PERSONAL REMARKS ON THE OCCASION OF THE JUBILEE OF THE ROTHSCHILD PRIZE IN PHYSICS

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Physics is the most fundamental among the natural sciences. It attempts, usually with success, to formulate the basic laws which govern all natural phenomena, including those considered as the domain of chemists and biologists. The most fundamental laws obviously relate to the behavior of the smallest objects, on one hand, and to the beginning of the universe, on the other. But the road, from discovering a basic law to elucidating complex collective phenomena of large numbers of units, is long and arduous. It is this journey that allows us to apply the laws of physics to technology issues, to the structure of complex materials, to living systems and to almost any other natural process or substance.

The history of physics research in Israel has traveled along all of these routes, and the Rothschild prize has been awarded to scientists dealing with smaller and smaller units of matter, as well as to those attempting to understand the cosmos and to those who seek to uncover patterns of behavior of complex systems, bordering on technological applications.

The Jubilee of the Rothschild prize is also a Bar Mitzva of the physics prize. Of the 13 physicists awarded the prize in its fifty years, ten are theoretical physicists and three are experimental practitioners. This asymmetry reflects a historical quality bias of Israeli physics, partly related to scarcity of resources, needed for sophisticated experimental apparatus, but also to a cultural inclination towards theoretical science.

Five of the theoreticians and one of the experimentalists dealt with the never ending chain of fundamental building blocks of matter, from the atom to its nucleus, onwards to the particles within the nucleus and further to the quarks within those particles. Three theoreticians dealt with the basics of the revolutionary theories of the 20^{th} century: General relativity, gravitation and cosmology on one hand and the fundamental elements of quantum mechanics, on the other. Two of the theoreticians and two of the experimentalists studied aspects of matter in its condensed forms, a topic which is only one step removed from the entire world of electronics, microprocessors, electro-optic

phenomena, microwaves and the like. Needless to say, the compartmentalization of physics research into the above categories is somewhat artificial, as all subfields of physics overlap, to some extent.

The shifting emphasis of the prizes, from one decade to the next, reflects the changing trends in physics research in the world and in Israel during these fifty years. Israel was first a one-man world center of atomic physics (Giulio Racah); it then became a one-group world center in nuclear physics (the Weizmann Institute), followed by a two-group center of particle physics (Weizmann Institute and Tel-Aviv University). In the last two decades, attention shifted to condensed matter physics and to cosmology, and, happily, additional institutions contributed to the international success of Israeli physics.

To my best knowledge, the Rothschild prize has been the only major science prize awarded in Israel exclusively to Israelis, on the basis of international reviews, rather than on the basis of intra-national views and evaluations. This fact, together with the low frequency of the prize in any given field, makes it a very special and unique honor.

On a very personal level, I allow myself to note that I studied, as an undergraduate, in courses of two of the prize winners at Hebrew University; my three supervisors for the M.Sc. and for the Ph.D. theses have all won the prize; another winner shared with me the Israel prize; another was a Ph.D. student of one of my advisors; two others were, respectively, my fellow undergraduate at Hebrew University and my fellow graduate student at the Weizmann Institute and, finally, one winner was recruited to the Weizmann Institute by me, when I served as its President. I also hasten to add that I have never been a member of the jury of the Rothschild Prize, I have never been consulted by the jury and I do not know who recommended me and who was in the jury when I won the prize. This tells us first, that Israel is still a very small country and its world renowned community of leading physicists is extremely compact. It also tells us that role models, and individual scientists who establish dynasties of talented young followers, are still the best methods of transmitting the spirit and practices of creative research, from one generation to the next.

My own prize was awarded for work done during the “hottest” decade in the history of particle physics, the 1970’s. Without any false modesty, I can state categorically that whatever one achieved during that decade, in particle physics research, included a significant component of serendipity. You had to be lucky to be born and to be trained as a physicist, just at the right time for actively participating in such a fantastic intellectual adventure. But we also know that, in science, almost everybody gets lucky on some occasion, but not everybody knows how to convert the lucky break into significant achievements. If I had to rewrite what the jury said, I would claim: “The prize has been awarded for making very interesting discoveries, while accidentally being, at the right time, in the right place.” Fortunately, it is not customary for prize winners to amend the verdict of the jury which gives them the prize.

I remember receiving the prize, as the youngest prize winner, so far, in Physics, in a ceremony at the Knesset, presided over by Yigal Allon, then foreign Minister and Deputy

Prime Minister in the first Rabin Government. As he was shaking the hand of the 34 year old winner, Allon literally whispered in my ear, on stage, near a microphone, but inaudible to the audience: “Haim, don’t let this go into your head”. I will forever be thankful for that remark. I also remember that the prize money was exactly the sum needed to replace my five year old Israeli made Triumph by a new Fiat 131, creating an amusing indirect connection between the theory of quarks and the car industry.

Today, the role of physics as a tool at the service of chemistry, biology and other scientific fields has increased significantly. It is a safe bet that some future Rothschild prize winners in the physical sciences will be physicists working in fields such as cell biology, systems biology, genetics, new materials and other related areas. But perhaps a renaissance of the march to the early universe and to the smallest particles will reappear on the horizon. One thing is clear: If we could now predict with certainty the results of the prize winners of the next fifty years, it would logically follow that these people are not worthy of their prizes. The beauty of science is mainly in discovering the unexpected. The next crop of winners will undoubtedly do just that.

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