# Why did Daulat Singh Kothari not become a Fellow of the Royal Society?

*Rajinder Singh*

*Daulat Singh Kothari is a well-known name among the Indian physicists. He was nominated for the first time in the 1940s to the Fellowship of the Royal Society of London, and for a second time in the 1960s; an attempt was made by Homi Jehangir Bhabha to find support for this nomination. The documents regarding Kothari's nomination were obtained and the results of the analysis are reported in this article.*

The Royal Society of London is one of the well-known scientific bodies in the world. It is the second coveted honour for scientists from Britain and the Commonwealth countries, after the Nobel Prize, to be elected to its Fellowship. The data collected from refs 1 and 2 and the web-page of the Royal Society of London (dated 16 May 2000) show that by 2000, 41 Indians had been elected as Fellows of the Royal Society (FRS). The number of persons who were nominated but not elected is unknown. This article deals with the case of the Indian physicist, Daulat S. Kothari (1906–1993) who was proposed, but not elected to the Fellowship.

According to E. N. da C. Andrade[3], the Royal Society came into existence in 1660. Though the Society had on its Fellowship some of the more renowned scientists like Isaac Newton (1642–1727), 'Nevertheless, the great majority of the Fellows, who in 1820 numbered 641 . . . were in no sense of the word devotees of science'[3]. Any person who was interested in science could become its Fellow. The election process was formal. Three Fellows had to sign the election certificate and state that the candidate would be a useful member for the Society. The nomination paper was displayed in the meeting room of the Society for ten weeks, and if there was no objection, the candidate was elected as a Fellow.

In 1847, under the new Statutes, the number of candidates to be elected per year was limited to fifteen[3]. In the 20th Century, the number of persons devoted to the pursuit of science increased, and accordingly, the number of Fellows elected per year was raised to 17, 20 and 25 in the years 1931, 1938 and 1945, respectively[3]. At present, 42 new Fellows and six new Foreign Members are elected every year. (See *The Year Book of the Royal Society* (henceforth *Year Book 2000*), p. D2).

According to the Statutes of the Royal Society, persons who are eligible for the Candidature, (a) 'are either (i) citizens of the British Commonwealth country or of the Irish Republic; or (ii) persons who, in the opinion of the Council (. . .), have been ordinarily resident and working in a country of the Commonwealth or in the Irish Republic for a minimum of five years; and (b) have made a substantial contribution to the improvement of natural knowledge, including mathematics, engineering and medical science'. Under the Statute 2, those persons who are eminent for their scientific discoveries and attainments, and are ineligible by virtue of Statute 1(a), can be elected as 'Foreign Members'. According to the Statute 4, there is also provision for electing a member from the Royal Family of the United Kingdom. Only one 'Honorary Fellow' per year can be elected. The Council can make a recommendation to the Society for the Honorary Fellowship, persons who, 'in its judgement, have rendered signal service to the cause of science, or whose election would significantly benefit the Society by their great experience in other walks of life'.

According to Statute 3(a) of the Society, 'Every candidate shall be proposed and recommended by a certificate in writing signed by six or more Fellows, of whom three at least shall recommend from personal knowledge of the candidate's contributions to the natural science' (*Year Book 2000*, p. D1).

Kothari was nominated in the 1940s under the above-stated regulations. Before going into the details of his case, it would be appropriate to give a short biography of the candidate.

## A short biography – Daulat Singh Kothari

The biographical data given below are taken from refs 4 and 5.

Daulat Singh Kothari was born in Udaipur (Rajasthan) on 6 July 1906. In 1933, he got his doctorate from Cambridge. Kothari's fields of specialization were astrophysics and statistical mechanics. He was Reader and Professor of Physics at the University of Delhi from 1934 to 1973. Between 1981 and 1993, he was Chancellor of the Jawaharlal Nehru University, Delhi. In Independent India, he occupied eminent positions like those of the Scientific Adviser to the Ministry of Defence (1948–1961), and Chairmanship of the University Grants Commission (1961–1973).

In his later life, Kothari was not only an astrophysicist but also a physicist–philosopher who played active part in exploring the interplay between science and philosophy, as well as between science and religion.

## Kothari's nomination for the Fellowship of the Royal Society

The nomination documents of Kothari show that in 1944 he was proposed by well-known scientists: Arthur S. Eddington, Edward A. Milne, Ralf H. Fowler, James H. Jeans, Charles G. Darwin, H. Jeffrey, R. Stoneley, B. Sahni, S. S. Bhatnagar and M. N. Saha[6].

About Kothari's scientific achievements the nominators wrote: 'Distinguished for work on Astrophysics . . . First to appreciate . . . importance of pressure ionization and relative importance of conduction and radiation in transport of energy in stars. Applied theory of degenerate matter to prove that the size of a cold body could not exceed that of Jupiter. Has done important work on formation of neutron stars in white dwarfs and energy generation in them. Other original work includes important contributions to the theory of bounded harmonic oscillators and its applications, theory of the liquid state (quantization of

holes in liquids), effect of radiation in Lamb shift, connection between statistical thermodynamics and partition theory of numbers. Author of book, *Nuclear Explosions and their Consequences*[6].

But Kothari was not elected in the following years. The main reasons were: firstly, in the mid-1940s, there was fierce competition among the astrophysicists. For instance, in a letter dated 23 June 1961, the astrophysicist William H. McCrea (1904–) wrote to the British physicist, Patrick M. S. Blackett (1897–1974) that Kothari's competitors Hermann Bondi (1919–), Fred Hoyle (1915–2001) and Raymond A. Lyttleton (1911–1995) were better candidates. They were elected in 1955, 1957 and 1959, respectively[7].

Secondly, in 1947, the British Government announced that the political power would be transferred to Indians in June 1948 (ref. 8). But India became independent in August 1947 itself. In 1950, India became a member of the Commonwealth[8], which qualified Indian scientists to become Fellows of the Royal Society. Between 1947 and 1950, Indian scientists did not qualify to be elected or nominated as Fellows of the Royal Society.

According to the Statute 3(e) of the Royal Society, unless a candidate is elected or dies, his candidature remains under consideration for seven years.

It is clear from the foregoing discussion that valuable years were lost due to the political situation in the case of Indian candidates. Apart from Kothari, other candidates who were nominated in the mid-1940s were botanist M. O. P. Iyengar (B. Sahni's letter to C. V. Raman, dated 24 September 1946), physicists S. Bhagavantam and R. S. Krishnan (B. Sahni's letter to C. V. Raman, dated 13 October 1944), and chemist T. R. Seshadri (C. V. Raman's letter to B. Sahni, dated 31 October 1946).

Thirdly, as far as Kothari was concerned, although in India and in some circles in England, he was considered a suitable candidate for nomination, the astrophysicists did not see his later work as of high rank (see below).

## Homi J. Bhabha and the nomination of D. S. Kothari

The Statute 3(e) of the Royal Society also states that for a renewal of candidature, an entirely new proposal is required, which is valid only for three years and after that it lapses for the next three years. This three years on and off continues in perpetuity. Every time a new proposal is needed.

Taking advantage of the Statute 3(e), Homi J. Bhabha thought of proposing Kothari to the fellowship. On 30 March 1960, he asked Kothari to send all his scientific papers and names of the books published by him. The latter thanked Bhabha for taking interest and sent a list of 50 publications (D. S. Kothari's letter to H. J. Bhabha, dated 14 April 1960). Evidently, not a brilliant record as far as the publications were concerned. Also Kothari's achievements were not like that of the Indian astrophysicist, M. N. Saha (1893–1956), who was nominated twice for the Nobel Prize[9].

As far as the second attempt by Bhabha to nominate Kothari was concerned, months passed before he reacted to Kothari's letter. On 29 November 1960, Bhabha sent a telegram to N. S. Siva – Secretary to the Atomic Energy Commission, asking him to wire or call Kariamanikkam S. Krishnan (1898–1961), Darashaw N. Wadia (1883–1969), Prasanta C. Mahalanobis (1893–1972) and Satyendra N. Bose (1894–1974). They were requested to send a cable to the Secretary of the Royal Society and append their signatures to the certificate. The secretary (N. S. Siva) acted accordingly.

Most probably due to different reasons, all the supporters did not send cables, as again on 15 February 1961, Bhabha sent letters to Wadia, Bose, Krishnan, Blackett, Mahalanobis and Sisir K. Mitra (1890–1963) and asked them to support Kothari's candidature. On 17 February 1961, except Krishnan, all the others replied. Response from the renowned British physicist, Patrick M. S. Blackett (1897–1974) was also positive. He stated: 'I fully agree that we should have another shot at getting Kothari into Royal. I will do some canvassing over here to get support' (P. M. S. Blackett's letter to H. J. Bhabha, dated 6 March 1961).

Blackett was able to get support from Harry H. Plaskett (1893–1980), who on 17 June 1961 wrote as follows: 'I think there is a reasonable case for nominating Kothari again, and I shall be pleased to sign the certificate though I cannot do so from personal knowledge'. And further, 'What astronomical support Kothari is likely to attract is difficult to say. From Jeffrey's letter I take it Hoyle, and there presumably Bondi and Lyttleton, are unlikely to be willing to append their signatures. I have been trying unsuccessfully to get support from (Roderick Oliver) Redman (1905–1975) and Wooly (presumably Richard van der Riet Woolley (1906–1986)) for one or two observational astronomers; I think they may be unwilling to sign for the certificates until some of the present astronomical candidates are elected. This seems only to leave Chandrasekhar, Thomas G. Cowling (1906–1990) and McCrea as possible supporters on the theoretical side, and the first two somewhat unpredictable' (H. H. Plaskett's letter to P. M. S. Blackett, dated 17 June 1961).

On 26 June 1961, Cowling wrote to Blackett and said that though in the 1930s Kothari had good ideas, his work was not first rank and was largely of formal interest. Still Cowling agreed to give general support. As far as W. H. McCrea was concerned, on 23 June 1961, he wrote to Blackett and stated that Kothari's work was not good enough to support his candidature.

Obviously, prominent British physicists like Blackett and Plaskett remained unsuccessful to win the support of influential astrophysicists. In the end, on 14 July 1961, Blackett had no other choice but to write to Bhabha that 'I find this problem of whether to put Kothari up again very difficult to judge. I think if his chances are not good it would be better not to do so, . . .' After that the idea of nominating Kothari was dropped.

## Conclusion

From the case study of the Indian physicist D. S. Kothari it is concluded that: Firstly, before proposing a candidate for the Fellowship of the Royal Society, the Fellows interact with their colleagues to get support. Secondly, a candidate has no chance to be re-proposed if he is not able to maintain his level of scientific achievements over a long period of time. Thirdly, without the support from important and influential Fellows, a candidate has little chance to be proposed.

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2. *List of Fellows of the Royal Society 1660–1998*, The Royal Society of London, London, 1999.
3. Andrade, E. N. da C., *A Brief History of The Royal Society*, The Royal Society of London, London, 1960, pp. 11–13.
4. *Fellows of the Indian National Science Academy 1935–1993*, Indian National Science Academy, New Delhi, 1994, vol. 1, p. 408.
5. Chattopadhyay, A., *Encyclopaedia of Indian Scientists*, Reliance Publishing House, New Delhi, 1995, p. 115.
6. P. M. S. Blackett–H. J. Bhabha Papers, Archives of the Royal Society London.
7. See ref. 2, p. 17; p. 83; p. 102.
8. Reese, T. R., *The History of the Royal Commonwealth Society 1868–1968*, Oxford University Press, London, 1968, p. 237.
9. Singh, R. and Riess, F., *Sci. Cult.*, 1999, **65**, 146–151.

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*Rajinder Singh is in the Department of Higher Education and History of Science, Faculty of Physics, University of Oldenburg, PO Box 2503, D-26111 Oldenburg, Germany (e-mail: rajinder.singh@mail.uni-oldenburg.de).*

## PERSONAL NEWS

# K. G. Adiyodi

K. G. Adiyodi, a pioneer in the field of invertebrate endocrinology passed away after a massive heart attack on 28 May 2001. Born in 1938 at Karivellor, a village in North Malabar area of Kerala, Adiyodi had his primary education in a local school. He graduated with B Sc Honours in 1958 and took his MA degree from Madras Christian College, Chennai in 1968. He obtained his Ph D in insect reproductive physiology from Kerala University, Thiruvananthapuram in 1970 under the able guidance of K. K. Nair, a doyen in the field of invertebrate endocrinology. Subsequently, he held appointments in Calicut University as Reader (1970–1977) and Professor in invertebrate reproductive physiology (1988–1991). After his marriage to Rita Adiyodi (nee Rita Gomez), Adiyodi began working on crustacean molting and reproductive physiology. Using a field crab *Paratelphusa hydrodromous* as the reproductive model, Rita and Adiyodi made significant contributions on endocrine regulation of molting and reproduction. Their review article on endocrine regulation of molting and reproduction in Crustacea, published in *Biological Reviews* in 1971 was a benchmark in the evaluation of the interrelationship between the two phenomena in these arthropods. The hypothesis they proposed on the interplay between the eyestalk neuropeptides to regulate reproduction and molting in decapod crustaceans is holding good even today. He championed the cause of invertebrate physiologists who were indeed looked down upon by the vertebrate or mammalian reproductive physiologists in India and abroad. To give a pride of place to invertebrate reproductive physiologists, he conceived the idea of organizing a forum for invertebrate reproductive biologists. This has resulted in convening the first ever international conference on the subject in 1975 at

Calicut; eventually, the International Society for Invertebrate Reproduction (ISIR) was born. The Calicut conference was identified as the first meeting of the ISIR, paving the way for the sequel of triennial international meetings, the latest in the series being the 9th International Congress on Invertebrate Reproduction and Development at Rhodes University, South Africa in July 2001. To be frank, the Calicut meet gave impetus for many researchers like me to choose invertebrate reproductive physiology as a career. Invertebrate reproductive physiology eventually became a discipline of considerable focus in many universities and research institutions in the south. Adiyodi's flair for editing manuscripts was par excellence. Capitalizing on the awareness created on research in invertebrate reproduction, he floated a new journal for ISIR, the *International Journal of Invertebrate Reproduction*, published by Elsevier Biomedical Press, Amsterdam. Adiyodi became the Founder Editor-in-Chief of this journal, which is now being continued with a new name, *Invertebrate Reproduction and Development*, published by Balaban, Philadelphia/Rehovot. Adiyodi, along with his wife also ventured into the editing of an open-ended multi-volume treatise entitled *Reproductive Biology of Invertebrates*, published by John Wiley & Sons, England.

In 1994, Adiyodi became Vice-Chancellor of the Cochin University of Science and Technology. In 1996, he was invited to be the member of the Union Public Service Commission (Government of India), a position he held until his demise. In his native state, Kerala, he is also remembered as one of the founders of Kerala Shastra Sahitya Parishad, now the largest popular science organization and movement in India, that has won several prestigious awards, including the Right Livelihood award. Adiyodi is survived by his wife, son, Nirmal and daughter, Laxmi.

T. SUBRAMONIAM

*Department of Zoology,*
*University of Madras,*
*Guindy Campus, Guindy,*
*Chennai 600 025, India*
*e-mail: tsbl71@hotmail.com*