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Tagore's Cosmic Scepticism and Modern Science

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Abstract

The swing between the sense of the mysterious sublime and that of the comprehensible universe characterises Tagore's coming to terms with modern science. There are three distinct stages. At the first stage he is a diligent, if capricious, student of science – one for whom science and poetry belong to two great but mutually exclusive worlds. The essay Āmār Jagat (My World, 1914) represents the culmination of this phase. Reductionist science, he seems to say, has no business to meddle in the affairs of poetry. The second stage, however, is characterised by a drastic change of perception. 'Modern science analyses reality with a detached mind; modern poetry should also do the same, for that is what is eternally modern.' He even wonders why higher mathematics should not be the subject of poetry. In 1928 he told Heisenberg that in the Isha Upanishad there is a strand of thought that supports Heisenberg's Principle of Indeterminacy. In 1930 he debated with Einstein whether there was any reality independent of the human mind. In the final phase, epitomised by the book Visva-Parichay (1937), he arrives at an open-ended, non-theological and non-dogmatic view of reality. One would like to characterise this approach as 'cosmic scepticism'.

At the early age of 12, after his *upanayana* (the sacred thread ceremony, a rite reserved for Brahmins), Rabindranath's father Debendranath ritualistically introduced him to the *gāyatrī mantra*[1]. 'The splendid cadence and intonation of this Vedic verse appealed strongly to his feeling for rhythm and his sense of the mysterious sublime. The *gayatri* remained his lifelong companion and he continued to find in it a source of contemplative insight and strength long after he had discarded the sacred thread'.[2]

Simultaneously, thanks to the rigorous coaching of his house tutors, he had already learnt that there are certain laws of nature in accordance with which nature works and which are 'testable' (to use a phrase from Karl Popper). That was how the seed of the swing between the sense of the mysterious sublime and that of the comprehensible universe was sown in his mind, wonder being the common factor linking them.

In the introduction to his book on modern physics and cosmology, *Viśvaparicay* (An Account of the Universe, 1937), dedicated to the physicist Satyendranath Bose (of Boson fame), Tagore wrote[3]:

> … Right from childhood, my craving for the taste (*rasa)* of science knew no bounds. I believe I was nine or ten at the time, when Mr. Sitanath Datta [Ghosh] would sometimes drop in on a Sunday. I now know that his stock was not big, but when he explained a simple theory or two of science with illustration, my mind would fill with wonder. I still remember that he would put a beaker of water on heat, and pouring sawdust into it showed how the hot water, being lighter, streamed upwards and the cold water, being heavier, moved downwards, and that was how the entire mass of water heated up. I still remember the thrill of discovering a solid mass of water dividing into two streams at the same time.

This is a typical example of what he would later describe as seeking 'pleasure in the analytical view of objective reality'. What stirred him as a boy was the realisation that the heart of something apparently so quiet as a beaker of water could contain such tremendous turbulence. He was convinced of the restricted nature of the one-dimensional world of our common sense experience, and could feel that in order to get at the true nature of things, you have to destabilise them and change the 'given' state. Thus scepticism and not blind acquiescence with passive reality, is the key to knowing nature. You have to confront and not merely worship nature as the giver of all that is, as the *gāyatrī* would prompt you to do.

Einstein and King Pravāhaṇa

A little diversion may be rewarding here. One recalls a similar, but far more intense, encounter of Einstein's who 'experienced a miracle ... as a child of four or five when [his] father showed [him] a compass.' Quoting Einstein's sister, his biographer Abraham Pais informs us that 'It excited the boy so much that "he trembled and grew cold. ... There had to be something behind objects that lay deeply hidden."…' The interesting point, however, is that for the rest of his life Einstein believed that 'the development of [our] world of thought is in a certain sense a flight away from the miraculous'.[4] The phenomena only *appeared* to be miraculous, in reality they were not. They were wonderful, even awe-inspiring, but not miraculous. Miracles were merely reflections of one's ignorance about the myriad laws of nature or of one's commitment to the irrational (that was Spinoza

speaking!). Like Rabindranath, Einstein too was drawn to institutional religion in his childhood, but at the age of twelve, with his first formal introduction to organized science, he for ever gave up that path. In later life what he eulogised as 'Cosmic Religion' had nothing to do with religion *per se*. Einstein once remarked, 'What really interests me is whether God had any choice in the creation of the world.' The very wording of the question showed that he had no need for a conventional, omnipotent God. Steven Weinberg rightly points out that 'Einstein's religion was so vague that I suspect that he meant this metaphorically...'[5] He literally carved out his mind in the immortal quote: 'Subtle is the Lord, but not malicious.' The 'Lord', i.e. Nature, would not reveal His mysteries at one go; but eventually He will, in small hiccups, in an exasperatingly tantalising process. Einstein was a realist *par excellence*. He believed in the real existence of the world and the complete 'knowability' of the world, however tough the task.

Not so with Tagore. Philosophically he was a dualist, not a realist. For the greater part of his life, he had been a believer in religion. He was not a reductionist trying to understand nature in terms of its basic constituents; he was a holistic synthesiser trying to fathom the meaning of the phenomenal universe:

āndhār rāte æklā pāgol jāy kende
bale śudhu, bujhiye de, bujhiye de, bujhiye de

In dark night the desolate man goes crying
in frenzy, unveil, oh unveil the mystery.

For him there was always something transcendental, something beyond the reach of human experience. It is the illimitable, he said, that continually spurs on physical science to search for new frontiers. He would fondly refer to King Pravāhaṇa of *Chāndogya Upanishad* (1:8:8) to drive home the point:

> If man would ever stoop to agree that there was an absolute limit, then his physical science would have dropped anchor and stopped moving long ago. Scientists had once claimed that they had pealed off all the layers of the fundamental elements of the physical world: so absolute was the pealing that the elements were not analysable any further. But see what has happened to that claim. Seated in the heart of things, King Pravāhaṇa goes on propelling all human enquiries further and further beyond every limit.[7]

Of Sawdust and Stars

Let us now come back to our original story. A few years after the child Rabindranath had learnt the theory of convection of heat from his house tutor, he accompanied his father

> to Dalhousie in the Himalayas. ... He (Debendranath) would acquaint me with the stars and the planets. He would go further and tell me about the planets' orbital distances from the sun and the duration of each planetary year. I used to take notes. Based on those I penned an immature article. I wrote because I had savoured the taste – this was my first-ever biggish article and its content was scientific information.[8]

Thrill' and 'taste' are the keywords at this stage. What did the boy taste? What thrilled him? It is easy to reconstruct that he had sensed an isometric unity between the circulating stream of sawdust in the beaker of hot water and the celestial objects moving about in empty space. He was awestruck by the fact that the sawdust, the water, the fire of the burner and the bright objects millions of light years away should obey the same set of physical laws. This is not philosophy. This is something one feels in one's bones, something that could stir one into poetry, into music. How strange that these insignificant, puny, helpless creatures that call themselves *homo sapiens* should be tied to the immeasurably vast universe through the bond of a *single* set of interconnected laws! And science is all about finding out and mastering those laws. This appreciation itself is a wonder, that itself gives a taste of the infinite and the taste of infinity gives one the assurance of a cosmic shelter. What is significant is that Rabindranath got a first glimpse of that sanctuary through science at a very early age.

Later he would explain the emergence of life in these terms: 'Then came a time when life was brought into the arena in the tiniest little monocycle of a cell.' He went on to elucidate how that tiny cell of life could add value to existence by 'overcoming the *obstructive inertia of Nature by obeying Nature's law*'.[9] You have only to break the obstructive inertia of nature, for instance by heating water, and then you come to know about the laws of nature which you cannot but obey, being a part of nature yourself. It is not for you that nature works; it has its own ways. It is for you to discover those hidden, often camouflaged laws, and that is where the whole humanity depends on science. It is this emphasis on the laws of nature, to be discovered by following the scientific method, that distinguishes Tagore from most of the other idealistic artists and thinkers of modern India.

Propagation
A Journal of Science Communication

On the strictly philosophical plane too, Tagore conceptualises the holistic integration working through the apparently separate principles of nature. This integration he calls 'a comradeship of creative co-ordination with the entire physical universe.' Here is an interesting example. 'Take, for instance, a piece of coal. When we pursue the fact of it to its ultimate composition, substance, which seemingly is the most stable element in it, vanishes in centres of revolving forces. These ... can further be analysed into a certain number of protons and electrons. Yet these electrical facts are what they are, not in their detachment, but in their interrelationship, and though possibly some day they themselves may be further analysed, nevertheless the pervasive truth of interrelation which is manifested in them will remain'.[10]

In a sense, it would not be an exaggeration to say that throughout his life, through all his creations, Rabindranath has given expression to this one wonder of comradeship, this one taste in many words, many tunes, many hues and many metres.

Mahāviśve, mahākāśe, mahākāla mājhe
āmi mānava ekākī bhrami vismaye

In immense space, in immense time, in an immense world,
I roam - Man, alone in wonder.

The fact that the atom and the sub-atomic particles are ever restless, and yet that ferment is incomprehensible to our common sense, never failed to amaze Rabindranath. That scientists could reconcile, explain and formulate such grossly contradictory notions is, for him, one of the greatest triumphs of *homo sapiens*, something that sets the species apart from animals. Talking of the celebrated particle-wave duality of light, he remarks,

> These contradictory notions lie beyond the realm of the common-sense language of human beings. Yet, human beings did not fight shy of diving deep into the sea of the incomprehensible. They did not even hesitate to call this stonewall an unceasing dance of electrical particles! They did not fear that they might have gone mad. ... In fact, science has proved that human beings *are* a race of animals bemused in madness. Whatever they think they perceive is in reality the exact opposite of what it actually is. Animals are never so libellous about themselves.[11]

Once again, we find, more than the facts and the theories of science, he values the excitement, the wonder that flows from it. This gives him an easy route away from philosophy to creative art. He characterises the primeval dance of the atom as 'rebellious' and 'beautiful'. That life-breathing dance sensitises the 'inert world' into consciousness, causes absolute bliss to undulate in rhythms and tunes, through joy and sorrow. Not stability, nor unwavering stillness, but instability and rebelliousness are at the bottom of all creation.

Viśva-tanute aṇ ute aṇ ute kānpe nṛtyera chāyā

In all molecules of universe-body pulsates the shadow of this dance.

One would like to characterise this process as a creative internalisation of scientific scepticism.

Three Stages

In this process, there are three distinct stages. At the first stage he is a diligent, if capricious, student of science – one for whom science and poetry belong to two great but different worlds, mutually exclusive. We find him engaged in developing a scientific temper among the intelligentsia. It has recently been discovered that among other things he was familiar with the works of the famous French textbook writer Adolphe Ganot (1804-1887).[12] Ganot's physics textbooks had ruled European schools and undergraduate classes for more than five decades. All Bengali physics textbooks were modelled on Ganot's books till 1898. Tagore's acquaintance with Ganot is apparent from an enigmatic reference to Helmholtz and Ganot in the famous satirical poem *Unnatilakshan* ('Signs of Progress', included in his book of poems *Kalpanā*) written in 1900 where he mercilessly ridiculed the strong variety of the slavish pro-British Hindu revivalism that glorified every nauseous superstition in the name of science.

As the culmination of this stage, one might consider his delightful essay *Āmār Jagat* (My World), written in 1914, shortly after he had returned from a momentous tour of Europe and the USA. Here he records a mock debate between a poet and his scientist friend. He apparently accepts the superior position of science so far as knowing objective truths is concerned. He does not question the validity of such knowledge. One finds the patronising scientist almost patting the poet on the back. Presently the poet hits back, questioning the scientist about his methodology. When describing the apparently fixed stars, astronomy says, they only appear fixed, because you are looking at them from such a great distance. If you look at them from a sufficiently close distance, or can devise some

mathematical substitute for such close observation, you will find that they are actually moving fast. Very fine; then how about the earth? The surface beneath your feet is obviously flat, then why do you say that the earth is actually round? Here your point is that if you looked at the earth from a distance, you would get a real picture of its true shape. Why these double standards? Why do you discount your immediate sense data in one case and accept them in the other? Heaping instance upon instance, drawn from the fields of physics, botany and psychology, Tagore himself arrives at the synthesis that both these viewpoints are necessary: he calls them the *near side* and the *far side* of the same thing. One may characterise these as the reductionist and the holistic approach respectively. In his typical Upanishad-honed fashion, he calls them the finite and the infinite. A complete mind, he asserts, has place for both. Indeed, only that mind is complete which can simultaneously comprehend the invisible ever-restless sub-atomic particles and an apparently solid nugget of iron, or the extensively porous leaf when looked under a microscope and the tightly shaped leaf seen by the naked eye. He generalises that the concepts of time, space, position, distance, nearness, movement, stillness, inside, outside – all have this dichotomy. He joyously quotes the famous lines from *Īsha Upanishad* to drive his point home: *tadejati tannaijati taddūre tadvantike* (It moves, it moves not; it is far, it is near).

From here, it is only a step to conclude that the poet need not feel shy when his feelings are apparently at variance with the ideas of the scientist. Poetry has a world of its own which is simply out of bounds for reductionist science. The point to note is that he is not against reductionist science *per se,* as long as it remains confined to the domain of science. Reductionist science, he seems to say, has no business to meddle in the affairs of poetry. Thus, in the end the patronising scientist gets a much-deserved rebuff from his poet friend.

Poetry and Mathematics

From this time onwards, we find in him a finer appreciation of the philosophical problems of science, as well as its relationship with the other creative aspects of man. At the culmination of this stage, he makes a surprising statement in 1932:

> If you ask me what pure modernism is, I would say it's looking at the world not with a subjective personal attachment, but with an objective clinical detachment. That is what constitutes a pure vision; that detached vision is bliss. Modern science analyses reality with a detached mind; modern poetry should also do the same, for that is what is eternally modern.[13]

It is 'surprising', because earlier he had accused modern (i.e. reductionist) science of intruding upon literature and thereby robbing it of its essential beauty, which resided in purely non-rational personal attachment. Literature, he said, was characterised essentially by its prejudices and caprices, which was in direct opposition to the impersonal, rational objectivity of science. He cites a beautiful example from his own *Chitrāngadā.* Arjuna is indulging in voyeurism, when he stealthily looks at young narcissistic Chitrāngadā undressing before bathing in a pond, rapt at the exquisiteness of her own form. Arjuna is excited and overwhelmed. This, Rabindranath appears to be saying, can be treated in two ways. One is the strictly Freudian interpretation, which is perfectly in order as science. However, the moment that interpretation interferes with and dominates over artistic presentation, it kills art. Tagore felt that Western literature of the modern period had fallen victim to just such an aggression from science. The extreme obsession of literature with the purely physical aspects of sex, which he saw as a 'nuisance', was a manifestation of this breakdown.[14]

Therefore, when he jumps from this position to its opposite and says that 'poetry should also do the same, for that is what is eternally modern', one is a little taken aback. However, he goes further:

> The mathematician no doubt engrosses himself in the profound symmetry permeating high-level mathematics, in the unity of forms. The fact of its orderliness is not only epistemic, it belongs also to the sphere of deep feeling: there you get pure bliss. It finds expression at the apex of knowledge where it is free of any utilitarian concern. There knowledge attains liberty. One naturally wonders why this has not been the subject of poetry. The reason, of course, is that its experience is esoteric, its access denied to the common person.

Thus, the poet confidently says, there is no intrinsic impediment to high mathematics being the subject of poetry! What a change from the position that science was poking its ugly nose in the delicate affairs of poetry!

Tagore and Heisenberg: Scepticism and Uncertainty

The third phase is marked by some original insights into philosophy of science. His 1930 'conversation' with Einstein is now staple food for philosophers of quantum mechanics. Here, however, we shall recount the less discussed 1928 tête-à-tête between Tagore and Werner Heisenberg (1901-1971).

Propagation
A Journal of Science Communication

The basic idea of Heisenberg's 'Uncertainty Principle' (also known as 'Indeterminacy Principle') is: 'it is impossible to determine with accuracy both the position and the momentum (e.g., an electron) simultaneously. The more accurately the position is known, the less accurately can the momentum be determined. It appears to undermine the "common sense" view of cause and effect, at least on the atomic scale. How can two consecutive observations of the same particle be distinguished from two observations of different particles, if a particle cannot be located exactly? If a particle cannot be identified without uncertainty, how can one be sure what will happen to it in the future, or if the law of cause and effect is being obeyed?'[15] Naturally, the physical significance of this principle gave rise to a sense of insecurity among scientists, including Heisenberg himself.

For an account of the Tagore-Heisenberg talk one relies on the diary of D. M. Bose, the well-known Kolkata physicist. He informs that Sommerfeld[16] and Heisenberg visited India in 1928, 'both of whom stopped for a few days in Calcutta on their way to attend another International Conference in Japan. Heisenberg appeared one day without any previous introduction in the University College of Science. Some of us ... arranged a lunch at Firpo's [a famous restaurant in those days] for Heisenberg. Rabindranath was in Calcutta at that time. Heisenberg having expressed a desire to see him, it was arranged that we were to take him the same afternoon to Jorasanko (the poet's residence). On arrival, we found that Rathibabu [the poet's son] had arranged a fine tea for us. We left Heisenberg to have a talk with the poet. I do not remember what was the substance of his talk, but Heisenberg was very much impressed by the poet's illuminating personality which reminded him of a prophet of the old days.'

We get an idea of what transpired between the mature poet (he was sixty-seven at that time) and the young scientist (then only twenty-seven) from an interview given by Heisenberg to Fritjof Kapra. In his book *Uncommon Wisdom,* Kapra writes, 'In 1929 (actually 1928) Heisenberg spent some time in India as the guest of the celebrated Indian poet Rabindranath Tagore, with whom he had long conversations about science and Indian philosophy. This introduction to Indian thought brought Heisenberg great comfort, he told me. He began to see that the recognition of relativity, incommensurability, interconnectedness and impermanence as fundamental aspects of physical reality, which had been so difficult for himself and his fellow physicists, was the very basis of Indian spiritual traditions. "After these conversations with Tagore," he said, "some of the ideas that had seemed so crazy suddenly made much more sense. That was a great help for me" .'[17]

We have seen above that already in 1914, Tagore was quoting the famous words from *Īsha Upanishad* (*Tadejati tannaijati taddūre tadvantike*) to assert that concepts like position, distance, nearness, movement, stillness, inside, outside etc. were not absolute. The philosophical difficulty faced by Heisenberg was that while his own immaculate mathematical calculations pointed to uncertainty and indeterminacy of fundamental physical concepts at the sub-atomic level, he could not reconcile himself to the physical absurdity that appeared to arise from this position. It is here that Tagore dispelled his uneasiness by showing that there indeed was a philosophical strand of thought in *Īsha Upanishad* that went well with Heisenberg's mathematical findings about physical reality.

It shows how Tagore read and interpreted the Upanishads in his own non-conformist manner. His familiarity with modern science reinforced that non-conformism. His interpretation and understanding of the Upanishads became increasingly individualistic and tinged with scepticism.

Creative Interpretation of the Upanishads

Tagore regarded the Upanishads not as revealed texts, but as having their base in the real temporal life of the people. In 1924, he wrote, '... the words contained in them had their full context in the life of the people of that period, who spoke them. Divested of that vital atmosphere, a large part of the language of these great texts offers to us merely its philological structure and not life's subtle gestures which express through suggestion all that is ineffable.' He was interested more in discovering those 'suggestions' than in theological reasoning: 'the Upanishads are based not upon theological reasoning, but on experience of spiritual life. And life is not dogmatic; in it opposing forces are reconciled – ideas of non-dualism and dualism, the finite and the Infinite, do not exclude each other.' As for the nature of the subtle 'suggestions' permeating the Upanishads, he clearly says that 'Suggestion has its unanalysable code which finds its depth of explanation in the living hearts of the people who use it. ... All poetry is full of such words, and therefore poems of one language can never be properly translated into other languages...'[18] He quotes from Keats' *Ode to the Nightingale* to drive home the point that mere philological correspondence with the English words will not make for a happy Bengali rendering. This analogy with poetry makes it clear that he is advocating a creative reading of the Upanishads. That

is why he was able to express his own idiosyncratic, *non-theological* and sceptical understanding of reality on the one hand, and at the same time communicate with the new ideas of modern science. Heisenberg's experience is a case in point.

In a remarkable passage, Rudolph Otto, the well-known author of *Idea of the Holy*, comments on Tagore's spiritual yet non-theological perception of reality. Tagore 'wanted neither to expound any theological theory before us nor to lecture upon any condensed doctrine of Indian mode of belief, but to lay open his ... totally personal perception which by no means can be extricated from this person...' Narrating how Tagore explained to him the special significance of *Īsha Upanishad*, Otto noted 'how in reality an age-old religious perception here renews itself in a modern soul ... how an ancient heritage at the same time changes into a contemporary one ...'[19]

One would like to characterise this approach as 'cosmic scepticism', which would have been impossible without at least an aesthetic grounding in modern science.

Conclusion

Tagore is the direct and authentic negation of C. P. Snow's 'Two Cultures' hypothesis. Snow, a British novelist with a proper science background, had written in 1959 that his literary friends were arrogantly ignorant of even the rudimentary aspects of science. Asked what they knew about the second law of thermodynamics, his literary friends' 'response was cold: it was also negative. ... I now believe that if I had asked an even simpler question – such as, What do you mean by mass, or acceleration, ... not more than one in ten of the highly educated would have felt that I was speaking the same language'.[20] What did Snow find about the other side, the scientists? He noted that his scientist friends were curiously ill-read in literature: 'Most of them, when one tried to probe for what books they had read, would modestly confess, "Well, I've *tried* a bit of Dickens".'[21] In Britain, things may (or may not) have changed in the intervening half-century, but this more or less sums up the present situation in India.

Compare this mutual insensitivity with an Indian poet belonging to a non-European culture, brought up in a colonial environment away from the great happenings in twentieth century science, without any formal training in science, and yet writing such understandingly on modern physics and cosmology, and taking on people like Heisenberg and Einstein in their own terms! Science for Rabindranath was not a wall, but a launching pad, cosmic scepticism providing the escape velocity.

Notes

1. 'We meditate o the adorable glory of the radiant sun; may he inspire our intelligence.' Trans. S. Radhakrishnan, in *The Principal Upanishads* (New Delhi: Indus, 1994), p. 299.
2. Krishna Kripalani, *Tagore: A Life* (New Delhi: National Book Trust, India, 2001), pp. 19-20.
3. *Viśvaparicay* [An Account of the Universe, 1937], *Rabindra Rachanavali* (*RR*), Centenary Edn. Vol.14 (Kolkata: West Bengal Government, 1961), p. 822. Translation mine.
4. Abraham Pais, *Subtle is the Lord* (Oxford: Oxford University Press, 1997), p. 37.
5. Steven Weinberg, *Dreams of a Final Theory* (London: Vintage, 1993), p.194. Also, regarding Einstein's famously recorded belief in 'Spinoza's God', see p. 205: 'And it does not seem to me to be helpful to identify the laws of nature as Einstein did with some sort of remote and disinterested God. The more we refine our understanding of God to make the concept plausible, the more it seems pointless.'
6. 'What is the goal [i.e. substratum or basis or final principle] of the yonder world?' He replied, 'One should not lead beyond this world-support. We establish the *Sāman* on the world as support for the *Sāman* is praised as the support.' (1:8:7). Then Pravāhaṇa, son of Jīvala, said to him, 'Verily, indeed, your *Sāman*, O son of Śālāvat, has an end. If someone now were to say, "Your head will fall off," surely your head would fall off.' (1:8:8) Radhakrishnan comments: 'The enormity of the error is suggested by the statement that your head will fall off if one utters a curse like that.' See S. Radhakrishnan, *The Principal Upanishads* (New Delhi: Indus, 1994), p. 352. It is indeed remarkable that while a Brahmin school of thought emphasised 'on the world as support for the *Sāman*', King Pravāhaṇa, a *kßatriya*, should consider this empirical idea as an enormous and limiting error, so much so that 'your head will fall off if one utters a curse like that.' The Tagore-Einstein controversy, as it were, was being held here under a different set of terms of reference.
7. Rabindranath Tagore, *Mānuser Dharma* [Man's Religion, 1932], *RR*, Vol. 12, p. 575. Translation mine. Though of a similar title, the Bengali work is not the same as the English *The Religion of Man*.
8. *Viśvaparicay*, *RR*, Vol. 14, p.822.
9. Rabindranath Tagore, *The Religion of Man* (1931, New Delhi: Indus 1994), p. 9.
10. Ibid. p.14. One may note in passing the anticipation of the later 'electrical facts' like quarks in this passage.
11. *Mānusher Dharma*, *RR*, Vol. 12, p. 576. Translation mine.
12. Tagore's Ganot-connection was first brought to my notice by Professor Subir Kumar Sen of the Department

of Library and Information Science, Calcutta University.

13. *RR*, Vol.14, p. 348.
14. Talking at large of society, Arnold Toynbee expressed almost the same sentiments in 1976: '... the scientific spirit has, I believe, contributed to the present outbreak of lawlessness, especially in the field of sexual relations. The ethical merit of science is that it is dedicated to discovering and facing the truth. Science challenges all traditional beliefs, conventions, and habits. ... Children today are educated -- not merely formally but by the Zeitgeist -- to have a scientific zeal for the truth and a scientific contempt for shams. ... Present-day children are ready to believe that their parents do not practice what they preach about sexual relations or about anything else.' Arnold Toynbee and Daisaku Ikeda, *Choose Life: A Dialogue* (Delhi: Oxford University Press, 1987), p.19.
15. E. B. Uvarov and Alan Isaacs, *The Penguin Dictionary of Science* (London: Penguin Books, 1993) p. 464.
16. Sommerfeld also met Tagore at Santiniketan and had a talk with him on the upper terrace of Udayana. He has left a beautiful account of his impression of the poet.
17. Quoted in Dipankar Chattopadhyay, *Rabindranath O Vigyan*, Ananda, Kolkata, 2000, p. 252.
18. See S. Radhakrishnan, *The Principal Upanishads*, Appendix A, pp. 939-940.
19. Rudolf Otto, 'Preface to the book "Tagore's Confession",' *The Golden Book of Tagore* (1931), reprint (Calcutta: Rammohun Library & Free Reading Room, 1990), Addenda, p.17. English translation from the German by Saumendra Palit.
20. C. P. Snow, *The Two Cultures and a Second Look*, London: Cambridge University Press, 1959), 1974 edn., p.15.
21. C. P. Snow, *op. cit.*, p.12.

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