

The Priore Machine:

A Biologically Active Combination of Modulated Magnetic and Microwave Fields

Office of Naval Research, (London): Report R-5-78 (August 16, 1978) by J.B. Bateman

Introduction:

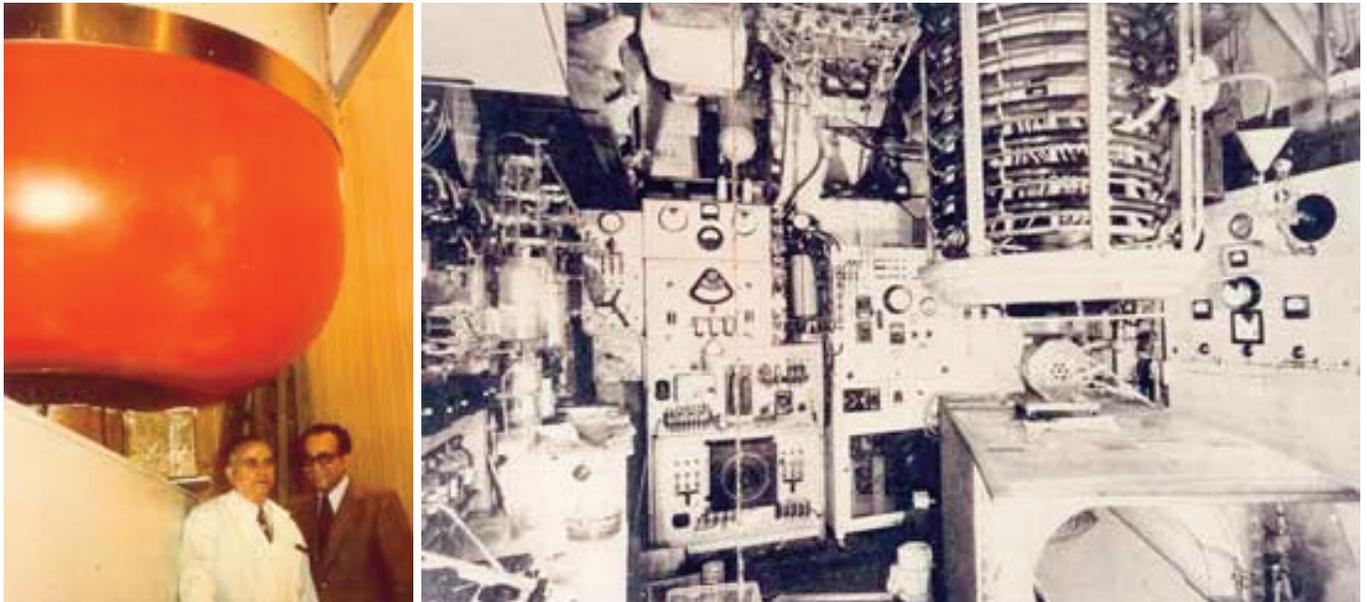
A very complicated generator invented by Antoine Priore (or Prioré), a former radar operator without academic qualification, has been said to produce radiation which causes certain implanted animal tumours to regress and cures trypanosomiasis in certain laboratory animals. There are several remarkable things about the papers describing these biological effects, the most remarkable being the contrast between the careful detail in which the biological data themselves are presented and the absence of anything but the most vague, and often contradictory, information about the generator. I have given examples of these disparities elsewhere¹.

A first consequence of the publication of these communications in the *Comptes rendus de l'Académie des Sciences* (Paris) was a violent polarisation of opinion within the Academy and in other French scientific circles.

There were some who wished to ignore or deny any

phenomenon, however completely attested, brought about by inadequately specified means; they would have opposed presentation of the reports to the Academy and would probably have succeeded in suppressing them but for the determined sponsorship of the distinguished secrétaire-perpétuel, Prof. Robert Courrier. Others felt that the importance of the results, if they could be confirmed, made further investigation imperative: if possible, with disclosure of the inventor's "secret"; if not, then without it.

A second result was the journalistic exploitation of a situation brimming over with human interest. Commentators^{2,3,4,5} ranged from a writer in *Esquire* who has since followed another path to notoriety³ to Lord (Solly) Zuckerman writing in popular vein⁴. None of them resisted the regrettable impulse to step up the popular appeal by introducing scientifically irrelevant biographical details about Priore in order to demonstrate his



Left: Prioré and Prof. Pautrizel under the bottom face of the apparatus **Right:** Prioré's Laboratory in the 1960s
(Images: www.priore-cancer.com)

worthiness for political patronage, which indeed he has received in abundance. Aside from this, they maintained a nice balance between sympathy for the victim of prejudice and healthy scepticism toward his work.

Zuckerman, in a lecture given at the Lovelace Foundation in Albuquerque⁵, gives Priore an honourable place in his catalogue of those whose innovative achievements remained unrecognised because of conservative prejudice and ignorance, from Babbage to Peyton Rous, though not without leaving himself a loophole should the initial promise not be kept. The main point, he insists, is that people who believe in what they are doing should refuse to be discouraged in an atmosphere of incomprehension and hostility.

The present report is the outcome of a visit to Priore's establishment sponsored by the organisation ADERA for those attending a course of instruction on microwave exposure hazards⁶. I shall write very briefly about the alleged biological effects, then about the Priore invention itself and the nature of its biologically active output. Impressions and private conversations bearing on these matters will be mentioned when they add, reliably or otherwise, to the total picture.

Biological Observations

There is a pre-history of verbal recollection and gossip connected with the Priore invention. Priore himself is said³ to have become interested in possible medical applications of electromagnetic waves upon observing that fruit and vegetables could be preserved by exposure to ultra-high frequency fields. A machine was built from US Army surplus and at some stage sick persons were placed in the field generated³.

According to a US scientist who has been interested in

repeating some of the Priore experiments, a politically well-connected lady who was cured in this way of cancer after receiving a prognosis of early death is still enjoying perfect health in Bordeaux.

The first experiments on cancerous animals were done by Delmon and Biraben who withheld their results from publication after receiving an unfavourable report from a committee, and because of a fear that publication would prejudice the candidature of one of them for admission to a fellowship (aggregation)⁷. They used rats implanted subcutaneously with a well-characterised uterine carcinoma, the so-called T8 (Guérin), having previously studied the effects of x-rays and of pulsed magnetic fields upon these animals without finding anything particularly noteworthy. The magnetic fields had no effect on tumour growth or on the occurrence of lymph node metastases, while the remission produced by x-rays was only transient. After exposure to the window of Priore's machine, on the other hand, tumour growth could be stopped for as long as three months afterwards. The animals recovered good general health, and lymph node metastases were seldom seen.⁸

The T8 tumour in rats was also used by Rivière and colleagues⁹ from Guérin's laboratory in the cancer institute at Villejuif. They found macroscopic regression of the tumours and of metastases after treatment and observed no relapses up to three months thereafter. Their publication anticipated that of Delmon and Biraben.

Rivière and colleagues then worked with rats implanted with a lymphoblastic lymphosarcoma which when untreated invariably proved fatal within 11 to 15 days, with generalised colonisation of the nodes and a leukemic syndrome. Treatment under the Priore machine led to total regression of the graft and of the

accompanying metastatic and leukemic phenomena¹⁰. Certain of these experiments were done with animals from Courier's laboratory under the constant supervision of his assistant Madame Colonge. The results were the same, and Courier reported them in an addendum to a further paper by Rivière et al¹¹ describing comparable results with a mouse lymphosarcoma. Further studies with the rat¹² yielded the discovery that treated rats clinically free of the lymphosarcoma were able to resorb a second transplant of the isologous tumour while succumbing to an homologous tumour of a histologically different type.

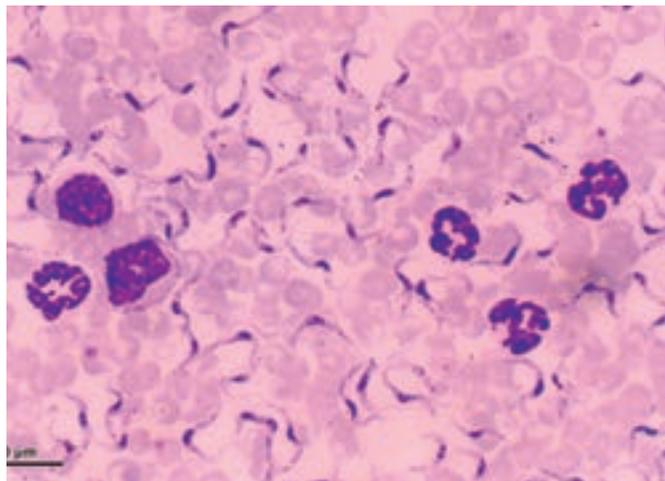
Courier⁷ complained that, because of a campaign of disparagement, no French "cancerologists" offered to repeat these experiments. Short-lived cooperation was however forthcoming from an English laboratory. According to one account², cancerous mice were sent over to Priore's establishment and some healthy ones were later sent from there to England, but the latter were not the ones that had been sent for treatment. The anonymous director of the English laboratory withdrew his cooperation, though not without providing "a French colleague" with a detailed memorandum. In 1977 Courier issued his own account of the episode and identified the persons concerned⁷. The director was the late Sir Alexander Haddow (Institute of Cancer Research, Royal Cancer Hospital, Univ. of London), and his envoys to Floirac were E. Whiss and Dr and Mrs E. J. Ambrose, the latter being scientists of some repute. Courier was evidently not persuaded that any substitution had taken place, for he wrote that the rumour was put about *on fait courir le bruit...*

When I asked about his plan to publish the evidence in detail, he told me that he had not found a journal willing to accept such a manuscript.

The discovery of specific anti-tumour immunity in the treated animals may have lent force to the hunch that the Priore radiation might act upon the immune system of the host rather than directly upon the cancer cells. At any rate, Prof. Raymond Pautrizel, a parasitologist already associated with the work of Rivière and Guérin, exposed mice after they had been injected with a dose of *Trypanosoma equiperdum* sufficient to kill them within five days if untreated, and they all survived¹³. At this point extraordinary measures were taken to remove all suspicion of fraud. The experiments were repeated successfully under lock and key and under the eye of a bailiff appointed by a "Commission de Contrôle" composed of university officials and local dignitaries. The official report was certified by all the members of the Commission. A positive result obtained under such

conditions, said Courier, should have put an end to all criticism from men of good faith⁷.

In a further series of short papers in the *Comptes rendus Acad. Sci. Paris*^{14,15,16} this indirect effect upon the immune system of animals infected with *T. equiperdum* was confirmed and elaborated. These brief published statements represent a lot of work: just how much was apparent from a lecture given by Pautrizel during my visit to Floirac. When I asked about his plan to publish the evidence in detail, he told me that he had not found a journal willing to accept such a manuscript.

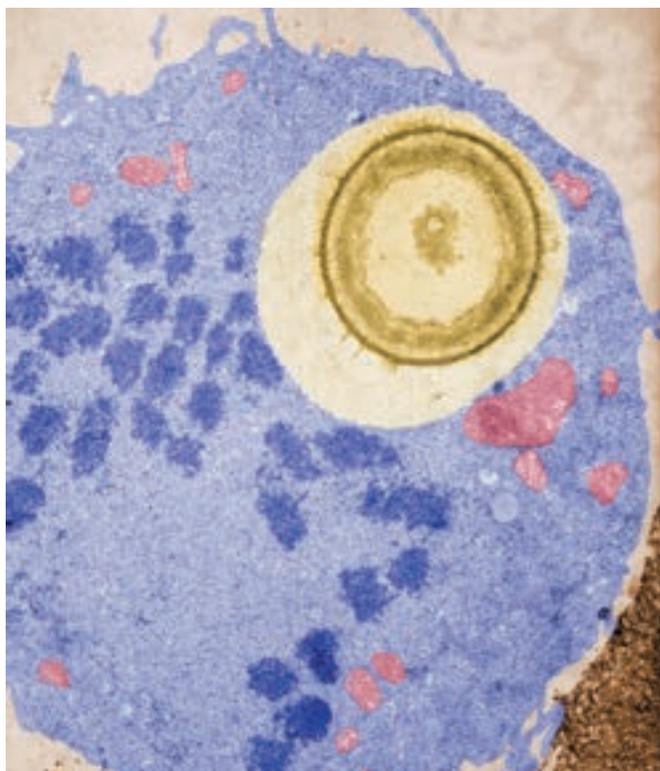


Trypanosoma equiperdum

The evidence presented, furnished by experiments on mice^{13,14,16}, rats¹⁴ and rabbits¹⁵, follows fairly conventional lines which I shall not attempt to review in detail. Briefly: the pathogenic organisms disappeared from the treated animals, which survived indefinitely. In rare cases where the parasites reappeared, they were of a different antigenic type from those causing the original infection. Treatment brought about an intense acquired immunity. Some animals were reinfected seven times over a period of six months, eventually with 100 times the original, and otherwise invariably fatal, dose, multiple reinfection resulted in a high titre of agglutinating antibodies.

The blood of these animals conferred upon other normal animals an immunity which persisted for about 45 days. Treatment with an immunosuppressor, cyclophosphamide, depressed, but did not abolish, the appearance of agglutinating antibody when infected animals were subjected to Priore irradiation, although relapse occurred after about 12 days. Newborn animals died of the infection whether irradiated or not, and the organisms found in their blood were of the original strain.

Trypanosomal antigen of unspecified nature, injected intraperitoneally after the first irradiation of infected animals, caused an enhancement of antibody production. When the parasites were protected from the host's immune system by being implanted in a diffusion chamber, Priore irradiation failed to inhibit their multiplication. In his talk, Pautrizel said that in order to



Macrophages (light blue) ingest *Cryptococcus neoformans*, a fungal pathogen (pale yellow circle).
(Image: Carolina Coelho)

elucidate further the apparent effect of irradiation in exalting the mobilisation of the immune system, the course of change of immunoglobulins M and G of albumin/globulin ratio, and of agglutinating and haemagglutinating titres was followed in irradiated and reinfected animals for about one year. The data were given in detail. With no time in which to understand, much less to assimilate them, I was left only with the impression that a clear picture has yet to emerge—a conclusion apparently shared by Prof. Czerny of Warsaw. One point of interest was the passing mention of a failure to modify the course of a malarial infection. This is not surprising, perhaps, remembering the vastly more complex life cycle of the plasmodium and its greater antigenic variability.

The postulated general stimulation of "defence mechanisms" by the output of the Priore machine led Pautrizel to ask whether this effect might extend to the prevention or cure of atherosclerosis. Another short paper communicated, as usual, by Courier¹⁷, described a "spectacular" attenuation of the hyperlipaemia induced in rabbits by a diet of "industrial granules" supplemented by one per cent of cholesterol, resulting in a daily cholesterol intake by each rabbit of about one gram. The observed effect of irradiation took the form of an inhibition of increased cholesterolaemia, persisting for several weeks after treatment, and a marked decrease in the extent of aortic deposition. I find the data rather

unconvincing, with quite a lot of overlap of experimental and control values. As for the explanation of the effect, if it can be confirmed, Pautrizel and colleagues¹⁷ ask whether it could be due to an activation of lipid catabolism.

Strangely enough they do not discuss the role of macrophages in the regression of tumours, the cure of trypanosomiasis, or the prevention of hypercholesterolaemia, although macrophage mobilisation might provide a common mechanism.

The Invention

Much has been written deploring Priore's secretiveness. It has been an embarrassment in one camp and a ground for dismissing his invention in another. My own view is that a secretive inventor and his invention, if important, must be investigated as a part of the external world, and the obstacle posed by limited cooperation accepted in the spirit in which the inaccessibility of nature is accepted as a challenge to our wits.

Priore has in fact been much more considerate than the Almighty, who after all has provided no blueprints to his creations, while Priore included in his first paper a footnote⁹ informing us that the physical principle of his invention has been the subject of a patent¹⁸. How strange that none of the journalistic commentators, from Zuckerman down the line, have thought it worthwhile even to mention the existence of this document. When drawing it to the attention of several members of the party visiting Floriac, I found astonishment at its existence followed by doubts as to whether, since they had not read it, it could contain any information of value. I had no opportunity to ask Priore about it, but an associate who did so met with a similar response: it won't help very much, he said. Nevertheless the apparatus described is presumably that used by Rivière, in whose paper it is mentioned, and the amount of detail given is such that, unless indeed it is fraudulent, a reasonable guess as to the nature of the emerging radiation ought to be possible for people competent in the field.

With this in mind I planned to include only a summary in this report, but have now decided upon a full translation (Appendix), without which the odd flavour of the document would be lost. A seemingly reasonable description of components and layout is coupled with a quaint—some might say superstitious—intrusion of pseudo biology and mention of electrophysiological pioneers whose identity can only be guessed through a haze of misspellings. There is, for instance, the choice of modulation frequency of the magnetic field to match the rhythm of the patient's heartbeat. There is, too, the comment that the best results are obtained when the cathode generating a stream of positive ions is made of molybdenum, the metal whose valency is closest to the mean valency of the chemical molecules constituting living tissues.

I leave the reader to form his own impression of the invention described in the patent, save to mention that the active radiation emerges from a tube containing a rotating deflector upon which impinge, from several different sources, a stream of positive ions accelerated in a cyclotron, a beam of centimetre waves generated by a magnetron, and a magnetic field. Any or all of these may be chopped or modulated according to various patterns. The machine was working during the visit to Floirac.

One could see the exit of the tube beneath which the biological targets are placed. There was a certain amount of rumbling and crackling, and the pinkish luminescent plasma appeared to be turbulent. I asked about the speed of rotation but was told by one of Priore's assistants that the information is strictly confidential. I could guess it to be well under 100 rpm.

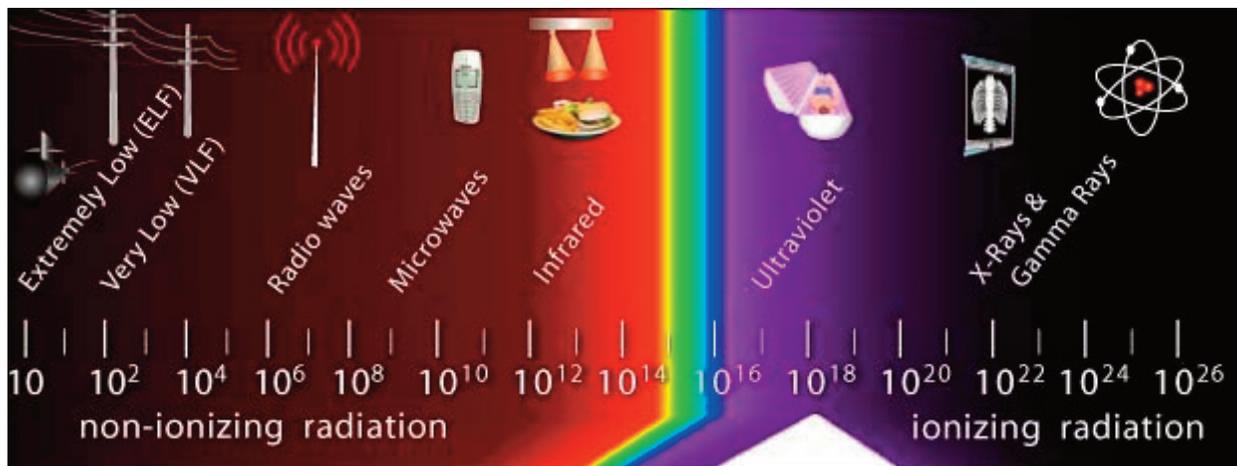
The Emergent Field

After several misleading statements about the nature of the biologically active field generated by Priore's machine (mentioned in endnote 1), a short paper in the *Comptes rendus* described the results of experiments in which two physicists of established reputation had been allowed to cooperate with Priore, Pautrizel, and their associates. Berteaud and Bottreau¹⁹ were able to analyse the radiation in some detail, up to x- and gamma-ray frequencies. Their report is confined to the assertion that they have established the presence of a 904 GHz pulsed electromagnetic wave, amplitude modulated at HF frequency 17 MHz, and a slowly modulated continuous magnetic field of the order of 1 kG. Other components, if detected, are not mentioned. There exists, I am told, a confidential report of the whole investigation. Bottreau assured me personally that there was no trace of ionising radiation.

Berteaud and coworkers¹⁹ also mapped the intensity distribution of these radiations in a plane perpendicular to the axis of the apparatus. Then, using as targets mice infected with *T. equiperdum*, they were able to demonstrate a simple relationship between the rate of decrease of parasitaemia in these animals and the relative intensity of the UHF component. However, in separate experiments they found that fatalities among infected mice were not decreased when the animals were exposed to an unmodulated 9.4 GHz field of comparable intensity. They concluded that the UHF field generated by Priore's machine is a necessary but not sufficient condition for the observed biological effects.

The results of Berteaud et al. leave us with some unanswered questions. If their analysis of the field was complete, the biological activity must rest jointly on the UHF component and the magnetic field. How critical are the exact values of the many parameters involved and the relationship between them for the manifestation of biological activity? Is it possible that the methods available to Berteaud and co-workers were incapable of furnishing a complete analysis?

One can only speculate. It has struck me that in all the papers describing the biological effects of this radiation, there is nowhere any mention of any search for the correct operating conditions of the machine. Apparently the machine, if it works at all, always produces results, and one must remember that two different models have been built and found to be effective. The one quantity that is regularly mentioned is the magnetic field strength, 620 G in the first model and 1240 G in the second. The patent document seems to suggest that there is great flexibility in the mode of operation. It is moreover almost inconceivable that Priore could have had any genuine theoretical basis upon which to favour one particular set



The electromagnetic spectrum, a chart of the different types of electromagnetic radiation ordered by increasing frequency. The frequency in hertz is given on the scale at bottom. The most familiar form of electromagnetic radiation is visible light (centre), with infrared (IR) and ultraviolet (UV) light on either side. The higher frequencies of EM radiation (right) consisting of x-rays and gamma rays, are types of ionising radiation. Lower frequency radiation (left), consisting of light, infrared (IR), microwave (MW), radio frequency (RF), and extremely low frequency (ELF) are types of non-ionising radiation.

of patterns over another in relation to biological changes that are themselves of intractable complexity and totally unpredictable. One is bound to suspect that the exact mix is anything but critical, and that if the reported biological effects are genuine they might very well be brought about by much simpler means. It is of some interest that extremely sharp frequency selectivity has been claimed in recent biological experiments with monochromatic microwaves, in contrast to the sort of flat response surmised in the present context.

The need for fine tuning could of course be obviated in a machine designed for sturdiness and broad applicability by arranging for it to generate "white" energy with respect to the several decisive characteristics, including modulation frequencies and perhaps their derivatives, or alternatively to generate an output which varies rapidly in real time, systematically or randomly, over a sufficiently wide range of values. The biological effects of such radiation would then be the sum of various qualitatively and quantitatively different selective processes including the possible cancellation of additive effects such as stimulation and inhibition. However, total nullification would be no more likely than it is, for instance, in the visible everyday consequences of illumination by sunlight. Such an approach, if it has been adopted by Priore or if it has emerged fortuitously as an unforeseen property of an assemblage of components chosen on the basis of some other rationale, would account for the extravagance of the machine in energy consumption in return for a very modest biological yield. There is no immediate evidence for this in the statements of Berteaud and Bottreau¹⁹, but the relevant quality of "whiteness" might apply pertinently to other parameters than those investigated by them. The possibility that some hitherto unrecognised feature of the radiation from a rotating plasma may be responsible for the Priore effects should not be dismissed out of hand, at any rate by those who, like myself, know nothing about plasmas.

Dr John Carstou of Brookline, MA, who counts among his accomplishments an extension of the Maxwell equations to the evaluation of ponderomotor forces, likes to call the Priore machine a magnetohydrodynamic wave guide. He considers the acceleration of the plasma to be a significant feature. He refers to the various types of oscillation that may be set up but does not, and presumably cannot, say how they can manifest themselves across a quartz window.

One's naive reaction is to doubt, in any case, whether



The main component: the plasma tube

the accelerations attainable in an apparatus as described in the patent document would be great enough to initiate a gravitational wave of any significance. Unless the suggestion is an obvious absurdity to a plasma physicist, somebody will have to do the arithmetic.

The New Generator

The further development of Priore's invention is being done under the auspices of an organisation set up for the purpose: the Société d'Exploitation du Rayonnement Antoine Priore (SERAP) which brings Priore into formal relationship with a company, Moteurs Leroy Somer of

Angouleme. This company has been the recipient of a \$0.7 million contract from the DGRST (Délegation Générale à la Recherche Scientifique et Technique) for the construction of a third machine of greatly increased output. Priore has been reported³ to predict that the cost is more likely to be \$3 million. No doubt other sources of funding are available. In return for such support Priore promises a much bigger and better machine that will generate a more intense field of much larger cross section than those with which the results already reported were obtained. So, one can guess, larger groups of small animals will be irradiated simultaneously for shorter periods than formerly and the rate of accumulation of data will increase—if, that is, the biological measurements can keep pace. Perhaps too, by the same token, small groups of large animals will be treated, with the single sick human as the ultimate target of the entire endeavour.

Little was learned of this latest development during my visit to Floirac. The Priore residence is coming to look like an industrial laboratory of electrical engineering geared to pilot scale operations. There are rumours of serious technical difficulties such as might have been anticipated in scaling up such a complicated device. It is said to be proving difficult, for instance, to construct a pyrex container able to cope with the very high energy flux in the plasma.

Is the new machine really needed? At the technical level the answer is almost certainly "no". Evidently technical considerations are overruled by others, no doubt of a personal, political, and even patriotic nature. The whole operation takes on a farcical aspect when one considers that the only genuine need in the present state of affairs is to get independent confirmation, or refutation, of results already obtained with equipment that was clearly adequate for the original experiments.

The funds now made available would suffice for the building of several replicas of the Mark 2 machine. These, placed in selected centres of research, could be used by independent teams for a critical repetition and extension of earlier findings. The success or otherwise of the time-consuming attempt to build a giant machine is largely irrelevant to the central doubts that persist as to the claims made for the Priore radiation, and this expensive diversion of effort betrays a certain recklessness which ill serves the quest for a solution to the mystery surrounding "L'affaire Priore."

This article was originally posted at <http://rexresearch.com/priore/priore.htm#1>

The Office of Naval Research was established by an act of Congress in 1946 as the US government's first permanent agency devoted to funding civilian scientific research during peacetime. The Office of Naval Research coordinates, executes and promotes the science and technology programs of the United States Navy and Marine Corps.

Endnotes

Note: References (3) to (5) have been available to me only in the form of translations into French and I therefore cite them in this form, with the original English reference when available.

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