

A Personal View of German-Japanese Scientific Cooperation

Two hundred years ago Germany was fragmented and depressed. Having terribly lost in the war against Napoleon, being squeezed between France and Russia, the remaining Kingdom of Prussia lost half its population and was forced to pay exorbitant indemnifications. However, King Frederick William III, and especially his well-beloved Queen Louise, realized that the Prussian state and society could only survive if they began to reform against the wishes of the nobility and conservative forces. Fortunately a few strong personalities made it possible.

A key undertaking was the reform of the Prussian education system. All the other reforms in organization, commerce or military relied on creating a new type of citizen who had to be capable of proving themselves responsible. Thus the existing wide variety of educational institutions was replaced by a compulsory school system divided into "Volksschule" (people's schools), Gymnasiums and universities, all with controlled exams - and driven by the idealistic concept that education and performance should replace social origin. Thus, since 1812, a university entry in Germany in principle requires to pass Gymnasium and to obtain the famous "Abitur". Additionally Wilhelm von Humboldt, older brother of the great explorer and co-founder of the Berlin University, stipulated the ideal valid today for most universities: that research and teaching form an inseparable unit.

Barely one hundred years later Germany was a leading force in science, industry and commerce. However, Adolf von Harnack elaborated in 1910 on a pivotal point: research in natural sciences had developed a tremendous dynamic, there were now entire disciplines which could no longer be fit into the frame of a university due to their need of large equipment as well as long-term commitment to problems far above the level of average students. He proposed to the Emperor the creation of professional non-university research institutes on the most modern fields of natural sciences, unified in a single organization, with freedom to rapidly adapt to developing new research topics.

His Majesty Wilhelm II. quite clearly understood the importance of basic research for innovation in an industrial country competing with the best in the world - he approved and supported the project. Within two years the first institutes of the Kaiser-Wilhelm-Society were established in Berlin. Fritz Haber, Max Planck, Albert Einstein: they were only three of the 15 Nobel Prize winners of the KWS until 1945. And so far scientists of the successor organization, the Max Planck Society, collected another 17 Nobel Prizes (among others awards).

Germany had its Kaiser Wilhelm Society, the United States the Rockefeller and Carnegie institutions, France had the Institut Pasteur - what happened one hundred years ago in Japan? "To turn the country from imitation to creative power, there is no alternative but to promote research in pure physics and chemistry, and for this we must establish an Institute of Physical and Chemical Research" argued the prominent businessman and industrialist Eiichi Shibusawa.

Together with various research leader he created in March 1917 RIKEN (Rikagaku Kenkyūjo) modeled on the Kaiser Wilhelm Society. After a difficult time due to the economic downturn after the Great War things turned around for RIKEN in 1921 under the directorship of Masatoshi Okochi. Although only 42 years of age, Okochi had a strong sense of vision and determination - and he transform RIKEN

into an institution like none other in Japan. In 1922, just a year after taking on his new position, he introduced a radically novel system in which each independent laboratory was directed by a Chief Scientist who was given considerable autonomy to manage research topics, personnel and budget. With funding secured through government and an increasing number of subsidiary companies, RIKEN grew steadily into a *second-tier zaibatsu* through the 1930s and early 1940s, nurturing in the process a new generation of young Japanese scientists. "It was a paradise for scientists" beamed Sin-Itiro Tomonaga, Japan's second Nobel Prize Winner (1965).

After the war RIKEN reopened under the name KAKEN in 1948. With a new status as a public corporation the name changed back to RIKEN in 1958, and the Institute was able to return to the forefront of Japanese science and technology. When, in 1967, RIKEN relocated to a large plot of state-owned land in Wako on the outskirts of Tokyo, this marked the start of a new and ambitious era in Japanese science. Modeled on the nation-wide institutes of the Max Planck Society in Germany, the 8 Research Centers in Wako were complemented with RIKEN satellite institutions across the country: the Tsukuba Institute opened in October 1984 to promote gene research, followed in 1997 by the Harima Institute in Hyōgo Prefecture with the SPring-8 synchrotron radiation facility, in 1998 by the Genomic Sciences Center in Yokohama (where there are now 4 centers), and in 2002 by the Kobe Branch with an extra center in Osaka. Furthermore, RIKEN established Advanced Science Institutes at Sendai and Nagoya as well as the Muon Research Facility at the Rutherford Appleton Laboratory in the UK (1995) and the RIKEN facility at the Brookhaven National Laboratory in the USA.

Both Germany and Japan enjoy a well-developed university system and a non-university organization dedicated to basic research - here the Max Planck Society, there the RIKEN conglomerate. The latter two organizations have quite a bit in common: they are world-famous, funded to a large extent by the government, and, although home for a large number of graduate and postgraduate students, they are not allowed to award graduate degrees. Consequently, already for this reason, researchers at both organizations are forced to maintain close interactions with national and international universities. Thus a natural question is "What are the attitudes of researchers in both countries towards international research cooperation, and specifically towards German-Japanese exchange activities and interactions?"

Let us first look at Japanese scholars visiting Germany. The country is - after the United States, Britain and Australia - the fourth most important host country for international students. In 2011, for the first time, more than 250,000 foreign students from all over the world were enrolled at German universities: this makes 11.4 percent of all students in Germany (lots of rattling statistics can be found at www.wissenschaftweltoffen.de!). Interestingly most of them came from China (25.564 in 2013), followed by Russia (10.912), Austria (8.655), Bulgaria (6.764), Turkey (6.666) and Poland (6.575). For this treatise the figures for other East Asia countries are of interest, and they can be found far down the table: Republic of Korea 4.279, Japan 1.908 and Taiwan 1.377. To get a better grasp of the significance of these figures we need to normalize: there are 19 Chinese students in Germany per million fellow inhabitants, 15 Japanese, but 58 Korean and 60 Taiwanese scholars.

Germany has always been an attractive country for foreign student, but it has become even more appealing over the last twenty-five years since unification. Especially the younger population has "chilled out" of xenophobic fears, has become European, even world citizen. Berlin has become an international hotspot again. English has lost the image of a "Fremdsprache" (foreign language) and is

accepted as simply a means of communication. And German universities are rapidly adapting too. They are still free of exorbitant tuition fees, they strive with excellence - and some are even conducting a good part of their teaching in English. And exchange programs funded on national and European levels have young people mixing up all over Europe.

What about postgraduate scientists? In 2012 Russia was top (1.717), closely followed by the USA (1.654) and China (1.360). Next are India, Italy, Poland, France and the UK - Japan ranks 12th with 372 postgraduate scientists at German universities. Or, in other words, there are more than 5 US-American scientists in Germany per million inhabitants, 3 Japanese, but only 1 Chinese. This would support the personal impression that for various reasons Chinese scientists tend to flock to the USA, Japanese scientists to Canada and Germany. Interestingly, 66 % of the visiting scientists from Japan, Korea or Taiwan are women, while for Chinese scientists the ratio is 50:50.

Looking at the numbers of Japanese students, graduates and even staff of universities or research institutes coming to Germany over the years, one notices an at first inexplicable decline. There is no indication that Germany has become less attractive to scholars – and actually this decline has been observed for other countries like the USA and UK as well. Thus the decrease might reflect a presumed inward-looking attitude of current Japanese students, a growing number of whom apparently have no interest in studying overseas.

But what about international students attending Japanese universities? In 2008 there were 100,000 foreign students registered in Japan, and the Japanese government announced an ambitious plan to host 300,000 students by 2020. However, there is a significant difference to the German situation: 93,3 % of these students are from Asia, 62 % alone from China – understandable, as almost all teaching is done in Japanese language and with Japanese textbooks. Japan is – subsequent to France, Austria and Canada - the eighth most important host country for international students.

What about German scholars visiting Japan? In 2009 Germany had 115,500 domestic students studying abroad. However, over the last 15 years the number of German students in Japan has risen only slowly, from 250 to 450 per year. By contrast the mobility of German students to China increased in ten years from 1,300 to more than 6,000 annually! One reason might be the currently 750 collaborations between German and Chinese universities, which cover not only the exchange of students and scholars, but also the joint development of curricula or even export of entire education programs to China.

For two highly industrialized countries like Japan and Germany the relatively low level of academic exchange cannot be caused by dire financial straits. And in fact, a closer look at the situation reveals a plethora of funding opportunities - which seem to be not used to their limit. Here I can point out just a few - there are more, and many organisations do have local offices in both countries.

At the forefront certainly is the DAAD. The German Academic Exchange Service (DAAD) is the largest funding organisation in the world supporting the international exchange of students and scholars. In 2013 it supported 558 German and 411 Japanese exchange visits by individual or project funding for periods up to one year and more. Remarkable is the, in general, larger number of German visitors to Japan, and the conspicuously low number of Japanese scientists and university staff members applying.

Next in line would be the DFG. The German Research Foundation (DFG) is the central self-governing research funding organisation in Germany responsible for promoting basic research. Besides funding excellent research projects at universities and other research institutions, it promotes international cooperation and is particularly dedicated to the promotion of young researchers. The DFG (together with DAAD and AvH) is partner of The Japan Society for the Promotion of Science (JSPS) and The Japan Science and Technology Agency (JST) - see below.

Unique among the German funding organisations is AvH, the Alexander von Humboldt Foundation, which promotes academic mobility and cooperation between excellent scientists and scholars from abroad with German partners. More than 500 junior researchers from around the world are annually invited to Germany to work for a year or two on a research project they have chosen themselves together with a German host and collaborative partner. To further their success they (and their families) initially attend intensive language courses and immersion in German social life. With research fellowships, research awards and by other means the AvH Foundation could support around 2.000 research cooperations between German and foreign scientists in 2013. The high regard given to Japan in 50 years of cooperation is reflected in the 10 % of all (worldwide) research stipends and close to 3 % of all research awards granted to Japanese scientists - and the 12 % of all AvH research stipends for German scientists going to Japan. Unfortunately, although the conditions are excellent, over the last ten years the number of applications and approvals are dropping.

Last, but not least, there is Horizon 2020, the biggest European Research and Innovation program ever with nearly €80 billion of funding available over 7 years (2014 to 2020) – in addition to the private investment that this money attracts. There are several program parts with capability to support German-Japanese research cooperations, particularly in the Marie Curie Mobility theme. Furthermore, to assist researchers worldwide with locating research and funding opportunities, EURAXESS was created: "Researchers in Motion" is a unique pan-European initiative providing access to a complete range of information and support services to researchers wishing to pursue their research careers in Europe. And, just recently, the new JEUPISTE project was launched to promote EU-Japan cooperation in Science, Technology and Innovation (STI) through supports to policy dialogues, deployment of bilateral information services, organisation of networking events focusing on specific technologies and/or societal challenges, operation of help desk services and contribution to the development of human resources for collaborative projects.

Like Germany, Japan has its research funding organisations. Foremost is JSPS, the Japan Society for the Promotion of Science, which supports individual mobility to and from Japan, international research cooperations, symposia or, for example, the travel grants for excellent students to attend the annual Lindau Nobel Laureates Meeting in Germany. Thus in 2012 a total of 219 foreign researchers were invited to Japan, mostly in form of postdoc fellowships - but the number is lower than the years before. By contrast the number of Japanese researchers sent to Germany increased in the last ten years considerably: from 131 (in 2003) to 318 (in 2008) to 885 (in 2012). Part of this may be due to the joint support of DFG and JSPS of International Research Training Groups between German and Japanese universities with formal reciprocal agreements. Under the support agreement doctoral development programs will be created, accompanied by exchange of senior researchers, and as a novel concept joint seminars planned by doctoral students will be held.

JST, the Japan Science and Technology Agency, is one of the core institutions responsible for the implementation of science and technology policy in Japan, including the government's Science and

Technology Basic Plan - but apparently does not support to a significant extent international research cooperations. Nevertheless, since 2006 JST supports, together with the DFG, joint German-Japanese projects in the areas of nanoelectronics and neurosciences.

The Japanese government and the funding organizations tend to promote application-oriented projects rather than basic research. However, they seem to change slowly their attitude as they realize that results in basic research are very important because they generate new ideas and method, from which, in turn, new applications arise.

Where do Japanese visiting researchers head in Germany? Depending on their research discipline most Japanese visitors either join a university, one of the 67 Fraunhofer Institutes for applied research or one of the 80 Max Planck Institutes dedicated to basic research. To use the latter (mentioned in the introduction and my former employer) as an example: 198 visiting scientists were noted in 2013, there existed 104 collaborative projects (half of them in the Chemistry, Physics and Technology Section), and even 4 of the 280 directors were of Japanese nationality.

Since 1984 the Max Planck Society has a special cooperation agreement with the RIKEN conglomerate, and extended this lately to some Japanese universities: besides the RIKEN – Max Planck Joint Research Center for Systems Chemical Biology (founded 2011) there exists since January 2014 a Max Planck – The University of Tokyo Center for Integrative Inflammation.

Are there significant difference between coworkers in Japanese enterprises in Germany and their counterparts in research institution? In my opinion: yes. Just this year Meike Michele Albers covered in an excellent doctoral thesis ("Japanische Unternehmen in Deutschland. Ein Aufeinandertreffen verschiedener Kulturen", Bonn University 2014) many aspects of the life of Japanese nationals and their employers in this country. What sticks out is that most Japanese in business, commerce, banking and even technology companies are male, hard working Japanese style, often accompanied by family, well-financed, and delegated for a limited period of a few months to a maximum of three years. Their needs are being taken care of, the limited time prevents learning German, and thus their social life centers around the Japanese communities in Düsseldorf, Munich, Frankfurt, Hamburg, Berlin, Stuttgart and Dresden - in that order. In most of these cities Japanese nursery schools are established, but only in Düsseldorf one finds congregated the Deutsch-Japanischer Wirtschaftskreis (DJW), a Japanese International School, the Eko-House with temple and language schools for the German language. A bit more shifted in the political direction the Japanese-German Center Berlin (Japanisch-Deutsches Zentrum Berlin JDZB) is concentrating on specialists' conferences, cultural events, language courses, exchange programs and a library.

By contrast to Japanese businessmen most Japanese scientists coming to Germany encounter a different situation. Their hosts are distributed all over the country, not all of their coworkers speak good English, and finding accommodation for a longer, but limited period is more problematic. Furthermore, the gender mix is roughly equal, they are single, financially depending on a stipend, living in guest houses or student apartments, and have thus much more to rely on kind assistance from their hosts. Previously simple tasks like buying Japanese food, going to a restaurant or finding a Japanese barber require hour-long travel by public transport.

Furthermore, their social life is much more complicated: they are removed from the Japanese community, and for lack of language knowledge have a hard time to immerse in the German community. With globalization Germany changed - and in most parts today foreigners encounter a

much more friendly atmosphere, especially those with a Japanese background. Among the younger generation the use of English is prevalent. But this makes learning German even more difficult, particularly when joining an institution with international flair ("everyone speaks English") - there is no need to practice the language. Language courses for Japanese visitors outside the big cities are scarce, expensive, and often not taken due to the short time in country. Obviously preparatory German courses are rarely taken in Japan.

One also has to consider the attitudes prevalent in Japan. Here competitive job hunting starts in fall of junior year, and study-abroad experiences are rarely given advantage in the domestic job market - potential employers seem to worry that returning students cannot re-adjust to the norms of Japanese society. And neither does a foreign degree or postdoctoral experience abroad serve well: after a stay abroad of more than a year they feel "cast out" of the promotion process in Japan, they are no longer considered part of the network, looked at as "contaminated" with strange ideas. This will change only slowly with more and more bilateral and multilateral research cooperations which cushion the impact.

This seems strange considering corporate Japan's appetite to engage more non-Japanese which has been soaring, reflecting a growing desire to go global and to add diversity to the workforce. At many large corporations it is now common to have a 10 percent target quota for internationals - however, foreign job seekers are still expected to fit the Japanese mold. It seems business leaders are not (yet?) tapping into the hidden potential of those Japanese returning from abroad.

What can be done to further the German-Japanese scientific exchange? A few points come to mind - and the author would love to discuss them with an interested audience:

- * To alleviate the worries of Japanese students (and parents) the number of short-term study-abroad exchange stipends could be raised. This would mean more administrative efforts, but could be advantageous in the long run.

- * The number of partnership programs between German and Japanese universities, or research institutions, could be increased. One of the general problems encountered in these long-distance exchange programs is the selection of suitable candidates. Sometimes a host is lucky and can contact a colleague known to both sides. But all too often today the interview is done simply reading the candidates curriculum and a Skype interview of a few minutes. It is a loss of face on both sides if a visitor has to be let go prematurely because his claimed expertise existed only theoretically and could not even be realized with remedial training. Here it might be interesting to contemplate a mediating role for the German Research and Innovation Forum Tokyo (DWIH Tokyo), which acts as an umbrella platform for German scientific and research interests in Japan. Its aim is not only to represent German research organisations, universities, and businesses but also consulting on potential cooperation opportunities, contacts to German and Japanese research performing organisations and companies.

- * There are several institutions in Germany where scientists planning to go abroad can take basic language courses coupled with instructions on cultural peculiarities. The above mentioned Humboldt Society sends all scientific guests, as a matter of principle, to a month-long language course in Germany before they can join their hosts for scientific work. This has a tremendous effect on their integration in an institute with all its facets. A service along these lines from all the other funding agencies would probably be a bureaucrats nightmare -but very welcome by the scientific community.

* Japanese students and staff members often have an excellent grasp of the English language - but they do not speak it. It is fascinating to observe the communication between a younger German scientist and an older Japanese colleague: one writing his questions in a superb handwriting at incredible speed - and the other answering in clearly spoken and well understood English. Japanese colleagues by nature are kind and shy - and it takes a lot of trust to lower the activation barrier. Some British universities have a "poet in residence" - it might be an idea to establish long-term visits of, for example, retired foreign colleagues at Japanese research institutions to act as "*gaikokujin in residence*". They could give course on scientific writing, improve papers, even create and support a debating society along the lines of American universities. And this certainly would help Japanese graduates, as the new official test of English includes a speaking section, which is a challenge for Japanese students, and often results in unnecessary low scores.

* Women rarely choose the fields of science and engineering. This has slowly changed in Germany, the trend in Japan is drearier: in 2011, the percentage of female graduates in tertiary-type A engineering, manufacturing and construction programs was 11%. But female students often excel their male counterparts, and are by nature easier to integrate in collaborative teams. In a concerted effort it might be possible to alleviate their concerns about the costs, risks and outcomes of studying in a foreign country like Germany.

Both Germany and Japan have risen out of the destruction of a terrible war seventy years ago. Both societies have a traditional mentality respecting science, technology, manufacturing and craftsmanship - which should favor collaborative research. The time is right to look forward, even to discuss adverse themes - and to realize the hidden opportunities.



The author, Dr. Werner Klotzbücher, was until recently a scientific group leader at a Max Planck Institute and visited Japan as part of a scientific cooperation with a partner at RIKEN. In his active retirement he gives lectures and consults on project funding from German, European and international sources (www.icck.eu). He very much welcomes comments to his e-mail address office@icck.eu. You can find out more about his activities at his website www.icck.eu.

Information & Contacts

DAAD	<p>Deutscher Akademischer Austauschdienst / German Academic Exchange Service Contact: Dr. habil. Ursula Toyka-Fuong Head of Section Japan, Korea, Australien, Neuseeland, Ozeanien Kennedyallee 50 53175 Bonn Web: www.daad.de</p>
DFG	<p>Deutsche Forschungsgemeinschaft / German Research Foundation Contact: Dr. Jörg Schneider Head Group International Cooperation Kennedyallee 40 53175 Bonn Web: www.dfg.de</p> <p>DFG Office Japan Contact: German Research Foundation 7-5-56 Akasaka, Minato-ku Tokyo 107-0052, Japan japan@dfg.de Web: www.dfg.de/japan/en</p> <p>Note: The DFG Magazin "Forschung" had a Japan supplement (8 pages) in the fall issue 3/2012</p>
AvH	<p>Alexander von Humboldt-Stiftung Contact: Dr. Barbara Sheldon Head of Division Strategic Planning Jean-Paul-Str. 12 53173 Bonn info@avh.de Web: www.avh.de or www.humboldt-foundation.de</p>
MPG	<p>Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V. Contact: Division for International Relations Hofgartenstr. 8 80539 Munich Cooperation with Japan: Dr. Sebastian Höpfner, Scientific Officer Ms. Sabine Panglung, Program Coordinator Web: www.mpg.de</p> <p>In the English language magazine MaxPlanck RESEARCH 01/2014 (the "Nanoelectronics" issue) there are several articles (e.g. 8, 82-88) describing the manifold scientific cooperation with Japanese scientists and organisations. Issue can be downloaded from https://bc.pressmatrix.com/de/profiles/99f9c77d7a2c/editions</p>
Fraunhofer	<p>Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. Contact: Dr. Raoul Klingner Headquarters International Business Development Hansastraße 27 c 80686 München Web: www.fraunhofer.de</p>

	<p>Fraunhofer Representative Office in Japan German Cultural Center 1 F Akasaka 7-5-56, Minato-ku Tokio 107-0052</p> <p>Fraunhofer Project Center for NEMS/MEMS Tohoku University 2-1-1 Katahira, Aoba-ku Sendai 980-8577</p>
DLR	<p>Deutsches Zentrum für Luft- und Raumfahrt Contact: Dr. Thomas Weißenberg Abt. Internationale Zusammenarbeit Linder Höhe 51147 Köln Web: www.dlr.de</p> <p>DLR Center in Japan Contact: Dr. Niklas Reinke, Head DLR Tokyo Office German Aerospace Center – DLR Sanbancho KS Bldg. 5F 2-4 Sanbancho, Chiyoda-ku 102-0075 Tokyo</p>
JST	<p>Japan Science and Technology Agency Contact: Kawaguchi Center Building 4-1-8, Honcho Kawaguchi-shi, Saitama 332-0012 Web: www.jst.go.jp</p> <p>JST European Office Contact: JST 28, rue de Berri Paris 75008, France</p>
EU-Japan Centre for Industrial Cooperation	<p>EU-Japan Centre for Industrial Cooperation Rue Marie de Bourgogne 52 B-1000 Brussels Belgium jeupiste@eu-japan.gr.jp</p> <p>Promotes all forms of industrial, trade and investment cooperations between Japan and the EU. Manages policy-related and business support activities such as managerial training courses, cluster missions, information seminars, researches, student placement programmes, a business forum, an info & help desk, etc.</p>
DWIH Tokyo	<p>Deutsche Wissenschafts- und Innovationshaus Tokyo German Research and Innovation Forum Tokyo Sanbancho KS Bldg. 5F, 2-4 Sanbancho, Chiyoda-ku, Tokyo 102-0075 info@dwih-tokyo.jp</p>
JSPS	<p>Japan Society for the Promotion of Science Contact: JSPS Overseas Offices 5-3-1 Kojimachi, Chiyoda-ku, Tokyo 102-0083 Web: www.jsps.go.jp</p>

JSPS Bonn Office

Ahrstr. 58 Wissenschaftszentrum

53175 Bonn, Germany

Web: www.jsps-bonn.de

Antragsfristen:

1. JSPS Postdoctoral Fellowship (short -term), für Doktoranden und Postdoktoranden (mit Aufenthaltsdauer bis 6 Monate):
beim DAAD unter <https://www.daad.de/ausland/studieren/stipendium/de/70-stipendien-finden-und-bewerben/?detailid=4085&fachrichtung=11&land=31&status=2&seite=1>

2. Postdoktoranden mit Aufenthaltsdauer ab 6 Monate:

a) bei der A.v.Humboldt-Stiftung, Bewerbung jederzeit möglich unter <http://www.humboldt-foundation.de/web/jsps-stipendium-postdoc.html>

b) über den Gastgeber bei JSPS Tokyo:

http://www.jsps.go.jp/english/e-fellow/postdoctoral_short.html

3. JSPS Postdoctoral Fellowship (standard):

Bei der A.v.Humboldt-Stiftung bzw. über den Gastgeber bei JSPS Tokyo, Bewerbung jederzeit möglich:

<http://www.humboldt-foundation.de/web/jsps-stipendium-postdoc.html>

4. JSPS Invitation Fellowship (short-term)

Beim DAAD mind. fünf Monate vor dem geplanten Aufenthalt:

<https://www.daad.de/ausland/studieren/stipendium/de/70-stipendien-finden-und-bewerben/?detailid=4086&fachrichtung=11&land=31&status=3&seite=1>

5. Bilaterales Wissenschaftler austausch-Programm

Beim DAAD...