

Some reminiscences of my undergraduate years in the HKU Faculty of Science

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On this happy occasion of the 70th anniversary of the HKU Faculty of Science, as my share of homework assigned by Venus Chu of the Faculty Office, I will select two out of the numerous memorable episodes to recount ---- the first day of class in my first year and the Silver Jubilee Science Exhibition in my third year as an undergraduate in the Faculty of Science.

In the autumn of 1963 I became a first year undergraduate in the Faculty of Science of the University of Hong Kong. School started in early October. The first class took place in (old) Chemistry Building, where in its place now stands Kadoorie Biological Sciences Building. The first class was a lecture on chemistry. Unlike undergraduates of today almost all of us arrived before class was due to begin. We all felt rather excited that morning, looking for the few old schoolmates but getting to know many more new friends from other schools. As it was a class in chemistry, all first year students, both in the so-called physical stream and the biological stream, attended. Altogether there were some sixty youngsters taking in the new experience of sitting in tiers of seats in a large lecture theatre overlooking the laboratory bench in the front, like watching the scenery down the slope from the hilltop!



(Old) Chemistry Building with the lawn (HKUSU Science Society Christmas card designed by Anita Wong Sau Chun, B.Sc. 1966)



*(Old) Chemistry Building, HKU
(photo taken in the 1960s)*

Sixty pairs of eager eyes watched as a slim young lecturer dressed in a white lab gown walked up briskly to the bench. Out of customary habit acquired from school days I almost would have stood up to salute the teacher, but was saved from the embarrassment only because the lecturer immediately opened his notebook (an old-fashioned hardbound notebook ----- a notebook computer still had to wait several decades to appear!) and delivered his lecture. That young lecturer was Dr. Chan Sai Cheung (陳世翔), who later became a Chaired Professor and served as the Dean of Science from 1977 to 1983.

The second class of that first day was a lecture on mathematics, which was also held in the same lecture theatre. About forty of us remained there, as about twenty in the biological stream left for their lecture in biology held in Northcote Science Building, which had long been demolished to make way for the flyover now joining Haking Wong Building and Pokfulam Road. Again we waited in excitement to see who would come to teach us. Right on the dot a lady dressed in an elegant Chinese “cheung-sam” entered the lecture theatre. She marched down the aisle to the front, flanked by two young teaching assistants. This time I knew better not to stand up to salute the teacher but waited in silence for her to begin. She looked around with a smile and began lecturing and writing on the blackboard. She was Dr. Doris Chen (陳郭麗珠), who took an early retirement in 1985, and the two young assistants were Mr. Ko Lo Suen (高勞孫), who later left HKU for Education Department (now renamed Education Bureau) of the HK Government and subsequently served as the Head of the Department of Mathematics of Northcote College of Education for many years, and Mr. Au-Yeung Yik Hoi (歐陽亦藹), who remained in the Department of Mathematics, rising through the ranks to a professor and retired in 1998.

After two classes we had a break. In those days the beautiful lawn that stretched from (old) Chemistry Building to HKU Main Building provided an ideal place for relaxing and socializing during the break. When the weather was fine, we basked in the sunshine (yes, in those days a blue sky was a common phenomenon!) and chatted or carried on discussion on academic matters. Sometimes we even played shuttlecock on the lawn. I do not remember what classes we had after the first two, or whether we had any further class at all, on that first morning; I only remember that I went back to St. John’s College (as an affiliated member) to have lunch with some classmates and got ready for the

laboratory session in the afternoon. It was a chemistry laboratory session. One of our teaching assistants was Mr. Poon Chung Kwong (潘宗光), who later became, like his teacher Professor Chan Sai Cheung, a Chaired Professor and served as the Dean of Science from 1983 to 1990.

When I got to my third year as an undergraduate the Silver Jubilee of the HKUSU Science Society came up. Preparation for a science exhibition got underway early in the summer of 1965, and the exhibition was scheduled to be held on December 13 – 17 of that same year in Loke Yew Hall and some adjacent classrooms plus the first year laboratory in (old) Chemistry Building. In those days this was meant to be a major event, because there had not been any science exhibition of a reasonably large scale held for the public so far before, very much unlike what it is nowadays with the many science exhibitions or competitions organized by schools or universities and there is now also Hong Kong Science Museum. We therefore took up the challenge in all earnestness and seriousness, regarding it as a rare opportunity to apply the knowledge we had learnt to attempt introducing to the public what science is. My contribution lay in designing the poster and the cover of the brochure for the exhibition and in joining the Mathematics Subcommittee of the Silver Jubilee Science Exhibition Committee.



Mathematics Subcommittee of the Silver Jubilee Science Exhibition Committee (photo taken on Chemistry Lawn the day after the exhibition, December 1965)

From left to right: Lee Kwok Pun, Lam Kin, Chow Sik Cheong, Siu Man Keung, Mak Yuet Kwai, Chan Fung Kit, Leung Seen Po, Chang Wai Lun (not shown: Cheng Kai Ming, Lai Tze Leung, Sit Yu)



Opened by H.E. SIR DAVID TRENCH, K.C.M.G., M.C.

13TH - 17TH DECEMBER, 1965.
10.00 A.M. - 7.00 P.M.

LOKE YEW HALL
&
CHEMISTRY BUILDING
&
ROOM 101, 100, 145.

(By kind permission of the Vice-Chancellor)

Cover of the brochure for the Silver Jubilee Science Exhibition, December 13-17, 1965.

The task of the Mathematics Subcommittee was to design and prepare a series of exhibits that would let the public see what mathematics is about. It turned out to be a very worthwhile educational experience, prompting us to read up a lot of books, to think about a lot of problems, and to engage in a lot of discussion. I still keep the notebook in which I recorded what crossed my mind during that summer. When I flip through the pages now, I recall the fond memory of one particular exhibit, which I thought up at the time and actually prepared it on show. It is the first-ever “water-computer” made in Hong Kong ----- first-ever simply because it is useless so that nobody would think of making another one! The device is based on the principle of syphon, consisting of three glass cylinders placed at three different levels connected through syphon glass tubes. The topmost cylinder can hold two units of water; the middle cylinder can hold four units of water; the lowest cylinder can hold eight units of water. The device aimed at illustrating the working of the binary representation of a given whole number. Allow me to say a few more words on this device below.

Algebra. (Bas Math).

TITLE BINARY SYSTEM

CONTENT
 In this arrangement, we try to illustrate the conversion of a number in the DENARY system into the BINARY system. The expression of a number larger than seven in the denary system would need at least four containers in the arrangement, thus revealing one disadvantage of the binary system, viz. a comparatively simple number in the denary system will result in a rather long expression in the binary system. The binary system finds its use in modern computers.

THEORY
 A number $N = a_n a_{n-1} \dots a_0$ is usually expressed in the denary system, whence
 $N = a_n \cdot 10^n + a_{n-1} \cdot 10^{n-1} + \dots + a_1 \cdot 10^1 + a_0 \cdot 10^0$ where $0 \leq a_i \leq 9$ ($i = 1, 2, \dots, n$)
 In general, a number is said to be $a_n a_{n-1} \dots a_0$ in scale s if
 $N = a_n \cdot s^n + a_{n-1} \cdot s^{n-1} + \dots + a_1 \cdot s^1 + a_0 \cdot s^0$ where $0 \leq a_i \leq s-1$ ($i = 1, 2, \dots, n$)
 In binary system, $s = 2$.
 $N = a_n \cdot 2^n + a_{n-1} \cdot 2^{n-1} + \dots + a_1 \cdot 2^1 + a_0 \cdot 2^0$ where $0 \leq a_i \leq 1$ ($i = 1, 2, \dots, n$)
 The above expression provides a method of converting a number in the binary system into the denary system. Also, we may observe the means of converting a number from the denary system into the binary system, viz. by successive division of 2 and noting the remainder. Take for example, 7.

$$\begin{array}{r} 2 \overline{) 7} \quad \text{---} 1 \\ \underline{4} \\ 3 \quad \text{---} 1 \\ \underline{2} \\ 1 \quad \text{---} 1 \\ \underline{0} \\ 0 \end{array}$$

i.e. $7 = 2 \cdot 3 + 1 = 2(2 \cdot 1 + 1) + 1 = 1 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0$
 Hence, in binary system, 7 is expressed as 111.
 The arrangement below utilizes the fact that whenever one container is full (containing 2, 2, 2, ... units respectively), it is emptied completely into the next container. Finally, water remaining in the container occupies 2, 2, 2, ... units and so gives the binary representation.
 It also illustrates the addition and multiplication tables, viz.

$1 + 0 = 0 + 1 = 1$	$1 \cdot 0 = 0 \cdot 1 = 0$
$0 + 0 = 0$	$0 \cdot 0 = 0$
$1 + 1 = 10$	$1 \cdot 1 = 1$

EXHIBIT

Handwritten notes on a 'Water-Computer' showing diagrams of the device and binary arithmetic examples. The notes include the title 'Binary System', a diagram of the water-computer, and binary addition and multiplication tables. The addition table shows $1+0=1$, $0+0=0$, and $1+1=10$. The multiplication table shows $1 \cdot 0 = 0$, $0 \cdot 0 = 0$, and $1 \cdot 1 = 1$. There are also some calculations like $10 + 001 = 110$.

Notes on a "Water-Computer"

For instance, if you pour five units of water into the topmost cylinder continually, you will see that the first two units fill up the topmost cylinder, thence being emptied into the middle cylinder through the syphon. The next two units of water poured in will do the same, thus filling up the middle cylinder so that the four units of water in the middle cylinder get emptied into the lowest cylinder through the syphon. The last unit of water poured in will remain in the topmost cylinder. The final result is water in the topmost cylinder and water in the lowest cylinder, corresponding to 101, which is the binary representation of 5. If you pour in one more unit of water, the two units in the topmost cylinder will be emptied into the middle cylinder through the syphon, resulting in water in the middle cylinder and the lowest cylinder, corresponding to 110, which is the binary representation of 6. With this device one can also illustrate how to add, say, $101 + 001 = 110$.

After designing such an exhibit I had to make it. I went to a senior classmate for help. She was a graduate student in chemistry at the time, so she immediately introduced me to "Master Lan" (藍師傅), a technician in the Department of Chemistry well-known for his expertise in making glass instruments. "Master Lan" kindly worked out a beautiful set of glass cylinders and syphon tubes to measure for me. I should take this opportunity to record my gratitude to these two persons who so kindly and generously gave their time and assistance in realizing the exhibit. (The senior classmate was the late Professor Lau Oi Wah (柳愛華), who was at one time the Dean of Science at The Chinese University of Hong Kong and who taught in the Department of Chemistry there for many years before her untimely passing.) A school pupil of today may regard this device as a childish toy, but in the mid 1960s when even an undergraduate did not have

the fortune to set eyes on an electronic pocket calculator and when the binary system was foreign to many in the public, this exhibit did attract quite a number of audience by explaining to them what the binary system was about.

We worked really hard before and during the Silver Jubilee Science Exhibition. I still relish those good old days when all members of the Science Society devoted their time and energy to the task for a common cause of popularizing science among the public. (However, that did not mean we brushed aside our daily lessons. Most of us went to class, did our homework and took our tests as usual. After all, we realized that organizing a science exhibition was an extracurricular activity.) That was also a time when I did two things that should not be done. Perhaps it is now an opportune moment to make a belated “confession” ----- after forty four years!

The first thing was taking refuge in Lugard Hall, which had long been demolished to make way for the plaza between Chong Yuet Ming Chemistry/Physics Buildings and Meng Wah Complex, for a couple of nights. We worked well into the small hours over the weekend just prior to the opening of the Science Exhibition. Feeling sleepy and fatigued after a whole day’s work, I just wished to lie down and take a rest as soon as possible. The obvious choice was to go up to the nearest hostel, Lugard Hall, and sneaked into one of the rooms of a resident classmate to catch a few hours of sleep before going back to work the next morning. Hence I became a temporary (illegal) resident of Lugard Hall for a couple of nights.

The second thing was about an elegant mathematical model in the collection of the Department of Mathematics. I very much wanted to borrow it for display, but was in a hurry to get it because it was the Saturday before the opening of the Science Exhibition on the following Monday. I summed up my courage, and that of my classmate Lam Kin (林建), to go together to the department. The Head of Department at the time, the late Professor Wong Yung Chow (黃用諷), was not in, so we spoke to his secretary. I mumbled something about borrowing the model and mumbled in an even more devious manner something equivalent to a “yes” when she asked whether Professor Wong had given his approval. Alas, I did not know Professor Wong lived so near to HKU Main Building where the department was then located. The dutiful secretary called up Professor Wong at home. He would come back right away. You can imagine the hard time we had, standing before Professor Wong to face the music — *young man, this is not the proper way to do things, ... you should first discuss the matter with me, ...* and all that. But when I pointed out the very interesting feature of the model which made me want to get it in earnest for the Science Exhibition, apparently that touched a right mathematical chord with Professor Wong. His stern countenance quickly softened to a beaming smile, and he went into details of the making of the model and its underlying geometry. We left his office with the model snuggly in my hands.



A model “borrowed” for display at the Silver Jubilee Science Exhibition.

In 1975, after a rewarding eight-year sojourn in the United States of America, I returned to my alma mater to join the Department of Mathematics, to which I am much indebted for my initial upbringing as a mathematician. More than four decades have passed, and I already retired in the summer of 2005. But the two episodes recounted above remain as vivid in my mind as if it happened just yesterday!