 rapid minutes. I'm not sure if I'm happy or sad about that. However, you were very effective in giving my students something(s) to think about. And, after all, isn't that what school and education are supposed to be about? Since you've been such a marvelous irritant and catalyst, please accept my invitation to join us once again . . . to do your number." SCS returned to his class in June and received a standing ovation from the students after the presentation.

SCS is not, however, entirely successful. We never thought we would be. In a sense we are like Sisyphus pushing that rock up the proverbial mountain of superstition only to watch it roll back down on occasion. A week after a lengthy article about us appeared in the *Los Angeles Herald Examiner,* it published an equally lengthy article about a woman who edits a magazine containing only articles contributed by ghosts. I wonder which is the better buy—the magazine that tells you, for $25, that there are ghosts, or the SKEPTICAL INQUIRER, for $18, which tells you that the former is probably using a different type of ghostwriter? Nevertheless, we have our successes, so we will continue to keep pushing that rock up the hill.

—Al Seckel, SCS Chairman

Firewalker Challenged, Gets Cold Feet

TOP CALIFORNIA firewalker Tony Robbins prepared well for his first Australian tour. Advance press releases were circulated to the Australian media, full-page advertisements were placed in the "alternative press,"


SUNDAY PRESS MAY 12 1985.
Melbourne, Australia.

By JANE SIMONS

Fiery fakir cools down

Fear

Challenged

Australian organizers were appointed, and an office with a toll-free number was opened. All was set for a profitable run. Robbins was to tour from May 8 to 20, 1985.

Robbins clearly hadn't counted on the Australian Skeptics, the Australian branch of the Committee for the Scientific Investigation of Claims of the Paranormal.

The news of Robbins's intended tour reached the Australian Skeptics in the same week as a copy of a paper on firewalking from Southern Californian Skeptics Bernard Leikind and William McCarthy (based on their article in this issue), both members of the Southern California Skeptics.

The Australian Skeptics rushed the paper over to one of their patrons, national columnist Phillip Adams. Adams made it the topic of his weekly column in Australia's national newspaper *The Australian* on March 30. Millions of Australians read the scientific explanation of firewalking.

The following weekend the Australian Skeptics held their first

national convention in Sydney. In his opening address the Skeptics' national president, Mark Plummer, challenged Robbins to allow his claims to be tested on arrival in Sydney. The challenge was widely reported by the media.

At the same time another American, Robert Young, from Hawaii, was touring Australia trying to stir interest in *his* firewalking courses. Not only was his pre-publicity not as good as Robbins's but everywhere he turned up there were Skeptics handing out flyers giving the scientific explanation of firewalking.

Young debated Mark Plummer on one radio station and challenged him to walk over the fire. Plummer said he would consider it if the Skeptics' scientists were allowed to take heat measurements of the fire first.

When the night came, Young's group refused to allow the measurements to be taken. The following day Plummer was given time on the same radio station to blast Young for not honoring the agreement. Although Young was invited to give his side of the story, he declined to appear.

The Skeptics kept up the barrage in the media, telling more and more people about the realities of firewalking and repeating the challenge to Robbins. Young found interest in the courses waning as the Skeptics' publicity increased.

Ten days before Robbins was due to arrive, Mark Plummer telephoned his office to get details of his arrival so that the Skeptics could plan their own press conference. He was told that the Robbins tour was "postponed." The Californian firewalker had got cold feet!

Faces, Flyers, and Frauds . . . and an Award

IN THE SUMMER of 1976, when the Viking 1 orbiter was daily taking extraordinary photos of huge canyons, volcanoes, and other surface features on Mars, one photo of a kilometer-wide formation that superficially looked like a giant stone face caused some momentary amusement. No one took the "face" seriously, but we knew that the fringe-science fans would probably try to make something mysterious out of it. The only thing surprising about the recent flap in the media about the stone face on Mars (see Martin Gardner's column, p. 14) is that it occurred nearly nine years after first publication of the photo. At *Science News,* where I was editor during the Viking mission, we published the photo in our August 7, 1976, issue (whose cover was the first color photo from the surface of Mars, taken on July 21 by the Viking 1 lander) and gave it a justifiably brief two-sentence reference at the very end of a 3-page article on the Viking findings by our space-sciences editor, Jonathan Eberhart. The reference quoted an apt quip by Viking site-selection chief Harold Masursky about the stone face: "This is the guy that built all of Lowell's canals."

* * * * *

A 1985 George Norlin Award from the University of Colorado alumni association to your editor makes special note of the SKEPTICAL INQUIRER. The citation refers to a journalism of public service. "Editor since 1977 of the SKEPTICAL INQUIRER, a quarterly that is recognized worldwide, he speaks calmly, authoritatively and fairly in a mine field of controversy against pseudoscience, superstition, and the irrational fringe."

* * * * *

Many readers (presumably relatively new ones) have written asking us to do something about the pro-paranormal flyer the *Reader's Digest* has been distributing this year in massive quanti-

ties. They all have complained that the four-color foldout is paranormal pandering of the worst sort. ("There Are Strange Things Going On Around Us," it begins.) In fact, this is another mass mailing of exactly the same promotional flyer we have already condemned in these pages ("Promoting the Paranormal: The *Digest*'s Glossy Sales Pitch," Fall 1983, pp. 5-8). We criticized both the tone and the facts of the promotional piece, in some detail, and said Reader's Digest Books ought to be ashamed of it. We even brought our critique to the attention of the editor of Reader's Digest Books, in a personal letter. There was no reply.

* * * * *

The American Astrological Association, Canton, Ohio, has descended to a new low in direct-mail solicitation. Recipients, allegedly those who had already sent in their exact time and place of birth, received an "Emergency Notification Memo." It was accompanied by a Lucky Number Horoscope with half of the page torn out and missing. "I had prepared your horoscope for internal research use *only*," says the letter. "But after reading your horoscope, I was *forced* to halt my research project and send you this *emergency notification*." It goes on to exclaim that "your horoscope" shows that opportunities for "extraordinary luck, love, wealth, and happiness" are about to occur in the weeks ahead. But to take advantage of these opportunities the recipient must, according to the writer's "research," know the exact minute when his or her significant time periods begin. That is why, says the letter, "I felt obligated to make this emergency notification." How does one get the missing part of the horoscope? By sending $10.95 to the Association. Asks one recipient, "Is this mail fraud?"

—*K.F.*

Australian Skeptics' Quarterly

The first 18 issues of the Australian Skeptics' quarterly magazine, *The Skeptic* (through the July 1985 issue), are available for $18 U.S. Order from Dr. J. Lattanzio, Canadian Institute of Astrophysics, University of Toronto, Toronto, Ontario M5S 1A1, Canada.

CSICOP Tenth Anniversary Fund
B. F. Skinner, Honorary Chairman

B. F. Skinner has agreed to serve as Honorary Chairman of the CSICOP Tenth Anniversary Fund. Dr. Skinner notes that he is extremely busy with research and writing and seldom takes on additional projects, but he feels the work of CSICOP is so important and unique that he is breaking his general rule.

Similarly, there are many calls upon each of us for our time and financial resources, but CSICOP is at a crossroads and really needs a major infusion of support to ensure its long-term viability. The Committee is small, but its influence has been impressive. One of the major reasons for this is the catalysis of enthusiastic support by *SI* readers who take initiatives ranging from lobbying local schoolboards to founding regional organizations and new publications.

CSICOP and the SKEPTICAL INQUIRER will be ten years old in 1986. Thanks to your subscriptions and contributions, we provide a much-needed skeptical voice in the midst of a cacophony of sensationalized and credulous reports of old and new paranormal claims. We are committed to skeptical and objective analysis rather than authoritarian or majority-of-the-moment pronouncements. We sponsor conferences and have greatly expanded our outreach to the news media, increased our support for the investigation of paranormal claims, such as that of the "Columbus Poltergeist," and are fielding an increasing flow of inquiries from the media and the general public. The SKEPTICAL INQUIRER is the *only* magazine of its kind; we think it does an essential job. (Other publications, from the *National Review* to the *Nation,* also require grants and bequests to survive, by the way, and they are less involved than CSICOP in activities beyond publishing.)

Look ~~inside the front cover at our "staff"~~ list—many are volunteers, only ~~five~~ are ~~full-time employees~~, and all those who *are* paid ~~could make more money elsewhere~~; there is no "fat" to ~~trim~~ as printing, postage, and other costs increase.

We plan to develop a definitive library/archive/database on paranormal claims, to establish liaisons with other organizations, to expand our program of providing speakers to public meetings and interviewees for the mass media, and to produce audiovisual resources for use in schools. We must upgrade our information resources and our ability to disseminate this information if we are to achieve

CSICOP's potential for constructive influence on public thought and scientific research.

Meanwhile, our resources are strained to their limits.

We are therefore launching a capital fund-raising campaign. We will focus initially upon the creation of a library/archive, but the fund will also allow us to improve our services, from publications to research. With Dr. Skinner as Honorary Chair, the fund-drive committee will consist of members of the Executive Council, the Executive Director, and others who are being added as this goes to press. Council, the Executive Director, and others who are being added as this goes to press.

We need your tax-deductible contributions, large and small, but unlike previous requests we will not simply be asking for funds to help meet immediate expenses. The Tenth Anniversary Fund will ~~be a fund~~ to guarantee our future.

We will be writing to ask for assistance.

I hope this "news briefing" explains the situation and convinces you to contribute what you can today and in future months.

John R. Cole
Executive Director

Paul Kurtz
Chairman

Executive Council: James Alcock, Kendrick Frazier, Martin Gardner, Ray Hyman, Philip J. Klass, Lee Nisbet

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MARTIN GARDNER

Notes of a Psi-Watcher

The Great Stone Face and Other Nonmysteries

CLOUDS OFTEN take the shapes of animals and human faces. The same is true of rock formations, such as the Great Stone Face in the White Mountains of New Hampshire, made famous by Hawthorne's tale. Draw a wiggly vertical line. It's easy to find spots where you can add a few more lines to make the profile of a face. On the left and right sides of the maple leaf on the Canadian flag you'll see the faces of two men (liberal and conservative?) arguing with each other. A few decades ago the Canadian dollar bill had to be re-engraved because the face of a demon accidentally turned up in the Queen's hair just behind her left ear.

This tendency of chaotic shapes to form patterns vaguely resembling familiar things is responsible for one of the most absurd books ever written about advertising: *Subliminal Seduction,* by journalist Wilson Bryan Key (Prentice-Hall, 1973). The Signet paperback had on its cover a photograph of an ice-filled cocktail with the caption "Are you sexually aroused by this picture?" It was the author's contention that hundreds of advertising photographs are carefully retouched to "embed" concealed pictures designed to shock your unconscious and thereby help you remember the product. The hidden pictures include words ranging from *sex* to the most taboo of four-letter words, but there are also phallic symbols and all sorts of other eroticisms. In the ice-cube in an ad for Sprite, the author professed to see a nude woman cohabiting with a shaggy dog. It's hard to imagine anyone taking this nonsense seriously, especially since the author's many references to "recent studies" never disclosed where they took place or who the experimenter was. More amazing still, the Canadian Catholic philosopher Marshall McLuhan wrote the book's laudatory introduction. Key has gone on to write two even more bizarre books about the sneaky ways modern advertising is subliminally seducing us.

More recently, UFO enthusiasts have been playing the hidden-picture game with the moon and Mars. They pore over thousands of photographs of cratered surfaces until—aha!—they find something suggesting the presence of alien creatures. An early anticipation of this pastime occurred in 1953, when H. Percy Wilkins, a retired British moon-mapper, discovered what looked

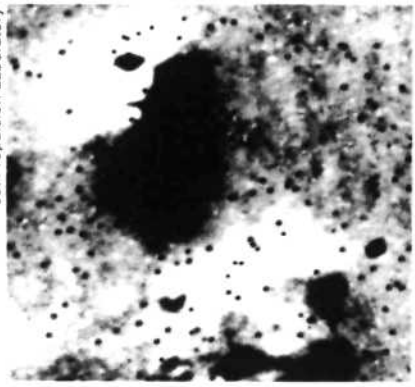
Do you see the demon in the Queen's hair? Some did, and the Canadian dollar bill had to be re-engraved as a result.

like a man-made bridge on the moon. Frank Edwards wrote about it in *Stranger Than Science* (1959), and UFO cranks lost no time seizing on this as evidence of lunar life. Donald Keyhoe, in *The Flying Saucer Conspiracy* (1955), reported that spectroscopic analysis had identified the bridge's metal! When astronomer Donald Menzel said he couldn't see the bridge, Keyhoe called him an "army stooge" collaborating on a vast government conspiracy to conceal the truth about UFOs. (See James Oberg's article, "Myths and Mysteries of the Moon," in *Fate*, September 1980.)

As late as 1976, UFO buff George H. Leonard was claiming that bridges on the moon are among the "least controversial things about the moon." Alas, all bridges vanished when the Apollo photographs were obtained. The "bridges" were nothing more than illusions created by lights and shadows, yet the myth of moon bridges still persists in UFO fringe literature.

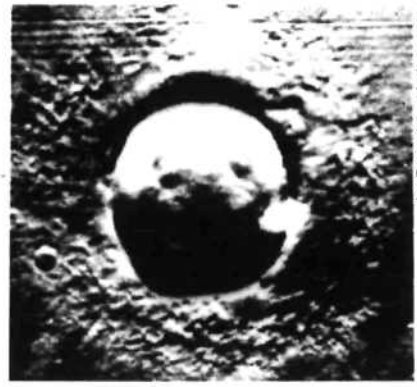
The same thing happened to mysterious spires on the moon. Photos in 1966 of the moon's surface showed objects casting such long shadows that UFOlogists decided they had to be rocket ships or radio beacons—at least *something* built by aliens. A Russian periodical called *Technology and Youth* featured a wild article about the spires in its May 1968 issue. The spires turned out to be ordinary boulders, their long shadows caused by the sunlight hitting them at extremely low angles.

George Leonard, in *Somebody Else Is on the Moon* (David McKay, 1976), carried this kind of speculation to such extremes that he managed to write one of the funniest books ever written by a UFO buff. Leonard is an amateur astronomer and retired public-health official in Rockville, Maryland. Photos of the moon's surface, he insists, show *rims of craters sliced away by giant* machines, jets of soil spraying out (caused by mining operations), and tracks of huge vehicles. "No, I do *not* know who they are," Leonard told the tabloid *Midnight* (February 8, 1977), "where they come from or precisely what their purpose is. But I do know the government is suppressing the discovery from the American people."



Jet Propulsion Laboratory

The Great Stone "Face." Photographed by the Viking 1 orbiter in July 1976. The feature is one mile across. Shadows in the rock formation give the illusion of a nose and mouth. The Jet Propulsion Laboratory points out that bit errors, caused by problems in transmission, cause the abundant speckles and comprise part of one of the "eyes" and "nostrils" on the eroded rock. JPL emphasizes that planetary geologists attribute the formation to purely natural processes.



Jet Propulsion Laboratory

"Happy Face." This otherwise typical Martian impact crater seems to show a "smiling mouth" and "eyes." They're both formed by fractures caused by the original meteor impact. JPL jokingly refers to the 5-mile-wide crater as the largest known Happy Face in the solar system.

Leonard quotes an unnamed NASA scientist: "A lot of people at the top are scared." He thinks the aliens live underground and that seismic quakes on the moon are caused by their undersurface activities. "NASA is simply lying to the American people about UFOs," he told *Midnight*. He suspects the aliens are waiting patiently to take over the earth after we blow ourselves up.

Seeing familiar anomalies on Mars has been common ever since the invention of the telescope. Percival Lowell found the red planet's surface so honeycombed with canals that he wrote three books about how the Martians, desperately in need of water, built the canals to bring water from polar regions. Now, of course, we know the canals were only figments in Lowell's mind, distinguished astronomer though he was. Unfortunately, this has not deterred seemingly intelligent people from similar self-deception.

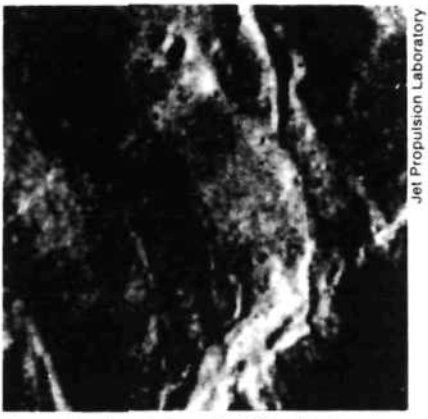
Here and there on Mars are formations with gridlike structures. "Did NASA Photograph Ruins of an Ancient City on Mars?" is the headline of a *National Enquirer* article (October 25, 1977). A photo of a region near Mars's south pole shows a series of squarelike formations called "Inca City" because they somewhat resemble a decayed Indian village.

In 1977, electrical engineer Vincent DiPietro came across a 1976 photograph taken by the Viking spacecraft that orbited Mars. At first he thought it was a hoax. The photograph showed a remarkably human-looking stone face about a mile wide. NASA had released the photo shortly after it was taken in 1976, and planetary scientists emphasized that it was a natural formation. DiPietro thinks it isn't. Computer scientist Gregory Molenaar used image-enhancement to explore details of the face, and in 1982 DiPietro and Molenaar published a 77-page book, *Unusual Martian Surface Features*, about their results. (It can be obtained

by sending $9.00 to Mars Research, POB 284, Glenn Dale, MD 20769. "Face in Space," *Omni*, April 1982, was an excerpt from this book.) The authors concede that the face may have been produced by erosion but they suspect otherwise. They claim that computer enhancement shows an eyeball in the face's right eye cavity, with a pupil near the center, and what looks like a teardrop below the eye. "If this object was a natural formation," they write, "the amount of detail makes Nature herself a very intelligent being."

West of the big stone face, in the shadow of a pyramidlike formation, is a gridlike pattern suggesting a lost city with an avenue leading toward the face. (See "Metropolis on Mars," an unsigned article in *Omni*, March 1985). Skeptics have pointed out that the so-called pyramid is much cruder than scores of pyramids found as natural rock formations in Arizona.

Top drumbeater for the view that the stone face proves that an alien race once flourished on Mars is writer



Jet Propulsion Laboratory

Kermit the Frog's there too! This Martian feature was formed by flowing lava. A small impact crater in the flow resembles an eye.

Richard Hoagland. He is completing a book about it that could make him lots of money, especially if he can tie the face into UFOs and get a chapter published in *Omni*. Fred Golden, writing the "Skeptical Eye" page in *Discover* (April 1985), ridiculed Hoagland's claims and ran a photo of another spot on Mars, where the topography resembles Kermit the Frog.

Let us not underestimate the public's scientific illiteracy. Dr. Emil Gaverluk, of East Flat Rock, N.C., is now lecturing around the country about the Martian face. A story in the Hendersonville, N.C., newspaper of February 16, 1985, reported that Dr. Gaverluk was speaking at the First Baptist Church on "the meaning of the gigantic face and pyramids and the laser of tremendous power that have been discovered on Mars." Why are these things on Mars? It's all explained in the Bible, Dr. Gaverluk told the newspaper columnist who wrote about him.

Dr. Gaverluk was identified as an expert on communications science and the holder of a doctorate in educational technology, whatever that is. His lectures on science and faith are sponsored by the School Assembly Service, of Chicago. Dr. Gaverluk illustrates his

talks with chalk drawings. He is a member of the American Association for the Advancement of Science and the Creation Research Society.

The great stone face can teach a serious lesson. If you search any kind of chaotic data, it is easy to find combinations that seem remarkable. Every page of a book of random numbers contains patterns with enormous odds against them if you were to specify the pattern before generating the random numbers. Every bridge hand you are dealt would be a stupendous miracle if you had written down its exact pattern before the deck was shuffled.

Let someone close his eyes and talk for 15 minutes about a scene he imagines. You'll have no trouble finding amazing correlations between his description and any randomly selected scenic spot. Let a psychic crime-solver rattle on for an hour about clues to a missing corpse. It's inevitable she'll have made some lucky hits if and when the body is found. If you don't have a tape of everything she told the police, how can you evaluate her accuracy? Jeane Dixon's few good hits seem impressive until you see a list of her thousands of whopping misses.

If hundreds of ESP tests are performed around the world during any given week, and only a few successful ones are published, the normal operations of chance are effectively concealed. J. B. Rhine was notorious in his belief that unsuccessful tests in his laboratory were not worth reporting; and equally notorious during his youth in finding patterns in data to support correlations that the experiment had not been designed to find. Today's better parapsychologists are aware of such statistical pitfalls, but a failure to understand them casts a deceptively strong glow of success over the results trumpeted in the early naive years of modern parapsychology.

Let's take a closer look at that great stone face on Mars. Rotate the picture (p. 416) 90 degrees clockwise and what do you see? On the left is the nude torso of a woman, complete with dark pubic hair, small breasts, and an enlarged belly button slightly off center. I'm surprised Ken Frazier would allow such a picture in his family magazine. •

Martin Gardner's latest book is The Magic Numbers of Dr. Matrix *(Prometheus, 1985).*

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ROBERT SHEAFFER

Psychic Vibrations

SINCE *SI* is a publication without a society page, we'll have to use this space to cover the recent "Cosmic Marriage" of Dr. Patrick Flanagan, guru of "pyramid energy" and the like (see *SI*, Winter 1984-85, p. 124), to Gael Gordon. As noted in the *Flanagan Research Report*, a wedding invitation was extended to "the enlightened spiritual community that once comprised the former spiritual hierarchy on the highly evolved lost continent of Atlantis." It was not stated how many of them were able to attend, although it was suggested that some members of this august group could only participate in the guise of their present incarnations. The bride wore a necklace that had been materialized by Sai Baba, and the entire wedding party was dressed in Atlantean-style costumes, as they chanted the Sanskrit Bajans. Gael radiates so much "love and beauty," reports Flanagan, that "wild animals often come up to her and show no fear." The joyous account of the wedding was marred only slightly by a "disclaimer" warning the reader to beware of vitamin products being peddled by "Patrick's ex-wife, 'Dr.' Joanne Flanagan," without Patrick's approval.

The newlyweds wasted little time before making a remarkable scientific discovery. Beginning a ten-day fast with tangerine juice, they felt so good and thought so clearly after the tenth day on their "liquidarian" diet that they decided to extend it. Around the sixtieth day, Gael and Patrick solved a problem that had stumped Patrick for 23 years, how to create "living water." This water, they report, "was *wetter* than any other water on earth." By consuming this

"Crystal Water," the Flanagans were able to continue their liquid diet for six months. This same incredible water is now available to you, in concentrated form (just add water), at a cost of just $3 a gallon.

Another Flanagan enterprise is the "Planetary Peace Core," an idea Gael and Patrick came up with on their wedding day. A "group visualization project" intended to rescue our planet from the perils that menace it daily, it consists of a network of individuals all over the globe "holding and hugging a model of the earth (an inflatable globe) and sending love and light to our Mother Earth every day at the same time." Your membership fee of $20 brings you "an official Mother Hugger card," your very own inflatable model of the earth, and instruction in effective visualization techniques.

* * * * *

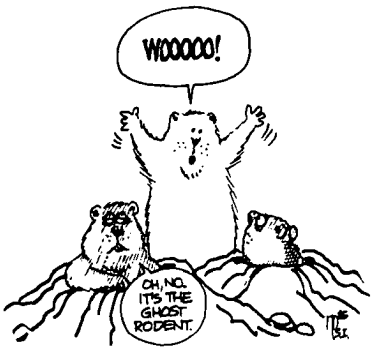
Longtime UFOlogist James Moseley recently made big waves in the UFO realm when he confessed himself to be "teetering on the very edge of the dreadful abyss of skepticism!" Moseley, who has been active in the field for more than 30 years, was the founder and editor of *Saucer News* and currently writes and publishes the witty *Saucer Smear*, a privately circulated newsletter of UFO-related gossip that is keenly enjoyed by the "UFO hard-core," who receive it free of charge. (Moseley and his *Smear* are the subject of the January 1985 "UFO Update" in *Omni*. Moseley explained to his readers that "your humble *Smear* editor is starting to lose the Faith! It seems that whenever a supposedly excellent UFO report is pursued objectively and in depth, it tends to fall apart—or, at the very least, strong weaknesses show up."

Moseley goes on to reveal some interesting facts about his late close friend, UFO writer and publisher Gray Barker, who died in 1984. "Barker was a skeptic," Moseley states, "as are several of the still-living UFO 'experts' who just aren't willing to admit it publicly." He also confessed that he and Barker hoaxed the 1957 "Straith letter," which purported to show that the U.S. State Department was taking seriously George Adamski's claims of extraterrestrial contact. (Adamski was fond of showing people the letter to bolster his credibility!)

One of the last books to roll off Barker's presses was *Flying Saucers from Khabarah Khoom* by Dominick Lucchesi, yet another UFOlogist who was active back in the early 1950s. Lucchesi claimed to have learned of a secret underground realm called "Khabarah Khoom," from whence UFOs emerge via secret openings in the earth. Barker surely did not believe these tales, any more than he took seriously his own writings on the "Men in Black" (MIB), which fixed the MIB as a permanent part of UFO folklore. Barker's 1956 book *They Knew Too Much About Flying Saucers* (in which Moseley and Lucchesi play small roles) was the first book to feature the MIB, who today are taken seriously even by many "scientific" UFOlogists, apparently on the grounds that any story told often enough must surely be true. Barker's role in creating the UFO "mystery" may rank second only to that of Ray Palmer, the man who persuaded Kenneth Arnold to write an article about his sighting of the "flying disks" for the first issue of *Fate*. Gray Barker was undoubtedly the most influential and widely read UFO skeptic of all time, although few of his regular readers shared his unstated skepticism.

* * * * *

Just when you finally stopped looking under your bed at night, *Fate* magazine had to once again shake the rational



world to its foundations by revealing the startling degree to which spooks surround us. In "Spirits of the Wild" in the March 1985 issue, J. Finley Hurley warns us that "apparitions are not necessarily wispy things that flit around only in the dark." In fact, "they may walk in broad daylight and appear wholly substantial and unremarkable. They do not attract any special notice unless they are where they shouldn't be." Apparitions need not be human, notes Hurley: ghostly dogs, cats, and horses have been reported, and one hunter ("a careful observer and an honest man," notes Hurley) reports encountering a ghostly deer that took no note of either the hunter or his shots.

Since it's often difficult to tell an apparition from a real person or animal, writes Hurley, and since wild animals in the forest are difficult to see and vanish quickly into the foliage, it is not surprising that "apparitions of wild animals are seldom reported—even if the forests are swarming with them." He likewise raises an even more unsettling question: "How many people on busy city streets are something other than legitimate members of our reality?" I think he has gone entirely too far. While one might be prepared to accept a story of a ghost or two inhabiting a drafty old castle in England, it stretches the imagination beyond all bounds to suppose that spooks might surround us on all sides. After all, there's a limit to the number of ghosts we skeptics are prepared to accept! •

An Investigation of Firewalking

Firewalkers ascribe their success to "mind over matter," mystical powers, or exotic physiological effects. The real physical and psychological explanation is much more interesting.

Bernard J. Leikind and
William J. McCarthy

FOR CENTURIES, some people in various cultures around the world have walked on hot coals without getting burned. Ordinarily, this is associated with religious rituals, and success is attributed to spiritual or mystical powers' protecting the walkers. Since firewalking is usually done in faraway places, many Americans are quite willing to give some credence to the firewalkers' claims that some sort of mysterious powers protect the walkers from harm—powers that can only be harnessed after long study and careful preparation. In the past year or so, many Americans have been walking across beds of hot embers as part of self-help seminars that purport to teach students to overcome fears or to take command of their lives and achieve success. Because firewalking seems so mysterious, if not impossible, to most of us, the firewalk serves as a powerful persuasive tool, convincing the walker that all of the material taught in the seminar must be correct.

We have investigated American firewalking in Los Angeles as taught and practiced by Tony Robbins of the Robbins Research Institute. We participated in a firewalk in the fall of 1984. One of us (WJM) attended

Bernard J. Leikind is a research physicist in the Physics Department at the University of California, Los Angeles, where he does experimental work connected with fusion energy and sometimes teaches. William J. McCarthy is a research psychologist in the Psychology Department at UCLA, where he investigates why people engage in health-damaging behavior like smoking tobacco and injecting heroin. He also teaches.

Robbins (*above*) as featured in *Life* magazine earlier this year. Author Leikind (*right*) walks on coals.

the seminar, and the other (BJL) did not, since he wished to test the proposition that the training offered in the seminar was not necessary in order to walk across the coals.

How the Investigation Began?

One morning in April 1984, I (BJL) read an article in the *Los Angeles Times* headlined "Firewalking, The Curious Hot Foot It to a New Fad" (Krier 1984). It received a big play, beginning on page 1, continuing on page 3 for another half-page, and including three large photographs, one of which showed a rugged fellow in a dark suit striding boldly across a bed of glowing embers.

The article was filled with statements by the firewalk leaders, like this one by Tolly Burkan, once professionally known as Tolly the Clown and now one of the nation's most renowned gurus of firewalking: "Just holding the thought in your mind that you're not going to injure your feet alters the chemistry of your body," he insisted. "Indeed, at many firewalking rituals throughout the world, belief is reportedly all that is needed."

Throughout the article, the consensus of the firewalkers was that in some way special mental powers altered the operation of normal physical processes. As it happened, I had read an article that dealt with firewalking in *Scientific American*'s "Amateur Scientist" column (Walker 1977). In fact, I had seen the article's author, Professor Jearl Walker of Cleveland State University, dip his fingers into molten lead, and I knew that he had walked on hot coals in his classes. Professor Walker attributed this ability

to the Leidenfrost effect: the presence of a thin layer of water vapor—a poor heat conductor—from moisture on the feet, either from sweat or from damp material around the coals.

So I thought I knew how firewalking was done, and I certainly believed it had nothing to do with the kind of exotic powers claimed in the *Los Angeles Times* article. I called the reporter and was told to write a letter to the editor. I called a skeptical medical doctor who had been quoted in the article, and he began referring reporters who called him about firewalking to me.

Sometime later, one of the principal firewalkers, Tony Robbins, was interviewed on a local call-in radio show. When I heard about this show, I called the station to see if I could get a tape of the program. Bill Jenkins, the interviewer, had firewalked and was a believer in the mysterious mental powers of firewalkers. When I told him what I thought, he was quite upset and maintained that water wasn't necessary. He challenged me to go to a seminar to see for myself. I accepted.

So it was that one evening in November 1984 my psychologist friend, Bill, and I drove up into the San Gabriel Mountain foothills above Burbank to attend as guests a firewalking seminar run by the Tony Robbins group.

I was plenty nervous. I had been going around telling everyone that I knew how it was done and that I could do it without the training. I was thinking, however, that I might get burned. I wasn't sure which would hurt more, red, burned feet or a red, embarrassed face. I had taken the precaution of calling my doctor to get some advice on first aid in case I needed it. He said that it wouldn't be too smart to burn my feet, even in the name of science, and said that not to do it would be the best first aid. Bill, on the other hand, intended to attend the training but not to walk—friendship only goes so far. So he was feeling pretty chipper.

What Happened at the Seminar?

While Bernie was feeling anxious about walking on hot coals, I (WJM) felt mostly the excitement of anticipation of a new adventure. I wasn't in any danger of burning my feet, since I wasn't going to walk. I was just going to look and learn. What kind of people would pay $125 for the privilege of risking their soles? What would the training be like? Could people really walk on hot coals without hurting themselves? Did Bernie know what he was talking about? Would I have to drive his car home for him?

The flyers advertising the firewalking experience and several other seminars claimed participation in these meetings could help people overcome lifelong fears like claustrophobia, eliminate lifelong addictions like smoking and overeating, and cure people of impotence and chronic depression—all within one or two hours. They could, it was said, help

students study more effectively and train people to know, instantly, the most effective ways to communicate with and persuade people. The flyer promised to increase people's confidence in their ability to accomplish any important goal and to overcome past failures and succeed at seemingly impossible tasks. The proof of these new abilities was to walk on fire. Thousands of people had already succeeded.

The audience of about 80 people was middle class, with an average age of about 35 and a fairly even split between men and women. The vast majority of the participants were white and somewhat formally dressed. They seemed nervously gregarious, the way a class buzzes with conversation before a midterm examination. Among those I talked to were lawyers, doctors, secretaries, and advertising consultants.

The seminar took place in a hotel conference-room, with folding chairs placed in a semicircle around a temporary stage. There was a sophisticated sound system and contemporary upbeat music.

Tony Robbins is a tall, powerfully built man with a lot of energy and a pleasant, forceful personality. He led the training for the entire six hours and was assisted by a small army of volunteers and staff members. Perhaps as many as one-fifth of the audience had attended the seminar before and were there for a refresher course.

Robbins told the audience they were "kindred" souls. He assured them that they could be as successful as he was simply by following the advice he was to give that night.

He warned against defeatist thinking, saying that fear of failure wipes out initiative and stops action. He claimed that stupid people can be successes while presumably smart ones may not be, that some stupid people may persist in the face of disappointment while the smart ones say it can't be done.

After about an hour, all 80 of us, clapping rhythmically and chanting, "Yes, yes, yes," filed out of the room and down to the parking lot to view the fires we would soon be walking on. The "yes" we chanted was the wishful answer to the question in all of our minds, "Can I walk the coals and not get burned?" The crowd of clapping participants encircled a bed of fresh sod in the middle of the parking lot. On the bed there were two bonfires of furiously crackling wood. The heat seemed particularly intense in the cold November night air. Robbins exhorted us to close our eyes and imagine ourselves conducting a successful firewalk. "What are you going to do," he asked, "when you have achieved success? You're going to celebrate!" He suggested we imagine we had just completed a successful firewalk, make a fist in the air, and shout with the elation we would feel upon achieving such a singular success. For several minutes, seemingly frenzied students shook their fists at the night sky and shouted "Yay!" "I did it!" and "Yahoo!" The din may have struck other hotel residents as yet more evidence that the strange things they had heard about California were true.

We returned to the seminar room where Robbins had presented himself as a "model" for us to emulate. He repeatedly told us that he was no different from us, that he had suffered the same anxieties and fears we were suffering, and that he nevertheless had succeeded in walking on coals many, many times without getting burned. He also encouraged all of us to think of past successes and to remind ourselves of all of our "untapped" power.

He said, "We're all masters" and our fears are often groundless and should be ignored. He listed five steps to get rid of any fear: identify it, analyze it to death, be willing to accept the worst, be willing to accept the best, and then take action.

Halfway though the seminar, Robbins began describing neurolinguistic programming, a technique he claimed could enable its practitioners to cure people of tumors and long-standing psychological problems in a fraction of the time required by conventional treatments. He claimed that neurolinguistic programming enabled him to read people's motives like an open book. Neurolinguistic programming gave him such power, he said, that he could, without touching her, make a woman have an orgasm involuntarily. He claimed that he had cured a man of impotence and a long-standing drug-addiction in 90 minutes and that he could bring a person who was brain-dead back to life.

Meanwhile, Bernie was waiting anxiously down by the conflagrations. He chatted with the attendants and measured the temperature with a pyrometer he had brought with him. The fires were hot, 1,500° F to 1,800° F. He was sweating. Then, back in the lobby, he was nervously thumbing through Kittel's textbook, *Thermal Physics*. "Perhaps," he told me later, "I missed something doing a crossword puzzle in class when I should have been taking notes."

Finally, at about 1:00 A.M., the seminar reached its climax. Robbins gave us pointers about walking on coals. He said we could end up with stumps for legs if we didn't follow instructions. We were to walk, not run, breathe fully and deeply, stand very erect, look up at the sky, visualize a cool place, and chant, "Cool moss, cool moss," as we walked. At the end, we were to quickly and carefully wipe our feet and then celebrate our success.

We took off our shoes and socks, turned up our pant-cuffs, and filed on down to the parking lot chanting, "Yes, yes." Workers were taking apart the bonfires with shovels and spreading burning coals into thin beds 8 or 10 feet long. The heat was powerful enough to force us to close our eyes and take a step backward when we stood near the fires. Burning embers floated into the sky.

Robbins was the first person to walk across the coals. Several staff members then followed his example, one after the other. They carefully and in exaggerated fashion followed the instructions so we would get the right idea. They huffed and puffed just before setting foot on the coals and

walked stiffly across with eyes fixed on a point in the sky.

News photographers' lights lit up the scene. They were allowed to photograph only the staffers. The students might be too easily distracted, Robbins said. They might lose their concentration and get burned. (One of the few times Robbins admits to getting burned while firewalking was when he walked on fire while being filmed for a TV show and was distracted during the firewalk by the talk-show host.)

Our spirits were high and the peptalk had been inspiring. People began walking across the coals and shouting in excitement, encouraging those yet to walk and congratulating those who finished. There was always someone walking on one bed or the other. The effect was to surround the firewalking experience with considerable noise and movement. It is not clear why the firewalk leaders encourage all of this distracting tumult while at the same time saying that a few photographers' flash lamps would distract the walkers. By the end of the seminar I had been swept up by the group spirit and was one of the first to walk across the coals. I was thrilled.

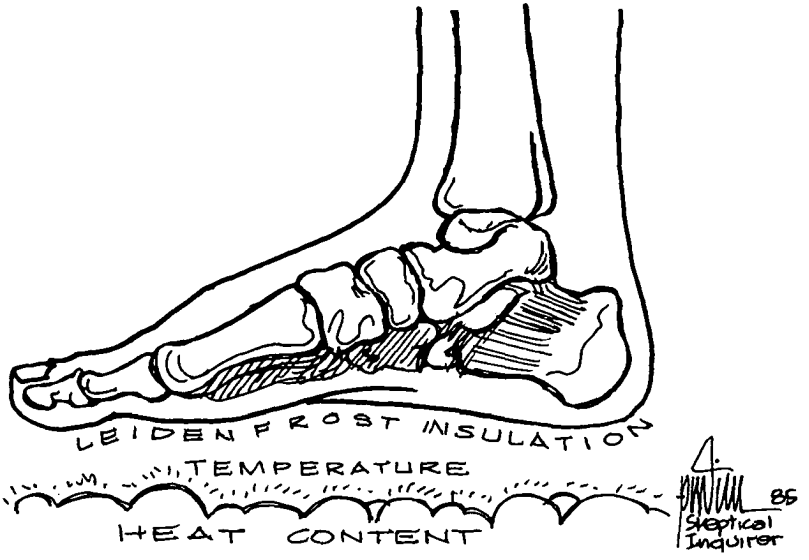
More than 90 percent of the participants, or about 80 tenderfeet, walked. Very few got blisters or, at any rate, very few volunteered that they had. Bernie did see two women with blisters at another walk he attended and there have been news accounts of others.

* * *

While the seminarians were walking, I (BJL) was trying to take pictures of the footprints I could clearly see in the embers. After the jam of walkers eased somewhat, I took my place in line. The firewalk leaders made me stand and take some breaths, but as soon as I took my first step I violated their rules—I decided that it might be a good idea to look where I was going, something that my mother always urged me to do. I did follow one of their rules. I wiped my feet when I got to the end. By this time the embers had cooled quite a lot and were not glowing much any more. They felt like warm moss on my feet. I was quite disappointed, so when they brought over a new load of glowing embers I jumped at the opportunity and was the first to walk. This time they were a lot hotter and I thought that I might have sizzled my feet, but I couldn't find any damage.

How Can It Be Done?

Firewalking appears to be one of those strange phenomena that, while appearing to be difficult or impossible, are actually quite easy to do once the trick is discovered. Evidently this trick has been found out by many peoples throughout the world, although it is ordinarily associated with mystical or religious states of mind. For example, one firewalker from Sri



Lanka said, "Anyone can do this if he prepares properly." That proper preparation, he went on to say, "may involve a week or two of fasting, prayer and meditation, devotional chants, frequent baths and celibacy" (Doherty 1982). For anyone who is planning a walk but finds this last requirement too extreme, I have been told by a reliable source that celibacy is not a prerequisite for a successful walk.

The secret to firewalking and many similar heat-defying stunts lies in the distinction between temperature and heat (or internal energy). This distinction is not a part of our commonsense notions, although all of us are actually familiar with it as part of our daily lives. For example, when we are baking a cake, the air in the oven, the cake, and the cake pan are all at about the same temperature. None of us would think for a moment before putting our hands into the hot oven air, but we know that we cannot touch the cake pan for more than an instant without being burned. Why is this? They really are at the same temperature. Why would the pan burn us and not the equally hot oven air?

The answer is that different materials at the same temperature contain different amounts of thermal or heat energy and also have different abilities to carry the energy from one place to another. Thus the air has a low heat capacity and a poor thermal conductivity, while the aluminum has a high heat capacity and a high thermal conductivity. Our bodies have a relatively high heat capacity, similar to water. When we put our hands in the hot oven air, energy flows from the air to our hands. As the energy leaves the air it cools and our hands warm up. But, because the air holds very little energy, it cools much more than our hands warm. Furthermore, because of the poor ability of the air to conduct heat from far away to our hands,

it will take a long time for our hands to finally get baked. In contrast, the aluminum cake-pan holds a lot of thermal energy and is an excellent conductor of heat. When we touch the metal and energy flows from the pan into our hands, the metal does not drop in temperature very much and even brings energy from far away to replace its losses while our hands quickly warm. It is for these reasons that we put a potholder, a poor conductor of heat, between our hand and the pan and don't worry about the air. So just knowing the temperature is not enough to decide whether something will burn us.

Firewalking and walking on hot rocks, as is done in Fiji, are based on this same idea. The embers are light, fluffy carbon compounds. Although they may be at a fairly high temperature (1,000° to 1,200° F), they do not contain as much energy as we might expect from our commonsense notions of incandescent objects. Thus, so long as we do not spend too much time on the embers our feet will probably not get hot enough to burn. In fact, because the capacity of the embers is low and that of our feet relatively high, the embers cool off when we step on them. How do I know this? Well, the color and intensity of the light from the embers tells us their temperature; yellow embers are hotter than orange, orange hotter than red, and so on. When I watched people walking across the bed of coals I could clearly see darkened footprints where the coals had cooled because of contact with the feet. In a couple of seconds the combustion reactions restored the embers' temperature and glow.

In my reading about firewalking and fire-handling, I have found the combination of low heat capacity and poor thermal conductivity to be the one common factor. For example, in Fiji, where people walk on hot rocks, they choose cobbles of volcanic rock, probably pumice. Pumice is that strange porous rock that floats in water. It has a low heat capacity and a poor thermal conductivity. Similarly, firehandlers can withstand flames on their bodies, for a short time, because the hot gases contain relatively small quantities of heat.

We may well ask, "Why is it that some people get burned and others do not?" The answer is that the practice of firewalking is not a controlled scientific experiment. There are many variables from one person to the next and from one moment to the next: how long we stay on the embers, how many steps we take, how tough the soles of our feet are, and whether we walk where the embers are deep or shallow, for example. It certainly is possible to get injured, especially if we believe that it is our mind that protects us and if we do not take into account the normal physical behavior of heat. *Rolling Stone* magazine (Krakauer 1984) reported in one group of firewalkers the average length of time on the coals was 1.5 seconds, with the longest being 1.9 seconds, except for one unfortunate woman with a brain and spine injury who, walking with canes and believing that her mind would protect her, courageously spent seven seconds on the embers before collapsing with severe burns. Another walker, a radio news reporter in San Francisco, a tough and fearless former war-correspondent, appar-

ently strolled more slowly than the previous walkers and strayed to the side into a deep pile of embers, where she badly burned her arches. There are many such variable factors, and in the tumult and excitement it is very difficult to make careful observations.

Another scientifically based explanation for the firewalking is the Leidenfrost effect. This effect is produced by getting a thermally insulating layer (like a potholder) between our feet and the embers. This principle is actually known to some of us and used in our ordinary lives. For example, some cooks will sprinkle drops of water onto a pan to see if it is hot enough. If so, the drops evaporate relatively quickly; if not enough the drops will dance or jump around for a surprisingly long time. Why does this happen? If the pan is sufficiently hot, a layer of water vapor forms between the drop and the skillet. This layer reduces the heat flow to the drop because vapors and gases are generally poor conductors of heat. When we wet our fingers before touching an iron to see if it is hot, or before putting out a candle, we are using this effect as well as taking advantage of the high heat capacity of water. It is also used in certain magic tricks, such as dipping fingers into molten lead, licking red-hot knives, and so on. However, moisture, while often present at firewalking, is not invariably present. James Randi told me that in Sri Lanka the walkers believe that moisture on their feet will cause the embers to stick, so they carefully dry their feet before they walk.

Since the Leidenfrost effect is well known and thoroughly documented, and since the walkers are often in a state of great physical excitement, their feet may be "sweaty" because of the nearness of a hot fire, and the surroundings of the bed of embers is often wet, I conclude that the Leidenfrost effect is likely to be helpful but not necessary for firewalking, provided the heat capacity, thermal conductivity, and temperature of the embers or rocks is suitably low. It is certainly true that at Robbins's firewalks the sod and ground around the fires are usually kept fairly wet.

All of the various other explanations for firewalking I have come across in my investigations begin with the assumption that you should get burned unless some special exotic effects are operating. Thus, instead of searching for ways in which normal physics or physiology might operate to reduce the likelihood of a burn, firewalk theorists search for anomalies in normal science or in areas on the frontier where scientists are still puzzled. Most of the explanations involve the necessity for "correct" beliefs on the part of the firewalker. For some, the belief alone is somehow sufficient. This is perhaps what is believed by the Greek firewalkers who carry statues of the saints as they walk. For others, the correct belief is supposed to induce physiological changes that protect the walker. For example, endorphins—chemicals found in the brain that have been associated with feelings of pain and pleasure—are imagined to increase because of the correct beliefs and to then protect the body from burns. Some believe that the physiological changes involve the "bioelectric field." As they approach the embers they can, they say, feel the electricity around

them and believe that they are somehow shielded by it. Another theory is that the proper beliefs change the properties of nerves and muscles so that they can conduct the heat away from the feet. Still others believe that the ability of some people to cause small changes in the temperature of their hands and feet might somehow be utilized to a much larger extent by firewalkers.

One characteristic of all of these explanations is that they are totally unsupported by any direct experimental data. Where is the measurement of the bioelectric field before, during, and after firewalking? Where is the demonstration of electrostatic shielding of heat? Where is the evidence showing that endorphins reduce damage from injuries?

There is a simple experiment that could be done to prove whether one's mental state effects the thermal properties of one's feet. The Tony Robbins people make such a claim. They say that walkers are in a certain "state" that protects them. Why not measure the flow of heat into someone's foot as they go in and out of this state? This would be easy to do and would involve no risk, since it could be done at low temperatures.

Bill and I believe that the explanation for the lack of burns is found in the ordinary physics of heat and materials. There are, however, some interesting psychological effects that play a role in the experience of firewalking. Bill will now describe this role.

What Are the Psychological Factors?

Psychology can explain why some people feel no pain or heat, even when they have been exposed to enough heat to produce blisters. It is necessary to distinguish the concept of pain from the concept of being burned. Pain from a burn is a perception that the body has been injured. People can get burned without feeling pain, and we can feel pain when no injury has occurred. Many of us have had the experience of cutting ourselves and not realizing that we are injured for some time. As a matter of fact, I (WJM) must admit that I did get burned when I firewalked. I got a dime-sized blister on my left foot, under my arch. Despite this evidence that I was burned, I remember feeling no pain, and I didn't discover the blister until the next morning.

The detection of pain caused by exposure to fire is not only a function of the temperature of our feet; it is also affected by the general sensitivity of our body and mind and by the presence of other, competing sensations. If we are in a quiet room and fully alert, we will be maximally sensitive to pain. If we are tired and surrounded by noisy, distracting events, we will be much less sensitive. Distraction can reduce the pain people experience, because they can attend to only a few things at once. Distraction is the basis for a number of techniques psychologists teach patients who suffer chronic pain. These techniques are quite effective.

In addition, the physiological responsiveness of our bodies is governed

to a large extent by a circadian rhythm. When we stay awake well past our normal bedtime, our normal physiological functions are nevertheless somewhat depressed—as if the body expected to be asleep even though it wasn't. The people who walked on the coals at 1:00 A.M. were therefore much less likely to feel pain or heat than they would have been had they conducted the same walk at 1:00 P.M.

Furthermore, the instructions we had been given before the walk actually seemed calculated to distract our attention from the sensations of our feet. Concentrating on the "mantra," looking up at the sky, hearing the applause and shouts of elation, and breathing in an artificial and forced manner, all served to distract the walker.

Women and men who are familiar with the Lamaze technique for preparing women for the rigors of childbirth know that increasing one's breathing rate in a prescribed manner just before the moment of greatest pain helps to reduce the pain that the mother experiences. The controlled breathing taught in the seminar had the same effect of reducing the maximum pain the firewalkers experienced. The likelihood of their perceiving any pain even if they were burned was greatly reduced.

Scientific Assessment

Firewalking, as practiced in this country, is being used as the keystone of a self-improvement program. It is claimed that by using special techniques the student can walk on hot coals. It is further claimed that these same techniques can be applied to solve the problems of ordinary life. Firewalking can be so surprising to us that it can have a powerful effect on our beliefs. Students frequently speak of having their entire system of beliefs blown after succeeding. Thus there can be no doubt about its powerful persuasive effect.

Nevertheless, as we have explained, the training has nothing at all to do with whether or not a firewalker will be burned. It does have some effect on whether you will want to walk and on what you will experience as you walk, but whether you avoid a burn is determined by the ordinary behavior of heat on the soles of your feet.

It is probably safe to say that the seminar we witnessed at least temporarily increased the self-esteem and confidence of most of the participants. The training effectively used techniques like behavioral modeling, verbal persuasion, and group pressures, which are well known to psychologists. We did not assess how long the benefits last or how well they might translate into increased success at the more mundane tasks of life. Many of the formulas for success were no different from those available in conventional self-help and positive-thinking programs. Those who were burned or who ultimately lacked the courage to walk, on the other hand, were very likely to experience a decrease in self-esteem and confidence because they would be likely to believe that their minds were weak.

The firewalk is an unusual and very persuasive technique. The seminar students are led to believe that it represents the first of what will be many examples of the wonderful effects of the seminar training. As we have shown, however, the training has nothing to do with not getting burned, since anyone can walk on the embers without much chance of injury. The students, unfortunately, do not know this, and it is this deceptive but persuasive practice that is our greatest concern.

The students may be led to accept the correctness of all that is offered during the seminar. In fact about one-fifth of the firewalkers pay as much as $375 for a full weekend course involving neurolinguistic programming, and, we are told, new and exotic theories of nutrition. Now neurolinguistic programming may be a useful addition to mainstream psychology, but from the material presented in the seminar it is certainly impossible to make a sensible judgment. The extreme claims for psychic- or faith-healing-style cures certainly cast doubt upon its truth, as does the use of a trick to supposedly show its effectiveness.

We are, of course, unable to read the minds of those who teach and profit from firewalking. We cannot tell if they are themselves deceived, simply ignorant, or charlatans. In any case, some people are clearly being harmed. Because elementary physics is not known, some are being burned. Because success is attributed to mental strength, those who are burned or fail to walk are damaged. And those who succeed are likely to believe much of the rest of the teachings of the trainers. Some of these teachings are fine, but others are quite exotic and strange, if not actually dangerous. What will happen to the believers when, inevitably, they learn the truth? Because all of the beneficial aspects of these trainings are available from other, more conventional sources, such as college courses in psychology and nutrition (perhaps, even a physics course), which have few harmful effects, we cannot find any justification for the deception that is being practiced and we would advise everyone to stay away. The firewalk trainers are misleading us about the keystone of their program—that it is their training that makes it possible for us to walk on hot coals. Considering that this basic principle of their program is wrong, the rest of it cannot be trusted.

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Firewalking: Reality or Illusion?

A cool look at the hot Burkan method.

Michael R. Dennett

TOLLY BURKAN has been teaching in classes across the country that your mind can be taught to control the chemistry of your body and that walking on red-hot coals proves it. The object of each of his seminars is to subordinate one's fear to one's will. Although the walk across burning wood embers is just the finale, it is this event that has drawn more than 20,000 to Burkan's classes. Enthusiasm for firewalking seems to be growing. Why?

Increasing numbers of firewalking students are giving testimony that the experience can add a new perspective to life. A San Francisco area physician says the course enabled him to conquer his fear of flying. A tennis pro said his game has improved since walking on fire. Some claim that firewalking class has improved their sex lives or helped them kick cocaine habits. Perhaps the most bizarre are claims that the feat sparks an ability to heal oneself. Failing eyesight can be restored and malignant tumors sent into remission. In short, firewalking is the most direct route to both mental and physical health.

Interest in firewalking has been increased by local and national publicity. The *Washington Post,* the *Los Angeles Times,* and numerous other newspapers featured articles on firewalking beginning in 1984. Independent and network television stations have carried stories about people walking on fire. Radio talk-shows have interviewed firewalking instructors. Burkan even made a one-hour appearance on the popular Phil Donahue show. When Burkan inaugurated a Seattle program, I decided to research the topic.

Burkan says he learned firewalking from a friend who experienced it in Tibet. Walking on burning wood embers is an ancient ritual still performed around the world. Both Greek and Roman literature mention it. Some American Indian tribes practiced it, and as late as 1921 a Cahuilla medicine-man demonstrated his immunity to fire in front of the press.

Michael Dennett is a frequent contributor to the SKEPTICAL INQUIRER.

Today, firewalking is practiced as a religious festival or tourist attraction in India, Trinidad, South Africa, Sri Lanka, the Philippines, the Fiji Islands, Japan, and Tahiti.

I was determined to find out exactly what went on at a firewalking course by signing up as a student. I drove to a "fear" seminar in a suburb of Seattle. Roger Stern, the principal instructor, made a big to-do about his credentials as a biologist with "several advanced degrees"—although he never specified what those degrees were. Joyce Quick, one of the three firewalking instructors, said she was a writer and editor and instructed at the University of Washington. A key ingredient in the class seemed to be an appeal to authority. This was reinforced later in the session when Stern made repeated references to Captain Hazelwood of the Seattle Fire Department, implying an association and recounting how Captain Hazelwood agreed with Stern's points related to fear. I talked with Captain Hazelwood a few days later and got an entirely different impression. In fact, he was unhappy his name was being used in connection with Stern's firewalking presentation. Hazelwood had allowed Stern to explain his system, but found it contained nothing useful to the department.

The fear seminar also emphasized anecdotes about mind-over-matter occurrences. Psychic experiments were touted as proof of the mind's capacity for the extraordinary. These stories were reinforced with numerous scientific-sounding phrases used out of context. Much fuss was made about biofeedback and the left and right brain dichotomy. Like the nineteenth-century cure-all pitchmen, the firewalkers tried to cloak their product in scientific respectability. The bulk of the class, however, was devoted to ritualistic chanting, singing, and Eastern philosophy.

After nearly three hours in class, we were told we now could walk on fire—if, deep down inside, we thought we could. The class moved outside and instructors spread coals onto an area of about 6 by 10 feet. All three instructors walked across the coals. One other person and I were the only students to do so.

It should be mentioned at this point that the firewalk is a *very* impressive trick. Burkan on television and Stern in the class stated that their wood fires are 1,300° F. Although some measurements by skeptics have put the temperature of wood fires in the range of 600° to 1,000° F, it is possible that the coal beds are as hot as 1,300° F. Standing near the coals, you realize (regardless of the exact measure), that the bed is hot. Even at 600° F, a person will be forced away by the heat. The illusion, for the inexperienced, is persuasive. Dr. Andrew Weil, who appeared on the Donahue show with Burkan as an observer, has been quoted as stating that "the scientific literature on firewalking is dreadful." Had Dr. Weil researched books on magic and illusion, he would have found it rich in detail about firewalking. Had he done this and also examined the physics of heat transfer, he might have come to an entirely different conclusion.

Our experience with heat comes, in most instances, from burns we

Stern demonstrating firewalk.

receive as children. Stern told my class that at 1,300° F we would be burned instantly unless we could control our fear. UCLA plasma physicist Bernard Leikind—as he explains in the preceding article—says that what is important is not the temperature but the heat content and the conductivity of the materials. In a firewalk, we are dealing with the transfer of heat by wood, an extremely poor heat conductor. (Copper and aluminum are literally thousands of times more conductive than wood.) Even more important is the heat content of the coals. In the final stages of a wood fire, when only coals remain, the heat capacity is reduced significantly.

Although the heat content of all the remaining coals from the wood fire is enough to burn many people, a person will not get burned unless a sufficient amount of heat is transferred. Limiting the period of time on the coals minimizes the transfer of heat. My observations indicate that one can expose the bottom of the foot for approximately one second before damage is incurred. Where additional insulation is used on the foot, a person might be able to stand as much as a four-second walk (about two seconds per foot). When writer Jon Krakauer timed firewalkers he found that, with few exceptions, the total elapsed time on the coals was less than two seconds. Kathleen Cole, a woman who participated in a firewalk in Renton, Washington, stayed on the coals for seven seconds. She was severely burned.

I talked with Roger Stern several weeks after I had taken his firewalking class and confronted him with some of my research. Stern denied that Cole's burns were anything but the result of her loss of faith. He explained that for six seconds Cole had been okay, but she lost confidence, became fearful, and was burned in the remaining second. I asked Stern if he could walk on coals for seven seconds. He said he could not. But he

said there were people in Greece who could. I offered to pay all expenses for such a Grecian to demonstrate a seven-second walk in Seattle. Stern replied that he did not need that type of demonstration to believe in the power of firewalking.

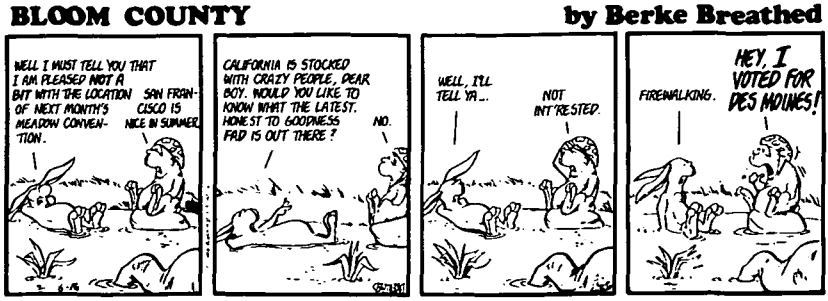
Faith, of course, is a major ingredient in the firewalking seminar, but it is not the only tenet. Stern teaches that no one should feel guilty about requiring someone else to walk before he believes.

What about the testimony given on the Phil Donahue show? A review of a videotape of the show discloses how a favorably conducted interview can bathe a subject in a positive light. Burkan was the principal witness for firewalking, and he presented himself well. Asked what he did before he started his firewalking business, he replied that he had been an instructor in the human-potential movement. He did not mention his background as a professional magician. Burkan also implied he had never been burned despite hundreds of firewalks. Yet a writer for the *Los Angeles Times,* Beth Ann Krier, reported that Burkan told her he once suffered third-degree burns on a firewalk.

More important to the credibility of the show was the testimony of Andrew Weil, a Harvard Medical School graduate. When in the early 1970s the alleged psychic Uri Geller first came to the United States, Weil rushed to interview him. After witnessing several magic tricks, Weil pronounced Geller authentic, a statement he later retracted. The show might have added to its credibility had it mentioned that Weil endorsed the idea of firewalking in his book *Health and Healing* before he ever met Burkan. Phil Donahue might also have told of the doctor's record of being fooled by magicians.

Weil admitted that he received burns on his feet at a firewalk. He did not add that most of the medical students who walked on the same coals that night were burned. Stern told me that 75 percent of the medical students had received burns.

Someone from the Donahue show might have asked how many people get burned at these firewalks. Burkan did say that now that he had more experience there would be no more *severe* burns. That was before Kathleen Cole's walk. Both Stern and co-instructor Byrne told me they had received



burns on more than one occasion. Melanie Morgan, a KGO-Radio (San Francisco) anchorwoman, took a fear seminar the same week I did. A few days after the class, a photograph of Morgan in a wheelchair with her feet bandaged appeared in newspapers. I, too, received minor burns, and I am convinced that many people who walked on Burkan-type coals receive some type of burn. Because the course teaches that those who get burned have not conquered their fear, many are not inclined to reveal injuries that don't require treatment.

In scientific terms, the firewalk's results are predictable regardless of a "faith" factor. Without the aid of the mind-over-matter class, people can walk on coals without sustaining burns. The firewalking proponents have an answer for this incongruity. Stern said there was no way I could prove a person's subconscious mind was not intuitively at work even if consciously the person is a doubter in the fear seminar: Catch 22. I was not at all surprised when Stern presented me with his loophole reasoning; it is an essential ingredient of all fake sciences that they be untestable. To test the firewalk, I placed a Curad bandaid (1" × 3¼") on each foot where it would be sure to come in contact with the embers. At 1,300° F, the bandages should have been severely damaged. Yet both survived; the simple cloth-and-plastic material withstood temperatures that should melt aluminum!

A common denominator in the world of the occult and pseudosciences is the opportunity to make easy money. This is certainly true of firewalking. Burkan has averaged earnings of more than $200,000 a year since he introduced his classes two years ago. The three instructors from whom I took the class charged $60 a student.

The idea of helping a person conquer fear through a group seminar is not in itself foolish. Group therapy has some positive aspects, and certainly people have benefited from the firewalk. Psychotherapists may consider employing a procedure like sky-diving or scuba-diving along with therapy, but there are important differences between fear seminars and professional counseling. In the fear seminar, there is no practical counseling. Many go away from the class more confused than ever. I noticed a definite negative reaction on the part of some of the students who did not walk on the coals. Students who successfully negotiated the firewalk are led to believe they can control many of the forces at work around them. One of my instructors said that, by working on fear, a person could pick up a hot pot from a stove without a potholder or handle. Would an instructor in sky-diving teach class members that once they became proficient they could jump without a parachute?

Human endeavors are launched for a myriad of reasons. Why people conduct and participate in firewalking courses and how they react to the experience would be an interesting study for a sociologist. I am still trying to answer the first question asked of me about firewalking. When I returned from my Friday session, my wife asked, "How much did you say it cost you to walk on fire?" •

The Myth of Alpha Consciousness

Alpha brain-waves are marketed as a way to produce relaxation, healing, and meditative or occult states. In fact, they are related to activity in the visual system and have no proven curative or paranormal powers.

Barry Beyerstein

PSYCHOPHYSIOLOGY SEEKS to understand how mechanisms in the nervous system mediate consciousness and behavior. Over the years this hybrid field has seen many newly discovered brain processes reportedly linked with unique psychological states only to have further research reveal that the relationship is far more complex than suspected. Correcting these misinterpretations takes time, even in the professional literature. Beyond the lab, it is even more difficult to retire obsolete notions about brain-behavior relationships when the popular press, profit motives, and a host of quasitheological beliefs conspire to perpetuate them. Alpha brain-waves and biofeedback are two areas in which such misapprehensions are legion.

In the late 1960s a reawakened interest in altered states of consciousness was buoyed by claims that patterns in the electroencephalogram (EEG) called "alpha waves" were indicators of meditative or psychic states. This, plus the understandable attraction of anything offering quick relief from anxiety and stress, spawned a multimillion-dollar industry aimed at teaching people to maximize EEG alpha through a technique called biofeedback. This occurred despite a growing realization among psychophysiologists that the alleged benefits were based upon unsupported assumptions about alpha and despite growing reservations about the efficacy of biofeedback in general.

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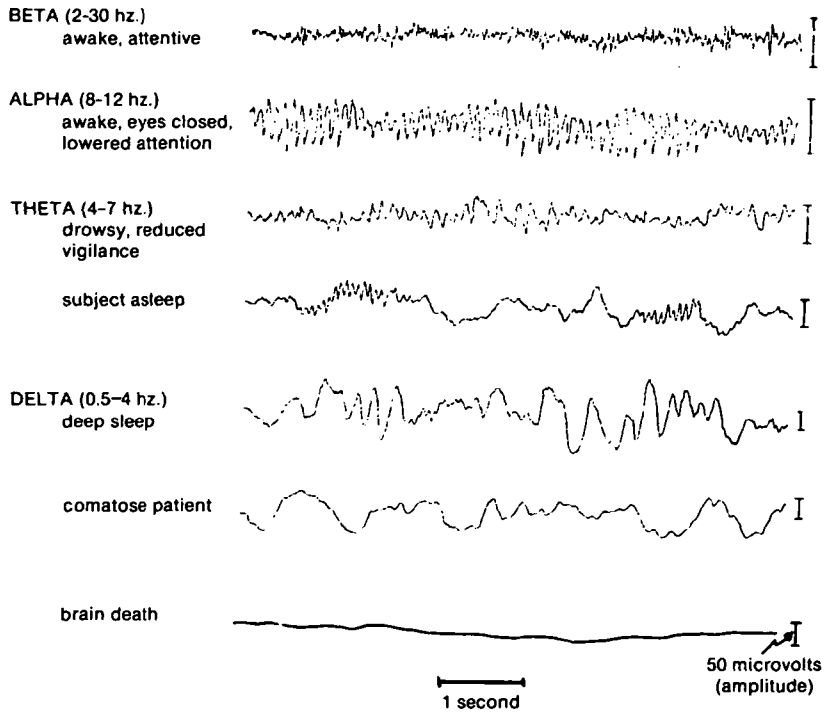


FIGURE 1. Typical electroencephalographs at different levels of arousal, in coma, and at death.

Alpha waves (Figure 1) are rhythmic pulsations in an EEG record produced under certain conditions by electrochemical activity in cells of the brain. They range in frequency from 8 to 12 Hz (hertz = cycles per second). The precise meaning of the alpha rhythm continues to be debated among brain researchers, though one would scarcely know it from most popular articles or the advertisements of the alpha-conditioning industry. Purveyors of biofeedback devices assert that enhancing alpha production brings about a special state of the nervous system that is both subjectively pleasant and psychologically, medically, and, some say, psychically beneficial. This putative state is known as "alpha consciousness," or simply "the alpha state."

Biofeedback employs electronic sensors to inform people of variations in physiological processes whose activities are not normally accessible to consciousness (e.g., brain or muscle electrical activity, blood pressure, etc.). Pioneers in biofeedback hoped that, by receiving immediate feedback about these unfelt bodily changes, people could bring them under voluntary control. This was touted by some as a shortcut to higher states of awareness and by others as an antidote to stress. Early positive reports achieved wide currency, but later disconfirmation from better-controlled studies have tended to remain buried in technical journals. I shall concentrate on claims

surrounding EEG biofeedback. Those interested in a critical assessment of other forms of biofeedback will find informative a recent review by Simkins (1982).

Early History of the Alpha Wave

The wave-forms we now call "alpha" were, among others, apparent when Richard Caton discovered in 1875 that weak pulsating electrical currents could be recorded from the exposed surface of animals' brains. A decade later, Adolph Beck noticed that the large rhythmic oscillations in the brains of awake but resting animals disappeared when they attended to stimuli—a phenomenon we now know as "blocking" of the alpha rhythm. (See Figure 2.) The slow alpha waves were supplanted by smaller, higher frequency activity now known as *beta waves* (13 to 30 Hz). Beta waves predominate in the EEG during activities requiring attention or mental effort. In 1925, a German psychiatrist, Hans Berger, discovered that the electrical activity of the human brain could be recorded from electrodes placed in the scalp (Berger 1929).

The prominence of alpha over the visual areas of the brain and the fact that alpha tends to be blocked by opening the eyes led Berger to suggest that it was inversely related to attention paid to visual information, a notion that has continued to receive support (e.g., Adrian and Mathews 1934; Morrell 1967; Mulholland 1968; Plotkin 1976; Beyerstein 1977; Ray and Cole 1985).

Given this background, one can see why many brain researchers were astonished to see alpha suddenly identified with transcendent or psychic states and offered as evidence for a unique and beneficial state of consciousness.

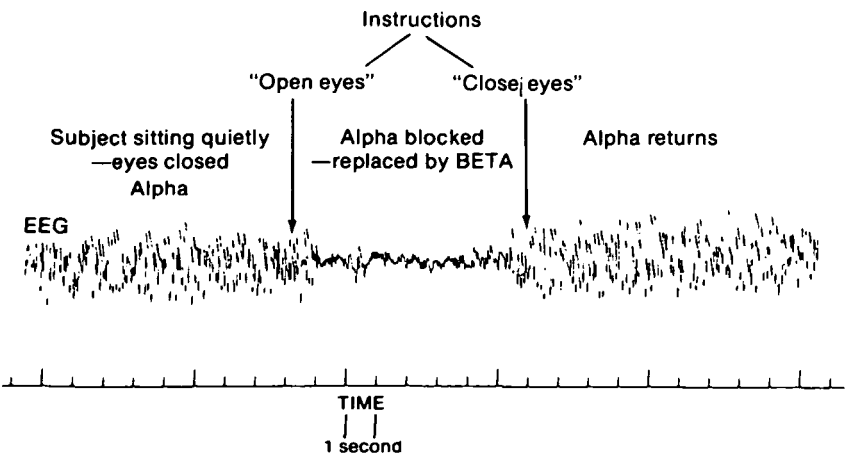


FIGURE 2. Alpha blocking

Origins of the Alpha-Meditation Link

The first suggestions that alpha is special and desirable arose from observations in Japan and India that experienced Zen and Yoga meditators showed much alpha in their EEGs while meditating (Bagchi and Wenger 1957; Anand et al. 1961; Kasamatsu and Hirai 1966). They also produced more than usual amounts of alpha with their eyes open and were less likely than untrained persons to show alpha-blocking in response to distracting stimuli.

As far as they go, these findings are reliable and I have confirmed them in my own lab. Writers of the early reports were careful not to make the logical mistake of assuming that, because two things are correlated, one must necessarily cause the other. Later interpreters were not so cautious. It became axiomatic within the consciousness-expansion fraternity that alpha and meditation were necessarily linked. The error in assuming this without the appropriate experimental controls is apparent in the following. Suppose we noticed that finger movements decrease during meditation. Can we conclude that quieting of the hands is an index of meditation, or that by immobilizing our hands we can propel ourselves into the same state as the person whose hands became still when he began to meditate? Just as there are many reasons for reduced finger mobility, there are many states of consciousness in which alpha might appear. Meditation is one of several states in which people tend not to process much visual information, hence the preponderance of alpha in their EEGs. Trained meditators have developed the ability to ignore stimuli that usually block alpha, but alpha by itself does not guarantee someone is meditating.

There are other problems in equating alpha with meditation. One is that, although the procedures and the subjective states associated with different meditative disciplines vary considerably, all seem about equally related to alpha production, even some to which adepts refuse to grant the status of meditation at all. Another problem is that, as Richard Caton knew more than 100 years ago, lower animals produce alpha, but most people are reluctant to conclude that their pets meditate. Finally, most (but not all) people produce alpha when they simply close their eyes and refrain from active thinking or remembering. Is that all meditation is?

Despite these shortcomings, it came to be widely believed that because highly trained individuals in a self-reported pleasant state of consciousness produce a lot of alpha, alpha must be responsible. By extension, it was argued, if nonmeditators could be taught to lengthen their alpha periods they could achieve the same benefits with great savings in time and effort. A major new growth industry was born.

In 1969, Joe Kamiya reported that ordinary people could learn to enhance alpha output with feedback. Kamiya presented subjects with a signal whenever an electronic filter detected alpha in their EEGs (Figure 3). They were simply told to do whatever they wanted in order to keep the alpha feedback tone on as much as possible. His subjects found the exercise

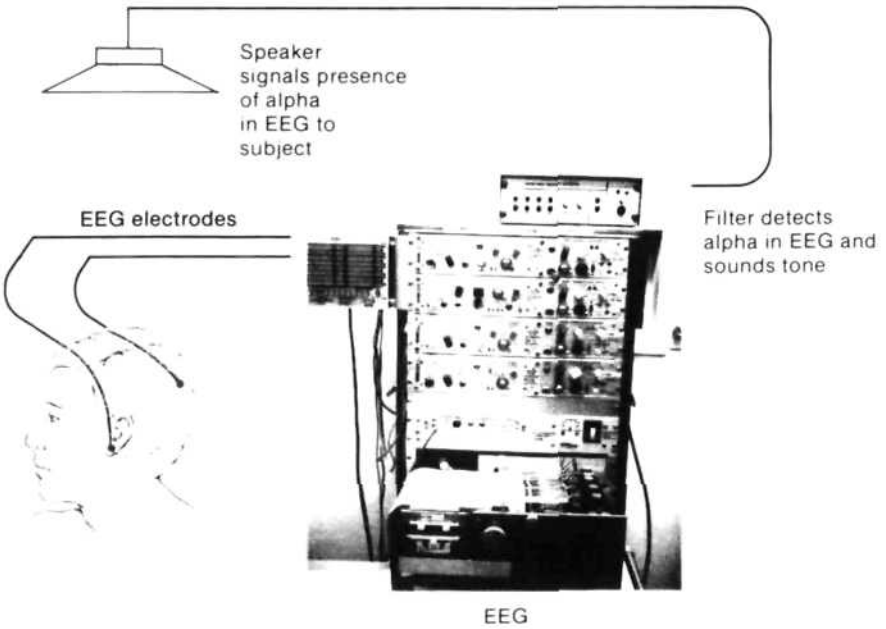


FIGURE 3. Alpha biofeedback

enjoyable, strengthening the presumptive link between increased alpha and transcendent states. We shall return to the question of whether learned control of EEG alpha has in fact been demonstrated or whether the pleasurable reports might not have been the result of subjects' prior expectations. First, a few speculations as to why the intitial claims failed to receive the critical scrutiny they deserved.

Alpha and the "New Age"

The enthusiastic reception accorded the notion of alpha consciousness seems to be yet another manifestation of the change in *Zeitgeist* or worldview that overtook many Western societies during the 1960s and 1970s. On the heels of social, political, and economic upheavals came increasing disillusionment with many conventional beliefs and goals and their philosophical underpinnings (Singer and Benassi 1981). Rising popular interest in alternatives offered by Eastern religions and altered states of consciousness coincided with a loosening of the behaviorist hold on academic psychology, making the exploration of conscious contents once again a legitimate field of research. Meanwhile, many people who had sought enlighten-

ment through consciousness-affecting drugs began to realize that this path is not without its costs as well. Nonchemical means to similar ends rose in value accordingly. Suggestions that alpha feedback was an electronic shortcut to benefits that cost others much time and effort added to its marketability.

The medical establishment was not spared its share of criticism during this time of reassessment either. Critics who saw modern medicine as increasingly mechanistic, impersonal, and preoccupied with cure rather than prevention were quick to see in biofeedback, especially alpha biofeedback, an alternative to the surgeon's knife, the psychiatrist's pills, and even the before-dinner cocktail. Thus the allegedly relaxing and curative powers of alpha consciousness were eagerly welcomed by the "holistic healing" movement. The putative link between alpha and mystical states long claimed to have healing properties enhanced its attractiveness to this constituency. Accumulating scientific evidence for psychological contributions to the onset and remission of certain diseases also helped open the doors of many establishment clinics to this fledgling therapy. Amid the exuberances of this era, many claims for alpha biofeedback were granted without the supporting data normally required of an experimental therapy.

Those of us who advocated a wait-and-see position regarding biofeedback and cautioned that earlier panaceas claiming such sweeping benefits had invariably proved disappointing were frequently dismissed as apologists for the status quo and holdovers of the outmoded "linear thinking" the New Age was seeking to transcend. However, the data that ought to have been gathered prior to the public promotions gradually accumulated. They strongly suggested that the initial zeal was premature.

The Scientific Evidence

Three major issues ought to have been settled before selling alpha feedback to the public: (1) How good is the evidence that increases in alpha during feedback sessions are in fact due to learned enhancement? (2) Is there really any such thing as "alpha consciousness"? That is, are there any mental contents that are invariably present when, and only when, alpha waves predominate in the EEG? (3) The "truth in advertising" criterion. How reliable are the psychological, medical, and mystical dividends alleged to accrue to those who cultivate "alpha consciousness," if indeed it exists?

Has learned enhancement of alpha really been demonstrated?

Given the extent of the promotional efforts, it may surprise many to learn that it is questionable whether EEG control as touted by the alpha-conditioning industry has ever been satisfactorily demonstrated. But what then of the many journal articles reporting a steady rise in alpha over the course of the feedback training? To assess these data, we must first rule

Equipment Problems: Alpha's Saturday Night Specials

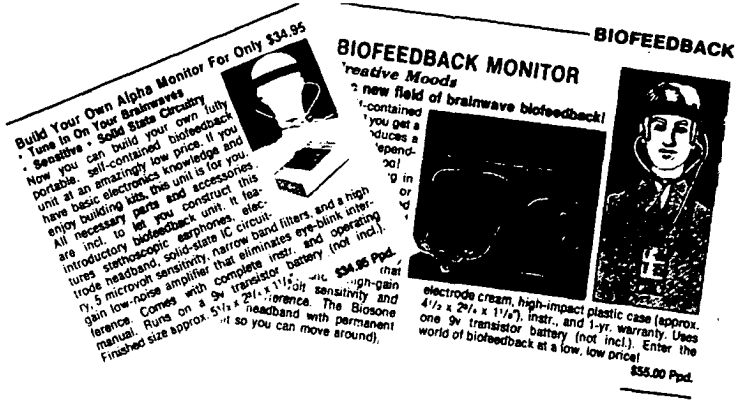
If it cannot be demonstrated that enhancing alpha promotes health and well-being, it is almost gratuitous to point out that most inexpensive portable alpha-feedback machines are technically inadequate anyway. Several companies sprang up to cash in on the alpha-consciousness fad and even some of the most reputable scientific supply houses were quick to start selling "Saturday Night Special" alpha units.

Electrical signals in the brain are many times smaller than the electromagnetic noise that pervades modern buildings. Furthermore, the EEG can be swamped by bio-electrical activity of muscles, skin, heart, and eye movements. Simply jiggling the electrode cables can give rise to spurious signals. Selecting the real EEG out of this maze of artifacts is no small task, one for which units that sold for as little as $50 are clearly unfit.

Reliable EEG recording requires meticulous care in preparing the skin to receive the electrodes, minimizing electrode impedance, shielding and grounding subject and apparatus, filtering signals, etc. Even labs costing millions of dollars are occasionally plagued by interference and artifacts.

An artifact-resistant EEG electrode alone costs about $25—one of the "Specials" someone brought into our lab used for electrodes the chrome-plated disks intended for plugging holes in automotive body-work! The instructions suggested placing the electrodes in a

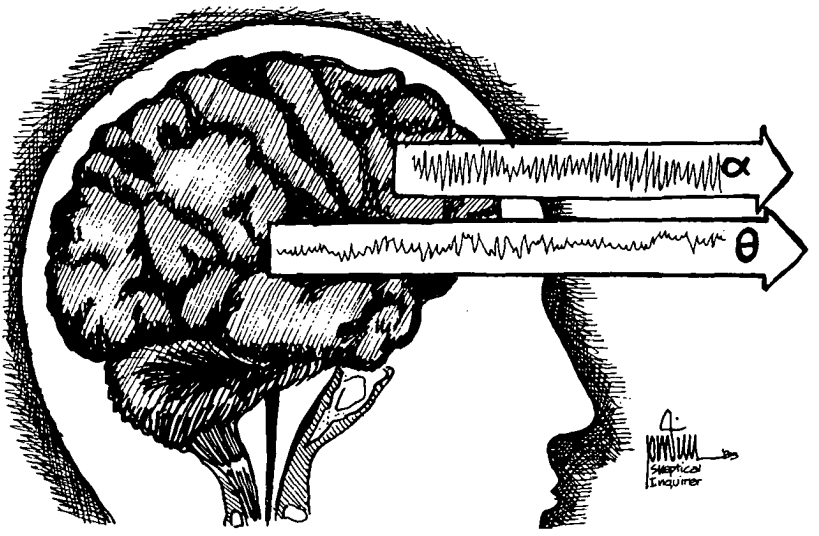
out alternatives to direct learned control that could produce similar results. Remember that most normal people exhibit alpha when they simply close their eyes and refrain from intense mental effort. Eyes-closed (EC) alpha production is measured at the outset of a feedback session as a baseline for later comparison. The task in alpha biofeedback is to do whatever is necessary (usually unspecified) to (1) produce more EC alpha at the end of the session than during the EC baseline and (2) eventually be able to meet or exceed the EC baseline with eyes open. For these comparisons to be meaningful, we must first be sure that the initial baseline was not artificially suppressed; for, if it were, a rise in alpha production due to dissipation of the suppressor could be mistaken for a learned increase due to the feedback.



position that maximized contamination from eye movements, but this hardly mattered because the wires carelessly soldered to the "electrodes" were left unshielded, forming a perfect aerial for interference.

Occasionally individuals bring their home alpha-apparatus to our lab to prove they can achieve results without our shielded recording suites and expensive apparatus. Never has anyone come to us out of dissatisfaction with their machines, but rarely has anyone failed to leave disappointed when side-by-side tests with our equipment showed what their devices were actually recording. Without adequate equipment and trained technicians, the majority of home alpha conditioners and alpha-parlor patrons have probably been "blissing out" on a symphony of eye movement and 60-cycle wall-main interference. Alpha conditioning cannot guarantee to lighten your spirits but it can easily lighten your pocketbook. *Caveat emptor!*

Since novelty, excitement, and anxiety tend to diminish alpha in the EEG (see later exceptions), it seems several attributes of first exposure to a feedback session could initially depress alpha baselines—e.g., newness of surroundings and apparatus, anticipation of something pleasurable or even mystical, and apprehensiveness about succeeding at something that in some circles has become an index of personal worth (non-alpha-producers are not children of the New Age, according to many popular writers). Since the typical alpha-feedback setting is quiet, monotonous, and undemanding, this by itself tends to promote relaxation and, thereby, the dissipation of factors spuriously lowering the EC baseline. Relaxation does tend to enhance alpha output, but the converse is not necessarily true. When these situational variables are adequately controlled for, there is little evidence



that increases in EC alpha-production with feedback are due to learned enhancement. Is there a better case to be made for the reports of eyes-open enhancement?

Several lines of evidence suggest that the rise in production of alpha during eyes-open (EO) feedback does represent a kind of learning, but not of the sort the feedback entrepreneurs had believed. What people learn with the aid of EO feedback (and probably with meditation training, too) are eye-movement, focusing, and attentional strategies that gradually overcome blocking of alpha that occurred before training. Thus it would seem that the apparent control over the EEG is mediated by learned behaviors that have long been known to affect EEG patterns. While this is of interest to psychophysiology, its relevance to therapy and spiritual enlightenment is questionable.

Alpha production goes up when active visual processing is minimized. Paskewitz and Orne (1973), for instance, showed that the alpha "enhancement" reported by others does not occur if subjects are given eyes-open feedback in darkness. They argue that, for the slow rise in alpha output to be seen, there must first be suppressing factors present (such as visual input to scan and assimilate) that the subject learns to ignore.

In 1977, I demonstrated a related phenomenon in subjects capable of hypnotically suggested blindness. (Note: Hypnosis, by itself, has no unique effect on EEG records.) When these subjects were told during eyes-open alpha-feedback that they could no longer see anything, their alpha output shot up immediately to almost equal their eyes-closed baseline. Output of matched subjects not given the blindness suggestion gradually rose to the

eyes-closed baseline by the end of the feedback session.

Of course simply removing visual input does not mean that visual processing stops completely—visual images can be attended to from memory. Work in our lab has shown that attending to these subjective images also attenuates alpha (McBain 1983). Since attention is likely to flag over a period of alpha feedback, this too could contribute to the apparent enhancement effect.

Attention paid to the internal or external visual milieu affects both the kind and amount of eye movements. Plotkin (1976) compared the effects of instructions designed to promote feelings reported to accompany an "alpha experience" (relaxed serenity, loss of body and time awareness, diminution of thought, egolessness, etc.) to instructions that demanded specific visual strategies. He found that learning visual control had a far greater effect on the alpha output.

In reviewing the relevant research, Johnson (1977) concluded that there has never been a conclusive demonstration of learned enhancement of alpha in excess of the true (i.e., nondepressed) eyes-closed baseline.

Does alpha indicate a unique (higher?) state of consciousness?

It is a common error to mistake correlation for causation. As we have seen, alpha tends to be present during meditation or relaxed, dreamy wakefulness, but it also appears when one sits quietly with eyes closed. It seems the real correlation is with some underlying variable—probably similar visual activity rather than common subjective experience—that these states share. If this is true, we certainly could not guarantee access to any particular state of mind by teaching people to enhance alpha (assuming this were possible).

If alpha is compatible with a variety of subjective states, can it be found in states less desirable than those the alpha industry alleges are produced by their devices? The best alpha producer I ever encountered was a ten-year-old hyperactive child—hyperactivity hardly being a condition intuitively associated with serene contemplation. But hyperactivity *is* linked to difficulty in focusing attention, and such focusing tends to block alpha. On the other hand, approximately 10 to 15 percent of the normal population produces little or no alpha under any circumstances. In my experience they are not, as a group, any more anxious, "uptight," or less able to experience reverie than alpha producers. They do, however, seem to differ in the degree to which they employ visual imagery in their thinking and problem solving.

My initial mistrust of suggestions that alpha could be a quick and easy route to relaxation or "higher states" was reinforced by an informal experiment we carried out several years ago at the behest of a local physician. He had several extremely anxious patients maintained on high doses of tranquilizers. He wondered if alpha biofeedback could help reduce

or eliminate their prescriptions. The first of several surprises appeared in the (drug-free) pre-training alpha baselines—several patients already produced abundant alpha at the outset and never surpassed their baseline in the ensuing sessions. Obviously some very anxious people can produce alpha. When the experiment was over, there was little to suggest that initial alpha output, or success or failure in augmenting it, bore any systematic relationship to the patients' evaluation of the training. Several showed no increase in alpha but nonetheless reported substantial relief. An equal number showed large increases in alpha output but complained they felt as anxious as ever.

Perhaps the most dramatic proof that there is no such thing as a unique "alpha state" comes from a study by Orne and Paskewitz (1974). Half their subjects received the calm, relaxing instructions of the typical alpha-feedback experiment, while the other half was treated brusquely and threatened with (but did not actually receive) painful electric shocks if they failed to increase their alpha production. Although the latter group, not surprisingly, reported anger, fear, and frustration (substantiated by physiological indications of agitation and high arousal), they nonetheless produced as much alpha as those who underwent the procedure designed to encourage relaxation and enjoyment. Thus, whatever strategies people acquire with the aid of alpha feedback, they can be learned in stressful conditions and have no automatic power to dispel unpleasant subjective states. Nevertheless, many people do report alpha conditioning to be pleasant and relaxing, and one might wonder why.

How did the widely held association between alpha waves and therapeutic or pleasurable states become established?

Critics of biofeedback, like those skeptical of psychic surgery, faith healing, or the "pop psychology" of EST and Scientology, are quickly inundated with testimonials from satisfied customers. But it has been shown repeatedly that such affirmations, while not to be dismissed out of hand, are nonetheless a weak currency (Nolen 1974; Randi 1980, Chap. 9; Gardner 1957; Rosen 1978).

There are several reasons why recipients of dubious "therapies" may honestly report improvements that cannot be objectively supported or why they may show real improvements that cannot legitimately be attributed to the "therapy" per se.

Most physical and psychological complaints are self-limiting. Many ineffectual treatments therefore are beneficial in the recipients' estimation because they coincide with recovery by natural restorative processes. In addition, these patients may simultaneously be receiving other, proven therapies or altering dietary, exercise, rest, and drug-use habits in salutary ways. And, of course, many complaints are essentially hypochondriacal to begin with and are amenable to simple assurance. Before a putative treat-

ment can claim success, contributions of these other factors must be excluded.

Furthermore, as the connection between anxiety and stress and psychosomatic illness has been documented, it has also been found that psychological processes can aid in recovery. They do so directly by affecting body chemistry and indirectly by promoting beneficial changes in life-style. To the extent that any physiologically inert treatment instills the belief that it will work, it is likely to have these positive spinoffs. They are known as "placebo effects." Virtually none of the commercial biofeedback establishments and relatively few published research studies have included the placebo controls necessary to separate specific curative effects from these secondary factors that mimic them (Simkins 1982).

The reasons people seek alpha biofeedback fall into two broad categories. One group desires relief from stress-related complaints like anxiety, sleep disorders, drug abuse, tension headaches, hypertension, and chronic pain. The other is primarily interested in altered states of consciousness. Both present fertile ground for placebo effects. In evaluating the effectiveness of any treatment it is essential to know two things in advance: the proportion of people with a specific complaint who typically improve with no treatment at all (the spontaneous remission rate), and the proportion who respond favorably to a placebo. The placebo and its administration must as closely as possible resemble the treatment being evaluated, save withholding the suspected active principle or ingredient. Recipients should be carefully matched for kind and severity of symptoms and randomly assigned to an active or a placebo group, and neither they nor the evaluators should be aware who is in which group (the "double-blind" control). Only if these conditions have been met and the response to the active treatment reliably exceeds both the placebo response rate and the spontaneous recovery rate should the effectiveness of a candidate therapy be acknowledged.

When sufferers arrive at the faith-healer's stage, the shrine, or the alpha-conditioning parlor, they harbor many beliefs and expectations conducive to a placebo effect. Of course, if subjective or objective relief is forthcoming, this is not a bad thing (unless exorbitant sums are extracted under false pretenses or sufferers are prevented from receiving other, more effective treatments), but realizing that many putative treatments may actually be capitalizing on placebo effects might allow them to be used more efficiently, stripped of their complicated, expensive, and often mystical trappings.

So how did alpha feedback stack up when controls for expectancy and placebo effect were belatedly put in place? Several reviews (e.g., Johnson 1977; Plotkin 1979; Simkins 1982) concur that the effectiveness of biofeedback for physical ailments has not been adequately established. Reviewing the literature on applications to pain control, Melzack and Wall (1982) conclude that biofeedback was "not found to be superior to

less expensive, less instrument-oriented treatments such as relaxation and coping-skills training." Its limited value is seen as a distractor, essentially a mechanical placebo.

As for the claims that alpha feedback necessarily produces an enjoyable altered state of consciousness, Plotkin (1979) convincingly argues that, while this may occur, it can be accounted for by a combination of expectancy effects and factors related to the feedback situation rather than by any inherent connection with alpha per se. Plotkin examined studies where, unlike Kamiya's early reports, care was taken to find subjects who had no preconceived notions about the "alpha state," or where subjects'

Theta: The Wave of the Future

If, as now seems incontrovertible, alpha is not the hasty man's shortcut to nirvana or even a credible alternative to a warm bath for reducing stress, there are other candidates waiting to take its place. The top contender at the moment is another frequency band of the EEG, theta (4 to 7 Hz). Many benefits once attributed to the "alpha state" are reappearing as purported consequences of high theta states. Like alpha, the theta rhythm has long been known to EEG researchers and several different theories exist to account for it. Theta has been extensively studied in relation to a brain structure called the hippocampus, which is involved in such diverse functions as arousal, attention, voluntary movements, and learning and memory. (See Bennett 1977, Chap. 11.) Although many biofeedback enthusiasts and occultists are embracing theta as the vehicle of alpha's lost promise, they seem likely to fall victim to the same logical and empirical inconsistencies that have plagued alpha research. Consider the Thomas Bennett statement (1982, 106) that "theta waves . . . can sometimes be observed during emotional stress in adults, particularly if the stress is produced by disappointment or frustration." In reviewing his own and others' research on theta, L. Johnson (1977) concludes that theta in the human EEG is "an artifact of general lowering of arousal level." Evaluating reports by Elmer Green and others of a link between theta and meditative and hallucinatory states, N. Birbaumer (1977) asserts that ". . . no sufficiently controlled study exists which supports any of these speculations" and that such claims are founded upon unsystematic observations lacking proper experimental designs. He goes on to agree with Johnson that there is no sound basis at the present time for attributing any benefits to theta biofeedback.

expectations were manipulated by overt or implicit suggestions from the experimenter. The inescapable conclusion is that to achieve "alpha consciousness" one must first be inclined to do so, by self-motivation, suggestion, or a number of situational variables common to most biofeedback settings.

The typical feedback setting is a complex social milieu including many psychological demands that amplify effects of preexisting desires and expectations. Furthermore, there are several aspects of the feedback routine that are known to affect consciousness in ways that bear a weak resemblance to meditative or hypnotic experiences. Among these are the effects of reduced sensory input and prolonged narrowing of awareness to the feedback signal, and mild elation at apparently succeeding in altering a physiological process the subject thinks will produce a desirable state of consciousness. It would seem that the reason there are so many satisfied alpha-feedback customers is that the process offers a restful temporary escape from the hustle of daily living under conditions that are themselves conducive to mild alterations in consciousness. In the absence of pleasant expectations, people are about equally likely to find the experience euphoric, unpleasant, or neutral. That the presence of alpha is incidental if predisposition and setting are right is apparent from an incident where a new owner of a feedback device had a transcendent "alpha experience" only to find that his faulty apparatus was giving feedback unrelated to his EEG (Alcock 1979). I have had people report transcendent experiences when, unbeknownst to them, I had actually been giving them feedback to *suppress* their alpha! These are examples of accidental and intentional placebo control groups, respectively.

As Andrew Neher (1980) points out, we need not deny the existence of transcendent experiences to question popular mystical explanations for them. Neher shows how a quasi-meditative state like "alpha consciousness" is the expected outcome of a number of psychological manipulations and how to experience it without expensive apparatus or training.

Alpha and the Publishing Industry

Pandering to the narcissism of the "Me Generation" and playing on the legitimate concerns of those caught in high-tension life-styles has enriched authors and publishers, too. Best-sellers extolling the curative and mystical powers of "alpha thinking" run the gamut from the generally responsible but erroneous to the demonstrably absurd. On the one hand, we have books like Barbara Brown's (1974) that promote her own views and warn against unscrupulous purveyors of the expensive, essentially useless alpha-conditioning apparatus. At the other extreme, we have laughable efforts like Jess Stearn's (1976) that are little more than advertising for seminars that offer paranormal powers under the guise of "alpha thinking" but never go near an EEG machine.

The middle ground is occupied by works like Lawrence's (1972) and Pines's (1973). They avoid much of the sensationalism of the genre but accept unquestioningly that alpha is incompatible with tension and anxiety and somehow related to ESP. However, for the most part they are only echoing claims by such researchers as Barbara Brown, Joe Kamiya, and Elmer Green. They fail to appreciate that these views were, and are, in the minority position among psychophysiologists. Lawrence's and Pines's books came out before some of the wilder assertions about alpha were overtaken by disconfirming data, but it is unfortunate that their misconceptions continue to be widely quoted.

Alpha and Psi Phenomena

Believers in the paranormal differ concerning whether or not psi will eventually be explained by the mechanisms of conventional science. Those in the affirmative were heartened by early demonstrations that biologically generated electrical fields could be detected outside the body. At last it was possible to suggest a mechanism whereby the emanations of one mind could conceivably interact with objects or other minds at a distance. Hans Berger's initial interest in the electrical activity of the brain stemmed from just such a desire to find a physical basis for psychic phenomena. Eight years before his classic report of the first human EEG recording, he had already published a monograph on psychic phenomena and he had devoted part of his rectoral address to the University of Jena to the subject. In the last publication of his life he propounded his brain-wave-propagation theory of telepathy (Brazier 1961, 112).

Subsequent demonstrations that the brain's electromagnetic fields obey the inverse square law, dropping to infinitesimal strength only millimeters from the scalp, and the failure of researchers to find (or even suggest) plausible brain mechanisms for receiving such emanations, if they could somehow traverse the required distances, has dampened but not eliminated theorizing along Berger's lines. A more prevalent recent trend among psi proponents has been to look to the EEG as a possible indicator of psi-conducive states (see, e.g., McCreery 1967, Part 2; Morris 1976; Honorton 1977). Interest in alpha in this regard stems from two main sources. First, there was the presumed connection between alpha and meditative states, which, in turn, have been associated with psychic powers at least as far back as the *Vedas* of ancient India (Honorton 1977, 437). Second, it is a prevalent theme in psi research that the probability of psi is enhanced if the percipient is in a state of " 'detachment,' 'abstraction,' 'relaxation' and the like" (J. B. Rhine, quoted in McCreery 1967, 92). Honorton's (1977) description of psi-conducive "internal attention states" wherein external distractions and striving are minimized resembles many authors' recipes for "alpha consciousness." However, this runs counter to another strong theme in parapsychology (e.g., see Alcock 1981) that says highly motivated

subjects perform better on psi tasks. Supporters of the latter position would presumably not expect alpha to be a concomitant of psi. The waters are further muddied by the realization, contrary to earlier belief, that EEG alpha does not necessarily denote a subjective state of effortless tranquility. It is not surprising, therefore, that when one tries to correlate two such elusive (and some would say nonexistent) phenomena as psi and alpha consciousness the resulting literature is, even to sympathetic reviewers like Morris (1976), "confusing."

Probably the staunchest defender of the alpha-psi link is Elmer Green. One of the most sanguine proponents of the curative potentials of biofeedback, he was brought to work at the Menninger Clinic by the noted parapsychologist Gardner Murphy. Green was recently seen on a nationally televised "documentary" on psychic phenomena claiming that some unremarkable EEG tracings were indicative that their producer was in telepathic communication. The loose procedure and lack of scientific controls displayed in this instance suggest such claims cannot be taken at face value.

Barbara Brown, though generally more responsible than most writers on the suggested alpha-psi link, nonetheless exhibits a generally credulous attitude toward claims in the area (Brown 1974, 405-407). She believes that not only will EEG research eventually succeed in identifying the brain correlates of psi states but through biofeedback people will be trained to enter them at will. To her credit, Brown acknowledges that other researchers had disputed her conceptions, but she attempts to cast doubt on their position somewhat curiously as arising from ". . . scientists . . . already at work to strengthen the dichotomy between science and spiritual development." In voicing her suspicions of a hidden agenda among critics who fail to see anything mystical in alpha waves, does she perhaps reveal one of her own?

Conclusion

Three of the main concerns of CSICOP are the demarcation of pseudoscience, evaluation of dubious health remedies, and examination of the evidence for alleged psychic powers. This article has touched upon aspects of alpha biofeedback relevant to each of these areas. I have tried to show how recent social trends set the stage for popular and professional espousal of a largely mistaken conception of the alpha rhythm. Its compatibility with the Zeitgeist perhaps accounts for the behavior of some respected scientists vis-à-vis alpha feedback that, if not pseudoscientific, at least falls short of the ideals of scientific verification. That much evidence of the previous 70 years made the revisionist notions about alpha improbable failed to impede the bandwagon effect. In the popular arena, pseudoscientific pronouncements on the curative effects of alpha abound, and the success of numerous marketing schemes fueled by throngs of satisfied

customers demonstrates once again the difficulty of disputing such claims.

Alpha biofeedback seems to be yet another in a long series of putative treatments to benefit from the ubiquitous placebo effect—a placebo to appeal to those whose faith runs more along technological than along theological lines. Finally, the debatable status of psychic powers has not been enhanced by their alleged association with "alpha consciousness," a putative state whose own existence is in grave doubt. We are reminded once again of Bertrand Russell's observation that there will always be more defenders of popular falsehoods than unpopular truths.

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Spirit Rapping Unmasked: An 1851 Investigation and Its Aftermath

The Fox sisters' spirit-rappings were investigated and explained by three Buffalo physicians. The faithful ignored and suppressed the exposé.

Vern L. Bullough

THE MODERN spiritualist movement began in 1848 at Hydesville in Wayne County, New York, when J. D. Fox, his wife, and their daughters became much disturbed by unexplained knockings in the house to which they had recently moved. The knockings, which apparently had occurred before the Foxes lived in the house but never on such a scale, caused a considerable stir in the village.

Various theories were advanced to explain these mysterious happenings, none satisfactory until one of the daughters, Katherine (Kate, b. 1830) concluded that the cause of the sounds was intelligent and if this was the case she should be able to communicate with it. Acting as a "medium" she, and later her younger sister Margaret (b. 1836), established communication with the rapper through flipping her fingers a specific number of times. The rapper responded with the same number. A code was worked out with one rap meaning no and three yes, and more complicated messages could be obtained by calling out or pointing to letters of the alphabet. Through this means the sisters learned that the rapper was the spirit of a peddler who had been murdered in the house.

Shortly after this Katherine and her sister Margaret moved to Rochester to live with a married sister, Mrs. Ann Leah Fish. The move did not cut down their ability to communicate with the spirit world, and their rapping sessions not only continued but began to attract large audiences. Soon their sessions had overflow crowds. As their fame grew,

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The Fox sisters, Margaret and Kate, with the third sister, Leah.

such notables as Horace Greeley, James Fenimore Cooper, and William Cullen Bryant came to visit and reported on the ability of the sisters.

Encouraged by such success, the sisters took their show to nearby Buffalo in 1851, where "crowds of visitors" paid $1.00 a head to watch the wonderful revelations about the next world unfold. Attending one of the first Buffalo sessions were three physicians from the University of Buffalo, Austin Flint, Charles A. Lee, and C. B. Coventry. They reported on their observations in a letter to the editor published in the February 17, 1851, issue of the *Buffalo Commercial Advertiser.*

The letter, slightly modified, along with a report of the full-scale investigation undertaken by the physicians, was then printed in the March issue of the *Buffalo Medical Journal,* of which Flint was editor. Flint urged other newspapers to use the report in the journal as the official text of the letter and of the report of the committee. This article is based upon the information contained in that report.[1] The letter read as follows:

> To the Editor of the Commerical Advertiser:
>
> Curiosity having led us to visit the room at the Phelps House in which two females from Rochester (Mrs. Fish and Miss Fox) profess to exhibit *striking* manifestations of the spiritual world, by means of which communion may be held with deceased friends, &c., and having arrived at a physiological explanation of the phenomena, the correctness of which has been demon-

strated in an instance that has since fallen under observation, we have felt that a public statement is called for, which may perhaps serve to prevent further waste of time, money, and credulity (to say nothing of sentiment and philosophy) in connection with this so long successful imposition.

The explanation is reached almost by a logical necessity, on the application of a method of reasoning much resorted to in the diagnosis of diseases viz: *reasoning by way of exclusion.* It was reached by this method prior to the demonstration which has subsequently occurred.

It is to be assumed, first, that the manifestations are not to be regarded as spiritual, provided they can be physically, or physiologically accounted for. Immaterial agencies are not to be invoked until material agencies fail. We are thus to *exclude* spiritual causation in this stage of the investigation.

Next, it is taken for granted that the *rappings* are not produced by artificial contrivances about the persons of the females, which may be concealed by the dress. This hypothesis is excluded, because it is understood that the females have been repeatedly and carefully examined by lady committees.

It is obvious that the rappings are not caused by machinery attached to tables, doors, etc., for they are heard in different rooms, and different parts of the same room, in which the females are present, but always *near* the spot where the females are stationed. This mechanical hypothesis is then to be *excluded.*

So much for *negative* evidence, and now for what *positively* relates to the subject.

On carefully observing the countenances of the two females, it was evident that the sounds were due to the agency of the younger sister, and that they involved an effort of the will. She evidently attempted to conceal any indications of voluntary effort, but in this she did not succeed:—a voluntary effort was manifest, and it was plain that it could not be continued very long without fatigue.

Assuming, then, this positive fact, the inquiry arises, how can the will be exerted to produce sounds (rappings) without obvious movements of the body? The voluntary muscles are the only organs (save those which belong to the mind itself) over which volition can exert any direct control. But the contractions of the muscles do not, in the muscles themselves, occasion obvious sounds. The muscles, therefore, to develop audible vibrations, must act upon parts with which they are connected. Now, it was sufficiently clear that the rappings were not *vocal* sounds: these could not be produced without movements of the respiratory muscles, which would at once lead to detection. Hence, *excluding* vocal sounds, the only *possible* source of the noises in question, produced, as we have seen they must be, by voluntary muscular contractions, is in one or more of the movable articulations of the skeleton. From the anatomical connections of the voluntary muscles, this explanation remains as the only alternative.

By an analysis prosecuted in this manner, we arrive at the conviction that the *rappings,* assuming that they are not spiritual, are produced, by the action of the will, through voluntary muscles, upon the joints.

Various facts may be cited to show that the motion of joints, under certain circumstances, is adequate to produce the phenomena of the

rappings; but we need not now refer to these. By a curious coincidence, after arriving at the above conclusion respecting the source of the sounds, an instance has fallen under our observation which demonstrates the fact that noises precisely identical with the *spiritual rappings* may be produced in the *knee joint.*

A highly respectable lady, of this city, possesses the ability to develop sounds similar both in character and degree to those professedly elicited by the Rochester imposters from the spiritual world. We have witnessed the production of the sounds by the lady referred to, and have been permitted to examine the mechanism by which they are produced. Without entering, at this time, into a minute anatomical and physiological explanation, it is sufficient to state that, owing to relaxation of the ligaments of the knee joint, by means of muscular action, and pressure of the lower extremity against a point of resistance, the large bone of the leg (the tibia) is moved laterally upon the lower surface of the thigh bone (the femur) giving rise, in fact, to partial lateral dislocation. This is effected by an act of the will, without any obvious movement of the limb, occasioning a loud noise, and the return of the bone to its place is attended by a second sound. Most of the Rochester rappings are also double. It is practicable, however, to produce a single sound, by moving the bone out of place with the requisite quickness and force and allowing it to slide slowly back, in which case it is noiseless.

The visible vibrations of articles in the room situated near the operator, occur if the limb, or any portion of the body, is in contact with them at the time the sounds are produced. The force of the semi-dislocation of the bone is sufficient to occasion distinct jarring of doors, tables, etc., if in contact. The intensity of the sound may be varied in proportion to the force of the muscular contractions, and this will render the apparent source of the rappings more or less distinct.

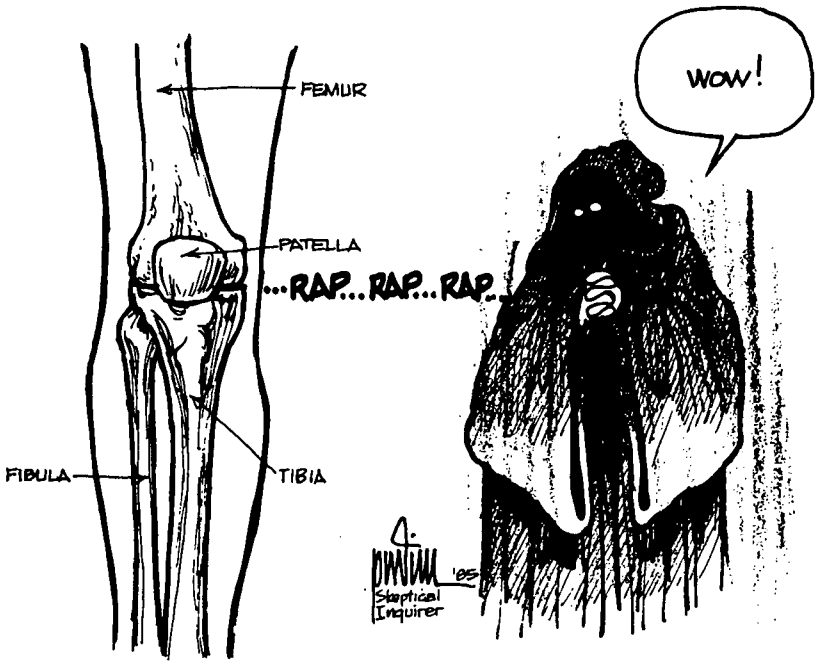
We have witnessed repetitions of experiments in the case just referred to, sufficient to exhibit to us all the phenomena of sounds belonging to the Rochester rappings, and without further explanations at this time, we append our names in testimony of the facts contained in the foregoing hastily penned exposition.

University of Buffalo } AUSTIN FLINT, M.D.
CHARLES A. LEE, M.D.
C. B. COVENTRY, M.D.

Feb. 17, 1851

The Fox sisters could not let such allegations go unanswered and on the next day inserted the following announcement in the Buffalo papers:[2]

We observe by a communication in the *Commerical Advertiser,* that you have recently made an examination of a highly respectable lady of this city, by which you have discovered the secret of the "Rochester Imposters." As we do not feel willing to rest under the imputation of being imposters, we are very willing to undergo a proper and decent examination, provided we can select three male and three female friends who shall be present on the



occasion. We can assure the public that there is no one more anxious than ourselves to discover the origin of these mysterious manifestations. If they can be explained on "anatomical" and "physiological" principles, it is due to the world that the investigation be made, and that the "Humbug" be exposed. As there seems to be much interest manifested by the public on this subject, we would suggest that as early an investigation as is convenient would be acceptable to the undersigned.

Ann L. Fish
Margaretta Fox

The three physicians agreed to set up an examination and met with the two women and their friends on February 19, 1851.

After a short delay, the two Rochester females being seated on a sofa, the knockings commenced, and were continued for some time in loud tones and rapid succession. The "spirits" were then asked "whether they would manifest themselves during the sitting and respond to interrogatories." A series of *raps* followed, which were interpreted into a reply in the affirmative. The two females were then seated upon two chairs placed near together, their heels resting on cushions, their lower limbs extended, with the toes elevated and the feet separated from each other. The object in this experiment was to secure a position in which the ligaments of the knee joint should

be made tense, and no opportunity offered to make pressure with the foot. We were pretty well satisfied that the displacement of the bones requisite for the sounds could not be effected unless a fulcrum were obtained by resting one foot upon the other, or on some resisting body.

The company, seated in a semi-circle, quietly waited for the *manifestations* for more than half an hour, but the "spirits," generally so noisy, were now dumb. The position of the younger sister was then changed to a sitting posture, with the lower limbs extended on the sofa, the elder sister sitting, in the customary way, at the other extremity of the sofa. The "spirits" did not choose to signify their presence under these circumstances, although repeatedly requested so to do. The latter experiment went to confirm the belief that the younger sister alone produces the *rappings*. These experiments were continued until the females themselves admitted that it was useless to continue them longer at that time, with any expectation of *manifestations* being made.

In resuming the usual position on the sofa, *knockings* very soon began to be heard. It was then suggested that some other experiment be made. This was assented to, notwithstanding the first was, in our minds, amply conclusive. The experiment selected was, that the knees of the two females should be firmly grasped with the hands so applied that any lateral movement of the bones would be perceptible to the touch. The pressure was made through the dress. It was not expected to prevent the sounds, but to ascertain if they proceeded from the knee joint. It is obvious that this experiment was necessarily far less demonstrative, to an observer, than the first, because if the bones were distinctly felt to move, the only evidence of this fact would be the testimony of those whose hands were in contact with them. The hands were kept in apposition for several minutes at a time, and the experiment repeated frequently, for the course of an hour, or more, with negative results: that is to say, there were plenty of *raps* when the knees were not held, and none when the hands were applied save once, as the pressure was intentionally somewhat relaxed (Dr. Lee being the holder), two or three faint, single *raps* were heard, and Dr. Lee immediately averred that the motion of the bone was plainly perceptible to him. The experiment of seizing the knees as quickly as possible when the knockings first commenced, was tried several times, but always with the effect of putting an immediate *quietus* upon the *manifestations*.

The proposition to bandage the knees was then discussed. This experiment was objected to, on the part of the friends of the females, unless we would concede that it should be an exclusive test experiment. We were not prepared with appliances to render the limb immovable, and therefore declined to have it considered such a test. This was the experiment anticipated, and one which, we presume, the females thought would end in their triumph. A bandage applied above and below the patella, admitting of flexion of the limb, will probably not prevent the displacement, as we have but little doubt had been ascertained by the Rochester females before the examination was invited. Should it become necessary to repeat experiments in other places, in furtherance of the explosion of the imposition, we would suggest that the bandage be not relied upon. Plenty of roller, with lateral splints, firmly applied, so as to keep the limbs extended, and render the

> joints immovable, would doubtless succeed in arresting sounds so far as they involve the knee joint. It will be observed that, in our exposition, we do not claim that this joint is exclusively the source of the sounds, and had our experiments, which were first directed to this joint, failed, we should have proceeded to interrogate, experimentally, other articulations. This, however, as the reader will note, seemed quite unnecessary. The conclusion seemed clear that the *Rochester knockings* emanate from the knee joint.[3]

Flint, the author of the article in the *Buffalo Medical Journal,* went on to add a number of other cases of individuals who could make sounds with their joints. He wondered how the Rochester sisters were able to keep their secret so long when the ability to make such sounds was so widespread and concluded that people believed because they wanted to believe.

In an April update in the same journal on the Rochester sisters, Flint reported that they

> continued to hold daily and nightly soirees [in Buffalo] which were well patronized until the 25th [of February], when they rather suddenly took their departure for parts unknown. Shortly after the secret of the knockings was announced, there was a change in the performances. The knockings now became a secondary matter, and the "spirits" were pleased to ring bells, gongs, play on the banjo, kick tables, chairs, etc., to select and admiring audiences.[4]

In spite of the disillusion of many with the knockers, enough believers in the city remained to continue to fill the hall. The sisters, however, allowed no more investigators into their act, and when a young "gentleman" in attendance tried to look beneath the table to see whether the women were now kicking the cymbals, gongs, and banjos, he was expelled from the audience.

By all rights of rational thinking, the Buffalo experience should have ended the saga of the Fox sisters. It did not. Instead, the Buffalo exposé was deliberately ignored or suppressed by the growing band of spiritualists. Besides, the Fox sisters put on a good show. In 1856, a New York enthusiast put it bluntly: "Come, let us go in and see Kate Fox. It will cost you nothing; Good show; cheap."[5]

In 1852-53, Kate Fox took her act to London, where, as Mrs. Hayden, she continued to enthrall audiences and kindled interest in spiritualism all over England. Later, in the 1870s, she became disillusioned with what she was doing and denounced spiritualism as humbuggery.

> Every so called manifestation produced through me in London or anywhere else was a fraud. Many a time have I wept, because, when I was young and innocent, I was led into such a life."[6]

The faithful ignored her denunciation and instead denounced her as so

sodden with drink that her outbursts had to be dismissed. The Society for Psychical Research in their later publicity glossed over the fact that Mrs. Hayden was one of the Fox sisters, and instead listed her as a Boston spiritualist. Though the society mentioned the possibility of snapping one's knee, they indicated that such an explanation was highly unlikely, and refused to accept the findings of Flint.[7]

In 1888, Margaret Fox Kane, who also denounced spiritualism as a fraud, explained that the original sounds had been made by tying an apple to a string and pulling it down the stairs. Later Kate, and soon after Margaret, found that they could make the same sound by snapping their toes. Flint therefore was technically in error but correct in principle. His experiment, especially when their legs were extended on the sofa, would have detected this. The sisters allowed no further experiments later in their career.[8]

In sum, sometimes the more things change, the more they seem the same. Believers who want to believe *will* believe regardless of what the evidence might indicate.

Notes

1. Austin Flint, "Discovery of the Source of the 'Rochester Knockings,' " *Buffalo Medical Journal,* 6 (1851): 628-642; the letter is reprinted from pp. 631-632. In the introduction to his account Flint reports that he had hit upon the solution to the knockings through a friend whose wife was able to do the same thing.

2. Ibid., p. 634.

3. Ibid., pp. 634-636.

4. Austin Flint, "Rochester Knockings," *Buffalo Medical Journal,* 6 (1851): 699-700.

5. Ronald Pearsall, *The Table Rappers* (New York: St. Martin's Press, 1972), p. 65.

6. Ibid., pp. 55-56.

7. For a good example of this, see Eleanor Mildred Sidgwick, "Spiritualism," *Encyclopedia Britannica,* 25, 705-708. This is the famed eleventh edition of the Britannica, published in 1911. Eleanor Mildred Sidgwick was secretary to the Society for Psychical Research, and this article unlike most articles in this particular edition did not give pros or cons but treated spiritualism as a real phenomenon subject to scientific investigation, which the society supposedly had done. Even today's believers in psychic phenomena would be embarrassed by the distorted view it gives.

8. Joseph F. Rinn, *Searchlight on Psychical Research* (London: Ridder & Co., 1954), pp. 60-61. •

CSICOP 1986 Conference at the University of Colorado

CSICOP's 1986 conference will be held at the University of Colorado, Boulder, Friday through Sunday, April 25-27.

The first meeting, on Friday afternoon, will be an "all magic" session, with Toronto magician and journalist Henry Gordon, magician Bob Steiner of the Bay Area Skeptics, "Captain Ray of Light," a.k.a. Douglas E. Stalker of the University of Delaware, James (The Amazing) Randi, and others.

Friday evening will be devoted to a distinguished lecturer. (Stephen Jay Gould has been tentatively scheduled.)

Saturday morning's session will include "Quantum Mechanics and Psychic Phenomena," discussed by leading scholars in physics and parapsychological research, including Helmut Schmidt. This will be followed by luncheon served during a series of informal roundtable discussions. Saturday afternoon the focus will be on reincarnation and related claims. Among the speakers will be Nicholas Spanos, an authority on hypnotic regression, near-death-experience expert Ronald Siegel, linguist Sarah Grey Thomason, and Leo Sprinkle, a practitioner of "past-life therapy."

The main speaker at the CSICOP Banquet on Saturday night will be biologist William V. Mayer, emeritus professor at the University of Colorado. The evening will conclude with the presentation of CSICOP awards.

The session on Sunday morning will focus on the skeptical "movement." Sociologist Ron Roberts will give an analysis of this phenomenon, and local groups will report on their activities.

This conference is sponsored by the Committee for the Scientific Investigation of Claims of the Paranormal in cooperation with the Committee on the Study of the History and Philosophy of Science and the Colorado Organization for a Rational Alternative to Pseudoscience (CO-RAP).

The Saguaro Incident: A Study in CUFOS Methodology

An investigation into the case of a nocturnal-light photo provides lessons in how UFO proponents operate.

Lee Roger Taylor, Jr., and Michael R. Dennett

PHILIP KLASS, Robert Sheaffer, James Oberg, and other members of CSICOP have argued persuasively that the study of unidentified flying objects is not a science. Articles in the SKEPTICAL INQUIRER and elsewhere have pointed to flaws in the basic premise of UFO studies. Chief among these flaws is the failure of UFO proponents to use proper scientific methodology—or, for that matter, any methodology at all. UFOlogy has thus established itself as a counterfeit science—or, to use the more common term, pseudoscience.

As a pseudoscience, the study of UFOs can be expected to display a distinctive set of characteristics similar to other less-than-scientific studies like astrology and palmistry. It is characteristic of a pseudoscience—and, indeed, even a mandate—that new cases must continuously be brought forth to cover old, unproven cases in order to justify and renew the "validity" of its faith. In other words, because a pseudoscience's "evidence" tends to wither over a period of time—largely due to scientific and public scrutiny (not to mention failures in prediction) whether desired or not—faith in the credibility of the "science" must be renewed periodically or else it would simply wither and die.

The committed UFO proponent will thus grasp at any incident or incidents that superficially seem to support his belief irrespective of potentially contradictory past statements. More often than not, these "new"

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cases are (1) not really new at all (that is, characteristically different from any case heretofore identified), and (2) fraught with scientific and logical errors.

Real science is characterized by the discovery and analysis of new data. These two concepts are integral and inseparable if progress is to be made. The scientific method demands careful checking and rechecking. It is hardly likely that, when an astronomer discovers an object on a photographic plate, his first step in analysis would be to proclaim what he "thinks" it might be and then argue from that basis contrary to all evidence that might follow. More likely, the astronomer will have a good guess as to the identity of his new-found object, but his first step is to confirm the fact that he has indeed made a discovery at all, which then must be reconfirmed by other astronomers. This process eliminates the possibility of naming dust specks and photographic-plate flaws after eminent astronomers.

Pseudoscience, on the other hand, tends to announce its discoveries without going through the process of analysis. In some instances, such as in UFOlogy, evidence may have been collected. The problem, however, has been either a faulty or incomplete collection of the evidence or an incomplete analysis of any or all of the evidence. Indeed, more frequently than not, the latter is true: Those pieces that seem to substantiate a predetermined hypothesis are used to justify it, while the remainder is consigned to File 13.

We became interested in these particular characteristics of UFOlogical investigations while unbeknownst to each other we pursued separate paths to a singular event that we have called "The Saguaro Incident." When our paths finally crossed, we were able to compare notes not only on our discoveries but also on the apparent "laws" that govern the formulation and the ultimate promulgation of an "incident" as a mysterious "unknown."

The Saguaro Incident contains nothing of momentous study. In fact, it was a rather unremarkable occurrence: a simple nocturnal light. This light was seen and photographed west of Tucson, Arizona, in March 1977. Its "discovery" was first published in the Center for UFO Studies (CUFOS) *Associate Newsletter* in May 1980 ("1977 Nocturnal Light Photograph Reported").

The essential facts as detailed by CUFOS are as follows. In mid-March 1977 between 10 and 12 P.M., James Ferguson and Tom Patton were two miles west of Tucson taking photographs of saguaro cacti, using flash-lighting effects, when the "floor of the desert around them suddenly began to brighten as if by a full moon." The two men turned and saw a mass of light that hovered for "many minutes just above the horizon and did not appear to move." As Ferguson and Patton viewed this sight—which CUFOS termed "amazing"—they turned their 35-mm camera around and produced the accompanying time exposure (Photo 1). CUFOS

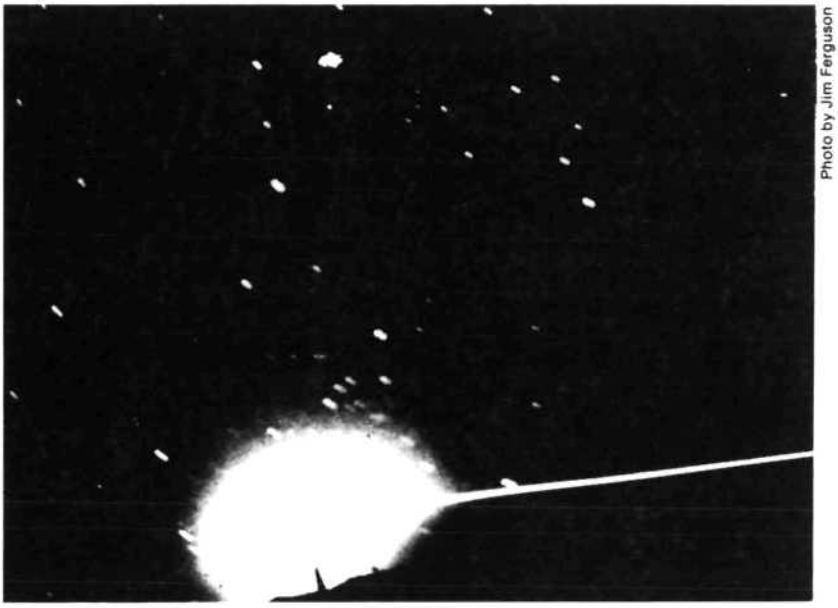

Photo by Jim Ferguson

PHOTOGRAPH 1: The Saguaro Incident photo.

explained that the time exposure lasted for "several minutes," as could be verified by the light paths of the stars. While the time exposure was in progress, the object moved "very rapidly to the North and disappeared." Readers were advised that the case was under investigation by the Center. The results were to be published in a future newsletter. To our knowledge, no subsequent information about this incident has been published by CUFOS.

As our separate investigations merged, the evident flaws in the CUFOS research became more pronounced and were indeed aggravated by their subsequent handling of the case.

Initially, one of us (Dennett) was immediately struck by a basic similarity between the Tucson photograph/description and another photograph/description in a recently published book. The other photo was *taken in 1923 by Josef Klepesta while he and another astronomer, Zdenek* Kopal, were making a time exposure of the Andromeda galaxy. Dr. Kopal later described the 1923 fireball as "many times brighter than the full moon and for a few seconds of its flight converted night into day." So impressive was this observation that Dr. Kopal could still remember it distinctly even though it occurred six decades ago. To Dennett, the Tucson description seemed almost identical.

A copy of the 1923 photograph and the written description were sent to CUFOS. The similarities between the two events were not viewed as significant by the Center. The idea that the Tucson photograph was or

could be a fireball or bolide meteor was rejected on the grounds that it would have been observed and recorded by the American Meteor Society.

Although the meteor explanation was not without its faults, the reasons given by the Center were invalid. Karl Simmons, the editor of *Meteor News* (the publication of the American Meteor Society), disagreed with CUFOS. Simmons stated that the absence of a report of a bolide was not evidence against the theory. Sporadic bolides (i.e., those not associated with any known meteor shower) occur with a fair frequency. The duration of these ephemeral objects may last from half a second to as long as five seconds. The probability that any two people in separate locations will be watching that segment of the sky (when no meteors are expected) at the instant of the occurrence is very low. As a matter of fact, Taylor had had a similar experience in 1971 in which he was the sole reporter of a bolide with an estimated magnitude of -16. Later, when Simmons received a copy of the photo, he identified it as an "exploding fireball, with a nice terminal burst." Of more importance to CUFOS, and their second argument against the bolide explanation, was its incongruity in every detail with the witness testimony. CUFOS assured Dennett that there was *nothing* to indicate flaws in the accounts of the two witnesses. The fact that Ferguson was a skilled photographer and capable of hoaxing a photograph was acknowledged by CUFOS's John Timmerman. Timmerman emphasized, however, that *no information had been presented to indicate a hoax.* He noted that the Center was continuing its investigation and that additional information would be published in the *Newsletter.* The case then stood as unexplained and rested, as far as the Center was concerned, on the credibility of the witnesses.

CUFOS did not reveal to Dennett, however, that Taylor was working with the Center on the very same case but presenting an alternative explanation and evidence that did in fact contradict the testimony of the witnesses. Taylor had first considered the possibility that the photograph might be a bolide but rejected it for four reasons: (1) Careful examination of the initial "beginning" of the light streak at the edge of the light "burst" reveals a slight curve. While meteors do sometimes move in erratic paths, an erratic path would characterize much of the light streak, or, at the very least, be preceded by a burst that would then cause the meteor to move erratically. (2) The light burst itself is nicely tapered in the direction of the path, which would be more indicative of a directional bright light that was slowly turned away from the viewer's line of sight. (3) The elapsed time for even a slow bolide of this nature would not have allowed enough reaction time to turn their camera in its direction. (4) It was highly coincidental that a terminal burst, or other light source, for that matter, should be so perfectly aligned with a tall, pointed object resting on a hill. This immediately raised serious suspicions of a hoax.

Taylor's initial impression, on the other hand, was that the object

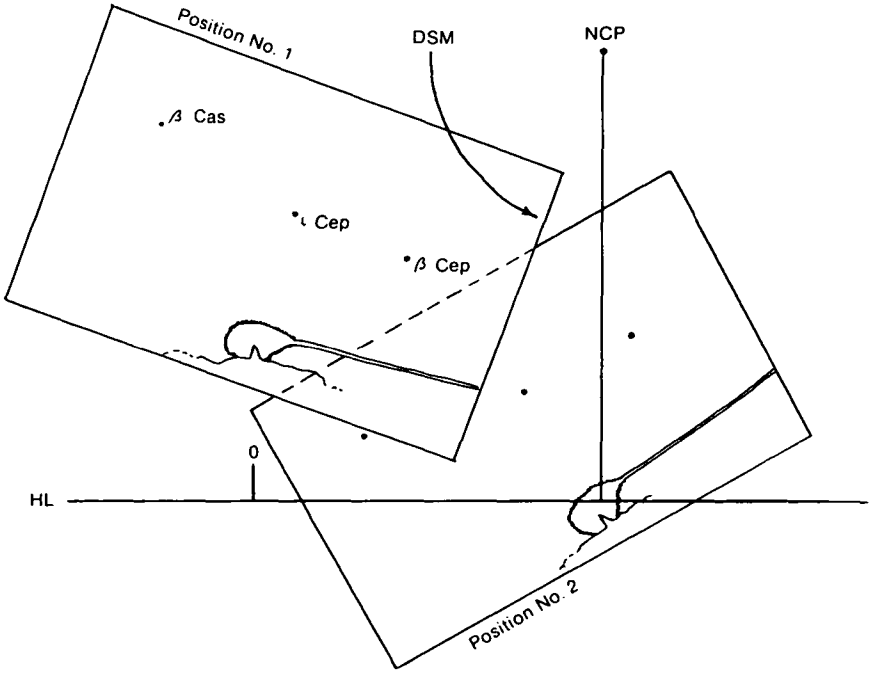

FIGURE 1: A comparison of relative star positions for two different times. The comparison indicates that the dark object in the light burst is perpendicular to the horizon. Position No. 1 represents the position of the stars with respect to the NCP (North Celestial Pole) and the assumed HL (Horizon Line) for mid-March at 8:00 P.M. Position No. 2 represents the position of the stars as they would appear for mid-March at approximately 11:00 P.M. If Position No. 2 is the correct time, the object would have first "appeared" *below* the horizon and flown high to the east. DSM—Direction of Stellar Movement (apparent)

may have been an aircraft with directional lights (such as landing lights) that was approaching the observers' position from the north and then turned to the east—which, in effect, would have caused the bright lights to nearly disappear and could have resulted in the thinly diminishing light streak.

This curiosity led to a more careful examination of the stellar background of the photograph, which in turn led to the conclusion that the photograph could not have been taken at the time the witnesses claimed it was. Four stars are easily identifiable in the photograph: Beta Cassiopeia and Alpha, Beta, and Iota Cephei. (See Figure 1.) The position of these stars in the sky is of little use without an identifiable horizon line. The camera is obviously askew with respect to the horizon, giving credence to the witnesses' statement that they hurriedly pointed the camera in the direction of the object. Centered in the light burst is what appears to be a large, narrow object. Since the witnesses had stated that they were photographing saguaro cacti (one portion of the Saguaro National Forest/Park

is located a few miles west of Tucson), Taylor made the inference that this object was just such a cactus, which like most of its species grows perpendicular to the earth. The only other possible explanation is that the object is a very large, narrow rock outcropping, which would have been highly unusual given the terrain. On the assumption that the object was a saguaro cactus and that the altitude of the North Celestial Pole at Tucson is 32.5°, an estimated horizon line can then be drawn. Placing the North Celestial Pole on the sketch is then a simple matter by matching the scale in degrees to the photograph. Having done so, it is then possible to calculate the approximate time. If the inferred horizon is correct, then the photograph had to have been taken at 8:00 P.M. for mid-March. By shifting the photograph to the 11:00 P.M. position (the estimated time of the photograph), Beta Cephei should at that time have crossed the meridian (an imaginary line drawn from the northernmost horizon point, through the North Celestial Pole, through the zenith, and then to the south). This position would then place Beta Cassiopeia very close to the horizon and probably hidden behind the mountains and hills in that region. In addition, this time-frame would place the photographed object below the horizon relative to the star positions for that time.

In other words, it would have been impossible for Ferguson and Patton to have seen the object at the time they "think" they saw it. Also, if 11:00 P.M. were the correct time of the photograph, the discernible nearby hill/bluff on which the cactus is situated would have to be tilted (along with the slender object) at a precarious angle. This in itself would not be unusual; however, the direction of the UFO's movement would have been clearly to the east and thus visible for a considerably longer time. According to Ferguson and Patton, the UFO "moved rapidly to the north and disappeared." If the photograph had been taken at 11:00 P.M., the object was already in the north and would have thus disappeared to the east. If, however, the photograph had been taken three hours earlier, at 8:00 P.M., according to a computer simulation the object would have had an azimuth of 348° and could have easily moved to the north.

It is perhaps understandable that the witnesses might make an error in their time estimate, but a three-hour error is highly unlikely. The remaining probability of error is that the photograph was not taken in mid-March at all but rather mid-April. This in itself raises serious questions about the credibility of the witnesses. It would imply that they could not remember what month it was taken, which in turn implies that they gave the photograph little or no attention for an unknown period of time before notifying CUFOS. This creates a situation fraught with "scientific" error: a photograph in which the time and date are unknown. There is some credibility associated with this hypothesis, since the photograph was taken in 1977 but CUFOS failed to publish it until 1980. The date that Ferguson reported the incident has not been released to us. The tentative

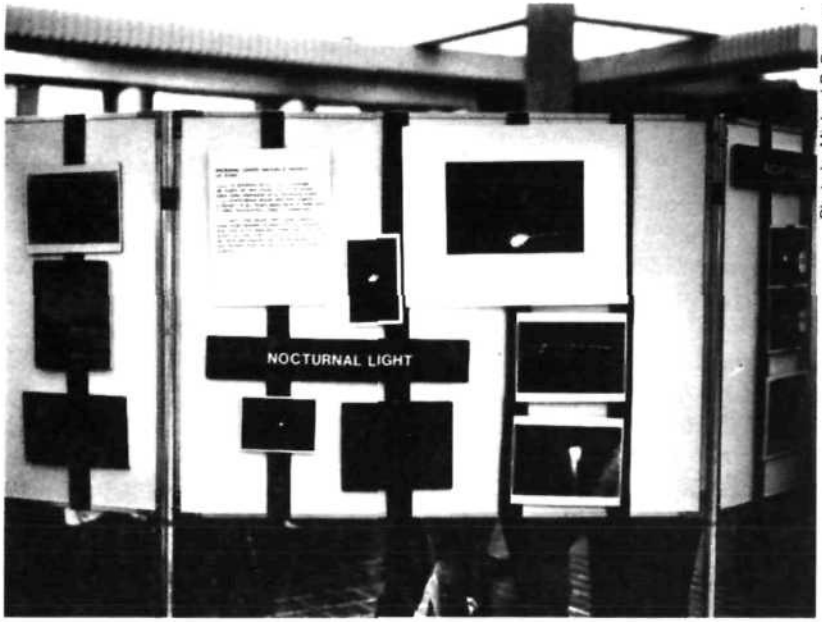

Photo by Michael R. Dennett

PHOTOGRAPH 2: A photo of the nocturnal light section of the CUFOS traveling photo exhibit. Note: Saguaro Incident Photo is the most prominently displayed of the "nocturnal light" photos.

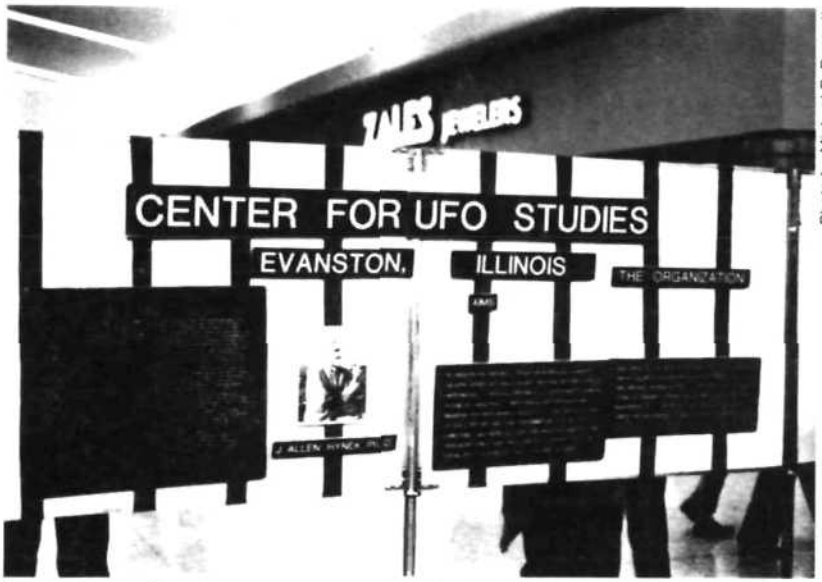

Photo by Michael R. Dennett

PHOTOGRAPH 3: Identification section of the CUFOS Photographic Exhibit with picture of J. Allen Hynek, Ph.D.

conclusion thus drawn is that somebody (whether Ferguson or CUFOS) did nothing with a photograph of a supposedly "other worldly" object for a very long time.

This body of evidence was presented to CUFOS independent of Dennett's, and we were given two quite different and independent responses. Communication continued with Dennett as he pursued his efforts to obtain more detailed information. After an extremely brief correspondence, CUFOS ceased all correspondence with Taylor, ignoring all further requests for information. In February 1981, before this brief spate of correspondence concluded (or was halted), Taylor received a personal letter from J. Allen Hynek. It congratulated Taylor on "a nice bit of astronomical detective work" and then went on to say that it threw considerable doubt on this case and that he did not take nocturnal light cases too seriously because of the lack of scientific leverage (Hynek 1981). During this period, Dennett was not informed that the credibility of the witnesses had been thrown into doubt.

It was not until some time after the initial investigation that Dennett discovered the work of Taylor. By then Dennett had become dissatisfied with the bolide theory because persistent investigation still had not turned up a single confirmation of a visible bolide in the Tucson area for March 1977. With the discovery of Taylor's data, the idea that the photograph was a hoax or an aircraft's landing lights became more plausible. Further investigation by both authors—now working in conjunction—revealed that CUFOS had made taped interviews with both witnesses but had never offered them for scrutiny. At one point Taylor was offered a transcript, but when he requested it CUFOS ignored all of his further correspondence. Both authors assumed that, given the discrepancies already discovered, this data was being withheld in the fear that further discrepancies might be found.

Nonetheless we persevered in the attempt to obtain more information. Dennett, by-passing CUFOS altogether, corresponded directly with Ferguson and Patton. In one letter, Patton claimed that the UFO remained in the sky for 20 to 40 minutes and stated that the object took off in a northwesterly direction. This is totally contradicted by the photographic "evidence." If this statement were true, then they would have to have photographed the object as it approached and then hovered—without making any effort to photograph it as it left. In other words, the object moved in a direction opposite to what is obvious in the photograph. In addition, the approaching object would have given off little more light than a star of magnitude −1—certainly not enough to light up the floor of the desert. Patton further indicated that the initial description of the amount of light produced by the object, as reported in the *Newsletter,* was accurate. Taylor, in re-examining the photograph in the light (so to speak) of Patton's final statement, tends to agree. The light required for that

amount of illumination would probably have made Iota Cephei invisible in a two-minute time-exposure. This, however, simply added another contradiction to an already heavily compromised testimony.

In a letter to John Timmerman in June 1981, Ferguson acknowledged the possibility of error in time: "The original time I gave was an estimate since neither of us looked at our watches. I ["We" deleted] had been photographing for sometime in the dark before the sighting occurred. Having just spent one month camping . . . I realized that our time could be off because one switches time when camping. . . . When you rise with the sun, you go to bed earlier. That makes bedtime seem later because I normally go to bed between 11:00 P.M. and 12:00 A.M. That could make 8:00 seem like 10:00 or 12:00."

Ferguson's explanation appears quite reasonable if one assumes that, having seen and recognized an unknown event that he acknowledges frightened them, there would be no need to look at a watch—even though Ferguson implies that one was available. His re-evaluation of his story is, however, less credible in light of the fact that twilight (the final diminishing glow as the sun fades completely) ended at approximately 7:30 in mid-March. Thus the two had been photographing for only about a half-hour in the dark. The implication is that the work of the two witnesses was so boring that a half-hour's work seemed like three hours.

In addition, after conferring with Patton "several years after the event," Ferguson agreed that "the object stayed there for sometime, what I think was about 20-30 minutes *before the picture was taken. . . . It wasn't until the end that I remembered the camera and took the picture*" (emphasis added). Thus, two men who had been photographing cacti stood around and watched what they thought was a craft from another world for about half an hour without giving a single thought to the camera loaded with film and ready to operate just a few feet away from them.

Finally, the photograph was allegedly taken just two miles west of Tucson, a metropolitan area with a 1980 population of 531,263; yet the object stayed in the sky for an alleged 20 to 40 minutes and was unobserved by anyone other than these two men. While it is possible that a fireball meteor in the late evening would and could have gone unseen, it seems improbable that a strange, glowing craft could have hovered for twenty minutes or more just outside a major metropolis without being seen by many people. Unless, of course, it only appeared as a hovering ball of light from one vantage point alone, while at any other vantage point it appeared as a known or recognizable object.

It would seem that CUFOS should have revealed the evidence against the authenticity of this photo to its readers. That the Center for UFO Studies ignored the work of two skeptics demonstrates an unwillingness to present material contrary to their preconceived idea of what UFOs are. Indeed, the CUFOS policy seems to imply a strenuous effort to inundate

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ASSOCIATE NEWSLETTER

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Volume One, Number One

You are reading the first issue of a new monthly publication by the Center for UFO Studies. The ASSOCIATE NEWSLETTER comes into being to broaden the range of information already available from CUFOS to those who are interested in keeping up-to-date on activities of the Center and news of UFO sightings and investigation not usually available elsewhere. If you are now or will become an ASSOCIATE of CUFOS (as described in the enclosed application form), you will begin receiving this new NEWSLETTER. It will be mailed monthly to ASSOCIATES of all "kinds," but will not be available by sale or by subscription.

This issue is being mass-distributed to potential ASSOCIATES to explain the Center and to attract new financial support for UFO information and research. We will be very grateful if, after reading this copy, you will pass it on to a friend near you or in a distant city who may wish to be involved in this very interesting work. Thank you for doing that for us.

It is our hope that the ASSOCIATE NEWSLETTER will grow in usefulness to those who read it and in this and future issues we plan the following articles. Dr. J. Allen Hynek, Scientific Director of CUFOS, will write a regular monthly item. Allan Hendry, our Chief Investigator and Managing Editor of the INTERNATIONAL UFO REPORTER, will report on recently investigated sighting reports not appearing in the IUR. Mimi Hynek, Vice-President for Publications, will report on new and popular items available from the Center Information Services Department. Fred Merritt and other officers and ASSOCIATES will contribute articles about UFOCAT, physical trace cases, sightings from aircraft, interesting visitors to the Center offices and a variety of other matters relating to UFOs. We will reserve space for the "photograph of the month" with commentary about it. You will be invited to send us your comments for possible publication as an ASSOCIATE CORRESPONDENT.

Besides the above, we hope to make announcements about conferences of UFO organizations which you might be interested in attending. We will publish the scheduled appearances of CUFOS ASSOCIATE speakers throughout the country, including Dr. Hynek's activities which you or a nearby friend might attend. In short, we will attempt to bring to you, through this publication, information which you might like to have, but don't have time to seek elsewhere. As an ASSOCIATE of CUFOS, we want you to stay informed and up-to-date. Welcome to CUFOS.

John P. Timmerman

1977 Nocturnal Light Photograph Reported

Between 10 and 12 PM in mid-March 1977 James Ferguson and Tom Patton were about two miles West of Tucson, Arizona in the desert preparing to take night photographs of saguaro cacti using flash-lighting effects. As they had their camera on a tripod and ready to take a photo of a large cactus, the floor of the desert around them suddenly began to brighten as if by a full moon. The shadows made them turn around just in time to see a large mass of light arise from behind a distant range of hills. This amazing sight stunned them at first and they waited for it to move higher in the sky. Instead, the mass of light hovered for many minutes just above the horizon and did not appear to move. The two photographers (Ferguson has an MA degree in Photography) quickly turned their camera on tripod toward the lers. light, set the aperture at f.1.2, set it for a time exposure and opened the lens. Several minutes passed which can be determined by measuring the light-paths of the stars visible in this picture and suddenly the light source moved very rapidly to the North and disappeared as a point of light in the distance. The trail of light on the picture indicates the path of departure. The negative of this photograph and the sighting are under investigation by the Center. The results will be published in a future NEWSLETTER.

The May 1980 *CUFOS Associate Newsletter*, reporting the Tucson "nocturnal light" photo.

its membership with as much unchecked, unverified, insubstantial, and incredible information as possible. Then, by tagging most incidents with "under investigation" or "investigation is continuing," the membership is convinced that the organization is carrying out diligent and exhaustive "scientific" investigations. In reality, the probability is very strong that many go uninvestigated, unverified, and unanalyzed. And, without followup revelations provided by either skeptics or investigators, the membership is likewise convinced that the evidence for UFOs (i.e., flying saucers, of course) is overwhelming, incontrovertible, and ever expanding.

Quite frankly, CUFOS reacted much as we expected it would. What neither of us anticipated was that the photograph was far from retirement six years after the event. This photograph, which had nothing identifiable in it, except a streaked star-field, and belonged to a class that J. Allen Hynek did not take seriously, suddenly reappeared in the November/December 1982 *International UFO Reporter.* It was one of four featured on the back cover. The photograph, however, was not part of a series of revelations of hoaxes or other exposed or prosaic events. Rather, it was part of the Center's "1982 Holiday Special." The advertisement read as follows: "Four Never-Before-Available Full Color Photographs of Unidentified Flying Objects, from the case files at the Center for UFO Studies, which remain unidentified, together with an explanatory article regarding each case involved, reprinted from back-issues of the CUFOS Associated Newsletter." It went on to say that they were 8 × 10 color prints, ready for mounting, showing "very interesting detail."

Neither of the authors had had an opportunity to examine a print of any size larger than a small postcard, because Ferguson had loaned the original negative to CUFOS and it had apparently not been returned. Thus Dennett could not resist obtaining an 8 × 10 copy—particularly one in full color, since the original was black and white. Not surprisingly, when it arrived it was simply a black and white glossy and certainly lacked any "interesting detail" that would have justified the $8.50 price. The information that accompanied the print was merely a reprint of the original *Associate Newsletter* description, completely unexpurgated of the errors and contradictions we had pointed out. No attempt by the Center was made to present any additional information or correct the major mistakes in the original report.

This merchandising of an unscientific, or at best questionable, photograph is an example of the manipulation of the credulity of the organization's membership. The photograph had ceased to be a point of investigation. Rather, it had become an object in a Barnum and Bailey three-ring circus and thus capable of generating money. Its value apparently was no longer scientific, just pecuniary. Both of us were reminded of Chaucer's "Pardoner" in *The Canterbury Tales,* who sold falsified Papal Bulls and relics and said:

> And I speak in few words
> To add spice to my preaching,
> And to stir them to devotion.
> Then I show them my crystal jars
> Crammed full of rags and bones—
> Relics they are, *as they each suppose.*

It was clear that so-called UFO studies failed a particularly important

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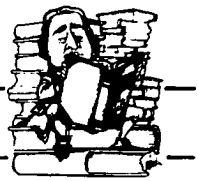
aspect of science: avoidance of methodological errors. Skeptics have identified many errors in the methodology of "believers." These flaws have been consistently brought to the attention of UFOlogists but have been just as consistently ignored. Among the most prevalent errors in methodology among UFOlogists are the following:

1. Acceptance of data obtained under questionable circumstances.
2. Failure to fully or properly investigate the event.
3. Withholding of scientific information/evidence from public scrutiny.
4. Ignoring information/evidence provided by skeptics.
5. A propensity to make bold claims that later cannot be supported.
6. Introduction of extraneous data or arguments.
7. Exploitation of an event for monetary or publicity reasons.

Errors of each of these types were identified by the authors as they became drawn into this unremarkable incident. In fact, our chagrin turned to amusement—partly out of frustration—because it is the nature of science to formulate "laws" on the basis of repeated observation. The "observations" above have been repeatedly made by prior skeptics. The authors, in the accidental, if not random, selection of a single event, observed all of these observations to be true. Therefore, it would not be untoward of either of them to call them "laws," or, more properly, "The Seven UFOlogical Laws of Belief."

While we were finishing this article, the CUFOS traveling photographic exhibit (*SI*, Spring 1984, p. 209) arrived in Seattle, and Dennett was able to view it. The Saguaro Incident photograph was the featured photo for the section marked "Nocturnal Light." A short description of the photo paraphrased the original description in the May 1980 *Associate Newsletter*. The prominent use of this photograph without any qualifications for a public display confirmed again what we have already stated concerning the methodology of UFO promoters in general and CUFOS in particular. •

Book Reviews



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Bypassing Bypass: The New Technique of Chelation Therapy. By Elmer M. Cranton, M.D., and Arline Brecher. Foreword by H. Richard Casdorph, M.D. Ph.D. Stein and Day, Briarcliff Manor, N.Y. 10510, 1984. 252 pp. $16.95, cloth.

The Chelation Answer: How to Prevent Hardening of the Arteries and Rejuvenate Your Cardiovascular System. By Morton Walker, D.P.M., in consultation with Garry Gordon, M.D. Foreword by Robert Atkins, M.D. M. Evans, 216 East 49 Street, New York, NY 10017, 1982. 288 pp. $14.95, cloth.

Robert S. Richmond

CHELATION THERAPY looks logical at first glance. Hardening of the arteries (which is going to kill most of us sooner or later if nuclear bombs don't) is usually accompanied by the deposition of large amounts of calcium compounds in the walls and lining membranes of the arteries. Chelating agents, chemical compounds (named for the Greek word for "a claw") that bind calcium and other metals, are easily injected into blood vessels. Why shouldn't they act like a sort of chemical Roto-Rooter for arteries, removing calcified plaques and restoring circulation, while deftly sparing the calcium that strengthens our bones?

Would that they did. The idea indeed looked good enough 30 or 40 years ago that a number of physicians tried various chelating agents for the treatment of arterial disease. Ethylenediamine tetraacetic acid (EDTA, for short), which was known to chelate and remove toxic heavy metals like lead with at least occasional clinical benefit, seemed a promising candidate. Unfortunately, apparently early

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successes were not repeatable in better controlled trials, and chelation therapy for arterial disease was eventually abandoned by orthodox medicine.

Instead of disappearing, chelation therapy took on a shadowy existence among variant practitioners hawking their pills and potions under such banners as holistic medicine and orthomolecular medicine. The Roto-Rooter theory was eventually abandoned, and in the past year or so has been replaced by the contention that intravenous EDTA is a panacea whose mechanism of action is to be explained in terms of "free radical pathology." Over the years, chelation therapy has been standardized by its practitioners, most of whom apparently use rather similar dosage schedules and plans of treatment. Since only M.D.'s and their immediate agents are allowed to administer intravenous medications, chelation therapy has a cachet that the nonphysician practitioner can only envy. (Not surprisingly, chelation therapists decry oral EDTA therapy!) A whole medical subculture has evolved around chelation therapy, with elaborate clinics, extensive promotional literature, and oral and written examinations leading to certification in the new specialty of Medical Preventics. These two books are examples of that promotional literature.

Chelation therapy is presented as a sovereign remedy for a single cause of disease. According to the chelationists, most chronic illness is caused by "free radical pathology." Mysterious chemical entities called "free radicals" (not to be confused with communists under the bed) destroy cells and thereby cause all ills, from hardening of the arteries to senility to (inevitably) the big C. Intravenous EDTA, along with vitamin and mineral pills and (let's give credit where we can) stopping smoking, comes to the rescue, routing the free radicals and extending our lives to 120 or so, all while sounding much more scientific than spinal subluxations or belief in the nonexistence of matter. Such a unitary concept of the causation of disease imposes a criterion of nonfalsifiability. What experiment could you design to prove that a disease wasn't caused by free radicals, particularly when you're assured that the treatment works so well that double-blind studies would be neither ethical nor practicable, and anyway the efficacy of treatment depends on the physician's faith in it? They can't lose.

From here on the old familiar laments fall into place: Organized medicine opposes chelation therapy because doctors couldn't make money doing vascular surgery and other high-tech procedures. Even the health insurance companies are opposed to the chelation alternative, we read. (I must confess that the chelationists' economic reasoning here quite eludes me.) Conservative physicians take generations to accept new ideas. They laughed at _____ (you can fill in the blank).

Anecdotal evidence abounds. The reader is fairly deluged with testimonials to near-miraculous healing. In contrast, statistics are sparse, and there are few accounts of failures of treatment; one never finds out just how many legs got amputated anyway. Like other practitioners, regular and irregular, chelation therapists have the privilege of burying their mistakes.

Bibliographies run amok. Citations run to the hundreds, in all the tongues of Babel, praising EDTA for miraculous cures in organisms from rotifers to house plants, while meanwhile the texts of the books make even more astounding claims that are often not backed up by references at all. It is certainly true that there is little ordinary medical literature either for or against chelation therapy. Most of the recent articles on the clinical chelation therapy have been published in obscure medical journals that are very difficult to obtain through the usual medical library sources. Legitimate research articles on free radical pathology (there really is such

a thing) suggest little present relevance to treatment, and certainly don't mention EDTA. Nonetheless, the massive bibliographies so confuse the reader that they actually detract from whatever plausibility either book may have.

Errors of fact numb the more sophisticated reader. EDTA is repeatedly referred to as an amino acid, as if it were a natural constituent of proteins. (It's a synthetic organic acid with tertiary amine groups, but the similarity ends there.) Neither is EDTA a calcium channel blocking agent, fashionable though that group of drugs may be in medical practice at the moment. Most heart attacks certainly are caused by blockage of the coronary arteries by arteriosclerotic plaques. There's no way the body (or the EDTA, which sometimes seems to be credited with a sort of intelligence of its own) can tell the difference between the good calcium in the bones and the bad calcium in the arteries.

The practicing physician will find it extremely odd that, amid the exhausting detail, neither book contains a clear statement of just how you administer a chelation treatment, though one supposes that the basic procedure could be written out in a page or two. Reading one of these books, a practicing physician couldn't just go to a hospital supply room and get the materials needed to administer a chelation treatment. Are the authors afraid somebody who hasn't passed the board examinations might try it? On a more academic level, it's easy to think up fascinating clinical studies of chelation therapy that one could do (and publish, no minor consideration). For example, how much lead or calcium does a course of chelation therapy remove from an ordinary individual? As far as I know, the American Academy of Medical Preventics hasn't found out.

Chelation therapy is clearly a pseudotreatment founded on pseudoscience. Major medical authorities seem either to hope it will just go away or to fear litigation if they make a noise like a duck. In a climate of medical practice where, to an increasing degree, truth in treatment is defined as what the health insurance companies are willing to pay for, such attitudes are short-sighted in the extreme. •

Articles of Note

Alcock, James E. "Parapsychology: The 'Spiritual' Science,' " and John Beloff, "Science, Religion and the Paranormal." *Free Inquiry,* Spring 1985, pp. 24-41. Two-part report on "Religion and Parapsychology."

Bennett, Dawn D. "Chelation Therapists: Charlatans or Saviors?" *Science News,* March 2, 1985, pp. 138-139. Good critical examination of this new "miracle cure" fad, called a fraud by critics. "Like Laetrile," Bennett concludes, "chelation therapy seems to be a modern version of patent medicines of old. No longer hawked on the streets and more sophisticated than herbal and exotic mixtures, chelation therapy nonetheless appeals to those looking for a quick and easy fix to medical problems." Quotes biochemist Boyd O'Dell: "It's difficult for people to see that it's not magic." See also Denise Hatfield, "Chelation Therapy: Quackery or Cure?" *ACSH News & Views* (American Council on Science and Health), March/April 1985.

Bennett, William J. "Where Does This Stuff Come From?" *Science 85,* July/August 1985, pp. 97-98. Asks how "sensational, fearful" books that distort the history, content, and vocabulary of science, such as Jeremy Rifkin's *Algeny,* get published. Bennett talked to Rifkin's editor at Viking (who points out that trade books are seldom sent out to independent reviewers before acceptance and need only be self-consistent); to several scientists quoted on the book jacket ("I've certainly learned a lot about endorsements," says one. "I wouldn't do it again"); to Rifkin; and to Stephen Jay Gould, who earlier wrote a scathing critique of the book.

Blackmore, Susan. "Rupert Sheldrake's *New Science of Life:* Science, Parascience, or Pseudoscience?" *Parapsychology Review,* May-June 1985, pp. 6-9. Examines Sheldrake's "formative causation" hypothesis. Finds tests for it intriguing but unconvincing.

Cavanaugh, Michael A. "Scientific Creationism and Rationality." *Nature,* 315:185-189, May 16, 1985. Lively sociological analysis of the creationist movement. Places special emphasis on the movement's behavior and the sources of its appeal.

Chazanov, Mathis. "Mind Magic." *Los Angeles Times,* May 26, 1985, p. 7. Feature on magician Bob Fellows, who uses illusions to demonstrate how cults manipulate the unsuspecting. "The fact is that we want to see something like this [the supposed power of ESP]," the article quotes Fellows. "The problem is that it can be manipulated by people who don't have the same interest you do. . . . Develop your critical thinking. Find out where your vulnerabilities are, find ways to counteract them, and then see how that can be practiced in everyday situations, and then you don't have to worry about cults."

Del Guercio, Gino. "Ghostbusters Debunk the 'Twilight Zone.' " United Press International syndicated feature distributed April 1985. Lengthy article, printed in many newspapers (e.g., *Arkansas Gazette,* April 14; *Tampa Tribune,* April 18) about CSICOP and its efforts to counter the trend of uncritical acceptance of the paranormal. Includes a sidebar article "How 14-Year-Old May Have Tricked the Media" about the notorious Columbus "poltergeist" case. "The committee is concerned that not only are the vast majority of these claims fraudulent, but they can be expensive, life-threatening, and undermine public science education."

Diamond, Jared. "Voyage of the Overloaded Ark." *Discover,* June 1985, pp. 82-92. Excellent article on creationism. Focuses on the struggle of scientists in the seventeenth through nineteenth centuries to accommodate a literal interpretation of Genesis with the new evidence of geology. They eventually abandoned the effort in the face of overwhelming evidence for an ancient earth and evolution of the species. Laments that today's creationists appear to be ignorant of this work of their great predecessors, who really were scientists. Instead they present a false equivalency of evolutionism and atheism, misinterpret science, dwell on superseded findings and solved puzzles, and exaggerate the meaning of disagreements among scientists.

Dixon, Bernard. "Numerology—It All Adds Up." *New Scientist,* May 30, 1985, p. 41. Column on the influence number patterns exercise on us all, virtually independent of rationality. Gives examples from twentieth-century biological sciences of the power of numbers "to seduce even the most rational spirits."

Dutton, Denis. "Requiem for the Shroud of Turin." *Michigan Quarterly Review,*

vol. 23, no. 3, Summer 1984, pp. 422-433. Responses in Winter 1985 issue (vol. 24, no. 1) by William Meacham and Peter M. Rinaldi followed by a reply by Dutton. Essay-review of two shroud books, one pro-authenticity (Heller), one anti (Nickell). "One has to admire Nickell's patience and good humor as he guides the reader through this morass, debunking one after another of the pro-authenticity arguments." Dutton, a philosopher, condemns the proponents for ignoring or actively suppressing skeptical evidence and for pretending to a scientific objectivity that "they obviously do not possess."

Feder, Kenneth L. "Spooks, Spirits, and College Students." *The Humanist,* May/June 1985, pp. 17-19. University educator relates astonishment and concern that 1,000 university students attended an illustrated campus lecture on the existence of ghosts and "sat in rapt attention," seemingly willing to accept nearly every double-exposure and cut-and-paste job. Expresses concern that little of the students' education is sinking in and that the knowledge and skills "we attempt to impart to them" does not seem to be applied outside the classroom.

Finn, Robert. "Ghostbusters!" *Engineering & Science* (California Institute of Technology), May 1985, pp. 2-7. Article on the Southern California Skeptics and their critical investigations of paranormal claims. Many excellent observations about the proper goals of the skeptic by physicist Murray Gell-Mann.

Gingerich, Owen. "On Trans-Scientific Turf." *Nature,* 314:692-693, April 15, 1985. Essay-review of Bauer's *Beyond Velikovsky* by an organizer of the 1974 AAAS symposium on Velikovsky's theories. Despite deficiencies, Bauer's account "is detailed, thought provoking, and the best yet written on a bizarre episode that continues to smoulder in the annals of science."

Gingold, Judith. "Sampling the Metaphysical Wares at Psychic Fair." *Wall Street Journal,* April 30, 1985, p. 32. Writer describes the world of "new age thought" and "metaphysics" at one of Los Angeles's many psychic fairs, where "rigorous thinking has been replaced by positive thinking, mysticism substitutes for logic. It is a kind of illogical positivism, an animated Walt Disney version of serious thought." Concludes, "Does all this strike you as silly? You needn't sulk alone. You can join the Southern California Skeptics," a new local group whose monthly meetings debunk pyschic claims.

"Go, Skeptics!" *Los Angeles Times,* May 5, 1985, Pt. IV, p. 4. Enthusiastically supportive editorial about the work of the SKEPTICAL INQUIRER and the newly formed Southern California Skeptics. "The Skeptics are on the right track, and we wish them well."

Hyman, Ray. "The Ganzfeld Psi Experiment: A Critical Appraisal." *Journal of Parapsychology,* vol. 49, no. 1, March 1985, pp. 3-49. Followed by Charles Honorton, "Meta-Analysis of Psi Ganzfeld Research: A Response to Hyman," pp. 51-91. See News & Comment, this issue.

Nickell, Joe. "Update on the Shroud of Turin." *Free Inquiry,* Spring 1985, pp. 10-11. Report on recent books and articles that "continue to present 'research' on the 'burial cloth of Christ' in the guise of science." Notes that most articles typically omit evidence against authenticity.

Palmer, John. "Psi Research in the 1980s." *Parapsychology Review.* March-April 1985. Balanced report on the current status of the field by parapsychologist.

Sagan, Carl. "The Man in the Moon." *Parade.* June 2, 1985, pp. 12-15. Discussion of what happens when our pattern-recognition mental machinery, conditioned

by our well-honed ability to recognize human faces, works too well and tricks us into seeing faces in all sorts of surfaces: on the moon, in eggplants, on tortillas, and on spacecraft photos of Mars. (See Martin Gardner column, this issue, for more on this subject.)

Sebeok, T. A. "Amazements Explained." *Times Literary Supplement* (London), March 8, 1985, p. 268. Essay on the Clever Hans phenomenon keyed to the book *The Hans Legacy* by Dodge Fernald, which rehabilitates the "towering accomplishments" of Oskar Pfungst (1874-1923). Pfungst, who never achieved the fame he deserved, solved the mystery of the horse that could supposedly calculate, revealing the fallacy of mistaking the animal as a message source rather than as only a channel through which its human partner's own message travels and is reflected back.

—*Kendrick Frazier*

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From Our Readers

Evolution and Christianity

Martin Gardner is a national treasure. In a better world than this he would hold a cabinet post: Secretary of Sanity. But even Gardner has blind spots, one of which is his apparent conviction that a vast moral and intellectual chasm separates crude, upstart systems of superstition, which he calls cults, from sophisticated, entrenched systems of superstition, such as modern Christianity. It is this conviction that underpins his arguments that modern Christianity, "except for Protestant fundamentalism, involves no dogmas that render any aspect of today's science impossible to accept," and hence that it is irrelevant to consider a scientist's (nonfundamentalist) Christian beliefs in evaluating his research ("The Relevance of Belief Systems," *SI*, Spring 1985).

In fact, a number of evolutionary biologists and historians of science have argued persuasively that Judeo-Christian theology is profoundly at odds with Darwin's theory of evolution.

As Stephen Jay Gould has pointed out, Darwin's 20-year delay in publishing his theory did not result from his fear of advocating evolution—evolutionary ideas had been commonplace since the late eighteenth century—but rather from his fear of advocating *a materialistic evolutionary mechanism*. Other evolutionists of Darwin's day spoke of "vital forces," "directed history," "organic striving," and so forth—vague, mystical notions that were easily reconciled with a Christian God who acts through evolution rather than through special creation. But in Darwin's materialistic vision organic design, including the design of the human brain/mind, is the product of random variation and nonrandom replication. The difficulty of reconciling this vision with Christianity and other currents in Western thought (such as the idea that there is a unity and harmony in nature) is probably why Darwin's views did not prevail in biology until the 1940s. The distinguished biologist George C. Williams has argued that "biology would have been able to mature more rapidly in a culture not dominated by Judeo-Christian theology and the Romantic tradition." Outside biology—in psychology, for example—Darwin's view of life has had almost no impact at all. Why? According to evolutionary biologist Michael Ghiselin, "A world populated by organisms striving to no end but rather playing ridiculous sexual games, a world in which the brain is an extension of the gonads . . . simply cannot be reconciled with the old way of thinking."

Gardner's claim that modern Christianity "involves no dogmas that render any aspect of today's science impossible to accept" is tenable only if "dogmas" and "impossible" are defined so restrictively and legalistically as to sap Christianity of its pith, its essence, its very *raison d'être*. Nonfundamentalist Christians are able to accept Darwin evolution so easily because they do not fully understand its implications.

Donald Symons
Department of Anthropology
University of California
Santa Barbara, Calif.

Martin Gardner's "The Relevance of Belief Systems" skirts what seems to me a crucial question for CSICOP: *Is* there any more evidence for specific religious beliefs (i.e., other than a vague feeling of possibility)—life after death, the efficacy of prayer, miracles, salvation, the existence of God, etc.—than for the "claims of the paranormal" that CSICOP examines? I see no logical reason for segregating into two categories such claims and religious beliefs. Some of the latter are manifestly more absurd than others, but "religious views—nowhere in sharp conflict with firmly established science" seems likely to be a class with no members.

I am not of course advocating that CSICOP investigate religious beliefs as claims of the paranormal. Scientific thinking is by no means pervasive enough as yet, and in any case such beliefs are not often definite "claims." Certainly there are psychological and cultural reasons that most people, even including scientists, continue to put religious beliefs and scientific thinking into separate compartments and are not capable of viewing religious beliefs as "extraordinary claims demanding extraordinary evidence."

Isn't it unseemly for an organization like CSICOP to genuflect to certain religions and castigate others (and distasteful to take comfort from what Catholics are *now permitted* to believe)? I find Gardner's position, if I understand it correctly, too close to that of the Irish priest in Honor Tracy's *The Straight and Narrow Path:* "How often must he tell [his parishoners] they were to eschew all superstitions save those approved by Holy Church."

William G. Keehn
Mountain View, Calif.

Martin Gardner replies:

Symons and Keehn have a point, but I suspect neither is aware of the extent to which demythologizing has penetrated liberal Christian, Jewish, Muslim, and Asian religious faiths. Even in the Roman church, the day has long passed when a Catholic biologist like George Mivart could be excommunicated for trying to persuade Rome that evolution must not be condemned. Mivart's battle has been won faster than Galileo's. Evolution in its most "materialistic" form (Darwin, by the way, believed in the inheritance of acquired traits, so for him the variations were not random) is simply taken by liberal theologians around the world as God's method of creation, no more requiring heavenly jabs than the earth requires such jabs to go around the sun.

The rise of the "higher criticism," for which Mivart also fought, has produced millions of Christians today who view the biblical miracles as myths. A top Anglican bishop has recently been in the news for denying the virgin birth and dismissing the bodily resurrection of Jesus as a crude "conjuring trick with bones." Paul Tillich, considered one of the greatest modern Protestant theologians, not only abandoned the miracles but he did not even believe in a personal God or personal immortality. To say that religious views nowhere in conflict with science are held by "a class with no members" is to so narrow the meaning of "religious" that it denies the existence of tens of thousands of the world's best scientists and most eminent thinkers.

Consider such physicists as Protestants Arthur Compton and Stanley Eddington, or David Bohm and his Eastern religious views, or Nobel Prize-winner Abdus Salam, a devout Muslim who sees physics as a form of prayer, and whose deep religious convictions are anathema to Muslim fundamentalists. Consider such influential Catholic theologians as Hans Küng, Edward Schillebeeckx, or the late Karl Rahner. The present Pope is kept from excommunicating them mainly because it would be bad public relations. Consider the Jesuit historian of philosophy F. C. Copleston, whose monumental history is as unbiased as such a history could be. I speak as a Christian outsider, but it seems to me grossly unfair to say that such thinkers either do not

comprehend science or should not call themselves Christians. The word Christian *has become too vague for such a blanket condemnation.*

Quite aside from word-quibbling, my basic point is as simple as it is obvious. Black and white are ends of a continuum but that does not make the distinction useless. There is a whopping difference between the research of top "religious" scientists whose metaphysical beliefs play no role in biasing their work and the ignorant babblings of creationists or the crazy claims of scientifically illiterate cults.

A flawed personal history

Henry Bauer's review of *Cosmic Heretics* by Alfred de Grazia (*SI*, Spring 1985), interesting and informative though it is, is far too uncritical in light of the book's many inaccuracies. Examples of de Grazia's errors of fact include: referring to the index of a book that has none (p. 7), misstating many events associated with the publication of *Worlds in Collision* in 1950 (pp. 10-14), placing a May 1980 seminar before Velikovsky's death in 1979 (p. 72), and falsely labeling C. J. Ransom a creationist (p. 123). Nevertheless, despite de Grazia's many factual errors and his consistent mischaracterization of my interactions with him, his description of Velikovsky's character and personality, highlighted by Bauer, rings true to my own experience with Velikovsky.

One of de Grazia's false allegations should be corrected because Bauer unfortunately lends it credence by repeating it. Contrary to what Bauer reports, the "paper delivered at a *Kronos*-sponsored conference" was not refused publication in *Kronos* "because of its deviations from Velikovsky's dogma." This is patently untrue because *Kronos* has published critical and/or deviationist material by many authors, including Dwardu Cardona, Peter James, Sean Mewhinney, David Morrison, Roger Wescott, and myself. Considering Bauer's familiarity with *Kronos's* contents, as evidenced by the references in his own book, he need not have taken de Grazia at his word on such a sensitive editorial issue.

Technically, the "paper" never existed because it was delivered extemporaneously. In the event, the speaker made his remarks and, without waiting for any comment or discussion on his controversial presentation, excused himself from the seminar so he could attend the opera. He never produced a written text and agreed privately that his remarks were too irresponsible to merit publication. The version that eventually appeared in a British journal was a corrected, heavily edited, and unauthorized transcription of a personal tape-recording. De Grazia never bothered to consult *Kronos* regarding this or any other incident in his book.

Cosmic Heretics provides many fascinating and original insights into the Velikovsky Affair, but the reader is cautioned to maintain a degree of skepticism. The book reads as though it is true to life, but it is not quite the personal *history* it purports to be.

C. Leroy Ellenberger
Senior Editor
Kronos
St. Louis, Mo.

I think your writers can be accused of elitism. I find it interesting that Henry Bauer can say that "the fuss was *not* caused by Velikovsky's suggestion of ideas. . . . It came about because Velikovsky wanted instant recognition . . . when he had no standing in any science, no qualifications, had not paid his dues." In others words, no one without a special degree is to be allowed to think for himself.

Granting that Velikovsky was hard to put up with, what do others face who are independent thinkers who have escaped indoctrination by specialists? The quarrel was not about ideas but about "standing." I suggest that professional scientists quit acting like union members and consider how, a century ago, some of them were writing that all scientific discoveries had been made by that time—along with how many "facts"

have changed since.

Actually, had Velikovsky's findings in ancient mythology been as consistent as he said, he would have had a method of research that is well worth considering. I take it that modern scientists, outside of anthropology, have no conception of primitive psychology (through which natural phenomena were interpreted in terms of magic and gods) and no respect for historians who are interested in other than wars and empires.

Harry E. Mongold
Manhattan, Ill.

UFOlogy getting more sophisticated?

Philip Klass writes (Spring 1985) that "UFOlogy is in the doldrums, as even its most ardent promoters admit." But perhaps "ardent promoters" are not the persons best placed to judge.

There are abundant indications that UFOlogy has moved into a new phase, less uncritical and more scientific. No longer is a witness report taken at face value, no longer is it matched up to this or that a priori hypothesis, extraterrestrial or otherwise.

Instead, an anomalous sighting that remains anomalous after intelligent assessment is treated pragmatically. Setting aside its "UFO" label, which is in any case essentially meaningless, the question is asked: To which branch of scientific inquiry does this alleged event seem to relate? The results of such an open approach are impressive. On the one hand, there is a growing recognition that, considered as natural events, UFO reports offer some very interesting extensions of our knowledge of geophysical and atmospheric phenomena. At the opposite end of the spectrum, behavioral scientists find that there are life-science aspects of the phenomenon that justify study; for example, the recurrent features of abduction narratives pose fascinating questions to the sociologist, who has here a unique opportunity to study the human mind in one of its strangest social manifestations.

Whether, apart from its geophysical and psychosocial aspects, the UFO phenomenon has anything else to teach us, will no doubt continue to exercise our minds, but Bertrand Meheust's recently published *Soucoupes Volantes et Folklore* convincingly demonstrates the relevance of UFO studies to the folklorist, to name just one field of research to which the phenomenon is relevant. Of all anomalistic phenomena currently manifesting, none offers so challengingly varied a spectrum of puzzling facets. Far from being in the doldrums, UFOlogy has never offered more promising prospects for the serious researcher.

Hillary Evans
Assn. for the Scientific Study of Anomalous Phenomena
London, England

Philip J. Klass replies:

If Evans is correct that UFOlogy "has moved into a new phase," which I strongly doubt, let us hope that it will be much more productive than its first several decades. I predict that investigation of UFO reports will yield scant, if any, increase in scientific knowledge of geophysical and atmospheric phenomena because most reports are so "polluted" by the popular image of "flying saucers." Perhaps the yield will be greater for behavioral sciences, but only if research is conducted by competent, skeptical scientists who today are not *UFOlogists. That folklorists will have a field day I do not doubt.*

Scientists as writers

Regarding Elver A. Barker's objection to the technical language used by scientists (Letters, Spring 1985), the reasons they use such terms are, first, they deal with many things that have no common

names (Finno-Ugric, fugacity, graviportal, moment of inertia, etc.); second, such terms serve as shorthand to reduce long, complicated descriptions to manageable compass. Thus Willard Gibbs's law of thermodynamics, one of the most important scientific discoveries ever made by an American, looks deceptively simple: $F = C + 2 - P$; but to explain it in simple terms takes a whole chapter if not a whole book.

A few scientists, like Charles Darwin and Irving Langmuir, have been good popularizers; but most are not. For most, writing of the sort that Barker would like is a skill that must be learned. For most scientists, learning it would require more of their working time than they feel they can afford. We don't live long enough to master all the skills we might like to have. Hence science writers like Asimov, Gardner, and me, who have spent years in learning how to present difficult scientific concepts in language clear to most laymen without, we hope, too much distorting or oversimplifying of the ideas set forth.

L. Sprague de Camp
Villanova, Pa.

Research center for IFOs

A research center has been established in Columbus, Ohio, to study identified flying objects (IFOs, prosaic objects once thought to be UFOs), UFOs, UFO hoaxes, and hallucinated UFOs. This research center, the Center for Identified Flying Object Studies (CIFOS), will primarily study the reliability and unreliability of testimony of IFO and UFO observers the factors that enhance, suppress, and distort the testimony of IFO and UFO observers, and all other psychological and sociological aspects of IFOs and UFOs.

In order for CIFOS to conduct research and assist researchers, I am seeking information on individual IFO incidents and UFO hoaxes. If you have (or will have) information on IFOs or UFO hoaxes, please contact me (CIFOS, 113 E. Northwood Ave., Columbus, OH 43201). A brief questionnaire will be sent to you for your information about these incidents.

Concise, informative, computer-searchable summaries describing each IFO incident and UFO hoax will be written using this information. Using these summaries, descriptive and statistical studies will be conducted. A catalog of many of these summaries will be published by CIFOS for use by scientists.

CIFOS hopes ultimately to be a center that provides information about IFOs, UFOs, UFO hoaxes, and hallucinated UFOs to scientists and other interested persons and to conduct experiments at American Universities.

Hobart Gregory Baker, Director
CIFOS
Columbus, Ohio

Scientific parapsychology

Some years ago I was a firm believer in the existence of paranormal phenomena, partly due to the reading of tens of books by proponents of the psi hypothesis. During the past two years, however, I had the occasion to read some outstanding books by skeptics like Randi, Hansel, Blackmore, et al., and have changed my mind. Actually my attitude with regard to psi could be described as "open-minded skepticism."

Recently I took a subscription to the SKEPTICAL INQUIRER and have bought some back issues, too. Attentive reading has convinced me that CSICOP no longer considers "scientific parapsychology" part of the occult lore. On the other hand, serious psi-researchers realize they need the advice of competent critics in designing fraud-proof experiments. This changing attitude of proponents and opponents promises to be the right one with relation to proving or disproving the existence of psi. Even if psi should not exist, the skeptics have no right to condemn all parapsychologists as credulous people who take their wishes for reality. No, the study of psi

should continue, no longer as a separate discipline, however, but as a part of "ordinary psychology."

This is the main reason I'm worried about the founding of so-called "anti-occultism" societies. Their members don't make a distinction between "true" parapsychology (which eventually could become a proto-science) and pseudoscientific lore like creationism, astrology, UFOlogy, etc. It's clear that they are as dogmatic as the people they are attacking, and such an attitude can only impede real scientific progress.

Werner Eeman
Lede, Belgium

A Detroit group

I wonder if Detroit-area skeptics have formed a regional group? If not, would you consider this letter a call to Detroit-area skeptics to get in touch with me at the Henry Ford Community College in Dearborn (Tel. 845-9606) with a view to forming such a group.

Skip Rosenthal
Library
Henry Ford Comm. College
Dearborn, Mich.

Astrology statement

May I offer my congratulations on your recent efforts on astrology (*SI*, Spring 1985). I am a recent subscriber and very pleased. I consider the magical thinking implied in this area symptomatic of a much greater pool of non-cause-and-effect thinking that seems to substitute for the potential of rational thought. While magical thinking runs wild, the potential suffers. Thanks for your efforts and for the initiative of Paul Kurtz and his Committee. It's refreshing.

J. Clayton Lafferty
Northville, Minn.

A Reminder . . .

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