

It all started with a humble, yet noble thought

Pien-Chien Huang



Preamble

It all started with a humble, yet noble thought. A cohort of expatriates dreamed of building a bastion for science and education in their motherland. The objective was clear, and the aims are simple. Let's establish a laboratory for molecular biology, and fill it with the best of minds one can find, combining the best of Chinese culture and the best of Western Science in search of new knowledge.

A draft of a Master Plan was prepared on August 15, 1983, debated and discussed. A protocol with high spirit was soon established at a meeting held in Lexington, MA giving birth to the Lexington Declaration. As implicit in the name Central Laboratory for Molecular Biology (CLMB) at the

Academia Sinica, the goal was not to set just another institute, but declaring it the paradigm of a magnet lab to attract foreign-trained life scientists back to their homeland, to conduct internationally prominent research, and to become a national focus for training.\

An Advisory Board was formally organized earlier in 1983, and appointments for its members made by then President of the Academy, Professor Dr. SL Chien (Figure 1).

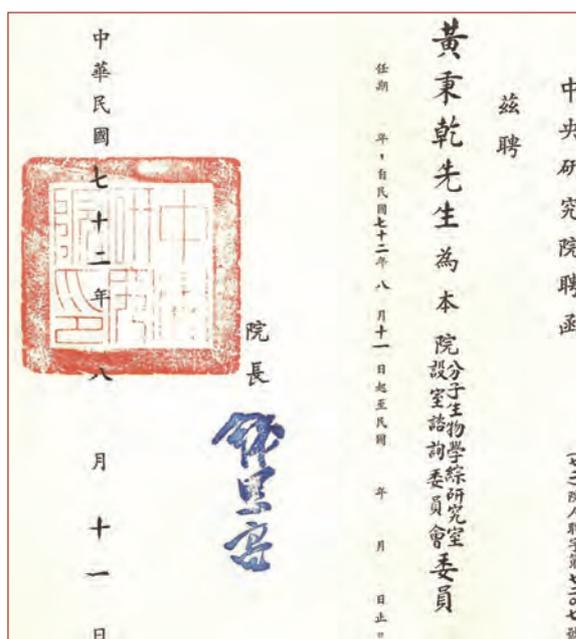


Figure 1. An appointment letter from President Chien

The membership consists of: Chien Ho (何潛Carnegie-Mellon), PC Huang (黃秉乾Hopkins), Ru-Chih Huang (黃周汝Hopkins), Paul Ts'o (曹安邦Hopkins), James Wang (王倬Harvard), Ray Wu (吳瑞Cornell), CW Wu (吳成文Stony Brook) and Paul Yu (余南庚Rochester), with WC Tien (田蔚城NSC), TT Kuo (郭宗德Botany), CS Chen (陳慶三Botany), and TY Tsai (蔡作雍IBMS) as special consultants and YH Lin (林耀輝Botany) as acting director for the Preparatory Office.

The role of individuals was quickly assigned. In a letter dated March 2, 1984, entitled: establishment, Paul T'so who chaired the Advisory Board wrote into the record:

"...It soon became quite clear to all of us that because of the massive amount of preparatory work needed



Figure 2. The team: front from left Chien Ho, James Wang, PC Huang, Ru-chih Huang, Paul Ts'o; behind Ray Wu, Peter Huang (a banker from Hong Kong) and Jacqueline Peng.

for CLMB, the intensive efforts of a team rather than several individuals are needed. ... A small working team has been initiated since then with P.C. (Huang) and Ray in charge of building construction and laboratory furnishing; Chien (Ho) and Ken (C.W. W. Wu) setting up the guidelines for the training protein; Jim and Ru-Chih organizing recruitment." (Figure 2)

The mandate and rationale for the basic design of the laboratory

It was mandated that "CLMB will be located on the campus of Academia Sinica, Nankang. It will be housed mainly in a five story building, occupying an area of 12, 500 sq. ft. The building is to be built with Mr. Dahong Wang (王大闕M. Arch., Cambridge, M. Arch., Harvard) as the architect and Mr. CT Wu (吳振台) as the general contractor, both of Taipei. It is to be completed by the end of 1985 for use commencing July 1, 1986. The building is to be designed for use by 70-80 scientists of all ranks, with 20 supporting staff, and for a budget no more than NT\$40 million."

The facility would have to be designed and equipped to accommodate a relatively diverse range of research needs, since an innovative move of CLMB was to have rotating team of visiting scientists to supplement the staffing

at the first few years. It was agreed that the space was designated initially as:

5th F for molecular immunology, cell and virology

4th F for structure, expression, cloning and transfer of genes

3rd F for host-vector, protein and nucleic acid interactions

2nd F for structure biology of macromolecules and their complexes

1st F for teaching, administrative and reference facilities

Basement for utilities, security, stockroom, isotope and air-raid shelter

Each of these floors was to be equipped accordingly and all of the major equipments (see list attached) installed prior to July 1, 1986.

Ray and I decided that there will be a conference room, a dark room and a cold room on each floor. Also on each floor there will be a centralized glassware cleaning and medium preparation room, equipped with autoclaves, drying oven and pipette and glassware washers. On the fifth floor there will be a room of seven units, each of which can be independently regulated for light and temperature, to house a limited number of experimental animals; (main vivarium would be located at IBMS and the NSC Animal Center to

be built on the Academy's campus). A separate housing will be constructed adjacent to CLMB for use in studies concerning plant-bacteria interaction, which require rigid control of light, temperature and humidity, as well as physical and biological containment. The main building will remain at a containment level of P1 and P2, with provisions for the use and storage of radioisotope and biohazardous material.

From its inception, CLMB plans to complement its endeavor with other institutes, particularly the Institute of Biomedical Sciences (IBMS) on campus, which was being built. Due to its proximity and larger capacity (and budget), a number of shared facilities will be housed in IBMS, to which a tunnel of 60 ft was designed to connect. The shared facilities included cell sorter, mass spectrophotometer and NMR, as well as a machine shop and a photographic shop, a library and animal quarters mentioned above. The two units, IBMS and CLMB, will also share landscaping and waste water treatment to minimize negative environmental impact.

CLMB attempts to develop a computer network system to enhance its scientific output and supporting efforts. At the initial stage, micro personal computer will be used to streamline the administrative and

bookkeeping processes. All properties will be bar coded along with the stockroom supplies to enable coupling with procurement. Users will be issued bar coded ID cards. An effective stockroom was viewed as fundamental to research support. Additional minicomputers and linkup to the main frame on campus was planned for implementation in 1987. Simply put, the mandate is specific and thorough, albeit no details given. It was up to the building construction and laboratory facilities team to decide.

The team aimed at a project that is modest, yet functionally efficient in terms of cost, service, maintenance and management, with in mind that CLMB is to last as a major resource for Molecular Biology studies in Taiwan.

Planning input from friends, and other thoughts

Without much previous experience in building, Ray and I solicited ideas from various friends we regarded. The response was overwhelmingly enthusiastic and helpful. Daniel Y Chien (胤), for instance, who was with Chiron wrote in endless pages (June 6, 1983) addressing the design of his R & D Laboratory, pointing out specific problems in fume hood exhaust, fire hazard material storage, and water

lines and sinks. He was so patient and kind in explaining to us how central air conditioning can be energy efficient, the logic of which we accepted in pushing for the first full air-conditioned lab on the campus of Academia Sinica.

Other friends of CLMB sent in details about their experience in special lab design. Che-Kun James (沈哲鯤), Tse-wen (張子文) and Nam-Hai (蔡南海) are just some of the examples.

June 2, 1983

Dear P.C.

Enclosed please find a list of the faculties and equipment currently available for my lab. It is enough for supporting the research of 6 graduate students, one technician and one post-doctoral. If you need further details (prices, companies, etc.), please let me know.

With my best regards,

Sincerely,

Che-Kun James Shen

July 6, 1983

Dear Dr. Huang:

Here are my major suggestions on the construction of the laboratories for hybridoma and cellular immunology research:

1. Install many tissue culture hoods.

Use both 4 foot and 6 foot hood. Hoods, not bench space, is the limiting factor for accommodating more people in most immunology laboratories.

- In Centocor, I have designed and implemented a "basic unit concept" for tissue culture laboratories. This unit comprises one 6 foot hood and one foot hood, a supply bench/shelf, and a working bench. The unit can accommodate three people working in the hoods. People here found it space-saving and convenient. I have enclosed a copy of the blue print for your examination.

In a late time, I will also offer my opinion on the selection of tissue culture incubators, microscopes and so on. Please call me anytime if you need additional information.

Sincerely
Tse-wen Chang, Ph.D.
Director - Cellular Immunology

Research (Centocor)

July 13, 1983

Dear Dr. Huang:

Thank you for your letter. Enclosed is a blueprint of our main laboratory. The reprints on Ti plasmids and plant gene manipulation will be sent to you at a later date.

With my best personal regards,

Sincerely yours,

Nam-Hai Chua

Professor

Laboratory of Plant Molecular Biology

(The Rockefeller University)

Our architect, Mr. Wang was a family friend of Ray, and more importantly a scholar and gentlemen. He accepted, and adhered to, many of our suggestions in his design; some of my naiveties that were adopted are shown in the hand sketches (Figures 3 and 4). This made working with him

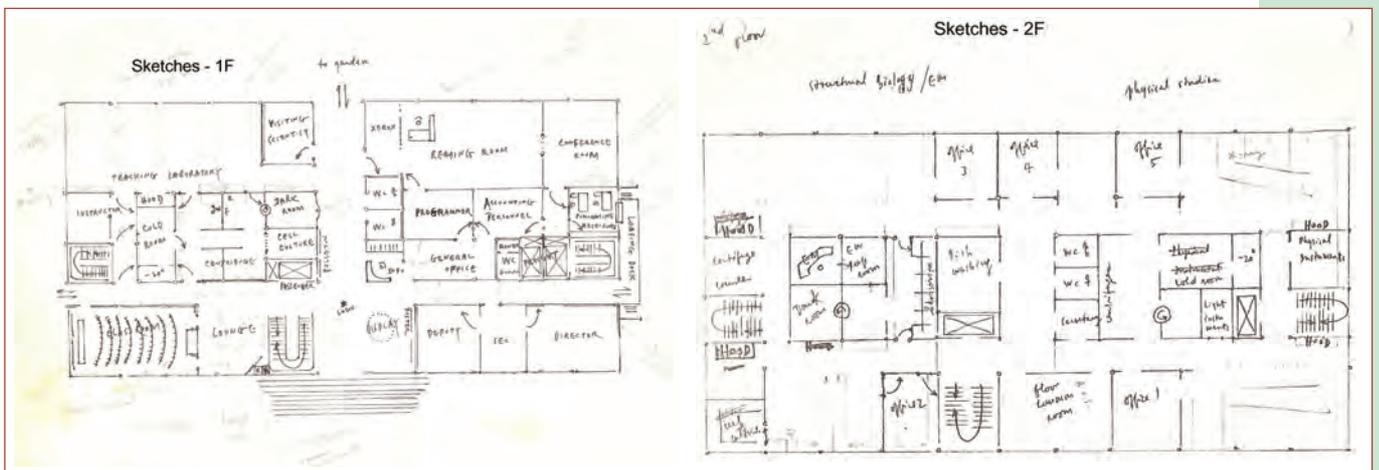


Figure 3/4 Sketches of floor design, featuring lab-without a wall concept.

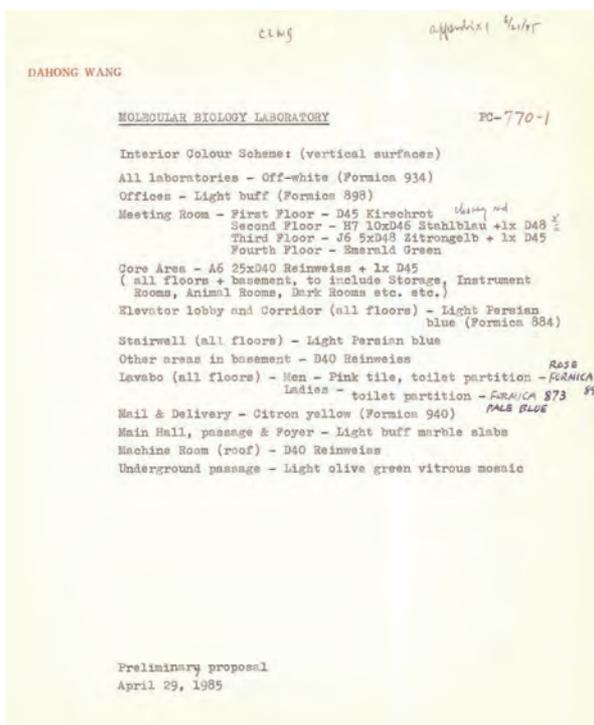


Figure 5. A letter, type-written, from Mr. Dahong Wang on color scheme

a most pleasant encounter, not to mention my learning a great deal of arts and forms from him personally. A plethora of new ideas was researched and raised. The idea of having a lab-without wall, innovative and bold at the time, was kindly accepted for its economic, transparent and effective features. The idea of keeping a common room on every floor also turned out to be a welcome thought. A stockroom for all was heretofore unheard of in Taiwan, but was adopted. Using a different color scheme for the walls of each floor was Wang's aesthetic instinct, for which we communicated many times in missives, not by word processing but typed (Figure 5). The slender tall doors are also typical of Wang's

signature.

Some details

I learned to plan and write down each item in excruciating detail. I kept records, among which "Design of Modern Laboratories for Molecular Biology - a Portfolio." I had a long Facilities Planning Check List by October 19, 1985, in which the floor plan, items to take note, reading room planning, waste water treatment, telephone, etc. were just some of the items noted systematically. While we consulted Paul T'so and the Advisory Board on major issues, Ray and I had much of the free hand, and responsibility, in making decision on much of the details; that too made life easier in spite of the pressure to be right. The selection of the pearl-like material for the outer wall of the building, for instance, was daring but kindly supported by our colleagues. Symbolically, it befits for CLMB to win the name 'pearl' of the Academy.

The construction and its supervision

It was not until the construction started that I realized a frequent and close supervision/inspection was necessary. We were very fortunate to have Mr. CT Wu as the general contractor, although by 'custom' the architect is the overall supervisor/inspector. I had no inkling that construction involves many conflicting

- b- preview of site
- c- meet with architect

9 Monday

- preliminary official inspection

10 Tuesday

- official inspection

11 Wednesday

- A- lab bench bidding
- b- chemical hood bidding
- c- meeting with waster water treatment experts

12 Thursday

- a- meetings with suppliers
- b- meet with CLMB staff: progress report

13 Friday

- a- meeting with Academy officials: glasshouse site and road
- b- meeting with architect and landscape designer

14 Saturday

- A- meet with CLMB staff (all): review and plans
- b- depart

The facilities

As the construction was well on its way, approaching completion, the next phase of Ray/Huang team was to start thinking and doing the facilities. We were aware of the expectation that we had to be “particularly mindful of the diverse and obstinate problems of attempting to create a leading research laboratory with under-developed domestic logistical support.” We would have to be imaginative in

addressing these issues, with the hope that “the result would serve as a role model for a number of other countries with newly prospering economics and creative potentials.” (Tom Broker’s write-up) .

Another issue was the diversity of demands for a limited budget. James ‘Jim’ Wang had already agreed to serve as CLMB’s first rotating Director. He had plans to bring with him five ‘Tigers’ (heavy weights) of molecular biology, i.e.: Leroy Liu (Hopkins) James Shen (UC, David), Gloria Li (Stanford), TH Hsieh (Duke) and David Tu (Penn State). Also, cadre of scientific staff has also been recruited and some (BC Chung, JL Hwang, Ming Tam, TF Hsu, TC Chen, Henry Sun, MC Lai...) were scheduled to arrive as scheduled on the 1st of July, 1986. Jim was concerned over the preparation. (Figure 7). Our mandate was to have not only the building done on time, but also the laboratories fully equipped ready to meet the needs for starting experiments upon arrival. It was a tall order, as each and every one had a unique and lengthy dream list. Some items needed assessment. Various suggestions came in this category. For instance, CC Liu, who was with Genetech at the time (presently at ITIR), was so generous with his efforts wrote (June 16, 1983) in considerable details on the choice of fermenters.

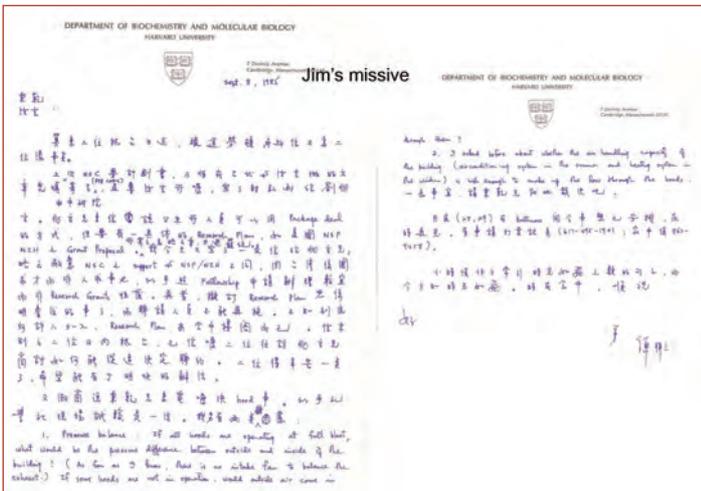


Figure 7. A letter from James Wang, getting ready to serve

headquarter in California. Price estimates were made with FAX to expedite the process. Isotopes were contracted for weekly delivery, and clearing the Customs as a routine. Expensive restriction enzymes were bought in quantities, but parceled into small units by a trained technician, and made available by

retrieving from storage in individual freezers on every floor. The savings were significant.

Again, more friends of CLMB helped in the planning.

June 30, 1983

Dear Ray and PC,

Enclosed is a list of the day-to-day disposable and consumable supplies Cold Spring Harbor keeps in its central Store inventory. This may be helpful to the Taiwan CLMB. Unfortunately CSL does not have a true stock room. In our limited experience, the Caltech Biology Dept. Stockroom was superb, and their inventory list might be most useful.

Best wishes,

Tom and Louise (Cold Spring Harbor)

Little did Tom and Louise, two of the most ardent supporters of CLMB, know that we had contacted Caltech

The requests would have to be manually tabulated, summed up, grouped, discussed and purchased under different categories of purchasing laws and restrictions, as Excel spreadsheet was not yet available. While most of the biddings and negotiation were done by the staff, major items required special considerations.

We managed to outcome the budget constraint with a series of innovative and creative procedures in the buying, yet remained perfectly within the legal boundaries. For instance, we established at CLMB the first stockroom for research in Taiwan, so that we would purchase in bulk with substantial savings through discount. We managed to have open bid as required, not item by item but as wholesale for glassware, plastic ware, various reagents and fine chemicals. VWR won such a contract with us via negotiation with its

and MRC Cambridge, both with well operated stockrooms. From Lee Hood's lab, we read:

July 13, 1985

Dear Professor Huang:

I am responding to the request you made of Lee Hood for an inventory of our stockroom contents. Enclosed is the updated list and should you have any questions on this information our stockroom supervisor's name is Bill Lease and he can be reached on 213/356-6804.

I also would be willing to answer any questions you may have. My number is 213/356-4954.

Mike Miranda

Administrator

(Division of Biology, California Institute of Technology)

We followed the practice of the Biochemistry Department at Stanford, that all supplies and resources were shared by members of CLMB. Accordingly, CLMB members and his/her staff would be able to access the stockroom for whatever was needed and available, although the items taken would be recorded but not charged. We were probably thinking ahead of times for the use of bar code to label every item in the stockroom, as supermarkets in the USA were just starting to have their items so coded. It was with some difficult that we

found a vendor in Taipei who could handle the software. It was gratifying to learn that the stockroom as a novelty was shown to be a welcoming success.

Another first in the facilities was signing a contract with Beckman. Prior to 1986, Hitachi reined the instrumentation market in Taiwan. Since most of the scientific staff, and the visiting scientists were from the USA, Beckman instruments would be preferred, if both the price and functionalities were comparable. However, Beckman products were much more expansive than those of Hitachi. Approaches were sought to contact Mr. Beckman's senior staff since Arnold Beckman is a Caltech alumnus, and many of us also affiliated with Caltech at various times. Once contacted, we were able to reach an agreement in that Beckman instruments would be sold to CLMB at 55% of their listed prices. With such a saving, we were able to add 10% of the value for a 5 year maintenance contract. For this, an escrow account was established with the Bank of Taiwan to guarantee the service; the contract stipulated stocking the essential parts of various instruments so that timely repair could be achieved. CLMB started with spectrophotometers and centrifuges, other institutes joined in later; the Institute of Biochemistry bought peptide synthesizer and

protein sequence with a remarkable saving under this agreement. It was a win/win arrangement for many. Meanwhile, the chronic problem of budgeting for maintenance of instruments was alleviated.

One other creative approach applied to travel and accommodations. Not only the staff scientists and their families needed airline tickets, the visiting staff and their students/technicians also would like to have low fares arranged for their travel. CLMB negotiated to purchase one hundred round trip tickets from the Korean Airline for this purpose at a sizeable discount. It shows that one can live well, without being rich. It fulfills our style: modest but efficient.

At the beginning of CLMB, some

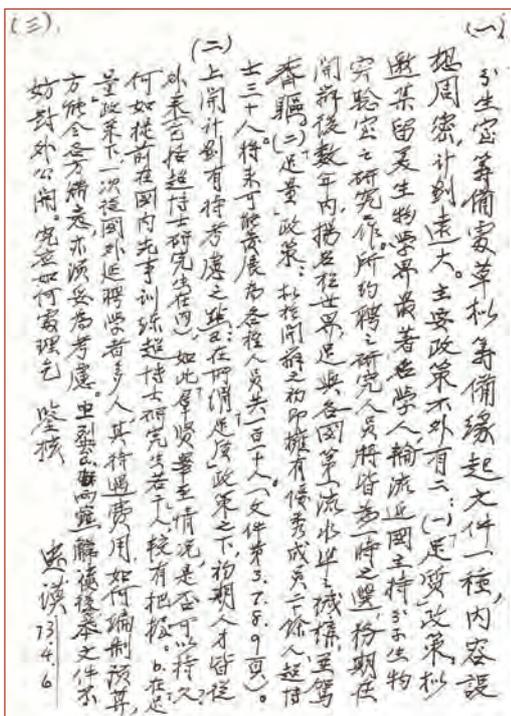


Figure 8. Skeptic

skeptics, including the Secretary-General of President TY Wu who witnessed the progress, questioned whether the recruits would stay (Figure 8). Two decades therein, we have the affirmative answer.

Prolog

CLMB was officially born and started operation on July 1 (1986). Its name was changed to IMB (Institute of Molecular Biology), following the amendment of the Charter for Academia Sinica, in January 1990. In 1995, a second building was built, a semi-conservative replication of the first, and soon filled with people and research activities.

The legacy goes on.

P.C Huang, August 15, 2006

Acknowledgments

It was a privilege to work with my eminent colleagues who served on, or off, the Advisory Board for CLMB; there were much that I learned by thinking and working with them. The vision and encouragement of late KT Li (李國鼎) was profoundly appreciated, without his support the dream of CLMB would not have been realized. My deep appreciation is due Mr. Dahong Wang (王大閔) for his ingenuity and talent given to the design of the building, and leaving with us his signature - tall doors. To

Mr. CT Wu (吳振台), many thanks for his taking pride in the construction of CLMB, with a basement leaked not and a building tilted not. I thank Ms. YF Chang (章玉芬), Mr. JY Hsieh (謝繼遠), Ms. LP Kao (高蘭萍) for their devotion and for helping me kept up

with my sanity and integrity while sailing through the various stages of complex challenges. I sincere thank Ray Wu, my partner and mentor, and members of CLMB for the opportunity to be one of the Team.