

ASTRONOMICAL RESEARCHES IN POINCARÉ'S AND ROMANIAN WORKS

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ABSTRACT. Henri Poincaré was not only a honorary member of the Romanian Academy, but also an important collaborator of many Romanian mathematicians and astronomers. It is sufficient to mention Spiru Haret, the first doctor in mathematics at Sorbonne, or Nicolae Coculescu, the first director of the Astronomical Observatory of Bucharest. The 150th anniversary of the birth of the illustrious French personality offered us a good opportunity to study the relations he and two other Poincaré, Raymond and Lucien, had with Romania.

150 years ago, Jules Henri Poincaré, the one who was to become the glory of France and of universal mathematics, was born at Nancy. In 1860 Raymond Poincaré, future prime minister and president of France (1913-1920) was born. Finally, two years later, his brother, Lucien, an important physicist who was to become the rector of Paris Academy, was born.

The extremely close collaborations between the Romanians and the French, especially in the second part of the 19th century, made each of these illustrious names of the Poincarés play a not at all negligible part in the emancipation of the young Romanian state, which had just been set up, first through the union of the two principalities, Moldavia and Wallachia in 1859, and then through the union of these two with Transylvania, Bassarabia and Bucovina on 1 December 1918, when the Great Romania was born. We shall try to sketch at least a part of the connections of the three Poincarés with the Romanians.

Immediately after the Union of the Romanian Principalities in 1859 the first modern universities of Romania were set up. From among the first students sent to Paris for doctor thesis, three approached subjects of celestial mechanics, namely the theses of Spiru C. Haret, Constantin Gogu and Nicolae Coculescu.

One of the most outstanding performances of Henri Poincaré in the realm of mathematics is subtly and closely related to Spiru Haret. Both got resounding results in maybe the most celebrated problem of dynamics: the n-body problem, initially aimed at modeling the planetary motions in our Solar System. Even if not decisive, Haret's results helped and determined Poincaré to search for, to find, and to offer new fundamental methods, primarily intended to tackle this problem, but revolutionary and useful for most domains of science. Haret's and Poincaré's achievements marked, respectively, the end of a old era and the beginning of a new era in celestial mechanics and, in general, in mathematics.

Which is the link between Haret's and Poincaré's achievements from the narrow standpoint

of the concrete problem they studied? Haret proved instability of the model of the n-body problem, but considering frequencies (mean motions) to be incommensurable. Taking also into account commensurabilities, and using generalized Fourier series (which generate quasiperiodic solutions), Poincaré proved the divergence of these series, which means instability, confirming in this way Haret's result. Haret's and Poincaré's results show that the question of the Solar system's stability remains still unsolved. Haret's work marked the beginning of the end of an era, that of exclusively quantitative endeavors in mathematics. 12 years younger than Henri Poincaré, Nicolae Coculescu was the third Romanian who presented a thesis of celestial mechanics in Paris, *Sur les expressions approchées des termes d'ordre élevé dans le développement de la fonction perturbatrice*, published in *Journal de mathématiques pures et appliquées*. Henri Poincaré was one of the members of the jury.

It is certain that Nicolae Coculescu asked many times the advice of his illustrious predecessor, the only evidence that we know of about this being the letter H. Poincaré received from his "élève bien dévoué" on 29 May 1899 (which is today in the archives of Nancy University). Naturally, H. Poincaré had other Romanian students as well. We should like to mention here one of the most brilliant ones, namely the physicist Dragomir Hurmuzescu, collaborator of Curies, author of important contributions to electricity and X-ray physics. He was one of the redactors of the two volumes of Poincaré, *Théorie mathématique de la lumière* (1889-1892).

Another volume of H. Poincaré, *Électricité et Optique de la lumière et les théories électrodynamiques* was published by Jules Blondin and Eugen Neculce, another physicist, professor at Bucharest University.

But H. Poincaré himself was in Romania. Finishing "École des Mines", he spend a lot of time for studying in Resita, a Romanian city situated at the epoch in the Austro-Hungarian Empire. His *Mémoire sur la fabrication de l'acier dans le Banat* has 213 pages.

Several famous universities, scientific societies and acadmies awarded Henri Poincaré. Between them, he was nominated "docteur honoraire en philosophie" of Cluj University (at the epoch Kolozsvár) and in 1909 "membre d'honneur" of the Romanian Academy.

Because the relations between the Romanians and the French are entirely special, being difficult to decipher all the threads that connect them, it is natural that in the most difficult moments of the two peoples' destinies there should be important moments of approach. Thus, in March 1919, Queen Mary visited France. The President of the Republic, Raymond Poincaré, felt obliged to receive the Queen of Romania at Elysée, with military honors, which was an unusual thing as the Queen was not a chief of state but only consort sovereign.

At the end of the First World War, France consolidated alliances in the East. It was a period of important exchanges of delegations between the two countries. Lucien Poincaré, the rector of Paris Academy and brother of the President of the Republic led one of the most important French missions in Romania. We still keep the photo of the delegation at the Astronomical Observatory in Bucharest. This has been only a short review of the most important relations established between Poincaré and the Romanians, unfortunately still very little studied.

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