The Forum

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WORKSHOPS WIDENING PERSPECTIVES

A new series of international workshops sponsored by the Israel Science Foundation (ISF) has been highlighting Israel's state-of-the-art contributions to basic scientific research, while bringing leading foreign scientists to Israel. Prof. Paul Singer, Chairman of the ISF Board, says:

"It is crucial for scientists in a small country like Israel to maintain close contact with the key international leaders in their field and it is equally important that the international scientific community recognize the exceptionally high-level of Israeli research, especially in those areas in which we are serious international competitors."

Founded by the Israel Academy of Sciences and Humanities, the ISF, now Israel's largest independent research foundation, seeks to assure the future excellence of Israeli scientific research by raising and competitively distributing research grant funds. Most of the $25 million distributed in 1997 was provided by the Planning and Budgeting Committee (VATAT) of Israel's Council for Higher Education and by private foundations (including the C.H. Revson Foundation, S.R. and H.R. Scheuer Foundation and Dorot Foundation). Although the ISF budget is expected to exceed $37 million within three years, the rapid growth of Israeli science, in both quantity and sophistication, means that many good projects can still not be funded. The ISF is thus experimenting with new, cost-effective approaches to increasing its overall impact. These include Centers of Excellence, special projects and the new ISF Workshop series.

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The new ISF workshops are exceptionally cost-effective, according to Hedva Baram, ISF Coordinator. "A typical workshop, with roughly twenty international invited speakers and ten Israeli ones, can be started with a $20,000 grant, of which we pay three-quarters and the host institution, one-quarter. Yet the impact on the participants, their future contacts and the future of their field in Israel can be incalculable."

The new program, administered by Shula Bonjack, has been an immediate success. Over a dozen ISF workshops have already been held in 1997, on topics ranging from electron condensates to gene targeting, and many more are planned (also see Calendar). "These workshops showcase the work of our ISF grantees," notes Bonjack, "and they stimulate our scientists' participation in the cooperative ferment that characterizes research at the cutting-edge of modern science."

Typical was the ISF's recent workshop on the local neural circuitry of the neocortex, the familiar grooved, outer layer of the brain. Senior experts from Oxford University (U.K.), the Max-Planck Institute (Germany), Stanford University (USA) and the Institute Cajal (Spain), among other prestigious institutions, met with their Israeli counterparts at Sde Boker, in the Negev Desert, to exchange ideas and data on how the cells of the brain are organized into distinct, localized structures that carry out their complex functions, including data-processing and "thought" itself.

The basic electrical circuitry of the cortex displays remarkable similarity from one place on the brain's surface to another, and from one species to another. The cortex seems to be divided into modules with similar underlying structures, functions and computational tasks. The ISF workshop emphasized recent work on the anatomically distinct modules ("barrel fields") which process sensory data from the facial whiskers of mice and rats, a particularly useful model system. Each "barrel" contains only about 1000-1500 nerve cells (neurons) and services only one whisker. This can be easily manipulated and the resulting nerve cell messages recorded.

The many important presentations at the ISF workshop were sufficiently exciting to rate an eight-page summary report, submitted to **Neuron** for international publication. The researchers found that net effect of the barrel circuitry on the electrical signals it receives is mainly inhibitory. That is, it lowers (as appropriate) the likelihood of such signals triggering neuronal activity further down the information-processing chain. Cortical cells also seem to combine inputs from other cells, with exquisite attention being given to the temporal and spatial patterns of the input before "deciding" to react. Furthermore, precisely synchronized oscillations in electrical activity are observed, which often involve neurons which are located quite far apart and which have few intervening connections. Mechanisms which could permit such widespread interactions are under intense study.

The excitatory and inhibitory neurons within each "barrel" are interconnected. These circuits are dynamic structures which can change their properties over short and long time-scales, and with experience (the cellular equivalent of "learning"). For example, increasing the stimulation frequency of excitatory neurons increases the effectiveness of their electrochemical linkages with inhibitory cells, but decreases the effectiveness of their linkages with other excitatory cells.

The overall ISF workshop program thus resembles the brain itself: a facilitating structure in which communication between otherwise distant parts helps them produce marvelously rich and innovative results together, results far beyond what they could produce on their own.

Selected Upcoming ISF Workshops

Nov. '97	Numerical Modeling of Clouds and Precipitation (Coordinator: Z. Levin, Tel Aviv University)
Dec. 14-16	Dynamics of Liquids at Interfaces (Coordinator: M. Urbach, Tel Aviv University)
Dec. 30-31	Cognitive Theories of Inter-textuality (Coordinator: Z. Ben-Porat, Tel Aviv University)
Jan. 03-07	Applications of Novel Supramolecular Systems (Coordinator: I. Goldberg, Tel Aviv University)
Jan. 12-16	Values: Psychological Structure, Behavioral Outcomes and Inter-generational Transmission (Coordinator: A. Assor, Ben-Gurion University)
Feb. 22-23	Photo-induced Dynamics and Its Applications (Coordinator: N. Moiseyev, The Technion)
Mar. 15-19	Phenotypic Plasticity in Plants (Coordinator: A. Novoplansky, Ben-Gurion University)
Mar. 16-18	Domain Organization in Membranes and its Biological Implications (Coordinator: Y. Barenholz, Hebrew University)
April '98	Trade, Hoarding and Recycling of Bronze (circa 1300-1100 BCE) (Coordinator: M. Artzy, Haifa University)