

# Anglo-American and German Connections in Japanese Chemistry: The Lab as Contact Zone

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## Yukichi Fukuzawa, *Autobiography*

“The year after I reached Yedo – sixth year of Ansei (1859) – there was established the so-called “Treaty of the Five Nations,” and the port of Yokohama was formally opened for trade with foreign countries. One day I went to Yokohama for sight-seeing.”

# Fukuzawa's chagrin

“To my chagrin, when I tried to speak with [foreign merchants in Dutch], no one seemed to understand me at all. Nor was I able to understand anything spoken by a single one of all the foreigners I met. Neither could I read anything of the signboards over the shops, nor the labels on the bottles which they had for sale.”

He later found a German merchant with whom he could communicate somehow, but only with a notebook because German and Dutch pronunciations are so different. He quickly made up his mind to switch his subject to English, because two mighty English-speaking countries, Great Britain and the United States, had a strong presence in treaty ports.

Theme of today's talk: Impact of increased English and German dominance on chemistry and its teaching in Japan

# Two origins of Tokyo University (TU)

Igakusho [Institute of Medicine] (1863)

→ Tōkō [Eastern School] (1869)

→ Tokyo Medical School (1872)

→ TU Faculty of Medicine (1877)

Kaisei-jo [Institute of Western Studies] (1863)

→ Nankō [Southern School] (1869)

→ Tokyo Kaisei School (1873)

→ TU Faculties of Law, Science, and Literature (1877)

# Slide note

The history of Tokyo University is a good starting point to tell this story. Tokyo (Yedo) was hardly *the* centre of excellence in Dutch/Western Studies in Japan throughout the Tokugawa period and soon after the Meiji Restoration in 1868, but TU gained momentum after 1871, when the Tokugawa domain system was abolished and the Ministry of Education was established in Tokyo. Both events triggered the centralization of political and educational institutions in Japan.

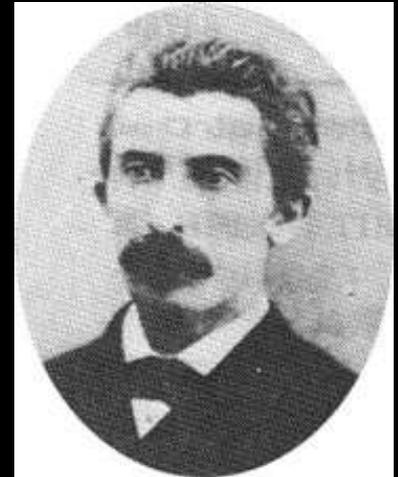
# Tokyo Medical School – TU Faculty of Medicine: German



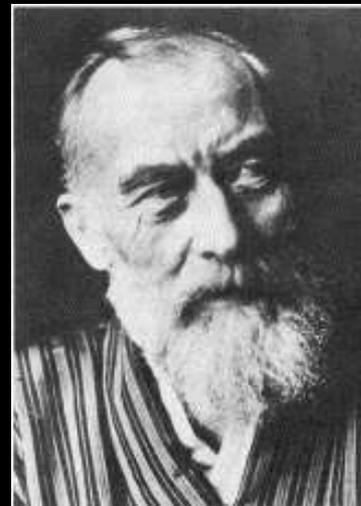
University Museum, University of Tokyo Koishikawa Building (reassembled Tokyo Medical School Main Building)



Guido Hermann Fridolin Verbeck (1830-98)



Johan Frederik Eijkman (1851-1915)



Erwin von Bälz (1849-1913)

## Slide note

Dutch influence was not completely lost at Tokyo Medical School. One example was Dutch-American missionary Guido Fridolin Verbeek (*Verbeek* in Dutch) – principal of Tokyo Kaisei School but also an influential figure in the Ministry of Education and the medical school. Ironically, however, he recommended German for the language of medical education.

## Slide note (continued)

Another example was Johan Frederik Eijkman, the older brother of Nobel laureate Christiaan Eijkman. He was a pharmaceutical chemist in his own right, teaching chemistry at the Faculty of Medicine. He wrote articles in Japan and contributed to the first Japanese pharmacopoeia, but all in German.

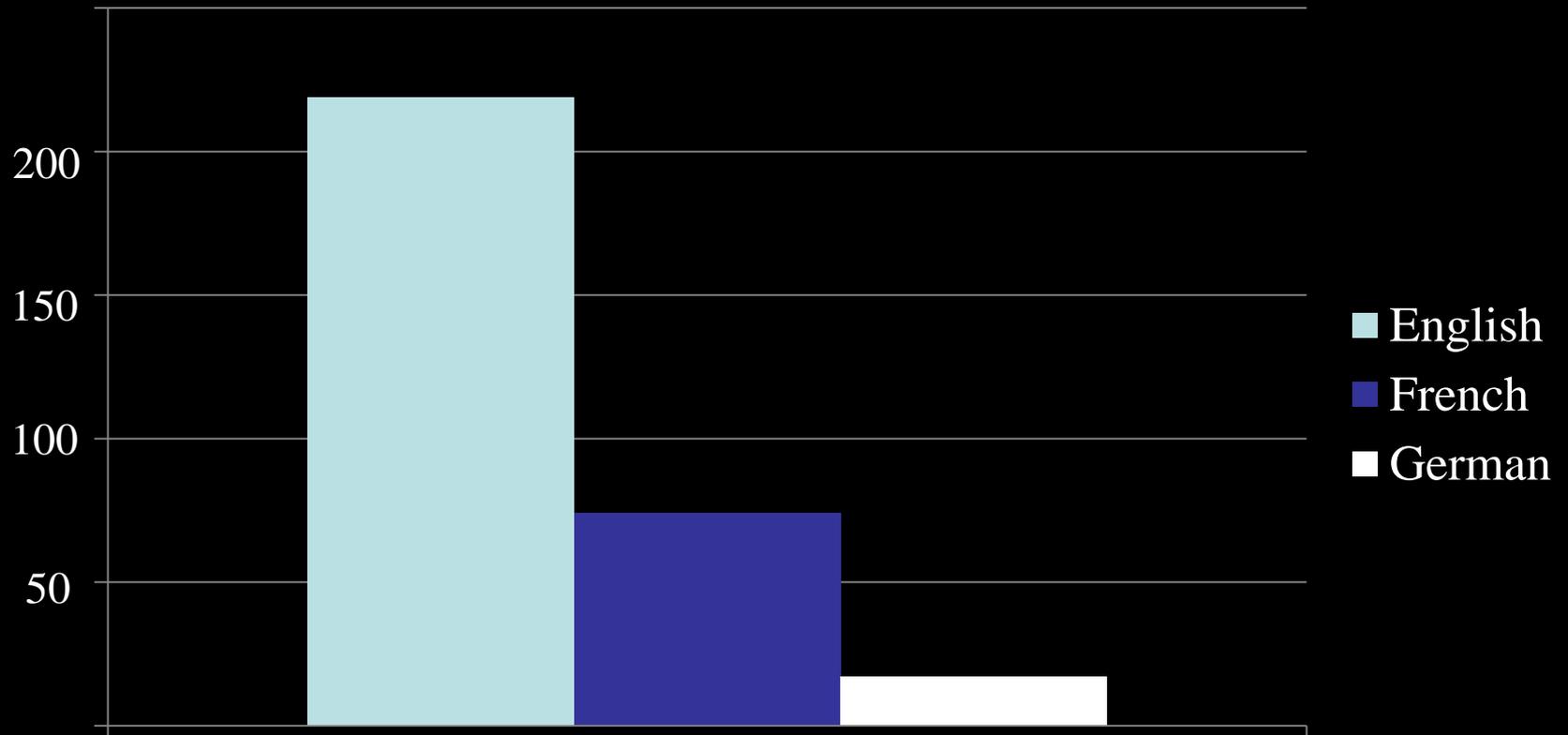
So in spite of some Dutch presence there was no denying that German dominated the teaching of Tokyo Medical School, personified by German physician Erwin von Baelz.

# Tokyo Kaisei School – TU Faculties of Law, Science, and Literature: English, French, German, but...



Source: *Tokyo Teikoku Daigaku gojūnenshi* (Tokyo, 1932)

# Nankō [Kaisei Gakkō] student enrolment, 1871



“We cannot afford it any more!”

“In July this year [1875] we dismissed French- and German-language students altogether. We did not want to, but it was unavoidable. [...] Once pupils reach the level of entering specialist departments, we would need three languages and three teachers to teach each subject.”  
(My translation, from “Introduction to the annual report of the Tokyo Kaisei Gakkō for 1875”)

# Two traditions of chemistry teaching at Tokyo University

Faculty of Medicine: German influence

Faculty of Science: British and American influence

*Two faculties of the same university located on different campuses*

# Relocation for better “School economy”

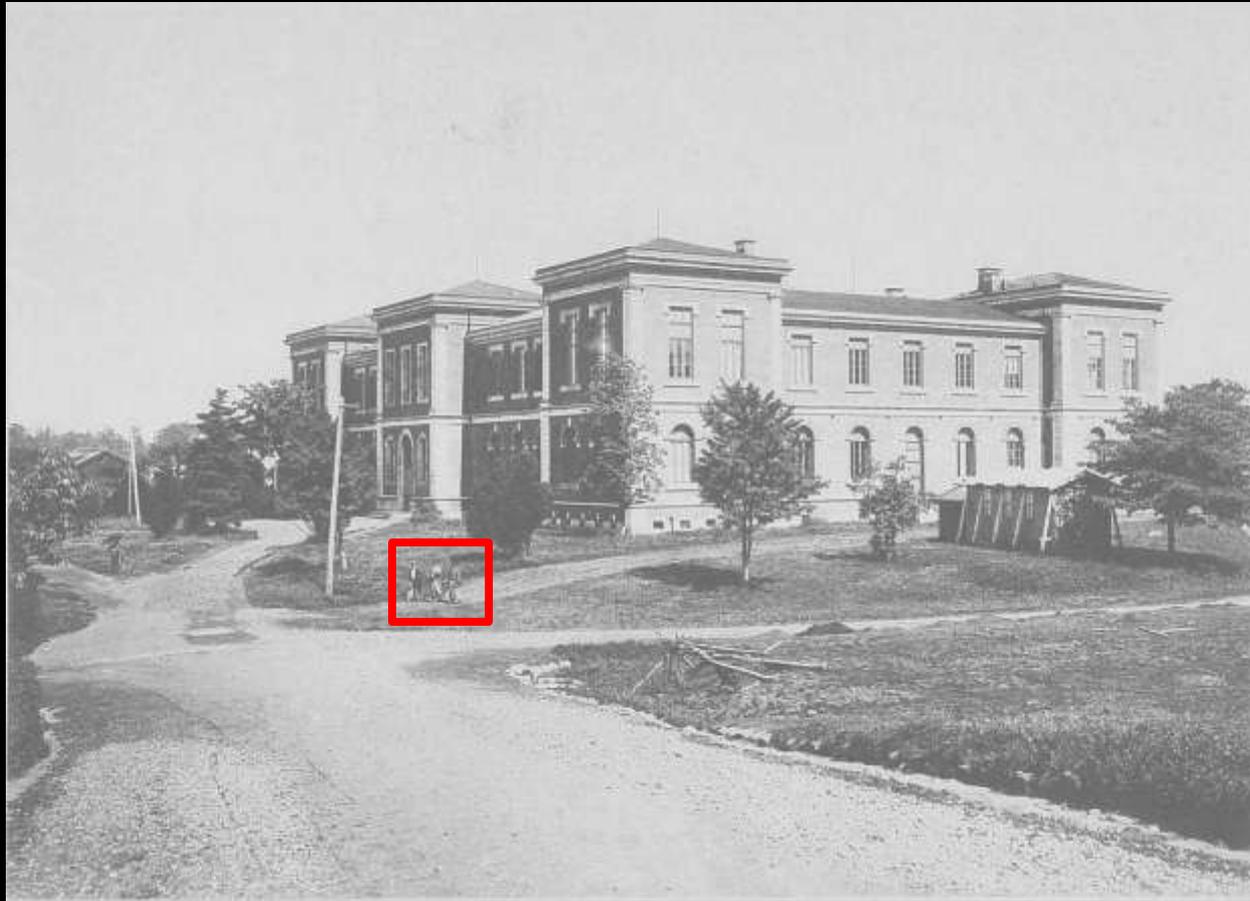
TU Faculty of Medicine



TU Faculty of Science

→ *Leading to a more ambitious plan*

# The “general chemical laboratory,” Tokyo University (designed 1885)



Source: Ogawa Kazumasa,  
*Imperial University of  
Tōkyō/Tokyo Teikoku Daigaku*  
(Tokyo, 1900)

→ Completed in 1888 as “the Main Building of the College of Science, the Imperial University,” accommodating physicists, mathematicians and chemists

Designed by:

Nagai “Wilhelm” Nagayoshi

-Successor of Eijkman

-Pharmaceutical chemist trained at  
Berlin with Hofmann

-Lost position in 1886

Redesigned by

Joji (“George”) Sakurai

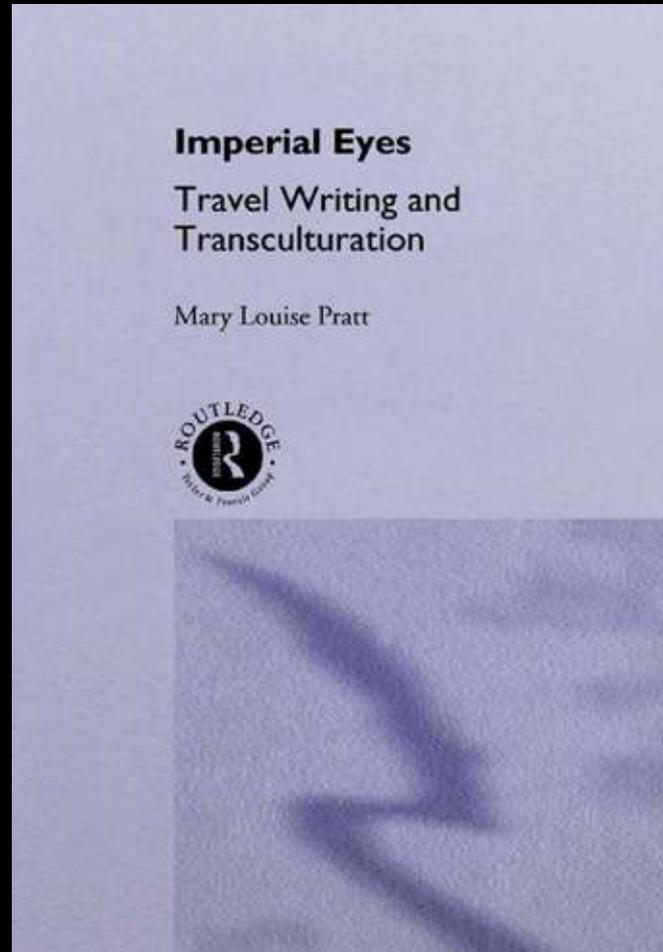
-Theoretical chemist trained at  
UCL with Williamson

-Became *de facto* HoD of chem

Collision of German and British styles?

How do we analyse their lab designs?

# Classrooms/labs as “Contact Zones”

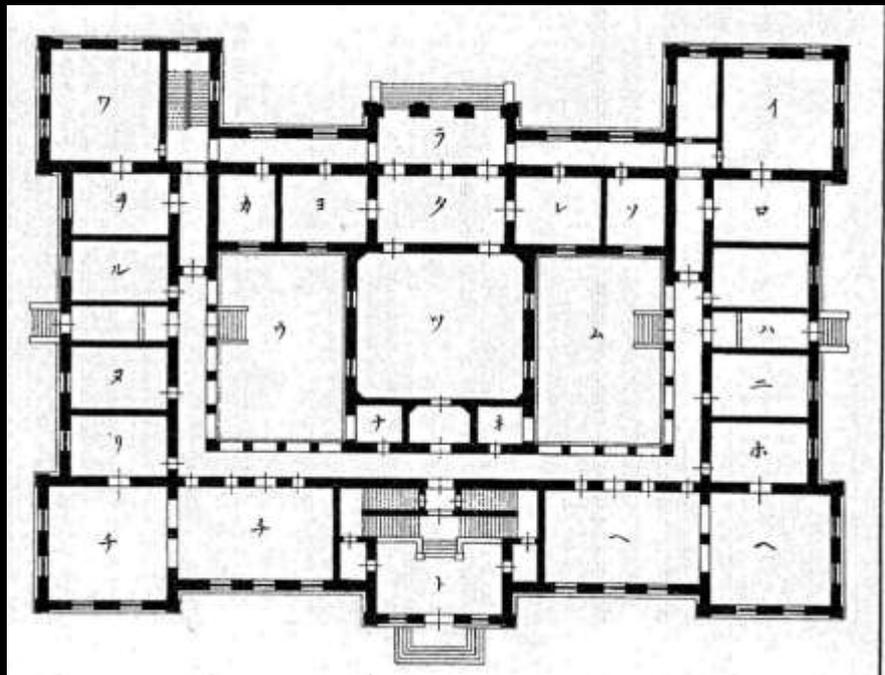


“Contact Zone” = “a space in which peoples geographically and historically separated come into contact with each other” (Pratt, 1992)

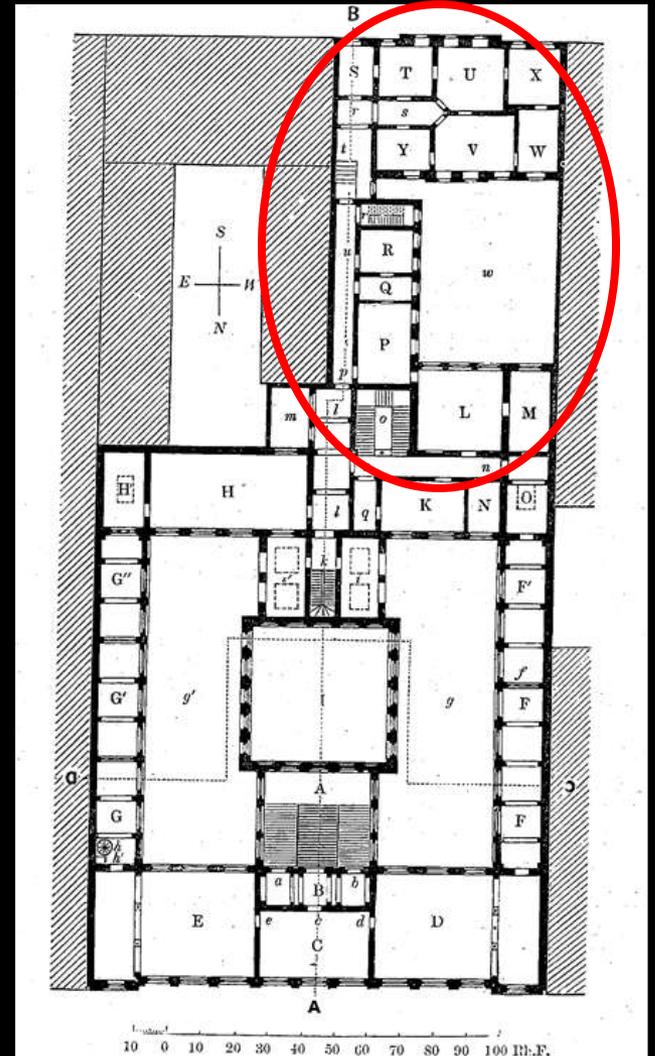
# A key research question

How did each designer conceive a laboratory as “contact zones” that connects (and divides) teachers and students?

# Nagai and the Berlin model



Source: *Yamaguchi Hakushi Kenchiku Zushū* (n.d.)

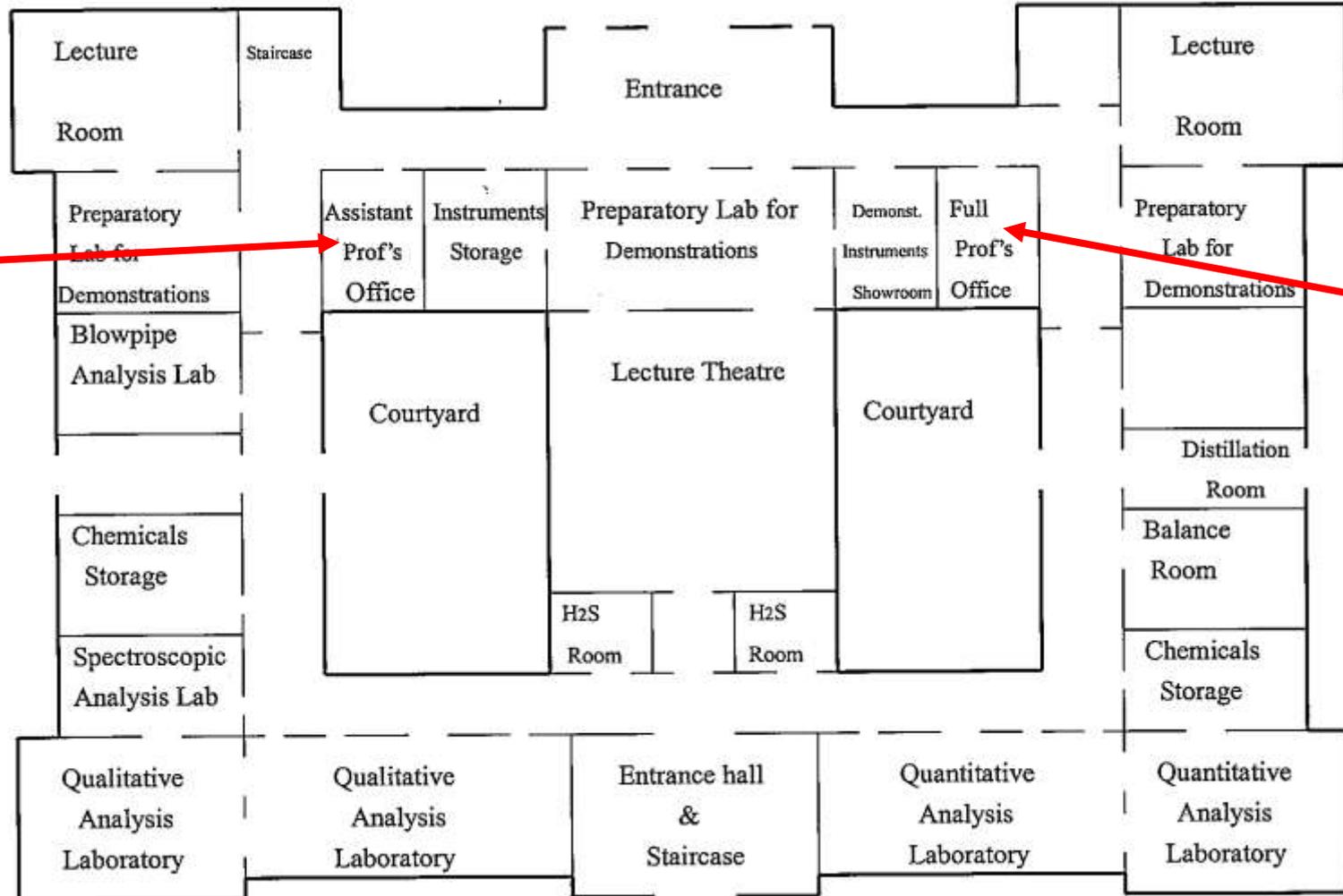


Source: A.W. Hofmann, *The Chemical Laboratories in Course of Erection in the Universities of Bonn and Berlin* (London, 1866)

## Slide Note

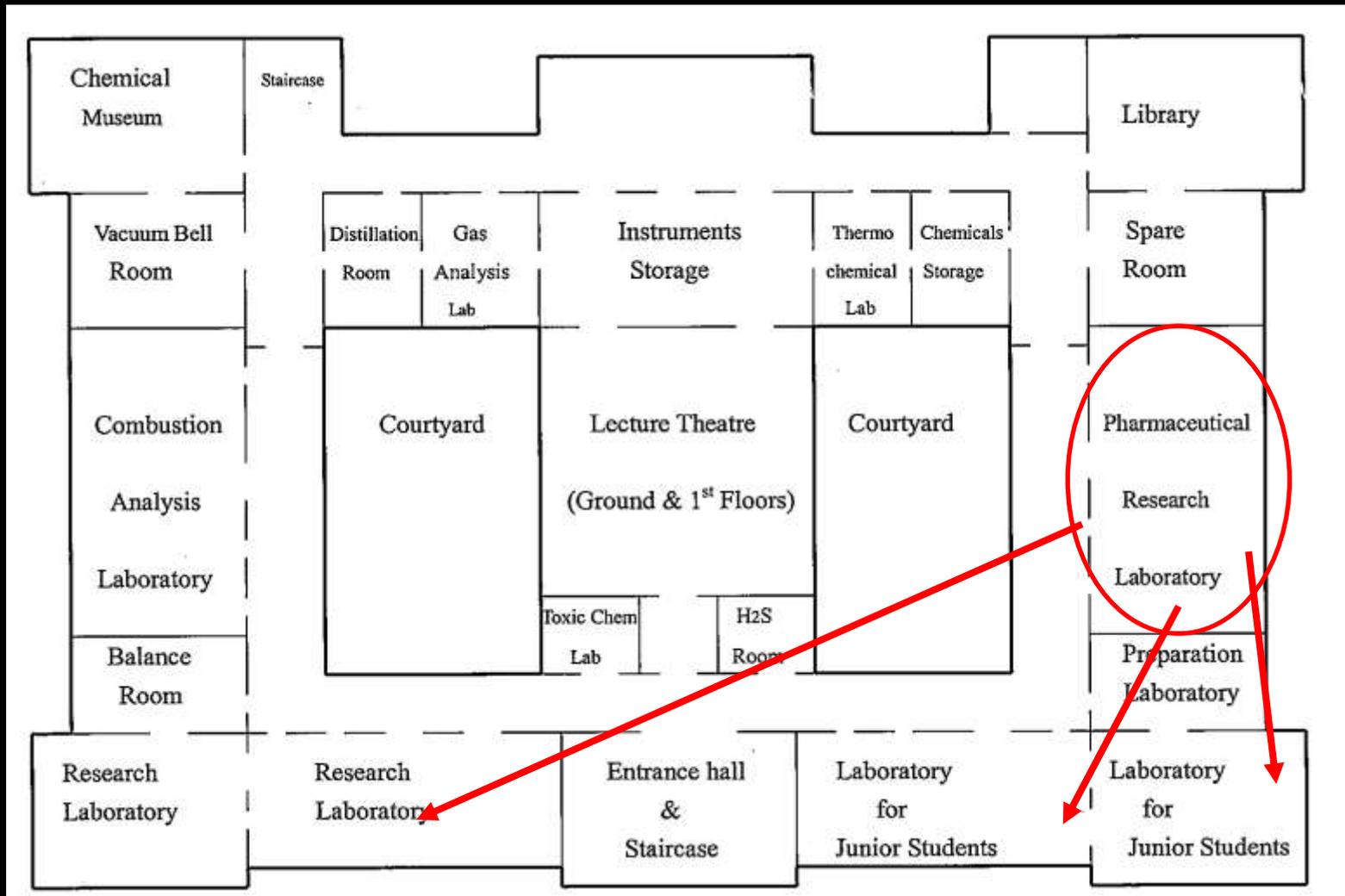
Remarkable similarity in shape, but the quintessentially Germanic fixture of a chemical institute, living quarters for the director's family, disappeared in Nagai's plan. German influence was not lost, however.

# Ground Floor, Nagai's plan



*German one-chair-per-discipline system*

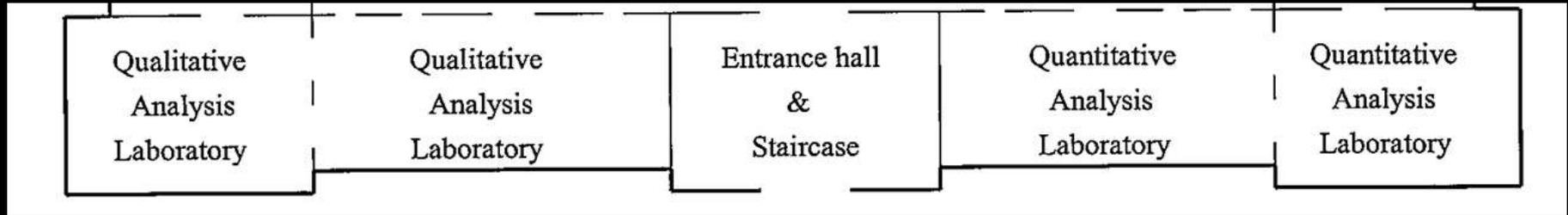
# First floor, Nagai's plan



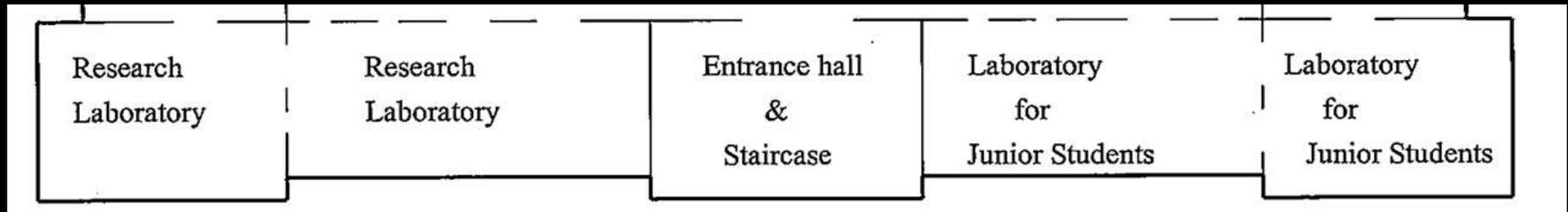
*Easier access to students' work for a director – main concern for Hofmann, Nagai's mentor at Berlin*

# From qualitative to quantitative analysis, From junior to senior students in Nagai's plan

## Floor 0

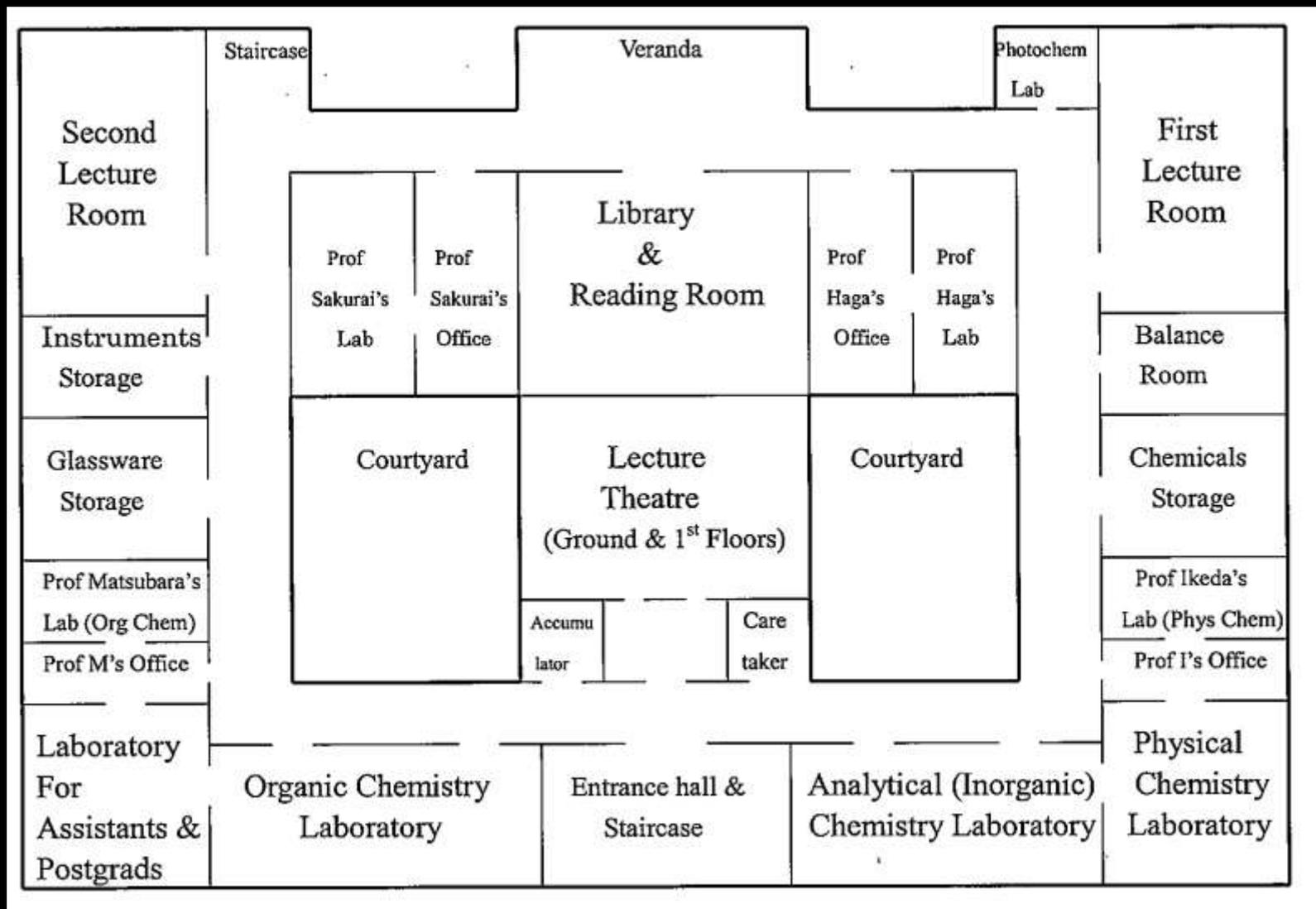


## Floor 1



→ Typical mid-nineteenth century practical training programme of (analytical) chemistry, originating in Germany and propagated to Britain

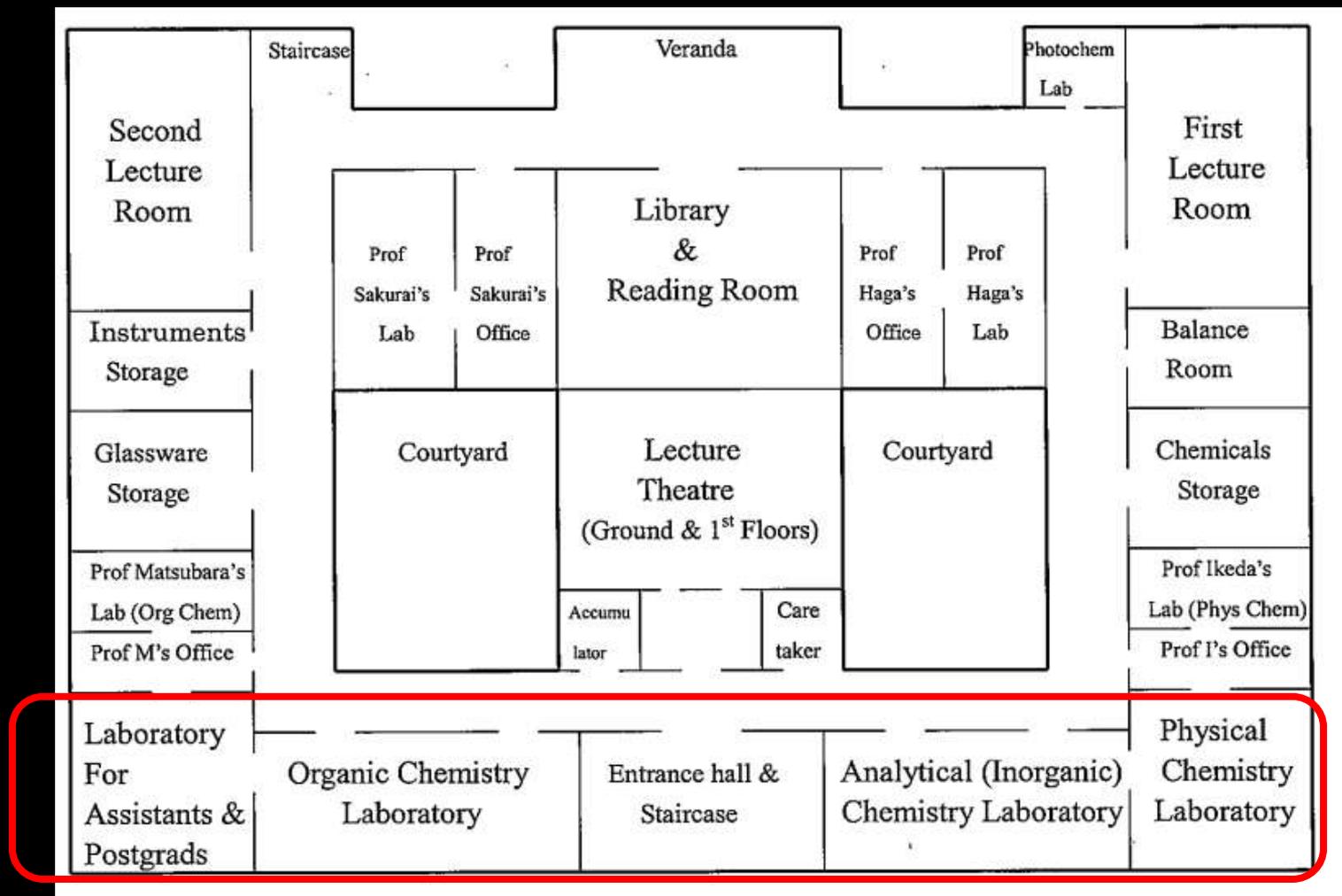
# Sakurai's redesigning (*first floor only*)



## Slide note

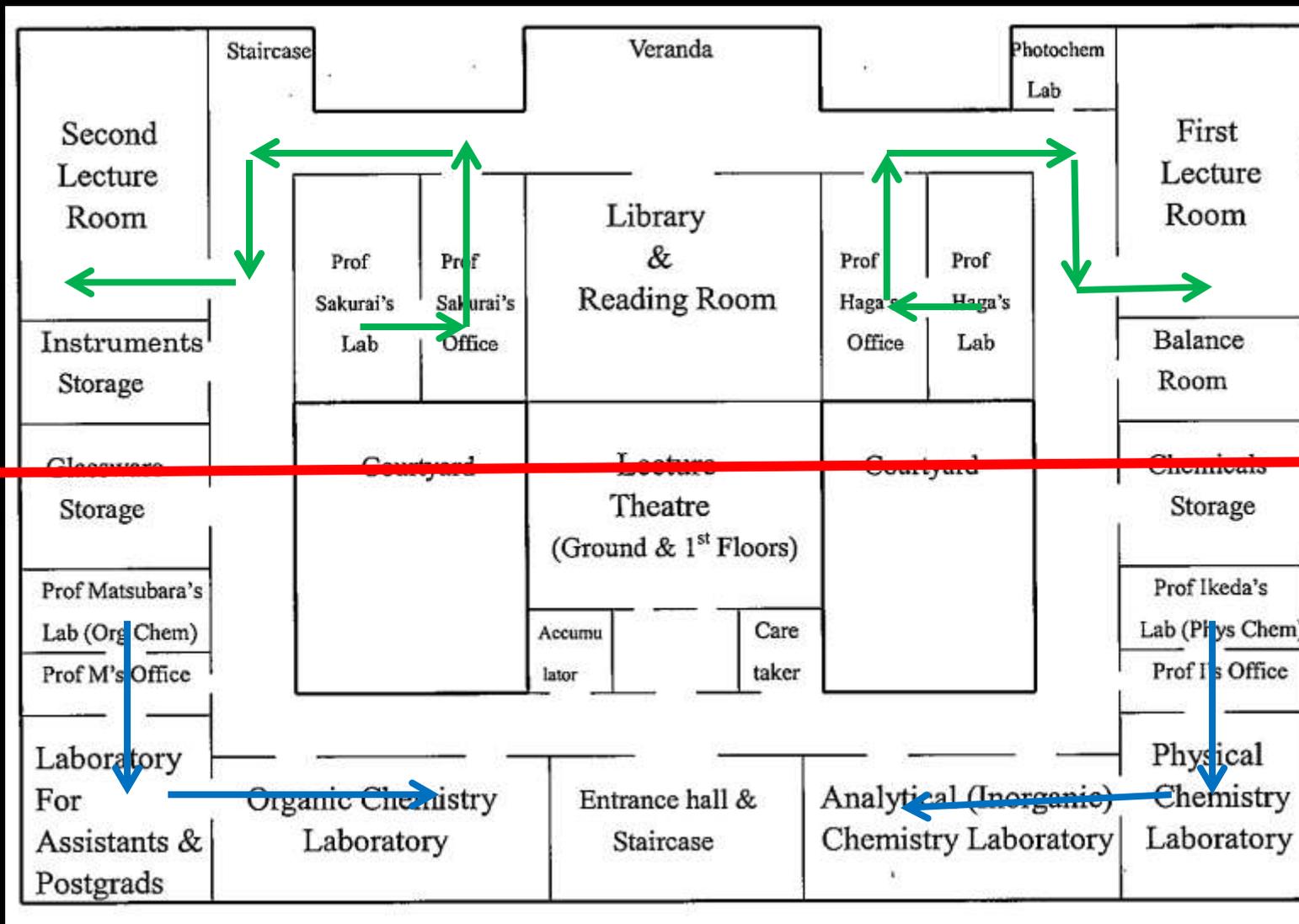
This restriction meant two things: 1) Sakurai had to give up many operation/preparation labs included in Nagai's plan even if he wanted; 2) It opened up the possibility of chemists collaborating with physicists and mathematicians who occupied the ground floor, which was definitely part of Sakurai's intention.

# New order of the practical training programme



*Based on subdisciplines of chemistry. Also interesting is that analytical chemistry laboratory is connected to physical chemistry laboratory, shows increasing interconnections between the two.*

# “Two worlds” in one laboratory



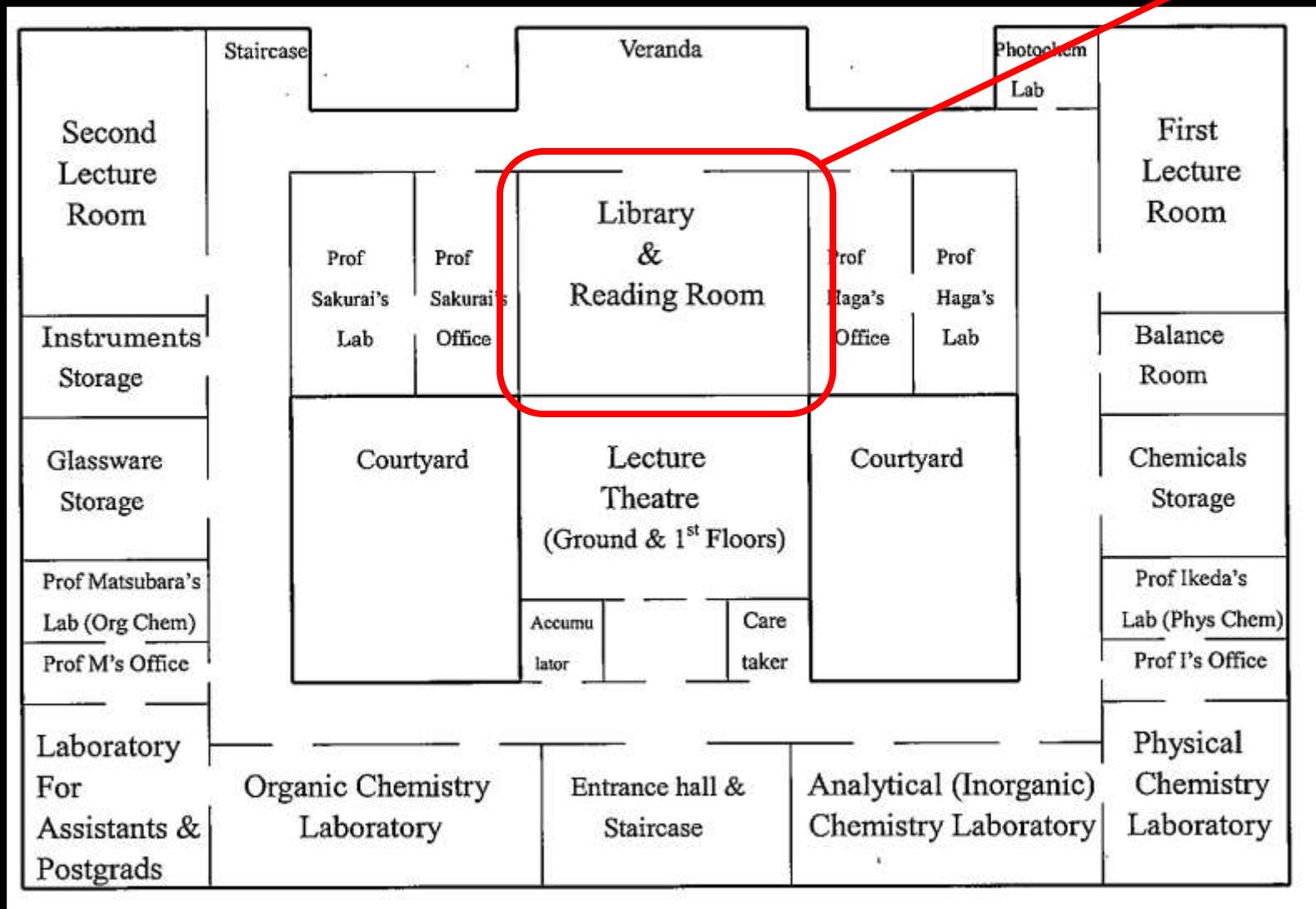
# Division of labour *à l'Anglaise*

- Senior Professors (green arrows): as lecturers
- Junior Professors (blue arrows):
  - as laboratory instructors
  - research partners/supervisors

Similar as UCL, RCC, Manchester, etc...

“Research imperative” developed from the bottom

# The *Zasshi-kai* (Journal meetings)



# Slide Note

Another contact zone: the centrality of the Library and reading room symbolises the importance of the Zasshi-kai in the department's intellectual and leisure life. Students and teachers would meet there after class, discuss latest literature, criticise each other, get outside for a drink and mingle with each other in a relaxed manner.

# Conclusions

The main difference between Nagai's and Sakurai's laboratory design was on how to construct the spatial arrangement that connects and divides 1) teachers and students, 2) disciplines, and 3) subdisciplines of chemistry

*Spatial analysis as a powerful tool to examine “national styles” and to connect socio-cultural/human factors and scientific/pedagogical practices*

Nagai's design =

- Berlin-style, director-centred, close attention to research supervision
- Emphasis on analysis and connection with pharmacy (through organic chemistry)
- Chemistry as an insular discipline

Sakurai's design =

- British-style, less centralised but role-dividing hierarchy, bottom-up research
- Emphasis on subdisciplines (esp. phys chem) and connection with physics and math, but not with medicine, pharmacy, and industry...