

KAKENHI ESSAY SERIES No.9 (Sep.2009)

Grants-in-Aid for Scientific Research: Nourishing Source of Growth for Budding Scientists

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It was not long after I completed the doctoral program at Tokyo Institute of Technology in 1968 and started out as a research associate at the Institute's Precision and Intelligence Laboratory that I received a Grant-in-Aid for Scientific Research (a scientific research grant) for the first time from the Ministry of Education, Science and Culture. While I was in graduate school, I helped to prepare applications for grants under then-Associate Prof. Yasuharu Suematsu, who was my dissertation advisor. His research team had been just established and, since our projects were on lasers and optical transmissions, areas of science that were then still of unknown value, our applications were never accepted. Another research laboratory where I was employed after graduation, led by Prof. Hitohiro Fukuyo, was also seeking grants and we learned from them how to outsource for clean typewritten application forms. Later, the Grant-in-Aid for Promoted Research was set up, allowing post-doc fellows like me to apply for funds for our own projects. I took this opportunity to file an application and I was ecstatic when it was accepted. The ceiling for a grant was set at about 500,000 yen and I think I received about 400,000 yen for my project. I bought a constant-temperature chamber that looked like a tank for keeping tropical fish and started polymerization of plastic optical fibers with distributed index, which later paved the way for the development of microlens arrays and microoptics research. I was a research associate for about six and a half years and, since Grants-in-Aid for Promoted Research were given for one year, I applied each year and I think I received a fund four times. I was really disappointed when my application was turned down. Without a grant, I had no idea how to proceed with my research. It was out of this experience in my younger days that I argued, after I became associated with the governmental panel for discussing research applications, that grants should be provided for two years.

I was truly happy when I was able to file an application to test my own ideas after I became an associate professor in 1974. But life is not a box of chocolates. I could not produce as many papers as I hoped before I became an associate professor and I had trouble having my applications accepted for research on new ideas. In those days, I drew strength from students who embraced fresh ideas and joined doctoral programs. In 1977, I invented the so-called vertical cavity surface emitting laser, a step which gradually led to approval of more of our grant applications and laid the foundation for preparations for the establishment of the hand-made equipment necessary for producing semiconductor lasers. Prof. Y. Suematsu was always telling us, "You can borrow measuring equipment, but you've got to build a production system on your own." Taking his advice to heart, we spent our research funds mainly for "creating things."

I worked in 1979 and 1980 as a member of visiting technical staff (MTS) at Bell Labs in the United States. This was a painful period since we had to return some of our research funds due to absence and we were unable to file an application for a new grant. Nevertheless, the research on the vertical cavity surface emitting laser and microlenses made progress, enabling us gradually to receive more grants. Around this time, the Grant-in-Aid for Specially Promoted Research started and Prof. Hiroyuki Sakaki of the University of Tokyo as well as Prof. Y. Suematsu received large budgets. Their research appeared unstoppable and prompted me to make up my mind to rise up to my own challenge some day. That time arrived in 1986. We applied for a Grant-in-Aid for Specially Promoted Research for the purposes of conducting the room-temperature continuous wave operation of the vertical cavity surface emitting laser and creating parallel integrated optical circuits. The application went through. We were able at last to purchase an ultra-high vacuum chemical beam epitaxy system that had remained far out of our budgetary reach. Using an organic metal-organic vapor phase crystal growth system that had already been completed with the help of earlier grants, we also successfully ran the room-temperature continuous wave operation of the vertical cavity surface emitting laser. The efforts by Prof. Fumio Koyama (a research associate at the time), who serves today as leader of a Global COE program, and others thus bore fruit.

And 10 years later, in 1995, the Ministry of Education, Culture, Sports, Science and Technology rolled out the COE Program, its largest funding initiative for scientific research at that time, and we succeeded in receiving a grant in the first year. Also qualifying in the same year were scientists like Prof. Ryoji Noyori and Prof. Katsuhiko Sato. As a result, we were able to establish a base for research on ultra-parallel opto-electronics which is as competitive as any at other leading universities in the world. It later evolved, if on a small scale, into the Institute's micro-system research center.

According to my KAKEN database of the National Institute of Informatics, grants-in-aid were provided for 34 projects between 1969 and 2001 (including group research like specific area research projects). As I stated earlier, I cannot think of anything that supported my research as much as these grants did. At Tokyo Institute of Technology, associate professors can enjoy the freedom of receiving budget allocations and choosing research topics just like full professors. In addition, donations from companies that kindly backed my research provided the flexibility of using the above-mentioned public research funds more effectively.

After retiring from the university in 2001, I started serving as one of executive directors of the Japan Society for the Promotion of Science (JSPS). Whenever I saw the gold fish tank that sat in the office of another director of the society and my colleague, Mr. Isao Kiso, I recalled the constant-temperature tank we bought with the first grant-in-aid I received. I tried gradually to improve the application system, which I as an applicant was not entirely satisfied with, hoping that future researchers would be able to fill in the application form with a sense of tension as well as satisfaction. The staff responded in the same spirit and I think we were able to raise these grants-in-aid to the level of "scientific research funds of the world" we could take pride in. Later I participated in the establishment of the Research Center for Science Systems, which enabled me to carry on further reform.

In 2007, something unexpected happened. I became the president of Tokyo Institute of Technology. Once again, I found myself on the receiving end of these grants-in-aid. I am hoping that researchers at my university can succeed in winning funding, but things do not always go according to my expectation. To this day, grants-in-aid for scientific research have continued to provide crucial support for a wide variety of "Gakujutsu" areas in Japan. Without them, there will be no future for Japan's science and any of cultures. There will be enough promising research projects even if 40% of applications are approved instead of the 20% today. I do strongly expect its reinforcement.