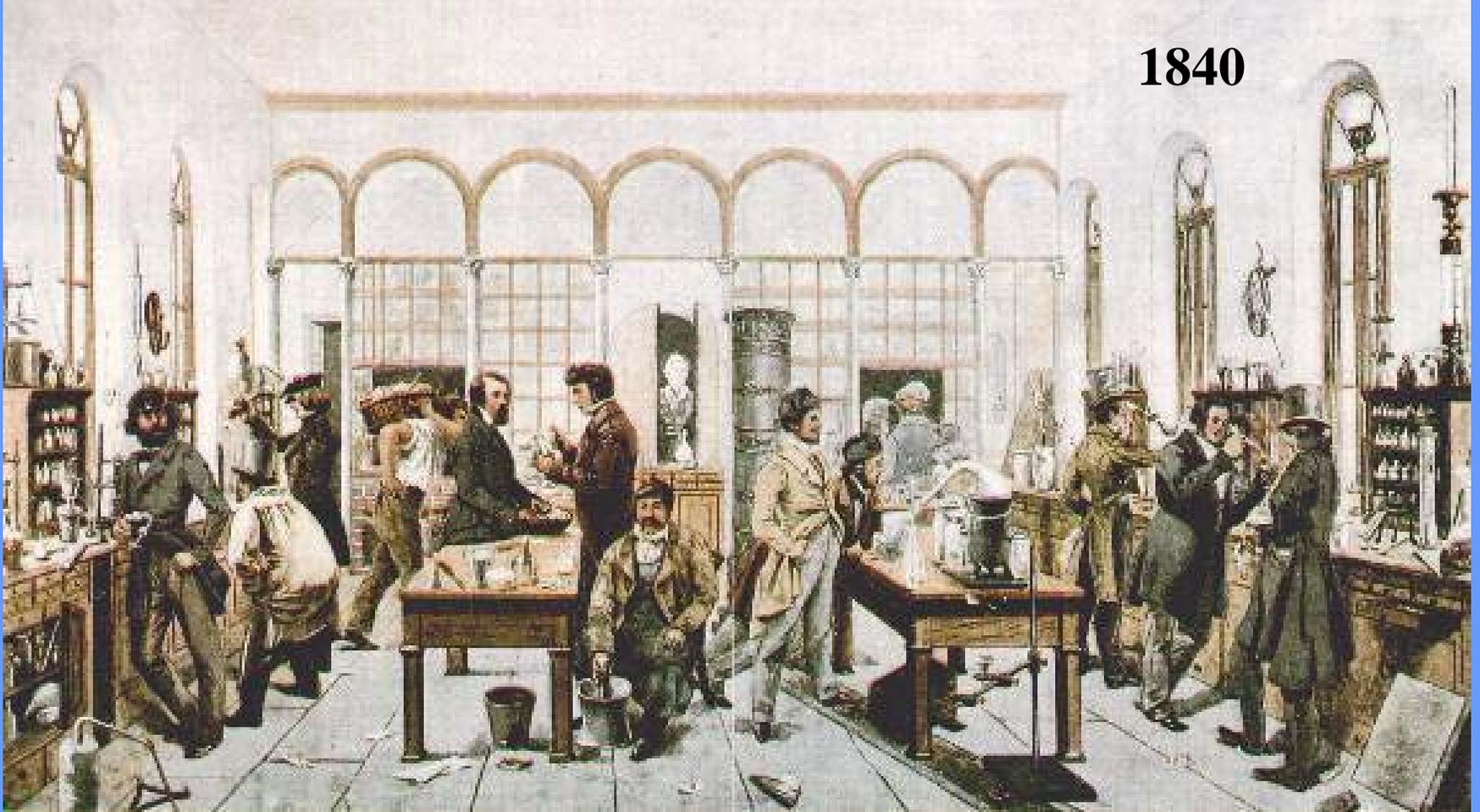




Justin von Liebig 1803-1873
a power point by Nancy Zipprich

Justus von Liebig was born in Darmstadt, Germany in 1803. His schoolmaster labeled him as “hopelessly useless”, and yet he would later become one of the master chemistry teachers of all time. His early inspiration for chemistry may have been traced to his father’s profession as a dealer in chemical supplies, or perhaps a peddler selling toy torpedoes powered by fulminates. He entered the University of Bonn in 1820, went to Paris to study in 1822, and in 1824 became assistant professor at the University of Giessen in 1824 at the age of 21. Here he emphasized the importance of a laboratory approach to the study of chemistry. After 1852 he became a professor at the University of Munich until he died in 1873.

1840



Liebig changed chemistry in Germany more significantly than any other chemist of his time when he was at the University of Giessen 1824-1852. He was responsible for the development of the teaching, research, and technology of modern chemistry.

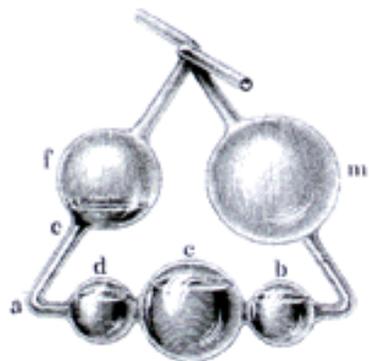
Liebig's most significant accomplishments are:

- invented laboratory instruction--he was one of the first chemists to organize a laboratory as we know it today
- involved in the organization of organic chemistry--improved organic and inorganic analysis of compounds
- with Wohler, developed a theory of radicals (giving different formulas for compounds consisting of C, H and O)
- along with Wohler, Liebig made the first experimental discovery of isomerism (first predicted by Berzelius)--for example HNCO = isocyanic acid and HCNO = fulminic acid
- wrote books about agricultural and animal chemistry where there was a practical application of organic chemistry to animal and plant science
- “Law of the Minimum” which is a major principle in plant nutrition

Justus von Liebig's inventions:

- silver mirror (which replaced the mercury mirror)
- meat extract (bouillon) which he called fleish extract
- baby food which was a substitute for mother's milk
- meat infusion for seriously ill patients
- baking powder
- corrosion-resistant alloy of Ni and Fe (a precursor to stainless steel)
- super-phosphate (fertilizer)
- newly isolated compounds--chloral hydrate, chloroform, and pyrogallol

Liebig developed a technique for determining the C and H contained in a sample, from the carbon dioxide and water given off when a compound was burned in a long glass tube heated by charcoal. The five-bulb apparatus contained a KOH solution which absorbed the CO_2 produced by combustion, and there was also a CaCl_2 tube in front of it and in back of it to absorb the water vapor formed.



Liebig's five-bulb apparatus.

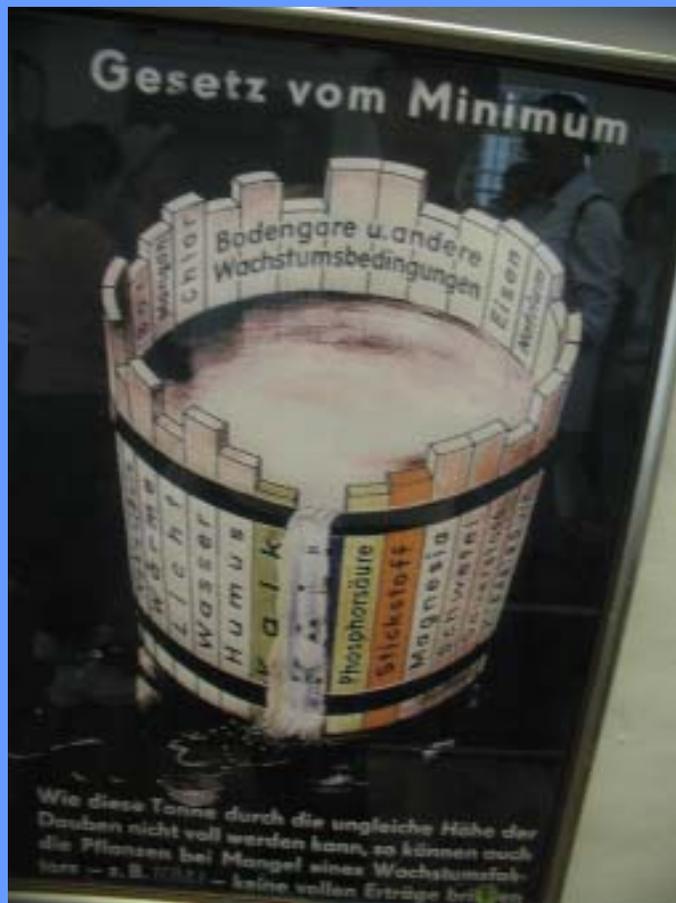


Different stages of glass-blowing to make the five-bulb apparatus. Liebig and his contemporaries had to blow their own glassware



Liebig's Theory of Mineral Nutrients for Plants

- Liebig's mineral fertilizer theory, based on the principles of plant nutrition, reformed agriculture during the mid 1800's.
- plants take minerals up through their roots from the soil
- soil is fertile only if nutrients removed by the plant are replaced
- each kind of plant species requires different nutrients
- one nutrient cannot substitute for another, which led to the "Law of the Minimum"



Liebig's "Law of the Minimum" in plant nutrition states that whichever nutrient is in least amount relative to the required amount, will determine the yield of a plant.



Liebig's Fleisch Extract became very popular and there were “collector cards” included in the extract sold at the time.



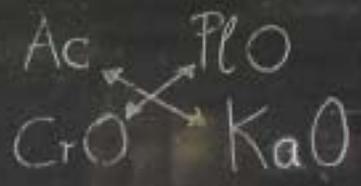
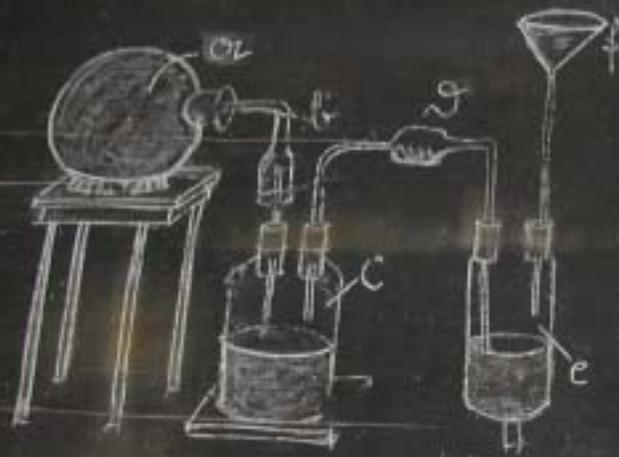
Professor Siegfried Schlindler

University of Giessen June, 2004

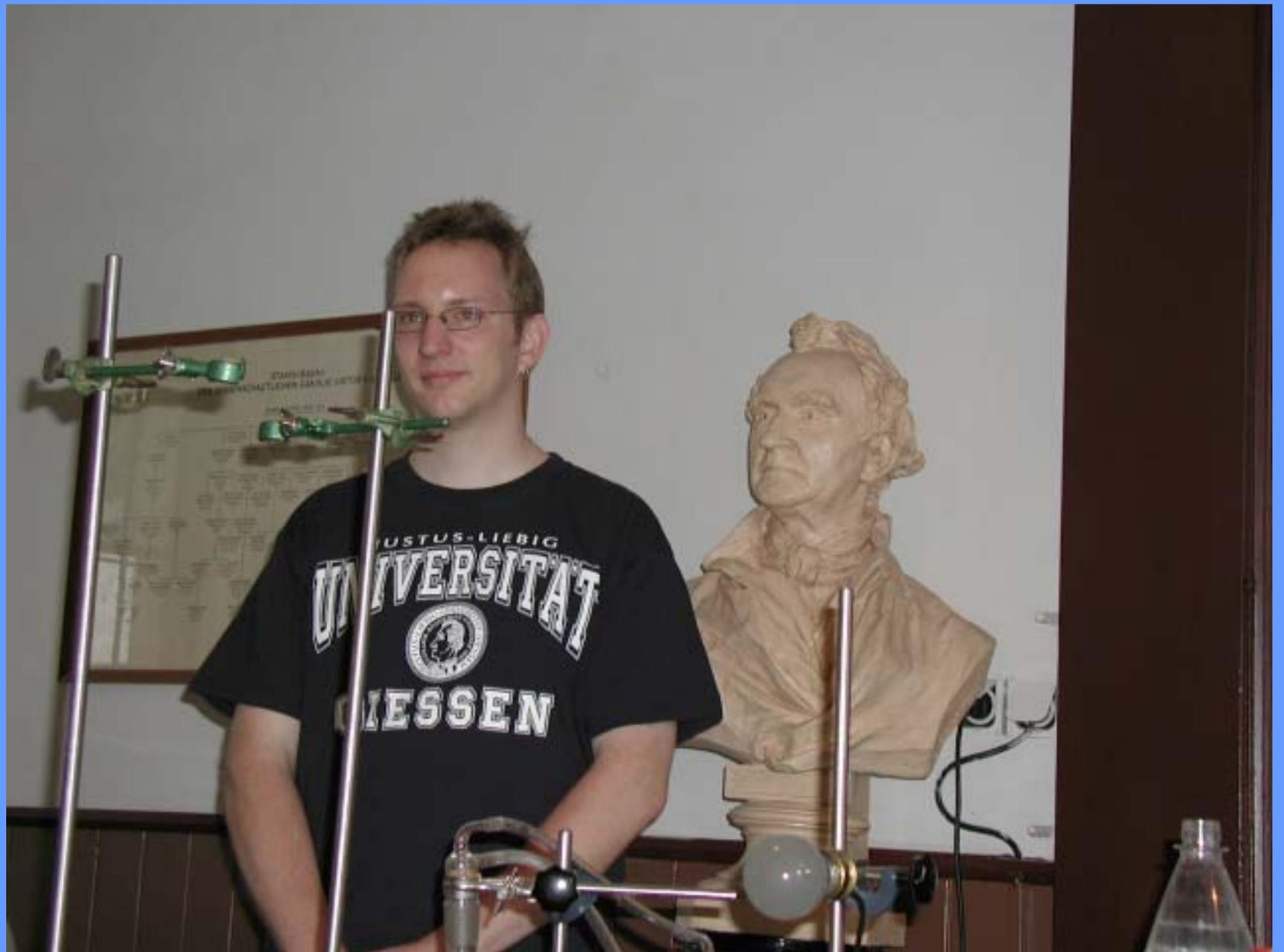




Lecture room (Auditorium) used by Liebig, with a view through the fume hood to the analytical laboratory



C O H N S P K Ca Mg Fe







O H N S P K Ca Mg Fe

Beim
die Li
Sachere
Sind,
Wärmer



Sind, immer ein wenig
wärmer

Montaigne















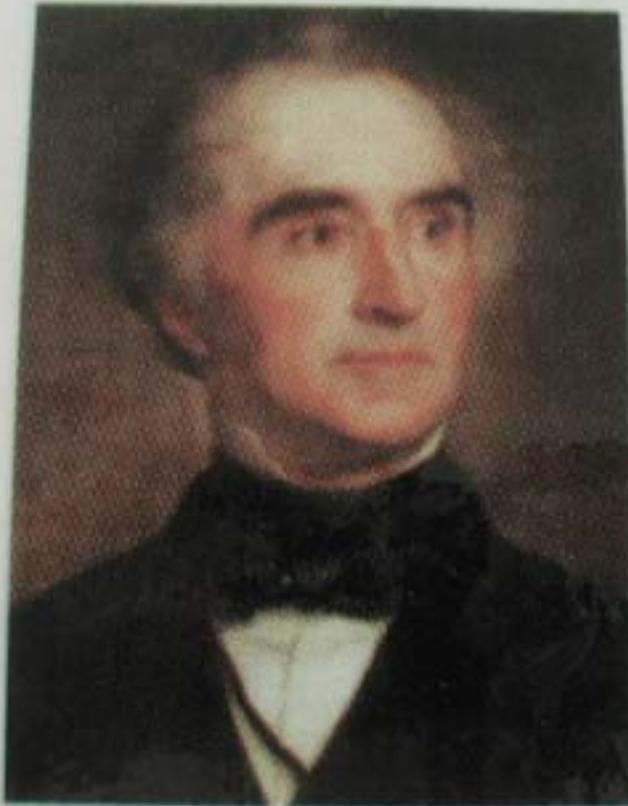




LIEBIG'S
FLEISCH-EXTRACT



JUSTUS
VON LIEBIG
1803-1873



FUNF-KEGEL-
APPARAT



55
Deutschland

2003





Dry Ice maker $\text{CO}_2(\text{s})$

The Liebig Condenser







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