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## Funding Innovative Science

IT IS A WELL-KNOWN PROBLEM: A JUNIOR RESEARCH GROUP LEADER MUST SOMEHOW COMPETE against the seniors, who have larger laboratories, good funding, and clout with the journals. Furthermore, in the normal grant system, preliminary data requirements make it hard to start new directions in research. Beginning scientists must build on their postdoctoral work, which forces them to continue along already-trodden paths. Once a laboratory has been established, it is reasonable for the reviewers of competitive grant applications to look for evidence of an investigator's likely success in the form of "preliminary results." But beginning group leaders should be judged only by their demonstrated excellence and their creativity in finding new directions. Such a change would greatly stimulate innovation.

I experienced the advantages of such a system 20 years ago, when moving to Germany from a postdoctoral position in the United States. A hierarchical system that emphasized seniority was rampant in Europe, and independent research positions for younger scientists were few. But I was lucky in joining the European Molecular Biology Laboratory (EMBL) in Heidelberg, which was exploring alternative ways to organize science, with the aim of promoting innovation and research excellence.

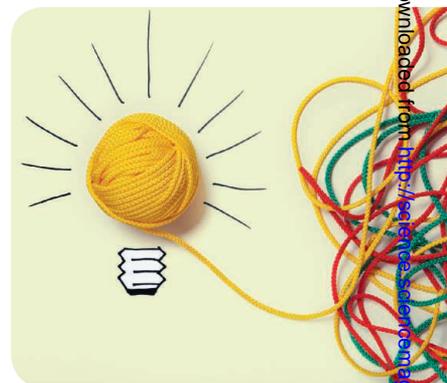
The EMBL had created a group leader system in which, apart from a few senior scientists to provide some stability, new researchers were directly funded for up to 9 years to do as they pleased, before being required to move on to a senior job elsewhere. This model was a success in large part because this type of funding encouraged a focus on innovation, but also because it provided a separate funding stream in Europe for starting scientists. The EMBL was not alone in this endeavor, as analogous thinking was beginning to take hold at other European institutions and funding agencies. But in 2007, the European system moved an important step further with the introduction of the European Research Council (ERC). The ERC currently runs a pan-European competition that in 2012 funded 536 proposals after receiving more than 4700 applications from beginning group leaders, each for 5 years for as much as 1.5 million euros per year. This grant program is specifically targeted at providing additional opportunities for young investigators who are "making the transition from working under a supervisor to being independent researchers in their own right." A crucial aspect of the ERC is that the reviewing criteria specifically focus on novelty, interdisciplinarity, and high-risk/high-gain research.\* The ERC runs other competitions to fund established investigators.

In the United States, the New Innovator Awards from the National Institutes of Health (NIH) are similar to the ERC junior grants in seeking innovation and explicitly not requiring preliminary data. However, there are far too few of them. Although a *Science* Editorial called for 500 of these grants in 2009,† only 51 were awarded in 2012. I suggest that NIH move to a model where all starting principal investigators are funded through a New Innovator Award type of program before they compete in the normal system. The new idea here is that a screen for excellence and innovation should be the only way in which new investigators get funded, through a separate funding stream, with no requirement for preliminary data.

In my own field of the biological sciences, the molecular biology revolution with its associated cataloging of gene function is approaching maturity. To understand how cells and organisms function, biology must now branch out into new areas, incorporating physics, chemistry, and engineering. No one knows the right way ahead, but each new laboratory should be a small experiment in that direction. Experience demonstrates that innovation in science mainly comes from the young. Only by providing our new group leaders with real freedom to maneuver can we sow enough seeds to find the right way ahead.

— Anthony A. Hyman

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\*<http://erc.europa.eu/starting-grants>. †B. Alberts, *Science* **326**, 1163 (2009).

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