

Save Our Science

The Struggle for Reason at the University

Astrology, parapsychology, and other "paranormal" phenomena are fashionable. Can we understand why? And what specifically should be done? At the University of Nice, France, an experiment is based on teaching the scientific method through examining the pseudosciences.

HENRI BROCH

In France, paranormal beliefs are thriving and the situation is becoming alarming. Figure 1 shows the results of a survey I conducted among university students on the scientific value of metal bending by mind power compared to relativistic dilation of time (taught to these same students). Mind-induced spoon bending is claimed to be a *scientific fact* by about seven students out of ten, and for more than a half of these students dilation of time is a *pure theoretical speculation!*

These shocking data were not the result of some local context or ambiguous formulation of the questions. They were statistically significant, and nationwide investigations conducted by professional pollsters produced similar results.

H. Broch inquiry, 1982-83 University of Nice. First Scientific stage (Deug A1, B1 et A2)		
Percentage of those who believe that each phenomenon is	"Mind induced spoon bending"	"Relativistic dilation of time"
Scientifically proven, a scientific fact	68	18
Recognized as acceptable, plausible	14	18
Unlikely	15	7
Pure theoretical speculation	0	52
Completely invalidated	3	5

Figure 1. Results of an investigation made among more than 300 university students on the scientific support they give to proposals concerning "metal bending by mind power" and the "relativistic dilation of time" (in an inquiry "psychokinesis versus relativity").

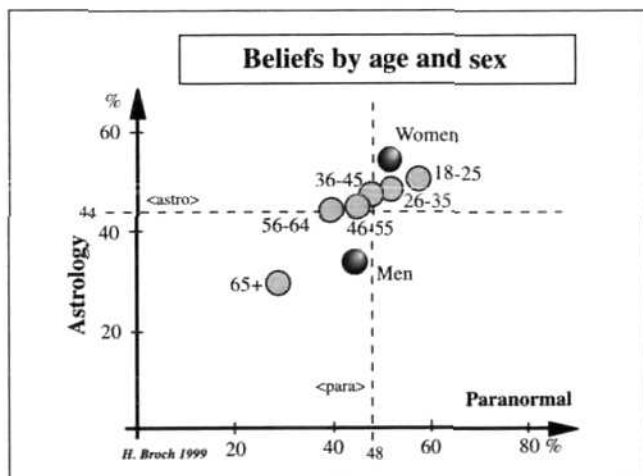


Figure 2. The level of belief in astrology and the paranormal versus age and sex among French people. Data from nationwide investigations made by professional pollsters; <astro> and <para> represent the mean values.

Figure 2 shows some surprising aspects, based on an investigation (by two sociologists, in 1986) of belief in astrology and the paranormal among the French.

The level of belief *decreases* almost continuously with aging, and, as widely asserted previously, a disparity between men and women is clearly confirmed, at least for astrology.

Contrary to what might be expected, the level of belief in the paranormal is *directly* proportional to the level of education (figure 3). Those with higher scientific degrees fare slightly better concerning astrology, although their level of belief in the paranormal is higher than the average.

Concerning professional categories, the group having the strongest belief in both astrology and the paranormal (figure 4) is primary school teachers ("instructors" on the graph)! Sadly enough, professors are stronger believers in the paranormal than the average French. Their belief in astrology, although "low," is still close to 30 percent. Rather surprisingly, people in the education world, students and teachers alike, are strong believers in the paranormal.

The situation has seen no improvement since 1986. In fact,

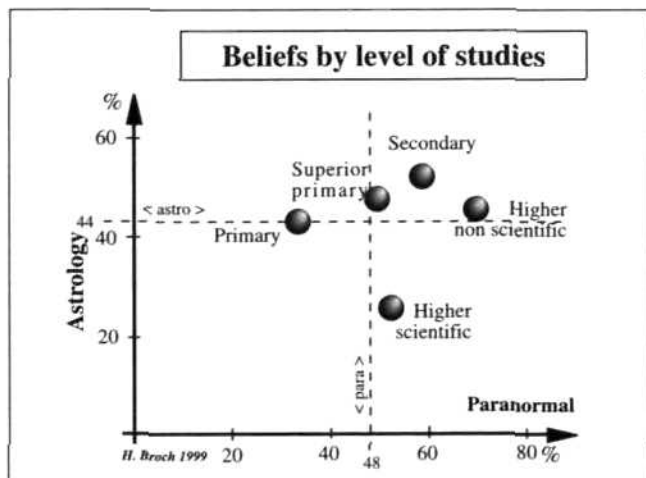


Figure 3. The level of belief in astrology and the paranormal versus the level of studies among the French. Data from nationwide investigations made by professional pollsters; <astro> and <para> represent the mean values.

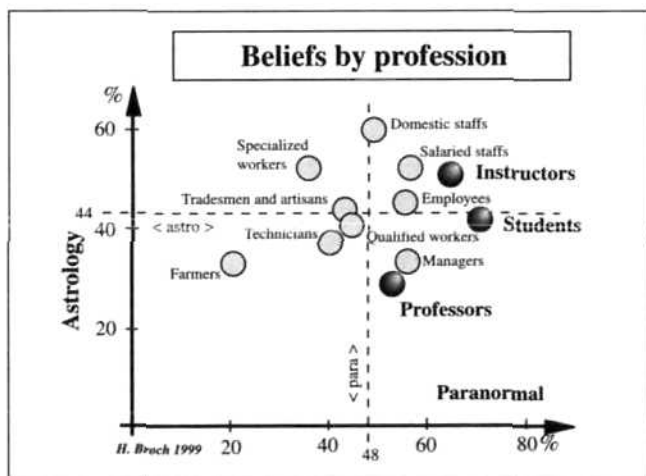


Figure 4. The level of belief in astrology and the paranormal versus the socio-professional categories among the French. Note the level of belief in the education world (primary school teachers, students, and professors). Data from nationwide investigations made by professional pollsters; <astro> and <para> represent the mean values.

more recent data confirm this dramatic trend. Obscurantism is experiencing an unprecedented diffusion. Yet, in an apparent paradox, the corpus of paranormal phenomena expands neither in quantity nor in quality. On the contrary, its sphere is shrinking, and no witches roam the skies on their brooms anymore. To illustrate this, figure 5 shows the decrease of reported psychokinetic power over time.

So-called "mana" was supposed to have moved the multi-ton statues of Easter Island centuries ago. Around 1850 the same power was claimed to be responsible when heavy tables "danced." A few decades ago the very same power could move a pan. By the 1970s we are down to small objects, such as a chess piece. Psychic power could nowadays displace a one-gram piece of paper! The alleged powers of psychokinesis have decreased by a factor of a million in the course of time, as the means of control and scrutiny get more sophisticated. This trend is also found in other types of psychic phenomena.

This paradoxical situation, i.e., the strong *increase* in belief versus the marked *decrease* of the number and intensity of the alleged phenomena, has several explanations.

• The electronic media resonance effect

Information regarding psychic events is broadly disseminated at an unprecedented rate. For example, a haunted house would have remained a local event in earlier times, while in the nineties

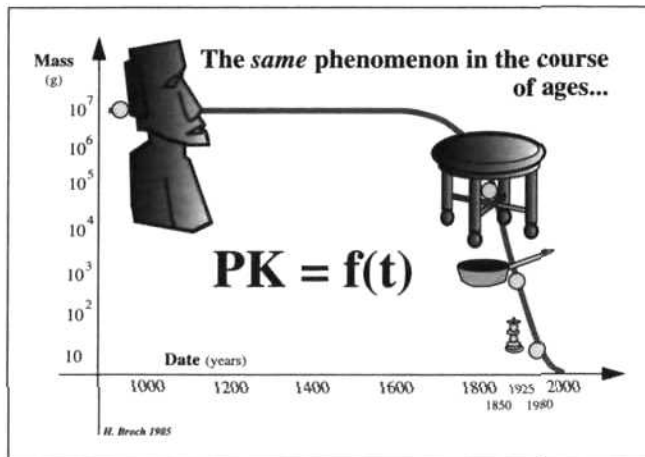


Figure 5. The decrease—by a factor of a million—of the reputed psychokinetic power “intensity” (the displaced masses) in relation with time. This trend can be found in any other type of psychic phenomena.

the “poltergeist-ing” of a Belgian country house became news worldwide through both Superchannel and CNN.

• “Media lies” and the deontology drift

“Media lies” are commonplace in both mainstream programs and those devoted to the paranormal. Too many members of the media do not hesitate to sacrifice truth on the altar of audience ratings.

• Transmission by educators

The teaching world is all too often the communication channel of beliefs. Stunning as it may seem, pupils in four classes in a public college in the south of France were sorted out according to astrological criteria. This was done for three years, until 1995, with the agreement of the whole pedagogic team.

Another sad example is given by the French Teachers Mutual Purchase Cooperative. Its October 1986 catalog presented a Cheops wine-maturing accelerator that is a replica of the Cheops pyramid. The catalog claimed to have “officially controlled” that you obtain the equivalent of three years of wine maturation in only five weeks by the power of the pyramid concentrating the “shape waves”!

• A change in knowledge transfer

The actual change in the process by which knowledge is acquired could provide a fourth explanation. The transfer of information is characterized by the proliferation of visual

Henri Broch, a CSICOP Fellow and Director of the Center for the Study of Paranormal Phenomena at the University of Nice-Sophia Antipolis, France, is professor of Physics and Zetetics. Address: Laboratoire de Zététique, Faculté des Sciences, University of Nice-Sophia Antipolis, Parc Valrose 06108 Nice cedex 2, France. E-mail: broch@unice.fr; Web site: <http://www.unice.fr/zetetique/>.

images and by immediate sensations, both detrimental to the value of the written symbol and of supported analysis.

Text, the written symbol, allows detailed, constructed, critical analysis; it can be available for years or centuries, while contemporary media lends itself to superficial, transient messages. The written word, along with supported analysis, is being replaced by the visual image and immediate impression. This leads to an insidious and progressive replacement of reason by emotion.

What Should Be Done?

Correcting the problems caused by pseudoscience is both a social and a professional responsibility. In this struggle for reason, it is necessary to use concepts or rules usable in practice. What would be the purpose of a solely discursive power or knowledge, with no operative capacity? With this in mind, we have to be careful not to lose contact with reality. The roles of observation and experimentation are fundamental. This is especially true in our society where all too often one teaches the results of science instead of explaining the manner in which these results have been obtained.

To be really efficient, a researcher has to have some Zetetics rules in mind. Zetetics is the “method used to penetrate the reason and the nature of things.” Taught since antiquity, Zetetics is in fact the refusal of all dogmatic affirmation. I summarized it as the “art of doubt.”

In 1993–94, at the University of Nice-Sophia Antipolis, I started a Zetetics course, “Paranormal Phenomena and Scientific Methodology.” This course, under the patronage of the Physics Department, is a transdisciplinary option proposed to any student in his first year in general science studies. It seems to fill a need: more than 1,500 students have registered in six years.

The teaching is composed of two sections, the course and the practicals. The course includes audiovisual sessions on various themes (for a total of twenty-six hours by year and by student). It is divided into three parts.

1. Claimed “facts.” Explanation and analysis of the substance

This part concerns the analysis of the *substance* of the claimed facts concerning various paranormal fields (astrology, spatial archaeology, miraculous and supernatural manifestations, and psi powers). For each field the results of a scientific investigation are given and analyzed.

2. Claimed “facts.” Reflection and analysis of the form

In this part I develop an approach to the same subjects but this time emphasize the *form* instead of the substance. This is done with two aims: to cast light on the media lies via their various “techniques” and also to show that a more mathematical analysis can provide important information concerning the credibility of an allegation.

3. Paranormal and Science. Shaping of the methodology

This part examines general questions such as: Are sciences, nonsciences, and pseudosciences equal cognitive fields? How

can we define a science? This part is dedicated to the shaping of the essential approach for an hypothesis to qualify as being scientific.

The directed works, the practicals, constitute the second part of the teaching (varying from ten to 200 hours by year and by group of students, but in fact with no limit). This part covers the analysis of experiments done directly "in the field" by small groups of students on a subject of their choice. The themes cover the entire field of paranormal phenomena, from magnetism and dowsing to Megalithic monuments and out-of-body experiences. At the end of the year, the students are assessed on the complete report they make on their experimentation. Students have their choice of forms for their reports: paper, slides, audio or video tapes, CD-ROM, Web sites, etc.

Here are some examples of reports:

- A group of students constructed a drawing visible from the sky using the techniques of the Peruvian Nazca people.
- Two girls made a statue that cries after two hours of prayers.
- Others students investigated the experiments on dowsing published by the physicist Yves Rocard. Professor Rocard was studying the detection of weak magnetic fields gradients by people using a pendulum and a specially designed electric sole (a sole with a small solenoid inducing a magnetic field in the heel of the subject). Figure 6 shows some results obtained by students attempting to duplicate the Rocard experiment.

Without going into detail about the results, we can say that the double-blind technique (not adopted by Rocard) leads to the conclusion that dowsing ability does not exist in the studied population.

Duplicating the Rocard experiment

presented in "L'Homme et le Milligauss," 1986, and "La Science & les Sourciers," 1989 according to Y. Rocard, **80%** of the population possess the dowsing reaction

Power (o = on; n = off)		Pendulum (+ = reaction; - = no reaction)	
Pierrette (65 years old)	o n n n o n o n o n	Patricia (17)	o n o o n o n o n n
Yves (42)	o n n n o n o n o n	Franco (46)	o o o n o n o n n n
Julie (20)	n n n n o n o n o n	Claudette (47)	n n n o o o n o n o
Andréa (19)	o o o n n n o n o n	Céline (16)	o o o n o n n n n n
Christophe (23)	n o n n n n n o n o	Stéphanie (19)	n o n o n n n n n o
Pierre (36)	o n n n o n o n o n	Jean-Pierre (45)	n o o n n n n n n o
Catherine (42)	o n o n o n o n n n	Francine (38)	n o o n n n n n n o
Patrick (33)	o o n n n o n o n o	Laurent (19)	o n o n n n n n n o
Bill (25)	o n n n o n o n o n	Sébastien (18)	o o n n n n n n o n
Aline (18)	o n n n o n o n o n	Patricia (19)	n n o n n n o n o n

S. Pean, E. Porcaro, T. Pringot, S. Raty, P. Wainman, "Les Sourciers," SB1 report of Zetetics 1994-95

100 successes / 200 trials Reaction: **28%** with the magnetic field ...
27% without the magnetic field!

33 people, 6 trial/head, double blind, direction of the current, right or left-handed person, sex, "parallel" or "transverse" oscillations, number of oscillations before rotation, sense of rotation...

V. Rousseau, T. El Souss, "Le secret des Sourciers," Master in Physics report of Zetetics 1998-99

93 successes / 198 trials Reaction: **30%** with the magnetic field ...
36% without the magnetic field !

H. Broch 1999

Figure 6. Results obtained by Zetetics students having duplicated Rocard's experiment on the dowsing reaction. The upper part shows some details of the results obtained by a group of students (first year of Biological Sciences, 1994-95). Power "on" means that the electric current was circulating in the solenoid (see text) and pendulum "reaction" means that the pendulum, held in hand by the subject, rotates. The other part shows the global result—this experiment has taken into account a lot of parameters—obtained by two students (Master in Physics, 1998-99).

- Other students made a non-faked video showing a young boy levitating and tested the public reaction when their film was viewed.
- Another group examined fakir claims concerning the bed of nails (a young girl presented her "extraordinary" powers).
- Three students examined various hypotheses for moving and erecting the Easter Island statues.

As figure 7 shows, they used a specially designed, reduced-scale statue and tested both the "sledge and oscillating trestle" and the "rotation with guying rolling gait" hypotheses.

- A study of the system used in the movie *Stargate* to position the destination planet.
- The possibility of subliminal video and audio messages.
- UFOs and various evidence-faking techniques.

Currently over 450 reports have been made. How can we encourage students to undertake such experiments and to adopt a scientific approach to a given problem?



Figure 7. Test using a reduced-scale specially designed concrete statue. The test was conducted on the campus of the Faculty of Sciences, Nice, by Zetetics students working on the various displacement hypotheses for the Easter Island statues. Excerpt from videotape.

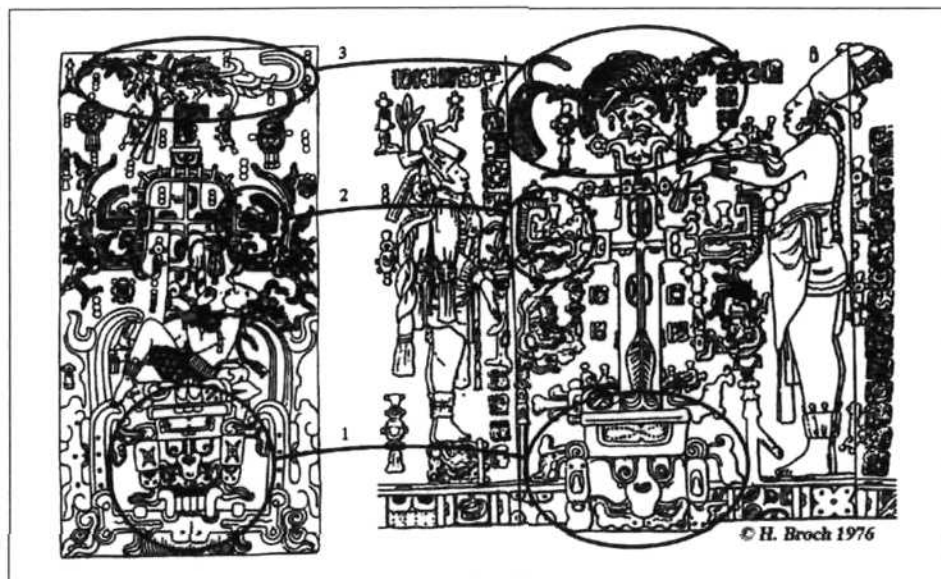


Figure 8. On the left: sculpture of the Mayan "Temple of Inscriptions" in Palenque, Mexico, claimed to represent a Mayan astronaut piloting a spaceship. Right: a sculpture in the neighboring "Temple of the Cross" in the same archaeological site. In 1 of figure 8: the mask of the "earth monster," symbol of death; In 2: a part of the Mayan sacred plant: the maize (corn); In 3: the "quetzal," the sacred bird of the Maya, symbol of the Sun, of life. The allegation of the Mayan astronaut originates from a French author in Nice in 1966 (for all the details, see H. Broch 1976 *La mystérieuse pyramide de Falicon* Paris: éd. France-Empire and H. Broch 1985, *Le Paranormal*. Paris: éd. Le Seuil).

Facets and Effects of Zetetics

It is necessary to present the scientific methodology not only in an attractive form but also in an easily memorizable one. This is the specific objective of the course using sections I call "Facets" and "Effects." Here are a few of the numerous Facets (with short chapter titles, making them easy to memorize) presented in the course:

- Nature is reliable.
- Quantity is not quality.
- Competitive is not necessarily contradictory.
- Inference is necessary.
- The burden of proof belongs on he who declares.
- To err is human, permanent fallibility is not.
- An extraordinary allegation needs a more than ordinary proof.
- The source of information is fundamental.
- A scientific theory can be tested.

In the course, each facet is detailed and illustrated. For example:

Context is important

The context of a claim or phenomenon always has to be taken into account. Often it allows the student to choose between different hypotheses. An example: After four excavation campaigns at the Temple of Inscriptions of the Mayan archaeological site in Palenque, Mexico, archaeologist Ruz Lhuillier discovered an internal crypt containing a sarcophagus in 1952. The cover of this sarcophagus was sculpted, and many magazines claimed that the sculpture represents a

Mayan astronaut piloting a spaceship. In context, the solution is easy. It is sufficient to compare the "Mayan astronaut" with another sculpture in the neighboring Temple of the Cross in the same Palenque site (figure 8). The "astronaut" is a dead or sacrificed person on the altar, giving his life for the prosperity of the community.

Alternatives are fruitful

One of the most powerful skeptical tools is the alternative. This consists simply of asking the question, "Is there another explanation that gives an identical result, in the same conditions and with the same characteristics?"

Confronted with a "paranormal" phenomenon, the student could discover that the same result can be obtained by normal means. Then, the natural method is supported and the psychic or supernatural hypothesis becomes superfluous.

The Shroud of Turin, for example is often presented as not having been made by human hands. It has been—historically and physically—proven to originate from fourteenth century France and was probably made by the simple technique of daubing on a bas relief.

With the same ingredients, I demonstrate how to reproduce

"shrouds" with all the characteristics attributed to the Turin one, including the three-dimensional effect (figure 9). (By the way, the first to describe the process and to realize the experiment on a bas relief was the Frenchman M. Clément, fellow of the Société Nationale des Beaux Arts, at the very beginning of the twentieth century.)

Some facets of Zetetics are especially important when applied to paranormal claims, and for this reason I refer to them as "effects" and name them for easier memorization. The "Escalation effect," the "Bi-standard effect," the "Rivulet effect," the "Biped effect," and the "Snowball effect" are among them.

I have no place here to give details. If you want to discover, among others, the "Doormat effect" (the most memorizable one for the students), which allows me to predict the six winning numbers of the French Lotto more than twenty-four hours in advance, please see the Proceedings of the Tenth Euro Skeptics Maastricht Congress.



Figure 9. The most probable process for making a "Shroud of Turin." A wet linen is placed on a bas relief (the bas relief here was made by Médard de Chardon, one of my Zetetics students) and, after drying, the daubing is made using a pad with red ochre pigments and bone or skin glue solution as binding agent.

210 anonymous questionnaires were distributed at the end of the course; 164 returned.

In the course, is the Zetetics methodology

- sufficiently apparent?

Yes 87%
No 3%
without opinion 10%

- easily memorizable?

Yes 50%
No 27%
without opinion 23%

- concretely applicable by yourself?

Yes 47%
No 20%
without opinion 33%

- You are: Student registered (88%)
Free listener (12%)

- Have you attended the entire course?
Yes (92%) No (8%)

- In a few words or lines can you give your opinion the course? Are there changes that you would judge useful for this teaching to do, on the substance as well as on the form (presentation, concept, duration, schedules, groups?)

Do you think the course has been (or will be) useful for you?

very useful 23%
useful 70%
hardly useful 7%
useless 0%
without opinion 0%

For the more than 50% of students who started the course with a high degree of acceptance of paranormal "facts":

Has the course induced you to modify your opinion concerning the paranormal?

Yes 70%
No 22%
without opinion 8%

If Yes, on which phenomenon? _____

Has the course induced you to modify your attitude on information received, whatever the subject?

Yes 87%
No 10%
without opinion 3%

Has the course encouraged you to gather more information or to undertake research on these phenomena?

Yes 70%
No 23%
without opinion 7%

H. Broch 1999

Figure 10. The opinion of Zetetics students. Results of anonymous questionnaires distributed at the end of the first year of the Zetetics course.

Conclusion

After six years of teaching this course, 1,523 students have registered. About 28 percent have quit, leaving 1,091 students presenting the examination, and, of this number, 845 have succeeded. We have a 77 percent success rate if we consider the students presenting the final exam or 55 percent versus the original registered students number.

What about the effects of the course? I think it is too soon to determine the full impact. Maybe it takes about ten years for the students to become actively involved and to intervene in various fields, hopefully diffusing the methodology they have learned.

The lasting impacts of such teaching may be delayed. As an example, one of my former Zetetics students has decided to reinvestigate the Rocard dowsing experiments. This work was done within the framework of a master's degree in physics. He is now spreading a critical, Zetetic, approach toward dowsing and magnetic fields among teachers in physics.

Using anonymous questionnaires distributed at the end of the course, feedback was obtained on the efficacy of this course. Figure 10 shows some data obtained at the end of the first year of the teaching.

More than nine out of ten students think that the course has been (or will be) useful or very useful to them. This is encouraging. We observe a clear change as 70 percent of these students have modified their opinion on this matter. More important, about nine out of ten declared that the course has induced them to *modify their attitude* on received information, *whatever the subject*.

Another very recent result of the course stems from the creation of the first Zetetics Laboratory in a French university.

The lab was created in 1998 thanks to the grant of our Belgian colleague Jacques Theodor. The explicit objectives are the analysis of "paranormal" phenomena as well as prophylactic measures vis-à-vis the pseudosciences and diffusion of scientific methodology.

The lab Web site (www.unice.fr/zetetique/) describes, among other things, the teaching program and presents the international challenge offering a 200,000 euros prize (about \$200,000) to any person who can prove a paranormal phenomenon. The lab Web site will make also some of the students' works available to the public as "*Z-Files*." Obviously, Z is for Zetetics.

Science is a self-corrective process of discovery, hence contrary to all dogma and all parasciences. Paradoxically, pseudosciences have a very *positive* role to play in the discourse on scientific methodology. They have a null performance power (that is, no scientific progress can be attributed to them), yet—by the example of their absurdity—pseudosciences could lead to the consolidation of reason and a wider diffusion of the scientific method.

Therefore it is legitimate to be interested in paranormal phenomena and nobody has the right to outlaw their seductions. But we have also to insist that the right to dream has a counterpart: the duty of vigilance.

References

- For a more complete information on Zetetics, see my lecture in the Proceedings of the 10th Euro Skeptics Maastricht Congress, 1999, of which the present text is a shortened version.
- Broch, Henri. 1985, 1997. *Le Paranormal*. Paris: éd. Le Seuil
- . 1991, 1994. *Au Coeur de l'Extra—Ordinaire*. Bordeaux: éd. Horizon Chimérique (with a thematic index and a bibliography of about 1,000 Zetetic titles allowing one to find some documentation on almost any "paranormal" field). Soon available at book-e-book.com. □