

Tenth Birthday of Institute of Molecular sciences.

We are here to congratulate the Institute of Molecular sciences on its tenth birthday.

I feel a strong affinity with the institute for several reasons. My own institute, the Royal Institution in London, is, I think, the oldest research institution in the world which is still active, whilst the I.M.S must be the youngest, at least the youngest which has already reached a position, in ten short years, of real distinction in research. Both enjoy an enviable independence in their research which is broadly determined by a director who is himself a practicing scientist rather than an administrator, and both are advised benevolently, by a council whose members are also practicing scientists. *a therefore human nature to cooperate with something that is working well.*

The foundation of the I.M.S, its *modus operandi*, its fine laboratories, retaining the beauty of their original site, and the quality of its scientific staff, are a grand tribute to the enthusiasm and foresight of its first director, Professor Hideo Akamatu. At the time of the I.U.P.A.C. meeting in Tokyo in 1977, Professor Akamatu ~~proudly~~ took me to see what was being created in Okasaki. My admiration for the I.M.S began with that visit and I have been ~~pleased~~ ^{happy} to serve as one of the two foreign members of its Council, and, through the Royal Institution, to have enjoyed an exchange of scientists and ideas. Real progress in science has already been made here, especially in the areas which are best known to me, such as free radical spectroscopy, the primary processes of photosynthesis and photochemistry and, on the more applied side, the photochemical conversion of solar energy.

I was delighted when I learned that Professor Akamatu's successor was to be my old friend Professor Saburo Nagakura, whose very great personal contributions to molecular science are known and admired far beyond these shores.

The Institution has also been fortunate to have the support of its council of very distinguished and wise men from the principal Universities and Industrial research laboratories of Japan.

The advance of Japanese science over the last few decades has been one of the wonders of the modern world. The only excuse which the rest of the world has been able to offer in explanation of its inability to advance at the same rate, has been that Japanese science has relied heavily on, and benefited from, earlier fundamental work done in other countries. Of course it has; that is what science is all about and we would be the first to complain if Japanese scientists, or those of any other country didn't read out publications and benefit from them. We have all much to learn from the way that industry and academic science work together in Japan, and from the equally effective collaboration which seems to exist between management and scientists.

The rapid translation of scientific discovery into commercially successful products is something at which the British once excelled, in the nineteenth century. They were overtaken by the United States and some European countries (particularly Germany in organic chemistry) in the early part of this century and all have been overtaken by Japan since the middle of the century.

All this illustrates that Japan cannot assume that it will always be in the lead. Nobody knows what country will be next. China perhaps? Although some of the leading scientists of the world are Japanese, and the number is increasing, Japan's contributions to pure science have not equalled its technological development and this has given an excuse to many of the politicians in other countries to claim that support of pure science is not an important factor in economic and technological progress. It is adequate, and more economical, they say, to rely on other countries to do this and to concentrate on applying and exploiting their results.

This false conclusion has not been swallowed in Japan and there is a strong movement here to become a leader in pure research, not just for reasons of prestige nor even just because of a thirst for knowledge but because they realise that, without a sound foundation of basic research, and the expertise which results from this, no country can compete effectively in the modern technological world. Good fundamental research is an absolutely necessary condition for economic and industrial prosperity but it is not a sufficient condition in itself. Other things are necessary as well and Japan possesses these other things more than most countries. But the birth of institutions like I.M.S, which is devoted essentially to the pursuit of natural knowledge, shows that the importance of this activity has been recognised and it is therefore an encouragement to scientists in all countries.

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To us chemists it is also an encouragement that the activity should be devoted to molecular sciences. We might define molecular sciences as an environment where two or more atoms are gathered together and it therefore embraces a large part of the natural world, from the rarified atmosphere of outer space to the crowded communities of the biological cell. Already the scientists here at I.M.S. have made excursions across this huge range of molecular phenomena with notable success. In the field that I find personally the most exciting at the present time, that of photosynthesis in the living plant and its imitation in vitro, Keitaro Yoshihara, ~~Hironobu Yamamoto~~ ^(or YAMAZAKI) and others here have made spectacular progress with their picosecond time resolved studies. I mention these only because of my personal familiarity with them, and equally notable progress has been made in made other fields of molecular science from theoretical studies of molecular structure and dynamics to solid state chemistry.

Bolton's note
CHEMISTRY PROFITS ONLY 3% OF GROSS PROFIT.
BECAUSE MONEY GOES TO MAKE PROFITABLE SUBJECTS NOT SO.
CHEMISTRY IS THE MOST PROFITABLE HIGH TECH INDUSTRY.
IN 1980 EARNED TRADE BALANCE OF > 2 BILLION MORE THAN REST OF MANUFACTURING INDUSTRY PUT TOGETHER!

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In last annual report, over 150 publications of high quality are recorded, which is a very high productivity for a small research group.

Another memorable success of the Institute has been the series of Okakasaki conferences which have brought together many Foreign visitors and their Japanese colleagues. I have had the pleasure of attending three of these and they seem to me to be just the right size, as indeed is the Institute itself. I am not in favour of huge conferences or huge research centres; these should be large enough so that one has enough people to talk to but not so large that many of the scientists are strangers to each other. This is one of the reasons that the I.M.S. is such a friendly and happy place to work in.

So, to Professor Nagakura and all research staff of the Institute of Molecular Sciences, our congratulations on this, your tenth birthday, and our best wishes for further successes in your future research.

Prof Nagakura
I.M.S.

~~Saigo ni, Nagakura Kyōju Hajime, Bunshiken no mina sama ni,
 kenkyūjo no jikāime no otanjōbe no oiwai, to kongo no gohatten o oinori
 mōshi agemasu.~~

10th birthday congratulations for the occasion

fundamental research in chemistry. But, it may be argued, subjects which lead to applications and technology require more expenditure. Not so. The chemical industry is our largest and most successful high-technology industry and provided, in 1980, a trade balance of £2100 which is greater than the rest of U.K. manufacturing industry put together!

So, if it isn't our basic research and there is such a poor correlation with government funding why don't we do better. There may be many reasons; one is almost certainly that the industrial revolution started in Britain and, once habits and customs are established they are difficult to change. It is often a great advantage to start with a green field. But the accusation is often made that the trouble is really with the academic scientists who are more interested in pure science than in its applications, and the relatively low status which is given to engineers in Britain. I am not too convinced about this. Scientists are not given a particularly high status either but that doesn't seem to have inhibited their work over the last two centuries or so. I suspect that the best place to do applied research is in the industry, where the research is being applied and that, although really basic research can be and must be carried out in the universities, industry must itself have research scientists knowledgeable and experienced enough to connect with, and make full use of, that basic research.

Prof Fukui (Nobel prize for chemistry 1981) has said "Industry is more likely to put its research effort into its daily business. It is very difficult for it to become involved in pure chemistry. There is a need to encourage long -range research, even if we don't know its goal and if its application is unknown." There are only a few cases, particularly in the chemical industry, where Japan has created its own inventions. The trend has been to import technology and I want to reverse this trend. I want to see more indigenous technology. This can only be done by pure research"

Also Genya Chiba, of ^{UK} Governments Research Development corporation "Japan's future must be based on science and technology. There is no question that the future of science and technology in Japan must involve heavy emphasis on basic research ". And Michiyuki Uenohara, Director of research at NEC corporation (electronics) , "We can't wait for solutions to come from outside Japan. We have to create an adequate environment to promote creativity by ourselves."

But these views do not mean an isolationism, indeed there are many scientific workers here from other countries, for example there are two British researchers here in Tsukuba at present working on the Gallium arsenide programme.

As a result of these views industry is setting up laboratories to do pure research especially in electronics eg Hitachi, Sanyo and Matsushita and N.E.C are all building labs. And they are all in real competition with each other.

In fact most of Japanese research is funded by industry, more than 75% of it, whilst in Europe the figure is more like one half. This must automatically ensure that more attention is paid to applied research and development in Japan. The total represents 2.58% of G.N.P. and the governments Council for Science and Technology have recommended that this should be increased (by both industry and government) to 3.5% by over the next ten years. And Japan's G.N.P is the second largest in the world.

On the whole University research in Japan has not been as successful as in most western countries. It is widely said that Japan imports its basic scientific ideas and exploits the results of other countries. But why not? Most scientists would complain if others ignored their work!

The vice minister of M.I.T.I. (ministry of international trade and industry) Keiichi Konaga says "We now need to develop new technologies by ourselves. Japan cannot afford to fall behind. The U.S and Europe are

actively engaged in basic research in revolutionary new technological fields. We would like to play a major role in this research. In the development stage Japan is just as advanced as the U.S and Europe. In basic and applied research however, Japan is quite a bit behind the U.S and Europe. For example, if you look at Nobel Prizewinners, particularly in natural sciences it is very obvious that Japan is inferior. For this reason we want actively to promote basic and applied research because we think that this would greatly enhance the development of Japanese industry."

One such fundamental research laboratory that I know well, since I have been a member of its council, is the Institute of Molecular Sciences at Okasaki, founded 10 years ago. None of the above criticisms can be leveled there, it has the freedom to do basic research of the highest fundamental quality and has already established an international reputation for itself. And there could hardly be a more striking demonstration of the Japanese determination to develop scientific research, both pure and applied, on a very large scale than the Tsukuba science city, and the world exhibition which is to be shown here. We give our best wishes to the exhibition, and to our scientific friends in Japan.

And I may finish by repeating my question "Since Japan has become so successful in technology without being equally successful in pure science, can it, and other countries whose main interest is in economic development, regard basic scientific research as relatively unimportant?"