

Twenty Years with *Resonance**

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Prologue

One late afternoon in January 1995 Professors N. Mukunda and Raghavendra Gadagkar came to my office and requested me to join the planning group of a new journal on science education to be launched by the Indian Academy of Sciences, Bangalore. They told me that the journal was meant for undergraduate students in sciences including computer and engineering sciences. As I had many commitments at that time, I was not sure whether I would be able to devote enough time for this project. They persuaded me to join the planning team and I agreed. In hindsight it was a very good decision as I got deeply involved in the project and the planning of a new journal was a stimulating experience. The planning group had besides Mukunda, Gadagkar, and me, Vani Brahmachari, J. Chandrasekhar, Mohan Dalampady, Uday Maitra, R. Nityananda, Gangan Prathap, and A. Sitaram. The ten of us met for about two hours every week during 1995 to outline the contents of the journal. There were brainstorming sessions with suggestions galore coming from the enthusiastic team. This group of ten became the first set of editors with N. Mukunda as the chief editor, five associate editors, one in each discipline covered by the journal, and a number of editors. On the suggestion of Professor P. Rama Rao, the then President of the Academy, a large number of editors from outside Bangalore were requested to join the editorial board. The editors in Bangalore attended editorial board meetings and those outside Bangalore were invited to attend if they happened to be in Bangalore.

Organization of the Journal

There was consensus among the editors that the articles in the journal should be interesting and comprehensible to undergraduates and to highly motivated higher secondary school/pre-university students. Articles in chemistry, physics, mathematics, biological sciences, computer science, and engineering were to be included in each issue. It was decided that each issue would highlight the work of one great scientist who is no longer with us. We felt that the “scientist of the month” would form the theme for an issue with around two articles on the biography and contributions of the scientist. It was also agreed that one of the editors would

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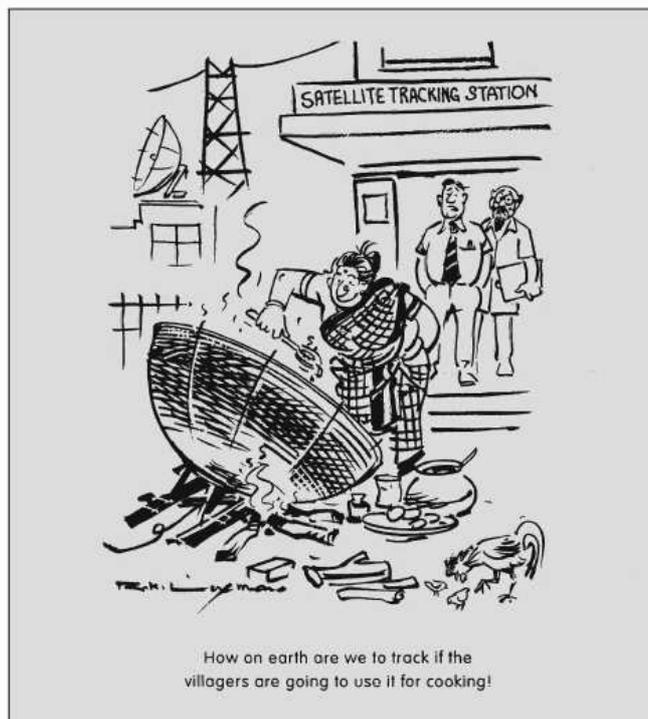
undertake the responsibility to either write the article(s) or identify appropriate scientists familiar with the work of the “scientist of the month” to write these articles. It was also decided that the articles in an issue would be categorized as *General articles*, *Series articles* and *Feature articles*. A series author would take up a topic and expand it into a number of articles preferably in successive issues of the journal. A *Feature article* was also like a series on a specific topic, but written by different authors each month. For example, a *Feature article* that appeared in the early issues was titled *Molecule of the Month*. A category called *Article-in-a-Box* was introduced for short essays and biographies. An *Article-in-a-Box*, in the first issue, was by J. Chandrasekhar. In this article he explained various shades of meaning of *Resonance*. (During the brainstorming sessions it was Chandrasekhar who had proposed *Resonance* as the name of the journal). As *Resonance* was intended for both students and teachers, it was decided that a category of articles devoted to improve methods of teaching and designing laboratory experiments would be presented in a section called *Class Room*. To encourage students to solve problems, a section called *Think it Over* was planned in which problems would be posed by the author and answers provided in a subsequent issue. Besides these, a *Book Review* section to review both classic books and new books of interest to students and a *Books Received* section listing popular science books of interest to students and teachers were planned. *Research News* section was introduced to make students and teachers aware of some interesting developments in science and technology. Another useful section planned was *Information and Announcements* of interest to students and teachers. Nobel Prize and Fields medal announcements each year were included in this section or the *Research News* section. Later full articles on the discoveries/inventions that led to the Nobel Prizes in physics, chemistry, physiology/medicine in that year were invited from experts in each of these disciplines.

The organization of *Resonance* was not static. It evolved as we grew. New sections were added based on the suggestions of one or more editors. One of the editors pointed out that Times of India used to publish a magazine called *Science Today* and (late) R.K. Laxman used to draw his inimitable cartoons on science and scientists in each issue. With some trepidation R.K. Laxman was approached to draw a cartoon each month for *Resonance* and to our delight he agreed and the section called *Science Smiles* was born from the fourth issue (April 1996). Laxman’s cartoons appeared in each issue of *Resonance* till June 1998.



Science Smiles

R K Laxman



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There was no cartoon for a few years. Ayan Guha started drawing cartoons based on the contributions of the featured scientist of the month from the November 2010 issue and he continues to draw one cartoon for each issue to this day. In April 1996 issue a category of articles titled *Reflections* was introduced. Articles in this category were intended to present personal philosophical and historical facts with broad perspectives. The first *Reflections* article was a translation from Bengali of S.N. Bose's essay *The Crisis of Science*.

December 1997 issue commemorated the centenary of the discovery of the electron by J.J. Thompson with him as the featured scientist of the month. This was the first issue in which most of the articles were related to one theme, namely the electron. Articles on the role of electrons in physics, chemistry, biology, and engineering were written by invited authors in

this issue. It was decided to introduce a new category of articles named *Classics* from this issue. In this category a seminal (and often hard to find) article of the featured scientist was reproduced with a brief introduction by the editor who took up the responsibility to assemble the articles in the issue. This was one of the few issues which had two *Classics* articles. The first *Classics* article was J.J. Thompson's lecture at the Royal Institution of Great Britain on Cathode Ray Tubes that led to the discovery of the electron. The second was the paper "The Theory of Positrons" by Richard Feynman that had appeared in the *Physical Review*.

Special issues devoted to themes such as *World Year of Physics*, *International Year of Chemistry*, and *National Mathematics Year of India* appeared in December 2005, December 2011 and September 2012 respectively. There were also some issues that were devoted entirely to highlight the work of a single scientist such as Einstein.

As mentioned earlier, new categories were added as *Resonance* grew based on suggestions from the editors. One of them was *Our Readers Write* that invited readers to send comments on articles with replies from authors. It was started in May 2006 and was discontinued a few months later as not many useful comments were received. The category *Face-to-Face* that reproduced conversations with personalities related to science was introduced in January 2008. The first *Face-to-Face* was Sujata Varadarajan interviewing (Late) C. Ramakrishnan, a distinguished molecular biophysicist.

Visual Design of *Resonance*

Planning the "look and feel" of the journal took up a lot of our time. We felt that unlike scholarly journals published by the Academy, this journal meant for young audience should look attractive to encourage them to browse issues of the journal and read articles. One of the editors, Gangan Prathap of National Aeronautical Laboratories (NAL), suggested that Srinivas Bhogle of NAL was a good visual designer and he be invited to attend our meetings. Many of the designs of *Resonance* were suggested by him including the page layout with wide margins, margin notes, placing logos for each section such as *Think it Over*, *Classroom*, *Classics* etc. Ayan Guha, then a doctoral student at the Indian Institute of Science and a talented cartoonist was requested to draw the logos. As and when a new category was introduced a new logo for that category was drawn by him.

The designs of the front and the back cover were discussed at length. It was decided that the front cover would have the title *Resonance* at the top and below it – journal of science education, to emphasize the fact that it was a science education journal. A colour picture from one of the featured articles was to be the centre piece on the cover. Titles of major articles were to be printed below it. It was also decided to print a hand-drawn portrait of the featured



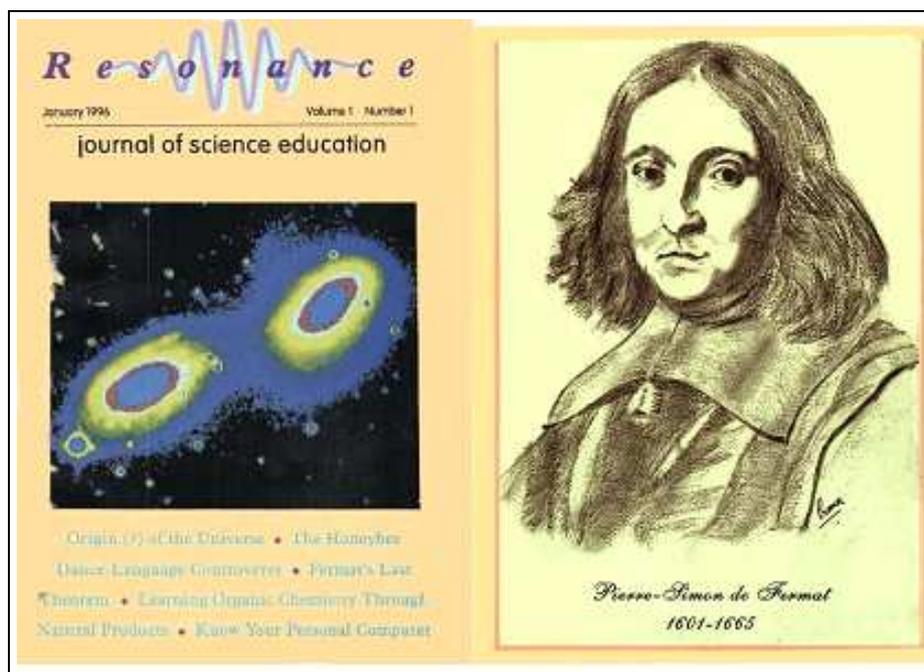
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scientist on the back cover rather than his or her photograph. Prema Iyer from Gadagkar's laboratory, who was an amateur artist, drew the portraits during the first five years. Subhankar Biswas started drawing the portraits from February 2006 and also assisted in the layout of the front cover. Instead of keeping the inside back cover blank, it was decided to print pictures of flowering trees, birds, plants, animals, or a month's night sky on it.

The layout of the contents page was also designed to attract readers. In some issues of *Resonance*, images of postal stamps (issued by various countries) of the featured scientist were printed in the contents page.

The First Issue

The first issue was meticulously planned. We invited some of the best scientists in India to contribute articles and they graciously agreed. We all waited with bated breath for the first issue to come off the press. We were very happy to see that its contents had a variety of memorable articles. The "look and feel" too was excellent.



The front and back covers of *Resonance* Vol.1, No.1, 1996.

This issue featured Pierre-Simon de Fermat, the great French mathematician, as the scientist

of the month. The proof of his famous last theorem had been published in 1995, after a wait of three centuries, by Andrew Wiles. Fermat's last theorem stated that no three positive integers x, y, z satisfies the equation $x^n + y^n = z^n$ for any integer value of $n > 2$. This seemingly very simple theorem, stated by Fermat around 1637, had challenged mathematicians for three centuries. An article by Yogananda discussed this theorem and Wiles' proof. Besides this, the issue had a set of eight *Series articles*; one in physics, two in chemistry, two in life sciences, one in mathematics and two in computer science. In addition, there were two *General articles*, three Featured articles: one titled *Nature Watch*, another titled *Molecule of the Month* and the third on *What is new in Computers?* Besides these, there was one *Class Room* article, one *Think it Over*, four articles in the *Research News* section, three *Book Reviews* of classical books, a listing of 15 *Books Received*, and *Information and Announcements*. The issue had 124 pages, a reasonable number.

Attracting Subscribers

The problem of attracting subscribers was discussed extensively during the planning of the journal. It was decided to print large attractive posters to be displayed on the notice boards of colleges and Kendriya Vidyalayas and other reputed high schools. Free sample copies of *Resonance* were also sent to the libraries of colleges and some reputed higher secondary schools. Department of Science and Technology (DST) and the Ministry of Human Resource Development (MHRD) were requested to give free subscriptions to Science Talent Scholarship winners. The yearly subscription was kept low at Rs. 100 for individuals in India and Rs.200 for institutions. Subscriptions for foreign countries were also kept reasonably low. Initial print run was around 3000. We also discussed selling individual copies in book stores but the logistics was daunting. The circulation slowly increased over the years.

Resonance Editorial Meetings

The chief editor from 1996 to 2000 was N Mukunda. There was a meeting of the associate editors with the chief editor once a fortnight and the entire editorial board met once a month. We were ably assisted by two assistant editors, Sujatha Mohankumar and M. Raj Lakshmi in later years. The role of assistant editors was important as they kept track of the records of accepted articles, articles being reviewed, pending invited articles, agenda notes, minutes, featured scientists list etc. They also copy-edited articles and often wrote the margin notes of articles. Each meeting was devoted to identify a scientist to be featured, the editor who took responsibility of soliciting articles relevant to the featured scientist and selecting the classics article. The production staff of the Academy that included M. Srimathi, and R. Pushpavathi



were experienced and did an excellent job of bringing out an issue once the articles were handed over to them.

Early years of *Resonance*

In the early years most of the articles were solicited by the editors from scientists known for their expertise and expository skill. I remember that one of the two series articles in computer science and the feature *What is new in Computers* in the first few issues were written by my doctoral students and reviewed by me and one of my colleagues. Often articles were written by the editors themselves. We aimed at around ten articles and about 96 pages per issue. This was not rigid and often *Resonance* exceeded the page limit. Submitted articles were not many and most of them were found not up to the standard expected by the editors after review. When the circulation of *Resonance* increased, we started getting reasonably good unsolicited articles from scientists in India and a few from other countries.

***Resonance* after the first five years**

I took over as the chief editor of *Resonance* in January 2001 and followed the excellent tradition established during the first five years under the able leadership of N. Mukunda. In the editorial of January 2001 issue, I took stock of *Resonance's* achievements and failures during the first five years. On the positive side *Resonance* was able to convey the excitement of doing science by featuring a great scientist in each issue and highlighting his/her work using an expository article and by reproducing an original writing by him/her. We were able to persuade many well-known scientists to contribute articles. *Resonance* also published many *Classroom* items, which explained some hard to understand concepts. Many of these articles were from college teachers and several from students on a variety of topics. We tried to have at least one article each in chemistry, physics, mathematics, life sciences, engineering and computer science. The editors maintained the quality of the articles. The production quality was very good and figures in colour were used wherever appropriate. *Resonance* was published reasonably on schedule every month.

On the negative side we were conscious that not all articles were easy to read and understand by a non-specialist. Even though their quality was good, they were not 'expository enough' for a reader from a different discipline to comprehend. We continuously requested our authors to simplify the presentation without loss of rigour (always a difficult task). *Resonance* needed more contributions, of good quality, particularly from students and teachers.

The circulation of *Resonance* had not increased; it fluctuated between 3000 and 5000 and it was difficult to acquire new subscribers. There was not enough publicity about the journal

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even though we sent posters to colleges every few months. *Resonance* was uploaded on the World Wide Web in 2000 and we felt that it would increase the readership (not necessarily circulation!).

Epilogue

I was in the planning group of *Resonance* during 1995, an associate editor from 1996 to 2000, chief editor in 2001 and 2002, and an editor up to 2014. During these twenty years I saw *Resonance* grow and improve in quality and appearance. The *Resonance* editorial board consists of part-time volunteers and they serve for a few years. Stability is provided by the superb infrastructure of the Academy to publish journals, the hard work of the editorial, production, circulation, and office staff of the Academy. Their contributions have been invaluable in the steady improvement of *Resonance*. In 2007 Indian Academy of Sciences entered into a co-publication agreement with Springer – a big international publisher. The association with Springer has improved the international visibility of *Resonance*. The production quality of *Resonance* has now considerably improved with glossy paper and better printing. Archiving of *Resonance* on the World Wide Web from the first issue is an excellent initiative. It is easy to search and download *Resonance* articles both from the site maintained by the Indian Academy of Sciences and the one maintained by Springer. Springer maintains a record of the number of downloads (on payment) of *Resonance* articles from their site and it is between 40,000 and 50,000 per year. Downloading articles from the Academy's site is free and the number of downloads exceeded 1.1 million in 2019, a truly astounding figure! *Resonance* is 25 years old and is now known as one of the best science education journals in the world.

Acknowledgments

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