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MATHEMATICAL ACTIVITIES IN GREECE

BY

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## MATHEMATICAL ACTIVITIES IN GREECE

At the end of February 1966, on the way back to London from a visit to Israel's universities (concerning which a separate report will be written), I had an opportunity to stop over in Athens. Brief visits were made to the Mathematics Departments of the University of Athens and the Polytechnic Institute (Technical University). Furthermore, Professor P. Rokkas of the University of Salonika was visiting the Polytechnic (where he will assume a new chair this fall) at the same time, so I had an opportunity to meet mathematicians from all three of Greece's universities. Two new universities, at Patras and at Ionina, are to be established, but I did not learn anything about the proposed size or scope of these institutions. While instruction and research in mathematics are evidently in a rather sorry state, it may nevertheless be worthwhile to submit the following brief account of my visit.

It should be emphasized that much of what is said below reflects impressions rather than asserting firm facts. This is due to several causes: first, the brevity of my interviews; secondly, the fact that one and sometimes both parties to each interview were speaking a foreign language, and it was not possible to clarify every remark that was made; third, there seemed to be in some cases a tendency to sidestep, or at least minimize, unpleasant topics. This last remark is not intended to be disparaging in any way.

My visit followed by almost seven years that of T.H. Saaty (see Technical Report ONRL-46-59), who apparently was not as depressed by his observations as I was by mine.

Greece's universities are government institutions, under the Ministry of Education. The University of Athens and the Polytechnic, currently enrolling 11,000 and 2,500 students respectively, were established in the late 1830's, shortly after the end of several centuries of Turkish rule. Incidentally, there seems to be a tendency, possessing some historical justification but scarcely conducive to the future development of the nation, to blame every bad feature in the current situation on the evil heritage of the Turks. The University of Salonika, which includes a faculty of technology, was established in 1925 and presumably has a rather small student body.

The two Athenian institutions are located in heavily populated districts near the center of the city, and give the impression of being severely overcrowded. The Polytechnic, I was told, is "soon" to move to a new campus on the outskirts of the city, but the precise meaning of "soon," and whether this statement implied the existence of a firm plan or merely a vague promise from the government, were not made clear.

At the Polytechnic, the staff of mathematicians (and physicists) appears to function almost exclusively as a "service" department, administratively distinct from the five "faculties" -- civil, electrochemical, architectural, chemical, and agricultural. All students attend lectures in mathematics, four hours weekly (I believe), for two or three years. The degree course takes five years. The coverage appears to be roughly that of the two-year program in analytic geometry, calculus, and ordinary differential equations, which used to be rather standard in many American engineering schools, but is now considered quite outdated and inadequate. If time permits, a bit of additional material, such as matrices or analytic function theory, may be thrown in. However, an opportunity for the student who may desire to do so to pursue mathematical studies beyond this level does not exist.

Professor P. Vassiliou is the only senior member of the Mathematics Department whom I met. He and two colleagues, Professors N. Kritikos and A. Papaspyros, carry the entire load of lecturing. They lecture to classes of several hundred students, who then divide up into smaller groups for problem sessions conducted by assistants. Vassiliou earned his doctorate in Germany under the great C. Caratheodory, and was moderately successful for a time in researches in number theory. He held a Rockefeller fellowship which enabled him to spend one year in the United States during the 1930's, but he has published little, if anything, during the past decade. Vassiliou did not indicate that either of his colleagues is engaged in any creative work, either, and a literature search through Mathematical Reviews for the past decade, which I performed after returning to London, "drew a blank."

Vassiliou did not seek to conceal the unfavorable state of affairs in his Department, but he did not appear to be agitated about it, either. He and the other mathematicians whom I met kept repeating that it is virtually impossible to keep capable mathematicians in Greece. Among those who have apparently left their homeland for good are C.D. Papkyriakopoulos (noted for his solution of "Dehn's lemma"), A. Papoulis, and D.G. Magiros, who have all found more satisfying conditions in the United States, while one or two have also established themselves in France. From personal acquaintance with one

of the persons named above I can say that the difference in salary scales is only a small part of the difficulty in keeping Greek talent at home.

To sum up, at the Polytechnic there appears to be neither creative activity, stimulating curriculum, nor any serious likelihood that the near future will bring any appreciable improvement.

At the University the situation appears to be somewhat better, but still far from satisfactory. Professor D.A. Kappos, who has spent over a decade in Germany and several years in the United States, is obviously well informed on modern developments in probability theory, and he publishes valuable material from time to time. His book Strukturtheorie der Wahrscheinlichkeitsfelder und Raume, which appeared in 1960 in Springer's "Ergebnisse" series, is certainly a very substantial contribution to the subject. It may be considered as a definitive presentation of that body of material which has developed since the publication of Kolmogoroff's monograph, in the 1930's, on the foundations of probability theory. (A rather detailed summary appears in #9982 of Vol. 22 (1961) of Mathematical Reviews.) A young colleague of Kappos, Dr. G.G. Legatos, keeps up with some of the current literature on non-linear ordinary differential equations and publishes occasionally.

An encouraging item is the fact that NATO will sponsor at Athens during the coming summer a course in probability with ten lecturers and forty students; Kappos will serve as host and organizer. However, this seems to be an isolated bright spot against a depressing background.

As for Salonika, Rokkas informed me that he and his colleagues are not able to do more than an occasional bit of work on minor problems. However, my attention was subsequently drawn to several papers published in recent years by G. Contopoulos, who, I believe, is associated with Salonika's Department of Astronomy. In Zeitschrift der Astrophysik, 49 (1960), 273-291, he obtains, formally at least, a third integral of motion in the form of an infinite series; while the whole question of convergence is left unsettled, it would appear that his idea may prove significant in the analysis of galactic motions. A second paper along these lines appears in Astronomical Journal, 68 (1963), 763-779; here the author seeks to grapple with the fact that the formal expansion of the aforementioned third integral may contain denominators assuming the value zero.

A somewhat disturbing circumstance is that, at all the universities and in many subjects, the textbooks for the courses often consist of notes written by the professors and sold to the students; the limited number of copies keeps the price at a level that can produce substantial hardship for many students. It is my understanding that all Greek students have had, during their pre-university training, a rigorous training in at least two of the major western languages -- usually English and French -- but I was told that despite this most of them feel at a loss with non-Greek texts. Since Greek is unlikely to become a major language of modern scientific communication, this is a sad situation. I have not yet encountered such a situation in the more developed small countries, such as Norway, Sweden, Finland, or Israel; Greece certainly cannot afford the luxury of teaching science and technology in its own language.

A bit of information on salaries may be helpful. I was told that a professor receives a salary equivalent to \$6,000, which, I would judge, is fairly satisfactory. On the other hand, assistants are paid very poorly -- about \$100 monthly -- and the ambition to achieve one of the few professorships may, even for a person of adequate talent, be realized only after a long struggle, if at all.

I also paid brief visits to the computation center and the physics department of the Polytechnic. There is virtually nothing to say about the former. It has an IBM 1620 and some peripheral equipment, and a very small staff which apparently fulfills only a service role within the Polytechnic. There was no offer to tell me of the activities and organization of the center.

At the Physics Department I met Prof. Th.G. Kouyoumzelos who, I believe, holds the only chair in the Department and therefore does all the lecturing. Students may take up to three one-year courses in the Department, during which they apparently make a nodding acquaintance with applied electronics and some phases of modern physics, but little more. In all fairness, it must be granted that Kouyoumzelos bears a heavy burden, and that he is trying to get a modest research program under way. He showed me some new equipment, valued at about \$20,000, with which he plans to perform some studies in scattering of elementary particles. (He has undoubtedly been helped in keeping informed of recent developments by spending a year at Oak Ridge.) I could not help being favorably impressed by his candor in describing the poor state of physics in Greece today, and by his statement that, while he should like to seek financial support from some American governmental agency, he will do so only if he feels that he

can make a strong case, with reasonable assurance of being able to carry through a project with competent staff.

#### Concluding Remarks

The present state of mathematics in the Greek universities is clearly not good. While a few people engage in some activity, it is nevertheless correct to say that Greece is a mathematical backwater.

It is quite clear, even after a brief visit to Greece and a superficial study of its conditions, that a revival of scientific scholarship can come about only as a part of a thorough overhaul of the nation's economic and educational structure. The nation has suffered centuries of oppression and intellectual degradation, but other nations have recovered from similar tragic histories. Merely pouring money into the country will not suffice. The flourishing of mathematics can only be realized as one small part of a complete overhaul of the nation.

My feelings on this matter are perhaps especially acute since my brief visit to Greece contrasted so starkly with my visit, immediately preceding, to Israel. The latter nation also faces problems of staggering immensity, and one may properly question whether it is using its own resources and the funds contributed from outside with maximum, or even reasonable, effectiveness; but one can see that much has been accomplished in the field of education, among others. Nothing remotely comparable, unfortunately, is in evidence in Greece.

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