INDIVIDUALITY AND SCIENCE*

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IN looking over my past research activities, the one idea which impresses me most is the individual diversity among living organisms. Our first published investigations had to do with a group of lower fungi which can be included in the name of bread moulds. Among these we discovered that growths which looked alike might differ in sex and in a wide range of chemical responses.

Another example of cryptic chemical differences was furnished by the black-eyed Susan (*Rudbeckia hirta*). Two races which had yellow instead of purple cones we found could be distinguished by use of strong potash solutions. The treatment turned the cones of one race black and those of the other red.

These examples have to do with innate differences between individuals. Let us consider some examples of differences in which the environment appears to be the controlling factor. One variety of corn has red kernels at the ends of the ears where they are exposed to the sun but white kernels where they are covered. Both the red and the white kernels when planted, however, gave the same kind of offspring. What was inherited was the capacity to become red in a light environment and white in a dark environment.

I used to ask my students to find two apple leaves which were alike. They would start with enthusiasm, but soon would come to realize that two leaves exactly alike could not be found if one used as a simple criterion of identity the possibility of having the two leaves match with all their indentations when one was superimposed upon the other. I would point out that the general pattern of the apple leaf in distinction from that of an oak, for example, was due primarily to its hereditary constitution but that the wide variations in size and shape of leaves and the arrangement of teeth on their edges were modifications of the pattern induced by differences in the environment such as the position of the developing leaf in relation to light and shade, vigour of the twig, its position in the developing bud and other possible factors in internal environment.

With these considerations in mind it is not difficult to realize that probably no two trees in orchard or forest can ever be exactly alike, since in addition to the modifications brought about by variations in environment we have the modifications brought about by differences in hereditary constitution.

Although we can influence the character of organisms through the environment, it is generally believed that we have no control over their heredity. This is not entirely true.

Records this month on seedlings of jimson-weed which had grown from seeds buried for thirty-nine years in soil at the U.S. Department of Agriculture in Arlington seem to be showing an increased rate of mutations. We cannot predict, however, the exact types of hereditary changes that will be induced by ageing and other stimuli. In some cases in the jimson-weed, however, we have used mutated chromosomes with which to synthesize new pure-breeding types with predicted characteristics. By attention to the total number of their chromosomes we have reduced their ability to hybridize with their parental types and

hence feel justified in calling them synthesized new species.

By one method we have succeeded in exercising conscious control over heredity, and are able to predict with reasonable accuracy the characteristics of the new types induced through doubling their chromosome number by means of colchicine. In our own and other laboratories new species have been produced by doubling the chromosome number of sterile species hybrids, and new species are known to have been produced by this method in Nature.

In many biological problems affecting human beings, science has had to look to botanists to lead the way. I need to remind you only of the original discovery of the mechanism of heredity by Mendel from his work on garden peas and its later independent rediscovery by three botanists. My interest in human individuality came from my experience with plants. It all started from a botanical problem in 1917 when we were trying to classify the colours of a segregating pedigree of Verbenas. A particular pink-flowered form was very fragrant to me but had absolutely no odour to my assistant. On the other hand, a certain red-flowered Verbena was fragrant to him but not to me. Some of the people in our laboratories agreed with me and some with my assistant. Only a very few found fragrance in both kinds of flowers.

Phenyl-thio-carbamide is a good reagent with which to show innate differences between people. Some of those we have tested need to have the solutions of this reagent more than eight thousand times as strong as others in order to taste it. The inability to taste the commercial crystals is inherited like blue eyes as a Mendelian recessive character; but different grades of taste acuteness have also been shown to be inherited. Numerous tests with other substances only emphasize the wide differences between people in their taste reactions.

The individual reactions of taste are dependent primarily upon innate hereditary factors, and the environment appears of relatively little importance. With smell the condition is quite the opposite. Probably even wider innate differences exist between people in their acuteness of smell than of taste, but environmental factors in abundance prevent the full expression of these hereditary differences. Thus age is a potent factor progressively dulling the sense of smell. A considerable number of people have lost their sense of smell entirely. Temporary conditions of a person, such as a cold in the head, may adversely affect his ability to smell. After being exposed to an odour for a time it becomes no longer perceptible. Olfactory fatigue apparently may be produced even by concentrations too weak to be detected. This is probably the explanation of asphyxiation of people by gradually increasing concentrations of gas which they never detected.

The sense of smell does not play as important a part in man as in many of the lower animals in bringing us information about the external world. There is not a negligible number of people, however, who can distinguish different individuals by odour in the same way in which dogs can distinguish individuals by scent alone. This power is more frequent in children but is often retained into adult life when it is generally concealed on account of the social taboo against speaking of personal odours. Several parents have informed me that certain of their children when young by smelling a handkerchief they had picked up could tell to which member of the family it belonged, but this ability had been lost after they had grown up.

*Substance of the address of the retiring president of the American Association for the Advancement of Science, delivered at Dallas, Texas, on December 29.

Associations are especially powerful with the sense of smell, but they exist with all the senses. So long as we live we are building up associations and developing our personality through reactions with our environment which express themselves in likes and dislikes. Likes and dislikes are important determiners of our behaviour.

The examples just given of the influence of heredity and environment have been taken from the senses of taste and smell. All the other senses are similarly subject to internal and external influence. I need only mention the innate differences in musical discrimination disclosed by Seashore and the progressive decrease, under the environmental influence of age, in the pitch or number of sound vibrations one can distinguish at a given intensity. There are a host of other responses which contribute to human individuality. Among these are the blood groups, the natural and acquired susceptibilities and immunities to disease and chemical substances, the allergies and the reactions to hormones and vitamins. The Binet and other mental tests have disclosed great differences between individuals in mental equipment.

cases, by a majority of only one. With its broadly changed complexion since early New Deal days, one might expect less diversity in judgment at the present time. This does not seem to be the case judging from a recent news report of the first two decision days of the present term. Within two weeks there were brought in three 5-to-4 and two 6-to-3 decisions. None of the justices during this time had failed to enter at least one dissent and all except two had more. We cannot here attempt to analyse the elements in these differences in judgments. Such blanket terms as liberal and conservative suggest the influence of innate disposition and also of such environmental factors as advancing age. If we remember our experiments with taste and smell we may agree that judgments of drinkers regarding the taste of beer and judgments of the Supreme Court regarding issues of law cannot help differing because men both are born different and have differences thrust upon them by their environment.

Differences in expression in art, music and literature can likewise be attributed to influences of heredity and environment. I have personally been inter-

VOTES FOR TITLES IN RELATION TO POSITION ON BALLOT, LANCASTER, PA., JANUARY 30, 1941

Titles		Position on Ballot*					Total votes	Percent of total	Rank
		1st	2nd	3rd	4th	5th			
Males	Why people differ	2.08 A	5.26 E	5.26 D	7.69 C	9.26 B	15	6.02	4
	Differences between people in taste and smell ...	44.4 B	70.83 A	63.16 E	59.65 D	69.23 C	152	61.04	1
	What makes differences in personality ...	1.92 C	14.81 B	6.25 A	5.26 E	8.77 D	19	7.63	3
	Demonstrations of heredity and environment ...	3.51 D	3.85 C	11.11 B	4.17 A	2.63 E	13	5.22	5
	Why each person lives in a different world ...	23.68 E	22.81 D	17.31 C	20.37 B	16.67 A	50	20.08	2
	Total number	37	59	45	53	55	249	99.99	
	Per cent	14.86	23.69	18.07	21.29	22.09	100.00		
Females	Why people differ	8.70 A	2.17 E	10.53 D	9.30 C	8.57 B	16	7.69	3
	Differences between people in taste and smell ...	62.86 B	47.83 A	65.22 E	57.89 D	60.47 C	122	58.65	1
	What makes differences in personality ...	4.65 C		10.87 A	4.35 E	7.89 D	12	5.77	4
	Demonstrations of heredity and environment ...	5.26 D		5.71 B	6.52 A	10.87 E	12	5.77	4
	Why each person lives in a different world ...	17.39 E	18.42 D	25.58 C	22.86 B	26.09 A	46	22.12	2
	Total number	38	52	39	49	49	208	100.00	
	Per cent	18.27	14.42	25.00	18.75	23.56	100.00		

*Five titles were listed in different orders on five ballots A to E.

Numbers under each position are percentages of votes cast for given title on the ballot indicated by letter at right of figure.

Males: Ballot A was voted 48 times; B, 54 times; C, 52 times; D, 57 times; E, 38 times.

Females: Ballot A was voted 46 times; B, 35 times; C, 43 times; D, 38 times; E, 46 times.

It will be granted no doubt that there are great differences between people in their sensory judgments regarding the world in which they live and that these differences are influenced in varying degree by factors of both heredity and environment. Is this true of man's mental and spiritual judgments? I believe it is even more so. A few simple examples may be given.

At the end of a meeting held at Lancaster, Pa., the audience was asked to select the best title among five which had been suggested for the lecture just given (see table). It might be thought that since all had heard the same lecture, there would have been considerable unanimity in preference. This was not the case, however. Though two titles had more votes than the others, each of the five titles was preferred by a considerable number. Here again we may be reasonably sure that factors of both heredity and environment did influence the mental judgments regarding the best title.

The Supreme Court of the United States is composed of outstanding minds. Their honesty is unquestioned, and they are freed from even the unconscious pressure of political expediency. Here, if anywhere, we should expect unanimity. The Supreme Court, however, from its early history had rendered numerous decisions by a divided vote and in many instances, including some of the most important

ested in studying the manner in which trees have been used in art. Styles in method of representation are evident, but the artists differ in the way in which trees appeal to them. Some are interested in individual trees, others in groups. Some prefer trees in the foreground, others in the background or in the middle distance. There are differences also in the species of trees which different artists like best.

We have given examples of differences in plants and animals such that no two individuals are exactly alike and have classified the causes of these differences into the interacting factors of heredity and environment. We have shown that both heredity and environment are likewise responsible for the diversities in man, not only in his physical structure and sensory reactions but also in his mental and moral judgments. Every thought and act of our lives is influenced by these two factors. Man has used his knowledge of heredity and environment to mould plants and animals to his personal advantage. Can this be done with man himself? To some extent, yes, but the way is not so clear.

I know of no adequate evidence that man to-day is a better animal physically or mentally than at the dawn of history. While man's biological evolution during these five thousand years and more has seemed to lag, and at the present time has appeared to many

to have been thrown into reverse, man's environment has changed markedly even within our own lives. Conscious control of human heredity, though a desired goal, will at best be slow even if our genetic knowledge were adequate for the task. Changing man's environment gives promise of more rapid betterment of human individuals, and in this effort we are far from reaching diminishing returns.

But the facts of individuality and the relative influence of heredity and environment upon personality must be carefully estimated in any rational campaign for permanent social betterment. Such knowledge has power to revolutionize our ideals and practice in social and religious justice, charity and education, methods of legislation and forms of government. Methods of education, for example, have been severely criticized for mass regulations which fail to take adequate account of individual excellences. Similar criticisms come from the so-called exact sciences, mathematics, physics and chemistry, against the difficult, less exact biological sciences, botany and zoology, and some would even deny the name of science to those most difficult studies of man's social behaviour. For years the educational world has been struggling with the problem of how best to deal with the increasingly recognized differences in mental ability, differences which, like those we have found in taste reactions, are of two kinds: a difference between general marked ability and general mediocrity and a difference between ability in certain lines such as mathematics, science, art or literature.

I recently wrote to the sixteen living past presidents of our Association and asked them if they could satisfy the enclosed New York State requirements for teaching in the State secondary schools. Not one of the past presidents of the American Association for the Advancement of Science would be allowed to teach science in a New York high school without further preparation since none had taken the required instruction, which included such subjects as the psychology, history, philosophy, principles and practice of education. One past president properly remarked that not all presidents would have been good secondary school teachers. It is a fact, however, that more than a quarter have had secondary school teaching experience, but could not now qualify under present requirements. This is not at the present time a serious deprivation of the freedom of these men, but some believe the State methods of selecting teachers place undue emphasis upon relatively unimportant requirements. Some educators have told us that in the balance between method and subject-matter they believed the pendulum had swung too far towards method.

Blanket regulations may make for ease of administration, but too great uniformity may preclude the assets of individuality. Uniform laws throughout the States would have certain advantages, but they might not be equally well adjusted to local environments and might prevent profitable experiments in local government. The increased means of communication throughout the world appear a mixed blessing. They tend to standardize our thoughts and behaviour in a common mould, but at the same time to decrease the material expressions of individuality available for social evolution through natural selection.

Opposition to totalitarianism is not merely because it attacks man's rights but also because it suppresses his personality. Individuality is the kernel of democracy, the biological basis of the struggle for freedom. When we fight for individuality we fight on the side

of Nature. Recognition of individuality and all that it implies especially concerns us as men of science. Even if science were again persecuted and driven under cover, as it was in the Middle Ages, there would still be some brave inquiring minds. But science cannot flourish without freedom of thought and its expression.

Why do I emphasize the value of individuality to science? Because I believe science is the great hope of mankind.

In speaking of science and men of science it should be clear I am not confining attention to the professionals. Whoever by observation or experimentation is responsible for increased knowledge of the world in which we live is a servant of science and contributes to the welfare of mankind. In this connexion it is appropriate to mention that in Colonial times keen observers had discovered the causal connexion between barberry bushes and infestations of wheat rust and had passed laws in Massachusetts for the eradication of barberries long before botanists learned that a necessary stage in the life-cycle of this rust is confined to the barberry.

Science is under fire for the suffering brought about by its applications, especially in the present war. Science is in no position to disavow its responsibilities in the problems of peace and war. As in epidemics of disease due to ignorance of medicine we need not less but more medical knowledge, so in seeking a cure for the scourge of war we need not less but more science. The remedy we trust may ultimately be found by that most difficult of all biological sciences—the study of motives and human behaviour. Science can reply to its critics that the applications of science are merely tools which men with good or bad motives use for their good or evil ends. The same can be said of printing. Even if we admit the responsibility of science for deaths due to its applications we will find that its applications have brought about even greater savings of life. The legend to a reproduction of the title page of Jenner's paper on vaccination published in 1798 reads: "The application of the facts presented in this paper has probably saved more lives than the total of all lives lost in war." The statement is easy to believe, since it has been estimated by Haggard that in the hundred years preceding Jenner's paper, sixty million people in Europe died of smallpox.

In war itself science has not been alone destructive, as may be seen from figures supplied by the Surgeon General's office regarding the annual death-rate per thousand in the United States Army for the Mexican War, the Civil War and the first World War. Deaths due to battle injuries increased from 15 per thousand for the Mexican War through 33 for the Civil War to 53 for the World War. The death-rate due to disease, however, decreased from 110 through 65 to 19 for the World War. The net result is that the total death-rate actually declined, from 125 in the Mexican War through 98 in the Civil War to 72 per thousand in the World War. It is a satisfaction to feel that though implements of war have increased in destructiveness, those who are fighting to preserve our free way of life may not be subjected to greater risks than our forefathers assumed when they too fought for their country.

It can scarcely be emphasized too strongly that it is not man's material comforts nor even the alleviation of his physical pains which are the greatest gifts of science to mankind. Science has freed men's minds. Foremost among liberating ideas is the belief that there is order and law in the universe and that this

order can be discovered by questioning Nature herself. Such belief was rare in the Middle Ages when processes of Nature were generally attributed to supernatural causes: winds and storms to demons, comets and epidemics to the wrath of the Almighty towards a sinful world, and investigations of Nature were persecuted by both Church and State as Satanic magic and sacrilegious questioning of the acts of God. The Copernican theory widened our physical horizons and showed our earth as a tiny speck in a universe of worlds. The theory of evolution brought a unity to our ideas of the organic world. The discovery of the mechanism of inheritance allowed an evaluation of the contributions of heredity and environment to the personality of individuals. The experimental method with adequate controls is the most valuable tool science has yet developed. Its understanding and use in daily life would mean more than all the scientific facts that schools can teach.

Science has helped to free man's soul. It has broadened the horizons of religion and given it a new point of view away from the old intolerant, materialistic theology when men sought their own salvation from selfish hope of heaven or fear of hell and persecuted or even killed those who did not conform to the authority of orthodox beliefs. Elimination of such incumbrances has left to religion a freer field for the cultivation of its great spiritual values.

Science has banished much of ignorance and superstition, but much remains. Recently in New York's Pennsylvania Station I purchased seven different magazines on astrology. One of them, and this not the best seller according to my newsdealer, I found had a monthly paid circulation of more than 132,000 copies. The readers of these astrological journals are part of our democracy and help to form the policies of our Government. Other examples need not be given to show that the scientific method has not yet saturated our land.

If we consider past efforts to better mankind, it is clear that good intentions are untrustworthy criteria of service to humanity. The biblical criterion—"By their fruits ye shall know them"—is biologically sound doctrine and still the best test. The attempts to suppress independent thought and study of Nature in the Middle Ages, and up to the not distant past in our own country, were inspired by noble motives, but they put civilization back by many centuries. The Crusaders had a lofty purpose but a trivial objective: the capture of an empty tomb, with all too slight appreciation of the teachings of Him whom the tomb had held.

During the plague of the seventeenth century when twenty-five million people or a quarter of the population of Europe died of this dread disease, there were doubtless, as there should have been, hospitals and other organized efforts to minister to the sick and dying. We can imagine the scant attention that would have been then paid to a request for a grant for a scientific study of the life habits of such creatures as rats, fleas and the wriggling animalcules which Leeuwenhoek discovered at about this time in drops of putrid water. Yet our knowledge of rats, fleas and bacteria is one reason why centuries later pest hospitals are not found in London and we no longer dread the plague. The illustration given is an example of the unsuspected value of knowledge in apparently unrelated fields. Many other examples could be given of the service of science to human welfare, a service which is often indirect. The ancients used human sacrifices to ensure bountiful

harvests. Now we use commercial fertilizers for this purpose and find them more efficient. In the old days people fought yellow fever and smallpox by church rites and religious processions. Now we fight these diseases by killing mosquitoes and by vaccination. Formerly thousands of people were executed on the ground that they were witches. Science has proved that witchcraft does not exist. It would be difficult to give from history as striking examples of success in direct efforts to improve the condition of mankind without the aid of science.

Knowledge is power also in our efforts towards human betterment. We must learn the facts about the environment in which we live if we wish to adjust ourselves into harmony with it. Efforts against Nature are doomed to failure despite high motives. It is for this reason we believe that in a rational programme for human betterment science—the free search for truth—is in the long run the best investment. If what I have said is true, it lays upon us all, both scientist and layman, a responsibility for the advancement of science, free and unhindered as a service to mankind. Think where we would have been now if in the Dark Ages men like Copernicus, Galileo, Albertus Magnus, Roger and Francis Bacon among other inquiring minds had been able to carry on their scientific investigations in an atmosphere of intellectual freedom. Our most difficult sciences might now have reached the stage occupied by biology, for example, and we might already have found a remedy for our present sick civilization.

How can science best be fostered? I need offer only a few suggestions.

Science, in common with all intellectual pursuits, needs tolerance, freedom from restraint and a recognition of the value of individuality. Men differ widely in their capacities for research. A great need therefore in the advancement of science, as of other intellectual endeavours, is to devise means for discovering the exceptional abilities at an early age and giving such abilities exceptional opportunities in order that their span of effective service with its social values may be prolonged.

The public, whom science serves, knows all too little what science really means. The magic and gadgetry of scientific applications rather than the methods and ideals of science make the great appeal. Yet the ideals and methods would help society reach judgments on the basis of ascertained facts rather than through emotional appeal and personal profit, and would transform our daily lives if universally applied. Think what a chance would come if our representatives in legislative halls should open each session with the prayer of Huxley: "God give me strength to face a fact though it slay me"—and really mean it.

A common comment of a layman after visiting a laboratory and having research explained to him is: "What great patience scientists must have!". The real thought appears to be how can reasonably intelligent men, as men of science seem to be, be content to spend time in such trivial and uninteresting details. The layman seems to feel as he might in watching a small child picking up little white pebbles laboriously one by one and putting them into a bucket, and then taking them out again one by one in the same painstaking manner. Yet this same layman sees reason in taking a stick and whacking a diminutive white ball over a field, alone or in company with others, and each time he gets it into a little sunken bucket he takes it out again and whacks it to another bucket of the same dimensions. Science as well as golf is a sport to those

who play the game and there is a chance of some bit of human value when the game is done.

In the promotion of human welfare through the advancement of science, men of science and the public have a common interest and may have a common share. I believe the American Association is especially adapted to furthering these common interests and could profitably undertake a study looking towards the development of a more effective programme that would serve the aims of man of science and layman alike.

In the United States as nowhere else patrons of art, literature and science have made investments in human good. The yields in benefits secured have varied much, but sometimes have been slight because the investments have been unsound. We trust that those of philanthropic intent who wish to promote human welfare through the methods of science will subject their donations to as careful checks as they would a financial investment in order to ensure a profitable yield in the way of scientific dividends. A newly established National Science Fund is in position to serve as a clearing house for advice on the probable scientific dividends which may be expected from investments in science.

Although we do, each of us, live in different and more or less separate worlds of our own, I trust we shall ultimately be able to acquire a social organization as orderly as the constellations of other worlds. In our fight for individuality and freedom in this War and in the peace to come, I do not despair. The experimental method has demonstrated we must use force without stint to show that freedom and political morality as well as personal honesty really pay. We still cherish the faith that the free search for truth by the methods of science has power to rebuild the world and will prevail.

SRINIVASA RAMANUJAN*

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SRINIVASA RAMANUJAN was a mathematician so great that his name transcends jealousies, the one superlatively great mathematician whom India has produced in the last thousand years. He was born at the village of Erode in Tanjore on December 22, 1887. His parents were Brahmins of high caste, but very poor, and without any means of direct access to influential people. Srinivasa's mathematical ability was soon recognized at the high school at the neighbouring town of Kumbakonam, which he entered at the age of seven. We are told with what delight the big sixth-form boys found at the bottom of the school a youngster who was ready to do all their hard sums for them, and with what mixed feelings he read in their books theorems which he had discovered for himself. In 1903, a few months before he left the high school with a scholarship to the Government college in the same town, there came into his hands a "Synopsis of Mathematics", a book containing the enunciations of some six thousand theorems, for the most part without proofs, and Ramanujan set to work systematically to establish the results. Geometry did not appeal to him, but

in algebra and calculus he found himself in a magic world, in which he lived for the next ten years. In proving one formula he discovered many others, and he began to compile a note-book, the first of the note-books which afterwards became famous.

Unfortunately, Ramanujan lived too completely in his new world. College regulations could secure his bodily presence at a lecture on history or physiology, but his mind was free, or, shall we say, was the slave of his genius. We know now that to describe one hour which Srinivasa Ramanujan spent on mathematics as mis-spent is absurd, but to the college authorities he was just a student who was neglecting flagrantly all but one of the subjects he was supposed to be studying. The penalty was inevitable: his scholarship was taken away, and he was told that he must repeat the year's course. So he ran away, and what he did and how he lived for the next few years is not on record. He returned to college for a short time, but failed to secure any academic qualifications.

Away from college, Ramanujan's wants were few, and for five years he was able to satisfy them without interrupting his investigations. But in 1909 he married, and needed definite employment. His unfortunate college record was a serious obstacle, and he obtained introductions from one to another of three Indian mathematicians, Ramaswami Aiyar at Tirukoilur, Seshu Aiyar in Madras, and Ramachandra Rao at Nellore, to whom in turn he produced his note-books as evidence that he was not the incorrigible idler his failures seemed to imply. Ramachandra Rao has given an account of Ramanujan's first interviews with him:

"Several years ago, a nephew of mine, perfectly innocent of mathematical knowledge, spoke to me: 'Uncle, I have a visitor who talks of mathematics. I do not understand him. Can you see if there is anything in his talk?' And in the plenitude of my mathematical wisdom, I condescended to permit Ramanujan to walk into my presence. A short, uncouth figure, stout, unshaved, not over-clean, with one conspicuous feature—shining eyes—walked in, with a frayed note-book under his arm. He was miserably poor. He had run away from Kumbakonam to get leisure in Madras to pursue his studies. He never craved for any distinction. He wanted leisure; in other words, simple food to be provided for him without exertion on his part, and that he should be allowed to dream on.

"He opened his note-book, and began to explain some of his discoveries. I saw quite at once that there was something out of the way, but my knowledge did not permit me to judge whether he talked sense or nonsense. Suspending judgment, I asked him to come over again, and he did. And then he had gauged my ignorance, and showed me some of his simpler results. I asked him what he wanted. He said he just wanted a pittance to live on so that he might pursue his researches. It is a matter of considerable pride to me that I was in some way useful to this remarkable genius in his earlier days."

Ramachandra Rao's interest took the most practical and generous form. He sent Ramanujan back to Madras so that he might work at the University there, and for a little more than a year he maintained him at his own expense. Many people, in India and in England, have been proud that they helped Ramanujan; of them all, perhaps his first benefactor deserves the highest praise.

* A talk broadcast in Hindustani in the Indian service on April 22, 1941.