

■追悼文

竹腰秀邦先生を偲んで



図1 1985年原研にて。

誠に残念なことでありますが、元 原子力研究所主任研究員、元 京都大学化学研究所教授、竹腰秀邦 京都大学名誉教授におかれましては、本年1月11日、お亡くなりになりました。享年93歳でした。

竹腰秀邦先生は、敗戦当時京都大学荒勝研究室の学生で、戦後旧荒勝研究室の一員としてサイクロトロン復興に参加し、1955年に組み立てを完了されました。その年の11月にはビームを外部に取出し、放射性同位元素の製造が開始されました。建屋は琵琶湖疎水を活用して日本初の商用電力発電所となった当時築90年の蹴上発電所の二代目の建物で、既に廃屋となって雨漏りがする状態だったものを京都市から借りたようです。

その後1956年から旧日本原子力研究所（原研、現 日本原子力研究開発機構）の物理部に所属されました。原研では、日本でいち早く原子炉からの熱中性子を用いてメスbauer効果の研究を開始されました。また、1962年からは電子リニアックの室長として加速器の開発・運転・維持および電子リニアックからの制動放射線による中性子を用いた中性子核物理等の研究を指導されました。当初の原研電子リニアックは加速エ

ネルギー 20 MeV で、当時国内では最新鋭の性能を誇るものでしたが、さらなる高性能化の要請を受けて、1969年から約3年かけて加速エネルギー 120 MeV への増力が行われました（JAERI レポート 1238, 1975）。この増力には極めて限られた予算のなかで、竹腰室長のもと室員17名が加速器機器の製作を分担し、加速管及びクライストロンなどを除くほぼ全てを自主製作するというものでした。以降この加速器を用いた大電力バンチャーの開発、導波管用マイクロ波窓の開発、大型クライストロン用 Ba 含侵カソードの開発などの多くの研究開発が実施されました。また、実験装置の製作においても 190 m の中性子 flight path 等の建設などをはじめとして様々な測定装置が設置されました。測定器については竹腰室長自らハンドメイド装置の製作に当たられました。電子リニアックが“竹腰色満載の”所謂手作りであったことが、その後の絶え間ない改良と改修により、ビーム出力と質の向上を可能とした一因であったといえます。その結果、原研電子リニアックは1993年までの21年におよぶ運転の継続と多様な研究にビームを供することができました。個人的には、竹腰室長は“竹腰のおじさん”（竹腰夫人も同じ物理部に所属しておられたため）と呼ばれて若い研究者への面倒見の良さ、技術サポートスタッフからの信頼の厚さには定評がありました。

1976年からは京都大学化学研究所・原子核科学研究施設（旧蹴上分室）に赴任されました。京都大学化学研究所教授として戦後立ち上げに尽力されたサイクロトロンを支えに戻ってこられたこととなります。当時、先生には理学研究科からだけでなく、原子核工学や他大学の学生も委託で来ていて、彼らと共に、サイクロトロンのビームを使った生物・材料照射実験や、サイクロトロンビームの引出効率向上のため、引出部に magnetic channel を付加するなどの改造もされました。手作りの特技から自作したスメア試料交換回転台（検出器はアロカから買った GM 管）の回路・制御を、岩下が PC8801 等を用いて構成させてもらいました。アーク溶接等もご自分でされていました。夏の暑い時期にランニングシャツだけで施工し、防護マ

スクはされていましたが、発生する紫外線でかなり日焼け？されていましたが、これによりアーク溶接に関する知見を深めさせてもらいました。

一方、超伝導サイクロトロンの研究も進められ、磁石や共振器の試作もされました。また、京都大学の第3キャンパス構想が京阪奈地区を想定して練られていた頃、それに合流すべく、800 MeV 陽子線形加速器と、それを入射器とする30 GeV シンクロトロンで構成される、共用加速器計画等を学内の関係者と共に進められました。バブル崩壊と共に立ち消えになりましたが、これはある意味、国内で継承されているような気がします。

前述のように建屋は旧蹴上発電所のものだったため、地下には排水路の名残があり、メインの水路は閉じられてサイクロトロン冷却水となる80 トンを擁するプールとなっていました。閉じられた下流側に小さな池ができていて、ボウフラ対策のためか、そこに鯉を放ち、時々パンの耳を餌として与えていらっしやいました。

1985 年頃からは、老朽化したサイクロを廃止し、蹴上地区から宇治地区へ移転してイオン線形加速器を建設するという計画に井上信先生とご尽力されました。ご退職の当日1990 年3 月31 日に返還書類を渡せたとのことで、蹴上サイクロトロンの誕生と終結に付き合われたこととなります。(「加速器」Vol. 3, No. 4, pp. 384–390 (2006), Vol. 4, No. 1, pp. 18–23 (2007), 化学研究所「黄檗」No. 29, 13-1) 蹴上の建物撤収時に先の鯉を回収？する際、鯉が釣られてしまったとぼやかれていたようです。その鯉は宇治地区にあった池に放たれたと聞いていますが、その池も今はありません。蹴上の建屋は現在関西電力が管理していて、時々一般公開されているようです。

ちょうど移転計画が動き出す頃、緊密な親交があった Los Alamos National Laboratory の R. A. Jameson 博士が滞在されていました。次に Jameson 博士からも寄稿されているので、そちらもご覧に



図2 1986 年6 月15 日弟さんの庭にて。



図3 R. A. Jameson 博士(左奥)とイオン線型加速器実験棟の玄関にて(左手前)。

なってもらえればと思います。

ご定年後、一年をおいて広島電機大学(現 広島国際学院大学)で数年教鞭を執られました。その後は自宅で菜園作りなどを楽しんでいらっしやいました。先生のご冥福を心からお祈りいたします。

水本 元治(元 原研)・岩下 芳久(京都大学)

Prof. Hidekuni Takekoshi

In Kyoto at the Keage Institute of the Institute for Chemical Research, Kyoto University, I first met Prof. Hidekuni Takekoshi. I will abbreviate his name as “T.”

He was very interested in PIGMI, also enjoyed hosting foreign visitors, and introduced many things even on this first meeting. He visited Los Alamos in 1981, and also sent Y. Iwashita, their young staff member, for three years to work with us in AT Division. It was

already clear that we were to be friends, and for my 1981 return visit to Japan, for which I requested that he arrange a Japanese-style accommodation, he replied that I would stay “at his house.” Remarkable, as that would be very unusual anywhere, but perhaps especially in Japan. So I traveled without accommodation reservation.

“His house” was two houses—one in Tokyo, one in Kyoto. His father had built two houses in a small walled garden in north-central Tokyo. The second had been for use of the four brothers at various times, but now mostly empty and available to T when he was in Tokyo. Later I had my own key to this house for many years—that was quite something—to be able to go to Tokyo at any time and stay at “my own house”! In Kyoto, T had cleverly invested in a small piece of land in a development planned to be near a new “Kansai Science City” corresponding to the northern Kanto area Tsukuba, where KEK is located. We also started “going around” to beautiful tourist areas of Japan.

We were then, and remained, best friends. His friendship has been a major influence on my life—a true “companion along the way.”

Since 1980, I have averaged one trip per year to Japan, mostly for at least one month, often for several months, once for a year, and explored with T almost every corner of the country. Words were not so many, although his English was quite ok—in Japan it is necessary to be able to learn through feelings. It is necessary to at least learn the two supplementary phonetic tables—katakana and hiragana—they are used for almost all foreign words and it helps very much to know it. The Chinese characters, reading, real Japanese conversation would have required too much time then, with so much to do, computing, etc. So one could not be pestering continuously with requests for translation. And he indicated that very soon, when I asked “What does “chotto-mate” mean?” after hearing it all the time. He replied “You will figure it out...” So I grasped completely that feeling was the key, and figured out eventually that “chotto-mate” meant “Wait a moment...”

After my decision to do something else at the end of 1987, I informed T, without making any requests. He

immediately went to work, and although the Japanese fiscal year was already half over, he managed an invitation from KEK for a year’s visit. I informed KEK that I was very glad for their invitation, but that it was necessary for me to spend at least half of the year with T in Kyoto. They had no objection at all. The old Keage Institute had become a very special place for me. It had been built in the Meiji Era, when Japan was opened to the West, as the first hydroelectric power plant in Japan, at the end of a long tunnel/canal from Biwa Lake (Biwako), in the Meiji red-brick style, with very thick walls. After WWII and the infamous incident, when the occupation forces threw the original Kyoto cyclotron and other small accelerator equipment into Tokyo Bay to prevent further nuclear researches, the Keage hydroelectric plant was replaced by a new one next door, and the old building was ideal for the building of a new cyclotron. T was a student and fortunate to be in Kyoto during the war, and helped finish the cyclotron, which became one of the longest running cyclotrons in the world. He then went to the Japan Atomic Energy Research Institute (JAERI) in northern Japan, and extended the electron linac from 20 MeV to 120 MeV. From there he returned as Professor of the Keage Institute. Working in the Keage Building was so peaceful and wonderful, it was the feeling of being a monk in a temple. I was determined to spend a longer period there, and 1988 was the last chance, as a new building on the KU ICR Uji campus outside Kyoto would be ready in 1989. Among many, it was a major reason why I changed course in 1987—I would have set aside time in 1988 in any case and under any circumstance.

During the 1988–1989 year, long linac investigations continued and also work with then-student Hiromi Okamoto on APF schemes, which he expanded and wrote a paper which I and others found very useful, even many years later.

A further activity for 1988–1989 was to become familiar with the program for atomic waste transmutation at JAERI (later JAEA). The Japanese had started a development program, and I arranged to meet them and learn about it. In ~1990, during the annual visit to T, he told me that I had a new job. JAERI was found-

ing a new accelerator group for ADT (Accelerator-Driven-Transmutation), the Group Leader Mizumoto had been a member of T's linac group at JAERI, a nuclear physicist using the electron linac but overnight ordered to become a proton accelerator expert. And I was to be his mentor. This was a very good job. JAERI contracted with me through LANL and provided funds that supported me and also were distributed by me in the LANL group to those who helped produce a succession of lengthy reports on all aspects of linac technology, and especially on my work on linac design. The Japanese grasped the advantages of a beam equilibrium, and the resulting linac was the first, and more or less still the only, long linac in the world with a fully equipartitioned design. It also has fully adjustable quadrupoles. The ADT project was merged with a long-sought project that Hirao had wanted for INS in Tokyo, later merged with KEK, for a spallation neutron source, and the J-Parc project was located at Tokai on the JAEA (JAERI) site. The ADT goal became low priority (and still awaits completion of the linac to ≥ 600 MeV), but the linac design remained, and it op-

erates well as the J-Parc injector.

From ~1990 to 2017, many weeks were spent at Tokai-mura. On weekends during those many years, I would go to Tokyo for two days and stay in Takekoshi's house, in the beautiful small compound in Tabata. It was a great honor—I could escape Tokai, where there was little to do, go Scottish dancing on Friday (and occasionally Saturday) evenings, and visit flea and antique markets on Saturday and Sunday, searching for mingei omiyage.

Explorations of Japan with T really began in earnest during the 1988–1989 year. After that, very visit included, as first priority, time with him. He retired from Kyoto University in March 1990, and went to work in Hiroshima, where I visited him every year, and then he moved back to Kyoto. I was able to visit him almost every year up to April/May 2019. The many adventures are related in my travel logs and diaries, and documented with many photos. My friend Hidekuni Takekoshi passed away on 11 January 2020.

R. A. Jameson