

ADDRESSES

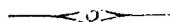
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**Address delivered at the Convocation of the University
of Mysore, on the 24th August 1929, by Sir C. V.
Raman, Kt., M.A., D.Sc. (Hons.), F.R.S.**

MR. VICE-CHANCELLOR, LADIES AND GENTLE-
MEN,

I felt highly honoured by the invitation to address this Convocation, and did not hesitate to accept it, even though, coming at a time just prior to my departure for Europe on scientific deputation, it has involved a certain dislocation of my work. For many years, I have felt a keen interest in the fortunes of Mysore, and of late my visits to the State have been so frequent that I might almost claim to be acquiring a domicile in His Highness' territory. The fact that Mysore has in the past offered scope for the activities of such distinguished administrators as Sir K. Seshadri or Sir M. Visvesvaraya, and claimed the allegiance even temporarily of a Brajendra Nath Seal or a Radhakrishnan is in itself sufficient to invest the State with a certain halo of glory. There is much in Mysore to arrest the attention of every educated Indian. The great works of public utility at Sivasamudram and Krishnarajasagara, and the industrial activities of the State at Bangalore and Bhadravati, would alone



Sir C. V. Raman, Kt., M.A., D.Sc., F.R.S.

have been sufficient to set Mysore on a pedestal, to be viewed with respectful admiration by other parts of India. The fame of Mysore has been spread far and wide by these and other evidences of the wisdom and enterprise on the part of her ruler and of those who have helped in her administration. As a man of science, my whole-hearted admiration goes out to that act of far-sighted policy which led to the establishment at Bangalore of the Indian Institute of Science. The full fruits of that act may yet some day be reaped in a harvest of fame and wealth for the Mysore State, nay, for all India. For several years, the affairs of the Institute have claimed my personal attention, and it has been my constant endeavour to try and hasten the advent of that glorious day.

At no time in the history of India, so far as I am aware, did the cultural contacts of the different parts of our great country altogether cease. Developments in any part of India have had, and will continue to have, repercussions in every other part of the country. For this reason, if for no other, the progress of Mysore will be watched with the keenest interest in other parts of India. If Mysore advances, it will rejoice the heart of every Indian. If she lags behind, the rest of India will also suffer. No one doubts to-day that

Mysore has a special and distinctive contribution of her own to make to our national culture.

As one instance of the way in which different parts of India can benefit by an exchange of ideas, I can mention the activities of the Indian Science Congress. I have even to-day the most vivid recollection of my first visit to Bangalore in 1917. Many pictures stand out in my memory, of those few days of hectic activity. The unaffected, though impressive, kindness with which the delegates to the Congress were received by His Highness in the grounds of the Palace amidst the sweet strain of Indian music, the first impressions of Bangalore with its notable public buildings and a general aspect so strikingly individualistic, the odoriferous activities of the sandalwood oil factory, the great campus of the Indian Institute of Science which for the time being became an arena for a boomerang display by a former Director-General of Observatories, these and other vignettes remain firmly impressed in my memory. Remarkably enough, however, what interested me most in that visit to Bangalore was a little tube of glass six inches long and half an inch broad which I saw used in a demonstration at one of our meetings. That little tube of glass filled with the glowing vapour of mercury and

emitting a dazzling white light came to me as a revelation. It opened my eyes to the immense power of the mercury arc as a tool of scientific research. You have all read in the "Arabian Nights" the story of how Alladin discovered, by accident, the secret of the wonderful lamp that was later to bring him wealth and fame. Alladin rubbed the lamp, and out came a mighty spirit ready to do his bidding. It is no exaggeration to say that the quartz mercury arc is the veritable Alladin's lamp of modern physics. Under the touch of the electric current springs from it a mighty spirit, travelling with the velocity of light; capable of performing the most wonderful tasks, a spirit capable of making itself as small as a hundred millionth part of an inch, nay, of entering within the atom or the molecule itself and of exploring its internal structure. It was no accidental coincidence that eleven years later, it was the same mercury arc lamp which served me to discover the new radiation effect which you may have heard of, and it was equally no accident that within a few days of the discovery, I chose a group of scientific men gathered at the same Central College at Bangalore as the audience before whom to place the first scientific account of the discovery.

There is no sphere of human activity which tends to draw peoples of divers lands and cultures together and create bonds of sympathy and friendly understanding so much as the pursuit of knowledge. Knowledge is universal by its very nature. A fact of nature newly discovered is a discovery whose significance or utility cannot be altered by the colour of the discoverer's skin or his nationality. Hence, recognition of such discovery is usually spontaneous. A striking example of this is furnished by the fact that the bitter feelings existing between England and Germany during the war did not prevent Englishmen of science giving the fullest and promptest recognition to the work of Einstein. The speedy reconciliation of England and Germany that has followed after the war is, I believe, due not a little to the cultural and intellectual domination which Germany continues to exercise over the whole world and which remains unaffected by her defeat on the field of battle.

Intellectual activity of the highest type such as every University should strive to develop is a force of incalculable power and importance for the national welfare. Apart from the direct results of such activity in promoting agricultural, industrial or commercial progress, its indirect

results are even more important. Intellectual stagnation is equivalent to national decay and death. Intellectual activity, on the other hand, leads to a quickening of the national life in all its aspects. To a normal human being in full possession of his faculties, the ideal of healthful happiness is not a life of slothful inactivity or placid contemplation, but one of varied activity, both physical and mental, interspersed by the minimum periods of rest which Nature demands for recuperation. Either physical or mental activity by itself is incomplete and insufficient for the maintenance of human efficiency at its highest level. The mainsprings of intellectual activity in every country are education and the spirit of inquiry, and its quality varies with the standard set by the thinkers and educators of the nation. Thus, in the last analysis, it is the leadership offered by the Universities that determines the level of intellectual activity in the country and therefore also the national efficiency.

In thus drawing attention to the relationship between national welfare and the work done in the Universities, I would wish to emphasise the danger of allowing such work to degenerate into a deadly routine of formal teaching and formal examination. The tendency of all formal schemes

of education is to regard the human mind as a kind of soft metal to be squeezed into shape by intense pressure into the hard steel moulds of syllabuses and examinations. This kind of mechanization of education is, I believe, most deadly in its effects, and is responsible for not a little of the intellectual sterility of the finished products of our Universities. The essence of education is the development of individuality and personality, and it is easily possible to carry the idea of formal training and intellectual discipline to the point of extinguishing such individual development. I would say that the good is often the enemy of the best. Formal training should make way in favour of individual freedom of study and work wherever and whenever the latter promises the best results. It is here that the discernments and sympathy of the teacher are most needed.

The ideal of University work is the provision of opportunities for special abilities, of teacher as well as of students, to express themselves. How this is to be done without dislocating the general activities of the University is, I consider, one of the most important problems in University administration, and its successful solution requires the most careful and sympathetic consideration. It is my conviction that, at the present time, Indian

Universities generally pay less attention to the development of special activities and abilities and more to purely routine activities than should really be the case. In a general way, of course, the differentiation between pass and honours courses recognizes the importance of giving special opportunities for special ability. But this, in my view, is not enough. There should be greater freedom for the expression of individual ability, and more time and opportunities for research work, for teacher and student alike, in those cases where evidence of ability to profit by such opportunities is forthcoming.

During the last few years, there has been a growing recognition that India is not a negligible factor in the advance of human knowledge. I will go further and say that the world outside has begun to learn that the Indian intellect can occasionally march abreast, or perhaps even lead, in the onward march of scientific progress. This is certainly a position in advance of that freely expressed ten years ago that the Indian mind was by nature sterile, and is, in my opinion, largely the result of the work of the younger generation of scientific workers in India during the last ten years. But the position reached is, in my opinion, still quite unsatisfactory. A great many new Universities

have sprung up all over the country and in many of them Indians are holding appointments with some opportunities for original work. Some of them are, no doubt, showing praiseworthy activity. But taken altogether, I think, not enough is being done. The reason for this is a matter which I would recommend to the University administrative bodies all over India carefully to investigate and set right without delay. In some cases, it may be lack of opportunities for research, by reason of excessive insistence on routine teaching; in others it may be lack of research equipment. I hardly think the lack of competent students or helpers can be the cause. If there is any point on which I feel a confidence derived from experience, it is that there is abundance of talent in the younger generation awaiting the right kind of leadership.

The field of human knowledge at the present time is in an extremely interesting state. The principal feature of the activity of the nineteenth century may be described as the fragmentation of knowledge into a large number of small holdings with uncultivated boundaries between them—mathematics, astronomy, physics, chemistry, geology, botany, zoology, sociology, economics, politics, psychology, philosophy and so forth. During the last twenty years, however, a strong

movement has set in towards a new synthesis of knowledge. A change has occurred in our philosophic outlook which is tantamount to a recognition that, in spite of her immense diversity, Nature is still one and indivisible. The barriers artificially set up by the nineteenth century between the different branches of knowledge are fast crumbling to pieces and in many cases, for instance as between physics and chemistry, have completely disappeared at the present time. The current of present-day progress thus gives a new strength to the University idea which recognizes the essential impartibility of that great estate which we call human knowledge. Not only so, but this also gives us fresh reason for hoping that India with her well-known power of synthetic and philosophic thought may yet, if she exerts herself, rise once again to a position in which she can lead the world in intellectual advance. But this is a mere possibility and to convert it into an actuality requires strenuous effort, and calls for a revival of our ancient love of learning compared with which the Renaissance of Europe in the Middle Ages would sink into insignificance.

The spirit of modern knowledge is repugnant to vague and unsupported speculations. An unhesitating rejection awaits generalizations, however

attractive, based on mere sentiment or belief, or on an incomplete analysis of experience or experiment. Rigour, logic, precision, attention to detail, a disinclination to gloss over essential differences, and the most rigid power of self-criticism,—these are what modern science demands. These habits of mind are hardly developed by the mere passive absorption of knowledge in the lecture room or library. Indeed, knowledge as embodied in a formal treatise or lecture is apt to convey an impression of static perfection which is deceptive and induces the mind to adopt an attitude of uncritical acceptance. The highest qualities of mind are evoked by knowledge which presents itself in a dynamic but imperfect form, calling for criticism and personal investigation for its adequate appraisal. This is the real value of research as an instrument of education in itself. The attitude of mind habitually adopted by the investigator is the one that not only leads to the advances of knowledge, but also develops his own inherent intellectual powers and enables him to apply his store of knowledge with success to new or old problems that press for solution. The promotion of such an attitude of mind in the intellectual products of the University is a matter of the greatest importance for the welfare of the State.

Real culture includes within itself an appreciation not only of intellectual values but also of social virtues. A truly cultured man has no use for dogmatisms, fanaticisms or unreasoning beliefs or prejudices of any kind. A University ceases to be a temple of learning and becomes a breeding place for the microbes of ignorance if it lends itself to the propagation of the religious antagonisms and of the communal jealousies that disfigure the public life of our country at the present time. A University should, above all things, be a place where personal ability and personal character are alone the passports to success, and a broad tolerance enables men of divergent views to work together for a common cause. If our Universities are animated by such ideals, they will prove a much more potent power for the building up of a great nation than Congresses and Councils, and solve the problem of the future of our country more effectively than Leagues and Legislatures. It is my earnest hope that the younger generation of University-trained men will in this matter have a saner outlook than our self-constituted political leaders. It is to you that I look to see the country set on the high road which leads to national honour and regeneration, and not on the wrong turning which can only lead to national humiliation and decay.

No convocation address can be complete which altogether avoids the political issue. There is no denying the existence to-day, both in British India and in Indian India, of political unrest. There is, however, no better tribute to the wisdom of the administration of His Highness the Maharaja than the fact that this problem is much less acute in Mysore than elsewhere in India. It is often suggested that unrest is due to education and will disappear with a restriction of educational facilities. I entirely disagree with this view, and believe that the real cure for unrest is an extension of education and the provision of special opportunities for those qualified by special energy, intelligence and ability to advance knowledge, to promote its useful applications and thus add to the national efficiency and wealth. On the broader issue of national self-determination, I will suggest to the young graduates of this University, and to others in a similar position elsewhere, that if we wish men of other nations to respect us and yield to our wishes, we must learn to respect ourselves and make ourselves worthy of respect from others. We must abolish slothfulness and self-indulgence, and substitute in their place a mentality that recognizes the highest form of human happiness to be that which is reached by

labour and self-restraint. We must put aside a spirit of defeatism and put in its place a spirit that glories in the overcoming of obstacles. We must learn to appreciate and use the products of Indian labour, however imperfect they may be. We must acquire by labour and thought the secret of craftsmanship which lies in meticulous attention to detail and the continual striving after perfection. We must refrain from copying the vices and expensive habits of other countries and never forget that alcohol and nicotine are the deadliest of poisons known to humanity. Finally, we must never forget that the strength of our people depends quite as much on our women as on our men. The richest rewards are the fruit of labour, study and thought. Self-determination will come, but we must prepare ourselves for it. It is no use asking for freedom if we are not prepared to pay the price for it.

Graduates of the Mysore University, it has been my privilege during the past few years to come into intimate contact with several members of your University, both teachers and students, and to learn to appreciate their zeal and enthusiasm, and the valuable contribution that the Mysore University is making towards the promotion of sound learning in Southern India. I have

been very fortunate during the past few years to have been able to welcome a number of students from Mysore to my laboratory at Calcutta and the ability and industry they displayed was a credit not only to themselves, but also to their teachers and the training they received in your University. Some of them even displayed striking originality and capacity for research, and it is a matter of great regret to me that lack of financial resources prevented me from inducing them to continue their researches at Calcutta beyond the stage of the Master's Degree in Science. I have, however, endeavoured to be of service to such men in procuring for them a suitable career in life. I know also that students from Mysore who have come to Calcutta to study other branches of science besides physics, have won the warm admiration of my colleagues in the University by their capacity and zeal. All this reflects the highest credit on your Alma Mater, and it is my earnest hope that you will resolve in your future career to serve her interests as best as you can. I join with your teachers in wishing for you a prosperous and successful career in life according to your respective abilities. Farewell.
