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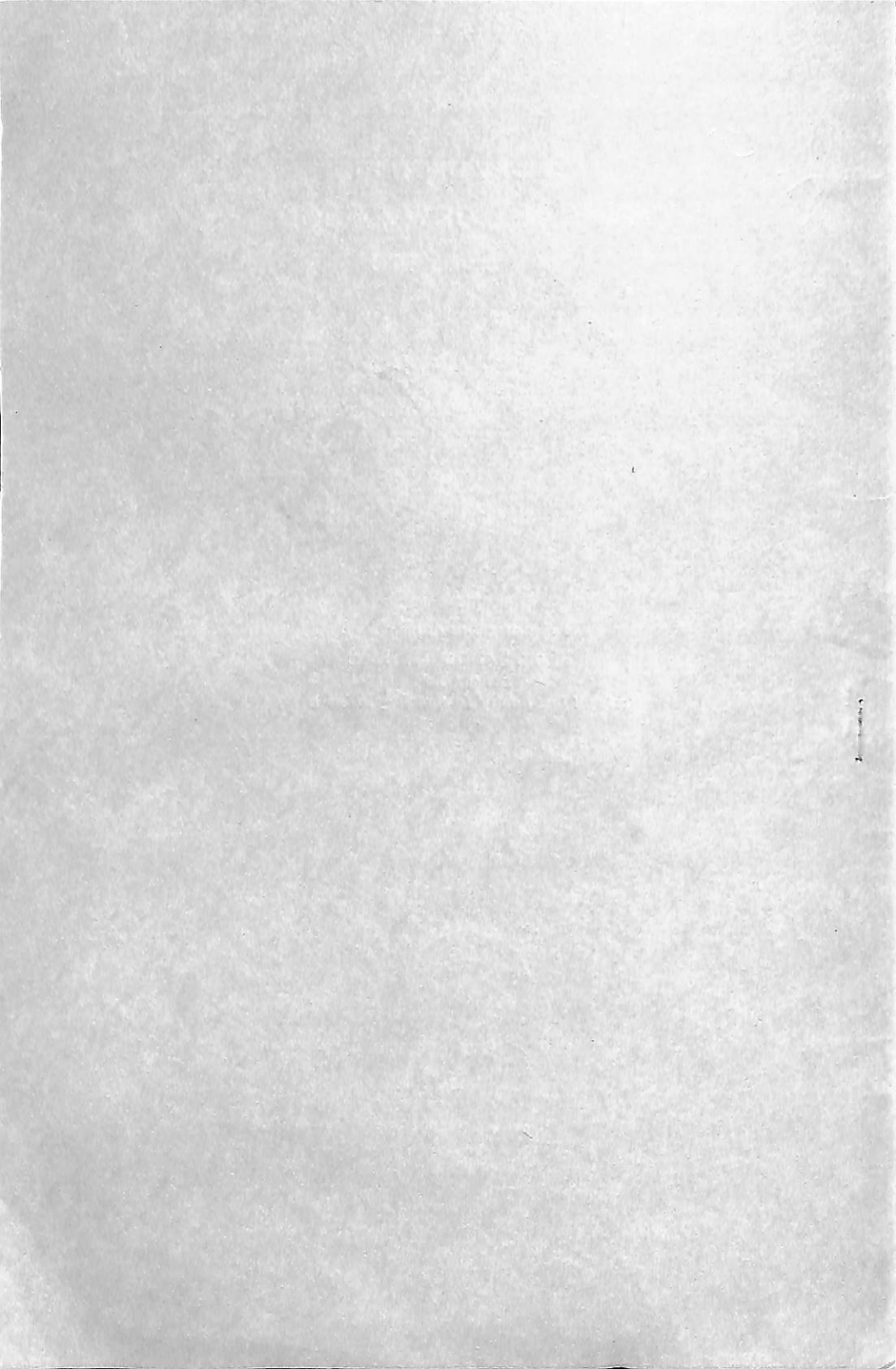
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CREATIVITY, INNOVATION AND PUBLIC EXPECTATIONS

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The Chancellor of Jadavpur University and the Governor of West Bengal, Honourable Shri Viren J. Shah, the distinguished Vice-Chancellor of Jadavpur University, Prof Asok Nath Basu. Members of the Academic Bodies of the University. Teachers and Staff Members, my dear students, ladies and gentlemen:

I am deeply privileged to be here to witness Jadavpur University's latest contribution to enrich our country's resource base of trained human power, ranging in expertise from engineering and natural sciences to subject areas in the humanities that deal with as yet dimly understood higher domains of the human brain.

I congratulate the outgoing students on their academic accomplishments as they step out to face the world, confident in the outstanding education they have received at this great centre of learning and research. I also applaud the efforts of the Vice Chancellor, Prof Basu, and all the Faculty and Staff Members of the University for their untiring vigil that has ensured a delicate balance of scholarly freedom and enlightened discipline that distinguishes an excellent programme of education from a pedestrian one.

The Annual Convocation of a multifaceted institution such as Jadavpur University is an event of profound significance. It is both an occasion to rejoice and take pride in the achievements of the outgoing class, and an interlude for deep introspection. This introspection may certainly be on strategies to surpass the performances of the past, but may perhaps even more usefully be on the purpose of the carefully tended groves of academe', so that rededication to future commitments may become more meaningful.

Not being used to addressing an audience of professionals from diverse disciplines on an occasion as solemn as the Convocation of one of the finest academic institutions anywhere, I have anticipated, I hope not entirely incorrectly, that the divergent interests of this audience might converge in a common concern about issues of academic purpose and utility. I will attempt to approach this Gordian knot indirectly from a terrain somewhat familiar to

me, and explore with you the impact of science and technology on public health, the nature of scientific creativity and technological innovation, the societal expectations from science, technology and academia, and my personal unease with the increasing influence irrational viewpoints are exerting on public policy matters of late.

I hope you will bear with me as I wade through these perilous waters.

Let me begin by emphasizing a commonality of purpose in academic pursuits that, all too sadly, we have begun to ignore, to our cost. The core point of academe is to try to understand the human condition, in all its details, all its nuances, all its contexts and situations. The academic enterprise therefore is basically collegial in nature. The understanding we seek is not a personal revelation, but a shared venture in which each step is explicable and communicable by reason and argument to the community. We hope that this increasingly sophisticated comprehension of our world and ourselves would allow us to think of ways to improve the human condition. This is the vision that holds all of us together; - scholars in the natural sciences, the social sciences, as well as the humanities. In this broad sense, therefore, science and the scientific methodology, is at the heart of all academic endeavour. When I speak of science as I go further, it is possible that I may seem to be concerned only with biomedical science, given the terrain I am somewhat familiar with, but my real concern is for the entire common base of collegial, rational scholarship that constitutes the academe’.

As I ponder the global milieu in the new century, the booming voice of our revered Professor of English at Presidency College reciting the Dickensian ode rings frequently in my ears:

‘It was the best of times, it was the worst of times.

It was the age of wisdom, it was the age of foolishness.

It was the season of Light, it was the season of Darkness...’

Dickens of course used these immortal words to describe the ambience of Paris during the French Revolution. Prophetically, these words describe our times as well in many ways.

Despite two World Wars and numerous lesser ones of increasing ferocity, ours has been the best of times globally, because the 20th was the first century in which mankind as a whole has had some respite from the constant

fear of premature death. Life expectancy has risen from about 30 years at the end of the 19th century to about 80 years in most developed countries now. Even an Indian can expect to live to be about 64 today while at independence the figure was only about 33.

Paradoxically, ours could also turn out to be the worst of times, perhaps in part because we have come to expect a great deal. While life expectancy has increased, we do not know how to prevent or cure the deluge of new and re-emerging diseases. Coupled with the epidemic surge of AIDS, drug-resistant microbes pose hazards of calamitous dimension to public health. Treatment of a single case of multi-drug resistant tuberculosis costs up to \$250,000 in the U.S. At development cost of over \$500 million dollars each and 10-15 gestation years per new drug, even chemotherapy is fast becoming unaffordable.

We are living in dubious and dangerous times indeed. Healthcare infrastructure is strained almost to the breaking point the world over. It is ironic that, despite the phenomenal improvement in the human condition in the 20th century, the inequities in healthcare delivery are causing rapid erosion of public trust not merely in modern medicine, but in the very foundational practices of science, especially in the Third World. Failure to ensure equity and sensibility is certain to increase social discordance in the coming century. In other words, social policy, particularly in technology-related areas, is now inextricably linked to the public perception of and support for science and scholarship. Academics must look critically at the evolving global scenarios in this context.

Over the past decade or so, India has been taking tentative steps to open its economy and participate in the global economic order with the profit and dignity due to a nation of a billion people. The stormwinds of globalisation have knocked down the protected little spaces where technologies could be borrowed, bought or re-engineered and adopted to our circumstances at our own slow pace by the sheltered domestic industrial sector, both public and private.

We are slowly internalising a basic lesson of this new global economic order: - that material progress of a nation crucially depends on the unique technological capabilities it can muster. It is also quite clear that in order to ensure fulfillment of the aspirations of national well-being, global

technological trade partnership on equitable footing must be a primary goal for all nations that cherish their sovereignty. We learnt this hard lesson with the demonstration that the logic of the globally integrated economic order propels transnational corporations not only to dominate international technology, trade and commerce, but also to exercise overwhelming proprietary control on knowledge bases through patent protection. In this scenario, only nations with strong scientific knowledge bases of their own can achieve steady high-level outputs of proprietary cutting-edge technologies. Only such nations can withstand and absorb scientific and technological shock waves generated elsewhere to respond with a resonance extending the frontiers of science and technology. How do we go about reaching this El Dorado?

Experience of the developed nations shows that competitive technology generation requires the bedrock of a comprehensive knowledge base built with rigorous fundamental research of the highest scientific merit. Building such an intellectual resource base requires enormous time, patience, financial and human resources that are difficult to muster by most countries of the third world. In contrast, developed countries have been investing large public funds consistently for many decades in the enterprise of knowledge generation. It is therefore no wonder that harnessing new knowledge for better technology has so far largely been their preserve.

For many years the benefits of the knowledge bases generated by affluent nations did trickle down to the poor ones as well. However, of late there has been a subtle change in the perception of scientific pursuits in the developed countries. From the urge to fulfill a social contract for altruistic motives, science is undergoing a metamorphosis into a source of financial gains for the investors as well as the scientists. Consequently, commercial interests rather than the urgency of the basic needs of the third world citizens determine the research priorities of the first world. Thus, for example, today the underprivileged third world bears the brunt of the big five of health problems - population, pollution, malaria, tuberculosis and acute respiratory infections, - along with the ruthlessness of the economic big five.

In formulating health policies, a great deal of hope is pinned on new biology as the wellspring of new, futuristic technologies because of the molecular insights into life processes it provides. New biology is the outcome of the convergence since the 1940's of the three major streams of biology:

biochemistry, cell biology and genetics. In fact, the powerful molecular approaches of new biology for studying disease processes has spawned a new biopharmaceutical industry that specializes in studying mechanisms of diseases and applies that knowledge to their diagnosis, prevention and treatment. The portfolio of products already in the market and under development of this new molecular medicine industry is certainly impressive, to say the least.

As a result, fuelled by this kind of hope, and hype from specialists, about the immediate value of new biology and its techno-twin, biotechnology, the lay public in developed nations (especially in the USA) supports an enormous biomedical research endeavour eagerly awaiting the emergence of new healthcare technologies for Century 21. Consequently, healthcare harvest of new biology has so far been for the developed countries to enjoy, by and large. Of late, these nations have begun insisting on overwhelming proprietary controls on knowledge bases generated from these efforts. Accordingly, the commercial interests of both the developed countries and of the elite of the Third World determine the priorities of biomedical research agenda the world over, rather than the urgency of the basic needs of poor Third World citizens, creating a worrying schism between expectations and realities in the Third World.

Two factors exacerbate this schism. The lacunae in healthcare delivery to the poor (both in the First and in the Third World) are due to resource constraints and implementation failures far more than the lack of technologies. Secondly, a lot of the new biomedical research agenda is based on hype, as seen in the recent fuss being made of genomics, which is unlikely to translate into real life utility (other than increasing share prices of select companies) any time soon. The reality is that improvements in healthcare over the short term do not need biomedical research as critically as they need political and administrative will. On the other hand, restraining biomedical research with the mindless rope of short-term expectations stands guaranteed to lose us the real and enormous long-term benefits by way of unpredicted futuristic technologies that rigorous, competent research has been historically shown to bring.

I have traced the thread of these arguments in the hope of bringing you to an appreciation of the centrality, and therefore the vulnerability, of science and technology for crucial issues of public policy in our country. I submit that, as

a society, we have begun to expect short-term 'fixes' from our science- and technology-driven approaches to public policy. This does not happen, since our short-term problems are related to the lack of distributive justice and representative political will, and these cannot be sidestepped by any techno-fixes, however clever. This inability to separate actions necessary for short-term and long-term gains from science and technology has led to growing gaps between fantasy and reality.

There are two casualties of this state of affairs. One is the long-term gain that scholarship, science and technology can bring to any society. In order for these gains to be realized, it is essential to support creative science, be it social or natural, as a primary goal, and recognize that internal excellence can be the only useful agenda for such science.

Although basic science is the least costly component of technological innovation, in this era of economic stresses, the temptation is to brand some scientific fields, particularly in the natural sciences, as crucial to the nation's welfare and others less so. However, one cannot choose selective excellence in science. It is essential that all of the major fields of scholarship develop at strong levels of activity and excellence.

We must also recognize that any creative scholarly enterprise requires an ambience that takes long to develop, but once developed and sustained it pays – it pays handsomely as the developed nations have shown. Creativity however is a complex phenomenon and cannot be ordained by fiat. Experience shows that creativity flourishes in a society that allows space for personal initiative, has patience for ideas to mature, encourages debate and criticism, welcomes the new, and respects specialized expertise. A myopic societal focus on attempting the impossible, which is to replace political solutions by technological band-aids, has begun to damage this basic delicate fabric so essential to outstanding scholarship.

The second casualty of the present state of unreal expectations from academia is the angry rejection of scholarship, scientific methodology and temper in matters of public policy and its societal moorings. One dangerous consequence already visible is the increasing influence anti-science and irrational viewpoints are exerting on public policy matters concerning public health. There are instances galore, both in the First World and in the Third. We know the irrational edge that the debate on genetically modified food takes on,

even in otherwise technology-savvy societies such as Germany. Another germane instance is the assertion by the President of South Africa in the recent past that HIV may not be the cause of AIDS. Or, take the mounting pressure in USA to change the time-honoured practice of scientific peer review system of the NIH to stop funding of projects that address ways to affect the behavior of people at high risk for spreading sexually transmitted diseases or study family structure and its impact on children, all issues of paramount relevance to public health, because the knowledge derived from such work alone can suggest ways to reach high-risk groups with effective intervention. Closer to home is the fanatic zeal of an influential erstwhile Union Minister in India for regulating animal experimentation with ill-informed rules and their motivated implementation, which has made serious real-life biomedical research nearly impossible to pursue in India, or the mind-boggling support to shamanic rituals being offered by yet another Union minister. In this situation, what needs to be done, then, - what should we do?

Ladies and Gentlemen, we must take valiant proactive stances now to resist the impending slide into a lifestyle governed by irrational beliefs and political expediencies, which inevitably degenerates into the abject intolerance mankind endured in the medieval period. For our times, the lessons of the McCarthy era in the early 1950's in the USA and the Lysenko doctrine in the erstwhile USSR should still be fresh in our memory as should the Talibanisation of Afghanistan, as well as the straws in the wind at home here.

On the one hand, we need to stop the hubris-driven pretence that our scholarship can provide short-term answers for societal problems. After all, in the short term, we are part of the political problem as well part of the democratic solution. Above all, we must stop being cavalier about the value of higher education and pursuit of knowledge. We must reject the foolish boast of possessing the third largest scientific and technical manpower. We must strive for excellence in scholarship, - in all its forms. We must combat the perennial fiscal drought of our universities for the right reason, - that it is a crime against unborn generations. Only with unflinching rigor can we tap for home use the cream of our billion people-worth gene pool, which already drives the science-based technology and economic engine from America to Zambia.

We must couple intensification of publicly funded efforts to attain critical masses for generation of trained manpower and knowledge base with a fierce

will to demand that we be made responsible for excellence. We must insist on our hard-earned right to be of help where we can be of most help. We, as natural scientists, must decipher the mysterious levels of natural phenomena, of the human body and the deep oceans and the distant stars and the depths of time. We, as social scientists, must see with greater and greater comprehension in the mirror of humanity, of this vast, chaotic, cooperatively competitive enterprise we have embarked on out of Africa a hundred and fifty thousand years ago. And we, as humanists, must create both the visions and the arguments that will replace the faith that takes on blind trust with the wisdom that comes of this understanding.

If we do not, or are allowed not, it appears appropriate to recall what the Poet of Poets said although in a different context; - *Ke tahader moner katha loye, beemar tare tulbe pratidhawani, ami jodi bhober kule bosey, parokaler bhalo-mondoyi gone? Tribhubaner gôpan kathakhani, ke jagiye tulbe thahar mone, ami jodi amar mukti niye jukti kori apon grihokone?* ['who will bring music to the words in their minds if we sit on the banks of life and worry about the hereafter; who will bring the mysteries of the three worlds to harmony in their minds if we sit huddled in corners praying for personal salvation?']

In what I have tried to convey this morning, my young friends in the audience, I hope, will perceive the anguish of a tired sunset generation looking wistfully towards a galaxy of rising suns. It is these bright young minds born today from the interstellar cloud of Jadavpur University who, I hope, will enter the lists on our behalf in the battle that is upon us. Therefore, before I close, let me congratulate all the students who have successfully completed their courses of study and are receiving their degrees at this Convocation. I hope that the graduating class will use the excellent education they have received in this University in fulfilling their lives' missions and make this Earth a more livable place for the children that were born last night.

In reverent recollection of the founding members of the National Council of Education, who conceived of this institution nearly a century ago, let us take a solemn vow on this occasion that we will not permit the easy way out with promises for the short run anymore. We will attend to the basics. Because if we do, the genetics of our billion plus populace will prevail – we shall win our rightful place of honour in the comity of nations – *Bharat abar jagat sabhay shrestha asan lobe*. Our land will in truth be *sare jahan se achha*.

Thank you for your attention.

