

APPRECIATION OF ROLAND EÖTVÖS

by

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The feeling of a deep reverence is arising in my mind as I fulfil my authority to show the portrait of Roland Eötvös by force of personal commemoration in course of our session. On and on lessens the number of those who saw still Roland Eötvös with their own eyes and heard him with their own ears. They participated in the fortunate experience, to obtain an idea about strict morals and scientific notability on the basis of a living example. Still it is ringing in my ears the utterance of Géza Bartoniek, — the director of Eötvös College —, who returned thanks to his good fortune for passing away his life in the shadow of a great individuality.

Roland Eötvös was with distinguished respect in regard to the reputation of his father as author and statesman but he never had a claim of inheritance on this reputation. He was full of ambitions, and was determined on dedicating his life to great products worthy of him, but for the appreciation followed in their footsteps he wanted to have him to thank entirely. It is characteristic of his impatience, he was ready of the interruption of his studies at the university reporting to a pole-expedition. It was only a momentary dream.

Even the fatherly influence could not divert from his intention giving over the juristic studies insured a straight course of his life and to turn to the study of physics. It is not probable at all that he would have been driven by his natural bent towards this profession. It is still less possible when in all fields the political discussions were the questions of the day, problems of natural science would have been displayed the directing influence on the young Eötvös decisively. He refers to the real reason of his decision himself. When he matriculated to the Heidelberg University, he considered almost incredible that he could enjoy the same air as Kirchhof and Helmholtz. Their names encircled with honour got to all corners of the cultural world. The young student could dream about similar works with them he might rise to the resembling degree of the scientific greatness. It is remarkable, he is not think-

ing about the two first names of the list of German physicists, neither of Mayer, nor of Clausius. These two giants are definitely with theoretical attitude, they cannot be ranged among the experimental physicists. The admiration of Eötvös was fascinated rather by the great results of the experimental researches, this is a clear sign that this form of the examination exercises a peculiar attraction on him. Indeed, when he gets later authority to give a course on the theoretical physics at the Budapest University, he keeps the management of this professorship only for a short time and as soon as possible he passes on the guiding of the experimental institute. His experimental vocation was obviously already at his student time. For measuring of capillary constant he designed during the laboratory training such an instrument, that gave possibility to contain undecided liquids into a closed wessel and with them their surfaces were protected from impurity. As far as the theory was concerned he was in contradiction to such difficulties in his student time, which almost finished catastrophically. He was very desperate in consequence of the theoretical lectures hard to understand of professor Neumann, that is, he was firmly determined to change his profession. Only his father's words gave him persistency for the future too, when his father declared before him that fulfilling his commitments is a question of honour.

Eötvös attained the analytical method of the research at the German universities. His most significant theoretical thesis — as it is called “Eötvös's law” — was still derived by meditative methods. He paid the tribute of admiration to those properties of bodies being in van der Waalsian proper state, that they retain their similarity in mechanical respect too. From that he drew the conclusion, if he proportions the vapour pressure effected on plate of a liquid cube to the surface tension operated edgewise he gets such a quotient which is the same for all liquids. The circumstance that we can today include the “Eötvös's law” into the frame of a more common law, it does not conclude anything from its value.

After taking over the experimental institute Eötvös got into far closer relationship with the secondary school. Surely the physicist probationer teachers could get lectures of physics in their first year directly from Eötvös. The circle of knowledge what they were brought by them characterized their preliminary training. The public average in that time could get only a negative criticism. The lowly scientific level of the teaching body was complained rightfully with the exception of a certain. On that condition Roland Eötvös made an effort to change in his Minister of Education's time as he wanted to create an institute included all the branches of study of secondary school. To the memory of his father he founded the József Eötvös College, that in one respect in the richness of the library but on the other hand in the active force of its attitude stimulating to labour indicated till now the most eminence in the history of our colleges.

No the exacting selection at the registration was the guarantee of full value of the prospective advance of the student but the competition sprung from traditions. It would be worthy to count up whether howmany former members of the College work till now at our universities. Eötvös suggested by his own example to his College the slogan of today: “Work has become a matter of honour and glory.” Every student who passed through the Garden

of University could see day after day the well-lighted figure of Eötvös in the library of the building "D" of today, as he was wrapped up in his calculations sitting at his desk. Whoever cogitating objectively wishes without doubt, if only it were successful to raise from the dead this unsurpassed institute. But with a necessary supplement! The old College does not know the ideological and political education. Such a standpoint is today unimaginable of course.

By all means we have to propound the question, what is Eötvös himself like from the point of view of ideology and of social policy. It is not possible to apply for him the same requirement and units of measurement as for one or another of the excellent persons of our age. His age was full of passion but in the point of view of socialist it was the age of unfruitful policy. The governing party preserved rigidly its position at the royal court because he did not touch to the compromise of 1867 according to the exhortation of Franz Josef I. Opposite of him there stands the party of the opposition of 1848 which received for example with cry of victory the result of his fighting that it succeeded in transmuting the name of the imperial-royal army to the name of imperial and royal army but he beheld with celestial tranquillity that many hundred thousands Hungarian citizens escaped to America away from the unbearable misery. Eötvös abandoned to this policy already with his choice of profession. He saw clearly with his searching glance that the science, the technical work and the high-class civilization set to the service of the national economy could guarantee for our fatherland the prosperity in the country and the prestige in foreign lands. He declared also his opinion plainly as President of Academy. He denounced the worthlessness of the patriotical catchphrase with the courage of great souls, the audience never heard idle phrases from him.

Doubtless he was a great scientist with an advanced mentality and this is the only requirement that may be claimed to the judgement of the notabilities of earlier ages. Roland Eötvös was chosen as the new denominator of our University by the excellent fine feeling of the Hungarian Republic.

It was unexpected for the national physicists the decision of Eötvös, that after the deduction of the law denominated from him he turned away from the problems connected with the microphysics and transfer his experimental activity to the field of gravity. We could believe that he detected any want in the Newtons theory of gravity and he endeavoured reform it. It is remarkable that this want exists indeed, but its authenticity came only to light long later, and then Eötvös — at least indirectly — contributed to its elimination. The main cause of his decision was his callings for the experiments, as a purpose of him was the powerfull refining of the gravitational measurements.

It is obvious, the result of this work was productiv of an exceptional practical advantage. The very place of the application of the gravitational instruments is not the laboratory but the open nature where the balance spicul looks under the earth and gives precise information about the invisible trends. The instrument would be entlisted in the service of geology as a reliable and ready attendant.

Eötvös himself spent his days on the ice of Lake Balaton with pleasure to investigate with his equipment the trends under the basin. Expeditions were organised according to his initiations, which investigate the terrain under the surface on prescribed direction. The Eötvös torsion balance gained a peculiar fame then it was obvious that it might be produced in a well carrying form for heavy fields and it was the correct indicator of the occurrences of mineral oil by its precise measurements. This circumstance made the name of Eötvös world-famed and his instrument a required investigating article. It is hardly believable that Eötvös could extort the exceptional sensitivity of his torsion pendulum from the form of torsional balance.

During the first stage of investigations it looked like we could not expect any fundamental interference in question of the force of gravity. However this problem existed already in the very moment of its conceptual birth. The gravity is the most striking case of the longdistance operating force. We do not know any materially medium, mechanical alteration of which we could explain as a force. When the Earth rushes with her full speed round the Sun she always occupies other and other places compared with them. That is the question, what a mechanism could make possible that the attractive force of the Sun could follow the Earth and it is present ready for action in all position of the Earth. Newton himself refuses very definitely that assumption as if he had believed in the longdistance operating force. However he does not endeavour to a positive standpoint and he is content with that declaration he does not pry into the question of "causa gravitatis".

All the more this question was investigated by another notability of the world appearing far later: Albert Einstein. After ten year's strenuous mental work he gave also answer to the question but it was only possible that he was supported by such a thesis, faultless experimental verification of which was due to Eötvös. We have to think of the identity between the heavy and the inert mass. It was well known on experimental basis, if we determined on balance the weight of two masses, from them the heavier has a greater resistance towards the same acceleration. In other words, to greater weight it corresponds a greater inertia. But the fact, that the weight of a certain body is strictly proportionate to its inertia was not demonstrated by the previous measurements precisely. The exact verification was so much wanted that the Göttinga's University announced a competition in 1906 for the final solving. Eötvös and his collaborators undertook the work and they won the offered prize on the basis of precise execution. The fundamental idea came from Eötvös and the measurement connected again with the sometimes well proved torsion balance. The previously measurements made with other methods which was similarly accomplished by excellent experimental physicists in point of view of accuracy could not be compared with the Eötvös's result at all. The limits of inherent error in measurements fall into $1/200\,000\,000$ part of the mass of the employed body.

Do not mind, that the scientific importance of this measurement is perhaps a thing of the past. Recently it was raised a premise on the part of Bondi — an English physicist —, that between particle and antiparticle a negative gravity comes into being. He wanted to solve the question supported on the accuracy attained by Eötvös. As it turned out eventually this accuracy is

not enough for the definition. But it became known in this time, one of the Eötvös' collaborators — D. János Renner — perfecting the carefulness of construction corrected the accuracy of result with a complete order of magnitude. The method of Eötvös turned to be excellent. Einstein could ground undoubtedly his famous equivalence equation on the measurements of Eötvös. In all the manuals and school-books of the world which introduce the theory of relativity we can find there the name of Roland Eötvös. We give also evidence today that the precise account of identify of two kinds of mass is till now the greatest accomplishment of the Hungarian physics.

The strict social judgement of today could also find those features of the spiritual likeness of Eötvös absence of which do not overlook even to the man of old ages. You see well the man full of constructive ambitions in him who separated himself from his cast, threw down the aristocratic Hungarian galadress and put on the white laboratory smock. You see in his person the active minister who was then "His Excellency" according to the official approaches, but in reality he is the creator of the working method of the youth in his college by his own example. And they recognize at last the eminent scientist, who discovers new veracities but his knowledges are not locked in the safe of abstract science but they are set to the service of technical advancement.

Already four decades passed away since the death of Eötvös but this time was enough to set us against such an extremely new physics about which the age of Eötvös could not take only any notice of the idea of daybreak. The pursuance of the work on this field was maintained for the following generation. But we do not make a mistake in time when our festal commemoration was attached to the personage of Roland Eötvös. His genius crossed also over with tragical grandiosity the threshold of our age. All who visited him in his last days, passed on to others with wonder, the dying scientist wanted to talk only about atom and electron. His name, who is accompanied to coffin by the science does real honour to our University.