



# PROFILES OF WOMEN SCIENTISTS IN ASIA

Their inspirational stories



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# ISRAEL

Nominated by the Israel Academy of Sciences and Humanities

# Professor Ruth Arnon



## Immunology

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## Biography

Professor Ruth Arnon, former Vice President of the Weizmann Institute of Science (1988–97), is a renowned immunologist. Among her scientific contributions is the development of Copaxone, a drug for the treatment of multiple sclerosis, which is presently marketed worldwide. A member of the Israel Academy of Sciences and Humanities, she chaired its Sciences division (1995–2001) and served as the President of the Academy (2010–15). She was President of the European Federation of Immunological Societies, Secretary General of the International Union of Immunological Societies and the President of the Association of Academies of Sciences in Asia (AASA). Her awards include the Robert Koch Prize in medical sciences, Spain's Jiménez Díaz Prize, France's Legion of Honour, the Wolf Prize for Medicine, the Rothschild Prize in biology and the Israel Prize. She has

an honorary doctorate from several universities in Israel and abroad. She is married with two children and six grandchildren.

## When did you know you wanted to pursue a career in science?

Since early childhood, I was attracted to topics related to nature and natural sciences. I also loved arithmetic. I read many books about discoveries and discoverers, and it aroused my curiosity.

## Who or what inspired your passion and curiosity in science?

At a very early age I read the book *Microbe Hunters*. I was fascinated by the biography of the great scientists and their discoveries—to me it was like a detective story. For each chapter, I wanted to reach the end and know what had happened.

## Who were the influencing role models in your career and how did they inspire and motivate your passion to pursue a career in science?

A role model for me was Madame Marie Curie. I admired her determination and stubbornness, her unlimited devotion to her experimental work. The true story about her coming to the lab in the middle of the night, being curious about the results of her experiment and not being able to wait for the next morning—admirable!

## What do you think is your greatest scientific achievement to date?

My greatest achievement to date is the development, together with my colleagues Michael Sela and Dvora Teitelbaum, of the drug Copaxone, which is probably the best drug for treatment of multiple sclerosis patients. It has been on the market worldwide for more than 20 years and is still going strong. At present, another product of my research, a universal flu vaccine, is being evaluated in Phase III clinical trial. If successful, this vaccine may bring tremendous benefit to the combat of influenza.

## What motivates you to work as a scientist in Asia?

I am an Israeli. Israel, although of very small area, is probably the only country in the world that is at the border of three continents. It is in close proximity to Europe and to Africa but it is located in Asia. Hence, we have strong scientific contacts, collaborations and involvement in both Europe and Asia. As such, the Israel Academy of Sciences and Humanities is a member of both the European organisation, the European Federation of Academies of Sciences and Humanities, and the Asian organisation, the Association of Academies and Societies of Sciences in Asia (AASSA). In this realm, I served for a time as President of AASA (before merging to become AASSA).

**What are some of the challenges you have faced as a female scientist and how have you overcome these challenges?**

I personally have never experienced discrimination as a female scientist. However, not giving up the opportunity of having a family meant working hard in order to achieve the fullness of my scientific work and, at the same time, raising two children and taking care of my family. I hope I have succeeded in both tasks.

**What are your future aspirations related to science? What further barriers do you foresee to reach those goals?**

The sky is the limit! So many new findings, so many new methodologies that provide endless opportunities. Due to my age, I personally will probably not be able to take advantage of them. But for young scientists, including females, there are tremendous opportunities—I don't foresee real barriers.

**What would you say to young women considering a career in science?**

I would say: if you love science, go for it!! It may not be easy but the satisfaction is tremendous. Don't be discouraged by failure—there are always failures on the way. But on the whole, there is the pleasure of coming to work every day and following your curiosity.



**What is your opinion on the state of gender equity in science? In your country, what do you think is needed to address this urgent issue? What is the role of learned academies or professional bodies at local, regional and international levels to support a future of gender equality? Are you involved in any events or organisations related to 'Women in Science and Engineering'?**

In academia in most countries, including my own, there is great inequality among genders: while among students there is a majority of women, in academic positions it is the reverse. Furthermore, the higher

the rank, the bigger the difference. In the rank of professor, less than 25% are females. There has been a gradual improvement over time but we are still far from equality.

# Professor Yonina Eldar



## Electrical engineering

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## Biography

Yonina Eldar is a professor in the Department of Electrical Engineering at the Technion – Israel Institute of Technology, where she holds the Edwards Chair in Engineering and heads the SAMPL lab. She is an adjunct professor at Duke University, a research affiliate with the Research Laboratory of Electronics at MIT and was a visiting professor at Stanford University. She is a member of the Israel Academy of Sciences and Humanities, and an IEEE Fellow and EURASIP Fellow. She has received many awards for excellence in research and teaching, including the IEEE Signal Processing Society Technical Achievement Award, the IEEE/AESS Fred

Nathanson Memorial Radar Award, the IEEE Kiyo Tomiyasu Award, the Michael Bruno Memorial Award from the Rothschild Foundation, the Weizmann Prize for Exact Sciences and the Wolf Foundation Krill Prize for Excellence in Scientific Research. She was selected as one of the 50 most influential women in Israel and is author and co-author of three books. She is married to Shalomi and a proud mother of five children: Yonatan (19), Moriah (15), Tal (12), Tal (6) and Roei (3).

## When did you know you wanted to pursue a career in science?

I always enjoyed maths and physics in school and knew I wanted to work in a field that combined them. It was important to me to do work that has an impact on people and involves working with people. During my undergraduate studies, I was fortunate to be able to learn from two mentors, Professors Arie Yeredor and Udi Weinstein, who exposed me to the beauty and unlimited opportunities of signal processing and scientific research. I completed my PhD at MIT, where I worked with Professor Al Oppenheim, who leads a remarkable and unique signal processing group. When I finished, I knew that my passion was in research, development and working with young talented students.

## Who or what inspired your passion and curiosity in science?

I was very fortunate to grow up in a home where knowledge was always highly regarded. My parents are both educators and are extremely devoted and passionate about teaching, reading and learning. My parents would use every opportunity, including travelling, family dinners and more, to teach us about the world. Although they are not scientists, they installed in me and my siblings the desire to learn, to teach and to make an impact.

## Who were the influencing role models in your career and how did they inspire and motivate your passion to pursue a career in science?

My ultimate role models are my parents, who always strived to make a difference and impact society. Although our fields are very different, I choose research and educational activities that I believe will benefit society. My first steps into the world of signal processing were guided by Professor Arie Yeredor, a close friend, and Professor Udi Weinstein. They are two inspirational teachers and researchers, truly passionate about signal processing. In their teaching they stressed that, if you really understand something, it can be explained in a simple way—no

matter how complicated. This mantra has guided my research and teaching. Professor Al Oppenheim, my PhD advisor, leads a unique group of students who work on innovative solutions and ideas, stressing out-of-the-box thinking rather than solving ‘hot’ problems. This has inspired many of my activities.

### **What do you think is your greatest scientific achievement to date?**

We developed the first analogue sub-Nyquist receiver that is able to sample and process signals at rates much lower than the Nyquist rate, which was considered the ultimate limit for analogue to digital signal conversion. This allows reducing sampling rates, processing rates, power, size and other physical parameters, such as acquisition time, without harming performance. Since our first prototype we have developed several complete hardware systems in areas ranging from communications to radar, optics and medical imaging, including a wireless ultrasound receiver. These prototypes can overcome various technological barriers by exploiting signal structure and the processing tasks in the sampling front end.

### **What motivates you to work as a scientist in Asia?**

My parents moved to Israel from Toronto, Canada, when I was a young child. Being Jewish, they were always passionate about living in Israel, home of the Jewish people. We were fortunate to be raised in Israel with unconditional love for our

country and nation. It was always clear to me that I would also build my family here. Despite the challenges on the scientific front, it is exciting and rewarding to know that our work in Israel has a direct impact on the future of the country.

### **What are some of the challenges you have faced as a female scientist and how have you overcome these challenges?**

There are many challenges, from raising a family while pursuing a career, to some that result from a dominant implicit and explicit bias—especially in engineering fields. It is extremely important to have a strong support system at home and mentors (both female and male) at the workplace. Recently, due to my own experiences and some lack of support by colleagues, together with other female friends and colleagues I have tried to be active in creating such groups for women scientists at all career stages. Providing opportunities for women scientists, such as invitations to give talks and nominating deserving women for awards, is an important way to try to overcome the inherent implicit bias. Unfortunately, some engineering associations do not have a very good track record in recognising deserving women members. A recent survey by the IEEE reported that more than 70% of women experienced negative outcomes in their careers due to gender. As a community, we need to find ways to change this, by mentoring, supporting each other, actively promoting women scientists and ensuring that deserving women are properly rewarded.



**What are your future aspirations related to science? What further barriers do you foresee to reach those goals?**

My aspiration is to build a truly interdisciplinary lab that uses signal processing to develop new devices and algorithms that will enable discoveries in biology and physics and impact the clinical world. These goals require close collaboration with leading scientists in those areas and with clinicians. I am currently working on establishing such collaborations.

**What would you say to young women considering a career in science?**

Women should know that they have a unique and important role in science. There is no evidence that suggests that women are not as good in science as men are. On the contrary, women add a unique aspect to science: in general, women tend to be more interdisciplinary and broader in their thinking. They are often motivated to interact more with colleagues and students, facilitating collaborative and interdisciplinary research. They are often attracted to topics that have a direct impact on society and are often motivated to connect technology to society. Define your goals and make choices that are right for you—there are many ways to succeed. Believe in yourself and in your own way. Don't try to follow someone else's path.