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9/21/64 - A-228  
Enclosure P. 1

DEMOCRITOS REVISITED

Greek Atomic Research Today

by

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"Tell the King that the rich palace of the God lies deep in the earth. Apollo no longer dwells here."  
(Answer of the Pythonesse of Delphi to Emperor Julian, 4th century A.D.)

1 - Introduction

Recent Greek history has had a profound effect on the Greek Atomic Research Center, Democritos. In this report, we review the events which led to the present state of things and we analyze the causes of the disastrous effect of those events on the once so promising enterprise of the research center, Democritos.

2 - Recent events

Two years ago, in a report on Greek atomic science (OWRL 46-62), I expressed optimism over the new developments which led to the successful installation of the Greek research reactor and the creation of the research center, Democritos. Today this magnificent accomplishment of a young and enthusiastic team of scientists under the administrative leadership of Admiral Spanides is in danger of being wiped out. Admiral Spanides is dismissed. The Graduate School of Physics is closed. The scientists' contracts are suspended and many of the scientists have left or are about to leave the Center; the remaining ones are demoralized. What has happened to bring about this incredible development?

In order to understand the situation we must review some recent Greek history.

On June 19, 1963 the Greek Government under Prime Minister Caramanlis came to an end. Until the new elections on November 3, 1963 there were two caretaker governments. The November election gave the majority to Caramanlis' opponent, G. Papandreu, who became the new Prime Minister. However, he did not obtain the absolute majority and his government did not function very well. After only 50 days in office, on December 31, Papandreu resigned and a third caretaker government took over. The new elections on February 16 gave absolute majority to Papandreu and he formed the present government.

CONFIDENTIAL

CONFIDENTIAL

Enclosure Page 2.

Just before the election, King Paul became seriously ill, and he died on March 6, 1964.

The Greek Atomic Energy Commission (GAEC) was not affected by all these changes until about the middle of March. The Commission was at that time in the Ministry of Coordination under Papandreu, Jr., a former Professor of Economics at the University of California. During the election campaign, on February 14, Papandreu had made a speech at Patras in which he praised the accomplishments of Democritos.

However, during the middle of March, stories were circulating in the newspapers that there were scandals connected with the GAEC. It was alleged that money was being mispent, that scientists were appointed for political reasons, that there was a wasteful administration, etc., etc. One demanded an investigation of the GAEC.

Most of these stories were pure fabrications. Democritos had had some difficulties with the appointment policy. Every institution of this kind has a certain fraction of deadwood. In Democritos this fraction is perhaps a bit higher than average because the supply of scientists in Greece is not enough and in order to get Democritos going, one had to employ a good number of second raters who had caused some problems to the administration. Apart from these difficulties, the GAEC had been functioning well. Young Greek scientists, attracted by the new and hopeful developments, were coming back from abroad. Cooperation on an international scale was giving an enormous impulse to the Research Center. The administration was doing its best to cope with incredible difficulties caused by inefficient government regulations. The Graduate School of Physics at the Democritos was beginning to show results in a crop of eager young physicists trained (for the first time in their own country) in modern physics. The trouble was, the GAEC was functioning too well. In spite of all the obstacles put in their way by a jealous group of professors from Athens University and the Technical High School, Democritos was developing, and its existence was a threat to them.

The political changes just reviewed gave to this opposition the long awaited opportunity to reduce the Research Center to its present state.

Here is what happened: the existing law requires that the Board of Directors of the GAEC must be changed every three years. Such a change was to occur on December 31, 1963. Because of the pending

CONFIDENTIAL

CONFIDENTIAL

elections, it was decided to extend the mandate of the Board for another three months, until March 31, 1964. Although the President was appointed until the end of 1965, Minister Papandreou dismissed the President along with the old Board. In his place he appointed L. Zervas, Professor of Chemistry at the University of Athens.

Zervas had little previous knowledge of the work at Democritos. Although he had often been critical of Democritos and the GAEC, he had never visited the Center before his nomination to the Presidency. His first visit occurred on April 14, 1964, one day after his installation in office.

One of the first acts of the new President was to stop the signing into law of the Graduate School of Atomic Science at Democritos, which had been operating on a provisional basis for a couple of years. The law had been prepared by the previous Board and it was ready to be signed. Zervas stepped in and prevented it.

As a result, the funds for the operation of the School were stopped, teachers and students dismissed and the building was closed.

Zervas also prevented the passage of a proposed salary revision, which would have brought the salaries of scientists at Democritos to an acceptable level. (Top salaries for senior scientists at Democritos are now about \$250 per month. The proposed salary reform would have had a ceiling about twice as high.) Furthermore, he terminated all the existing contracts for September 30 without giving any indication of his intentions for reappointments. Finally, he stopped all forms of cooperation with other institutions. There had been active and fruitful contacts with the University of Grenoble, with the Polish AEC, and with the Weizman Institute. All these outside activities had to be suspended. To give symbolic expression to this reorientation towards a more nationalistic Greek science, Zervas ordered that all signs at Democritos which were in English and Greek be replaced by signs using exclusively the Greek language.

Zervas advocates that Greece's participation at CERN should also be stopped or reduced. (This amounts to about \$400,000 per year. It is calculated according to a formula based on the economic strength of the country.) He finds that participation in CERN is too expensive and not sufficiently profitable for Greek science. He is now negotiating with CERN for a reduction of the Greek contribution.

CONFIDENTIAL

CONFIDENTIAL

He is apparently unaware of the fact that Greece's participation in CERN is its only contact with modern high energy physics. Neither does <sup>she</sup> not appreciate the tremendous scientific stimulus which Greece can derive from the participation at CERN. Very recently the electronics department at Democriton, for instance, had taken on a CERN assignment which would have given Greece a unique opportunity to contribute to high energy physics. If Zervas succeeds in cutting the relation with CERN this project will probably have to be stopped too.

Zervas is of the opinion that the GAEC has been operating too extravagantly and that Democriton has too many permanent positions. He visualizes a center with a few leading scientists in permanent positions assisted by a number of junior scientists in temporary positions, a system modeled after the example of the German research centers and universities before the war.

The leader of the opposition to the GAEC is Professor N. Anastassiades who is Professor of "Electronic Physics" at the University of Athens. He is politically quite influential, having good connections within various Ministries and with NATO personalities. Besides his regular professorship, Anastassiades also heads a private school of electronics, fills two substitute professorships of nuclear and theoretical physics at the University of Athens and directs a NATO-financed Institute of Ionospheric Studies.

His admitted intention is to become President of the CERN and he uses his various influences most effectively to bring this about.

One had to have lived here for some time to understand how it is possible for a man who is a scientific nonentity to obtain such an influence with the Greek Government, with some of the NATO officials, and with international organizations.

While I was in Athens, Anastassiades remarked to a Greek-American visitor in a discussion about Democriton: "We have cut their head off and if they raise it up again, we cut it off again." With this Herculean deed accomplished, the professor is confident that his influence will prevail.

### 3 - The present state of Democriton

All these recent events have had a disastrous effect on the morale of the scientific personnel at Democriton, and the students of the school. The closing of the school resulted in the immediate

CONFIDENTIAL

CONFIDENTIAL

dismisal of its Director, Dr. J. Rowcock, A. Contogouris, P. Hadesannou, and P. Protopapadakis who are leaving the Center and the country. Zervas went to the U.S. trying to recruit new scientists but without success. He then tried to impose restrictions on Greek scientists leaving the country. None of these efforts is suitable to stop the decay of the morale of his scientific staff.

At the moment of writing this report, almost everything in the Center is in a state of suspense. It is nearly impossible to make any plans or any decisions. The present Cyprus crisis does not improve matters. Important papers remain unsigned at the Ministry for months or get lost in the Ministry which is fully occupied with the Cyprus problem. For the last four months the scientific activity of the Center has been virtually at a standstill because of this blockage of action by the Prime Ministry. Some of the scientists are using this time of suspense to write up for publication, as yet unpublished, research which was done at the Center some time ago. A good deal of credit for holding up the morale of the good scientists at Democritos goes to Dr. Th. Kanellopoulos, the scientific director of Democritos who has done everything possible to improve the working conditions at the Center. But if the Center is to be saved, it needs desperately help from outside. The U.S. could give such help in various ways but has not done so up to now. Since the U.S. has contributed about 30% (\$350,000) to the price of the reactor at Democritos and continues to pour enormous sums into the Greek economy, it would seem that a more active interest on the part of the U.S. in Democritos would be quite justified.

#### 4 - The project of the new university in Greece

That Greece needs a new university is obvious to anybody familiar with the educational situation in Greece. There are two principal reasons why this project is quite urgent for Greece: The existing universities will not have the capacities to absorb the estimated future number of students, and (due to lack of staff and space) the existing universities are not capable to give some of the specialist training for the formation of engineers and scientists.

To illustrate this, consider for instance the situation at the University of Athens. The University has about 4,000 students. The Physics Department has five chairs, of which two have been vacant for a number of years. Thus, a physics student has the choice of attending a course in general physics by Professor Alexopoulos or in thermo-dynamics and mechanics by Professor Papalannou and one in electronics and electromagnetic theory by Professor Anastasiades.

CONFIDENTIAL

CONFIDENTIAL

The latter also substitutes for the missing professors for theoretical physics and nuclear physics, although he does not know these subjects.

✓ What there is of a laboratory is a museum of the physics of fifty years ago. Quantum mechanics has never been taught at the University, let alone such important advanced subjects as nuclear physics, solid state physics, or high energy physics.

Instead of thus offering a reasonable undergraduate and graduate study program the student is required to take all kinds of peripheral subjects which are useless for his professional training as well as for his general education because of the low quality of the teaching.

A check on the curriculum for a physics major revealed that the following courses are required for the degree: General Physical Geography, History of Science, Meteorology, Crystallography, General Geology, Seismology, Introduction to Philosophy, Pedagogy, Applied Mechanics, and Astronomy.

This system of requiring peripheral courses is strongly motivated by the financial advantage which the professors derive from a large number of students in their courses.

There exists no central library at the University. Individual professors have libraries of their own attached to their chairs. The student, however, is neglected with this system. He has no regular access to books.

This situation is rather typical for all the higher institutions of learning in Greece. There does not exist anything corresponding to a graduate school in any field and there is no possibility that the system can be corrected in the foreseeable future.

As a consequence of this deficiency, the scientific development of Greece is caught in a kind of vicious circle which works as follows:

- (1) Because of lack of graduate study facilities, students go abroad to complete their studies;
- (2) Successful students obtain employment abroad and find it unprofitable to return to their home country;

CONFIDENTIAL

9/21/64 - A-22B

CONFIDENTIAL

Enclosure Page 7.

- (3) The constant outflow of qualified young people results in a deficiency of trained persons who could do graduate teaching in Greece;
- (4) Because of lack of teachers and graduate study facilities in Greece, students go abroad, etc.

This vicious circle works like a pump which syphons off the most capable of the young scientists; and so long as this vicious circle is not broken, the scientific development of Greece is gravely handicapped.

It was recognized by responsible circles in the Government that this vicious circle could be effectively broken by creating a new university, with a new curriculum, a new standard of teaching and new research facilities. Encouraged by a financial offer from the OECD (the European Economic Development Council), the Ministry of Coordination asked the major Greek universities in January 1963 to study this question and to work out a proposal, but no report was ever produced. Indeed, the existing universities have shown little or no enthusiasm for the project of the new university, preferring the status quo or at best a better support of the existing institutions. Earlier this year, the Ministry then asked a working group at Desocritos to study this question, and this group produced a detailed proposal which was submitted to the Ministry in February 1964.

This study contains a criticism of the existing system, estimates of immediate and future needs, and a concrete proposal of a new university for technical and scientific studies based on a detailed analysis of the future needs of Greece.

For the choice of a site, the authors propose the harbor city of Patras on the west coast of the Peloponnese.

The proposal was the subject of an international conference sponsored by the Ministry of Coordination at the end of August, 1964. The conference was organized primarily for prestige and propaganda reasons, and has produced little that was not already contained in the project of the working group.

Although the creation of a new university will certainly be effective in breaking the vicious circle of higher education, for the present crisis at Desocritos the proposal comes too late. At the rate at which the Greek Government is working, such a project will not be realized before several years and if all goes well, its influence will be felt in Greece in about five years from now. In

CONFIDENTIAL

CONFIDENTIAL

such a long time, there are many hazards which might interfere with the project. In any case, the present crisis of Democritos will have to be solved long before the new university's influence will be felt.

5 - The Physics Division at Democritos

The Physics Division at Democritos has projects in Neutron Physics, Solid State Physics, Nuclear Physics and (until recently) Theory..... (This section of the report is highly technical.)

....Theoretical Physics is virtually non-existent now that all the theoretical physicists have left as a result of the new policy.

Special mention should be made of the very fine electronics laboratory under the leadership of Dr. C. Laskaris. The laboratory is engaged in the construction of special circuits for the physics division as well as the development of electronic computing units and memory devices using advanced techniques and circuit designs. It also has a small theoretical group studying modern problems of Cybernation and non-linear network theory.

6 - What is the future of Democritos?

The crucial question which will determine the future of Democritos is this: "Will it be possible to attract and retain a sufficient number of first-rate scientists so that the laboratory can grow beyond a certain critical size and that it can benefit from the inspiring leadership which high quality scientists could give?"

If the answer is yes, then the laboratory is saved. What are the prospects that this could be accomplished?

There are two major obstacles to overcome:

(1) While there are certainly a considerable number of Greek scientists who could fill some of the crucial positions of leadership, there are not enough of them. In numerous discussions about this question, it became evident that there is a missing generation of scientists in the age group of from 35 to 50. There are some young talented scientists who should be given opportunity for research. But they have no prestige in Greece and therefore no influence. The Greek officialdom being unable to judge quality, must judge by rank, title or prestige. This gives to an older and mostly incompetent group of politically influential scientists and professors an

CONFIDENTIAL



CONFIDENTIAL

inordinate influence in government circles.

(2) In order to bring the few first-rate scientists back home and retain those who are already in Greece, certain conditions must be met. They are essentially the following:

- ✓ (a) Salary rates and social security, competitive on an international scale.
- (b) Freedom of research within the limitations of a carefully planned budget.
- (c) Free exchange of ideas and information with any place in the world.
- (d) Acceptable working conditions concerning space, supporting services and administration.
- (e) Educational opportunities for the formation of new scientists.
- (f) A critical size of the operation to stimulate junior scientists and prevent isolation.

From my experience and my knowledge of the Greek situation, I have come to the conclusion that all of these conditions could be met in Greece today, except the last one. Concerning the last one, certain transition measures, such as temporary foreign visitors and exchange arrangements could be introduced until the critical size of the operation is reached. The reason why these conditions are not met today and Democritus has to lead such a precarious existence, is not because of lack of finances but because of the incompetence of certain leaders in Greece. (Example: [A Ford Foundation educational aid offer of \$400,000 was lost because it was "forgotten" in the Prime Ministry. Such things are quite common occurrences!]) There are people in Greece today who see and understand these problems. The tragedy of Greek science is that these people are not the ones who make decisions in Greece on scientific policy. Admiral Apanides, the deposed President of the GAEC, had a clear comprehension of these problems and he had made considerable strides towards the realization of better conditions.

Can a developing country like Greece permit itself the frivolous sport of dismissing one of its most competent and devoted public servants in this manner?

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This last section started with a question concerning the fate of Democritus. In ancient Greece, one used to go to the Oracle of Delphi to learn about one's fate. The last recorded oracle was given in reply to a question of the Emperor Julian. It is quoted at the beginning of this report. If the Phytoneas were asked the question of the title of this section, it could answer exactly as it answered Emperor Julian 1500 years ago. And the tone of its sombre pessimism would be as meaningful today as it was then.



9/11/64

CONFIDENTIAL