

Pilgrimage through the History of German Natural Science

University City Tübingen.

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Introduction

Tübingen is a city located in the southwestern part of Germany in the state of Baden-Württemberg, about 50km south of Stuttgart, and distributed along the river Neckar. Tübingen has been an University town since 1477, and is the economic and cultural center of this area.

Most of the larger cities in Germany were destroyed by bombardment during the 2nd world war, however, some cities such as Tübingen, Göttingen, Heidelberg and Freiburg were for the most part left untouched. This is because some of the American and English intellectuals who studied in these German universities asked authorities to stop bombing these unarmed university cities.

In this area, many towns and villages including Tübingen have “ingen” at the end of their names. The railway station names between Stuttgart to Tübingen are as follows:

Stuttgart Esslingen (Neckar) Oberingen –
Essingen Plochingen – Wendlingen (Neckar)
Nurtingen Metzingen Rentlingen Tübingen.

I asked some people about the origin of the “ingen”, but they could not answer. Later I found that the towns whose name with “ingen” at the end, were established by Allaman during the Germans “Wandeljahre” in the beginning of the middle age.

A similar article on the University City Tübingen was

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History of Tübingen and the University

Tübingen first appears in the German history in the middle of 11th century. In the year 1078, the city was surrounded by wall, and business section was inside the city. The city of Tübingen grew steadily and obtained the right of self government in 1231. However, the city was getting weak, and the city was bought by Lord Württemberg in 1342. Since then, the history of Tübingen became a part of the history of Württemberg.

In 1447, Bart Eberhardt established the University of Tübingen. At that time, the population of the city was about 3,000. After the Reformation, the city of Tübingen accepted protestantism and Lord Württemberg established “Stift” in order to strengthen the religious leader. The Stift is a kind of religious college with a dormitory. The education in the Stift is said to be very strict as described in “Unterum Rad” by Hermann Hesse. From the Stift, many intellectuals emerged and Tübingen-school of protestantism was established. The fame of Tübingen came from the Stift and the University. However, the “Stife” was absorbed later by the school of philosophy of the University.

At the end of 16th century, J. Kepler (1571-1630) studied mathematics and astronomy in Tübingen. During the year 1790 to 1791, G. W. F. Hegel (1770-

1831), J. C. F. Hölderlin (1770-1848) and F. W. Schelling (1775-1854) studied theology in Tübingen as classmates.

In the beginning of 19th century, the University of Tübingen was operated in the traditional way as was established in the middle age. University of Tübingen established a new “Faculty of Mathematics and Natural Sciences” in 1863. As the city grew, the city wall surrounding the city and city gate were removed. The population of the city was about 15,000 and 1,000 students attended the university. The old university buildings and the dormitories, which were constructed in the middle ages, were located along the Neckar river. By the 19th century, there was little spaces left in the old town, and new buildings were erected in the flat area in the north and east district. After the 2nd world war, university buildings and hospitals were further expanded to the northern hill apart from the old town.

Over the years, the city of Tübingen was influenced by the existence of the university. Many German cities were industrialized and numerous factories were erected. Intellectuals of Tübingen refused industrialization of the city, claiming that Tübingen should be an Olympus or Athen for academism. Thus we can see many remains of the past academism in the old town. University buildings are spread all over the old town, with citizens living among the university buildings.

Railroad Station to the Stift Kirche

Getting off the Tübingen Central Station, we head towards the old town of Tübingen. The first monument we see is the statue of Johan L. Uhland (1787-1862) on Uhlandstrasse near the railroad station (Fig. 1). He was a linguist, poet, and collector of traditional folk songs and legends. He was born, worked, taught and died in Tübingen. His thought was liberal and he has been

loved and respected in Tübingen (Fig. 2).



Fig.1. Johann Ludwig Uhland (1787-1862) was born in Tübingen. He studied, taught and died here. He was a linguist, collector of folk song and legend. The bronze statue is standing by the Uhland street near the railway station.



Fig.2. Commemorative stamp for Uhland was issued from DDR in 1987.

As we cross the “Ebelhard Bridge” about half way, we can see “Hölderlinturm” at the left side. The building stands by the riverside (Fig. 3). The roof is painted



Fig.3. When we crossed the Eberhard bridge, we can see Hölderlinturm standing by the river Neckar. The mentally ill Hölderlin was brought up by the carpenter Zimmer’s family for long years (1770-1848). Now the Hölderlinturm is a small museum for him.

black, and the wall is yellow in color. The building with the green tree and the blue sky is reflected by the river surface.

As a whole, the scenery is arguably one of the best photographic objects in Tübingen. After Hölderline became mentally ill, he was taken care of the carpenter Zimmer's family for many years (1806-1845) until his death. Hölderlin tower is now a small museum and is open to the public (Fig. 4, 5). Under the tower, by the riverside, 3-4 wooden boats are moored. The scenery is similar to that of river Cam in Cambridge.



Fig.4. A small bronze plaque for Hölderlin (1770-1843) is near the Hölderlin tower..



Fig. 5. Johann Christina Friedrich Hölderlin, 1770- 1843 (The postage stamp was issued in 1993 by BRD).

Crossing the bridge, and turning to the left, there stands Stift Kirche. This is a protestant church, however, we can come in to see inside. Some years ago

(10 years?), when I was going up to the Bell Tower, in the dark, suddenly the Bell started to ring loudly. I was really surprised what was happened in the dark. The scenery from the Bell Tower was beautiful (Fig. 7). This is the Tower that astronomer Mastrin, teacher of Kepler, watched stars.



Fig. 6. The bell tower of the Stift Kirche is a nice place to watch old town.



Fig. 7. The scenery from the bell tower was beautiful. Most of the houses in the old town have orange roofs and white walls. It was said that Kepler's teacher Mastlin observed stars from this bell tower.

Holzmarkt, Alte-Aula

On the north side of the "Stift Kirche", there is "Poseidon's Fountain". Close to the fountain there is "Heckenheimer" bookstore, where Hermann Hesse worked for few years in his young days. A bronze plaque is at the entrance, and Hesse's photograph is on the shelf. I wanted to take picture of Hesse's portrait

in the bookstore. I asked the man who belongs to the bookstore, “May I take picture?” He said “Nein!” He understood my words as “May I take away the Hesse’s photograph?”, my words literally meant so, and I tried again in German “Darf ich es photographieren”, and received his permission, and took some pictures (Fig. 8).



Fig. 8. Hermann Hesse (1877-1962) worked for few years in the “Heckenhauer” bookstore. A bronze plaque is on the upper part of the entrance, and his photograph is on the book shelf.

When we pass through the small Platz (Holzmarkt), and turn to the left, there is an old University building called “Alte Aula” (Fig. 9). This was the main building of the old university.



Fig. 9. “Alte Aula” was the main building of the old university, which was constructed in the middle of this 16th century and reconstructed in 1777 in this style. The Alte Aula with red roof and yellow wall is beautiful. The old building is now used for research institute.

The yellow wall and red-orange colored roof make the

building beautiful. The building was first constructed in 1547, and later (1777) reconstructed in the late baroque style. The “Alte Aula” is now used as a research building. I have heard that the portraits of Kepler, Hegel and Schelling exist in the “Alte Aula”, however, I have not been able to find them.

Passing the “Alte Aula”, we take a narrow road called Burggasse, and we can see Evangelish Stift at the left side. The Stift is a religious school to educate protestant elite. Various intellectuals emerged from the Stift. In addition to the religious people, philosopher (Hegel, Schering), literacy (Hölderlin, Mörike, Hauf) and scientist have emerged from this school.

On the way to the Schloss

The castle in Tübingen stands high above the city by the Neckar, and is called Hohenstaufenschloss Tübingen. We follow the narrow road (Burgsteige) to the castle, and we pass by an old bar called “Schlosskeller” on the left side. Small bronze plaque is on the upper part of the entrance. The plaque is for Michael Mastlin (1550-1631), who is a teacher of J. Kepler (1571-1630)(Fig. 10, 11).



Fig. 10.

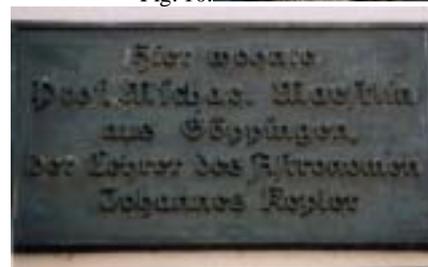


Fig. 11.

Fig. 10, 11. On the way to the Castle, there is a bar named “Schlosskeller”. The small plaque is on the entrance. The plaque says “Astronomer J.Kepler’s teacher Michael Mastlin lived in this house”. However, the plaque is too small to read.

Mastlin believed in a heliocentric structure of the planetary system, and he taught mathematics and astronomy to young Kepler. He studied (1589-1594) first at the Stift to become a churchman, but later he was interested in the physical sciences and became an astronomer (Fig. 12). As a result Kepler met a good teacher, and Mastlin had a good student.



Fig. 12. Johannes Kepler, 1571-1630 (Astronomer, stamp issued 1971 by DDR).

As we climb further up the slope, we reach the Outer Gate of the castle (Fig. 13). The Gate was built in 1606. This is a beautiful construction with decorative sculptures. We go through the Outer Gate and we reach Schlosshof (large square place in the castle). At the present time, the building is used for research institution (Fig. 14). We see plates such as “Uhland Institute” and “Institute für Prehistorische Forschung”. On the wall of the Schloss Hof, there are three plaques dedicating scientists.



Fig. 13. If we follow the slope to the Castle (Schloss Hohentübingen), we reach the outer gate which was constructed in 1606. The outer gate decorative is interesting as construction with sculptures rather than a part of fortress.



Fig. 14. The rectangular Hof of the castle is wide, but only a fountain and few trees are there. The Schloss building is now used for research institution and for storage.

The first plaque is for physicist and astronomer J. G. Friedrich Bohnenberger (Fig. 15). He studied from 1796 to 1831 in this castle.



Fig. 15. The plaque is for J. G. Friedrich Bohnenberger, Astronomer, physiker and mathematiker. He worked in this Schloss for 1796-1831 as a professor of University of Tübingen.

The second plaque is for Julius Eugen Schlossberger who studied physiological problems between 1846 and 1860 (Fig. 16). He is one of the founders of biological chemistry.



Fig. 16. Under the plaque of Hoppe-Seyler, there is a plaque of Julius Eugen Schlossberger. He is a founder of Physiological Chemistry at the University of Tübingen and he worked here between 1846-1860.

The third plaque is for Felix Hoppe-Seyler (1825-1895) (studied here 1861-1872) (Fig. 17). The plaque was displayed commemorating Hoppe-Seyler's 100th birthday (26 Dec 1925). Hoppe-Seyler is a pioneer of physiological chemistry. He clarified the role of hemoglobin in red blood cells. He also studied chlorophyll. He started first academic Journal of Physiological Chemistry "Zeitschrift für Physiologische Chemie" in 1877. He obtained chairs at Berlin, Tübingen and Strasbourg. He is one of the founder of biochemistry. G. Hufner listed in the plaque, is the successor of Hoppe-Seyler.



Fig. 17. On the south side wall of the Schloss Hof, there is a plaque for Felix Hoppe-Seyler (1825-1895). The plaque was erected for Hoppe-Seyler's 100th anniversary (1925). He studied here 1861-1872, then he moved to Strasbourg. Gustav Hufner was the successor of Hoppe-Seyler, and studied here 1872-1885.

The scenery from the castle is just as beautiful as that from the Bell Tower of Stift Kirche (Fig. 18). Most of the roofs of the old town were orange colored and walls were white.



Fig. 18. The scenery from the Schloss is just as beautiful as that from the Bell Tower of the Stift Kirche. The scenery is a combination of three colors, orange-red roof, white house wall and green color of the trees.

If we go down the Neckarhalde, we can see J. L. Uhland's old house where he was born, studied and died. The memorial plate for Uhland is made of red-brown sandstone (Fig. 19).



Fig. 19. If we go down the Neckarhalde, we can see J. Ludwig Uhland's (1787-1862) haus where he was born. The plaque is a red brown sand stone. It says "In this house J. Ludwig Uhland (1787-1862) was born in 26 Apr. 1787".

Marktplatz

On the way to "Marktplatz", we found a plaque of Phillip Melanchithon (1497- 1560) near "Stift" (Fig. 20). He was a humanist who taught Greek philosophy. Later, he contributed to protestantism as an humanist. His original family name was "Schwarzerd (black soil)", and he called himself "Melanchithon" in Latin.



Fig. 20. Near from the Stift, we found Phillip Melanchiton's (1497-1560) house where he lived and studied. He taught Greek Philosophy and contributed later to protestantism as a humanist.

The old city hall in the “Markt Platz” is beautiful, not only for its design, but also beautiful in its aged color (Fig.21). An open market is held regularly here once a week (Fig. 22).



Fig. 21. There is a large old city hall in the Marktplatz. The shape of the old building is not only beautiful but the old color of the city hall is also beautiful.



Fig. 22. In the Markt Platz, open market is held regularly to sell goods necessary for every day life.

Publisher Cotta’s plaque is in the corner of the square in front of the “Alte Aula” (Fig. 23). Cotta is a famous publisher since 18th century. They published many well edited books of famous authors such as Goethe and Schiller, but are now located in Stüttgart. The existence of the publisher Cotta is suitable for the university town Tübingen (Fig. 24).



Fig. 23. Across the street opposite side of the Alta Aula, there is a bronze plaque of publisher Cotta. Cotta have been a famous publisher who published well edited literary works like Goethe and Schiller. Later the publisher moved to Stuttgart, however, the existence of the publisher Cotta in Tübingern is very suitable to the University town. In this plaque it described that Goethe stayed at Cottas house in Sep. 1797.



Fig. 24. I found a plate “Melanchthon Schule”. The school is probably an ordinary school for education. There are “Umland Schule” and “Hölderlin Schule” in this town.

Old Botanical Garden

As we approach the “Old Botanical Garden”, we find two monuments. One is the memorial stone (Gedenkstein) of Karl Correns (1864-1933) (Fig. 25).



Fig. 25. In the old botanical garden, memorial stone for Carl Correns (1864-1933) who rediscovered Johann Mendel’s (1822-1884) forgotten law of heredity is there. He obtained his seats at Leipzig, Munchen and Berlin. He died in Berlin, and his grave is in Waldfriedhof, Dahlem, Berlin.

He is a botanist who rediscovered the forgotten Mendel's law of heredity. He obtained chairs at Tübingen, Leipzig, Münster and then Kaiser Wilhelm Institute, Berlin. Corrense's profile is carved on the memorial stone. His grave is in the Wald Friedhof Dahlem, Berlin.

The other monument is the statue of Hölderlin made of white marble (Fig. 26). However, the statue is weathered considerably and his arms are missing. I believe that important monuments should be brought to museums to avoid weathering. Destruction of memorial statues are taking place worldwide, and appropriate measures should be taken.



Fig. 26. In the old botanical garden, close to Corren's memorial stone, there stands J. C. F. Hölderlin's (1770-1847) marble statue. Unfortunately the statue is weathered and both arms are missing.

Wilhelmstrasse

When we proceed to Wilhelmstrasse from the "Old Botanical Garden", we reach the University Library (Fig. 27). On the upper part of the main entrance, we can see the words "Königliche Universitäts Bibliothek". The building of the Bibliothek is not tall but it was constructed from yellow sandstone. The "Busts" of the famous international intellectuals can be found in the outside of the main building (Fig. 28).



Fig. 27. There is a "University Libray" in the right side of the "Wilhelm street".



Fig. 28. Around the main building of the "University Library", more than a dozen portrait of famous persons are on the wall. I would like to show you two famous persons who interested in natural science.

I want to show you the busts of two philosophers, Immanuel Kant (1724-1804) (Fig. 29) and G. W. Leibniz (1646-1716) (Fig. 30). Both philosophers had an interest in nature. I have heard that the library of the University has a collection of almost two million books.



Fig. 29. The first person is Immanuel Kant (1724-1804). He published *Allgemeine Naturgeschichte und Theorie des Himmels* (1755). His great work is "Critical Philosophy" and he developed his epistemology.



Fig. 30. The second person is Gottfried Wilhelm Leibniz (1646-1716) who was a Naturforscher, mathematician philosopher and politician. He established new mathematics including differentiation, integration, and he made a mechanical calculator. Grave of Leibniz is 「 St. John Church 」 in Hannover.

As we proceed further, we can see “Lothar Meyer Bau” (Fig. 31). Meyer is one of the chemists who found the periodic law of elements. The name of the building is dedicating to Meyer for his finding.



Fig. 31. If we proceed further down Wilhelm streett, we can see “Lothar –Meyer Bau”. The name of the building commemorates the work of Lothar Meyer. He found a periodic property of elements using atomic volume.

Next, we see “Hegelbau” (Fig. 32). Hegel was a philosopher and he spent his student days in Tübingen with Hölderlin and F. W. Schelling. He is famous for his idealistic philosophy (Fig. 33). The building name is dedicated to Hegel. He obtained chairs at Jena, Heidelberg and Berlin.



Fig. 32. And as we proceed further, we can find “Hegel-Bau” which commemorates the works done by Georg Wilhelm Friedrich Hegel (1771-1831).



Fig. 33. Geolg Wilhelm Friedrich Hegel, 1770- 1831 (Philosoper, stamp issued 1970 by DDR).

Memorial Stone of L. Meyer

In the woods near by “Max Planck Institute für Biology” at the eastend of “Spemannstrasse”, there stands a memorial for university staff who died during the war. In the same woods, there stands a memorial stone of L. Meyer (1814-1878) (Fig. 34). The stone is difficult to find, because of the heavy bushes. Letters on the stone are simple and painted in red as follows: “Zum Andenken an Professor Lothar Meyer 1895.



Fig. 34. The east end of “Spemann Street” near the Max Plank Institute of Biology, there is a memorial for the university persons who died during the war. Near the memorial, the memorial stone of Lothar Meyer’s is in the woods. The words engraved on the stone are simple. 「Zum Andenken an Professor Lothar Meyer 1895」. It is difficult to find the Meyer’s memorial stone, because of the woods.



Fig. 35. Johannes Kepler (1571-1630) was born in Weil der Stadt near Stuttgart. He is a mathematician and astronomer. In other words, he is a founder of mathematical astronomy. His astronomy is heliocentric. He formulated three laws of planetary movement, but his view of the world is a mixture of the modern and the middle ages.

Dean’s Office

I visited the Dean’s office of “Mathematics and Natural Science” (Fakultät für Mthematik und Naturwissenschaft) to take pictures of scientists in his office. The Dean was not present, but I had received permission to take pictures beforehand. The portraits in the office were as follows:

- 1) Johannes Kepler (Astronomer, 1571-1630)
- 2) Adolf Strecker (Chemist, 1822-1871)
- 3) Julius Robert Mayer (Physician and Physicist, 1814-1878)

J. Kepler (Fig. 35) is an astronomer. After studying mathematics and astronomy at Tübingen, he moved to various places in search of a solid position, which was difficult in the days of “30 Years War” in Germany. He accomplishments include the discovery of the famous three laws of planetary movement. He is an interesting person in the history of science, because his view of the world overlaps that of both the modern and middle age.

A. Strecker (Fig. 36) studied chemistry at Giessen and obtained a chair at a military college in Norway, then in Tübingen and Würzburg. Beautiful oil painting of A. Strecker was in the Deans office. The “Strecker reaction” for amino acid synthesis is familiar to the author, and was particularly memorable.



Fig. 36. An Adolf Strecker’s (1822-1871) oil painted portrait is on the wall. Some of Strecker’s Work is closely related to the author’s interest. The famous work he has done is amino acid synthesis from aldehyde, ammonia and hydrogen cyanide. The method is called “Strecker Synthesis of Amino acids”. He moved to Würzburg and died there. His grave is in the Haupt Friedhof in Würzburg.

J. R. Mayer (Fig. 37) was originally a physician. He was educated Medicine at the university of Tübingen, and later became interested in physics. In the year 1842, he proposed “Mechanical equivalence of Heat” and also the “Conservation of Energy”. These are among the most fundamental laws in nature, but he had difficulty publish those findings. J. Liebig accepted the article for publication on his Journal. However, both articles were not accepted in the academic society. “Mechanical Equivalence of Heat” was considered to be Joule’s work. In addition, the “Conservation of Energy” was thought to be the finding of Hermann Helmholtz. Moreover his theory on the generation of heat in the sun was thought to be the idea of Helmholtz and Lord Kelvin. All of the new ideas he proposed were regarded as other man’s work. In 1849, he tried to commit suicide and he jumped out from the 2nd floor, but he was survived and sent to the mental hospital (1851). However, in the beginning of 1860’s, the originality of Mayer’s finding began to be appreciated before his death. After his sad experiences, he lived quietly until his death.

One interesting thing in the Deans office is a congratulatory address from the President of Tokyo University (Dr. Seiji Kaya) to the President of the University of Tübingen. The address was written in Japanese by brush and ink in the year 1963, which was the year of 100th anniversary of the establishment of the new faculty in Tübingen (Fig. 38).



Fig. 37. Julius Robert Mayer (1814-1878) was originally a physician. Later he was interested in physics. He was a founder of the concept of “work equivalence of heat” and “conservation of energy”. However, his view was not accepted in the academic society, committed suicide, but survived and sent to mental hospital. After 1860, his theory was gradually accepted and he received international honor. It was said that his mental conditions never recovered.



Fig. 38. Showa 38th year in Japanese calendar corresponds to the year 1963. This year was the 100th year that the University of Tübingen reformed the old university system and establish “the Faculty of Mathematics and Natural Sciences”. The congratulatory address written with brush and ink in Japanese was sent to the president of the university of the Tübingen from Dr. Seiji Kaya, president of Tokyo University. The photograph is the congratulatory address from Dr. Kaya.

Scientists in Tübingen

Since the reorganization of the old university system in 1863, scientific branches were reformed and unified under the name of the Faculty of “Mathematics and Natural Science” (Mathematisch

Naturwissenschaftliche Fakultät) (Fig. 39). The faculty was composed of seven branches of scientific areas. These are as follows:

Mathematisch- Naturwissenschaftliche Fakultät

- 1) Mathematics
- 2) Physics, Astronomy
- 3) Geology, Mineralogy, Paleontology
- 4) Chemistry, Physical Chemistry, Physiological Chemistry Pharmacology
- 5) Botany
- 6) Zoology
- 7) Geography



Fig. 39. In the year 1963, a small booklet entitled “Hundert Jahre, Mathematisch-naturwissenschaftliche Fakultät der Eberhard-Karls-Universität zu Tübingen” was published. The cover of the booklet shows the system change from 1863 to 1963 in figure. All branches of natural sciences were classified as independent territories from the old “philosophy” in the Middle Ages.

During the past one hundred years many famous scholars appeared in Tübingen especially from the University. Some of the scientists are shown below.

Friedrich Paschen (1865-1940) was a professor of physics who found spectral series of hydrogen atom (1908) (Fig. 40). This finding became the foundation for the establishment of the modern physics in the beginning of the 20th century.



Fig. 40. Physicist Friedrich Paschen (1865-1940) found spectral series of hydrogen atom.

Hans Geiger (1882-1945) was a professor of physics (Fig. 41). He devised a sensitive instrument to detect radioactivity, the Geiger counter.



Fig. 41. Physicist Hans Geiger (1882-1945) made counter for radio-activity.

Walther Kossel (1888-1956) was a professor of physics and he is famous for his theory of the chemical bond (Octet Rule) which was also proposed independently by American scientist Gilbert Lewis (1875-1946) at the same time (Fig. 42). Walther is a son of Albrecht Kossel (1853-1927) who found a group of physiological compound “Nuclein”. The grave of Albrecht and Walther are in the Wald Friedhof, Heidelberg.



Fig. 42. Physicist Walther Kossel (1888-1956) proposed “Octed Rule for chemical bounding.

Paul Walden (1863-1957) was a professor of organic and physical chemistry, and he was interested in the history of chemistry.

He was an orphan, earned money as a home teacher, and he graduated from “Riga Technical College”. After graduation, he engaged in physicochemical and stereochemical research. In 1895 he found the “Walden Inversion”. The terminology of the reaction is due to Emil Fischer (1852-1919) who was a founder of stereochemistry of organic compound. He obtained a chair of professor as chemistry in Riga. In the year 1919 he became president of the newly established “Latvia University”, however, because of the social turmoil in his country, he fled to Germany, and took a seat as professor of chemistry at Rostock University. After retirement he devoted his time to the study of chemical history.

Since he was neither German nor Russian, he could not receive any pension, and have to continue to teach for a long time. The picture of P. Walden was taken in the occasion of his memorial lecture in his retirement at the age 90 years old (Fig. 43).

The name reaction founded by P. Walden is an important stereochemical reaction, and is related to the

inversion of configuration of chiral organic compounds. Shown below is the reaction of a chiral organic compound () with alkali to form compound () via intermediate structure (). In this reaction, the configuration () is converted to (), just like left handed structure () is converted to right handed structure (). This structure change is called (Walden) inversion, and this type of substitution reaction is now called S_N2 reaction. S_N2 means that the reaction is Substitution reaction, nucleophilic and bimolecular.



Fig. 43. Chemist Paul Walden (1863-1957) found inversion of configuration in the substitution reaction of chiral organic compounds. The inversion of configuration is called “Walden Inversion”. He lectured in the University until his age reach 90 years old.

Ernst Felix Hoppe-Seyler (1825-1895) was a founder of modern physiological chemistry (Fig. 44). He was an orphan, and was brought up by his brother-in-law (Dr. Seyler), and he called himself “Hoppe-Seyler” in his later years. He studied in Halle, Leipzig and Berlin. He became medical doctor and practiced for short time. At the same time, he started research in Rudolf Virchow’s (1821-1902) laboratory. He published the great handbook “Handbuch der physiologish und pathologischen Analyse” (1861-1872). He became a professor at Tübingen, however, he was called from newly germanized University of Strasburg as a professor of physiological chemistry, where he

remained there until his death.

His working area was wide, and covered almost all area of physiological chemistry. He was interested in red pigment in blood, and the reaction with carbon monoxide, analysis of milk and urine, formation of dolomite (a mineral) etc. He wanted to establish physiological chemistry with an academic discipline. For this reason, he tried to establish comprehensive analytical methods on the basis of physics, chemistry and medicine. The first physiological Journal “Zeitschrift für Physiologische Chemie” was published in 1877. The Journal is often called “Hoppe-Seyler”.



Fig. 44. Chemist Ernst Felix Hoppe-Seyler (1825-1895) is a founder of physiological chemistry and published first journal of physiological chemistry (Zeitschrift für physiologische Chemie).

Eduart Buchner (1860-1917) was born in München as a son of professor of medicine. He studied chemistry under Adolf Baeyer (1835-1917), and botany under Karl Wilhelm Nageli (1817-1891). His elder brother, Hans Buchner, (1850-1902), was a bacteriologist. Eduarat’s most important contribution to science is in enzymology. It was believed that fermentation reaction proceed in the presence of live yeast cell by the action of vital force. Buchner wondered whether the fermentation required live yeast cell or not. He ground yeast cells with sand and

attempted alcoholic fermentation with sugar. Buchner found that fermentation proceeded without live yeast cell. Therefore fermentation is not the results of the vital force of the living yeast cell. This simple experiment damaged considerably the vitalistic interpretation of fermentation. Buchner received the Nobel Prize in 1907. Buchner died in the Rumanian front during the 1st World War. He was the first and the last Noble Prize Winner to die in the battle field.

Adolf Friedrich Johann Butenandt (1903-1990) studied at Marburg and Göttingen (Fig. 45). He was a pupil of Adof Windaus (1876-1959, Steroid chemist) in Göttingen. He obtained chairs at Danzig, Tübingen, Berlin and München and he became a director of Kaiser Wilhelm Institute and later the Max Plank Institute Biochemistry in 1936-1960.

He isolated human female hormone (Estron, 1929), and male hormone (Androsteron, 1931) and other human sexual hormones. He also synthesized Teststeron (1935). He was awarded the Nobel Prize in 1939, but could not actually receive the prize until 1949 because of political pressure from the Nazi.



Fig. 45. A.F. J. Butenondt (1903-1990) isolated human femal and male hormon and synthesized female hormone.

Famous Persons buried in the Tübingen Friedhoh

Famous persons were buried in the Stadtfriedhof (city cemetery) Tübingen. They are as follows:

Johann Christian Hölderlin (1770-1843, poet) (Fig. 46)

Johann Ludwig Uhland (1787-1862, poet, linguist)
(Fig. 47)

Eduart Spranger (1882-1963, philosopher) (Fig. 48)

Lother Meyer (1830-1895, chemist) (Fig. 49)

Paul Walden (chemist, 1863-1957) was buried in the
Waldfriedhof, Tübingen with his family(Fig. 50).



Fig. 46. Johann Christian Hölderlin's (1770-1843, poet) gravestone is light brown sandstone. His name, birth and death dates are engraved on the gravestone. The grave looks new and may have been rebuilt in the late years. Deep red flowers were in bloom around the gravestone.



Fig. 47. Johann Ludwig Uhland (1787-1862, poet) was born in Tübingen, taught, studied and died here in Tübingen. He was a multitalented intellectual and he was popular in this area. I remember that there is "Uhland Strace" in the Berlin Mitte.



Fig. 48. Eduart Spranger (1882-1963) was a famous philosopher, psychologist and pedagogue. His gravestone is light brown sandstone. He and his wife's names, birth and death dates are recorded on the stone. In the lower part of the gravestone, a cross is engraved. I remember that there is a Spranger's Gedenktafel in Dahlem, Berlin.



Fig. 49. Lothar Meyer's (180-1895, Chemist) gravestone is a modified large natural stone. Meyer's full name, birth and death date are recorded by the black metallic letter. He found periodic property of elements using atomic volume.



Fig. 50. Paul Walden (1863-1957, chemist) is Latvian. He lost his native the world war. He was a foreigner in Germany and could not receive pension for everyday life. He worked in the University until his late years. The photograph was taken at his memorial lecture when he resigned at 90 years old. The "Walden Inversion" is important for the chemical reaction of chiral organic compounds. In his later year he studied history of chemistry and published some historical books.