The Forum

A Quarterly Publication of the AMERICAN FOUNDATION FOR BASIC RESEARCH IN ISRAEL (AFBRI)

WINTER 1998

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Israel Science Foundation Promotes Israeli Excellence

This year marks the 25th anniversary of the Israel Science Foundation (ISF), now exactly half the age of the State, whose basic research it was formed to support.

Founded in 1972 as the Basic Research Fund (BRF), administered by the Israel Academy of Sciences and Humanities, the Foundation's first 15 years of operation were hampered by small annual budgets, which remained less than $1 million throughout the 1970s. This changed after the publication of the Israel Academy's 1986 report on **Scientific Research Activity in Israel**, which warned the Israeli Government about an impending crisis in Israeli basic research, the crucial intellectual foundation of its burgeoning high-tech industry.

Energetic action by the Planning and Budgeting Committee (VATAT) of Israel's Council for Higher Education and the international donor community (particularly the C. H. Revson Foundation) has since increased the ISF budget more than ten-fold in just one decade, from $2.7 million in 1987 to $29.3 million in 1997. Thanks to continuing major increases in VATAT's contribution, this should reach $36 million by the year 2000. This increase has allowed the ISF to more than double the size of its individual research project grants (now about $35,000 a year for three years) and to increase its acceptance ratio from 22% to 33%, despite a two-fold increase in the number of submissions (now about 900 a year).

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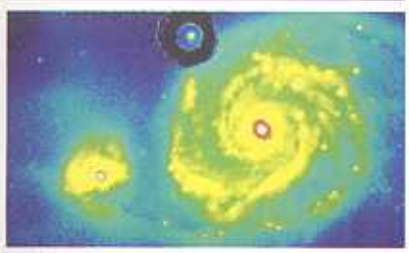
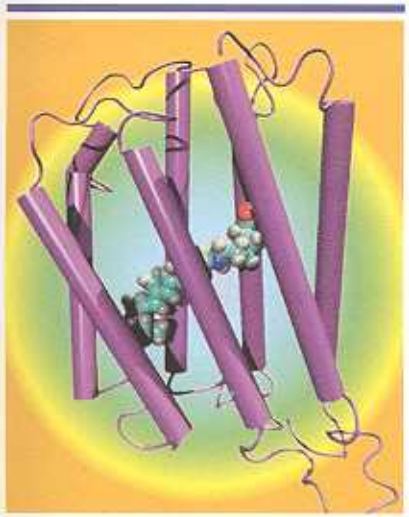
Rapid growth was accompanied by structural changes. The BRF became the ISF in 1992 and a legally independent nonprofit organization in 1996. The ISF also began to diversify its program, adding four new channels for grant support to its original individual-investigator grant program (still $22.1 million of its $29.3 million budget for Academic Year 1997/98). Special Equipment Grants (86 grants, $3 million total in 1997/98) enable scientists and their institutions, who must provide matching funds, to acquire the often expensive ($100,000-$200,000) scientific equipment needed for cutting-edge scientific research. International Workshops (16 grants, $310,000 total), bring ISF research results to the attention of the larger Israeli and international research community and help ISF grantees better define and realize their future research plans. Big Science Initiatives, which are funded on a highly selective, *ad hoc* basis help Israeli scientists participate in large, multinational "Big Science" programs. The two initiatives funded to-date involved the International Human Genome Program and high energy physics experiments at the European Center for Nuclear Physics (CERN). A grant to help Israel participate in the European Synchrotron Radiation Facility in Grenoble has just been approved. Centers of Excellence (12 grants, $3.05 million) help outstanding multidisciplinary, multi-institutional research teams compete internationally in specific, high-priority research frontiers. Twelve such ISF Centers are currently active, eight in the Exact Sciences and four in the Life Sciences.





The ISF Centers of Excellence program has been particularly successful. "A small country, such as Israel, may not be able to be a *quantity* leader in science," AFBRI President Prof. Joshua Jortner notes, "but it can and must be a *quality* leader." ISF Chairman Prof. Paul Singer agrees: "Israeli research teams can be highly competitive in selected cutting-edge fields; but they need internationally competitive funding to do so. These $1 million Center of Excellence grants, spread over three years, are an important step in that direction."

For example, the ISF Center for Multiwavelength Astronomy combines astronomical observations at different wavelengths (radiowaves, infrared and ultraviolet light, X-ray emissions), to exploit the unique physical properties of each. Accumulating radiowave and other data had suggested that the centers of most normal, nearby galaxies contain small, dormant "black holes". If such objects (LINERS) were indeed "mini-quasars", they could answer one of the most pressing questions in modern cosmology: where are all the quasars that existed 5 billion years ago today? Center scientists foun that ultraviolet observations from the Hubble Space Telescope are, indeed, suggestive of quasars, but that the visible spectra of such objects (also taken by Hubble) show the characteristic signatures of massive young stars. Thus, the centers of normal, "modern" galaxies seem to harbor ultra-compact clusters of normal young stars rather than more exotic power sources.

Another ISF Center is studying the molecular basis of vision, which begins when light is absorbed by the visual protein rhodopsin in the light sensitive area (retina) in the back of the eye. In the related, but more easily studied, bacterial protein bacteriorhodopsin (bR), the molecule then changes shape (conformation) and pumps a positively charged hydrogen atom across the bacterial membrane. Center scientists have drawn international acclaim for their ingenious use of a modified atomic-force microscope to detect light-induced conformational changes in *single* bR molecules – a major technical *tour-de-force*. Their microsecond time resolution is a thousand times faster than any previous attempt at ultrafast atomic-force sensing.

Yet another ISF Center of Excellence is studying the subsequent processing of visual information in the brain. These and other ISF programs are described in the recently published **ISF Annual Report** for 1997, copies of which are available from the Israel Science Foundation and the Israel Academy of Sciences and Humanities.