

Ejvind Slottved and Ditlev Tamm

THE UNIVERSITY OF COPENHAGEN

A Danish centre of learning since 1479

FREDERICUS SEXTUS
INSTAURAVIT A M D C C C X X V I I



COELESTEM ADSPICIT LUCEM

1. University of Copenhagen, 1479
2. Aarhus University, 1928
3. University of Southern Denmark, 1966
4. Roskilde University, 1972
5. Aalborg University, 1974
6. University of the Faroe Islands, 1960
7. University of Greenland, 1989
8. University of Iceland, 1911
9. Christian-Albrechts Universität zu Kiel, 1665
10. Uppsala University, 1477
11. Lund University, 1665
12. University of Stockholm, 1877
13. University of Gothenburg, 1891
14. Umeå University, 1965
15. University of Oslo, 1811
16. University of Bergen, 1948
17. University of Trondheim, 1968
18. University of Tromsø, 1968
19. University of Helsinki, 1828 (1640)
20. University of Åbo, (1640) 1918
21. University of Jyväskylä, 1966 (1863)
22. University of Joensuu, 1966
23. Rovaniemi University, 1996



- A. Scania, Halland (1645) and Blekinge (to Sweden in 1658)
- B. The Duchies of Schleswig and Holstein (to Prussia and Austria in 1864)



The University of Copenhagen

UNIVERSITY OF
COPENHAGEN



Ejvind Slottved and Ditlev Tamm

The University of Copenhagen

A Danish centre of learning since 1479

COPENHAGEN 2009

The University of Copenhagen
A Danish centre of learning since 1479

© 2009 by Ejvind Slottved and Ditlev Tamm, University of Copenhagen

The authors wish to express their gratitude to Associate Professor, mag. art.
Thorkil Damsgaard Olsen whose manuscript served as the basis for Chapter 19 and to
Finn Aaserud, Director of the Niels Bohr Archive, whose manuscript served
as the basis for Chapter 22.

English translations: Tam McTurk, Translation Centre, University of Copenhagen
English editor: Cay Dollerup

Cover design, graphic layout and typesetting: Birger Gregers mDD
Set in Minion and Univers

Printed by Hendriksens Eftf.
Printed in Denmark 2009
1st edition, 1st printing

ISBN: 978-87-90655-64-8

Produced for
The University of Copenhagen
Nørregade 10,
DK-1017 København K

Contents

1	Peregrinationes Academicae	9
2	The foundation of the Copenhagen University	13
3	Reformation and University	17
4	Tycho Brahe	29
5	Academic dynasties	37
6	A cabinet of specimens	47
7	Absolutism and the “Learned Republic”	51
8	Steno	61
9	Ole Rømer	67
10	Saving the Icelandic Sagas	71
11	Doctors and surgeons	77
12	Danish Enlightenment	87
13	The University of the “Golden Age”	99
14	Constructing the University Campus in the 19 th century	107
15	H. C. Ørsted	113
16	The new democracy and the University	119
17	Women and the University	127
18	The University and the Royal Academy	131
19	Vilhelm Thomsen and comparative linguistics	143
20	Arctic studies	149

21	August Krogh, Nobel Prizes and the University	159
22	Niels Bohr and his Institute	167
23	The University during World War II	177
24	1968	185
25	The University today	195
	Illustrations and quotations	201
	Selected bibliography	213
	Index of names	217

Maps:

Denmark and surrounding countries

University buildings in central Copenhagen

In 2009, the University of Copenhagen has been in existence for 530 years. The University was founded in 1479 as a small ecclesiastical establishment. Today it is one of the largest organisations in Denmark, as well as the most important Danish centre of learning.

The history of the University of Copenhagen was written in 15 volumes in the years up to and following its 500th anniversary in 1979. In the present volume, the history of the University and its impact upon Danish learning is presented in a briefer version, aimed at foreign scholars who might wonder what is particular for a national university located in the capital of a small Northern European country.

The story is told in 25 brief chapters, each aiming at presenting a specific feature, a prominent scholar or an important field of research undertaken by the University.

Universities in principle are universal, but they all have their own unique history linked with their geographical position and the people who over the years have made up the university.

January 2009

Ejvind Slottved

Ditlev Tamm



Important European universities up till around 1500. After the foundation of the Universities of Bologna, Paris and Oxford around 1100, universities proliferated across Europe throughout the Middle Ages. These universities were inter-

national, using Latin for teaching and sharing a common curriculum. Bologna was famous for law and Montpellier and Padua for medicine. A great deal of travelling took place between universities. Students from countries without universi-

ties, e.g., Denmark and Norway, had to study abroad. This map features particular important European universities and those popular with Nordic students.

Founded in 1479, the University of Copenhagen was the only university in Denmark for more than four centuries, a period during which the nation's territory and borders changed significantly. At the time the University was founded, what is now southern Sweden was a part of Denmark. From 1380 to 1814, Denmark was in union with Norway. In 1460, the Danish King inherited the title of Duke of Schleswig and Holstein, making him the ruler over a part of what is now northern Germany. Situated in the Danish capital, the University of Copenhagen was the seat of higher learning to which students would flock from different parts of the monarchy.

Prior to the founding of the University of Copenhagen, Danes and Norwegians who wished to pursue academic studies had to go abroad on so-called *peregrinationes academicæ* to foreign universities. Although Denmark's major monasteries and cathedrals, such as those in Lund, Roskilde and Odense, maintained centres of learning, they did not offer a full university education. In medieval universities, all of the instruction was in Latin, which was the common language of political, clerical and scholarly communication in medieval Europe. The universities also shared a common curriculum and were thus international.



Students in Bologna, 1346. The University of Bologna was held in great respect, especially for its law graduates. The relief on Bonifacio Galluzzi's tomb from 1346 (by sculptor Bettino da Bologna) depicts a legal scholar interpreting a text for six diligent, note-taking students.



Sixtus IV's papal bull of 19 June 1475. The most important outcome of King Christian I and Queen Dorothea's Journey to Italy in 1474-75 was Pope Sixtus IV's papal bull of 19 June 1475, which granted permission to establish a university in Denmark. Although the King attracted attention at the Papal Court because of his impressive stature, his poor Latin elicited a sardonic comment from one cardinal: "A beautiful animal, such a shame it cannot speak" ("*pulchra bestia, si non careret loquela*").

Several seats of learning situated in other countries were popular with Danes in the Middle Ages, including the University of Bologna, said to be founded in 1088 and famous for its legal studies. Since the 12th century, the University of Paris attracted so many Danes that a special college was set up to cater for them. The stream of Nordic students travelling to Paris gradually dried up in the late 14th century.

After the foundation of universities in northern Europe, Nordic students, most of them Danes, would attend one of the many German universities established in the late 14th and early 15th centuries. 1600 Danes are known to have been matriculated at German universities in the years from 1451 to 1535, half of them in nearby Rostock. However, only a few of them earned a Master's degree, and even fewer undertook studies at one of the "higher" Faculties of Theology, Law or Medicine. Aca-

demical studies often involved an expensive overseas stay lasting several years, which made these studies very much the preserve of the sons of prominent families. However, some students outside of these circles were able to pursue their studies with support from the Church or the King as tutors of the richer students.

Following the establishment of universities in Rostock and Greifswald in northern Germany, the Danish sovereign was inspired to establish a university in Denmark. In 1419, the Pope granted the Danish King, Erik of Pomerania, permission to do just that – but for reasons that remain unclear, the King's plan failed to come to fruition.

The plans were only carried through following a royal journey that was undertaken by King Christian I who visited the Pope in Rome in 1474-75. The visit followed some of the high points of his reign: he had re-established the “Nordic Union” (comprising Denmark, Norway and Sweden, the so-called Kalmar Union) in 1457, and in 1460 he had become the Duke of Schleswig and Holstein. Politically, the visit was a great success – one important outcome was that Pope Sixtus IV issued a papal bull in 1475 granting permission to establish a Danish university.



Christian I's stay in Italy is noteworthy because he was depicted at several points during his travels, making him the first Danish king whose appearance was accurately recorded. A 1474 fresco by Andrea Mantegna features the Gonzaga family at their castle in Mantua. Christian I is supposed to be the person standing in the background wearing a low, flat hat.



Bartolomeo Melioli made two medals featuring portraits of Christian I, when the Danish King was visiting his brother-in-law in Mantua, Italy, in 1474. The first medal features a half-length portrait of the King wearing a breastplate. The Latin legend reads “Christian, King of Denmark, to whom God and the sword have subjected three kingdoms, travelled thus to Rome in the third year of the pontificate of Pope Sixtus IV.”



The inauguration of the University of Copenhagen in the collegiate Church of Our Lady, 1 June 1479. This historical picture painted in the 19th century by Wilhelm Marstrand is a part of the decoration of the University of Copenhagen's Ceremonial Hall. Following the ecclesias-

tical part of the ceremony, Oluf Mortensen, the University Chancellor and Bishop of Zealand, introduces the professors to King Christian I. Holding the manuscript for the Latin speech he has just delivered, Peder Albertsen approaches the King, who nominates him as the Universi-

ty's Vice Chancellor. The man in the violet cape is a professor of canon law and the first Dean of the Faculty of Law. Behind him is the University's first Rector Jesper Henriksen, and Petrus David de Scotia, the first Dean of the Faculty of Philosophy.

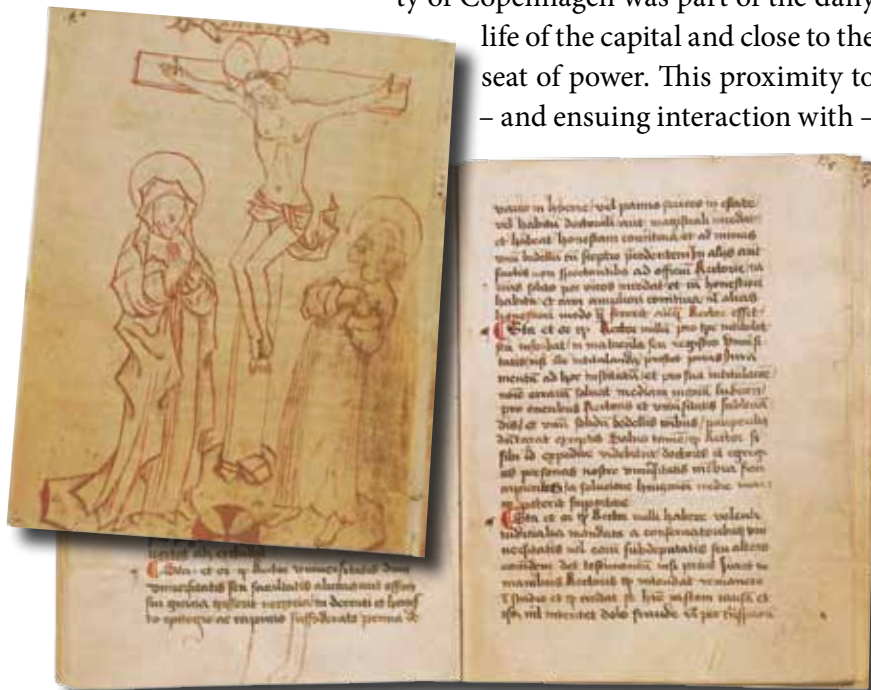
The foundation of the Copenhagen University

2

The University of Copenhagen was officially inaugurated at a ceremony in the Copenhagen Cathedral on 1 June 1479. Many prominent European medieval universities, such as Oxford and Cambridge in England, and Uppsala in Sweden, dominated the small towns in which they were located. Denmark, however, like France, placed its most prestigious seat of learning at the very heart of the realm.

The papal bull did not stipulate a specific location, but Copenhagen's status as the capital city made it the obvious choice. The presence of a small Chapter at the main church, comprising eight canons and a dean, also weighed in the city's favour, as it provided an organisational and financial basis for the new entity. From its very inception, the University of Copenhagen was part of the daily

life of the capital and close to the seat of power. This proximity to – and ensuing interaction with –



The University Statutes. The legal basis for the University of Copenhagen is laid down by four documents: a Royal Licence, dated 4 October 1478, in which the new university is accorded its privileges; a letter of 18 October 1478, in which the Archbishop of Lund gives his consent to the establishment of the new university and formally confirms that it will be situated in Copenhagen; an open letter from the Bishop of Roskilde, dated 4 November 1478, in which, in his capacity as the University's Chancellor, he also consents to the establishment of the University and extends his protection to its doctors, masters and other members; and finally, the Statutes sent to the University on 28 November 1479 by the Archbishop of Lund. The Statutes set out detailed regulations for life at the University. Article 6, concerning the Rector's appearances outside of the University, is typical:

We decide and ordain that, when conducting the business of the University, of any faculty or of his own office, the Rector shall dress in a proper and distinguished manner, bearing a fur hood in winter and silken cloth in summer or the doctoral or Master's dress. He shall be accompanied by a fitting entourage and at least one ceremonial official shall precede him bearing a staff. In matters not connected with his office, the Rector shall venture forth into the streets less often than was previously his wont, shall wear dignified clothes, be accompanied by a larger retinue and comport himself in a more dignified manner than prior to his appointment.



The University of Cologne Seal and the University of Copenhagen Seal. Although the papal bull of 1475 stipulated that the University of Copenhagen was to be modelled on the University of Bologna, it was in fact based on the University of Cologne. The similarities between the two universities' seals are immediately evident: the Cologne Seal features the three magi (Cologne's patron saints) under a three-winged canopy, while the Copenhagen Seal depicts St. Peter holding the keys to Heaven and Earth beneath a similar canopy. The lettering on the two seals is also similar.



the nation's rulers would determine the future shape and eventual history of the University.

Before the inauguration, Christian I had entrusted a royal official, Peder Albertsen, with the practical aspects of running the University, including the appointment of professors. Albertsen had studied abroad, primarily in Cologne, Germany, where he earned his Master's degree in 1474, and later became a Licentiate of Medicine. The structure of the University of Copenhagen therefore was largely based on the University of Cologne – indeed, 52 of the 61 regulations in the Cologne statutes were replicated in Copenhagen – and Albertsen recruited key members of staff from Cologne as well.

Albertsen returned from Cologne in May 1479, accompanied by a group of prospective lecturers, including a Scot, a Dutchman and two Germans. A couple of Danish lecturers were recruited too, including the University's first Rector, Jesper Henriksen, who also served as the Dean of the Chapter at the main church.

In accordance with the papal bull, the University was divided into the four traditional faculties: Theology, Law, Medicine and the lower-ranking Arts (or Philosophy). Students in the Faculty of Arts would concentrate on the humanities and natural sciences as a prelude to their studies in one of the "higher" faculties. The University was granted the right to confer internationally the following academic degrees: bachelor, licentiate, master's and doctorate.

The University remained a modest-sized institution until the Lutheran Reformation some 50 years later, with a total of probably 40-60 students, and approximately only ten new students per annum. The oldest records have been lost, but we know that during the inauguration ceremony, the Rector matriculated the King and Queen of Denmark, bishops and other clerical dignitaries, lecturers and chancellors, prominent nobility and finally "students from Denmark, Norway, Iceland, Germany and the Netherlands", in all a total of 80 people.

The founding of the University of Copenhagen did not reduce the number of Danish students who travelled and studied at foreign universities. In 1498, the King banned students from travelling abroad until they had completed three years of study in Copenhagen, but to little avail. In the 1520s, Christian II considered forbidding people who had not earned a bachelor degree from studying abroad. However, the plan to impose fines on them was never implemented.

One main reason behind the establishment of the University of Copenhagen may have been the increasing need the royal and ecclesiastical administrations had for trained civil servants. As a result, the Faculty of Law was probably the most active faculty. Its early history is known from the preserved statutes and addenda. Like the University, the Faculty of Law and its Statutes followed the Cologne model.

The Faculty of Law was set up for studying both canon law (church law) and Roman law. The two legal systems, according to the Statutes, were based upon “knowledge of what is good and just, the most valuable knowledge of all”. They promote justice and peace, and also contribute to “keeping selfish impulses within the boundaries of the law”.

The Statutes envisaged licentiate or doctoral degrees in either canon or Roman law. Teaching was

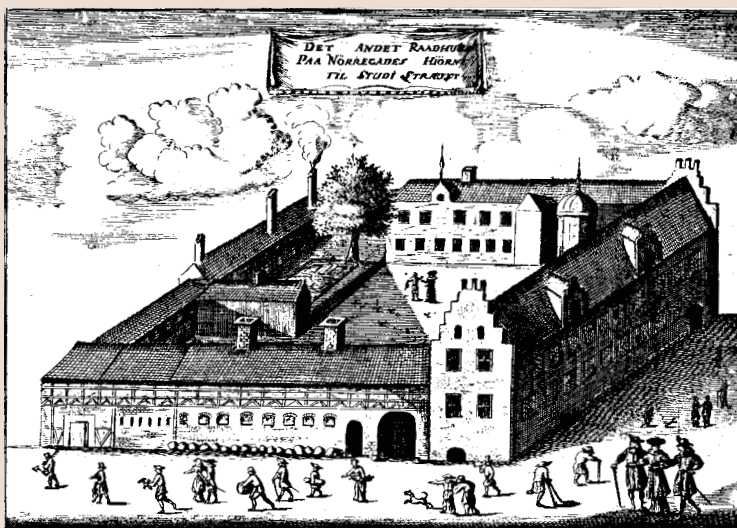
to be based on a main lecture between six and seven in the morning, and two main lectures in the afternoon. The bachelor and licentiate degrees were conferred after 3½ and 2½ years, respectively. Doctorates were presented at a ceremonial lecture. The programme complied with the common European standards, and focused on “the articles that are most relevant and best serve a practical purpose”.

It is not known whether it actually proved possible to implement the full, ambitious programme of studies stipulated in the Statutes. The total number of students in the Faculty is also unknown. All that is known for sure is that three students earned doctorate degrees, three students were awarded the licentiate degree and six students earned bachelor degrees.

Buildings and finances

Around 1500, the Danish royal family resided at Copenhagen Castle. The Bishop’s residence and the University were located in the district around the Cathedral, later known as the Latin Quarter. The city administration was located on “Gammeltorv”, between the Castle and the University.

The University was not provided with sufficient financial endowments. The Cathedral Chapter had to fund many of its activities. This is probably why Jesper Henriksen, Dean of the Chapter, was the obvious choice to be the first Rector of the University. In the period prior to the Lutheran Reformation, the University gradually acquired a small number of urban and rural properties, as well as four village churches – but even so, the resources at its disposal fell short of what was needed to support academic activity.



The first University building. Medieval Copenhagen revolved around the main church. The canons from the Chapter lived in the neighbourhood to the east of the church. The street names still bear

witness to this. This was the city’s political, ecclesiastical and cultural centre, home to the City Hall, the University and the church.



Reformation and University

3

The Lutheran Reformation in Denmark, in 1536, led to a major shift in the University of Copenhagen's function and position in society, as it was now to serve the state rather than just the Church. In order to fulfil the University's new purpose of training teachers and ministers, it needed to recruit suitably qualified professors. As the majority of professors at the University were Danes, those seeking employment at the University of Copenhagen were required to spend a significant period of time studying abroad. Once established, this tradition was to last for more than two centuries.

Following a civil war between Lutherans and Catholics, the Lutheran Reformation began in Denmark in 1536, when an assembly of prominent Danes legalised the schism with Rome and the establishment of a national Church. The strong personal beliefs of the new king Christian III, led to the Danish Church becoming a royal institution. The University, which had virtually ceased to exist, was reorganised to serve the new Church.

The Reformation in Denmark did not sever the ties between the University and the Church, but the nature of their relationship did change.



University of Copenhagen seal 1537

As part of its reorganisation, the University and the four faculties were all given new seals. The five seals follow the same basic template: an allegorical figure above elements of the Danish national coat of arms, with the two parts separated by the royal crown. At the top of the main University Seal is the symbol of power: the King with his crown, sceptre and orb. At the bottom are the three Danish lions and the Norwegian lion (cut in half for compositional reasons), flanked by the year 1537 and the legend "Seal of the University of Copenhagen, resurrected by King Christian III".



The picture shows Hans Tausen protecting the Bishop of Sealand, Joachim Rønnow, from Copenhagen citizens. This historical picture painted in the 19th century by Carl Bloch is a part of the decoration of the University of Copenhagen's Ceremonial Hall. King Frederik I had protected the Lutheran preachers. After the King's death in 1533, Joachim Rønnow banished the leading Lutheran preacher Hans Tausen from his diocese, subjected him to censorship and banned him from preaching. The Reformation enjoyed popular support in the main Danish towns, so the treatment meted out to Tausen fuelled riots against the Bishop in Copenhagen. The picture shows the dramatic moment when Tausen escorted the Bishop home to protect him from the enraged citizenry, and thus depicts the magnanimity of the coming leaders of the Danish church.



Martin Luther (1483-1546), one of the most influential figures in the history of Christianity, 1505 became an Augustine Monk, and in 1512 he was awarded a doctorate in theology and became a professor at the University of Wittenberg. Holding that the Bible was the only infallible source of religious doctrine, Luther challenged both the spiritual authority of the Pope and the executive authority of the Emperor at a meeting in Worms, Germany, in 1521. He was subsequently excommunicated from the Roman Catholic Church. Luther and the other reformers established and shaped the denomination that would bear his name.



Fresco painting of Philipp Melanchthon (1497-1560) in Åsted Church, Viborg Diocese. Philipp Melanchthon called for a reform of teaching practices in line with humanist principles, advocating an in-depth and broad education in which humanistic studies played a major role. The new ideal combined biblical theology with humanistic scholarship. The ideas of Luther and Melanchthon were incorporated into the Statutes of the University of Wittenberg in 1536, and in the centuries to come exerted major influence on other Lutheran universities, including the University of Copenhagen. The Danish government tried – unsuccessfully – to persuade Melanchthon to come to Copenhagen. Instead, Luther's confidant Johann Bugenhagen served as advisor during the introduction of the new church system and university reforms.

Unlike Roman Catholicism, Lutheranism did not welcome devotion to images in churches. Luther distanced himself in particular from images of saints, but this did not exclude others from painting the Reformers. In Wittenberg, Cranach painted Luther, Melanchthon and Bugenhagen. This custom spread to Denmark, as evidenced by this fresco painting of Philipp Melanchthon.

The University's new role was to help establish the "Christian state" in which the word of God, the Gospel, could be preached and accepted freely.

Luther's concept of the "Christian state" made a clear distinction between the spiritual and temporal regimes. In the spiritual regime, God rules through the Gospel, which the people must accept of their own free will. The temporal regime is controlled by an authority whose power is granted by God; its duty is to do whatever is necessary in order for



Christian III (1503-1559) met Luther in 1521 at the Church meeting in Worms, an encounter that was to have a lasting impact on the King. As King, Christian later corresponded with and supported Luther and the other Reformers in Wittenberg right up until his death. Charged with re-organising the University in the aftermath of the civil war of 1533-1536, he considered it only natural to summon a teacher from Wittenberg to help implement the reforms. His correspondence with the Reformers and with Martin Luther reveals a deep interest in theology. This was also reflected in the reformed University, where the dominant faculty especially was Theology. Christian III was sceptical about the usefulness of legal studies, a fact reflected in the minor role assigned to the Faculty of Law in the University Charter. This engraving is from 1535, immediately before Christian III was charged with the responsibility of overseeing one of the most comprehensive social changes in Danish history.

the spiritual regime to flourish. This duty extends to practical matters such as the administration of the Church and education.

The reform of the University followed the teaching programme laid down by Martin Luther in the early 1520s, which emphasised the importance of Bible studies, the Church fathers, Hebrew, Greek, Latin and



The four Faculty Seals 1537.

Shaped like medieval clerical seals, the seals of the four faculties feature the following elements:

Theology: At the top is a crown over a dove sitting on a book, symbolising God, the Holy Spirit and the Bible. Below the crown is the Norwegian national coat of arms.

Law: The sceptre and sword at the top symbolise power and the law respectively. The lower part features the Wendish wyvern.

Medicine: At the top, a hand from Heaven points to a bouquet of herbal remedies. Below is the lion of the Goths from the Danish national coat of arms (which is halved, possibly to match the University's Seal).

Philosophy: A naked man lies holding in his hands a book and a globe, symbolising scholarship and the natural sciences. Below the crown is probably the cross from the Danish flag.

Together, these seals illustrate the close links between the state, the Crown and the University.



Johann Bugenhagen (1485-1558) came to Wittenberg in 1521, where he became a parish priest and a professor of theology. He was an emissary for Luther in the Nordic Countries, and organised the Lutheran Church in Denmark, Norway, the duchies of Schleswig and Holstein, and in a number of German towns.

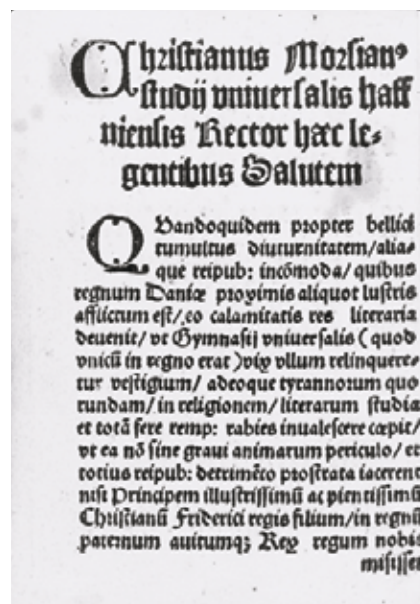
history. The properties and income seized from the Roman Catholic bishops were used to fund a solid educational system that would ensure a steady supply of qualified teachers for grammar schools and ministers for Danish parishes. The University itself was reorganised for the purpose of training ministers, which remained its focus for the next two centuries and made it an integral part of the Danish state building.

The University of Copenhagen had come to a standstill during the civil war in the 1530s, but resumed its activities in the spring of 1537. At first, it operated in the Church of Our Lady, but an extensive reform programme quickly improved matters. The reforms concluded in June 1539 with the publication of a new University Charter, which remained in force until 1732.

Once a secure financial basis was established and the physical infrastructure was in place, the Copenhagen Chapter and its assets were transferred to the University. The canons' houses were handed over to the professors. A significant amount of land and property also passed to the University, and later monarchs bequeathed yet more land. These and other sources of income provided the University with a solid foun-



Christian Morsing study catalogue. Christian Morsing (-1554) who had been a professor at the University of Copenhagen during its Roman Catholic period, retained his position after 1536 and became the first post-Reformation Rector. In



1537, he published a booklet containing descriptions of the syllabi for the subjects taught at the University, as well as regulations for professors' conduct. The book concludes with a note that teaching was to begin on 28 October 1538.



The University Charter 1539. After the Reformation, the University became part of the state apparatus, and was no more an independent Church institution. Just as with other important legislation, it was the rulers of the country – i.e., the King and his Council – who drew up the new Charter. The Charter is a large parchment, certified with Christian III's majestic seal as well as the seals of the council members.

Peder Palladius (1503-1560) matriculated at the university in Wittenberg in 1531, and obtained his Master's degree in 1533. The Reformers recommended Palladius to Christian III. As a result, the King waived the large fees associated with the theology doctorate, which Palladius obtained in 1537. In the same year, he was ordained as one of the new Protestant bishops by Johann Bugenhagen, in a ceremony held in Copenhagen Cathedral. As Bishop of Sealand and Professor of Theology at the University, Palladius became the leading figure in the established Church. He wrote numerous books and pamphlets, the best known being his "Book of Inspections", in which he sums up his experiences of visiting more than 300 parishes. As well as presenting a record of Church activities, the book also provides remarkable insights into daily life in the 16th century in rural Danish parishes.



Konsistoriehuset ("The Senate House"), c. 1420, is the oldest preserved building in central Copenhagen. It was once part of the Copenhagen residence of the Roman Catholic Bishop and may have served as the Bishop's private quarters. The Academic Senate has held its meetings in this building since 1563.

dation for its activities over the following centuries. The University also took over the bishop's residence opposite the Cathedral, which remained the main seat of University activities until the early 20th century.

The University still comprised the four traditional faculties, but the number of permanent chairs was now 15, a number that did not change significantly until the late 18th century.

The relative importance of the different faculties is reflected in the professorial salaries set in 1537: professors in the Faculty of Theology were paid twice as much as professors of philosophy, while the remuneration of law and medicine professors was somewhere in between the two.

Ten out of the first 14 professors at the University in the Lutheran era were of Danish origin. The chair briefly occupied by Bugenhagen was taken over by a Dane. Only two of the post-1537 professors had worked at the Catholic University, yet one became the first post-Reformation Rector.



“Wittenberg is widely acclaimed for the study of the three ancient languages, Latin, Greek and Hebrew,” wrote Henrik Smith of Malmoe in 1519. In the 16th century, the town of Wittenberg in Saxony, Germany, became the centre of the Reformation. A large number of Danes converged upon it to study theology and other subjects. In the period 1502-1559, 301 students from Denmark, Norway and Schleswig-Holstein went to Wittenberg to study under Luther, Melancthon and other famous teachers. Christian III provided financial support for the Wittenberg theologians. One such theologian, Johann Bugenhagen, came to Copenha-

gen in 1537 to help reorganise the University following the Reformation and to draft its new charter. Prominent Danish theologians like Peder Palladius and Niels Hemmingsen were trained in Wittenberg, and knew the small university town well. This woodcut from around 1540 shows the castle and the palace chapel (to the left) at one end, the church in which Luther preached in the middle, and the university and Luther’s and Melancthon’s houses to the right, at the other end of the main street.

As part of their studies, many future teachers at the University of Copenhagen would study abroad, sometimes for several years and

at different universities. In the first century after the Reformation, they usually stopped off at Wittenberg, no matter which university was their ultimate destination.

By the end of the 16th century, Wittenberg no longer enjoyed the same authority it had among the first generation of Protestants. Still, it had Shakespeare’s Prince Hamlet, the protagonist of the play of the same name (1602-03), studying in Wittenberg. Thanks to this literary reference, the University of Wittenberg became known far beyond Protestant Europe.

The University Charter guaranteed substantial autonomy. From 1563 onwards, this was exercised by the Academic Senate, called the *Konsistorium*, on which all permanent professors had seats. The Senate was chaired by the Rector, who was elected for a year at a time. However, as the King’s Chancellor also served as the University Chancellor, the Crown could – and did – keep a close eye on the University’s activities.

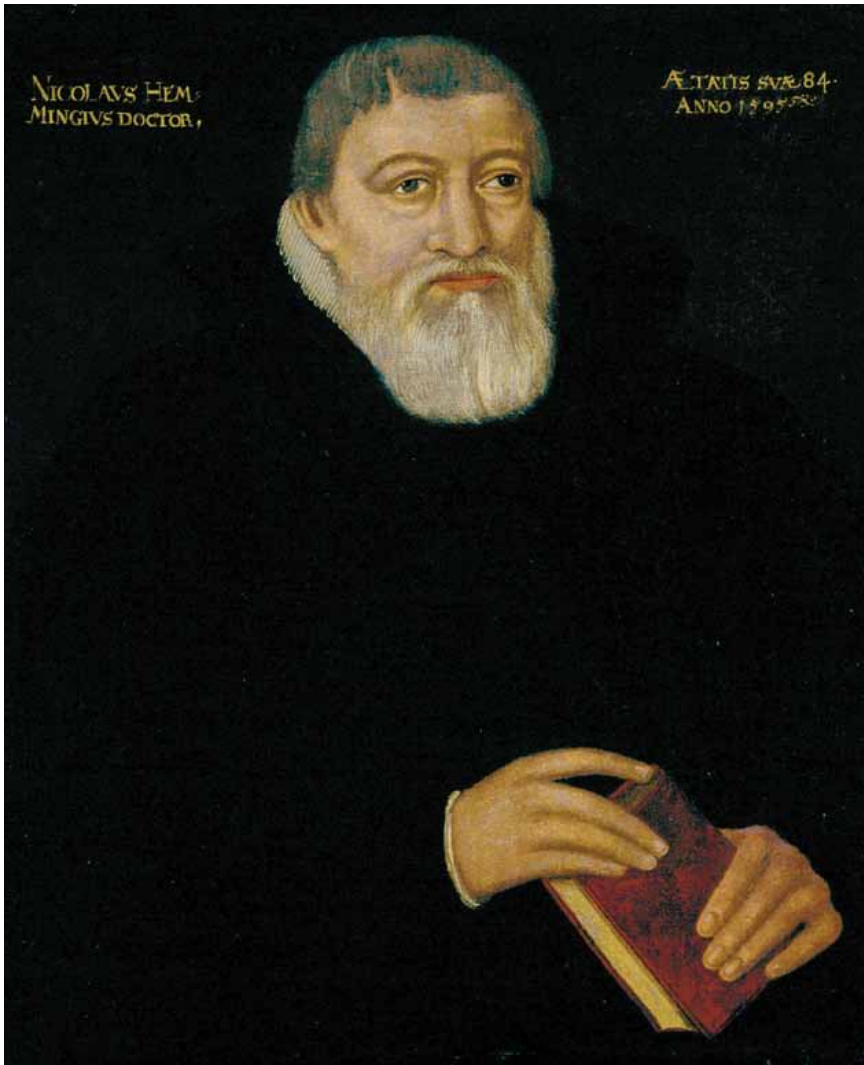
The revived University had difficulties recruiting students at first. As the situation improved, the number of students stabilised at just below 1,000 during the 16th century, a level maintained until the end of the following century. This number of students was needed in order to ensure a steady corps of teachers for grammar schools and ministers for parishes throughout the Danish realm. Students were usually recruited from the peasantry or were sons of merchants in the towns, while the aristocracy normally took other educational paths. Ministers’ sons made up a significant proportion of the student body. Substantial salary increases in the mid-16th century enabled Danish ministers to finance their sons’ university studies. An inevitable outcome of this was the creation of “ministerial dynasties” – families whose positions in the

The first lecture list. The King and the University Chancellor saw to it that biannual catalogues of lectures were published. This is the first one, dating from 1603-04.



Church over several generations would enable them to play a key role in Danish religious life.

The new Protestant Church Ordinance of 1537 and the University Charter of 1539 clearly stated that the main purpose of the post-Reformation University was to train ministers for the Lutheran Church, not to provide general academic studies. In order to increase the number of students, the grammar-school system was introduced in 1537, ambitiously aiming to establish a school in every major town. After the King's death, Jakob Bording, a professor of medicine, summed up Christian III's efforts to live up to Luther's ideal of a Christian prince: "When he



Niels Hemmingsen (1513-1600) was the most prominent Danish theologian of his time. His writings often deal with issues concerning the overlap between law and theology. He is particularly well known for his writings on marriage and divorce, which influenced the first temporal Danish marriage law. Hemmingsen studied for five years under Philipp Melancthon in Wittenberg, where he graduated as a Master in 1542. Upon his return to Denmark, he became a professor of Greek at the University of Copenhagen. He entered the Faculty of Theology in 1553, becoming first a Doctor of Theology and then head of the Faculty in 1557. In 1579, following accusations of crypto-Calvinism, the King ordered him to resign his professorship and move to the provincial town of Roskilde as canon at the Cathedral of Roskilde. Hemmingsen never returned to the University, but was not punished financially and was held in great esteem throughout his life, both in Denmark and abroad. Several of his works were translated into German, English, Icelandic and Czech.

realised that the Holy Church needed good schools to maintain its status, schools that would educate the pious in a manner that would allow them to propagate the Christian Gospel, he resurrected the University of Copenhagen, which had fallen into complete disarray at the time.” The role of the University according to Lutheran faith was to ensure that theology was taught and that the Gospel was preached correctly, to instruct in the correct manner of administering the sacraments and to communicate Christian teaching to children. The ultimate goal of all education, from village schools at one extreme to the University at the other, was to help spread the Gospel according to Luther’s teachings. The University became responsible for checking and approving all

Academic degrees

Right from the start, the University awarded bachelor and Master's degrees at the "lowest" faculty, the Faculty of Philosophy. The higher faculties (Theology, Law and Medicine) awarded licentiate and doctorate degrees.

The bachelor degree was abolished in 1775 after it had been gradually replaced by a system of preparatory exams. In 1824, the doctorate, at long last, was introduced as the highest degree in the Faculty of Philosophy. Similarly, the licentiate degree also fell out of use in the course of the 19th century.

A new University Charter in 1788 introduced a system of final examinations at Master's level in each faculty, and the relative importance of the academic degrees changed – they were now milestones in an ongoing academic career. After the licentiate degree fell out of use in the 19th century, the doctorate was the only remaining academic degree until the licentiate was reintroduced – first in Theology in 1955, and then in 1969 in all fields. In 1989, the term "licentiate" was replaced by the Anglo-Saxon designation PhD. The bachelor degree was reintroduced in 1988, and now constitutes the first part of the University's Curriculum before a two years study to obtain the master's degree.



The University of Copenhagen's four doctoral hats. Especially in the early days, graduation ceremonies for doctorates included the ritual presentation of symbols of dignity, such as the doctoral hat and ring. The ring is the only symbol still used in Denmark. The four hats, one for each faculty, were used at the University of Copenhagen until the early 19th century, but hats are still used in Sweden and Finland. However, in these countries the hat is given to the doctoral candidate to keep, whereas the University of Copenhagen insisted that all hats be returned after the ceremony.

books in Danish, German or Latin that were imported or printed in Denmark.

In 1569, King Frederik II introduced four travel grants, called *Stipendia Regia*, each the equivalent of a law professor's annual salary. Three were awarded to theologians, the fourth to a medical student. Private travel grants were also available. Many of those who received travel grants were later employed by the University of Copenhagen; this was the case for 27 out of 62 recipients in the period 1569-1648. In the 17th century, it was increasingly suggested that ministers should be trained in their mother country in order to secure their loyalty. The number of royal grants was reduced as a consequence, but budding professors were not banned from travelling abroad.

Danish noblemen rarely studied at the University of Copenhagen. Even those who did, such as the astronomer Tycho Brahe, who received a sound basic education in Copenhagen in 1559-62, rarely pursued academic careers that did not bring noblemen social prestige. Most young noblemen were taught by private tutors, and their education often con-

Academic travelling

In the 16th century, a majority of academic travellers headed for Wittenberg, though some ventured much further afield. The well-known 17th-century anatomist and geologist Niels Stensen (Steno) probably was the most itinerant – from the first time he left Denmark until he died 27 years later, he travelled an average of 1,000 km per annum. Considering the modes of transport of his day, this was quite an achievement.

The most popular destinations for Danish researchers were universities such as Padua and Montpellier, which

had medicine as their main subject; Basel, with its strong empirical tradition; and Leiden, where the emphasis was on discovery, observation and the practical application of science. These universities were all characterised by a great degree of religious tolerance. The four cities were also important centres of international trade, so their universities were influenced by merchant culture, and were among the first to study new plants, illnesses and artefacts from America and the Far East.

<i>Person</i>	<i>Most important universities and cities</i>
Tycho Brahe (1546-1601).	Leipzig (1562-65), Wittenberg, Rostock (1566-69), Augsburg (1562-65).
Ole Worm (1588-1654). Doctor in Medicine, Basel 1612.	Marburg, Strasbourg, Giessen (1605-07), Basel (1607-08, 1611-12), Padua (1608-09), Leiden (1610), London, Oxford (1612-13).
Thomas Bartholin (1616-1680). Doctor in Medicine, Basel 1645.	Leiden (1637-40, 1646), Padua (1641-43, 1644-45), Basel (1645).
Ole Borch (1626-1690). Doctor in Medicine, Angers 1663.	Leiden (1660-65), Florence, Rome (1665-66). Angers (1663).
Niels Stensen (1638-1686). Doctor in Medicine, Paris 1664.	Amsterdam (1660), Leiden (1660-64), Paris (1664-65), Montpellier (1665-66), Florence (1666-68).
Holger Jacobæus (1650-1701). Doctor in Medicine, Leiden 1677.	Leiden (1671-72, 1678-79), Florence (1674-77), Bologna (1674-77), Oxford, London (1678-79).

Examples of study tours

cluded with a prolonged “grand tour” of other European countries. Registering at foreign universities was common during these tours. It was important for Danish academics who did not belong to nobility to work as tutors for young noblemen as this presented an opportunity to finance their studies abroad. Another advantage was that these young academics would have patrons at Court who would be able to further their academic careers.



Tycho Brahe

4

In general, the natural sciences played an insignificant role in academic life during the era of Roman Catholic hegemony, at the University of Copenhagen and elsewhere. The Reformation and reorganisation of the University in 1537 did nothing to alter this. The emphasis remained on theology and on the “liberal arts” in the Faculty of Philosophy. The Faculty of Law had one professor, medicine had two and the natural sciences were represented by a single chair in physics and one in combined mathematics/astronomy, a situation that reflected Luther’s disdain for the natural sciences.

It is therefore surprising that Denmark was the home of the world’s first natural-science research centre – the astronomer Tycho Brahe’s observatory on the island of Hven – in the second half of the 16th century. The observatory played a key role in the breakthrough made by the natural sciences in 16th- and 17th-century Europe. Its existence was the result of many factors, including some of those happy coincidences that are liberally scattered throughout history.

Tycho Brahe was born in 1546 to one of Denmark’s oldest and most influential noble families. He received a sound and thorough education in his early years, and began studying liberal arts at the University of Copenhagen’s Faculty of Philosophy at the age of 12.

Brahe’s interest in astronomy was first aroused by an eclipse of the Sun in 1560 that was partially visible from Copenhagen. He made several astronomical observations before embarking upon his first journey abroad. As he put it: “In my native country, Denmark, I had already, thanks to a few books, particularly Ephemerides, made myself acquainted with the elements of astronomy, a subject for which I had a natural inclination.”

In 1562-70, Brahe studied at the universities in Leipzig, Wittenberg, Rostock, Basel and Augsburg. He was originally supposed to study law,



Tycho Brahe receiving the King of Scotland, James VI, on the island of Hven in 1590. This historical picture painted in the 19th century by Carl Bloch is a part of the decoration of the University of Copenhagen’s Ceremonial Hall.

In the 1570s, Tycho Brahe built up a unique astronomy research centre on the island of Hven, in the sound between Sealand and Scania. The main building, Uraniborg Castle, included homes for Brahe and his staff, astronomical observatories, a library and a chemistry laboratory. The Stjerneborg observatory was constructed underground, so that the instruments could be securely fixed in place and remain undisturbed. Other facilities included a print works and a paper mill.

Brahe himself designed and continually improved the instruments used on the island. His standards were very high, and his instruments, which included quadrants, sextants, globes, armillary spheres and clocks, were among the best in the world. A large brass globe that featured about 1,000 stars, based on Brahe’s own observations, was particularly famous. He began working on it during a stay in Augsburg. Many years after his death, it was brought to Copenhagen, where it was installed in the University Observatory in 1656.

Brahe was a European celebrity at the time, so it was natural that the King of Scotland, James VI, should visit Hven during his stay in Denmark and Norway following his marriage to Christian IV’s sister, Princess Anna. King James presented Tycho Brahe with the two dogs seen in the picture.

Tycho Brahe at his mural quadrant, an early astronomical instrument used to measure the elevation of stars, in Uranienborg. At that time, it was technically difficult to construct large perfect circles, and so a quarter circle was used, which could be more easily transported or fixed. Fixed quadrants provided the most accurate observations. The first mural quadrants were constructed by Arabs in the early Middle Ages. While in Augsburg in 1569-1570, Brahe constructed a mural quadrant that he would later use for his empirical observations. Brahe installed his mural quadrant on the island of Hven in 1587.



but decided to devote himself to science, specifically astronomy, during his stay in Leipzig in 1564. He returned to Denmark in 1570, convinced that his task was to base astronomy on precise observations. By then, he had already constructed his first astronomical instruments.

The most significant event in Brahe's career took place on 11 November 1572. While staying with an uncle, he observed a new "star" (which we now know was a supernova some 200 light years from Earth) in the constellation Cassiopeia. Brahe closely observed this star until spring 1574, when it was no longer visible to the naked eye. The results of his observations were published in Latin, in 1573, as the treatise *De nova stella* ("Concerning a New Star"). The book attracted widespread attention throughout Europe and made Brahe famous. His careful observations and precise measurements led him to the controversial conclusion that this was a new fixed star, which challenged the traditional view that the heavens never changed. Brahe's views gradually gained ground. Acknowledgement of the fact that the firmament is capable of change, that stars are not fixed and eternal, constitutes a milestone in the history of modern scientific thinking – even though it was impossible to explain the cause of such changes at that point in time.

As a nobleman, Brahe was expected to enter the King's service, which usually meant a military and administrative career. At that time, it was considered inappropriate for a member of one of the most prominent families in the kingdom to be appointed a mere professor at the University of Copenhagen. Fortunately, King Frederik II recognised his potential. The King and Queen were deeply interested in neo-humanist and Platonic thought, and wanted Copenhagen to be regarded as a centre of learning that would bestow glory on the country, city and Court.

In 1574, Tycho Brahe was invited to lecture at the University. Considering his lack of an academic degree and, above all, his noble social status, this invitation was extremely unusual and illustrates the uniqueness of his position. His lectures on the mathematical sciences, including astronomy, were based on the ideas about the goal of science expressed by Melanchton and the University Charter. For Brahe, astronomy was a tool with which to study the divine laws of the firmament. Unlike the University astronomer, whose work was based on Ptolemy, Brahe adopted a Copernican, albeit non-heliocentric, view of the Solar System. The university professors clearly held Brahe in high



Christian Sørensen Longomontanus (1562-1647) was born in the village of Lomborg (Latin name *Longomontanus*) in Jutland. After graduating from the University of Copenhagen, he began studying under Tycho Brahe on Hven in 1589, and remained his mentor's most capable and trusted assistant until Brahe's death. Longomontanus received a solid education as an astronomer on Hven, and was responsible for both observation programmes and theoretical work. In 1605 he took over the professorship in astronomy at the University of Copenhagen. During the 1640s, he was in charge of setting up the University's new observatory in the Round Tower. As an astronomer, Longomontanus was on a par with the best of his day and remained loyal to Brahe's legacy. However, he was no innovator, and rejected Kepler's demonstration of the planets' elliptic orbits around the Sun.

esteem and asked him to become Rector in 1577, although he declined the offer. Key aspects of his view of science served as ideals for Danish natural scientists well into the next century. Brahe did not think that he could realise his scientific ambitions in Denmark. He was about to leave, when, in February 1576, the King offered him a post as Royal Scientist. The entire island of Hven was put at his disposal, along with generous funding for his work. Brahe later wrote that the King “asked me to erect buildings [on the island of Hven] and produce instruments for the study of astronomy and chemistry, and was gracious enough to tell me that he would, in rich measure, defray the costs. [...] After a week’s consideration [...] I gave up my previous plan and agreed, not without pleasure, to the King’s wishes, especially since this island lies in isolation between Sealand and Scania. It would be a place where my work would not be interrupted by visitors, and I would have the peace and the comfortable conditions that I had sought elsewhere, in my native country, to which I owe so very much, rather than other countries.”

Over the following years, Brahe commissioned the construction of the Uranienborg and underground Stjerneborg observatories on Hven, which would later provide the setting for varied and prolific scientific studies. He himself did not leave the island, but preferred to exchange ideas through letters. Thanks to Brahe’s extensive correspondence, his observatory became a renowned centre for European science. Uranienborg has been described as the world’s first research institution, and a forerunner for 20th-century “big science”. Though fairly modest in size, the island’s facilities were certainly expensive. It has been estimated that during Frederik II’s reign, Brahe’s funding amounted to 1-2% of the Crown’s total annual income.

Early in his career, Brahe rejected the Ptolemaic view of the world in which the Earth is the centre of the universe – yet he did not fully accept Copernicus’ heliocentric system. Instead, he developed his own theory of a system in which the Moon and the Sun orbit the Earth, and the planets, in turn, orbit the Sun. He retained the Earth as the centre of the universe, and thus his system was long valued in the Catholic world.

Uranienborg played an important role as an educational institution for students from both Denmark and abroad. Brahe’s observatory was independent, but his relationship with the University of Copenhagen

was generally good. Many of the professors sent their best students to Hven, which has been described as a kind of “graduate school”.

Tycho Brahe’s 21 years on Hven represent the first golden era in the history of Danish science; but his time there did not end happily. Brahe’s relationship with the 16-year-old Christian IV, whose reign commenced in 1596, soured. Brahe failed to fulfil his administrative obligations and neglected his duties, such as maintaining the burial chapel of the King’s father and grandfather. He was also open to accusations of Calvinist tendencies. Once he fell out of favour with the Court, he became vulnerable. In April 1597, Brahe left Hven forever and ended up at the Imperial Court in Prague. In 1598, he accepted the patronage of Emperor Rudolf II. However, without the facilities and opportunities he had enjoyed on Hven, he found the last years of his life less than satisfactory. It was therefore extremely fortunate for European science that Brahe found a worthy successor in the young Johannes Kepler (1571-1630). Shortly after Brahe’s death in 1601 Christian IV ordered the buildings on the island of Hven to be demolished.

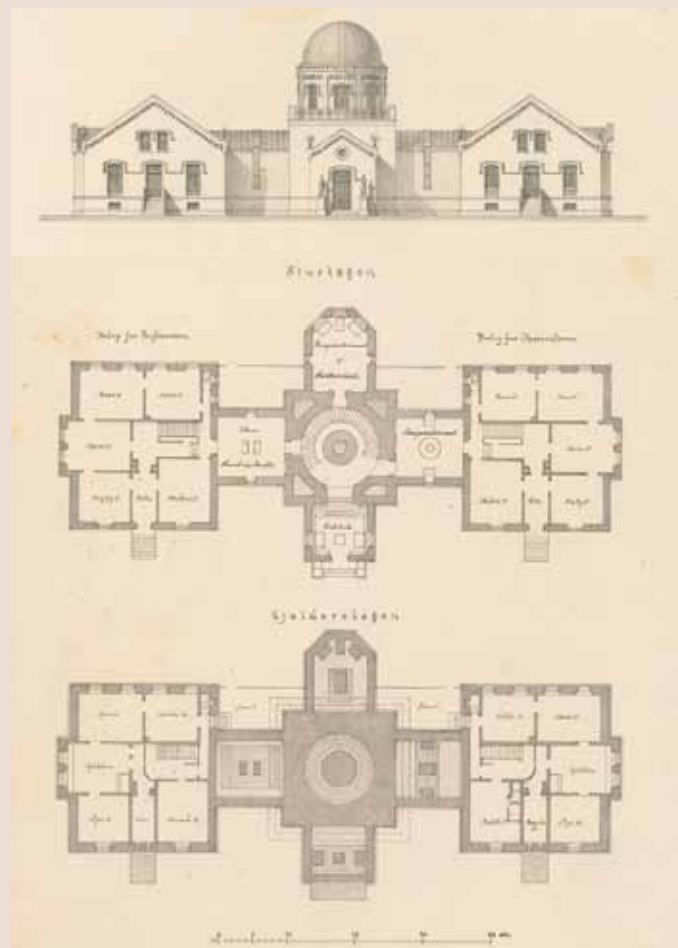
The Danish Astronomical Observatories



The University Observatory. In 1642, some 24 years before the opening of the observatory in Paris and 33 years before Greenwich was founded, the University of Copenhagen established its own astronomical observatory. It was housed in a Round Tower, which was specially built for the purpose at the east end of the University's magnificent new baroque Trinity Church. The location was probably determined by the King's desire to have a decorative building in the city; however, the site was not ideal, as light and smoke from the city made observation difficult. The King's interest in the Round Tower is apparent from the large inscription, a rebus written in a mixture of icons, Latin and Hebrew, which reads: "Let the Lord guide learning and justice in Christian IV's heart."

The first astronomical telescope in Denmark was installed in 1643, but the standards of the Round Tower observatory were not as high as those of Hven. The Round Tower observatory had its heyday under Ole Rømer (Professor of Astronomy, 1685-1710), who ensured that it was equipped with up-to-date instruments. These instruments were lost in the great fire that laid waste to large sections of Copenhagen in 1728. Nevertheless, the Tower survived and continued to be used as an observatory for another 150 years until its instruments became obsolete.

The University of Copenhagen's second observatory was built in 1858-1861, by Christian Hansen, on the former fortifications around Copenhagen. It was located due north of the Round Tower so that the older observations could still be used. Its interior and equipment were among the best of that time, but the observatory suffered from the same drawback as the Round Tower – i.e., city light affected the observations.





The Brorfelde Observatory. In the late 1930s, worsening conditions for astronomical observations in Denmark led to plans for a second observatory at Brorfelde, Sealand. The plans were delayed by a recession and the Second World War, but were not abandoned. Thanks to generous donations from the Carlsberg Foundation, among others, a large meridian circle was inaugurated in 1944, on the 300th anniversary of the birth of the astronomer Ole Rømer. The main building was completed two years later, on the 400th anniversary of the birth of Tycho Brahe. A number of other buildings were constructed for specific observations in the following decades. Eventually, the lighting conditions would deteriorate here too and the University wound down most of its activities in Brorfelde in the years up to 2000. In the mid-1980s, the Carlsberg Meridian telescope was moved to the observatory on Gran Canaria, Spain.



The La Silla Observatory, Chile. Nowadays, Danish astronomers usually make their observations by participating in international projects, and through access to modern telescopes and satellites via, for example, Denmark's membership of the European Southern Observatory (ESO) and the European Space Agency (ESA), whose activities are concentrated at the La Silla Observatory in Chile.

The Ørsted Satellite. Astronomy observatories are moving further and further away. The latest Danish Observatory is the Ørsted Satellite, orbiting several hundred kilometres above the Earth's surface. It was sent into orbit in 1999, and hoped to function about a year, but in 2008 it is still sending valuable magnetic observations back to Earth.





Many professors at the University of Copenhagen in the 17th century, and nearly all of those in the higher faculties, stemmed from a small number of academic families. The University was an academic community, but family relations, whether by blood or marriage, played an important role. A prudent marriage aided social and academic progress. Professors' daughters were attractive partners for young academics seeking a career at the University, while professors' widows often remarried within the same circles. In other words, the academic community looked after its own.

Marriage within a close social circle was a socio-historical phenomenon found in other strata of society at the time, particularly among the nobility and the merchant class. It was most common in Copenhagen, but was also found in the dynasties of ministers within the Church. Close family ties, of course, could lead to nepotism and the exclusion of outsiders. A network of close family ties meant that anybody who moved in professorial circles in their youth had an advantage when embarking upon a university career. As a result, the Chancellor and King introduced systems to curb nepotistic practices. The University was no longer free to appoint professors; approval had to be granted from the King.

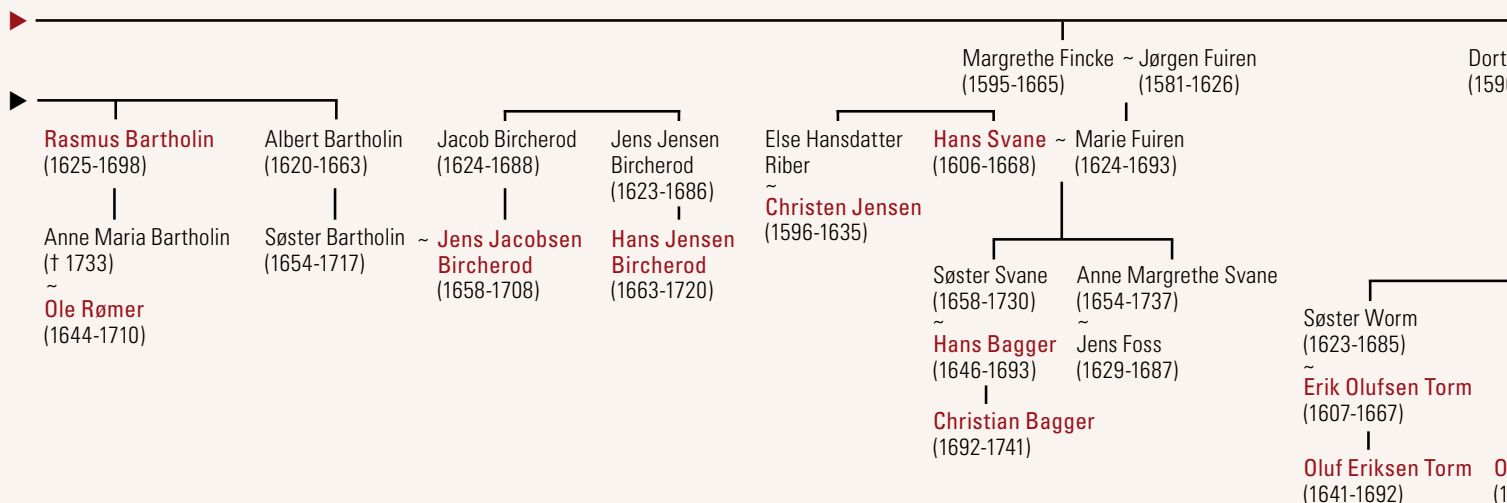
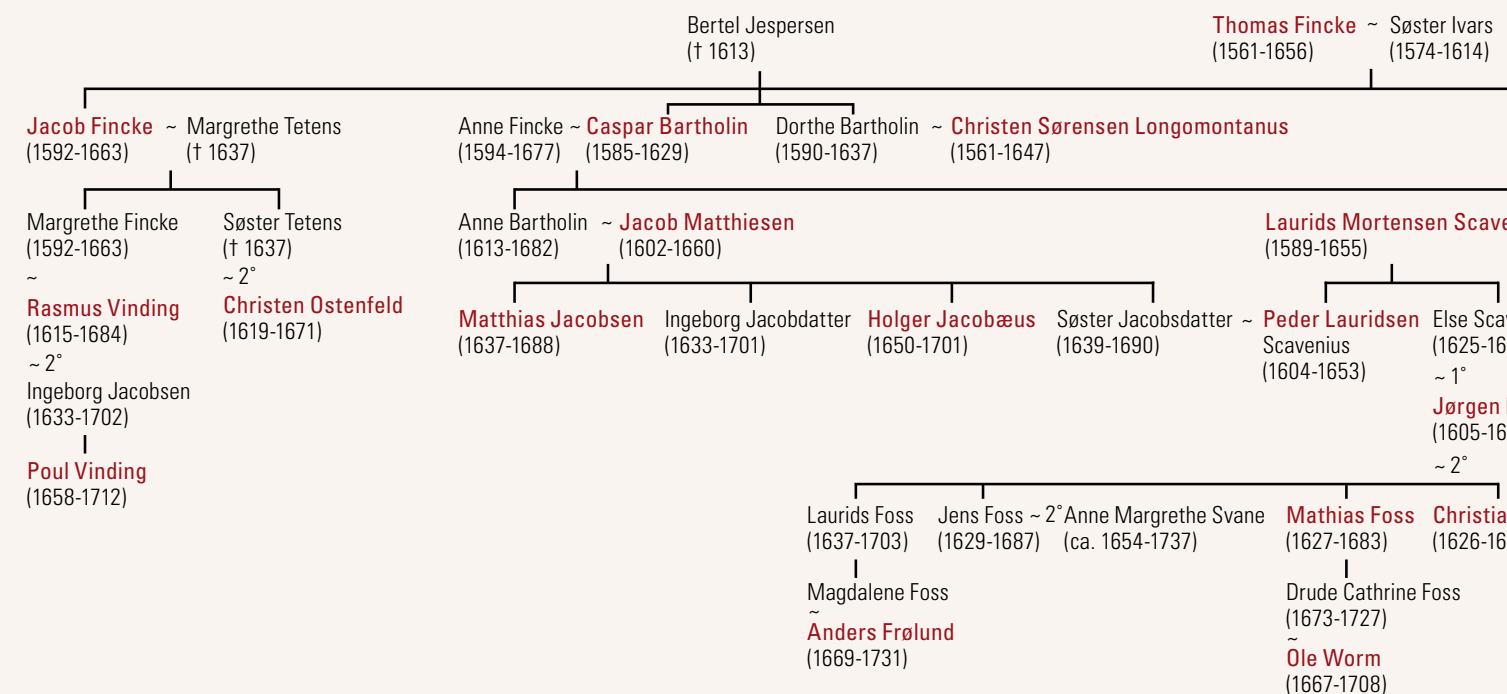
In academic circles, in Denmark and all over Europe, nepotism based on family connections was commonplace from the late 16th until the early 18th century. However, partly thanks to those very networks, the same period was something of a scientific golden age in the history of the University of Copenhagen.

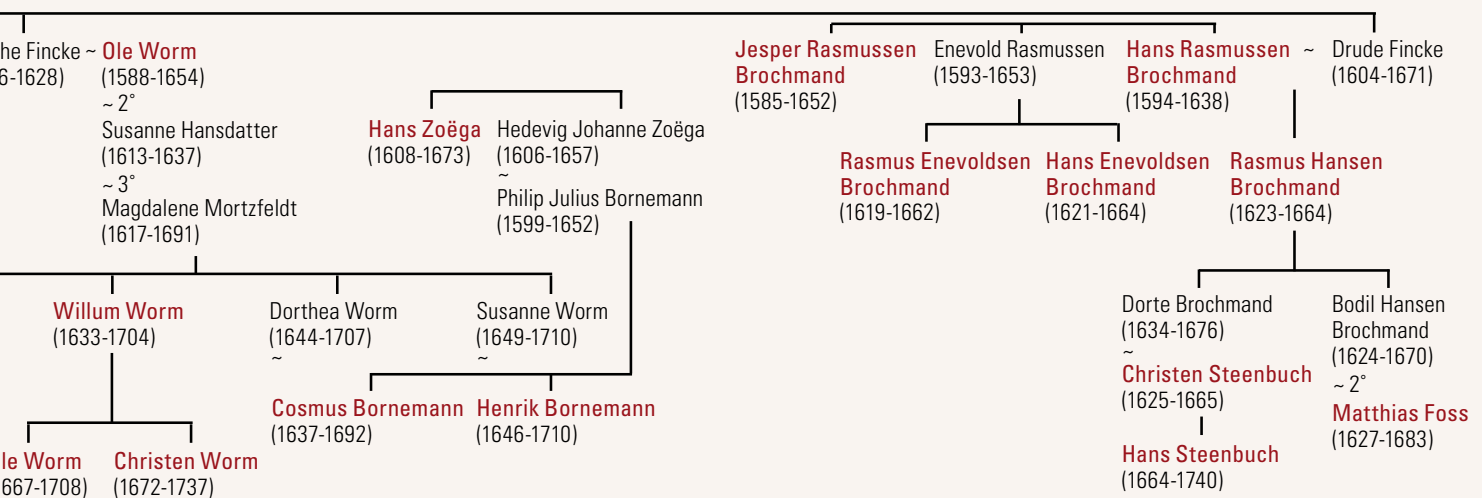
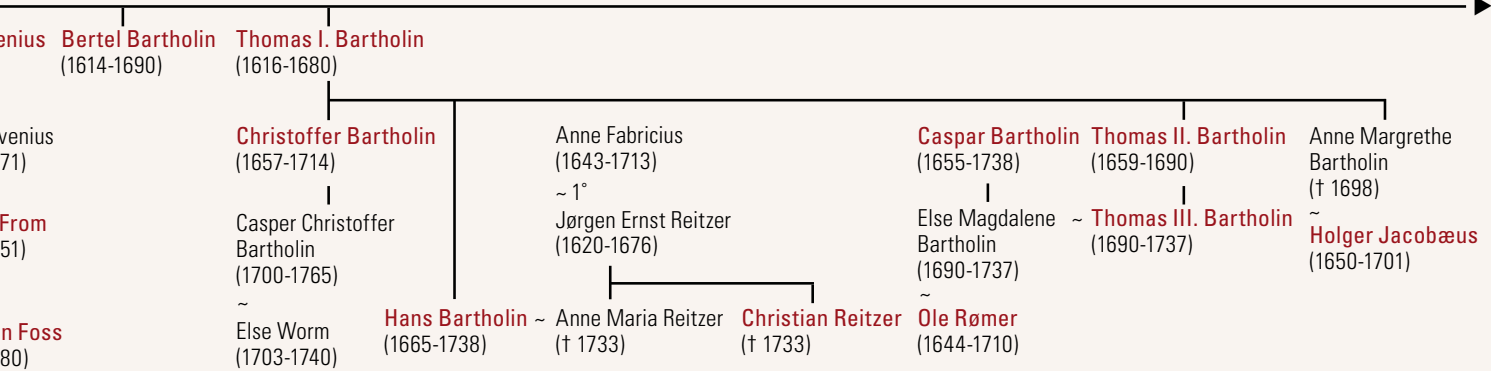
Physician Thomas Fincke was at the centre of a web of marital interrelationships spun in the 17th century. His four daughters all married professors from prominent professorial families, such as the Bartholins and Worms. Other families joined this community by marriage, e.g.,

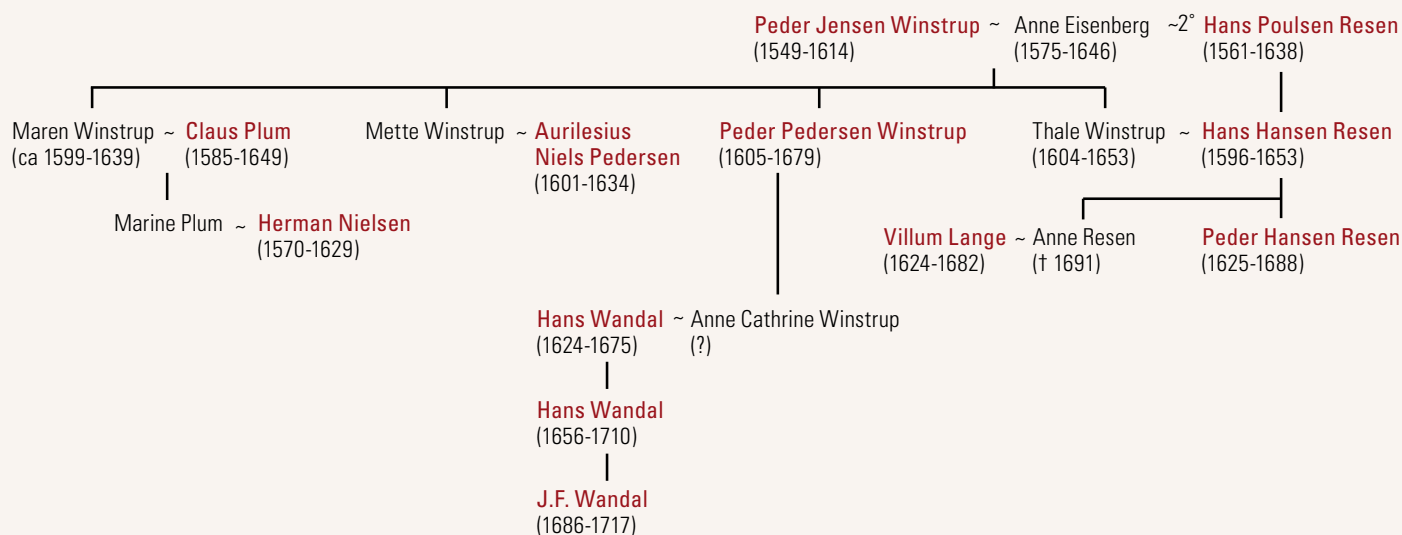


Thomas Bartholin (1616-1680). After his father's death in 1629, Bartholin lived with his relative Ole Worm, who was a major influence on his life. In 1634, he matriculated at the University of Copenhagen. He majored in theology but also studied other subjects, including medicine. In 1637, he embarked upon a study tour that included years of study in Leiden, followed by stays in Paris, Montpellier, Padua, Rome, Naples and Messina, where he turned down the offer of a well-paid professorship. He concentrated on medical studies, especially anatomy, and graduated as a doctor of medicine in Basel in 1645. Upon his return to Denmark in 1647, he was appointed a professor by the University, and replaced his maternal grandfather, Thomas Fincke, as First Doctor of the Realm in 1656. He retained this professorship until his death. As the head of the powerful Bartholin clan, Thomas Bartholin was the dominant figure in Danish medicine and the natural sciences.

Bartholin was known for his discovery of the lymphatic system. However, credit for the discovery must be shared with Olaf Rudbeck, a Swede who observed the lymphatic system in a calf in 1650. The rivalry between the two led to an acrimonious dispute, which dragged on for centuries, about which of the two actually made the observation first. It is now agreed that Rudbeck was the first to discover the lymphatic system, but that Bartholin was the first actually to publish his discovery. It has also been claimed that Bartholin "grasped the full implications and significance of the discovery before Rudbeck and in more detail."







Genealogical table of the most important professorial families.

University life in the 1600s was characterised by some co-option and nepotism. Most professors belonged to a handful of families. At the centre of the most important 17th century's web of marital connections was Thomas Fincke, a physician whose four daughters all married professors. From these marriages stemmed famous professorial families such as the Bartholins and the Worms. Other families admitted into this community by marriage included the Brochmann, Foss, Bircherod and Scavenius families. Another large group were descendants of the Bishop of Lund, Peder Vinstrup. The Wandals belonged to this latter dynasty, for example. Around two-thirds of the professors in this period appear to have belonged to one of these academic clans. Professors at the University are marked with red lettering.

the Brahmans, the Bircherods, the Foss and the Scavenius families. Another large group were descendants of the Bishop of Lund, whose widow married the Bishop of Sealand. The Wandals formed yet another professorial family cluster. Approximately two-thirds of the professors of the period belonged to one of these families.

Despite wars and religious strife in 16th and 17th century Europe, scholars and scientists shared a sense of purpose that transcended all borders. They considered themselves part of an international "republic of letters" that was independent of nations and religious beliefs. Travel and prolonged study visits to foreign universities provided Danish scholars and scientists with more profound learning than they could acquire in Copenhagen. The journeys were followed up by extensive correspondence and exchange of news, views, information, artefacts and natural objects, and much more.

Ever increasing and wide-ranging research into the natural sciences took place at the University of Copenhagen after 1600. This fertile period peaked in 1650-1680, but drew to a close because of changes introduced by the absolute monarchy. Danish doctors, chemists, astronomers and mathematicians figured prominently in European academia. The academic network dominated by the Bartholins was essential to the



Thomas Fincke (1561-1656) was the progenitor of the Bartholins, the largest of the two professorial dynasties that dominated the University of Copenhagen for more than a century. He studied mathematics in Strasbourg, and then went on to study in Heidelberg, Leipzig, Basel, Padua and Pisa. He acquired his medical doctorate degree in Basel in 1590. Fincke was appointed Professor of Mathematics at the University of Copenhagen in 1591, and then Professor of Medicine in 1603, a position he held until his death. He excelled at administrative and practical work and served as Rector five times. He is notorious for his harsh judgement of Tycho Brahe's instruments, from his time as a member of the commission sent to Hven after Brahe's departure in 1597.

dissemination of new ideas. Danish academics were acutely aware that they were part of a community of learning, and they coveted international recognition.

Professors at the University in the 17th century needed a powerful patron at Court to promote their own and their family's career. Prior to

Ole Borch (1626-1690). After graduating from the grammar school in the provincial town of Ribe, Borch matriculated at the University of Copenhagen in 1644. Urged on by Professors Ole Worm, Simon Paulli and Thomas Bartholin, he devoted himself to the study of medicine, botany and chemistry – although he never lost interest in Latin poetry, in which he was highly accomplished. His poor finances initially made the near-obligatory journey abroad impossible. However, in 1655 a nobleman appointed Borch private tutor to his sons, which afforded him ample opportunity to conduct his own studies, especially in chemistry. After distinguishing himself in the defence of Copenhagen during the assault by the Swedish army in 1659, Borch was appointed Professor at the Faculty of Philosophy and eventually received funding for the long-overdue trip abroad. His travels began in 1660 and lasted six years. They took him to Germany, the Netherlands, Britain, France (where he earned his Doctorate in Medicine in Angers in 1664) and Italy.



the introduction of the absolute monarchy, this patron was usually the King's Chancellor, who also served as Chancellor of the University and acted as a bridge between the two worlds. The Bartholins' domination of University affairs, particularly at the Faculty of Medicine, was largely due to their ability to ingratiate themselves with various royal chancellors. Academic success was not exclusively based on talent. Diplomacy was also important.

Thomas Bartholin (1616-1680) was appointed as a professor of mathematics in 1647, before turning his talents to anatomy. He became famous in Denmark and abroad for discovering the lymphatic system, which he first described in 1653. Due to poor health, Bartholin was excused from performing anatomical dissections by the mid-1650s. In 1660, the King exempted him from teaching so that he could devote more time to study and writing. He continued to be active at the University, where he was appointed University Librarian and held the office of Rector several times, including in 1680, the year of his death. He played an active role in various social spheres, and was a leading figure behind the draft of the Medicinal Order of 1672.

Thanks to his extensive publications, Bartholin was responsible for major advances in Danish science, particularly in medicine. He began publishing early in his career: during his prolonged study tour abroad (1637-1646), Bartholin published several theses, including one on unicorns in 1644. He remained a prolific writer throughout his life, with numerous learned works to his credit. These included one on anatomical studies, *Historiarum anatomicarum rariorum centuria I-VI* (1654); the first Danish work on the preparation of compound medicines and the identification of samples, *Dispensatorium Hafniense* (1658); and texts on Danish medical practice. He also wrote wide-ranging collections of shorter pieces that continue to provide valuable information about the culture, history and conditions of the medical profession in Denmark at the time. In addition, he authored a practical guide to the right and proper conduct of young doctors on study tours abroad, which was primarily written for the benefit of his son and nephew, but was clearly of interest to others (*De peregrinatione medica*, 1674). One of his most important contributions was the production of the first Danish scientific periodical (*Acta medica et philosophica Hafniensiae*), which was published in five monumental volumes from 1673 to 1680. The second volume contains the first extensive Inuit glossary, based on the surgeon Reinhold Horn's encounter with three Greenlanders who stayed with Thomas Bartholin's brother.

To many in the academic world, Thomas Bartholin embodies the nepotism of the era. His wide European network, his large personal fortune, his connections at Court and, especially, his permanent position as Dean of the Medical Faculty meant that he had plenty of opportunities to influence matters of importance at the University, particularly when it came to appointments – an influence he did not hesitate to exert.

Domus Anatomica

In 1644, two years after the new observatory in the Round Tower in Copenhagen was completed, Copenhagen inaugurated another building dedicated to the thriving natural sciences. Like the Round Tower, the new Anatomy House (*Domus Anatomica*) was an expression of Christian IV's desire that the University of Copenhagen should rank among the finest in Europe. His goal was for Danish physicians to receive the same excellent instruction in Denmark that they had previously sought abroad, particularly in Padua, which had its own permanent anatomical theatre (1583), Leiden and Basel.

More than half of the two-storey building's lower floor was taken up by the Anatomy Theatre (*Theatrum Anatomicum*), which was entered through a door Bartholin called "more convenient than magnificent", and which bore a Latin inscription that read: *Hic aut ossa vides corpora secta Viator, Hic ars Naturæ solvit & unit opus* ("Wanderer, here you will see bones as well as dissected corpses, here the work of creation, unified by anatomy, is rent asunder."). The front row at the bottom was reserved for professors, medical doctors and distinguished visitors. The two skeletons symbolise Adam and Eve on opposite sides of an apple tree. The first floor featured a royal boudoir that was used several times by the King, as well as a number of small rooms that were used for a variety of different purposes.

The Anatomy House provided the setting for major scientific breakthroughs. It was here in 1653 that Thomas Bartholin first proved the existence of the human lymphatic system. However, the building is rarely mentioned in histories of science, as it was razed to the ground during the great fire of 1728.

In 1657, the top floor was converted to house the University's collection of curiosities, which consisted of rare natural-science objects bequeathed to the University by Henrik Fuiren and some anatomical specimens that were no longer in use.

Largely abandoned after 1656, the Anatomy Theatre was resurrected in 1672 by the Royal Anatomist Steno, shortly after his return to Copenhagen from Florence. On 29 January 1673, the Anatomy Theatre reopened with Steno's grandly staged dissection of a female corpse. In his opening speech, he uttered the famous words: "Beautiful is that which one sees, more beautiful that which one knows, but by far the most beautiful is that of which one is ignorant." This was Steno's last public dissection, and after his departure, practical anatomical activities ceased altogether.



The Anatomy House (*Domus Anatomica*) was set up in 1644 in one of the first buildings erected after the University took over the Bishop's Palace in 1537. The Anatomy House is described in detail, in 1662, by Thomas Bartholin in *Domus Anatomica Hafniensis brevissime descripta* ("A Brief Description of the Anatomy House in Copenhagen").

Natural science, theology and politics

Danish academics working in medicine and the natural sciences in the 17th century knew that to freely pursue their studies and receive the support of the King and the government, they had to observe carefully the dividing line between natural science and theology. The science school at the University, the successor to Tycho Brahe's research centre, represented progress – the main focus was on empirical observation rather than the philosophical speculation and neo-Platonic thinking that characterised much of Brahe's writing. The dynamic and wide-ranging research environment in mid-17th-century Copenhagen was epitomised by interest in Descartes' scientific and mathematical work, rather than his metaphysics.

In the years following the introduction, in 1660, of the absolute monarchy in Denmark, some progress was made towards a new view of nature and science; unlike previous epochs, the academic arguments of the day were factual and direct. The work of Ole Worm, Thomas Bartholin and Ole Borch was part of the Renaissance humanist tradition, which had boundless admiration for classical scholarship, and incorporated numerous quotes from ancient texts. The writings of Rasmus Bartholin, Steno and Rømer, on the other hand, were more objective and were to a higher degree based on empirical studies.

However, despite the promising outlook in the early 17th century, the Scientific Revolution did not ultimately break through in Denmark at this time. Following the death of Ole Rømer in 1710, the natural sciences disappeared completely from the Copenhagen research scene. Even the Professorship in Physics – or natural philosophy – that had been introduced at the time of the Lutheran reforms was abolished by the new University Charter in 1732.

Traditionally, this decline in the natural sciences has been blamed on the nepotism of the “academic dynasties”. However, it has been pointed out that the thriving scientific and intellectual environment in 17th-century Denmark was in fact the result of the Copenhagen academic community's eagerness to encourage fresh talent and recruit promising researchers. A strong international academic network also existed and the political system of the day offered researchers some flexibility. It was not a lack of talent that stifled the exact sciences in the late 17th century, but other, external factors – first and foremost the introduction of the absolute monarchy in 1660.



Ole Worm's Museum (*Museum Wormianum*)
 Title copperplate for the Latin catalogue
Worm's Museum – or a description of the curiosities, of nature and of art, from Denmark and

abroad, which are stored in the author's residence in Copenhagen. This impressive museum catalogue of some 400 pages was published in Leiden in 1655.

Professor Ole Worm (1588-1654) was another leading figure in Danish academic life in the first half of the 17th century. Not only was he an outstanding medical doctor, he was also an assiduous antiquarian and earned national renown as the founder of Danish research into runes.

From a historical perspective, Worm made his most important contribution to academic studies in 1621, when he took over the chair in physics and introduced “demonstrative teaching” using objects from his own collection. He founded the *Museum Wormianum* (Worm’s Museum) in 1620 and continued to add to the collection throughout the rest of his life. After his death, King Frederik III acquired the collection as part of the Royal Danish Chamber of Arts. Part of Worm’s collection is now on display in the Natural History Museum at the University of Copenhagen.

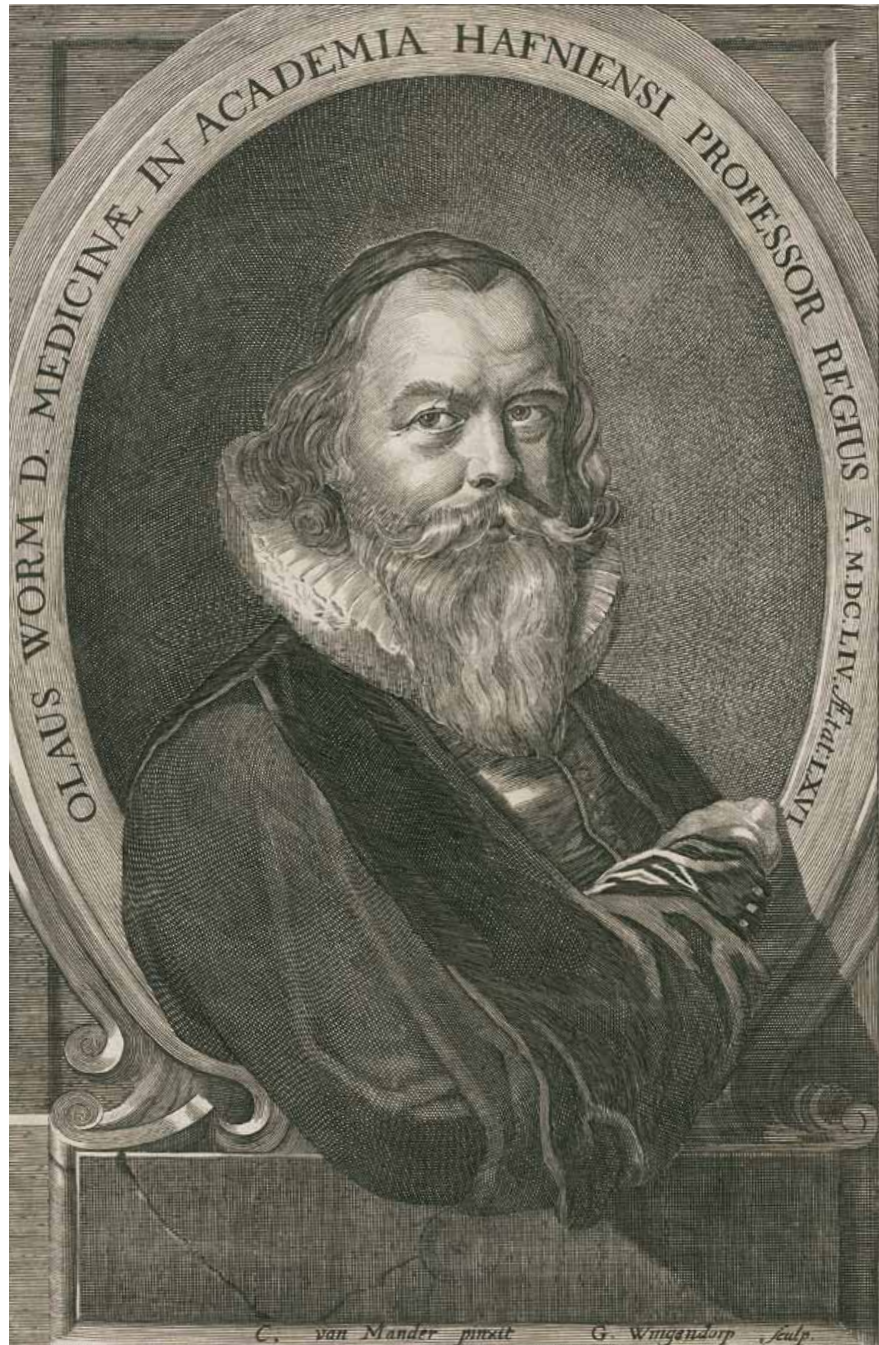
His collection illustrates the influence of the renewed interest in classical Antiquity during the Renaissance. One reason for this was that many European princes began collecting curiosities from distant lands, which had been brought to Europe by merchants and explorers. These collections became immensely popular in the 17th and 18th centuries, and were in many respects the precursors of modern museums. However, unlike modern museums, they did not collect and display their exhibits in any systematic way – at least not initially.

Worm’s was the first collection of scientific, archaeological and ethnographic objects to be built up systematically with the express purpose of facilitating academic study. The *Museum Wormianum* was among the world’s first academic collections, and one of the first in Europe to be used for instructional purposes in university teaching.

Worm’s own description of the collection was published posthumously in 1655 as the folio *Museum Wormianum*. The book comprises four sections, which suggests that Worm was attempting to describe

Ole Worm (1588-1654). At the age of 13, Worm was sent to stay with relatives in Germany in order to attend good schools. He took up medicine after studying theology in Giessen and Marburg for a few years. He studied first at Strasbourg and later Basel, where a botanist inculcated in him the importance of systematic plant collection and direct observation. He continued his studies of medicine and chemistry in Italy, France, Germany and Great Britain, where he practised as a doctor. In 1613 he was appointed to a chair in the Faculty of Philosophy at the University of Copenhagen. He remained a professor of medicine from 1624 until his death, and served several terms as Rector. His works include a study of a rune calendar (*Fasti Danici*, 1626), a book about the celebrated Danish “golden horn” found in Jutland in 1639, and a monumental collection of all known Danish, Norwegian and Gotland runic stones and inscriptions (*Danicorum Monumentorum libri sex*, 1643). He also published medical writings, some concerning objects in his natural-science collection, e.g., the narwhal’s tusk (the “unicorn horn”), the Norwegian lemming and the bird of paradise.

As a doctor in Copenhagen, he treated everybody, from the royal family to the city’s poorest citizens. He even remained in the city to care for patients during several plague epidemics. It was during one such epidemic in 1654 that he died – of a bladder ailment, however, not of the plague.



nature and art from the lowest to the highest stage – from the mineral and plant kingdoms all the way up to the animal kingdom, and to the objects and tools produced by humans. The collection was organised according to the same principles, and also by the type of material, with

natural and art objects grouped together. The natural-science part of the collection included stones, minerals, soil, dried plants, seeds and fruits, mounted animals, dried fish and crustaceans, shells and corals. These were essential pieces of a medical collection at a time when natural philosophy and the natural sciences were considered to underpin the study of medicine.

Although the museum was a private collection, its fame extended beyond the shores of Denmark. Later generations have considered this polyhistorical collection to be little more than an accumulation of curiosities, disregarding the fact that Worm arranged the objects systematically and studied them according to principles of organisation that were determined by the materials involved and fell within well-defined academic categories.



Absolutism and the “Learned Republic”



Danish participation in the Thirty Years’ War in Europe was followed by two decades of hostilities with Sweden, which nearly brought about the end of Denmark as a sovereign state. It became obvious that the nation would need all of its resources to survive. As in many other European states, absolute monarchy was seen as a solution to the nation’s problems.

Absolute monarchy was introduced in Denmark in 1660. The country was no longer governed by a form of co-operation between the various classes, and all citizens were now the subjects of a single, omnipotent ruler. Without delay, rules were in place governing rank and precedence, the individual’s rights and privileges, and their place within the social hierarchy, all of which were determined solely by their relationship with the King. The role of the University and learning changed, and the “Learned Republic” promoted by the Bartholins was no longer sustainable.

Academic life in Copenhagen changed in the first decade after the introduction of absolute monarchy. Prior to this, King Frederik III and the leading political figures of the day had all been patrons of science. They supported the ideals of the academic communities, including the importance of what today would be called basic research.

All this changed after 1660. The goodwill, which had ensured funding for the appointment of suitable candidates as supernumerary professors, dried up. This was partly due to the harsh economic consequences of the wars with Sweden, and partly because University professors lost their privileged position in a system that valued administrative skills and military rank above scholarly pursuits. The University had fallen out of favour at Court.



Peder Schumacher (in 1673 ennobled as Count of Griffenfeld) interpreting the Scriptures for Frederik III, under the supervision of Bishop Jesper Brochmand in the Bishop’s home. This historical picture painted in the 19th century by Carl Bloch is a part of the decoration of the University of Copenhagen’s Ceremonial Hall. Brochmand became Professor of Pedagogy in 1610, and progressed via the chair in Greek to Professor of Theology and a doctorate in 1615. An active opponent of ‘crypto-Calvinism’, he also spoke out against Catholic missionary work in Denmark from the 1620s onwards. Brochmand was highly regarded at the Court and by the Danish Church and was one of the most influential Danish systematic theologians. His *Prayer Book*, published in the 1630s, remained popular among Danish commoners for 200 years. He was also held in high esteem abroad, especially for his polemics against the most learned theologian of the time, the Jesuit cardinal Robert Bellarmine.

Peder Griffenfeld later became a Danish statesman and Chancellor of the University until he lost all his positions in 1676. He was the author of the *Lex Regia* 1665, which laid out the legal basis for the absolute monarchy.

Students defending Copenhagen during the Swedish assault on the city, 11 February 1659. This historical picture painted in the 19th century by Vilhelm Rosenstand is a part of the decoration of the University of Copenhagen's Ceremonial Hall. The Swedish assault on Copenhagen represented a key moment in Danish history. At the time of this mid-winter attack, the Swedes had conquered all of Denmark except the capital. Everything was put in the defence. Students at the University of Copenhagen were permitted to set up their own corps, which ended up some 250-strong, headed by two officers. The language of command was Danish, not German as in the regular army. The student corps remained under the University's jurisdiction, and its rank and file were not disciplined through corporal punishment. They fought valiantly when the Swedes stormed the city, and several who distinguished themselves in action were duly rewarded. Among them was Ole Borch, who received financial support and whose courage in battle may account for the special professorship created for him in 1660.



The University was considered useful when it helped the new regime to maintain its power – e.g., by drafting some of the major legislative work that was one of the lasting achievements of early Absolutism.

The legislative work was completed in 1683 in Danish, and a Norwegian edition followed in 1687. It encompassed not just civil law, but also criminal law and process – an achievement unmatched by Europe's leading nations at the time.

The University made a substantial indirect contribution to the work – a draft by Professor Rasmus Vinding formed the basis for the final version. Vinding was originally a professor of Greek, but took over the professorship in history and geography in 1661, and became a Supreme



The Danish Code 1683 which was followed by *The Norwegian Code 1687*. The two codes were drafted by a commission established by Frederik III. *The Danish Code* was not completed until 13 years after the King's death. The codes met a practical need, especially within the field of procedural law. Similarly, the division of Denmark into two legal districts (i.e., Jutland and Sealand) with different laws was outmoded and caused problems. Few lawyers were educated at the University, and most judges and practising lawyers tended to be laymen with a practical knowledge of the law but no University education. The Codes are known as the Codes of King Christian V who is depicted at the frontispiece.

Court Judge three years later. Vinding was not unique among his peers – a number of professors of law and theology also served the absolute monarchy.



Born as Peder Schumacher, Griffenfeld (1635-1699) was the son of a wealthy Copenhagen wine merchant. He began to attend school at the age of four. At 12, backed by excellent testimonials, he matriculated at the University, where he studied theology. He also studied history, constitutional law, natural science and languages. His nine-year grand study tour took him to German, English, French, Spanish and Italian universities, and expanded his extensive knowledge of languages (including Arabic and Persian) and, especially, constitutional law.

Peder Schumacher was employed by Frederik III upon his return to Denmark in 1663. His career progressed quickly – his first major task, in 1665, was to draft the Act of Succession. The accession of Christian V in 1670 further improved his position, and in 1673, he was named Count of Griffenfeld.

As well as holding a leading position in the Danish Government, Griffenfeld acted as the University's patron. He wielded power with great skill and brilliant diplomacy, particularly in the execution of foreign policy.

Griffenfeld's political activities earned him many enemies and accusations of corruption and nepotism. After being arrested in 1676, he spent the remaining 22 years of his life in Norway as a prisoner of the state.

The students



In Denmark, a new student is called a *rus*. The term comes from Latin *depositurus*, which is in turn derived from *deponere*, which originally meant to de-horn (e.g., a calf). In this context, it refers to coarse 17th century matriculation rituals. The *rus* was humiliated and manhandled in imaginative ways, and had to wear horns during this ordeal. He was then matriculated, received his certificate of matriculation and shook hands with the Rector as a sign of his willingness to comply with academic law.

The University Prison. Until 1770, students who broke academic laws were handled by the University's own police, court and prison authority. The University Charter of 1539 stated that students apprehended for breach of the peace at night were to be presented to the Rector for punishment the next morning. This would usually consist of a sojourn in the student prison, called the Carcer. Lack of respect for professors was punished in the same way. The court minutes show that drunkenness and disorderly behaviour were frequent offences, and that violence was common during the weeks in which newly matriculated students were brutally initiated. The last student to serve time in the Carcer did so in 1712. The building still exists, and many of the prisoners' names are still carved into the walls. The University also had jurisdiction over the peasants on its extensive properties, and a special prison was built for them too.



Ole Borch on a botanical excursion. Teaching at the University was predominantly theoretically based in the 16th and 17th centuries. Empirical studies, however, had been introduced in scientific research in fields such as astrono-

my and anatomy. As a result, practice began to play a role in the teaching of students as well. This drawing from Professor Holger Jacobæus' (1650-1701) Travel Journal, late 17th century, depicts his fellow professor Ole Borch on a bo-

tanical excursion with a group of students. The second student from the left is Peder Kylling, who published the first purely botanical work on Danish flora in 1688.



Epitaph for the two brothers Bent and Niels Andersen in the Church of Sorø. Their father, Oluf Andersen, owned a shipping company and was the mayor of the Norwegian town of Frederiksstad. They studied in Copenhagen, but fled the city during an outbreak of the plague in Copenhagen in 1654 – to no avail. They fell victim to the plague in the town of Sorø and died within two days of each other, aged 17 and 20.

University foundations and student residences

Unlike Oxford and Cambridge, for example, Copenhagen was not well provided with colleges and teeming with student life. The vast majority of students in Copenhagen lived with their parents or in private lodgings. In the 16th and 17th centuries, some 20% of students lived in one of the four residences founded in this period. Located in the Latin quarter, close to the University, the residences are still in use and students continue to make their mark on daily life in the heart of the city.

Students were also able to apply for grants to study abroad from an increasing number of bursaries established by various kings, as well as by private individuals. The most important one was the *Kommunitet*, created by King Frederik II in 1569. One of its aims was to provide two meals a day for 120 students.



The Refectory Building. Until the end of the 18th century, students had meals provided by the *Kommunitet* in the long building that demarcates the western end of the University's main yard. They sat at tables according to their faculties, and would debate academic subjects in Latin during meals. The picture features the building's façade as it looked after it was renovated in the wake of the great fire of 1728.

Regensen (*Collegium Domus Regiæ*) was Denmark's second student residence – and, in its heyday, the most prestigious. It was built in 1618–1623 by King Christian IV to accommodate the 120 students who benefited from the *Kommunitet*. The original building was destroyed in the great fire of 1728, only to be rebuilt much as it looks today. The type of student life that would later come to epitomise Regensen – in which the lime tree in the middle of the courtyard played an important role as a meeting place for parties and discussions – began here in the late 18th century.



Valkendorfs Kollegium, the first student residence in Denmark, was established by the prominent nobleman and civil servant Christopher Valkendorf in 1588. Located near the University, it housed 16 residents and offered the use of a garden. Until the beginning of the 19th century, residents had to be nominated by the Valkendorf family.



Borch's Hall of Residence (*Collegium Mediceum*), the third student residence in Denmark, was founded by Professor Ole Borch on 29 July 1689. It was housed in the professorial residence that Borch purchased from the University, and provided free accommodation for 16 students: 10 students of theology; three students of chemistry, botany or mathematics; and three students of classical philology. The numbers accurately reflect both the dominance of theology in the 17th century and Borch's personal interests. According to Borch's Charter, chemistry students were obliged to conduct experiments in the residence's laboratory.



Elers Kollegium was founded in 1689 by the High Court Judge Jørgen Eler. It served as a memorial to his two daughters, who perished when the Copenhagen Opera House went up in flames in 1689. The residence accommodated 16 students: eight of theology; two of medicine; two of mathematics; two of classical philology; one of law; and one of political history.

The University after the Great Fire of Copenhagen in 1728



Panorama of the University Courtyard, 1749. The great fire of 1728 reduced large parts of the city to ashes and was a disaster for Copenhagen –the University did not escape unscathed either. Apart from the Senate House, all of the buildings in the University quarter, including all of the professorial and student

residences, were partly or completely destroyed. It took almost a generation to repair the damage and bring the new buildings up to date. This delightful panorama of the Senate Courtyard by the two amateur painters Rach and Eegberg provides an excellent impression of the somewhat rigid environment of the

University quarter in the 18th century. At the rear is the medieval Senate House (c. 1420). To the left is the official residence, built in 1732, of the administrator of the *Kommunitet* (*oeconomus communitatis*). On the right is the 17th-century auditorium, which was restored after the fire.



Professorial residence, c. 1756. For the professors, the fire meant that the old, dilapidated, Reformation-era buildings were replaced by new official residences. This took time, and construction work was not completed until 1760. The 11 new residences consisted of two standard houses designed by Professor of Mathematics J. F. Ramus. Each professor had his own auditorium in the residence, where he gave private lectures in addition to the public ones at the University. Most of Ramus' buildings were destroyed by the British bombardment of 1807, while others were rebuilt or sold off. St Kanikestræde 11, which is still owned by the University, is the only one to retain its original exterior.



Renowned as an anatomist, geologist and theologian, Niels Stensen (1638-1686) was one of the major figures in 17th-century Danish academia. Considered the founder of the science of geology, he formulated the basic principles of historical geology and crystallography. He also discovered the parotid gland's excretory duct, and explained the creation and function of lachrymal fluid.

Stensen called himself *Nicolaus Stenonis*, commonly shortened to *Steno*. He was the son of a successful Copenhagen goldsmith, which may have sparked his interest in metals and minerals. After graduating from grammar school, he studied medicine and other subjects at the University of Copenhagen (1650-1659). His preceptor was Thomas Bartholin, famed for his discovery of the lymphatic system. He attended Bartholin's anatomy lectures, studied mathematics under his brother Rasmus Bartholin, and accompanied the botanist Simon Paulli on his excursions.

Steno studied the works of French philosopher Descartes and atomist Pierre Gassendi, both of whom were to exert a huge influence upon his world view and academic work. Some of his early work is presented in the Chaos manuscript, so named because of its opening words: "8th of March 1659/In the name of Jesus/Chaos". The manuscript, whose wide range of subjects includes the crystal structure of snowflakes, is an early illustration of Steno's diligence and the breadth of his interests.

In 1659, Steno travelled to Amsterdam. It was during his stay here that he made his first great discovery – the parotid gland's excretory duct. He published his findings in 1661. The following year, he relocated to Leiden, where his studies of the tear gland resulted in *De glandulis oculorum*. He then travelled to Paris where he was accepted into scholarly circles; it was here in 1664 that he delivered a lecture on the anatomy of the brain, which became a classic in its field. In his presentation,



Niels Stensen (1638-1686). Steno is one of the best known Danish natural scientists. He is most famous for his contribution to the development of both anatomy and geology, of which he is considered one of the founders. Steno's career and relationship to the University of Copenhagen have been the subject of much discussion. Upon his return to Denmark in 1664, after his first journey abroad, he was not granted the expected professorship in anatomy at the University, which was most likely due to his long stays abroad, his hesitation to accept the first royal summons to return in 1667-1668, and his conversion to Catholicism. He was eventually appointed as Royal Anatomist

Steno criticised the idea that man should be considered a machine, as proposed by Descartes two years earlier. He also refuted Descartes' argument that the pineal gland was the seat of the soul or spirit.

After further studies in Montpellier and Florence, Steno returned to Denmark in 1664, hoping to obtain a chair. While in Copenhagen, he published an important work on muscles, in general as well as specific muscles, such as the tongue and the heart (*De musculis et glandulis specimen*). His conclusions about the latter were particularly important: "If, as the acknowledgement of our intellect and senses assures us, we can be certain that the heart has all the same constituents that are found in the muscles, then the heart is not a unique organ, nor is it the seat for a particular substance like fire, congenital warmth or the soul, nor is it the creator of a particular fluid such as the blood or production of certain spirits, namely the animal spirits."

Steno's dreams of being appointed as anatomist to the University of Copenhagen were not fulfilled. Instead, he went back to Paris, and then on to Florence and Rome. Immediately after converting to Catholicism in 1667, he received a summons to Copenhagen with an offer of a chair. However, he chose to continue his studies in Italy, and this turned out to be one of the most scientifically fruitful periods of his life. Not only did Steno continue to pursue his anatomical studies, but he also returned to the geological interests outlined in his *Chaos* manuscript of 1659.

In several areas Steno was heavily influenced by Descartes. Like Descartes, he held mathematics – by which Steno and his contemporaries meant geometry – as the ideal. Inspired by this, in 1667 he published *Elementorum myologiae specimen*, an ambitious attempt to outline a geometric description of the structure and function of muscle fibres. Here Steno attempted to understand muscles, both at rest and when contracted, in mathematical terms. This work was not well received at the time, and remained unappreciated until the 20th century.

Steno's short thesis *Canis carhrariae dissectum caput*, published in 1669, on the dissection of a shark's head was equally significant. In some respects this was a supplement to *Elementorum myologiae specimen*. His discussion of the similarity of shark teeth to the fossils called *glossopteris* ("tongue stones") was particularly important. These fossils were the subject of much discussion at the time, and theories about their origins abounded. Ole Worm had several examples in his museum, and had suggested that there might be several types – some mineral in origin, some animal. Steno argued that the tongue stones were

NICOLAI STENONIS
DE SOLIDO
INTRA SOLIDVM NATVRALITER CONTENTO
DISSERTATIONIS PRODROMVS.

A D
SERENISSIMVM
FERDINANDVM II.
MAGNV M ETRVRIÆ DVCEM.



4976

FLORENTIÆ

Ex Typographia sub signo STELLÆ MDCLXIX.
SVPERIORVM PERMISSV.

De solido – Title page. Steno intended *De solido* to be the preparatory work for a major collection on geology, although such a work never materialised. This treatise is considered to be Steno's greatest scientific work, and remains a key geology text. *De solido* demonstrates that many of the stones with organic forms found in different soil layers were in fact fossils formed in water, and therefore that the Tuscan plains had been sea beds at some point in the distant past.

fossilised shark teeth, not natural mineral structures. His conclusion was definitive: Malta, and other places where large numbers of these tongue stones were found, must once have been under water. Others before him had made the same suggestion, but Steno went further. Empirical observations and rational arguments led him to the conclusion that the Earth must have changed significantly over a very long period of time, and its crust had to consist of the sedimentary layers deposited in the sea and in bodies of fresh water. Over the following years, Steno continued his geological studies. While travelling in Tuscany, he systematically studied the range of minerals found in the area. In 1669, he published his findings in *De solido intra solidum naturaliter contendo – Dissertationis prodromus* (“Provisional announcement of a thesis about permanent bodies, which are found naturally embedded in other bodies), usually referred to as *De solido* or *Prodromus*.

In 1672, following another summons from the Danish King, Steno returned to Copenhagen to take up a position as Royal Anatomist. In January, he staged a major anatomical demonstration, during which he made the statement that was to become famous:

*Pulchra sunt, quae videntur
pulchriora quae sciuntur
longe pulcherrima quae ignorantur*

“Beautiful is that which one sees, more beautiful that which one knows, but by far the most beautiful is that of which one is ignorant”.

Steno’s final stay in Copenhagen was neither long nor happy. He returned to Italy in 1674, and entered the Catholic priesthood in 1675. Two years later, he was made a titular bishop, and became the Apostolic Vicar for North Germany and Scandinavia. At first he lived in Florence, but moved later to Hannover. Here he became acquainted with the German mathematician and philosopher Gottfried Leibniz, who wrote the following about Steno: “He had been a major anatomist and leading expert in the study of nature, but regretfully ceased his research, and from being a major natural scientist became a mediocre theologian.” Steno died in poverty in 1686, and was buried in Florence.

Thanks to his work in anatomy and geology, Steno is one of the great names in Danish scientific history. However, it is not quite clear whether his work actually lived up to its potential. Despite his undeniable origi-



Steno’s discovery that the so-called “tongue stones” were in fact fossilised sharks teeth is now considered to mark the beginning of geology as an exact science. In 2004, when the internationally well-known Danish artist Per Kirkeby, himself a geology graduate, was commissioned to decorate the University’s Museum of Geology using appropriate motifs, he included a small image of a fossilised shark tooth in honour of Steno.

nality and genius, his work did not significantly influence the science of his day. The explanation for this may well be that Steno never completed the work that would have secured his place in posterity. Even his best-known text, *De solido*, is only an announcement of a major work, akin to those of Descartes or Newton, which he never completed despite having collated enough material and was never followed up by a more substantial thesis. Steno's increasing interest in religion led him away from his empirical work on anatomy and geology, and into a more spiritual world to which he dedicated his last efforts.



Ole Rømer (1644-1710), a professor at the University of Copenhagen from 1681-1710, is another towering figure in Danish science. His career can be seen as an archetype of a scholar and administrator in the early stages of the absolute monarchy.

After matriculating, Rømer lived in the home of his preceptor Rasmus Bartholin, one of the leading professors at the University of Copenhagen, and became his assistant. Bartholin was to exert a huge influence upon Rømer's academic career.

The King had entrusted Bartholin with the important task of publishing Tycho Brahe's observations, which had been purchased by Frederik III in 1662. Although almost a hundred years old by then, Brahe's observations were still the most exact and correct in existence, and as such were of major importance for astronomers. Aware of Rømer's mathematical skills, Bartholin delegated the huge task of editing Brahe's work to his gifted assistant. The work provided Rømer with in-depth insight into updated observation principles as well as the associated mathematical problems.

In 1671, the French geodesist and astronomer Jean Picard arrived in Copenhagen. The purpose of his visit was to determine the exact difference in longitude between Brahe's observatory on the island of Hven and the magnificent new observatory that was under construction in Paris. The data would enable astronomers in Paris to make use of Brahe's observations. Picard employed a brand-new method developed by the first director of the Paris Observatory, Jacques Cassini, which was based on observations of Jupiter's moons. Rømer was placed at Picard's disposal and conducted the necessary measurements on Hven. With the King's permission, he accompanied Picard to Paris in 1672, where he soon became a member of the *Académie Royale des Sciences*, founded six years earlier. Rømer continued to edit Brahe's works, but



Ole Rømer (1644-1710) was born in Århus, and attended the local grammar school, where his talent for mathematics was recognised early. In 1662, he matriculated at the University of Copenhagen, where, under the guidance of Professor Rasmus Bartholin, he pursued scientific studies, particularly astronomy. In 1672, he went to Paris, where he was to remain for almost a decade. He became a member of the *Académie Royale des Sciences*, which was of crucial importance for his academic development. Paris offered ample opportunity for both scientific work and practical tasks, such as participation in the construction of the fountains at Versailles. In 1681, Rømer was summoned to Copenhagen to take over several posts ranging from Royal Astronomer to Chief Constable of the city. These offices included him with a range of practical tasks, and he approached these with the same diligence and competence with which he pursued his scientific work.



This copper etching depicts Ole Rømer's small observatory in his professorial residence near the University. Rømer left a large number of manuscripts, some of which were not published until relatively recently. This etching is from his notebook, *Adversaria*, which he intended to publish alongside illustrations of his astronomical instruments.

was soon engaged in the new observatory's most important task – observing the moons of Jupiter. The years spent in Paris were highly fruitful. He presented a number of theses to the *Académie*, including practical, down-to-earth proposals about, for example, pendulum clocks, the best shape for cogs, and a new design for the nozzles of the fountains in Versailles, a project for which he was engaged as a consultant. It was in work such as this that he demonstrated an interest in and aptitude for both theoretical and practical subjects, a combination that would remain the defining feature of Rømer's work throughout his life.

In 1681, Rømer was recalled to Copenhagen to take on a range of offices: Royal Astronomer, Professor of Mathematics, City Engineer, Fire Chief and Chief Constable – and, later, also assessor at the Supreme Court. In 1686, he took over the professorship in astronomy, and was therefore placed in charge of the Round Tower Observatory, whose instruments were by that time hopelessly out of date. Over the following years, his practical abilities turned out to be invaluable, as he supplied the Round Tower Observatory – as well as his own observatories, in his professorial residence near the University and in a village near Copenhagen – with new instruments of his own making.

Rømer tackled all manner of practical problems throughout his career (e.g., the construction of more reliable clocks and other instruments), but he also pursued a major scientific objective: demonstrating the fixed stars' parallax in order to prove that the Earth moved around the Sun. He was on the verge of conducting his major parallax experiment at the time of his death in September 1710. Rømer was far ahead of his time – the fixed stars' parallax was not demonstrated until 1838.

Rømer's achievements were many and varied. He was responsible for a reform of Danish measurements, weights and calibrations in 1683. In Copenhagen, he introduced pavements and street lighting, improved water supplies and set up a fire-fighting service. He successfully completed the first comprehensive measurement of Danish roads, which were then fitted with milestones. And he was responsible for the introduction of the Gregorian calendar in Denmark and Norway in 1700.

His main scientific work was in astronomy, but his interests were much broader. In 1724, inspired by an earlier meeting with Rømer, the German physicist Daniel Fahrenheit set the temperature scale of his thermometer. The scale was based on Rømer's idea of using the freezing and boiling points of water as fixed references for a system of calibra-

tion, which then made it possible to compare measurements performed with different thermometers.

Ole Rømer is the only Danish natural scientist of international repute in a period otherwise characterised by a decline in the natural sciences in Denmark. By the time he died in 1710, he had solved a problem that had vexed scholars for thousands of years – i.e., whether light has a finite speed or not – and yet this was only one of his many achievements. However, his reluctance to publish his results concealed his true stature from the annals of science. Many accounts – including his correspondence with the German polymath Gottfried Leibniz – bear witness to the fact that his perfectionism did not allow him to publish results before he was absolutely convinced that they were correct. It is only quite recently that the full scope of Rømer's work has finally been recognised.

It might be thought that Rømer's activities, as a government official, chief constable etc., would have interfered with his academic work. It is true that he showed an impressive commitment to the political and administrative tasks assigned to him by the absolute monarch. However, there was nothing strange about this – at that time in Denmark it was the rule rather than the exception that professors' competencies were put at the service of the state. Rømer considered the two sides of his activities – practical and academic – to be interrelated. At that time, an individual's position in society under the Danish absolute monarchy was defined by the office he held. In itself, a professorial chair was not held in particularly high esteem. Rømer adroitly positioned himself in such a way that he achieved recognition for his multitudinous efforts, and in 1706 he was rewarded with the title Councillor of State.

The speed of light

Ole Rømer is best known for his discovery of the speed of light. In December 1676, Rømer presented to the *Académie Royale* a four-page thesis, *Démonstration touchant le mouvement de la lumière trouvé par M. Römer de l'Académie Royale des Sciences* ("Demonstration of the movement of light, found by Mr. Rømer of the Royal Academy of Science"), on the speed of light – or "the light's hesitation", a term he coined himself – based on observations of the moons of Jupiter. This became the work that ensured his fame.

Rømer realised that his discovery might encounter resistance, especially from his superior, Cassini, who at that

point was the leading authority on the moons of Jupiter. As Rømer anticipated, Cassini firmly opposed his theory. Rømer therefore opted for a strikingly dramatic and risky strategy. In September 1676, he informed the members of the *Académie Royale* that the next passage of the moons of Jupiter, due in November, would take place 10 minutes later than expected. When this turned out indeed to be the case, Rømer presented the Academy with his explanation, namely that light took time to move.

Rømer's discovery was not accepted until approximately two decades later, but it was received favourably in other European countries and secured Rømer a place at the top of the international academic hierarchy.



The Icelandic Sagas form a unique body of literature dating from the 13th century. Most of them are stories that take place in the Icelandic past. The sagas have fascinated scholars and ordinary readers not only in the Nordic countries but also worldwide. They were preserved in medieval manuscripts that were collected from all over Iceland in the 17th and 18th centuries. The story of how this was done is basically the story of one man, a Danish Professor of Icelandic origin Árni Magnússon (1663-1730).

The Icelandic Sagas were written in Old Norse in the 13th-15th centuries. A rich literary treasure, the Sagas were written in the native language of an area on the periphery of Europe, at a time when most European literature was in Latin – which makes them unique in European culture.

The Danish historian Thomas Bartholin (1659-90), son of anatomist Thomas Bartholin brought the Icelandic manuscripts to the attention of European scholars. In 1677, Bartholin became a professor in politics and history, and was appointed Royal Archivist in 1684. In the year before his death, Bartholin's diligent work resulted in *Antiquitatum Danicarum de causis contemptæ a Danis adhuc gentilibus mortis libri tres ex vetustis codicibus et monumentis hactenus ineditis congesti* ("Three books on Danish Antiquity, about the reasons for the contempt of death by the Danes in pagan times, collected from old, hitherto unpublished manuscripts and memorials"). In this book, he criticised his contemporaries for their lack of interest in Old Norse literature, and presented hundreds of texts in order to prove that they merited attention.

This anthology featured many previously unknown Norse literary works, along with Latin translations that provided European scholars with insight into the old Norse world. The book was a success, and inspired generations of scholars, including Thomas Gray and Thomas



At more than 200 pages, *Flateyjarbók* is the longest extant Icelandic parchment manuscript. Written between 1387-1394, *The Flatey Book* contains mostly sagas about Norwegian Kings, e.g., Olaf Tryggvason (died 1000), Olaf Haraldsson (Saint Olaf, died 1030) and many others. It also contains the "Greenlander Saga", which is one of the oldest Icelandic sagas and one of the earliest descriptions concerning the discovery of North America (*Vinland*). Towards the end of *The Flatey Book* are annals from the period when Julius Caesar became "absolute king of the whole world" and up to 1394. No other Icelandic manuscript incorporated as many sources, and the book has preserved a great deal of interesting material not found elsewhere – yet another reason why it is considered one of the most significant works of Icelandic literature. The page in the illustration depicts Saint Olaf killing a mermaid (bottom right-hand corner).

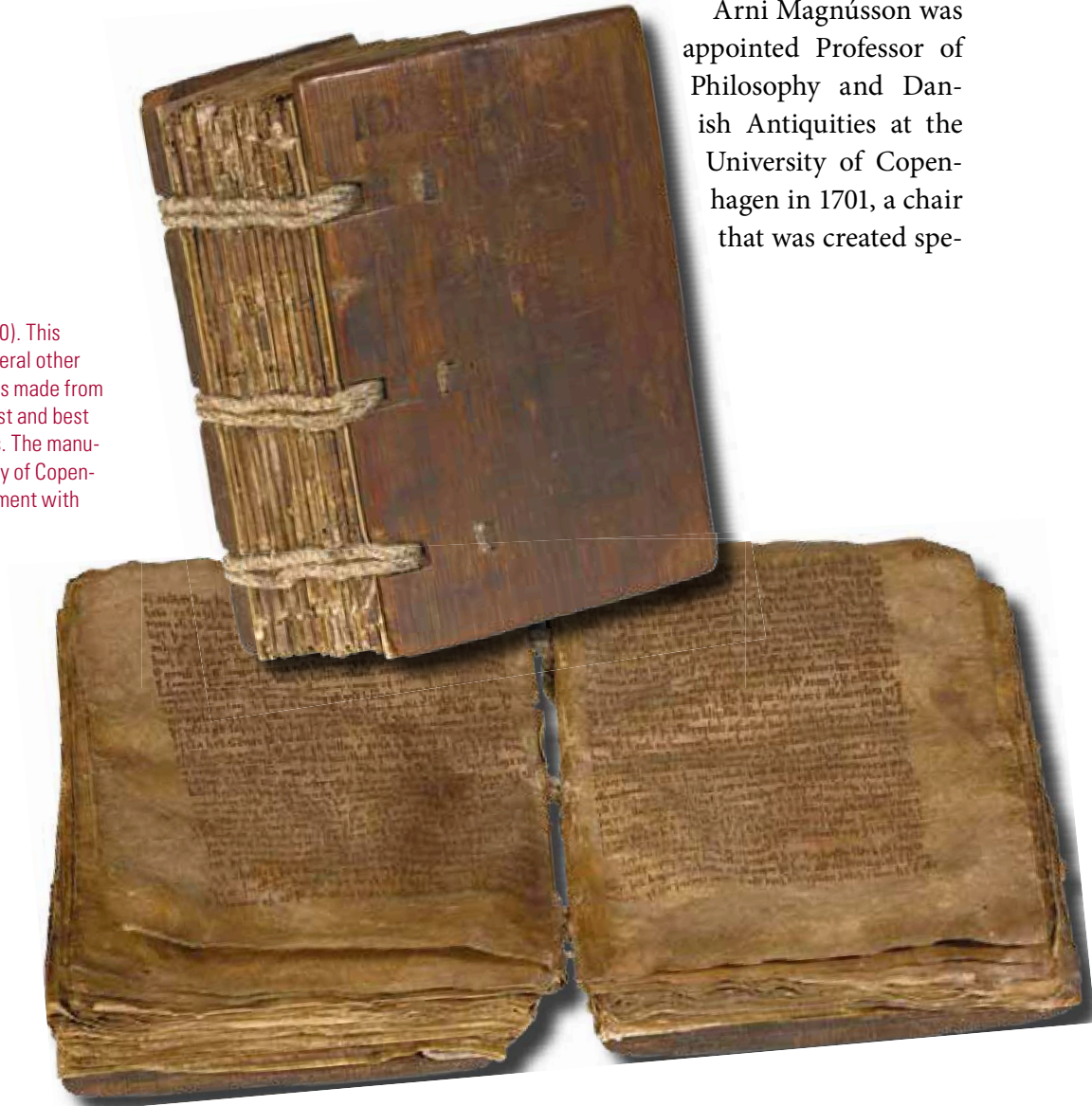
The Bishop of Skálholt, Brynjólfur Sveinsson, secured his place in literary history by giving in 1662 two magnificent works of saga literature (*The Flatey Book* and *Codex Regius of Older Edda*) to King Frederik III, who had sent several expeditions to Iceland to collect manuscripts

Percy in England, Walter Scott in Scotland and Johann Gottfried von Herder in Germany.

Árni Magnússon was Bartholin's most trusted assistant. After passing a theology examination in the summer of 1685, he embarked upon what would turn out to be his life's work: collecting Icelandic manuscripts. His brother Jón wrote that the purpose of Magnússon's first journey back to Iceland was "both to collect relics from ancient times for his master (Thomas Bartholin) and to bid farewell to friends and family, as he did not expect to return again". In 1689-1690, Magnússon went on an expedition to Norway with a similar purpose.

Árni Magnússon was appointed Professor of Philosophy and Danish Antiquities at the University of Copenhagen in 1701, a chair that was created spe-

Njal's Saga in wood binding (c. 1300). This unimpressive little volume, like several other wood-bound saga manuscripts, was made from driftwood. Njal's Saga is the longest and best known of the Icelandic prose sagas. The manuscript is still stored at the University of Copenhagen, even after the return agreement with Iceland.



The Arnamagnæan Foundation

The day before his death, Árni Magnússon bequeathed his collection of books and manuscripts to the University of Copenhagen. He also stipulated that his fortune should be used to found a scholarship named after his Latin name, *Arnas Magnæus*. The Arnamagnæan Scholarship received a Royal Charter in 1760. Its purpose is to fund the study of writings from Magnússon's collections.

It is difficult to overestimate the importance for Old Norse studies of Magnússon's scholarship and the provisions he made for future research. For a quarter of a millennium, the Commission has maintained a major systematic collection that is central to European cultural heritage. It has facilitated work that would otherwise have been impossible.

The collection has also been a rallying point for the preservation of Icelandic – and Faroese – cultures and languages, and was therefore a key factor in the process of achieving Icelandic independence and autonomy for the Faroe Islands in the 20th century. The Arnamagnæan Commission receives an annual grant from the Danish state for work on *A Dictionary of Old Norse Prose*, and for research scholarships that enable Icelandic citizens to study the manuscripts in the Arnamagnæan Collection in Copenhagen. The Commission also administers the Arnamagnæan Research Scholarship, the core of which consists of the fortune Magnússon bequeathed to the collection, which is also allocated to Icelandic philologists, literary researchers and historians for the purpose of studying the archives and collections in Copenhagen.

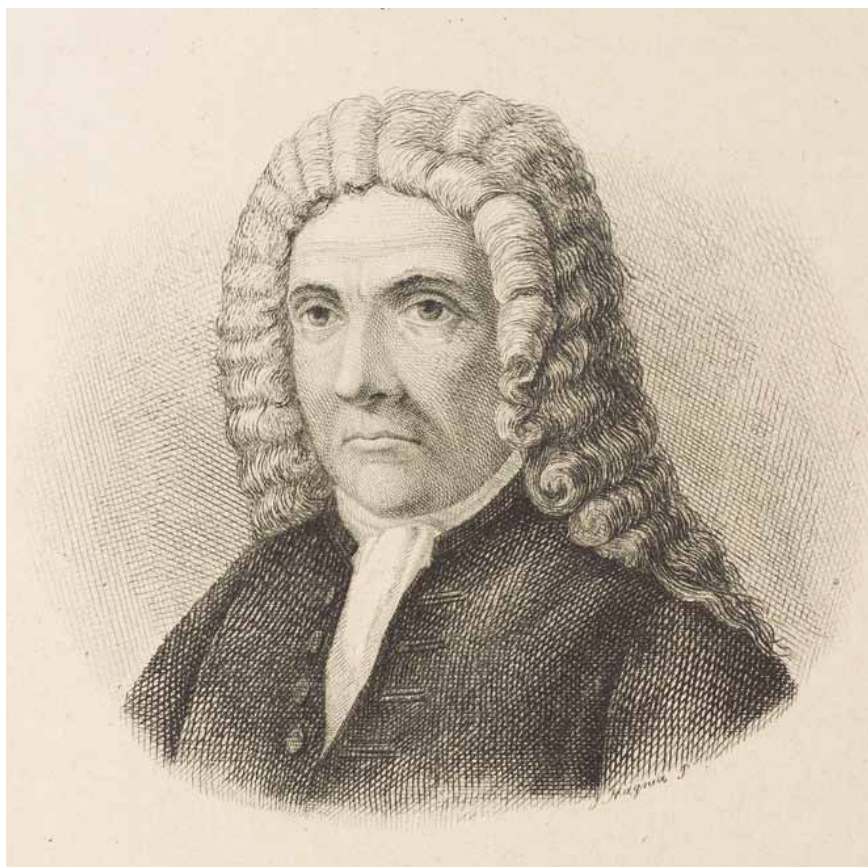
cifically for him, and which he had been promised as early as 1694. In 1702, Árni Magnússon travelled to Iceland as a Royal Commissioner in order to establish a land register. The journey was to last more than a decade, except for two stays in Copenhagen, during one of which he married a well-to-do widow. His new-found wealth enabled him to buy manuscripts, and his post as Royal Commissioner meant that he was able to travel all over Iceland in search of manuscripts. Thus he had the means and the opportunity to collect systematically all of the remaining texts.

The second half of the 17th century saw several Danish and Swedish expeditions in search of manuscripts. However, while they had looked for specific works, e.g., manuscripts renowned for their beautiful decoration, Magnússon spent his time and energy collecting the less spectacular works – obscure and seemingly insignificant manuscripts that

Árni Magnússon (1663-1730) qualified for university from the school at the Icelandic Cathedral of Skálholt in 1683, and passed his theology examination two years later. From 1685-1690, he worked as an assistant to Thomas Bartholin, who sent Magnússon on collecting trips to Iceland and Norway. He spent the years 1694-1696 on a study tour in Germany, and his stay in Leipzig proved particularly fruitful. In 1697, he was appointed Archivist at the National Archive in Copenhagen and in 1701 he became a professor at the University. He was also appointed assistant librarian at the University, and managed the Library from 1721.

The Professor of Nordic Philology at Odense University, Hans Bekker-Nielsen said in 1979 of Magnússon: "The collection of manuscripts and books was Árni Magnússon's pride and joy. His passion was the study of manuscripts, and his methods were strict and philological. As an expert in manuscripts, he had no equal, and in his practical mastery of Norse palaeography, he was far ahead of his time. On the other hand, he did not publish extensively on his research since, as he put it, he 'did not want to fill the world with useless books – there were enough already!'"

This is the only known portrait of Magnússon. The artist is unknown, and both its authenticity and the date are uncertain.



were often dirty and tattered. In doing so, he saved what turned out to be the real treasures from almost certain disintegration.

Magnússon managed to track down almost every manuscript left in Iceland, and he transcribed those that he was not allowed to take with him. He employed Icelandic assistants with a flair for philology and an understanding of his uncompromising demand for highly accurate transcriptions. In 1720, he traded his chair for a better-paid ordinary professorship in history and geography.

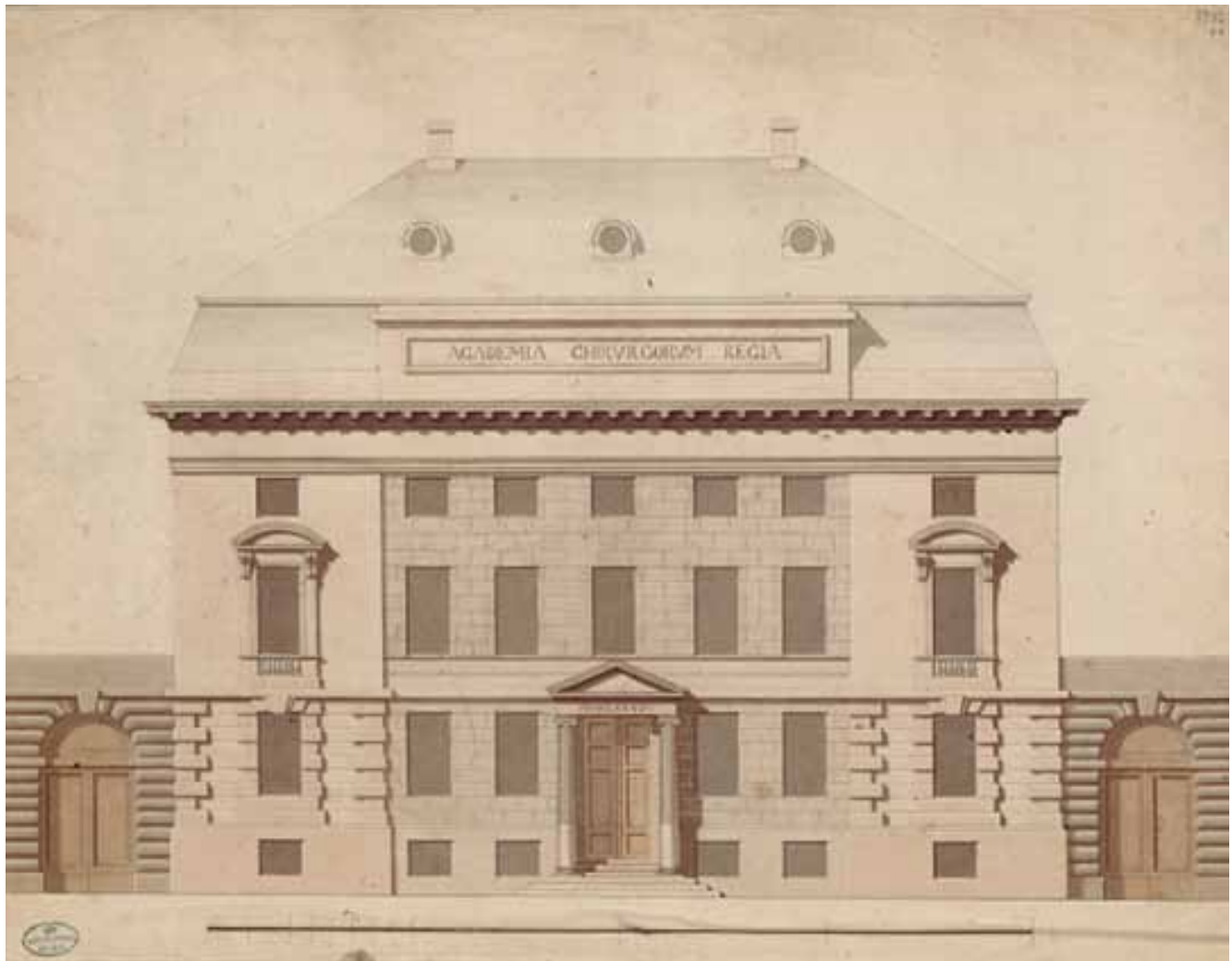
In October 1728, large parts of Copenhagen were devastated by fire, and the flames destroyed some of the University and its library. Magnússon's collection was badly damaged. The medieval parchments were spared, fortunately, but the calamity left Magnússon a broken man. To those who sought to console him, he said, "I have lost my passion." He died just one year later, in January 1730.

The saga of the Icelandic manuscripts

Already in the 19th century, Icelanders started to issue requests that Denmark return Icelandic manuscripts which were considered the most important cultural heritage of Iceland. After Iceland became independent in 1944, the demands were repeated. In 1965, the Danish Parliament decided that a large number of manuscripts were to be returned to the University of Iceland in Reykjavík. This statute gave rise to a legal conflict on the property rights of the manuscripts to be decided upon by the Danish Supreme Court in 1967. Icelanders have highly appreciated the return and not without reason characterised the Danish gesture as “unique in an international context, a testimony to outstanding Danish magnanimity in returning treasures so central to Icelandic cultural heritage.”



When the *Flateyjarbók* and the *Codex Regius* as the first manuscripts were returned to Iceland on 21 April 1971 on a Danish navy ship.



The Surgical Academy was established in 1785 as a special university-level institution independent of the Faculty of Medicine. The spe-

cific purpose of the Surgical Academy was to train doctors for the Danish–Norwegian Army and Navy. The Academy’s training programme

was of a better quality than that of the University, and its graduates often found work as general practitioners in Denmark.

The 17th century heralded a golden age for the Faculty of Medicine at the University of Copenhagen, thanks mainly to the scientific endeavours of its most prominent members, such as Thomas Bartholin, Simon Paulli, Ole Worm, Ole Borch and Steno. On Bartholin's initiative, the Faculty had been attempting to introduce regulation into all fields of medicine since the 1650s. These efforts culminated in the first Danish Medicine Decree in 1672, which stipulated that foreigners who claimed to be medical doctors or licentiates, and who wanted to practise medicine in Denmark, had to be approved by the Faculty. It was decreed that Danes had to acquire a doctorate in medicine as a precondition for working as practitioners – the effect of which is still in force today.

Initially, however, this attempt to raise the academic standards of the profession was not accorded significance. Due to rapid progress in fields such as anatomy in the 17th century, practically trained surgeons had greatly improved their skills. From approximately 1700, surgery was considered a professional field in its own right in Denmark. This did little to close the gulf between academic physicians and surgeons that continued to exist until the end of the 18th century. One source of friction was that the surgeons were often thought to be more skilful doctors than the physicians!

Previously, practical medicine had been the reserve of non-academic barbers, principally because it usually involved surgery, which was not a subject traditionally taught at university. This is part of the explanation for the great interest taken in anatomy at the time. Professor Simon Paulli, among whose academic duties was to take care of surgery, arranged for the newly inaugurated Anatomical Institute (*Domus anatomica*) to be open to barbers.

This desire to expand the professional horizons of Danish barbers was fuelled by the need for competent surgeons in the army and navy.

In the course of the 17th century, it became common for naval vessels and army units to have their own barbers. Contemporary accounts reveal that the government and the military had little faith in the practical skills of academically trained physicians. Generally speaking, doctors were held in low esteem.

In 1666, Thomas Bartholin wrote that he did not know of “any other place where doctors were respected so little. People will barely deign to greet the doctor, erudite, experienced and educated; they will leave him to starve and pursue with him invective, and when extreme need and intense pain finally drives people to seek out the doctor, they pass misjudgement on his every deed. They neither obey the doctor’s orders, nor countenance a methodical course of treatment.”

In the 17th century, Denmark was involved in a series of wars with Sweden. Throughout the 18th century, Denmark–Norway was a highly militarised state that set about re-arming. Military considerations were accorded top priority. In 1736, a special educational establishment opened for surgeons, The Anatomical and Surgical Institute (*Theatrum anatomico-chirurgicum*). In 1785, it was replaced by a special university-

Johannes de Buchwald – surgeon and doctor

Johannes de Buchwald (1658-1738) was the leading professor of medicine in the first half of the 18th century. His career sheds interesting light on the rivalry between surgeons and physicians at the time. In 1676-1680, he was trained as a barber, and then went abroad, working in hospitals in Leiden and Amsterdam. He also spent a year in Vienna, in the service of the Imperial Surgeon and Physician Martin Havelant, during which time he began to take an interest in surgery as a science. Over the following years, he educated himself in both practical skills and theoretical knowledge, and also worked as a ship’s surgeon. He made several trips abroad to study medicine, and acquired the medical licentiate degree in Leiden in 1697. Upon his return to Denmark, he studied anatomy under Caspar Bartholin Jr., and qualified as a doctor of medicine in 1700. He was appointed Royal Physician in 1707, and Counsellor in 1717. The King promised de Buchwald the first vacant professorship of medicine at the University, which he took over the same year. De Buchwald enjoyed widespread respect, both in Denmark and abroad, for his skills as a surgeon and doctor. However, his colleagues at the University were less welcoming, and never allowed him to forget that “he had pushed his way up from the barber’s bowl to the doctor’s hat, yes, even to Professor of Medicine at the University of Copenhagen”.

level institution that was independent of the Faculty of Medicine at the University of Copenhagen: The Surgical Academy (*Academia Chirurgorum Regia*).

As part of its efforts to improve standards at the Faculty of Medicine, the Danish government tried to bring in foreign experts, albeit without much luck at first. However, in 1753, Christian Gottlieb Kratzenstein accepted an extraordinary teaching Chair in Experimental Physics – although he actually lectured in almost all of the natural-science disciplines – and he retained this post for the rest of his life. In 1763, he was appointed professor of medicine. Kratzenstein had great influence on the gradual improvement of the status of the natural sciences in the Faculty.

However, in the second half of the 18th century, the Faculty of Medicine was in a state of crisis; academic standards fell, and so did student numbers (with three to five students matriculating each year). The Faculty also had stiff competition from surgeons.

Recovery was slow and gradual. The 1672 decree that determined the preconditions for practising doctors was tightened with the University Charter of 1732. It stated that candidates for medical doctorates first had to pass an examination on the different medical disciplines. When the University's examinations were reorganised in 1788, this new Charter introduced a specific “final” medical examination. This reorganisation is described as “the great and badly needed rejuvenation of the whole system of teaching, including at the Faculty of Medicine”.

However unsatisfactory medical training may have been, the 18th century also saw the beginnings of another important element in the development of an efficient health service – the first real hospitals.

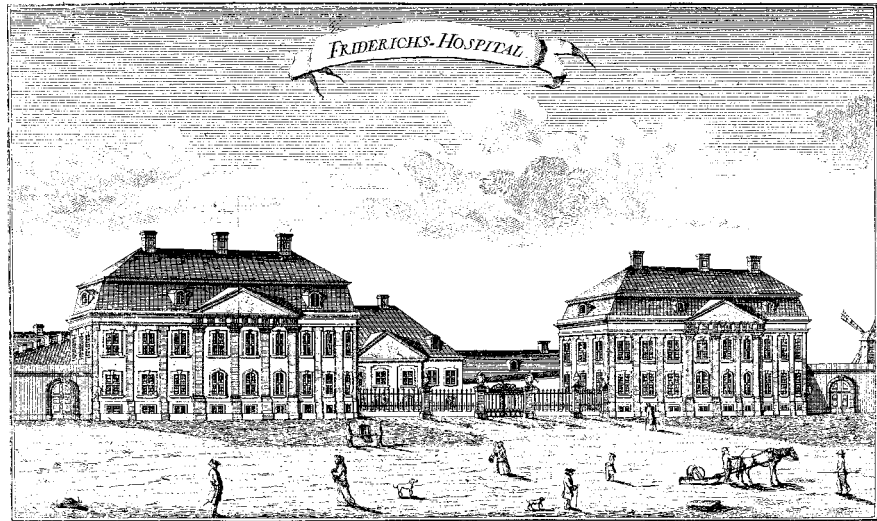
Foundations designed to care for the old and the infirm, who were unable to care for themselves, had existed in most Danish towns since the Middle Ages, but they offered virtually no medical treatment and were therefore not hospitals in the modern sense. At the time, many university cities in other countries had a new type of institution; hospitals that served a dual purpose – taking care of the underprivileged sick and simultaneously providing clinical teaching and medical training.

The first such institution in Denmark was the King Frederik Hospital, founded by Frederik V in 1750. Following the model observed elsewhere in Europe, it had its own management and was not formally affiliated to the University. Built to house 300 patients, its Charter (1756)



Christian Gottlieb Kratzenstein (1723-1795) studied medicine in Halle, Germany, where he attracted such attention for his theses about the use of electricity in the service of medicine that he was appointed Professor of Physics in 1746, at the age of 23. Two years later, he was installed as professor at the university in St Petersburg. In 1753, he was appointed Professor in Experimental Physics at the University of Copenhagen. In 1763, he became Professor of Medicine, and went on to head the Faculty a decade later. He was a member of many bodies, e.g., *Collegium Medicum*, the Royal Danish Academy of Sciences and Letters and the Royal Danish Agricultural Society. He served as the Rector of the University several times. Kratzenstein was a real polyhistor, and he studied almost all scientific disciplines diligently. He was also an excellent and committed teacher. However, his efforts to improve conditions at the University were hampered by his belligerent disposition, which on several occasions brought him into open conflict with colleagues.

Frederik V laid the foundation stone for the King Frederik Hospital in 1752. It opened on his birthday, 31 March, in 1757. The building was designed by the two outstanding Danish architects of the era, Nicolai Eigtved and Lauritz de Thurah. The picture features the hospital complex seen from Amaliegade; the mill in the background still exists on the ramparts of the Citadel of Copenhagen. Today the hospital building houses the Danish Museum of Decorative Art.



stipulated that it was to take in the poor and destitute for the purpose of “curing all illnesses and injuries, which with God’s assistance we might hope to remedy, by dint of healing power or any type of surgical operation”.

There was no mention of teaching in the hospital charter, but as early as 1757, the hospital’s chief medical doctor (*Medicus*) was ordered to organise a weekly clinical seminar for medical and surgical students, with presentations of different diseases, their diagnoses and how they

Grønnegården (The Green Courtyard) the King Frederik Hospital. The hospital unites the Baroque period’s formal demand for symmetry with medical needs for light and fresh air in the beautiful central garden. The hospital served as the University hospital until the early 20th century. It was replaced by the first University of Copenhagen Hospital in 1906, which was built according to the same principle, also featuring a garden at its centre.





The facade of the General Hospital, on Amaliegade. "The General", as it was known, was a foundation for paupers and elderly, who were incapable of taking care of themselves, and thus came under the city of Copenhagen's "poor laws". In the 1770s, the hospital added an infirmary that grew over the years, eventually becoming the city's second hospital in today's sense of the word. However, it continued to be a large poorhouse in which the patients lived and died in wretched conditions, having forfeited all rights as citizens. It was eventually demolished in 1896.

might be treated. He was expected to emphasise his experience in the use of simple and cheap treatments and methods, so that the young and inexperienced students were not led to rely on unnecessarily expensive resources.

Similar duties were not expected of the head surgeon (*Chirurgus*), although he might allow students to observe surgery. For many years, the hospital's teaching activities, which were not co-ordinated with those at the University or the Surgical Academy, remained modest. In the course of 19th century, the clinical teaching was gradually increased. Yet, the King Frederik Hospital became increasingly outmoded. In 1906 it was replaced by the Copenhagen University Hospital (*Rigshospitalet*), which provided an up-to-date framework for clinical teaching.

In 1788, a new Charter for the University of Copenhagen provided the framework for a comprehensive modernisation process. It laid the organisational foundation for the much-needed reform of Danish medical science, although it took a long time before the full impact was felt. The first precondition, a reorganisation of the University's finances, was not completed until around 1830.

The years 1838-1842 saw the reorganisation and co-ordination of Danish medical and surgical training and research, and heralded the



Peder Christian Abildgaard (1740-1801) was one of the pioneers in early Danish biological science. He was apprenticed as a chemist at the age of 16, and passed the university entrance exam four years later, in 1760. In 1762, he became a medical doctor on the basis of a chemistry thesis, and started to study medicine. The same year, King Frederik V sent him to a new veterinary school in Lyon, the first in the world, in order to study methods of combating cattle plague. On his return to Denmark in 1773, Abildgaard founded the veterinary school, modelled on the one in Lyon, at the government's invitation. He remained its director until his death. In 1783, the King purchased Abildgaard's extensive library. It was largely thanks to Abildgaard's efforts that Denmark could declare cattle plague eliminated in the country in 1771. He continued his work as a physician for a number of years, while he pursued his broad interest in the natural sciences. In 1789, Abildgaard founded the Society for Natural History and was the secretary of the Royal Danish Academy of Sciences and Letters for two decades.

The Royal Danish School of Veterinary Science

Military considerations, first and foremost the need for veterinarians to look after the military's many horses, lay behind P. C. Abildgaard's decision to establish a veterinary school on Christianshavn. The school opened in 1773, and it continued to be in operation until it was incorporated into the new Royal Veterinary and Agricultural University in Frederiksberg, a suburb of Copenhagen, in 1856. Abildgaard was succeeded as the director by the eminent veterinarian Erik Viborg, who continued to raise academic standards under his guidance. The Veterinary School also worked closely with the Faculty of Medicine and enjoyed considerable respect internationally.



The Veterinary School on Christianshavn was demolished many years ago. In 1990, F. Harvendel painted the above charming watercolour. It is based on a sketch from a cup on display in the Veterinary Medicine Museum at the University of Copenhagen. The school's founder, P. C. Abildgaard, lived in the building to the right.

advent of modern Danish medical science. The first stage included the introduction of the unified medical/surgical exam in 1838. Although physicians and surgeons were still considered to be independent and equal partners, the new exam obliged them to cooperate in the forma-



tion of a joint educational programme, regardless of the practical inconveniences that this might entail. However, the two institutions were not truly merged, as the University still retained Latin as its academic language, and this acted as a barrier to the non-Latin-speaking surgeons.

Around 1840, it was decided that Danish should replace Latin as the language of instruction and examination at the University, and in 1842 the Faculty of Medicine and the Surgical Academy merged to form the Faculty of Health Sciences. The conditions were finally in place for modern Danish medical research and teaching. In the second half of the 19th century, the University acquired property adjacent to the Sur-

Johan Clemens Tode (1736-1806) was a fascinating figure on the 18th-century Danish medical scene. Born in Holstein, he came to Copenhagen at the age of 21 to train as a surgeon. He studied both surgery and medicine abroad (1763-1768), and acquired his doctorate of medicine upon his return to Copenhagen. In 1771, he was appointed Court Physician and became a member of the medical college (*Collegium Medicum*). In 1774, he was promised a medical chair, but had to wait no less than 23 years. He was forced therefore to make a living from other, less lucrative appointments. The talented but restless Tode participated in nearly all movements of the time and took a particular interest in the further education of doctors and co-founded several medical associations.

Tode's comprehensive literary output covered many areas – practical medicine, popular science, politics, journalism, literature and criticism – and he published a large number of short-lived magazines. He also wrote anecdotes, poems, narratives and a number of articles under pennames and in different styles on a range of subjects, including hygiene and diet – he was the first in Denmark to emphasise the importance of healthy nutrition. In terms of genre, his works were precursors of the contents of modern weekly magazines. Tode's literary talent also came to the fore when he wrote a drama in 1783.

His most significant medical achievement was published in 1774, when he proved that gonorrhoea and syphilis are two different diseases. To this day, he is also highly regarded for his contributions to veterinary sciences.

Combined with excessive drinking and his lack of a permanent appointment – he spent most of his life in abject poverty – his multifarious activities took their toll on his health. He was finally appointed Professor of Medicine in 1797, but suffered a brain haemorrhage the same year. Appointed Rector in 1800-01. In 1805 Tode had no choice but to resign from his chair on grounds of ill health.

Nevertheless, his peers held Tode in high esteem – after his death in 1806, his many friends erected a memorial on his grave with the inscription "Doctor, Friend of Humanity and Poet".



The Municipal Hospital in Copenhagen was designed by architect Christian Hansen and built in 1859-1863. The cholera epidemic of 1853, which took the lives of more than 5,000 people, revealed that health provisions in the capital were wanting in the extreme. Wide-ranging reforms were introduced, including the building of the new, modern Municipal Hospital outside Copenhagen's medieval ramparts. The hospital's design combines classic and modern features. Architecturally, the buildings are inspired by the style of old Byzantine churches, complete with characteristic yellow walls broken by horizontal stripes of red brick. The hospital also reflects the modern era's new approach to European hospital construction – heating and plumbing were installed, and the building had plenty of light, fresh air and space. In the late 20th century, it was gradually replaced by modern hospitals. The Municipal Hospital's buildings were taken over by the University of Copenhagen in 2000 and now houses the Faculty of Social Sciences.

gical Academy. This allowed for the creation of an up-to-date medical research and teaching environment on Bredgade. This was also the first major step in the gradual move away from the older main buildings, which was to characterise the University in the 20th century.

In Denmark as elsewhere medical science to day constitutes one of the most expensive fields of research. At the core of this research is a desire to improve prevention, medicines and methods of treatment. These scientific endeavours are vital, in the literal sense. Medical research today is international and its enormous scope means that it is sometimes difficult to recognize Danish contributions.

Throughout the 20th century and into the 21st, the Faculty of Health Sciences has been renowned as a European high-level faculty capable of playing a key and equal role in international medical-science partnerships, and whose study programmes live up to the demands of modern society. It is the largest Medical School in Scandinavia and the centre of a very strong basic biomedical research. During recent years



the Faculty has had a pivotal role in establishing several highly competitive research centres e.g. within the fields of protein research and ageing.



The Panum Institute. In the 1970s, the Faculty of Health Sciences' theoretical subjects were brought under one roof in the north of Copenhagen. Named after one of the faculty's most prominent 19th-century members, P.L. Panum, this major new building complex also became the home of the Copenhagen School of Dentistry in the early 1990s. It will be subjected to a thorough modernisation programme over the next few years.

Peter Ludvig Panum (1820-1885). A year after passing his medical degree at the University of Copenhagen, Panum in 1846 was sent to the Faroe Islands to help combat a virulent measles epidemic. In his thesis on the successful combating of epidemics, he demonstrated that the contagion is spread from person to person and not, as was generally assumed, through the air. This work broke new ground and made him famous internationally. In 1864, Panum was appointed Professor of Physiology, Physiological Chemistry and Comparative Pathology at the University of Copenhagen, where he played a key role in efforts to renew medical studies right up to his death in 1885.



Ludvig Holberg attending a performance of his play *Erasmus Montanus* at the Royal Theatre in Grønnegade. This historical picture painted in the 19th century by Vilhelm Rosenstand is a part of the decoration of the University of Copenhagen's Ceremonial Hall. The play is about a farmer's son, Rasmus, who returns home on holiday after a year's study. He has Latinised

his name, and is now called *Erasmus Montanus, baccalaureus philosophiae*. Boasting of his academic erudition, Rasmus's behaviour annoys the villagers, especially claiming that the Earth is round. He shows contempt for ordinary people, including his father and brother – those whose labours enabled him to study at the university in the first place. Confronted with the

prospect that his girlfriend will not marry him because of his opinions, Rasmus eventually renounces his belief in a round Earth and learns the lesson how to behave as a true scholar. Holberg had a keen eye for students' appropriation of sterile academic culture and argumentativeness, and Rasmus was a typical example of this.

The academic peaks of the 17th century were followed by a period of conspicuous growth in the medical and scientific disciplines, particularly in surgery and other practical subjects in 18th-century Denmark. Nevertheless, most of this growth occurred outside the University.



Ludvig Holberg (1684-1754) was a dominant figure in Danish intellectual life in the first half of the 18th century. He has been called the Danish Molière because of his comedies, which are still performed today. Holberg travelled intensively in Europe and visited the Netherlands, Great Britain, Germany, France and Italy. He published a book of natural law in Danish in 1716. The following year, he took up a professorship in metaphysics and became Professor of Latin Philology in 1720. From 1730 until his death, he held the Chair in History and Geography. He was Rector from 1735-1736. Being an exceptionally good manager, he was charged with the University's finances a year later, and continued to take care of them until 1751. At the same time, he continued to write, producing not only major historical works, but also his celebrated comedies, moral essays, a satirical novel in Latin called *Nicolai Klimii Iter subterraneum* ("The Subterranean Voyage of Niels Klim"), 1742, which became famous all over Europe, and translated into German, Dutch, French, English, Russian and Hungarian, and much more. He also made important contributions in the field of law. His presentation of natural law, *Naturens og Folkerettens Kundskab*, ("Knowledge of Natural and International Law"), which was published in several editions, was a bestseller in his lifetime and was translated into German and Swedish.

The University's finances – the salary system for professors

Thanks to the substantial income received from the post-Reformation Kings, the University of Copenhagen remained financially secure until the 19th century. Most of its income was generated by farms – formerly Church, monastery and chapter property – to which was added other smaller sources of income.

Until the end of the 18th century, the University's income was predominantly in kind – i.e., corn, cattle and other agricultural produce. Around 1600, the 15 professors decided to divide the estates between them so that each received a portion of the property. This certainly simplified the University's administration, but it meant that the individual professors had to work hard to make sure they received due payment.

The transition to this system had the unintended effect that individual professors, rather than the University as a whole, reaped the benefit of the burgeoning agricultural economy – which, despite all manner of setbacks, such as wars, cattle plague and sand drift, continued to improve throughout the 17th and 18th centuries.

In addition to the revenue from their estates, the professors enjoyed free housing in one of the University's professorial residences. It would be pointless to calculate a professor's overall income in today's money, but Copenhagen professors were certainly remunerated very generously. Indeed, a number of them – the Bartholins are obvious examples – were able to amass large personal fortunes.

Playwright Ludvig Holberg, who served as a professor in the first half of the 18th century, is a case in point. He began his career in 1714 as a poor, unpaid professor and was promised the first salaried vacancy. When he died 40 years later, he was a baron and left a large fortune. Although revenue from his writings contributed substantially to his income, his professor's salary, coupled with his modest lifestyle, was largely responsible for his wealth.

The 18th century was an academic low point for the University, so it was unfortunate that this system of payment – in which most of the University's income was devoted to paying 15 or 16 professors – blocked much-needed innovations. The new University Charter of 1788 increased the number of chairs and the Crown had to step in because the University did not have the funds to cover the salaries of additional professors.

The old system of remuneration was phased out after 1796. After that, as chairs became vacant, the income associated with them was taken over by an academic foundation, which was responsible for paying new professors. This process was completed in 1830, enabling the property that had previously paid 15 professors to cover the salaries of twice as many. In addition, a special foundation had funds at its disposal for the regular appointment of senior associate professors. This turned out to be highly significant for the University's academic expansion in the 19th century.

Following the Reformation, the main purpose of the University of Copenhagen was to provide ministers for the Danish and Norwegian churches. Theology and Philosophy were the only prospering faculties while the Law and Medicine Faculties had few professors and students.

Student numbers remained fairly stable until around 1800. There are no accurate records for this period, but the average annual number of matriculations provides some indication. This figure, calculated over ten-year periods, was around 160-170 in the decades after 1600, rising to just over 200 around 1800.

Examinations with more professional elements were introduced to complement academic degrees. The first was a special theology exam,

designed for those who aspired to jobs in the church and in grammar schools. Refined throughout the 17th century, this exam evolved into its final form in 1707 when a grading system was introduced.

Two new law exams were introduced in 1736: a Latin exam for students based on the same principles as the 1707 theology exam; and a Danish law exam that provided those destined for jobs in local administrative and legal systems with some basic knowledge. From then on, Danish law would constitute the core of the Faculty of Law's activities. Another innovation was that law exams started to be a prerequisite for a number of offices in the Danish Civil Service – and the more elevated the office, the higher the grades required.

The Ludvig Holberg Memorial Fund

Ludvig Holberg continues to play a major role in the cultural self-image of the Norwegian people. As recently as 2003, the Norwegian Parliament established the *Ludvig Holberg Memorial Fund*.

Based at the university in Holberg's home town of Bergen, the Fund awards two annual prizes: the Ludvig Holberg Memorial Prize and the Nils Klim Prize.

The Ludvig Holberg Memorial Prize (NOK 4.5 million / EUR 555,000 / USD 750,000) is awarded "for outstanding scientific work in the humanities, social sciences, law and theology. The prize shall contribute to raising the status of these disciplines in society, and to inspiring children and young people to develop an interest in these fields." Its recipients include Julie Kristeva and Jürgen Habermas.

The Nils Klim Prize is awarded to "young Nordic researchers under 35 who have made an outstanding contribution to research in the arts and humanities, social sciences, law or theology, either within one of these fields or through interdisciplinary work."

Slowly, the University's function in Danish society changed: its main focus moved towards training the civil servants who ran the growing state apparatus. This change was clearly expressed in the University Charter of 1788. It confirmed, once and for all, the University's role as a place of training for the state's civil servants by stipulating final exams in all four Faculties, all of which were subject to uniform guidelines. Ever since then, the relevance of the academic degrees has been mainly significant for career advancement at the University.



Sorø Academy, 1749. In 1623, Christian IV established the Royal Academy for noblemen in Sorø. The Academy was held in high esteem during his lifetime, but lost its glamour after his death (1648), fell into disrepair and was closed in 1665. Thanks in part to an endowment from Ludvig Holberg, it was revived as the "Noble Academy" in Sorø in 1747.

Sorø Academy

The education and training offered by the post-Reformation University of Copenhagen did not meet the needs of the new secular landowning and governing aristocracy. They wanted an education that strengthened their position, comprising physical training, instruction in modern languages and scientific knowledge that would be useful in politics. This would enable them to master effortlessly every conceivable situation that might arise in national administration or international diplomacy. Abroad, special academies emerged to provide this new kind of training, and the study trips of young Danish noblemen changed accordingly. Instead of heading for the universities of Rostock and Wittenberg, noblemen began to converge on new centres of learning in the late 16th century.

To meet the needs of the nobility, an academy devoted to the study of history, political science, law and moral philosophy was set up in Sorø in 1623. It lapsed into dis-

repair after Christian IV's death in 1648, and closed in 1665.

Following prolonged discussions, the "Noble Academy" in Sorø was revived in 1747, partly thanks to Ludvig Holberg's considerable endowment. It functioned in this form until 1813, when it was razed to the ground by fire. It was reorganised in the early 1820s, this time as an ordinary grammar school, albeit with supplementary instruction in political science.

However, this too proved unsatisfactory, and the following decades saw a protracted debate about a reform of the Danish educational system, in which the ideas of the theologian N. F. S. Grundtvig played a significant role. In the end, none of the many proposals put forward for a special teaching institution were implemented, and in the mid-19th century Sorø Academy became an ordinary grammar school.



Peder Kofod Ancher (1710-1788) graduated in theology at the University in 1730, and in law in 1738. He was appointed professor at law in 1741, and a year later he became Doctor of Law. In 1748, he was promoted to the top law professorship. He later served as University Rector on several occasions. He is considered to be the founding father of Danish legal history as a discipline, thanks to his major work on the subject, which was published in two volumes in 1769 and 1776.

Theology, Philosophy and Law, then, loomed large in the 17th and 18th centuries. Physicians played only a minor role, as most – and the best – doctors trained elsewhere. The exact sciences were particularly weak in the 18th century. Only mathematics, physics and astronomy were part of the traditional university subjects. The chair in physics was dispensed with in 1732, and subjects like botany and chemistry were mere adjuncts of medicine. In the 1750s, it even proved impossible to fill a chair in *oeconomie*, which, in accordance with the utilitarian ethos of the day, included an element of natural sciences. Following

The University Almanac, 1782. In 1778, the University's Professor of Astronomy Thomas Bugge took over the post as president of the Royal Danish Agricultural Society. One of the duties of his office was to publish the University's annual almanac, one of the most widely read publications in Denmark. The almanac was particularly important for farmers because it provided information about annual fairs and market days, and was therefore printed in numbers that were otherwise unheard of – sometimes up to 100,000 copies. The almanac was thus not only a money-spinner, but also the obvious choice as a medium for large-scale public education campaigns on subjects such as agrarian reforms and the modernisation of Danish agriculture. As a result of Bugge's editorial work, the Royal Danish Agricultural Society agreed in 1782 to supply an annual presentation on a practical agriculture subject, written in clear and easily understood language. The Society's high-quality articles have now been appearing in the almanac for more than 200 years.



several unsuccessful attempts, an extraordinary professorship in zoology and mineralogy was finally occupied in 1769. This, however, was the full extent of qualified science professors the University was able to deliver at the time.

A new University Charter of 1788 prescribed a small number of new professorships in the natural sciences, but the range of subjects was limited by the lack of specific exams and by the fact that they were rarely taught in grammar schools. This was a serious problem for the govern-

The Royal Danish Academy of Sciences and Letters

The oldest Danish scientific society is the Medical College (*Collegium Medicum*) founded in 1740. However, in the long run, the Royal Danish Academy of Sciences and Letters was to exert the greatest influence. Founded in 1742 on the initiative of the Royal Historiographer Professor Hans Gram, it was given the seal of approval by Christian VI – which was vitally important in the era of Absolutism.

The creation of a periodical was a central activity for all of the scientific societies in Europe, and the Royal Danish Academy of Sciences and Letters was no exception. Its monograph series, popularly known as “Papers” (*Skrifter*), was first published in 1745, and has continued uninterrupted to this day.

Hans Gram wanted the Society’s publications to be published in Latin, the language revered in academia. However, it was decided that they should be in Danish. One reason for this decision was that the Society’s purpose was to spread knowledge of science and its results among the general population, who in the united Danish–Norwegian–Schleswig-Holstein state spoke either Danish or German.

Gram originally envisaged that the Society would busy itself with Danish history and antiquities, but at the founding meeting it was decided that the natural sciences and mathematics should also be included. Initially, the Society comprised four sections, which merged into two in 1866: humanities and sciences.

The Society’s first major undertaking was a geographic and trigonometric survey of Denmark and Schleswig-Holstein in the years 1761-1843, an exercise that produced 24 accurate maps.

In 1876, brewer I. C. Jacobsen established the Carlsberg Foundation for the promotion of research and made the Royal Academy the ward of the foundation. This was an event of major significance for the Society, which, albeit indirectly, now found itself with a sound economic basis for its activities. The Carlsberg Foundation is the majority shareholder in the Carlsberg Breweries, and its board includes five researchers elected by and from the Danish members of the Society.

Since its foundation, the Carlsberg Foundation has been an extraordinarily important source of funding for Danish research, not only in terms of direct activities such as researchers’ salaries and operational expenses for projects, but also for buildings, equipment etc. The Foundation supports research in the natural sciences, medicine, humanities and social sciences, and it gives priority to basic rather than applied research.

ment, which at the time relied heavily on civil servants and their official qualifications. This did not change until a mathematics/scientific teaching exam for schools was introduced in 1883.

Konsistorium as matrimony court. In the 18th century, *Konsistorium*, the Senate at the University of Copenhagen, also served as a court dealing with cases concerning marriage, adultery, broken engagements etc. University lecturers served as judges. The judgements made by Ludvig Holberg in this capacity were later collected and published. He also drew on his court experience when writing a comedy in which a servant lectures his master about the potentially disastrous consequences of breaking off an engagement.



Beginning with the British Royal Society in 1645, and followed by the French *L'Académie Royale des Sciences* in 1666, a number of scholarly societies were set up in Europe in the 17th and 18th centuries. These societies were important because they provided a forum for the natural sciences at a time when European universities were characterised by conservatism and a general rejection of new sciences.

This was certainly very much the case in Denmark. Twenty years after Ole Rømer's death in 1710, the natural sciences were virtually non-existent. Indeed, professors at the University spent much of the 18th century trying, largely successfully, to exclude all but the traditional medieval subjects.

Accordingly, it fell to circles outside the University – particularly the State – to push for the academic and scientific innovations that were introduced in the latter half of the 18th century. The many scholarly societies or academies that were established served as channels through which new knowledge and technology gained a foothold. These new scholarly and scientific forums allowed experts from different disciplines to meet and discuss each other's work, and to publish their findings in their own series of monographs. Academies co-opted their own

Danish expeditions

Expeditions to Africa, Asia and America were common academic activities in the 18th century. In 1737-1738, the naval officer Frederik Ludvig Norden participated in an expedition up the Nile in order to establish trade connections between Denmark and Ethiopia. Though this aim was not achieved, Norden produced drawings and the first reliable maps of the upper Nile, and his work attracted European attention.

The 1761-1767 expedition to Yemen – *Arabia Felix* – had a far greater impact. The expedition was proposed in 1756 by the Göttingen Professor Johan David Michaelis. He succeeded in winning the Danish Minister J. H. E. Bernstorff for the idea, and the Danish King agreed to provide funding. In addition to the acquisition of philological and biblical knowledge, the expedition's other objectives would be to learn about natural history and to collect specimens.

D. G. Kratzenstein, Medical Professor at the University, was charged with planning the natural-science aspects. Among other things, he defined the goals of the expedition, including the definition of longitudinal reckonings, systematic marine-biology surveys and observations of the Venus Passage.

The expedition comprised five researchers and a servant, only one of whom made it back to Denmark. The most prominent researcher was the Swede Per Forsskål, a pupil of Linné and an expert Oriental philologist. He acquired a large herbarium of plant species previously unknown in Europe, as well as significant zoological and mineralogical collections. He may have been the first to describe the migration of birds, and he developed a special technique for preserving fish, copied from botanical herbariums. The "Forsskål Fish Herbarium" is preserved in the University of Copenhagen Zoological Museum.



Carsten Niebuhr (1733-1815) was the sole survivor of a Danish expedition to Yemen, and his successful journey home was a major achievement in itself. Prior to the expedition, he studied land-surveying in Göttingen and astronomy in Copenhagen, and he made several longitudinal reckonings during the expedition. He is mainly remembered for his precise mapping of the area from Suez to Mecca, and his meticulous copies of inscriptions in Persepolis, which later enabled G. F. Grotefend to decipher cuneiform.

members, including famous researchers from other countries who contributed from afar as "corresponding members".

The University Charter of 1788 laid the foundation for a radical re-organisation and expansion programme that would continue until the 20th century. This ongoing process enabled the University to adapt to

Flora Danica

Flora Danica inspired the porcelain of the same name, the most distinguished and interesting set produced by the Royal Copenhagen porcelain factory. The Flora Danica set was ordered by the Danish King in 1790, and was intended as a gift to the Russian Tsarina Catherine II – however, she died before it was completed. The Danish Crown Prince, the future King Frederik VI, took over the order, and the set was delivered in 1802. However, it was incomplete, as production was halted by royal order. The set was only used at special gala banquets, birthdays, weddings etc. Time has taken its toll on the set – of the original 1,802 pieces, just over 1,500 remain.

The decoration on the Flora Danica set was not chosen according to aesthetic criteria. Instead, in keeping with the spirit of the Enlightenment, Royal Copenhagen opted to use the “academic” illustrations from the celebrated botanical volumes.

Production resumed when a committee of women from the Danish bourgeoisie decided to present a Flora Danica set as a wedding gift to Princess Alexandra and the Prince of Wales, the future King Edward VII of Great Britain, in 1863. This new set differed from the first in several ways. The flowers and plants could now be chosen both from the illustrations for the first set and an additional 1,440 new patterns. This time, aesthetic considerations were given top priority, and the committee members opted for flowers that suited their taste. Flora Danica has remained on Royal Copenhagen’s sales list ever since.



The globe flower (*Trollius Europaeus*) in Volume I of *Flora Danica* from 1764. *Flora Danica* is a monumental botanic reference in 54 folio volumes, whose 3,240 illustrations depict every known flower in Denmark as well as a large number of other plants. The first volume was published in 1761, and by the time it was completed in 1883, ten botanists had served as its editor. *Flora Danica* is a scientific and artistic achievement of the highest order. The work appeared in both a hand-coloured version and in a monochromatic edition. In order to guarantee widespread circulation, free copies were sent to bishops, who allocated them to ministers, scholars, schools etc. In return, the recipients were asked to provide information about plants in their area. Its publication was subsidised by the Crown, and consequently the subscription price was low enough for the work to reach a larger audience than would otherwise have been the case.

changes in society. One of its most prominent aspects was the long-overdue breakthrough of the natural sciences, which continued to grow at a rapid pace – eventually assuming a leading position at the University throughout most of the 20th century.

The Charter also represented a radical break with the classic Lutheran university, in which all academic activities were subordinate to theology. In that light, it is less important that the first reforms were minor and few in number.

The Charter of 1788 became the framework for the development of the University. Its degrees were tailored to the needs of the civil service, and that remains the norm to this day. Even though research is only mentioned indirectly as one of the University's main activities, the Charter facilitated the transition to a modern university in the 19th century, which repositioned research and teaching as equally important and closely associated activities.

It was also significant that the four Faculties were finally decreed to be formally equal. Each had a final examination that was directly aimed at specific functions in the civil services – i.e., the legal system and administration; medicine; grammar schools; and the Church.

One innovation was the use of external examiners in degree finals, appointed from circles of prominent practitioners of the subject fields: judges and civil servants for law exams; leading doctors for medical degrees; and bishops and other senior clerics for the theology degree and grammar-school teaching exams. The system implied that there was no question that the University's graduates were qualified for their offices; the external examiners ensured that this was the case. The advantage for University graduates was that they enjoyed a monopoly on state jobs.



The term the “Golden Age” was coined by posterity, referring to the period between 1800 and about 1850 in Denmark. It was an epoch of romanticism and a revived interest in the nation’s glorious past. The best-known and typical examples of Danish Golden Age culture are found in literature and the arts. Similar examples of this combination of past and present with views of a future golden age are found as well in history, language, theology and law. Dolmens and barrows in the landscape, and an abundance of archaeological finds bore witness to the glorious past that was conjured forth in the poems and plays of the celebrated Danish poet Adam Oehlenschläger (1779-1850).

Oehlenschläger became a professor of literature at the University; other noteworthy individuals of the Danish Golden Age culture were also associated with the University of Copenhagen, which at that time was still the only university in the Kingdom of Denmark.

The Golden Age occurred in a time of political disasters. In 1801, the Danish Navy was defeated by a British fleet and Denmark was forced to leave an alliance with other nations that stayed neutral in the Napoleonic wars. Unfounded British suspicions as to the neutrality of Denmark led to an attack and the bombardment of Copenhagen in 1807, with the subsequent surrender of the Danish Navy to the British. Denmark was forced into an infelicitous alliance with France that led to the dissolution of the 400-year old union between Denmark and Norway in 1814. Thus, the years from 1807 till 1814 were a disastrous time for Denmark, which until then had been a relatively strong power in Europe.

The present main building of the University was built in the 1830ies following the destruction of 1807. This building and the decorations inside reflect the new ideals of a University that derived from Berlin and the thinking of Wilhelm von Humboldt. In Denmark, these ideas affected the very concept of what constituted a university. As such, a



The British bombardment of Copenhagen in September 1807 was a disaster not only for the loss of the Navy but probably more for its political consequences, and the damage caused to the city and the University, which was partly burnt down. Eckersberg was one of the most famous Danish Golden Age painters; and this picture gives a vivid impression of the nights of horror when British fire bombs, till then unknown, and for the first time used in a terror bombardment against a civilian population, were fired against the beautiful tower of the main Church of Our Lady, the neighbour of the University to whom it belonged. The Church was completely and deliberately destroyed by the bombs. After the bombardment, a reconstruction programme for the University was started, but it took many years to re-establish the main buildings.

Fortunately, the University Library only suffered slightly from the bombardment in 1807. Paradoxically, one of the few books that was damaged was a copy of Marsilius of Padua's medieval classic from 1324 titled *Defensor Pacis* ("The Defender of Peace"). The copy in the library was printed in 1522.



H. N. Clausen (1793-1872) was a prominent and well-known professor of theology from 1822 to his death. He took an active role in liberal politics and became involved in polemics with N. F. S. Grundtvig, who challenged his view of the on Christianity. His bust can now be seen outside the University's main building.

primary goal for the University was to combine research and lectures based on research in order to educate students to not only be professionals, but also independent, thinking individuals.

The Faculty of Theology remained important, and ministers and students of theology were seen as typical representatives of the University and its culture. A significant feature of Danish cultural life in the 19th century was that the around two thousand ministers in local parishes functioned as centres of academic culture throughout the agricultural country. Very few people had a university education. There were now less than one hundred students matriculated each year from the grammar schools. University education was thus limited to a small and exclusive group of people and after graduation they would be employed in the few academic jobs in the country. One type of position was as a minister, and income would depend on the agricultural value of the property attached to the parish. Since ministers belonged to the academic elite, they played a large role in Danish cultural life. Small surprise that many ministers were also poets. Parish life, the church and its surroundings and the people participating played an important role, as themes in contemporary literature and visual art.



Nicolai Frederik Severin Grundtvig (1773-1872) is one of the most well-known figures in Danish history, and his works are still the object of scientific research. He was educated as a candidate of theology in 1803, served for some time as a teacher or a vicar, and is especially well-known as a poet and author of some of the most beautiful and popular hymns used in the Danish Church. He is also known for his ideas of popular education, which eventually lead to the Danish system of schools (called "*Højskoler*") located in the countryside; the aim was to educate young peasants especially and others who had no possibility of entering a grammar school. The idea that education should not be only for the elite, but for "the people", still plays an important role in Danish debate on the educational system. Theologically Grundtvig represents a view of Christian religion that stressed how man as a human being is in the centre. Christianity therefore does not mean that man should suppress ordinary human feelings or desires. A dominant wing of the Danish Lutheran Church takes its name from him. Grundtvig's notion that country and people are a unity and his stressing that humanity is a dominant qualification have made him an icon in terms of how Danish people understand themselves. He also helped shape their concept of how society should be built on a sense of nationality and equality, providing opportunities for as many people as possible, combined with a basically rather pragmatic attitude towards life. His importance for University studies has not been considerable, but several academic studies have been conducted on his thinking and position in Danish society.

The two best-known Danish theologians of the "Golden Age" were not employed at the University. N. F. S. Grundtvig (1783-1872) started as a fierce critic of Danish theology and its rationalistic thinking which did not correspond to the essence of Christianity. A poet and a writer of Danish hymns, which are popular to this day, he later exerted enormous influence by the impact of his ideas concerning a general education that aimed at expanding knowledge among people who did not have access to academic institutions.

A leading theologian at the time, Professor H. N. Clausen (1793-1877) wrote a book on the Catholic and Lutheran churches that led to

This picture by the painter Wilhelm Bendtz from 1828 is often seen as the most typical representation of student life in Copenhagen in the first part of the 19th century. “The Tobacco Company” shows the students as a closed, elite group enjoying themselves as what was called by contemporary author J. L. Høstrup (known for his comedies on student life), “Masters in the realm of spirit”.



Joachim Frederik Schouw (1789-1852) graduated in Law in 1811. However, his real passion was the natural sciences, so he studied botany as he earned his law degree. Using his reflections on the distribution of plant species in the area under different climatic conditions, he addressed the question of the beginnings of organic life and the origin and development of species. He was appointed Professor of Botany in 1821.

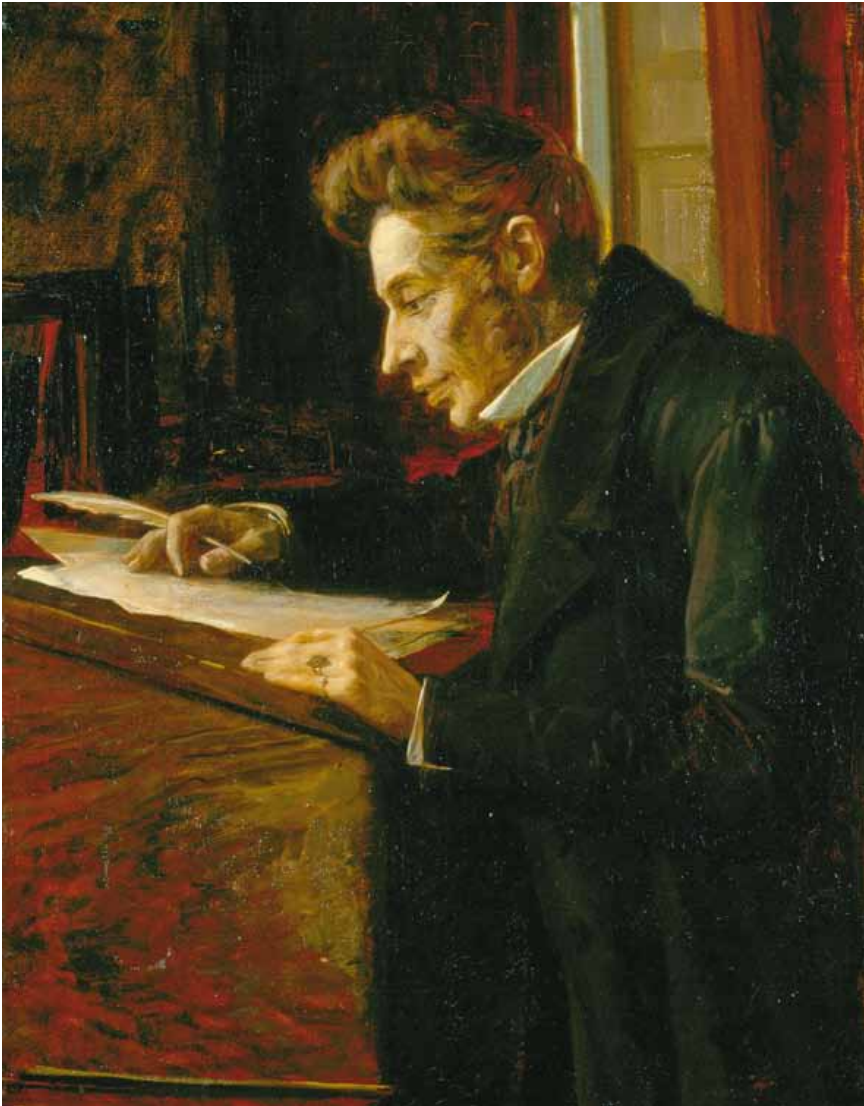
Schouw belonged to the liberal wing in the political debates of the 1830s, and in 1830 he became the first president of the “Assembly of the Estates of the Realm”, a precursor of the democratic parliament. He continued to be an influential figure in the Assembly until the constitution was invoked in 1849. In 1848, he was elected to chair the constituent national assembly for the constitution in 1849 he was elected to Parliament. This bust of him by H. W. Bissen was erected in front of the main University building in 1875.



polemics with Grundtvig, who was, incidentally, subject to censorship for his way of arguing.

Søren Kierkegaard (1813-1855) studied theology in Copenhagen in the 1830s. His writings, based on his religious thinking, are probably the most important Danish contribution at a global level to modern theology and existentialist philosophy. Today he is considered one of the finest representatives of the “Golden Age”, although he kept his distance from contemporary Copenhagen cultural circles.

The Faculty of Law was small, with few professors, and the best lawyers were not necessarily members of the Faculty. A leading figure in Danish jurisprudence was Anders Sandøe Ørsted (a brother of physicist H. C. Ørsted, presented in Chapter 16), who made his career as a judge



Together with the poet Hans Christian Andersen (1805-1875), the philosopher Søren Kierkegaard is probably the Danish Golden Age figure most well known outside Denmark. Kierkegaard was born in Copenhagen and studied theology at the University from 1830 to 1840. He wrote a thesis on the concept of irony. His collected works, not only those that were published, but also his notes and entries in diaries, are still fantastic reading and have made him world famous for his thinking on religiosity and the basic conditions of human life. You may choose to see him primarily as a theologian, but he is also considered a forerunner of existentialistic philosophy. In his last years, he became a fierce critic of the established Danish church. People from all over the world learn Danish in order to read his work in its original language, which for him is such a personal means of expression that he can be ranked as one of the most prominent users of Danish language. Today his work is studied intensively by Danish and foreign scholars and a Centre for the Study of Søren Kierkegaard was created that now forms part of the Faculty of Theology. The Centre in recent years edited his complete works in a new critical and annotated edition.

and civil servant and was never attached to the Faculty, although his prolific writing had a great influence on Danish law. In fact, German jurisprudence also greatly influenced Danish law. Although the so-called German historical school was affected by Roman law, it could be considered a legal parallel to romanticism, and this view of law as a result of historical processes and as living in the spirit of the people influenced junior members of the Faculty. Generally, Danish law, and especially Danish writing on the law, to a great degree was influenced by German thinking. Most law professors had studied in Germany; they knew German legal authorities and German legal concepts were assimilated in Danish law.



Poet Adam Oehlenschläger (1779-1850) is often considered the founder of Danish Romantic poetry and literature. He became famous when in 1803 he published a collection of poems, one of which, in beautiful, strong language lamented that two golden horns from antiquity had been stolen and destroyed. Oehlenschläger constructed the theft as a revenge of the old Gods that their gift to present time had not been respected and called for a new Golden Age. He is the poet of the Danish national anthem. In 1810, he was appointed Professor of Aesthetics at the University.



Anders Sandøe Ørsted (1778-1860) is the most famous Danish lawyer in the first part of the 19th century. He was educated at the Faculty of Law at the University of Copenhagen, but apart from private teaching of law students, he was not attached to the University. He followed a career as a judge and later as a leading civil servant in the Royal administration. He entered Parliament in 1849, and served as Prime Minister in 1854-1855. His contributions to Danish law consist in a series of important articles and books on most subjects within the field of law. He is often considered the founder of modern Danish legal science and his legacy was important for later generations of legal scholars. He was influenced by German law of his time, especially in the field of criminal law. Also knew Friedrich Carl von Savigny and his school and was well versed in modern French law. He often referred to foreign law as a means to improve Danish law. Apart from his position as a lawyer and civil servant, Ørsted also took an active part in Danish cultural life.

History and linguistics were also influenced by romantic Golden Age thinking. Several men of letters without university tenure contributed to a new interest in history. In 1807, the precursor of the present-day National Museum, a collection of Danish prehistoric Antiquities, was founded as tangible evidence of interest in history and archaeology. An archaeologist without any university connection, Christian Jür-



Two gouaches, by P. C. Rosengren, of the idyllic University courtyard as it looked after the reconstruction resulting from the bombardment in 1807. Both pictures give an impression of serenity and peace, which however was only the surface of a very conflict-ridden period during the early 19th century.

gensen Thomsen, conceived the useful division of the collection into the Stone Age, Bronze Age and Iron Age. For several years after 1811, the Danish classical archaeologist P. O. Brøndsted (1780-1842) was a lecturer of history at the University, but he soon left in order to study ancient Roman and Greek cultures in their respective countries. The Danish linguist Rasmus Rask (1787-1832) was only appointed Professor of Oriental Languages a year before his death. His impact on comparative linguistics made him well-known internationally; his studies of Nordic languages can be considered notable achievements as well, since he created the basis for the Department of Nordic Languages.

Philosophy at the time was influenced by German philosophers Immanuel Kant, Fichte and Hegel. F. C. Sibbern (1785-1872), who was a professor of philosophy for 57 years, was also an author. Poul Martin Møller (1794-1838) was a well-known poet, and a professor of philosophy. Both Sibbern and Møller were influenced by Hegel and debated his philosophy, with Møller being the most Hegelian of the two. Rasmus Nielsen (1809-1883) dominated in the period 1841-1883 as a professor of philosophy; he was the first person in University circles to understand the philosophical implications of Kierkegaard's thinking. Another prominent Danish Hegelian was the poet J. L. Heiberg (1791-1860), who became a doctor in literature, but never applied for a professorship. He lived as a poet and dramatist and his plays are still performed in Danish theatres.



The University's first main building was erected after the Lutheran Reformation in 1536. This building was razed to the ground by the Great Fire of Copenhagen in 1728. It was rebuilt, but burnt down again during the British bombardment in 1807. Built between 1829-1836 by architect Peder Malling (1781-1865), the present building contains teaching facilities and the Ceremonial Hall.

The eagle over the entrance portal, which would later become the emblem of the University, was placed there at the suggestion of Professor of Theology M. H. Hohlenberg, who considered the eagle, in soaring flight and with acute vision, a symbol of thinking and science. This was expressed in the inscription *Coelestem adspicit lucem* ("The eagle looks upon the heavenly light"). The main building was to

be the setting for almost all of the University's courses over the next century, and this is still where theologians, lawyers and economists receive most of their education. P. C. Rosen-green's gouache (c. 1860) provides an impression of the atmosphere on the University Square just before the University Library was built.

Constructing the University Campus in the 19th century

14

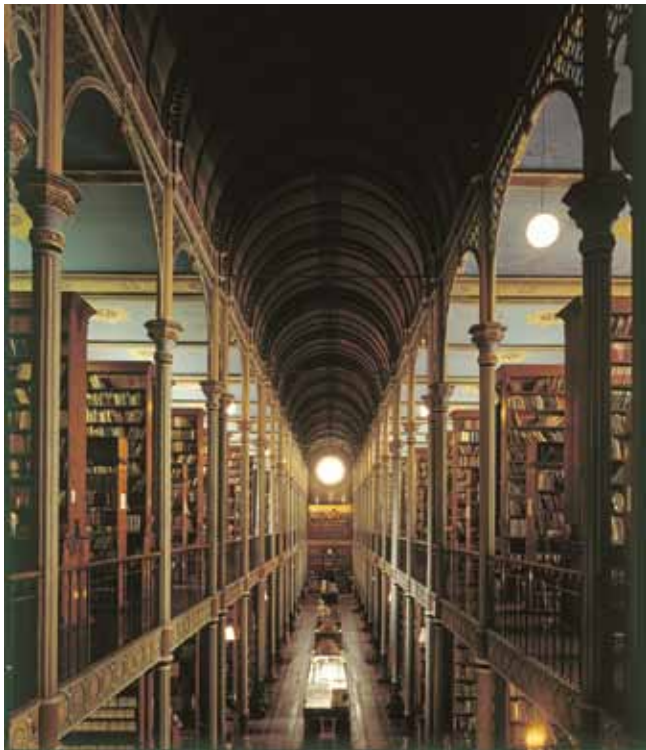
The British bombardment of Copenhagen in 1807 left most of the University buildings in ruins. In the wake of participation in the Napoleonic wars as a French ally, national bankruptcy in 1813 and the loss of Norway in 1814, Minister of Finance Ernst Schimmelmann proposed cuts in University funding due to tight finances. Tradition has it that King Frederik VI replied: “Just because we are poor, there is no need to be stupid as well,” words that came to be programmatic of the University’s future. The disastrous years between 1807-1814 were followed by a period of initiative and progress.

It took nearly fifteen years before the rebuilding of the University Campus in the centre of Copenhagen commenced in earnest. However, once started, progress was rapid. Like a phoenix from the ashes, a



Established in 1785, the Surgical Academy was an autonomous university-level institution, independent of the Faculty of Medicine. Its surgery graduates proved highly successful, and in time came to constitute a significant proportion of the country’s doctors. Around 1800, the established practice was that most of the University’s medical graduates also sat an examination at the Surgical Academy. In 1838, the two institutions jointly introduced a combined Doctor’s Examination (*examen medico-chirurgico*). Four years later, the Surgical Academy merged with the Faculty of Medicine to form the Faculty of Medical Sciences. The Faculty acquired adjoining properties in the second half of the century, thus establishing a complex of buildings that housed most of the University’s theoretical medical science activities until after World War II.

new, modern and relatively well-equipped university complex emerged from the rubble. Having exhausted the potential of the Latin Quarter in the second half of the 19th century, the University moved more and more of its activities to other locations in the city. The reorganisation was complicated, and impacted every aspect of University activity. Essentially, the 1788 Charter set the frame for the development until 1970, with minor amendments along the way, e.g., empowering new subject fields to participate in and influence University management.



The new University Library 1861. The architect Johan Daniel Herholdt designed this building in 1856-1861 to house the University Library, which was founded in 1482. In 1996-97, a comprehensive and successful restoration programme converted the beautiful Reading Room, previously a closed storage facility, into a modern study area, complete with computers and open shelves. Although the façade is of red brick and fancifully elaborated, it is yellow brick that dominates the interior. Herholdt's use of brick was pioneering at the time, and contributed substantially to its popularity in modern Danish architecture. The Reading Room is open to the public and is noteworthy for its beautifully decorated cast-iron construction. The frescoes on the ceiling are by George Hilker.

The Charter made it possible to organise the University's teaching and academic activities along the lines of Humboldt University in Berlin. The University's substantial income streams had not been put to effi-



The University of Copenhagen Zoological Museum was built in 1871 by architect Christian Hansen. It was the first building in Denmark designed specifically to be a museum. Built in an epoch with no effective sources of artificial light, maximising natural light was a primary consideration for any exhibition room. Accordingly, the collections were positioned around a central hall that functioned as a light well, casting daylight on the exhibits. This middle-hall principle was considered radical in its day, and was later copied in Hamburg, London, Paris and elsewhere. The museum was also innovative in terms of its presentation of exhibits. The first director, Professor Japetus Steenstrup, organised the museum into three departments: the most primitive species were on the ground floor; arthropods were on the second floor; and the most advanced species were on the upper floor. Visitors would advance through evolutionary history as they ascended through the building. The Zoological Museum moved in 1965. Nowadays, the building is used by the University administration.



The new Astronomy Observatory, 1861. The decision to place an observatory on the site of a former rampart of the Copenhagen fortifications turned out to be problematic, because observations were difficult due to light pollution. However, it was fortunate for the city of Copenhagen that the observatory and the Botanical Garden was placed here, since this ultimately ensured that present-day Copenhagen has a garland of picturesque parks around the medieval district.

cient use by outmoded administrative practices. A reorganisation of the University finances was therefore essential to meet the challenges posed by an ambitious building programme, the introduction of new subjects and increasing student numbers.



The great auditorium in the University Annex St. Pedersstræde.

On the initiative of Professor of Physics H. C. Ørsted, a proposal from astronomer and mathematician G.F. Ursin for a dedicated school for craftsmen, or a trade school, in 1829, led to the establishment of the *Polyteknisk Lærestalt* (College of Advanced Technology), now the Technical University of Denmark. This new institution conferred engineering degrees of a high standard that met the needs of the expanding industrial society. The College developed in close symbiosis with the University, to the benefit of both parties.

The College initially was housed in a couple of the University's older buildings. In 1860-1861, the present University Annex was built for the College. The Annex was taken over by the University in 1890, when the College moved to a large new building in the Botanical Gardens.

To a certain extent, the University and the College shared both professors and courses in basic subjects such as mathematics, physics and chemistry. The establishment of the College of Advanced Technology therefore significantly strengthened the scientific environment in 19th-century Denmark.

The Palm House in the Botanical Gardens. The University's first Botanical Gardens were established in 1600, on roughly the same site as the Zoological Museum. They have been re-located several times, finally finding a permanent home after the University took over land from Copenhagen's former fortifications. The Botanical Gardens were moved to this location in 1871-1874, and were opened to the public at the request of the City of Copenhagen. In a successful blend of science and recreation, the Gardens are now home to approximately 13,000 plants. The major complex of greenhouses, with the Palm House the jewel in its crown, was completed in 1874 thanks to financial support from the founder of Carlsberg Breweries, I. C. Jacobsen.



The process of renewing the University's property portfolio began in the early 1820s. It turned out to be a vast project that would take more than three quarters of a century to complete, but it secured a physical framework that was to fulfil the majority of the University's needs until well into the 20th century.

The Geological Museum. In the last decades of the 19th century, several new buildings were erected for the University and the College of Advanced Technology on the edge of the Botanical Gardens. In 1888, construction began on a large complex in the south-eastern corner, designed by architect Hans J. Holm. It originally housed the University's Mineralogical Museum and Chemical Laboratory, and is today home to the Geological Museum, which includes rich Arctic collections of international renown.





In 1890, the College of Advanced Technology (*Polyteknisk Lærestalt*) moved into the large complex at the north-east corner of the Botanical Garden, designed by architect Daniel Herholdt. It was housed here until 1965. The building now houses the University's biology department.



Rigshospitalet, Copenhagen University Hospital. Built in 1903-1906 on Blegdam Common in the northern part of Copenhagen and designed by architects Martin Borch and Kristofer Varming, Copenhagen University Hospital replaced the outdated King Frederik Hospital on Bredgade. The building was the capstone of the University's 19th century programme. The hospital fulfils a dual purpose – it is the leading hospital in the Danish health services, and

it also functions as a University and teaching hospital, which is why the construction was financed by the large student fund *Kommunitet*. This new hospital provided the University with an up-to-date setting for clinical teaching, and inspired the development of the University Park, where much of the University's medical and scientific instruction and research converged in the 20th century.



In the 18th century, the academic standards of the natural sciences at the University of Copenhagen were rather low. The first half of the 19th century, however, saw rapid progress, culminating in the establishment of a Faculty of Science in 1850. The breakthrough for the natural sciences – in modern terms – was largely due to the persistence of one man, physicist H. C. Ørsted. A brilliant political tactician, Ørsted had close connections with the government through his brother Anders Sandøe Ørsted, who was a lawyer and civil servant. Even so, it was only after years of hard work that Ørsted succeeded in achieving full equality for the natural sciences at the University. In addition to the formation of the Faculty of Science, Ørsted must also be credited for establishing chairs in all of the main science subjects, as well as for introducing modern science degrees in Denmark during the first half of the 19th century.

Another important initiative was the founding of the *Polyteknisk Lærestalt* (“College of Advanced Technology”), now the Technical University of Denmark. Originally intended to be a modest craftsmen’s school, the College was instead granted university-level status to train engineers for the rapidly expanding Danish industry. Ørsted was its first director and his official residence was the College’s first home. The College worked in close symbiosis with the University until it moved to the north of Copenhagen in the 1960s.

As a scientist, Ørsted contributed to chemistry by producing aluminium in 1825; but, above all, his name is associated with the discovery of electromagnetism in 1820. He nonetheless had little understanding of the practical applications of this discovery. Instead, he saw it as a testimony to what had inspired and interested him throughout his life – namely, the mission of natural science and the natural laws to unify truth with beauty and benevolence. This lifelong fascination was reflected in his final great work *Aanden i Naturen* (“The Spirit in Nature”,



Hans Christian Ørsted (1777-1851) finished grammar school in 1793 and graduated with distinction in pharmacy in 1797. In 1799, he obtained his doctorate with a thesis on natural philosophy, a subject that fascinated him for the rest of his life. In 1800, he became an associate professor of chemistry, at the time still an ancillary subject under the Faculty of Medicine. In 1806, as provided for in the University Charter, a professorship in physics was set up at the Faculty of Philosophy. Ørsted was appointed to it and retained this chair until his death.

C. W. Eckersberg painted Ørsted at the peak of his career in 1822, following his discovery of electromagnetism. Ørsted is holding a silver plate featuring a sound image, a phenomenon that fascinated Ørsted. Sound images consist of the patterns that appear on a plate strewn with fine sand when the edge of the plate is touched with a violin bow. Ørsted proved that the basic shape for a pure tone is the hyperbola – a mathematical form in which he saw proof of the relationship between beauty (music) and reason (mathematics). In the background is a piezometer, an instrument used for quantifying pressure in liquids.



The Nordic Meeting of natural scientists in 1847.. This historical picture painted in the 19th century by Erik Henningsen is a part of the decoration of the University of Copenhagen's Ceremonial Hall. The picture was painted half a century after the event, and is an idealised, partly fictitious representation of an excursion to Roskilde. The cathedral (in the background) is the burial place for Danish Kings. Henningsen painted the participants at the end of an open-air gala dinner in front of the bishop's residence in Roskilde. H. C. Ørsted, who presided at the meeting, is delivering a speech. The picture is noteworthy for its portraits of the leading Nordic natural scientists. Henningsen took great trouble to procure photographs and life-like original pictures. This means that everybody in the painting can be identified. The picture is composed so that the most prominent participants are in the foreground.

Scandinavism and co-operation between Nordic universities

After the Napoleonic Wars, many European countries made efforts to promote and organise the natural sciences. It was important for these sciences that they achieve the cultural and social recognition enjoyed by the traditional university subject fields. One method of doing so was to arrange international scientific congresses, in which the German universities were particularly active, and which attracted prominent Scandinavian natural scientists such as H. C. Ørsted.

At the same time, the movement known as Scandinavism was emerging in the Nordic countries. This was an intellectual and political movement especially supported by university students and professors, designed to emphasise the common bonds between the Nordic countries. For example, this occurred through formalised research co-operation, typically by regular meetings involving researchers in a particular discipline – medicine, law, history etc. – at venues that

alternated between the Nordic countries. Many such meetings still take place today.

Natural scientists also organised regular Nordic meetings. The first was held in Gothenburg in 1839. In the 1840s, when Scandinavism was at its peak, there were meetings in Copenhagen in 1840 and 1847, in Stockholm in 1842, and in Oslo in 1844.

In 1848-1850, in a rebellion provoked by the German-speaking nationalists in the duchy of Schleswig and the duchy of Holstein, which was also part of the German Federation, broke out into open war. Swedish and Norwegian volunteers participated in the combat on the Danish side, but there was no official support for Denmark from Sweden and Norway. The Scandinavian movement was weakened in the years that followed and finally given up after 1864. This was reflected in a decrease in the number of regular meetings of Nordic natural scientists.

Nordic universities



Mariboegården, King Frederik University, in Oslo, Norway. Bought in 1820 by the University and for the first generation centre of most of its activities.

The desire for a Norwegian university was expressed for the first time at the last assembly of Estates of the Realm in Norway in 1661. Following decades of heated debate in Denmark and Norway, the Norwegian university was finally established by royal ordinance in 1811. It was named the King Frederik University (*Universitas regia Fredericiana*) after its founder Frederik VI. In 1939, the name was changed to the University of Oslo (*Universitas Osloensis*). Its beginnings were modest: the corps of teachers consisted of five professors and an associate professor, and the 17 students, who started in 1813, received their instruction in rented rooms. The three University buildings on Karl Johan Street were not completed until 1852. In the early 20th century, space in Oslo was at a premium, and in 1923 a plan was adopted to move to Blindern, outside the city. The process of relocating the University's activities began in 1931. Only the Faculty of Law now remains on Karl Johan.

The University of Oslo was set up with the traditional four faculties: Theology, Law, Medicine and Philosophy. In 1861, Natural Science became a faculty in its own right. Since World War Two, three more faculties have been added: in 1959 the Dental School was incorporated as the Faculty of Dentistry; the Faculty of Social Sciences was created in 1964; and the Faculty of Education was established in 1996. Throughout the 19th century, in addition to its function as an educational and research institution, the University of Oslo played an important role in the cultural, linguistic and political development of Norwegian society that followed in the wake of the Eidsvoll Constitution of 1814. By the end of the 20th century, it had become a large international university. Today, its more than 100 departments and centres provide a setting for teaching and research in a broad range of subjects. The University also owns and runs most of the historical, cultural and natural history museums in Oslo.



The University of Lund was founded in 1666, a few years after the area of southern Sweden (i.e., Scania, Halland and Blekinge) became part of Sweden as a result of the 1658 peace treaty. It was important for Sweden to have a university in the region in order to bolster the government's efforts to integrate the conquered provinces even if it was stated in the peace treaty that Danish law should be respected. It also meant that local students who had previously enjoyed easy access to the University of Copenhagen would not find their educational opportunities radically reduced – as would be the case if they were forced to make the 600-kilometre trek to the University of Uppsala.

An important move towards Nordic understanding was the celebration of the Danish poet Adam Oehlenschläger as Nordic poet laureate in the Cathedral of Lund 1829.

The University of Lund has remained an important cultural centre in southern Sweden since its foundation. It is now one of the largest universities in the northern countries, with some 40,000 students. In October 1997, the Scanian and east-Danish universities joined forces to set up the Øresund University – a network of universities in the Copenhagen region and Scania.

Degrees in the natural sciences

Unlike the other faculties, the Faculty of Science initially was unable to offer a final degree examination, since the Danish labour market of the day had no demand for natural scientists. Until the end of the 19th century, grammar school education was totally dominated by classical philology, philosophy etc.

In order to graduate formally, natural science students were obliged to take a doctorate in philosophy. However, in 1848, the University was authorised to compose individual examinations in the philosophical and scientific disciplines whenever there was no relevant final examination.

This led to an ongoing expansion of the University's

range of subject fields in the humanities and natural sciences. In the 1870s, the grammar schools were replaced by modern upper-secondary schools, in which mathematics, physics, chemistry, natural history (botany, zoology and geology) and geography were a part of the syllabus. Therefore, a final degree examination in the natural sciences was introduced in 1883.

For many years, upper-secondary schools were the only institutions that offered posts for natural science graduates, so the Faculty of Science long remained the smallest faculty at the University in terms of student enrolment; it did not outstrip the Faculty of Theology until 1940.

1851-1852), and gained him a reputation as a metaphysicist in some countries.

Ørsted also took a deep interest in Danish language throughout his life. He consciously sought to create Danish vocabulary that could replace foreign loanwords in the natural sciences as well as other fields. He coined more than 2,000 words, many of which gained a permanent foothold in the Danish language.

During the fifty years he was affiliated with the University of Copenhagen, Ørsted was a dominant figure in Danish science and intellectual life. His contemporaries praised his personal characteristics, particularly his willingness to help, and his diligence, broad-mindedness and tolerance. From a long-term perspective, his achievement is, however, problematic. Admittedly, Danish physicists and chemists must be grateful to him as the driving force behind efforts to improve conditions for their work, but he did not leave behind any outstanding successors. This is partly because his subjects – physics and chemis-

try – were still new in his day, and there was not yet a tradition of systematic collaboration or training new researchers. However, it was also partly because Ørsted's view of science and his lifelong preoccupation with natural philosophy were rooted in the 18th century rather than the 19th. His strength lay in his experiments, as witnessed by his descriptions of electromagnetism, his studies of the compressible nature of fluids and his work in chemistry – especially the discovery of aluminium.

In the final analysis, Ørsted's mastery of even elementary mathematics was incomplete, and his basic, natural philosophy could sometimes lead to peculiar conclusions about the nature of physical phenomena. As a result, his textbooks soon went out of use, and he had little influence on the long-term development of physics. His greatest legacy rests on the role he played in creating solid organisational frameworks for the expansion of the natural sciences in Denmark.

The evolution of the Faculty of Science, 1850-2008

List of teachers in the Faculty of Science in selected years from the period 1850-2008

YEAR:	PROFESSORS	ASSOC./ASST. PROFS. etc.	TOTAL
1850:	7	0	7
1871:	7	1	8
1892:	10	0	10
1919:	15	3	18
1931:	16	3	19
1958:	36	4	40
1973:	62	409	471
1981:	60	443	503
1990:	50	424	474
1999:	73	422	495
2008:	109	357	466

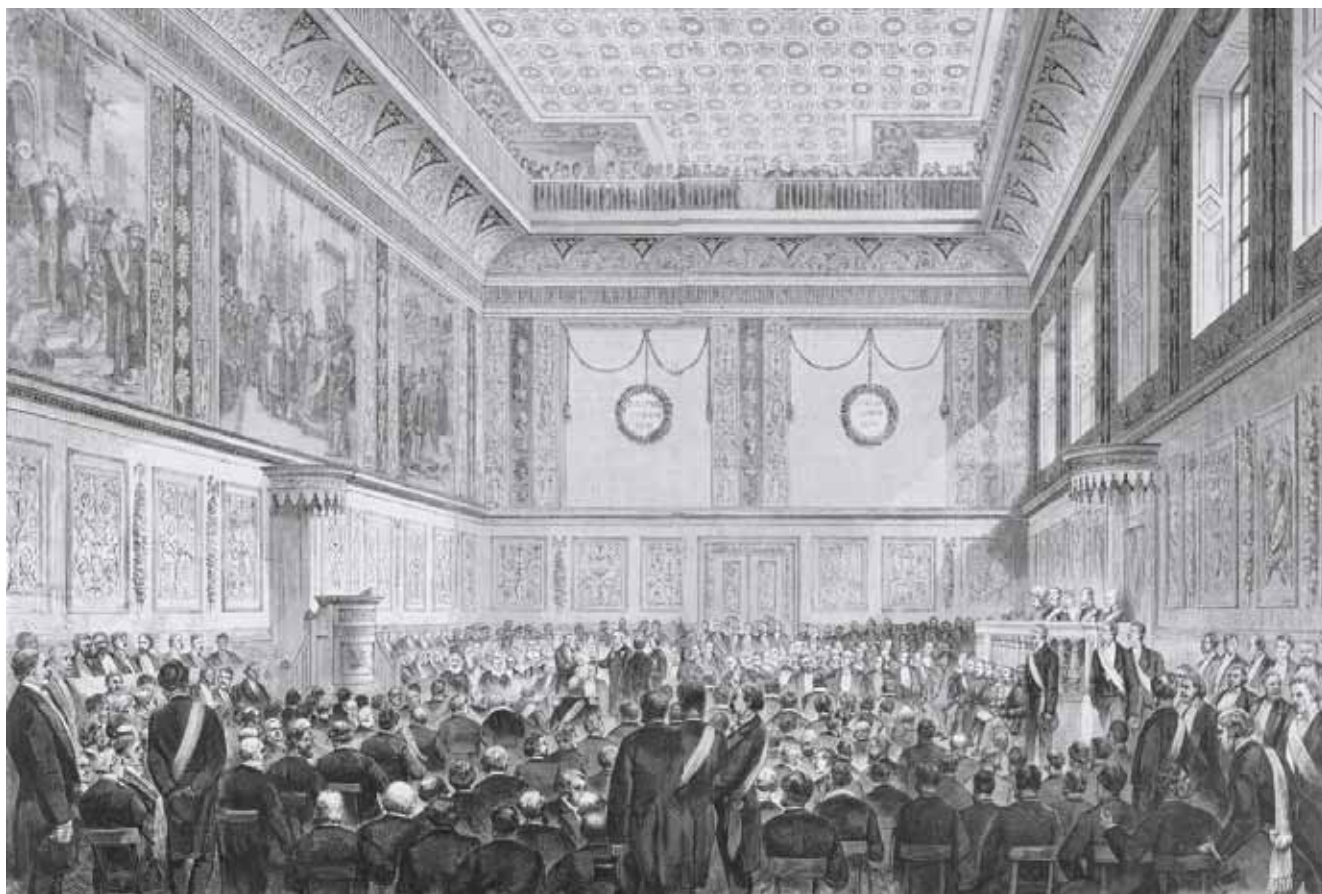
A characteristic feature of pre-World War Two Danish university history is that the academic development of subject fields was closely associated with individual chairs, i.e., professorships. At its inception in 1850, the new Faculty of Science boasted seven professorships including: astronomy, physics, chemistry, mathematics, botany, zoology and mineralogy (geology). A new subject field or a new discipline might be introduced by a loosely affiliated researcher, an associate professor or senior associate professor. However, it was usually the establishment of a professorial chair that marked the real breakthrough for the subject.

In 1844, the University was authorised to appoint a small number of promising young researchers as temporary lecturers, usually for a limited number of years. This system proved beneficial for the University as a whole and for the natural sciences in particular. It provided opportunities both to retain promising researchers in established subject fields and to appoint young academics who would devote themselves to the many new subjects and

disciplines that emerged in the 19th century. At the same time, the Faculty of Science was engaged in an uphill but largely successful struggle to ensure that new subjects were firmly entrenched by setting up permanent chairs for them.

Until approx. 1960, the number of chairs therefore reflected the faculties' academic development accurately. However, this situation was altered by the explosive growth in student enrolment that began in the 1960s, and which multiplied more than fivefold over the next few decades. The increase in the student population was mirrored by an increase in the number of teachers, albeit not on the same scale.

Only a small proportion of the new posts were full professorships; most were lower-ranking associate professorships, a category that had existed since the foundation of the University, with the appointees usually functioning as assistant teachers etc. As part of the transformation of the University, associate professors achieved full academic freedom and parity with full professors in the 1970s.



The 400th anniversary of the founding of the University of Copenhagen in 1879 was staged against the backdrop of Denmark's defeat in the war with Prussia and Austria in 1864 and the ensuing loss of the duchies of Schleswig and Holstein. This came to have an unforeseen impact on the celebrations. The University wished to endow the festivities with an international flavour by inviting representatives of European and American universities and scientific societies. As Scandinavism appeared to have lost impetus after the 1864 defeat, the University also wished to exploit the opportunity to re-establish connections with the universities in other Nordic countries.

A series of grand events were planned, including a general ceremony in the Copenhagen Cathedral; an academic gala at which honorary doctorates etc. were to be conferred in the University's Ceremonial Hall; and a magnificent banquet organised in cooperation with the City of Copenhagen. A special Jubilee medal was

issued and special anniversary publications were published by the University and by each of the five faculties. The emphasis on Nordic connections was illustrated by the fact that honorary doctorates were to be conferred only on Danes, Finns, Icelanders, Norwegians and Swedes. The University budget for the festivities also earmarked an amount for special events for students.

Just before invitations were due to be issued, the news broke that Prussia and Austria had reneged on Article 5 of the Prague Treaty of 1866. This article envisaged the possibility that north Schleswig be returned to Danish rule by a plebiscite. The news caused a stir in Denmark; the feeling was that the northern part of Schleswig with its homogeneous Danish population was now lost forever. In order to avoid the celebrations being hijacked by inappropriate demonstrations, the University decided to restrict the anniversary festivities – they would now be open only to Nordic partici-

pants. Fearing that this turn of events might be misinterpreted in Germany, the government objected to this ruling. The University faced a difficult choice – it could either proceed according to the original plans or cut back and organise an ordinary academic event. In the end, the original programme was substantially reduced. The student events were cancelled, and official invitations to universities and societies abroad remained unsent. Instead, approximately 100 universities around the world received a missive outlining the reasons for the modest celebrations. The Nordic universities and societies also received the special anniversary publications and the Jubilee medal. However, despite the lack of invitations, many Nordic academics still found their way to the celebrations.

The picture depicts the ceremony of 5 June 1879 in the University's Ceremonial Hall, at which 73 honorary doctorates were conferred: 37 Danish, 17 Norwegian, 17 Swedish, one Finnish and one Icelandic.

After almost two centuries of absolutism, Denmark adopted a Constitution with parliamentary democracy and a constitutional monarchy in 1849. Professors and students from the University had participated actively in the political debates of the 1830s and 1840s, when the key issue was whether or not to introduce constitutionalism. Academics were also strongly represented in the assembly that was commissioned to draw up a new constitution in 1849.

The most urgent political issue in subsequent years was the so-called Schleswig Question, which concerned the position of the two duchies Schleswig and Holstein in the Danish Monarchy. This issue was linked to the establishment of organisational and administrative frameworks for the new form of government.

Three Danish governments between 1849 and 1864 were headed by members of the Faculty of Law and a fourth one by the prominent lawyer A. S. Ørsted. Other professors were members of Parliament or the cabinet.

The constitution of 1849 was revised in 1866 after the loss in 1864 of the Duchies, and over the following years the debate about the nature of constitutionalism became increasingly heated. The government was chosen by the King, but the agricultural party – the largest in the second chamber of the Parliament – maintained that the composition of the government should reflect that of the second chamber in Parliament (*Folketinget*). The ensuing struggle for parliamentarism based on lasted from 1875 to 1894. On the defence of the Kings right to chose his govenment freely was H. Matzen, Professor of Constitutional Law. The Minister of Justice, former law professor J. Nellemann, officially backed the government line, as did a third professor, C. Goos. The Faculty of Law thus was active in its support of the government. The constitutional dispute was eventually resolved in 1901.



Johan Nicolai Madvig (1804-1886) was appointed Professor of Classical Philology in 1829. He was a central figure in Danish intellectual life, culture and politics for more than half a century, exerting great influence on the development of classical philology in Denmark and playing an active role in the moderate political wing in the run-up to the 1849 constitution. In 1848, he resigned his chair at the University to take up the post as Minister for Church and Education, but returned to the University in 1851. Madvig was held in high esteem in Denmark. He had considerable influence in Danish politics and served as the University's Rector on five occasions – the last time in 1879. He was therefore the natural choice to preside over the 400th anniversary celebrations. As president of the Academy of Science from 1867 and the first Chairman of the Board of the Carlsberg Foundation from 1876 until his death ten years later, he held two of Danish science's most influential positions.

A few years after Madvig's death, his bust was displayed in front of the main University building.

1864

1864 was a decisive year in Danish history. After a short war, two-fifths of the Danish Monarchy, the Duchies of Schleswig and Holstein, were ceded to Prussia and Austria. The war was due to factors associated with nationalism, patriotism and the Danish political system's failing to understand the great power politics. About 200,000 Danish-speaking people in Schleswig came under German government, and Denmark was reduced to a tiny state and lost any influence upon European politics. The loss gave rise to new initiative, but it also signified the beginning of Danish small-state mentality.

The 1864 war was the result of a long history; for centuries the dominating story was the relationship between Denmark and Northern Germany. From 1460 until 1864, the Kings of Denmark were also the Dukes of Schleswig and Holstein. The inhabitants of Holstein and the southern part of Schleswig spoke German, while those in northern Schleswig spoke Danish.

The relations between Denmark and the two duchies were unproblematic until the early 19th century, when nationalism emerged all over Europe. This led to tension between Denmark and German nationalists concerning the duchies. The northern pro-Danish part of Schleswig wanted to be incorporated into Denmark, and this view gained wide support in Denmark. However, the pro-German parties of Schleswig and Holstein argued that this would be in conflict with the legal basis of the union between Denmark and the duchies that had been in place for centuries.

In 1848, the pro-German population of Schleswig and Holstein rebelled against the Danish King, demanding a new constitution and separation from Denmark. The rebellion was led by the Duke of Augustenborg, a distant relation of the Danish royal family, who claimed the right of succession to the two duchies. The rebellion, initially supported by Prussia, was suppressed, and as part of the 1851 peace treaty, Denmark was forced to promise not to establish closer links with Schleswig than with Holstein.

When the last member of the Oldenburg Dynasty, King Frederik VII, died without leaving an heir to the throne of Denmark in 1863, the question of succession became crucial. Despite the agreement of 1851, in 1863 Denmark seized the opportunity to incorporate Schleswig into its constitution. After the German Confederation's demand that Denmark retract this action was refused, partly due to the short time limit given, Prussia and Austria declared war. A short but bloody conflict ensued, after which Denmark was forced to cede the duchies to Prussia and Austria in 1864. Following its war with Austria, Prussia was granted complete sovereignty over the duchies in the 1866 Peace of Prague treaty. This treaty included article that promised a plebiscite to decide whether north Schleswig should return to Danish rule. The 1864 defeat left deep scars on Denmark. Only in 1920 after the First World War the Danish-speaking part of Schleswig were reunited with Denmark.

The University of Kiel



The main building of the Christian Albrecht University in Kiel, built 1873-76 (Architect Martin Gropius). Around 1640, Christian IV and Duke Frederik III of Gottorp made plans to establish a university in Holstein, but it never materialised. Instead, Duke Christian Albrecht of Schleswig-Holstein-Gottorp founded the University of Kiel in 1665. At that time, the connection between the kingdom of Denmark and the ducal part of the duchies of Schleswig and Holstein was minimal. The purpose of the university in Kiel therefore was to assert the two duchies' independence from the Danish Crown – as well as to establish Gottorp as a centre for culture and science in northern Europe. This ambition was abandoned, however, once the duchies in their totality became subject to the Danish Crown in 1713.

The University of Kiel's role was clearly defined once it established itself as a training centre for the civil servants of both duchies. However, after the first Schleswig-Holstein War in 1848-1850, the University of Copenhagen set up a chair in Schleswig Law at the Faculty of Law in Copenhagen in order to train Danish-speaking civil servants loyal to the Danish Crown for service in Schleswig.

After 1864, when Schleswig and Holstein came under Prussian administration, the University of Kiel grew – both in terms of buildings and the number of teachers and students. It was forced to shut down in 1944, but resumed instruction in November 1945. Since then, it has continued to grow as a regional university. In the late 20th century, it had approximately 600 teachers, including 430 professors, and 23,000 students in seven faculties.

Georg Brandes and the University

The controversy surrounding the Danish literary critic Georg Brandes, who never became a professor at the University of Copenhagen, caused a split in Danish intellectual circles for more than a generation. After travelling abroad, Brandes invoked the right to give public lectures at the University that was embedded in a doctorate, and embarked upon a series of lectures at the University concerning the main currents in European literature (1871). The introduction of modern philosophy and criticism in Denmark proved provocative. Brandes' lectures became a public draw and made him a controversial figure in Copenhagen's academic community. In his lectures of 1871, Brandes questioned the values and norms that the University was expected to uphold. At the time, it was widely believed that the state shared responsibility for the attitudes of university teachers.

Brandes hoped to replace the University's Professor of Aesthetics (literature), the ageing poet Carsten Hauch, who also saw Brandes as his natural successor. In November 1871, while Hauch was recuperating from illness in Italy, Brandes applied to the University for a post as a lecturer in aesthetics. His application split the Faculty of Philosophy. As its doyen, Professor J. N. Madvig could not bring himself to support Brandes' application and it was therefore put on hold. After Hauch died in April 1872, the question of his successor could no longer be ignored. Prevailing opinion in the government and among the Faculty was against Brandes, whom many saw as a libertarian and thus a danger to society. A provisional decision was taken – Hauch's chair would not be filled.

In the following years, the question of Brandes' appointment at the University resurfaced several times, but it was not solved. It was an issue that could not be dealt with objectively – i.e., it was not a question of academic qualifications, but of whether the University could be used as a platform for debates on modern values and norms that were widely considered to be immoral.

When the Ministry of Education proposed that the empty chair should be abolished in 1884, the University opted for a temporary solution, and appointed two lecturers to teach literature. This in effect destroyed Brandes' chance of obtaining a professorship. One of the lecturers died shortly afterwards, while the other continued to teach until 1892, when he was appointed to the chair that had been vacant for 20 years.

In the meantime, attitudes at the University regarding Brandes had changed. A majority of professors had made several attempts to get him appointed as an extraordinary professor, but their efforts were in vain. However, in 1901 after a change in the political system they succeeded in securing for him the title of Professor and a lifelong grant corresponding to the highest professorial salary for independent research.



Georg Brandes (1844-1927) graduated with a Master's degree in aesthetics (literature) in 1864, and became a Doctor of Philosophy in 1870. His public breakthrough came with the series of lectures he gave at the University in 1871. In the painting (by H. Slott-Møller), he is shown at the podium. However, his dreams of a university career, for which he was eminently qualified, were dashed by opposition from conservative forces. Therefore, Brandes was

obliged to make a living from private sponsorships and from his wide-ranging literary activities for the next two decades. After the political system changed, he was guaranteed lifelong state funding and was appointed a titular professor in 1901. He remained a controversial figure for the rest of his life, but was also increasingly acknowledged to be a giant in Danish intellectual life.

As mentioned, the University's financial administration was finally modernised after the Napoleonic Wars. This doubled the number of professors in the first half of the 19th century. The modernisation as mentioned previously also allowed for the implementation of a major building programme, which meant that the University had a modern property portfolio by the end of the century.

In the long term, the University had to address an additional rather typical problem concerning finances – i.e., expenditures were rising faster than revenue and the University was expected to cope with the deficit by means of funds acquired over the centuries. It took a long time before it was acknowledged that this was impossible and that the imbalance between income and expenditure was not a temporary phenomenon, but a permanent state of affairs. Furthermore, it was due to deteriorate further since the basically self-financing University, which had remained surprisingly stable for centuries, now had to procure funding for its on-going expansion programme. Establishing modern natural-science and medical facilities proved particularly expensive, and the many building projects only served to increase the deficit in the University accounts.

Many people considered the University an active supporter of anti-democratic forces during the constitutional struggle – and it paid the price for this allegiance. One of the weapons deployed in the struggle for parliamentism was to refuse to approve the government budget. As a result, the country was administered by provisional budgets for many years. Since it was impossible to implement the necessary reforms of the University's finances in the midst of this deadlock, the University was forced to cover the rising annual deficit by eating into its assets, which gradually were whittled away during the closing decades of the century.

It was imperative that reform concerning the University's finances was included in the political agreement that brought the constitutional struggle to an end. The agreement meant that the University was never again to be considered a separate institution with its own funding streams, and its operating costs have been state funded ever since.

The University of Iceland



In 1908, teaching of Icelandic law commenced in Iceland. This was the beginning of a new Icelandic University, *Háskoli Íslands*, founded in Reykjavík in 1911. It got off to a modest start, with 45 matriculated students – one woman and 44 men – in its first year. By the end of the 20th century, the university had approximately 6,700 students, of whom 4,100 were women, at nine faculties: Theology, Medicine, Law, Economics, Humanities, Engineering, Natural Sciences, Dentistry and Social Sciences. With more than 400 full-time teachers, 1,800 part-time teachers and some 400 other employees (e.g. technical and administrative staff as well as researchers) when the students are included, the university is Iceland's biggest workplace. Since 1940, most of the university has been located on a single campus in the centre of Reykjavík.

The university offers more than 50 degree courses. Even though it is possible to complete a full degree programme

in Reykjavík in most disciplines, the university is very international in its outlook. In order to adhere to international standards, the university's teachers are encouraged to take up guest positions at overseas universities at regular intervals. A large number of Icelanders complete parts of their education, often a whole degree programme, at a foreign university: in the late 1990s, approximately 90% of all Icelandic academics took their final degree at an overseas university, forging a valuable network of international contacts in the process.

The University of Copenhagen served as Iceland's national university until 1911. Danish universities still attract Icelandic students, but universities in the other Nordic countries, as well as in the English-speaking world, are proving increasingly attractive to Icelandic students and researchers.



In the first four centuries of its existence, the University of Copenhagen was an all male preserve. Today, women make up the majority of students in all faculties except the Faculty of Science. However, it took a long time to reach this point. The shift started in 1873, when Nielsine Mathilde Nielsen applied to study medicine. The University Senate procured a declaration from the Faculty of Law that stated women did not have any legal right to matriculate, as this would require that the rules governing the University's activities obliged it to provide educational programmes for women. Nevertheless, the Faculty concluded that since there was no direct and specific ban on the admission of women, the University management had the right to admit women in cases it deemed appropriate. The Faculty pointed out, however, that it was unclear whether official bodies outside the University would grant female graduates the right to practice their professions. The Faculty of Medicine then issued its own declaration, which made it clear that it had no wish to enter into a futile discussion about whether the natural abilities of men and women were equal. It did not accept Nielsine Nielsen's argument in her application – namely, that women were particularly well suited to the study of medicine. Although the Faculty did not reject Nielsen's application, it emphasised that female and male students would be required to meet the same demands, which might be a problem. The Faculty's recommendation was not unanimous – Mathias Saxtorph, Professor in Surgical Pathology – submitted a minority statement where he claimed that the majority decision would do irreparable damage to the University. Specifically, he asserted that: “a woman who is able to disregard all feelings of decency and modesty to the extent that she wants to attend lectures on male anatomy and ailments along with male students, and who desires to study and treat male surgical and syphilitic diseases in hospital wards, can only be looked upon with abomination and loathing by fellow students.”



Nielsine Mathilde Nielsen (1850-1916) took her school-leaving exam in 1877. She became the first Danish female medical student and, graduating in 1885, the first female doctor in the country. After working in the Municipal Hospital of Copenhagen from 1885-1886, she became a general practitioner in Copenhagen in 1889, and served as a municipal venereologist from 1906. The photograph is from 1877, her first year at University.



Nanna Berg (1864-1908) was the daughter of a prominent politician, Chresten Berg. In 1887, she became the first female law graduate in Denmark. Berg was offered a position as a barrister, but the Ministry of Justice refused her authorisation on grounds of gender – a ruling subsequently upheld by the Supreme Court.

The table illustrates that female students make up the majority of the student population of the University. Only the Faculty of Science and some special fields, such as history and economics, have a majority of male students. However, higher up the hierarchal ladder, the picture changes: males dominate in professorships and the university management. The University had its first female Rector in 2001. In 2008, two of the eight deans were women.

In his statement, Saxtorph declared that if a woman was ever admitted to a graduate post in the hospital service as part of her training, he would submit his resignation. Saxtorph was a man of his word. When the question arose in 1884, and the Ministry granted female medical graduates such a right in 1885, he resigned his position as chief surgeon at King Frederik Hospital.

Following an exhaustive final debate in the University Senate, during which the Faculty of Theology in particular expressed grave misgivings, the University decided to recommend that women be admitted in 1875.

This did not mean that women were granted equal rights: unlike men, they were (a) not entitled to pass the university entrance examination at state grammar schools, so they had to seek entrance to the University by the more circuitous route of private schools or tutoring; and (b) although women were permitted to study at and graduate from the University, it was stressed that this did not entitle them to posts in public service.

In other words, women did not enjoy the same right as men to use their qualifications. In some sectors, a considerable time gap ensued before there was full formal equality between the genders. For example, women were granted the right to sit for theology finals in 1916, but were not permitted to enter the clergy of the Danish National Church until after World War Two.

This pattern was also seen in the legal professions. Thus, the very first woman law graduate in 1887 was offered a position as a barrister, but the Ministry of Justice refused to grant the necessary authorisation,

Proportion of male and female students at the University of Copenhagen, 2007

	Women		Men		Total
Faculty of Life Science	2,218	69%	983	31%	3,201
Faculty of Pharmaceutical Sciences	890	70%	378	30%	1,268
Faculty of Humanities	7,435	62%	4,519	38%	11,954
Faculty of Law	2,513	61%	1,594	39%	4,107
Faculty of Science	2,389	39%	3,761	61%	6,150
Faculty of Social Sciences	3,461	55%	2,885	45%	6,346
Faculty of Health Sciences	2,916	71%	1,215	29%	4,131
Faculty of Theology	512	62%	317	38%	829
Total	22,334	59%	15,652	41%	37,986



a ruling upheld by the Supreme Court. Women got access to law practice as advocates in 1908. In 1921 women and men were granted equal access to public service employment and in 1936 women were accepted as full judges.

Finding adequate employment was somewhat easier for female graduates of medicine and humanities. However, one of the recurring arguments in the widespread debate in the 1870s about women's admission to the University, i.e., that there would not be many female students, turned out to be correct in the short term. In the years 1875-1900, there were 56 female graduates out of a total of 5,000 – i.e., women constituted a mere 1% of all graduates.

Like other universities in the Western world in the 21st century, the University of Copenhagen nowadays has a majority of women in the student body. There are few subjects in which men still constitute a majority. This also goes for graduates, but among staff, the preponderance of men still increases with each step up in the hierarchy.

Inge Lehmann (1888-1993). In the early 20th century, very few women studied natural science. Inge Lehmann was an outstanding exception. After studying at Copenhagen and Cambridge, she graduated in 1920 with a Master of Science in mathematics, and was then appointed to a post in the University's actuarial mathematics laboratory. Chance would have it that she was appointed to a position at the Geodetic Institute in 1925. She became fascinated by the science of geodesy and obtained her Master's degree in 1928. During her long scientific career as a seismologist, Lehmann was especially interested in seismic records and the information they yield about the interior of the Earth. In 1936, she published her landmark thesis with the unassuming title *P?*, in which she hypothesised that there is a small, solid core in the otherwise fluid centre of the Earth. Her theory was acknowledged by the scientific community within a couple of years.

Lehmann's scientific career took off after she retired from her post as state geodesist in 1953. During a stay in the 1950s in the US, she discovered a seismic discontinuity that lies at depths about 220 kilometres. It is named the "Lehmann discontinuity" after the discoverer. She published her last paper when she was 99 years old. She received many honours and awards during her long career. Since she did not seek the spotlight, preferring to hide behind her research, it was not until late in life that Lehmann achieved major international recognition. Among the many awards bestowed upon her were honorary doctorates at Columbia University, New York (1964), and the University of Copenhagen (1968); she was elected a Fellow of the Royal Society in London in 1969.





A Meeting of the Academy of Science. The Carlsberg Foundation commissioned this painting for the new Academy building. It was painted in 1895-1897 by P. S. Krøyer (1851-1909), a celebrated Danish painter at the time. The picture hangs on the wall of the Academy's meeting room.



Japetus Steenstrup (1813-1897). Bust in front of the University's main building. At the ceremony unveiling the bust in 1897, Steenstrup's former pupil, the 70-year-old C. F. Lütken, was reportedly overcome by emotions when he delivered his memorial speech. He suffered a brain haemorrhage from which he never recovered.

Since its founding in 1742, the Danish Royal Academy of Science has had close ties with the University of Copenhagen. Until well into the 20th century, the University's dominant position in Danish academic life meant that the vast majority of Academy members were professors at the University. This was also the case at the end of the 19th century, when P. S. Krøyer, the most celebrated Danish artist at that time, painted *A Meeting of the Academy of Science*.

Krøyer had a singular talent for capturing his era on canvas. His pictures are a treasure trove of typically Danish scenes and portraits: Skagen fishermen; women promenading on the beach; men of industry; stock-exchange barons; and, in this instance, the academicians of the day. The painting of the Royal Academy of Science is the largest and the best of his great representative works.

Krøyer had more or less a free hand as far as the positioning of the figures in the picture was concerned, as long as he placed the older and more prominent members in the foreground. The President of the Academy, chemist Julius Thomsen, sits at the middle of the table, beside the Danish Crown Prince Frederik, who was an honorary member. Across from them is the mathematician H. H. Zeuthen, the Academy secretary. It was also decided in advance that the Academy's oldest member, Japetus Steenstrup, should be giving a lecture, even though he no longer attended meetings.

Krøyer's picture is not merely a snapshot of Danish scientists of the time. Collectively, the portraits represent many of the trends that dominated Danish academic life throughout the 19th century. There are stories about the human relationships behind the picture, about friendships or enmities that transcended academic boundaries or were caused by academic disagreements. Strong tensions lurk beneath the surface – some personal, some academic. Conflict flared over opinions concerning the controversial literatø Georg Brandes, who never got a well-deserved professorship in Copenhagen, and over views of the political situation of the day. When the picture was painted, there still was bitter conflict about parliamentarianism: the sitting government remained in power without a majority in the second chamber.

J. Nellemann, who served as Minister of Justice until 1896, and Professor C. Goos, the Minister of Culture, who refused to appoint Georg Brandes as a professor at the University of Copenhagen in 1892, are featured in the back but in very centre of Krøyer's picture. Both were high-

ly esteemed academics, but there was no doubt whatsoever about their conservative leanings; they personified the right-wing government and its policies. On the other hand, two of the other figures depicted – Kristian Erslev, who introduced source-criticism in historical studies in Denmark, and philosopher Harald Høffding – were well known as being in opposition to the government.

Just across from Japetus Steenstrup stands his son, Johannes Steenstrup, who originally studied law but pursued an academic career in historical studies, focusing mostly on Danish history in the Middle Ages. He was the author of the first volume of a widely read national history of Denmark penned by a combined group of historians. There are other historians in the picture, including J. A. Fridericia, who belonged to the radical circle influenced by Brandes; Edvard Holm, the author of a major work about the history of Denmark–Norway in the 18th century; and A. D. Jørgensen, who did much to make Danish history popular. They all participated in the writing of this monumental work on Danish history, which represented a first attempt to establish collaboration between individual researchers and disciplines and collate the sum total of the knowledge and perception of the history of Denmark available at the time. This attempt was to have several successors in the course of the next century.

Japetus Steenstrup was a polyhistor, zoologist, archaeologist and much more. In his volume on the history of Denmark, Johannes Steenstrup venerated his father's observations, which were already slightly outdated. History was a leading academic discipline of the day, and historians were well represented in the Academy.

In 1900-1901, the two philosophy professors K. Kromann and Harald Høffding, both of whom are depicted in the painting, gave lectures about the significance of the previous century.

In *Livsanskuelse og Videnskab* ("Philosophy of Life and Science"), a speech given in 1900 at a University gala celebration of the introduction of the Lutheran Reformation, Kromann stated that: "It is not easy to ascertain whether it really is justified to call the 19th century a century of the natural sciences and science in general; it is possible that close examination would reveal that the various disciplines of history have made even more significant progress in the ability they have gradually developed of imagining themselves to be in minds far away in space and time, an ability which was virtually unknown in previous centuries."



Carlsberg's honorary residence. In his will, the founder of the Carlsberg Breweries, J. C. Jacobsen, donated his home in Valby as an honorary residence for distinguished researchers selected by the Academy of Science. The first resident was philosopher Harald Høffding. He was followed by physicist Niels Bohr, archaeologist Johannes Brøndsted, astronomer Bengt Strömgren and sinologist Søren Egerod. In 1997, the building was turned into the Carlsberg Academy to be used for small conferences and workshops under the Academy's auspices. It also comprises a guest residence for foreign researchers.

In his discussion of the natural sciences, Kromann prefigured one of the most significant advances of the 20th century. He highlighted the atom as representing the “knowledge limit” of research, and it was in this field that scientists such as Niels Bohr – the son of physiologist Christian Bohr, who appears in the painting – would provide completely new insights a few years later.

Harald Høffding was one of the most acclaimed celebrities within Danish cultural life at the time. In 1900, he gave his last lecture called *Ved Aarhundredskiftet* (“At the Turn of the Century”), a retrospective analysis of the 19th century. He too mentioned the enormous significance of the natural sciences, but was inclined to see the “century” as a long one, beginning with the Enlightenment at the end of the 18th century. He saw the break between the Enlightenment and Romanticism as symptomatic of the 19th century, which he described as “an era of con-

traditions". It was not a creative century, he said, but rather a "century of verification".

On the subject of history, he said: "It was not something entirely new in the natural sciences to seek empirical confirmation of hypotheses. Conversely, it was a new approach for historians studiously to seek to verify and rectify traditions and theories. History research has reconsidered its principles and methods, and its monumental works have applied critical methods to some of the most important periods in the history of mankind. A new tool has emerged in historical criticism, a new weapon for use in intellectual disputes, which in large part are about reassessing ideas passed down from the past in the light of new circumstances".

However, Høffding considered the "social movement" and the "class war" to be "a landmark of the previous century", expressing a view that would persist long into the 20th century. Like the historians, both Kromann and Høffding were influenced by the positivism of the day. Høffding became widely known for his many books and theses on philosophy and the history of philosophy, ethics and religious philosophy, as well as for his activities as a teacher. He forged many contacts abroad, and in Denmark, his influence extended beyond the fields of humanities and natural-science research; he was a well-known key figure in Danish intellectual life around the turn of the century. In 1914, Høffding became the first occupant of the honorary residence set up by Carlsberg's founder I. C. Jacobsen. This residence had first been offered to philologist Vilhelm Thomsen, who had to decline it due to ill health.

Philology (linguistics) was a prominent subject field in the humanities at that time. Danish researchers had made an international impact in the field by dint of their studies of many languages. Almost half the Academy members within humanities were philologists. In his memoirs, Høffding relates that he attended some classes given by A. F. van Mehren, the University's first Professor of Arabic (on the right-hand side at the front of the panting). Arabic was introduced as a new subject at European universities following Napoleon's campaign in Egypt, which stimulated widespread interest in Orientalism. Van Mehren's studies in Arabic rhetoric were renowned, and he was acknowledged as an expert on Avicenna, Averroes and other Arabic philosophers. Oriental philosophy was also taught by V. Fausbøll, the founder of the dictionary of Indian Pali, while Herman Møller sought to prove the existence of links between Semitic and Indo-European languages. Karl Verner gained in-

ternational acclaim for his studies of the Germanic sound shift, lending his name to “Verner’s Law”. L. F. A. Wimmer was an excellent runologist.

Classical philology – i.e., Greek and Latin studies – was still considered of central cultural and educational significance at the turn of the 19th century. J. N. Madvig had been the primary figure in 19th-century classical philology, and was therefore the guardian of classical culture in Denmark. A new generation had taken over, and strong forces were undermining the position of the subject. All the academicians in Krøyer’s painting had attended grammar schools, all of which taught Greek and Latin.

Mathematical/natural science teaching was not introduced in schools until 1871. The basis in classical training for all students was dealt a shattering blow by the new school curriculum of 1903, which introduced a modern-language exam and general classical studies instead of Greek language. In the years to come, the classical tradition would face even more difficulties. The classical philologist M. Cl. Gertz was involved in drafting the new school curriculum, which provoked the anger of his colleagues. However, he was also known as a researcher studying Seneca, a diligent publisher and translator of classical and medieval Latin texts. J. L. Ussing became internationally known for his publication of the comedies of the Roman dramatist Plautus.

In 1883, at 28 years old, J. L. Heiberg was elected as a member of the Academy. Heiberg took a deep interest in the natural-science classics, and published the works of the Greek mathematicians Archimedes and Euclid – a task in which he was greatly encouraged by the prominent mathematician Hieronymus Georg Zeuthen. Heiberg also played a key role in the public debate about the role of the classical subjects. He could not accept that Greek would no longer be a school subject for all, and attacked his senior colleague M. Cl. Gertz for endorsing the reform. Together, Heiberg, Brandes and Høffding set up an association for the preservation of Greek. It did not survive its founding members however.

The country’s best-known and most celebrated philologist, a man who rose above every form of academic and personal conflict, was Vilhelm Thomsen. In the painting, Thomsen is seated between Mehren and Zeuthen, with his long face, pointed beard and his hand under his chin. Thomsen and his research are the focus of the following chapter.

The Academy of Science is divided into the humanities and the natural sciences. This distinction may appear more absolute than it really is, and was perhaps less so at the time when the members of the Academy had a shared ground in classical culture. Philosopher Harald Høffding spanned both areas, and was not the only one – he reports in his memoirs that physiologist Christian Bohr was an admirer of Goethe, and physicist C. Christiansen’s favourite read was Homer in the original Greek. At that time, the basic education in joint humanities afforded particular weight to the classics, which therefore established a common frame of reference. Many of the academicians featured in this chapter criss-crossed the boundaries between the natural sciences and the humanities.

As a young man, botanist Eugen Warming in front of the picture visited P. W. Lund, who was a Danish botanist residing in Lagoa Santa in Brazil and studying South American flora. During the 1890s, Warming became internationally known as a botanist and plant geographer. Emil Hostrup achieved fame as a plant pathologist, and his book *Vejledning i den danske Flora* (“Guide to Danish Flora”) is still referred to. Botanist Johan Lange’s *Haandbog i den danske Flora* (“Handbook to Danish Flora”, 1850-1851) provided the basis for the study of flora in Denmark. He also turned his attention to Greenland, producing what would become a standard work on Arctic flora (*Conspectus Florae Groenlandicae I–II*, 1880-1887). O. G. Petersen, a professor at the Veterinary and Agricultural University, was particularly interested in the growth rings of trees, while P. E. Müller, who started as a zoologist, became one of the country’s biggest names in forestry and agricultural science.

A well-known and spectacular 19th-century scientific conflict took place between different factions of Danish zoologists, and some of the men depicted in Krøyer’s painting came to feel the repercussions. Japetus Steenstrup, a zoologist and geologist (who at first glance appears to be a doddering, slightly diabolical old man with crooked, claw-like hands, characteristics which are all belied by his keen and lively eyes), played a key role in the then famous “Steenstrup–Schiødte dispute”. The painter Krøyer, only a child at the time, had felt the impact of this particular quarrel. His stepfather, zoologist Henrik Krøyer, an expert in Danish fish and parasitic crayfish, sided with Schiødte and was subsequently passed over for a position as inspector at the Natural History Museum in favour of Japetus Steenstrup – who nevertheless was undoubtedly the greater talent at the time.

Steenstrup was one of the pioneers of Danish bog archaeology, coining the phrase *Køkkenmødding* (“kitchen midden”) to describe the layers of oyster shells that are evidence of a specific type of Stone-Age settlements. He studied fish, octopuses and other marine animals, alongside a host of other zoological subjects. He was attacked for adopting a speculative approach in some of his studies, but his reputation in Denmark as one of the century’s most prominent natural scientists remains solid. A large circle of zoologists gathered around Steenstrup, including his pupil C. F. Lütken, who is also depicted in Krøyer’s painting. A prominent ichthyologist, Lütken wrote schoolbooks and textbooks on natural history, and assisted Steenstrup in his fish research.

Associate Professor J. E. V. Boas, who is relegated to a place behind the lecturer in the painting, was another of Steenstrup’s pupils. Although he expected to be offered the chair at the University of Copenhagen after Lütken, it was not to be. Instead, he taught for some 50 years at the Royal Veterinary and Agricultural College. He published anatomical studies of crustaceans, fish and mammals, including *The Elephant’s Head* (1908-1925). His principal achievements were in forest zoology, which he developed as a science in Denmark.

J. C. Schiødte was Steenstrup’s academic rival and opponent. The conflict between them originally arose out of their different approaches to zoology, but in the end it also involved academic positions and research funding. Schiødte’s circle initially included entomologist Frederik Meinert, seated in the front left of the picture, an inspector at the Natural History Museum, who later broke with Schiødte. His speciality was the mouthparts of flies, as well as mosquito- and water-beetle larvae, centipedes and strepsiptera.

Few of these zoologists were convinced that Darwin’s theory of evolution was right: in spite of his excellent scientific contributions, Steenstrup was a representative of the speculative school of natural science; Lütken was a transitional figure between natural philosophy and Darwinist-inspired natural sciences; and only J. E. V. Boas actually came to embrace the evolutionary school.

Without doubt, the most colourful zoologist of the day was William Sørensen, who never obtained a position at any seat of higher learning. He is the figure with the long red beard, standing by the wall on the left in Krøyer’s painting. Sørensen taught at various schools in Copenhagen and at the Royal Danish School of Educational Studies. He spent a couple of years in South America where he began his studies of fishes and

arachnids. He wrote his thesis on sound-producing organs in fish and also studied spiders and arachnids, which became the area of expertise that would bring him international renown. He was uncompromising in his search for truth, and expressed a profound hatred for “the Orthodox”, his term for Japetus Steenstrup and his henchmen among the researchers. He detailed his enmity in a series of good-humoured but rambling polemics, and worked hard to strip Steenstrup of the credit for the discovery of “kitchen midden”, which he attributed to the archaeologist Worsaae. He considered Boas to be nothing but a plagiarist. Sørensen launched broadsides at Frederik Meinert, whom he accused of delaying his research, and many others in his 500-page book *The Good Deeds of Pious Souls* (1907). He, too, had been trained in the classics – in 1884 he published the last Danish zoological work to be written in Latin.

Danish mathematics entered a fruitful period in the 1870s, thanks to the work of many talented mathematicians who would become members of the Academy in the 1890s. The two dominant characters in Danish mathematics around the turn of the century were Hieronymus Georg Zeuthen, secretary of the Academy, and Julius Petersen, who is seated behind Zeuthen in the painting. Both were professors of mathematics at the University of Copenhagen, who brought Danish mathematics international recognition. Zeuthen wrote his thesis on conic-section systems, and published a series of works on the history of mathematics, including *Keglesnitlæren i Oldtiden* (“Conic Sections in Antiquity”, 1885) and *Matematikkens Historie* (“The History of Mathematics”, 1893).

His textbook on geometry was translated into several languages, and so was *Methoder og Theorier* (“Methods and Theories”, 1866). Along with Thorvald Thiele, a professor of astronomy and an excellent statistician with a deep interest in mathematics, Petersen set up the Mathematics Society. To complete the picture, it should be mentioned that Julius Petersen was deeply committed to social causes. In 1871, he published a pamphlet about the living conditions of the Copenhagen working class.

C. F. Pechüle, a comet researcher and observer at the University’s observatory on Østervold, was responsible for keeping the standard time in Denmark, a task he performed without the aid of modern, precise chronometers.

Chemist Julius Thomsen was President of the Royal Academy of Science from 1888 until his death. A square in Copenhagen was named after him, but this was due to his energetic and highly visible participation in the city governance from 1861 until 1894. Nonetheless, he was a great chemist, and is especially renowned for his research into thermochemistry, for which he coined the phrase “heat-content change” in relation to the generation and consumption of heat. In 1895, in one of the Academy’s publications, he outlined his visionary thoughts about the periodic table, which would later influence Niels Bohr’s theory of the atom. Thomsen was also extremely practical. In the 1850s, he helped to initiate the industrial-scale extraction of soda from Greenlandic cryolite, and spent many years as a director of the Cryolite Company. In 1866, he was appointed as a professor at the University of Copenhagen without having obtained a doctorate, which was quite unheard of at the time. From 1883 until 1902 he was also a director of the *Polyteknisk Lærestalt* (“College of Advanced Technology”).

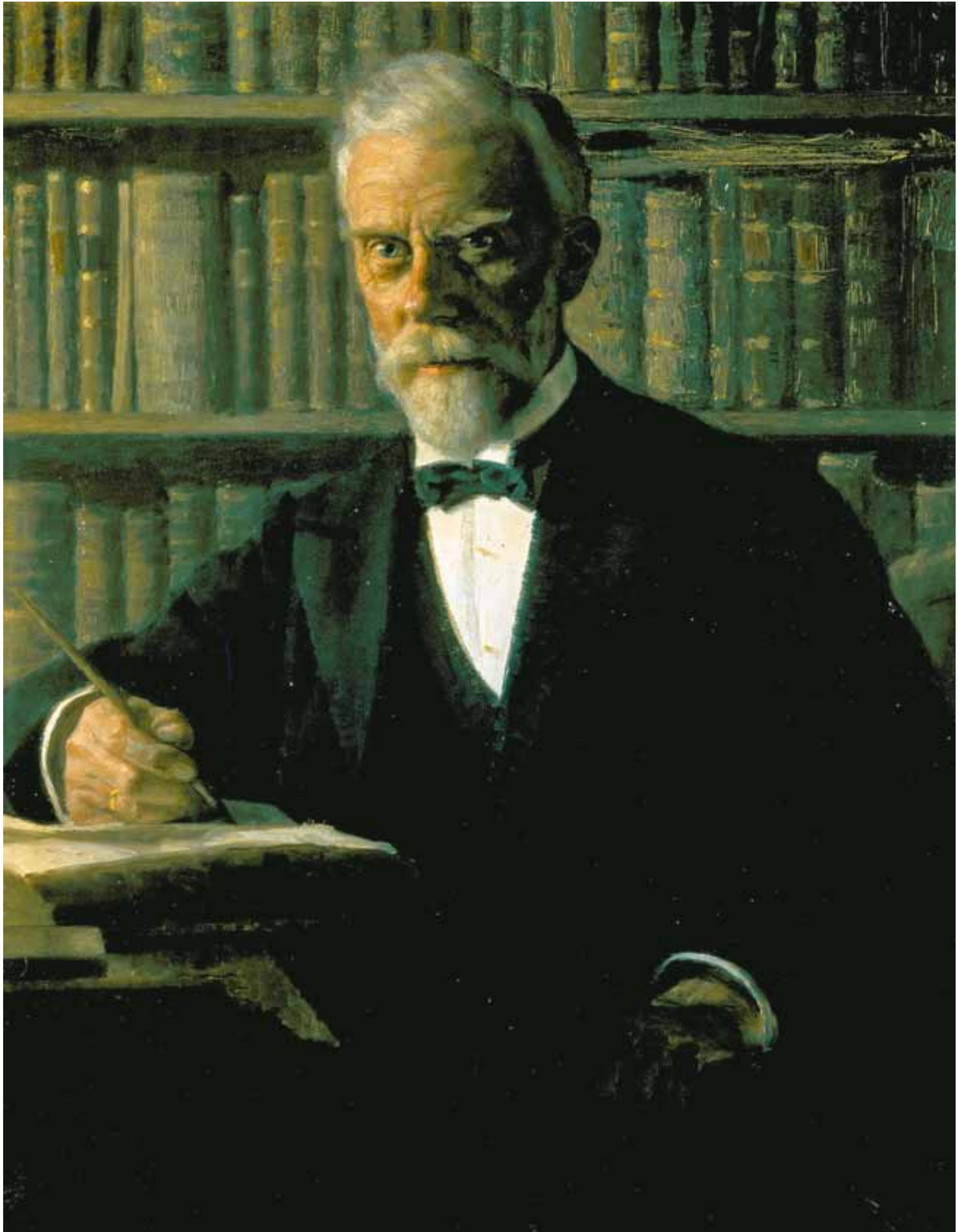
Thomsen’s colleague S. M. Jørgensen was a professor of chemistry and also held in high esteem. He was an excellent teacher, and his book *Kemiens Grundbegreber* (“Basic Concepts of Chemistry”, 1902) was translated into many languages. The third University chemist in the painting, Odin T. Christensen, conducted research into fluoride and manganese compounds.

The two physicists in the painting, C. Christiansen and P. K. Prytz, both contributed to the development of experimental physics in Denmark. Christiansen was a member of the circle that included Christian Bohr, Vilhelm Thomsen and Harald Høffding. He also played an important role in the career of his pupil Niels Bohr, acting as the official opponent when Bohr defended his thesis.

Closest to the lecturer, his hands cupped behind his failing ears, sits Julius Lange, the only art historian in the painting and the University’s first Master in art history, a field in which he later became a professor. As a member of Krøyer’s circle, Lange was an important figure in the world of Danish art and art criticism, and is one of the few elder Danish art historians whose ideas still arouse interest. He earned international acclaim for his studies of antique sculpture and for his demonstration of the “the law of frontality” in his work on artistic representations of the human form. Lange was more interested in European art history than were earlier Danish art historians. He approached a work of art

as an expression of the artistic processing of materials, and stressed the importance of the artist's intention and the combination of content and form as elements in artistic production.

In *A Meeting of the Academy of Science*, the painter Krøyer captured contemporary scientists in a state of rapt attention. They had all made a contribution to 19th-century science – and much of their work would resonate well into the next century. The idea behind the Academy of Science was that the disparate fields of study constituted a single entity: science. The strength of Krøyer's masterpiece is that it presents that diversity as a single artistic entity. Or, as his old friend and art historian Julius Lange put it: "A work of art shall be in harmony with itself in its entirety and in its individual parts, i.e., it shall make an impact as a single force."



One of the academic achievements in Danish humanities in the 19th century was the development of comparative and historical linguistics, which employed precise concepts and well-defined methods within a coherent theoretical framework.

Reference to the ancient Indian language Sanskrit and the study of the relationship between classical and modern European languages provided the basis for the breakthrough development. As early as 1786, Sir William Jones, an Englishman, had identified classical Indian Sanskrit as a language that could be usefully compared with the languages of Europe: “The Sanskrit language ... is of a wonderful structure; more perfect than the Greek, more copious than the Latin ... yet bearing to both of them a stronger affinity, both in the roots of verbs and the forms of grammar, than could possibly have been produced by accident; so strong indeed, that no philologer could examine them all three, without believing them to have sprung from some common source, which, perhaps, no longer exists.”

It was first and foremost the Indo-European languages that were the subject of the studies that systematically developed and perfected comparative and historical linguistics. Researchers at German universities were the leaders in the theoretical discussions and in providing most documentation.

There were, however, significant Danish contributions to this research in the 19th and 20th centuries. Work by Rasmus Rask, Vilhelm Thomsen, Karl Verner and Louis Hjelmslev, all professors at the University of Copenhagen, had a decisive impact internationally and helped to set a standard that contributed to making the study of language a science.

In his prize-winning thesis of 1811, Rasmus Rask formulated the grammatical rules of languages and demonstrated that it was possible to cat-



Bust of Vilhelm Thomsen raised in 1929 in front of the main University building.

◀ Vilhelm Thomsen (1842-1927), was the leading linguist of his age; he received numerous Danish and international awards, including in 1912 the highest decoration in Denmark, the Order of the Elephant.

Rasmus Rask (1787-1832) studied theology at the University of Copenhagen, but after only one year he devoted himself entirely to the study of languages, which had fascinated him since childhood. He decided to describe as many languages as possible according to the same system in order to compare them. On his journeys, which brought him to, e.g., Iceland, the Middle East and India (1812-23), he learned several languages and described them in a number of publications. Rask made a modest living as an assistant librarian in the University Library, supplemented with public and private funding for his travels and publications. His ambition of a post as professor at the University was not fulfilled until a year before his death. Rask had a rare talent for languages, and studied many of them in the course of his life. His interest in languages was theoretical, and he did not place great importance on fluency. Rask's greatest achievement was that he established a systematic basis for modern comparative linguistics.



egorise languages by affinity. He was also the first to establish systematic differences between (a) the classical European languages (Latin and Greek) and (b) the Germanic languages by means of the linguistic feature later referred to as the “Germanic sound shift”.

Karl Verner's brief article of 1875, with the modest title *Eine Ausnahme der ersten Lautverschiebung* (“An Exception to the First Sound Shift”), once and for all explained all exceptions to the “Germanic sound shift”. Verner showed that the exceptions to the Germanic sound shift were not random irregularities, but could be accounted for by rules that were just as precise as were those for the sound shift.

Vilhelm Thomsen's (1842-1927) work on comparative and historical linguistics, with its unequalled breadth, gained respect far beyond his



Karl Verner (1846-1896) began studying a number of languages at the University of Copenhagen in 1864. As linguistics as such was not yet an examination subject, he took a Master's degree in Slavic philology in 1873. After prolonged studies abroad, he was made a Senior Associate Professor in 1883, and a Professor in Slavic Languages and Literature in 1888. In his memoirs, Verner recalls how the idea of his brilliant thesis came to him, in a dream during a midday nap.

native country and the relatively small international linguistics community.

It was clear from an early age that Thomsen's future would lie in the study of languages. Before he graduated from grammar school (1859), he had learnt Spanish, Portuguese, Icelandic, Sanskrit and Arabic in addition to the languages taught in school. He spent a short period of time studying theology, supplemented with studies in Latin, Greek and Nordic philology, as well as studies of other languages, including Sanskrit, Russian and – especially – Finnish.

Thomsen headed for Finland for his first prolonged stay abroad in 1867, and immersed himself in the study of the Finnish language. His first major academic treatise in Danish, *Den gotiske Sprogklasses Indflydelse på den finske* ("The Impact of the Gothic Language Class on Finn-

ish”), was published in 1869, and translated into German a year later. It brought the young linguist well-deserved international attention. In this groundbreaking work, Thomsen presented well-documented, watertight proof that the Finnish vocabulary includes a number of loanwords that derive from an archaic Germanic language whose word forms were at an earlier stage of development than those of Gothic, which goes back 1,500 years. In one fell swoop, he had provided the Finnish language with a pre-history stretching back perhaps 2,000 years, and also supplied the historical studies of Indo-European with the rudiments of a previously unknown Germanic language that predated Gothic.

In 1871, Thomsen became a lecturer. In 1887 he was appointed Professor of Comparative Linguistics at the University of Copenhagen. This gave him the opportunity to continue his studies of Finnish loanwords. The fruit of many years’ labour, his monograph *Berøringer mellem de finske og de baltiske (litauisk-lettiske) Sprog* (“Relations between the Finnish and Baltic (Lithuanian–Latvian) Languages”) was published in 1890. Thomsen had hoped to continue studying loanwords, notably between Slavic and Finnish and between Finno-Ugric and Iranian. However, he abandoned this plan in 1893, when another researcher published a monograph on the relations between West Finnish and Slavic. He regularly published scholarly papers on issues in comparative and historical linguistics – all of which were elegantly written and provided precise and well-documented solutions, often to linguistic questions that were neglected. However, once examined in depth, these turned out to offer new and significant perspectives.

During his early years at the University, Thomsen attracted great attention for three lectures he gave in Oxford in 1876 on “The Relations between Russia and Scandinavia and the Origin of the Russian State”. In these lectures, he employed linguistic evidence to provide an answer to a historical conundrum. Thanks to his expert linguistic analysis of the names in the oldest Russian historical sources, Thomsen concluded that: “the first organisation of the Russian state was due to Scandinavians, Russ being the name by which, in ancient times, the Northmen were designated among the Eastern nations; no serious criticism will ever be able to refute this fact.”

In 1893, Thomsen once more created an international stir when he announced that he had succeeded in deciphering two long stone inscriptions found by a Russian archaeology expedition in the Orkhon Valley

in north-east Mongolia in 1889. The inscriptions had defied previous attempts at deciphering by both Finnish and Russian researchers. Thomsen's breakthrough came from the flimsiest possible key: a short Chinese inscription on one of the stones indicated that it had been erected in the year 732 in memory of a member of a Turkish dynasty – this suggested the possibility that the text was in a Turkish language, and that the name of the deceased might be found in the inscription. In addition, the inscription consisted of only 38 different characters, which led to the assumption that the writing was based on a kind of alphabet.

In this way, Thomsen deciphered the code. He uncovered the structure of the complicated rune-like alphabet and identified the language of the inscriptions as an ancient form of Turkish. In reading and interpreting the inscriptions, he brought to light a complete text in the oldest and most pure Turkish dialect known, and he provided a basis for comparative and historical Turkish linguistics. His keen detective-like skills were admired far beyond linguistic circles, and cemented Thomsen's reputation as one of the most prominent scholars of his age. He expanded the scope of comparative linguistics far beyond the Indo-European languages.

In the course of the 1930s, Louis Hjelmslev (1899-1965) and Hans Jørgen Uldall (1907-1957) co-operated in developing a theory of language: "glossematics". It is a formalistic and structural model for linguistic analysis in which a sign is a function between two forms, a content form and an expression form. The content is the psychological and conceptual manifestation of the sign, whereas the expression substance is the material substance in which a sign is manifested (e.g. in sound).

In the following decades – not least because of Hjelmslev's tireless organisational work in the Copenhagen linguistics community, which became known internationally as "the Copenhagen School" – glossematics became an important source of inspiration for junior researchers in linguistics, comparative literature and semiotics in Denmark as well as abroad.



Louis Hjelmslev (1899-1965) started his career in comparative Indo-European linguistics. His 1932 doctoral thesis on Baltic (especially Lithuanian) sound history helped him secure a post as Senior Associate Professor at the University of Århus in 1934. He was appointed as a Professor in Comparative Linguistics at the University of Copenhagen in 1937, but Hjelmslev's greatest achievements – as a researcher, teacher and organiser – lay in the field of theoretical linguistics.



The University of Copenhagen's Arctic Station in Disko celebrated its centenary in 2006. The Rector of the University of Copenhagen, Professor Ralf Hemmingsen, said on that occasion: "The University of Copenhagen's northern outpost, the Arctic Station in Qeqer-

tarsuaq (Godhavn), Greenland, is a flagship in Danish Arctic research. However, it is more than a research centre – it also offers a historic journey through Greenland's culture and is a symbol of Denmark's traditions in the northern regions."

These were not empty words, as illustrated by the impressive and thoroughly comprehensive research activities that have taken place or have been initiated at the Arctic Station over the last century, activities amply described in the 400-page centenary publication.

Denmark has been involved in the exploration of Greenland and the Arctic Region since the mid-18th century. This work has been wide-ranging, and has comprised the natural sciences, ethnographic, social, theological, humanities and medical subjects. Involving researchers from many countries over the years, the research has also been truly international. Danish Arctic research stands out because it has been going on for such a long time. Moreover, the vast majority of research projects have involved the University of Copenhagen in some way or other. The most visible example is the University's Arctic Station on the island of Disko, although the station itself only represents one small component of the University's contribution to Greenlandic and Arctic research.

Danish polar research started with small Arctic expeditions in the early 17th century, the main purposes of which were to control the profitable whaling industry, to claim sovereignty over the area in the face of Swedish and Russian competition and, if possible, to re-establish links with the descendants of Viking settlers on Greenland.

These expeditions were the first in modern times to impart knowledge of Greenland and its people to Denmark. However, the University was not engaged in any scientific research on the expeditions, nor did it have any interest in participating.

The first Danish exploration of Greenland can therefore reasonably be identified as occurring in 1721, when the Norwegian minister Hans Egede set up a mission station in Nuuk (then Godthaab) that would serve as the base for future work. However, more than a century and a half passed before there was any systematic research. Missionaries, officials of the trading company Royal Greenland, doctors, officers and other Danish state employees carried out the work of exploring and describing Greenland. Some of the scientific studies were dictated by the

The Moravian mission station “New Herrnhut” in Nuuk (1747) is Greenland’s oldest house. It stands on one of Nuuk’s most beautiful spots, in a fertile beachside meadow that was diligently cultivated for one-and-a-half centuries. An impressive edifice, the mission station was designed according to principles developed by the Moravians (Herrnhut Brethren). It was first built in Germany from precision-cut timber, then dismantled, sailed to Greenland and reassembled. Since the Moravians left Greenland in 1900, the building has been used for various purposes, e.g., as the first home of the Greenland National Museum from 1966-1978, after which it was refurbished to house Greenland’s university, *Ilisimatusarfik*, which opened in 1982.



desire to find minerals. The only profitable find was the cryolite at Ivigtut, which was quarried between 1865 and 1990.

For more than 150 years, much of the early exploration of the Arctic was carried out by missionaries from the mainline Lutheran denomination known as the Moravian Church (or the Herrnhut Brethren). Founded in the 14th century, this church was renewed in 1727 by Count von Zinzendorf who was related to the Danish Queen. Since the conversion of heathens was central for the Moravians, they were granted permission to establish a mission in Greenland in 1733. A mere 12 years after the arrival of Hans Egede, a few Moravian missionaries therefore settled in a valley a couple of kilometres south of the Sisimiut colony. After a difficult start, during which it became evident that the missionaries had underestimated the severity of the Arctic climate, the mission firmly established itself by the mid-18th century, operating out of the mission station New Herrnhut in Nuuk.

Missionary work was central to the Moravians’ endeavours and they enjoyed significant success over the years, the effects of which are felt in Greenland to this day. However, they also helped to spread knowledge

of the indigenous language and culture. Unlike Danish ecclesiastical ministers and other civil servants, who considered stays in Greenland temporary assignments before their eventual return to Denmark, the Moravians would usually spend their lives in Greenland. This offered them a unique opportunity to forge contacts with the native population. They introduced organised schooling in 1738, but it was their printing activities that were of particular significance. They would supply the congregation with books – first and foremost the New Testament. The first texts to be translated into Greenlandic were produced as early as 1735; in 1747 the Moravians published the first book in Greenlandic – a songbook that they had printed in London. They also published the first book in Greenland – a Moravian songbook – in 1793.

Samuel Kleinschmidt (1814-1886) was a major figure in early Greenlandic scholarship. The son of German and Danish missionaries, Kleinschmidt followed in his parents' footsteps until 1859, when he became a teacher at the teacher training college in Nuuk. He is credited with having saved the indigenous language thanks to his publication of a German–Greenlandic dictionary and a grammar book (1851). He also formulated Greenlandic orthography and produced the first translation of the Bible into Greenlandic. His work reflected his scientific thoroughness and his open-minded interest in all things concerning Greenland – as he himself put it: “by predilection I am a Greenlandic.”

In 1878, on the initiative of Frederik Johnstrup, Professor of Mineralogy at the University of Copenhagen, the Danish government set up what is now known as *Kommissionen for Videnskabelige Undersøgelser i Grønland* (“The Commission for Scientific Research in Greenland”). Since the mid-1870s, Johnstrup had been calling for a systematic geological survey of Denmark, Iceland, the Faroe Islands, the Danish West Indies and, especially, Greenland. He pointed out that Denmark bore a particular responsibility for the exploration of Greenland, and argued that the considerable income from the cryolite quarrying in Ivigtut should be re-invested in further geological exploration. Johnstrup was named the chair of the Commission, which also included Hinrich Rink and Commander Niels Frederik Ravn. Both Rink and Ravn had participated in a Danish natural-science voyage (1845-1847), the “Galathea” Expedition.

The Commission's remit was gradually extended until it was responsible for approving all plans for research projects in Greenland, a reasonable precaution in view of the demanding logistical difficulties of Arctic research. In 1950, a proposal to do away with this approbation



Danish chemist, geographer and geologist Hinrich Rink (1819-1893) was the most eminent figure in early Greenlandic research. He worked as a geologist on the natural-science Galathea Expedition (1845-1847), which explored oceans and regions during a circumnavigation of the globe. He subsequently went to the Nicobar Islands, which at that time was a Danish colony. In 1848, Rink went to Greenland to work as a geologist, but quickly became fascinated by the ice sheet. He visited and mapped out the Jakobshavn fjord and glacier, and was the first to provide an accurate explanation of its origins. His studies resulted in the treatise *About the Spread and Movement of the Ice across the North Greenland Mainland* (1851), which is still considered a classic in glaciology.

Over the next 30 years, he contributed substantially to the administration and exploration of Greenland. In 1857, he helped Greenland take its first steps towards democratisation, established its first printing house and newspaper, and “discovered” the expressive Greenlandic artist Aron of Kangeq. Rink left Greenland in 1862 for health reasons, but he continued his academic work on the indigenous language and culture until his death. He produced the two-volume landmark, in 1887-1891, *The Eskimo Tribes, their Distribution and Characteristics, Especially in Regard to Language I-II*, in which he describes the Inuit people and their language.

Knud Rasmussen (1879-1933) was the grand figure in Danish polar research. He grew up in Ilulissat (Jakobshavn), the son of the local minister and a Danish-Greenlandic mother. Greenland's nature and people heavily influenced his upbringing, and as a boy he learned to use traditional hunting weapons, kayaks and dog sleighs. His first years at school were spent in Ilulissat, but at the age of 12 he was sent to school in Denmark. Rasmussen did not thrive there. The contrast between Ilulissat and Denmark was too great. He finished school in 1898, but lacked the ambition and the desire to continue his studies. In 1900, he made the acquaintance of the polar researcher Mylius-Erichsen and, along with two others, joined his Greenland expedition of 1902-1904. After trying in vain to persuade the Danish government to get involved in North Greenland exploration, he established the Thule Station in 1909, which would go on to serve as the base for a series of expeditions, culminating in the Fifth Thule Expedition of 1921-1924, known as the "*Great Sleigh Journey*". This trip took Rasmussen from Greenland to the Siberian coast, across the Arctic part of North America. He described many Inuit tribes along the way, and brought back a large collection of objects and artefacts to the National Museum in Copenhagen. His many expeditions were of immense scientific and academic value. Rasmussen was also a highly popular figure and became a national hero.



was rejected, since it was considered necessary to have a broadly based Commission that could co-ordinate the many and varied projects involving many research disciplines and initiatives. University of Copenhagen professors with research experience in Greenland have been Commission members as a matter of course. Since 2000, the Commission has consisted of equal numbers of Greenlanders and Danes.

During the 1870s, the Commission initiated a number of expeditions to Greenland. The findings of these and later expeditions were published in the periodical *Meddelelser om Grønland* ("Announcements about Greenland"), the first volume of which appeared in 1879. The periodical played a pivotal role in publishing the results of research on Greenland, and has been continued as three parallel periodicals in English for biology, geology and the social sciences since 1979.

Volume I features the results of the Commission's first expedition – to South Greenland in 1878 – and presents a vivid picture of the scope of the expedition and its work. It includes a report from First Lieutenant J. A. D. Jensen, who headed the expedition, an annotated map drawn up during the journey, topographic descriptions of the area and a survey of the ruins of the Viking settlements in the Ameralik Fjord. It also



Following the successful Fifth Thule Expedition, Knud Rasmussen was awarded an Honorary Doctorate of Philosophy by the University of Copenhagen. The picture shows the presentation ceremony in the Academic Teachers Council's meeting room on 14 December 1924. In attendance are (front row, left to right) the Rector Professor H. F. Torm, Knud Rasmussen and Professor N. E. Nørlund, Dean of the Faculty of Science, who awarded the degree.

includes Jensen's observations on astronomy and meteorology, Andreas Kornerup's descriptions of the geological formations and the organic life found on one of the Nunataks – the free-standing mountain tops above the Greenlandic ice sheet – and Johannes Lange's annotations on the plants brought home by Kornerup. The Commission's early expeditions were characterised by the multi-disciplinary nature of their systematic descriptions of the different districts of Greenland.

As mentioned previously, the Commission's work instituted a system whereby all plans for research in Greenland were to be approved by

The race to the North Pole

After years of fruitless attempts, American polar explorer Robert Peary reached the North Pole in April 1909, an achievement that understandably attracted international attention. Through no fault of its own, the University of Copenhagen came to play a minor role in this American achievement. Peary's attempt to reach the North Pole pitched him into fierce competition with another American polar explorer. In September 1909, Frederic A. Cook arrived in Copenhagen claiming to have reached the North Pole, and said that proof of this would follow as soon as possible. Obviously acting in haste, the Faculty

of Science conferred an honorary doctorate upon Cook. When news of this reached the US, Peary's supporters launched an attack on Cook and the University of Copenhagen, contesting his claim to have reached the North Pole. Following an in-depth investigation, a commission set up by the University declared that there was no proof that Cook had reached the Pole, but that it was impossible to strip him of his honorary doctorate. Cook died in the US while serving a sentence for fraud. New evidence that emerged in the 1990s suggests that Cook did in fact reach the North Pole, but whether he or Peary was first has never been determined definitively.

Willi Dansgaard and ice cores

Willi Dansgaard's (1922-) pioneering ice-core research is an important element in international research on climate change today.

As so often occurs in the history of science, chance played a part in determining the course of Dansgaard's research. He was employed at the University's bio-physics laboratory, where he had access to a mass spectrometer that had been procured for another purpose. In a previous job at the Meteorological Institute, he had been interested in meteorological phenomena, which gave him the idea to analyse rainwater samples in the spectrometer. In 1952, he succeeded in demonstrating that there were links between the temperature at which rainwater forms and its content of the oxygen isotope ^{18}O . He hypothesised that levels of ^{18}O could therefore be used as an indicator of air temperature. Subsequent analyses of rainwater samples from all over the Earth confirmed his hypothesis.

In 1954, Dansgaard proposed that quantifying the content of heavy oxygen isotopes in the Greenlandic ice sheet would provide him with a picture of the climate several hundred years ago. He soon had the opportunity to test and prove his theories on Greenlandic ice cores extracted by French researchers. At the time, nobody envisaged that his idea would become the basis for a whole new branch of geo-physics, or that it would lead to several ice-core drilling projects that have enabled researchers to plot climate patterns over hundreds of thousands of years.

Here too, luck played a part. The US established a military presence in Greenland in the early 1950s, and explored the possibility of establishing military bases under the Greenlandic ice sheet, beyond the reach of the Soviets. In the early 1960s, as part of this project, the Americans developed deep drilling techniques in order to understand better the structure of the ice sheet. The first successful drilling was performed at Camp Century, close



Willi Dansgaard (1922-), Professor in Mass Spectrometry at the University of Copenhagen from 1962-1992, occupied a special teaching chair that was created specifically for him. He is shown working on one of the Greenlandic glacial ice cores, which he, more than anybody else, has called attention to as pivotal in modern climate research.

to the Thule base, and reached primordial rock at a depth of 1,390 metres in 1966.

The Americans agreed to help Dansgaard when, with the backing of the Danish authorities, he suggested using ice cores for climatology isotope studies. After three years of isotope analyses, Dansgaard and his staff plotted a temperature curve for Greenland's climate over the last 120,000 years.

He also demonstrated how dramatic climatic changes can occur over a very short period of time, even without human intervention. This knowledge plays a central role in current research on the future development of the climate.

Dansgaard's work is conducted at the Centre for Ice and Climate at the University of Copenhagen. Managed by Professor Dorte Dahl-Iversen, the centre extracts ice cores up to 3 km long and is one of the world leaders in its field. The research now includes the Antarctic, where the lack of precipitation means that ice cores contain 800,000 years' worth of climate information.

the Commission, to which reports on the results were also to be submitted. The Commission has therefore been able to build up a unique and extremely valuable scientific archive of more than 100 years of Arctic research.



Minik Rosing (1957-), Professor of Geology at the University of Copenhagen since 2000, photographed during field work in Greenland.

The oldest traces of life on Earth

A few years ago, Minik Rosing, Professor of Geology at the University of Copenhagen, proved that Arctic research could still contribute to the solution of scientific key questions, when he was able to date the origins of life on Earth back more than 3.8 billion years – 300 million years earlier than previously believed. His conclusions were derived from studies of rocks from the Isua range in Greenland, the oldest known mountain complex of its kind anywhere on the surface of the Earth. These mountains provide a natural record of the prevailing forms of life on the planet's surface 3,800 million years ago.

Rosing and his colleagues assumed that the life forms found here would be micro-organisms, probably bacteria. Living organisms affect and alter the environment in which they live, so researchers gain insights into the early organisms' way of life through studying the geochemical traces of their impact on the environment. The Isua organisms turned out to have been capable of a form of photosynthesis, a highly advanced metabolic strategy that the very first organisms on Earth are unlikely to have mastered. The existence of traces of photosynthesis in the 3,800-million-year-old deposits therefore suggests that life emerged earlier than previously thought – perhaps as early as the first seas emerged, approximately 4,400 million years ago.

The next step was to assess whether life itself may have had a critical influence upon the environment; i.e., could the Earth's geological development have taken a different direction if life forms had not adopted this metabolic strategy? Analyses of the energy used in photosynthesis in relation to the Earth's own energy consumption, as well as analyses of how organisms' metabolisms may have influenced the Earth's crust, led to the conclusion that it is possible that the continents emerged as a side-effect of the activities of living organisms. In other words, these minuscule micro-organisms helped to shape the surface of the planet as we know it.

The most significant Danish endeavours in the exploration of Greenland commenced in the early 20th century. Beginning in 1886, American Robert Peary, operating from a base in the Cape York district near Thule, conducted a series of expeditions that culminated when he reached the North Pole in 1909. Following the purchase of Alaska in 1867, the US became interested in acquiring Greenland as well, but the Danish government declined.

Under the international law of the day, North and East Greenland were considered no-man's land. However, in 1902-1903, Denmark sent

Fróðskaparsetur Føroya, the University of the Faroe Islands, in Thorshavn, was founded in 1960 as *Academia Færoensis*, and was accorded official university status in 1990. It arose out of the *Faroese Scientific Society*, which was founded in 1952 to provide a venue for science and research in the Islands. In 2008, the University had three faculties – Faroese Language and Literature, Science and Technology, and History and Social Sciences – that confer degrees at bachelor, Master and PhD levels. Faroese folklore and cultural heritage constitute a central area of research. The University also organises public lectures and evening courses in Faroese. The University appointed its first professor, the Faroese Christian Matras (1900-1988), in 1966. He became an assistant professor at the University of Copenhagen in 1936, served as an associate professor in Faroese in 1942-1952, and then as a professor in 1952-1966. The picture shows the first university building (built in 1965), which has housed the Department of Faroese Language and Literature since 1990.



a number of expeditions to these regions, partly to make land surveys and partly to strengthen and consolidate Danish presence in Greenland and thus counteract American influence.

First was the so-called *Danish Literary Greenland Expedition* of 1902-1904, headed by L. Mylius-Erichsen, in which the young Arctic explorer Knud Rasmussen participated as an interpreter, a first step to his fame. Upon his return, Rasmussen called for the Danish state to get officially involved in North Greenland; his proposal was rejected, undoubtedly to avoid offending the US. Instead, Rasmussen supported the “North Star” trade and mission station in the Cape York district in 1909, and a year later the Thule trade station in collaboration with Peter Freuchen. Both stations came to serve as bases for Rasmussen’s many expeditions.

The next major venture was the 28 man strong *Denmark Expedition* of 1907, again led by Mylius-Erichsen, who, along with two other participants, perished along the way.

After yet another expedition to North Greenland, headed by Einar Mikkelsen, the torch passed to Knud Rasmussen and Lauge Koch. Several major expeditions departed from the station in Thule during the years 1912-1924, including Koch’s 1920-1923 exploration of North and East Greenland to mark the 200th anniversary of Hans Egede’s arrival, and Knud Rasmussen’s fifth Thule expedition, known as “*The Long Sleigh Journey*”, of 1921-1924. The purpose of the latter expedition



Ilisimatusarfik, the University of Greenland, in Nuuk (Godthåb), previously known as the Inuit Institute, was accorded university status in 1989. The University's research and instruction is centred on subjects relevant to Greenland and the Arctic region. It was originally housed in the former Moravian mission station, but in 2007 it moved to a new university park to the north of Nuuk. The University serves as a centre for education, research, documentation and mediation of knowledge. Most of the instruction is conducted in Danish. In 2008, there were 14 teachers and approximately 150 students, at four departments: Economics, Political Science and Social Work; Cultural and Social History; Language, Literature and Media, and Theology. All departments have agreements concerning teacher-exchange programmes with corresponding Danish departments.

was to shed light on and describe the Eskimos' cultural history and the natural conditions in which they lived. The studies were wide-ranging, taking in everything from natural conditions, flora, fauna and archaeology to language and culture. The journey also took Rasmussen and his companions across the northern border of the American continent into Siberia. In scientific terms, both expeditions were extremely successful. Huge collections of samples, specimens and artefacts – more than 10,000 objects in total – were brought back to the National Museum in Copenhagen. These collections and the publication of *Reports of the Fifth Thule Expedition 1921-24* cemented Copenhagen's position as a centre of Arctic research.

The exploration of Greenland and the Arctic continues at a steady pace to this day. The Commission, in which University staff play a significant role, and the Arctic Station in Disko are key components in this work. In recent years, however, several parties have expressed concern about the decline in funding for basic research in the Arctic. One such critic is Minik Rosing, the current chairman of the Commission and Professor of Geology at the University of Copenhagen. Rosing is renowned for his groundbreaking theories about the links between the origins of life on Earth and the formation of the continents (see fact box), and is currently the most prominent international representative of Danish and Greenlandic research in the Arctic Region.

August Krogh (1874-1949). Krogh's scientific passion was aroused early on by popular science books, and in high school he demonstrated a deep interest in botany. He eventually opted to study zoology due to the influence of the prominent zoologist William Sørensen, whom he had accompanied on excursions as a child. During his student days, Krogh attended lectures in physiology and sought further guidance in experimental methods from Christian Bohr. In 1899, after completing a Master's Degree in Zoology, he obtained a post in Bohr's physiology laboratory at the University, where he continued his studies into the respiration of frogs. In his doctoral thesis, "The Skin and Lung Respiration of Frogs" (*Frøernes Hud- og Lungerespiration*, 1903), he demonstrated that oxygen intake in the lungs is the result of a purely physical process of diffusion. Krogh's work on air regeneration in the lungs of animals and humans earned him international recognition. In 1908, he was made senior associate professor, and in 1916 he became Professor of Animal Physiology at the University. Two years later, he established the Animal Physiology Laboratory, which provided the framework for his scientific career.

Krogh received the 1920 Nobel Prize in Medicine or Physiology for his work on metabolism. He was invited to give a number of guest lectures at Yale University, and during his stay in the US, he became aware of the Canadian researchers F. G. Banting and C. Best's successful attempts to manufacture insulin for the treatment of diabetes. Krogh acquired the Scandinavian rights to the production, which marked the start of the flourishing Danish pharmaceutical industry.

As Krogh's staff, headed by Doctor Hans Christian Hagedorn, gradually assumed more and more responsibility for insulin production, Krogh turned his attention to his work at the University. Thanks to generous donations from American foundations, Krogh procured an excellent physical setting for the Animal Physiology Laboratory and the Rockefeller Institute, where he continued doing research on a broad and constantly widening range of physiological subjects until he retired in 1945. The institute he founded and shaped throughout his career today bears his name.



When the first Nobel Prizes were awarded in 1901, Niels Finsen, a Danish doctor, was nominated for the Prize in Medicine or Physiology. He received it in 1903 for developing a method that used light therapy to cure tuberculosis of the skin (*lupus vulgaris*).

The Nobel Prize has gradually achieved the status of the crowning scientific accolade, one that researchers all over the world dream of winning. Thirteen Danes, four authors and nine scientists, have been awarded the Nobel Prize. For Danish science, and particularly the natural sciences at the University of Copenhagen, these Prizes have been of great importance. They have helped to raise the profile of Danish science, they have made it easier for Danish scientists to enter into international partnerships, and they have contributed to Danish research by attracting substantial and sometimes vitally important funding from international foundations, e.g., in the years of financial straits before World War Two.

Two researchers, physiologist August Krogh and especially physicist Niels Bohr, who received the Nobel in 1920 and 1922, respectively, achieved unparalleled status in Danish natural science research, the effects of which are still felt to this very day. Bohr's efforts will be discussed in the following chapter, Krogh's below.

August Krogh stands out as a scientist who combined theoretical insight with an ability to create necessary physical and organisational frameworks. He was also keenly aware of the practical applications of scientific discoveries.

As a boy, Krogh reproduced all the experiments described in the popular science works he could lay his hands on. In so doing, he showed excellent talent for constructing apparatus, an ability that would prove invaluable throughout his career. These creative skills came in handy

Niels Ryberg Finsen (1860-1904) passed his medical finals in 1890, after which he was appointed *prosector anatomiae* at the University of Copenhagen. At the same time, he began his pioneering studies on the effects of light on the human organism and its potential use in medical treatments, a subject that he was the first to study in a systematic and scientific way.

In 1893, Finsen published his first article "The Impact of Light on the Skin", in which he proposed, for example, that smallpox patients be protected from the irritant effects of light by using red curtains and red window panes – an age-old household remedy mentioned in Thomas Bartholin's *Cista Medica* (1662).

In 1896, he described the first successful use of light to treat the common and hitherto incurable cutaneous tuberculosis (*lupus vulgaris*). Finsen was both an excellent theoretician and a brilliant practitioner, as evidenced by the carbon arc lamp with quartz filters that he designed in 1899 and which remained standard equipment in light treatment for the next quarter of a century.

Finsen was the first to realise that light did not just have adverse effects, but could also be therapeutic. In 1896, he established a "Light Institute", today known as the Finsen Institute, which still plays an important role in Danish medical research.

In 1898, Finsen was appointed titular Professor of Medicine. He received many accolades and in 1903, the year before his death, he received the Nobel Prize in Medicine for his treatment of *lupus vulgaris* with light.

Finsen is venerated in Denmark, whereas his name was quickly forgotten abroad. Worldwide, the disease cutaneous tuberculosis disappeared in the first half of the 20th century mostly due to general campaigns to improve hygiene rather than to Finsen's light treatments, the popularity of which was largely confined to Denmark.



and bloomed after 1910, when Krogh set up the Animal Physiology Laboratory that he was to lead. Along with two doctors – his wife Marie Krogh and J. Lindhard, who in 1917 became the University's first professor in the theory of gymnastics – Krogh embarked upon a series of studies of respiration, metabolism and blood circulation at rest as well as during muscular work. These studies would form the basis for new fields in physiology and many were carried out with apparatus Krogh had designed personally, such as an electric bicycle ergometer, various types of recording spirometers and apparatus for measuring the basal metabolic rate. Produced in the laboratory's own workshop, these instruments were sold to laboratories and hospitals in Denmark and abroad, and they were an important source of income for the laboratory, since the proceeds were used to cover operation costs.

In 1920, Krogh was awarded the Nobel Prize for Medicine or Physiology for his studies of metabolism and the circulation of the blood. He was also invited to deliver a series of guest lectures at Yale University,

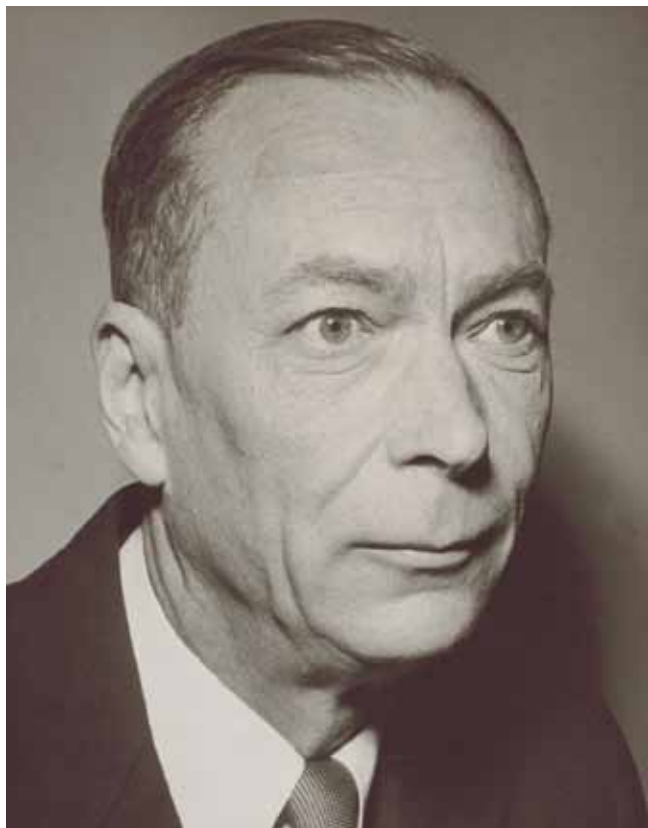


Johannes Andreas Grib Fibiger (1867-1928) passed his medical finals in 1890. In 1895, he acquired a doctorate for his bacteriological thesis, in which he made it clear that bovine tuberculosis could spread to people, especially infants, through the ingestion of fresh cow's milk. As a direct result, Denmark was among the first countries to prescribe the pasteurisation of milk and dairy products by law.

In 1900, Fibiger was appointed Professor of Pathological Anatomy at the University of Copenhagen. Between 1907 and 1913, he conducted a number of experiments designed to identify the cause of cancer. In the following years, he was nominated for the Nobel Prize in Medicine no less than 16 times. In 1926, he became the first cancer researcher to be awarded the Prize for groundbreaking work. The nomination was preceded by intense debate about the long-term importance of his research. The citation for the Nobel Prize mentioned that Fibiger had brought experimental cancer research out of an impasse. Fibiger's discoveries were thus an indispensable part of the progress of cancer research. Even though his results proved unsustainable, his work was a significant step on the path towards modern cancer research.

and during his stay in the US, he became familiar with Canadian researchers F. G. Banting and C. Best's successful attempts to produce insulin to treat diabetes. Krogh had a special interest in the subject, as his wife Marie suffered from the condition. He estimated that even though preparations for industrial production were in full swing in the US, Canada and Great Britain, it would take considerable time before insulin came on the market elsewhere. He acquired the Scandinavian rights for production, which heralded the beginning of the burgeoning Danish medicine industry.

Upon his return from the US in 1922, Krogh gathered a number of parties interested in production, and the Nordic Insulin Laboratory was set up. Krogh allied himself with a young doctor, Hans Christian Hagedorn, who had just written a thesis on diabetes. As Krogh became increasingly absorbed with work at the University, Hagedorn was put in charge of the development of the insulin production. There were many problems in the production that remained to be dealt with; one of the main issues was what kind of raw material to use. Insulin is produced



In 1920, Carl Peter Henrik Dam (1895-1976) graduated as a chemical engineer from the Technical University of Denmark, the country's leading institution for chemistry studies and research. His interest was quickly directed towards biochemistry, particularly physiological and nutritional aspects.

In 1923, Dam obtained a post at the physiology laboratory at the University of Copenhagen, and in 1928 he became an assistant in the newly established Bio-chemistry Department. He was awarded a Doctorate of Philosophy in 1934 for a thesis that initiated a series of studies – some in cooperation with the biochemist Fritz Schönheyder at the University of Aarhus – that eventually led to the discovery of vitamin K in 1936. Dam explained that the new vitamin's designation "K" was determined by two factors: firstly, that the "vitamin alphabet" had reached K, and, secondly, that K stood for the Danish word "koagulation" ("coagulation"). K vitamins help the blood to coagulate.

Shortly after the outbreak of World War Two, Dam travelled to the US and Canada to lecture and study. He was in New York when he learned that he had been awarded the 1943 Nobel Prize in Medicine or Physiology.

In 1946, Dam returned to Denmark, and took up a professorship at the Technical University of Denmark. He spent the rest of his highly productive career focusing on nutrition research. Dam felt it was his duty as a scientist to draw attention to the poor conditions for science in Denmark. In doing so, he followed in the footsteps of another Danish Nobel-Prize winner, August Krogh.



Aage Bohr (1922–) is a son of the Nobel Prize winner Niels Bohr. In 1943, he fled with his father, via Sweden, to Great Britain and the US, where he worked as an assistant in his father's research into atomic energy.

On his return to Denmark, Bohr finished his Master's Degree in Physics in 1946. Following several years of study in the US, he obtained a post at the Niels Bohr Institute, and his life-long collaboration with Ben Mottelson started shortly afterwards. In 1956, Bohr was appointed Professor of Physics, and in 1962 he took over, from his father, as head of the department, a post he retained until 1970. Bohr and Mottelson worked on Niels Bohr's theories and the theories behind James Rainwater's observations. Bohr and Mottelson's major work was *Nuclear Structure 1–2* (1969 and 1975 respectively). Together, they devised a theory about the structure of the atomic nucleus, and proved the connection between collective movement and the movement of atomic core particles. It was for this work they received the 1975 Nobel Prize in Physics alongside James Rainwater.

Bohr is a member of the Academy of Science and has received numerous honorary doctorates, distinctions and awards, such as the H. C. Ørsted Medal in 1970 and the Ole Rømer Medal in 1976, both of which were jointly awarded to Bohr and Mottelson.



Ben Roy Mottelson (1926–) was born in Chicago, Illinois, and pursued his graduate studies and PhD work at Harvard University. His PhD thesis in nuclear physics was completed in 1950. Having received a Sheldon Travelling Fellowship from Harvard University, he chose to spend 1950-1951 at the Institute for Theoretical Physics in Copenhagen (later the Niels Bohr Institute), the cradle of much modern physics and renowned for its strong traditions of international collaboration. A fellowship from the US Atomic Energy Commission enabled him to continue his work in Copenhagen for two more years, after which he secured a research post in the theoretical study group formed in Copenhagen for CERN (The European Organisation for Nuclear Research). In 1957, he was appointed Professor at NORDITA (the Nordic Institute for Theoretical Atomic Physics) in Copenhagen, which cooperates closely with the Niels Bohr Institute.

In 1975, Mottelson was awarded the Nobel Prize, along with Aage Bohr and James Rainwater. They received the Prize “for the discovery of the connection between collective motion and particle motion in atomic nuclei and the development of the theory of the structure of the atomic nucleus based on this connection”.

Mottelson resigned his professorship at NORDITA in 1994 and was subsequently appointed an advisory professor at the University of Copenhagen.

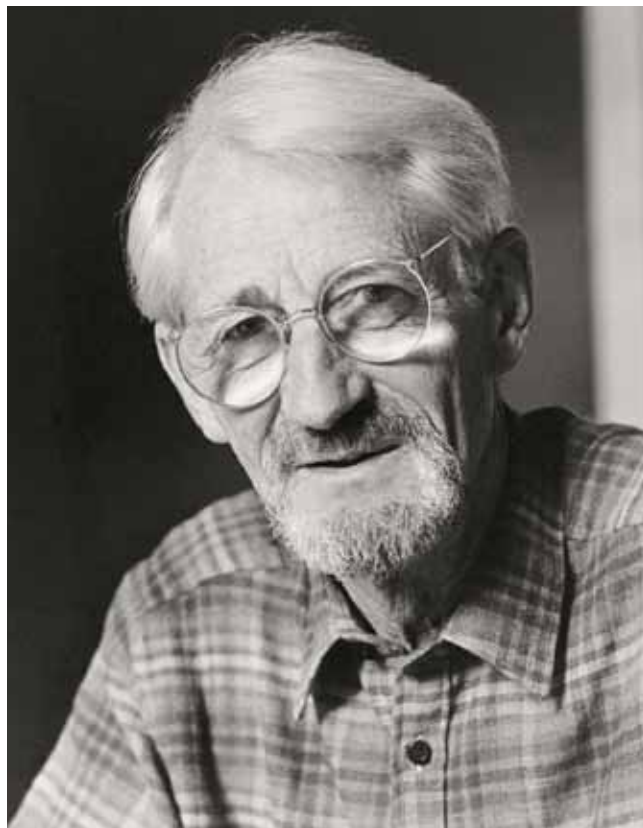


Niels Kaj Jerne (1911-1997) studied medicine at the University of Copenhagen where he in 1951 received a Doctorate in Medicine for his immunology thesis. While pursuing his studies, Jerne worked at the State Serum Institute (*Statens Serum Institut*). In 1956, the opportunities for a scientific career within the pioneering field of immunology were limited at the University of Copenhagen. Jerne instead forged an outstanding career abroad. He worked first at the World Health Organisation in Geneva, then as a professor at universities in the US and Germany. In 1969-80, he was head of the Basel Institute of Immunology, which he established as one of the world’s foremost centres for immunology research.

Jerne’s work is marked by three major contributions to immunology. The first, in 1955, had a great influence on the development of immunology. The next, a pioneering theory about the formation of antibodies, was published in 1971. Finally, in 1973, he presented his third and most cited contribution, which outlined the network theory. It describes the immune system as a complex, self-regulating network capable of activating or deactivating itself as required.

Niels K. Jerne became a member of the Danish Academy of Science in 1969 and of several overseas science academies, including in 1980 the British Royal Society. He received honorary doctorates in Chicago (1972), Columbia University, New York (1978) and Copenhagen (1979). In 1984, Jerne was awarded the Nobel Prize in Medicine or Physiology for his fundamental research into the human immune system. He shared the Prize with Georges F. H. Köhler and César Milstein.

Jens Christian Skou (1918–) graduated in medicine from the University of Copenhagen in 1944 and became a doctor of medicine from the University of Aarhus in 1954. In 1963, he became a professor of physiology at the University of Aarhus. In 1978 he was appointed Professor in Biophysics, a position that he held for a decade. His work focused on the ability of cell membranes to transport substances into or out of the cell. Published in 1957, a first article about the sodium-potassium pump ($\text{Na}^+, \text{K}^+ \text{ATPase}$) eventually led to his being awarded the Nobel Prize in Chemistry in 1997. He has also researched the analgesic and toxic effects of local anaesthetics. Skou is a member of the Academy of Science and a number of scientific societies abroad.



from pancreases and where could these be acquired? As luck would have it, the Danish insulin researchers decided early on to use good-quality pig pancreases for this purpose and the rapidly growing Danish slaughterhouse sector was able to supply them in large quantities.

The initial difficulties were gradually overcome, and by the end of 1923, the Nordic Insulin Laboratory had a product that surpassed overseas competitors in terms of quality and production cost, and which has continued to improve over the years. It should be noted that for many years, Danish insulin production was an idealistic enterprise. Krogh himself had no interest in financial gain, and he originally obtained the production rights from the University of Toronto with the stipulation that nobody would make a profit from the discovery. Accordingly, insulin was sold at production cost in Denmark. The export income, quite significant over time, was used to set up a foundation that, among other activities, funded research in biology and medicine.

Another of Krogh's diverse talents was revealed in 1923: at a time when the Danish state only invested modest sums in new university

premises, he succeeded in obtaining considerable financial support from American foundations. In the following years, this influx of funding made it possible to build *The Rockefeller Institute* at Nørre Fælle in Copenhagen – an impressive complex by the standards of the time. Here Krogh established a research base that provided the framework for the rest of his highly productive career and bears witness to the exceptional breadth of his talent.

Krogh had a huge influence on Danish and international research in human physiology, medicine and other aspects of health care. And although this is harder to assess, his work in animal physiology is probably equally important: August Krogh's many monographs, which were widely published, influenced physiologists all over the world. Each one of them represents a significant synthesis of central areas of animal physiology, and several continued to be reprinted long after his death.

August Krogh was a man of moral fortitude who stood firmly on his principles. He proved this shortly before his death in 1949, when he announced his resignation from the Academy of Science in an open letter of protest. Krogh had failed to gain Academy support for reforming the organisation of research or for improving research conditions after the prolonged stagnation associated with World War Two. The fact that one of Denmark's few Nobel-Prize winners resigned from the country's top scientific institution in an open letter, drew public attention to a problem that Krogh took very seriously. This unwillingness to compromise was typical of Krogh, and was a trait he shared with the tutor from his youth, William Sørensen. In his office, Krogh kept a bust of Sørensen, inscribed with the latter's motto: "In the final analysis, everything depends on character." Krogh made this sentiment his own.



Niels Bohr is a towering figure in the history of Danish science and the University of Copenhagen in the 20th century. His most important contribution was the development of quantum physics, but his influence extended much further.

Bohr was born in 1885. His father, Christian, was a professor of physiology, who provided intellectual stimulation for his young children, for example, by having them attend discussions in the circle of intellectuals that met in the family home.

Bohr's chosen field was physics, in which he obtained his doctorate in 1911. His dissertation on the electron theory of metals was a pioneering study that garnered considerable acclaim – although, because it was written in Danish, it reached a limited audience. This particular work belongs in the realm of “classical physics”, because at this stage Bohr did not employ the quantum concept introduced by the German physicist Max Planck in 1900.

Throughout his career, Bohr depended on “sounding boards” for his theoretical thinking. He may have talked through his Master's thesis with his parents; later on he would regularly discuss theories and concepts with his wife Margrethe and junior colleagues. This enthusiasm for debate enabled him to establish a fruitful scientific milieu at the Niels Bohr Institute.

Bohr first utilised quantum concepts when he studied with the British physicist Ernest Rutherford in Manchester. The experiments conducted by Rutherford and his group demonstrated that an atom consisted of negatively charged electrons circling a heavier, positively charged nucleus. According to classical physics, this system would be unstable. Bohr postulated that electrons could only occupy specific pre-determined orbits, and that electromagnetic radiation from an



Niels Bohr met his future wife Margrethe Nørlund, the daughter of a pharmacist, in the provincial town of Slagelse, through Margrethe's brothers, whom Bohr knew from his studies at the University. The wedding took place on 1 August 1912, and the marriage proved to be a particularly happy one. Throughout their life together, Margrethe was Bohr's most trusted adviser who also took care of much of his social life. They had no fewer than six sons, the fourth of whom, Aage, would eventually take over his father's role as the pre-eminent Danish physicist and receive the Nobel Prize. The photograph shows Margrethe and Niels Bohr on his 70th birthday in the garden of the Carlsberg Honorary Residence of the Royal Academy.



The Niels Bohr Institute was established by Bohr in 1921 as the Institute of Theoretical Physics at the University of Copenhagen. The Institute was the centre of Bohr's academic life. He created a unique international research centre for atomic and nuclear physics, and continued to direct its activities until he died in 1962. Following his death, the centre has continued to maintain its high standards and prominent international status. The photograph shows the Institute in 1938, after it had gained recognition as the world's leading nuclear physics research centre.

atom occurred when an electron jumped from a higher to a lower orbit.

Few would accept this revolutionary theory at the time, though it would become a mainstay of physics in the future.

Bohr's atomic model not only substantially improved his publication record, but also secured him a teaching post in physics at the University of Copenhagen. In 1914, he launched his campaign for a new full professorship in theoretical physics, to which he was appointed two years later. In 1917, he began work on establishing the Institute for Theoretical Physics, which was to be affiliated with his chair. Although public funding was in short supply, the project made swift progress, not least due to private donations from well-to-do friends. In 1921, Bohr gave an inauguration address before the Danish political and scientific elite gathered in his new auditorium. He stressed that, despite the Institute's name, experiments and experimental scientists would in fact play a vital role in testing the theories propounded.



Niels Bohr and Ernest Rutherford at the Solvay Conference in Brussels, 1930.

Bohr wanted the Institute to be a meeting place for the best young physicists in the world – somewhere they could gather to discuss the latest developments in an informal fashion. Founded just after World War I, when lingering enmities made co-operation difficult in many fields, including the sciences, the Institute was a haven where scientists were able to meet in a peaceful and relaxed atmosphere, regardless of nationality or political allegiance.

The Institute made Bohr feel “morally pledged” to remain at his home university, despite being offered chairs by Rutherford – who promised Bohr that “between us we could make physics boom” – and by several foreign institutions with better facilities and higher salaries.

Bohr was still quite young when he was awarded the Nobel Prize in Physics in 1922, the same year Albert Einstein received the deferred 1921 Physics Prize for his discovery of the law of the photoelectric effect. Bohr thought it was only right that Einstein should be awarded the prize before him, a view that he expressed both publicly and in person



Niels Bohr and George de Hevesy at the Niels Bohr Institute in 1920.

to Einstein. The statement echoed Bohr's concern that physics should develop harmoniously, and that its pioneers should be acknowledged in the correct order.

At the time Bohr received his Nobel Prize, the Hungarian George de Hevesy and the Dutchman Dirk Coster were working at the Institute. Their experiments showed that chemical element 72 in the periodic table had properties that were in accordance with Bohr's theory – which by then he had developed so that it encompassed and explained the entire table of elements. This proved not only Bohr's theory, but also that his goal of experimentally testing theories at the Institute was worthwhile and realistic. Element 72 was named *hafnium*, the Latin name for Copenhagen.

Bohr's institute became a place of pilgrimage for young physicists from all over the world. The original building soon proved too small, especially since a significant part of the Institute was given over to housing the professor and his expanding family, as was the norm at the time. In 1923, the International Education Board was established by means of the Rockefeller fortune, with the express purpose to “make the peaks higher” in foreign, especially European, basic science by supporting the best institutions and providing exchange scholarships for junior scientists. Bohr's international status is evident in that he was the first to receive such a grant. Supplemented with support from local sources, the Rockefeller grant was used to construct two new buildings on the premises – one was a villa for Bohr and his family, while the other housed experimental equipment and accommodated young visiting physicists.

When Werner Heisenberg proposed his revolutionary theory of quantum mechanics in 1925, the young German physicist had already worked closely with Bohr. He later formulated the uncertainty principle of quantum mechanics while working as Bohr's assistant in Copenhagen in 1926-1927. Together, Heisenberg, Bohr and a few others developed the so-called “Copenhagen interpretation” of quantum mechanics, which provides a conceptual basis of the theory even today.

A central element in this interpretation is Bohr's concept of complementarity, according to which physical phenomena at the atomic level manifest themselves in different and seemingly contradictory ways depending on the experimental framework of the observations – e.g., light sometimes appears as waves and sometimes as a stream of parti-

cles. Both properties must be taken into account in order to formulate a complete explanation. Bohr believed that a basic epistemological insight had been derived from quantum mechanics, and throughout the rest of his life he sought to apply it in other fields, including biology, psychology and sociology. The other giant of 20th-century physics, Albert Einstein, was not convinced by the Copenhagen interpretation, famously asserting that “God does not play dice.” The discussion between Bohr and Einstein constitutes one of the fundamental philosophical discussions in 20th-century physics.

In his lectures in the United States in 1938, Heisenberg introduced the phrase the “Copenhagen Spirit” to describe the special way of thinking about physics at the Institute. As well as contributing to this spirit, Bohr was also a diligent fundraiser and an efficient administrator. The scientific and international prominence of the Institute was not simply the result of disinterested discussion, but was due to Bohr’s careful planning. He particularly wished to strike the right balance between theories and experiments, which required both the appropriate apparatus and the right people.

He realised at an early stage that cutting-edge research in theoretical physics was moving from the study of the atom as a whole to the examination of its heaviest constituent part, the nucleus. Bohr’s fundraising abilities would be required once more if he was to realise his vision of an institute for theoretical physics that would be able to combine theory and experiments in a fruitful manner.

Bohr needed new equipment to replace the spectroscope that was used to study the atom – namely particle accelerators for the bombardment of the atomic nucleus. Together with chemist George de Hevesy and physiologist August Krogh, Bohr applied to the Rockefeller Foundation for a cyclotron, a kind of particle accelerator. In accord with the foundation’s endeavour to develop the field of “experimental biology”, the cyclotron would be used in biological studies related to the radioactive indicator method developed by de Hevesy early in the century, which, thanks to the recent discovery of induced radioactivity, could now be applied on a grander scale to the study of chemical processes in the metabolism of animals. The foundation granted the money for a cyclotron and for a number of years animals were kept at the Bohr Institute as part of de Hevesy’s project. The cyclotron was also used for experiments



Albert Einstein and Niels Bohr at the Solvay Conference in Brussels, 1933.

A photograph of Niels Bohr and Werner Heisenberg at the informal annual conference at the Institute in 1936. The man with his back to the camera is Wolfgang Pauli.



in nuclear physics, and after World War Two it was devoted exclusively to this purpose. Thanks to Danish funding, Bohr also acquired additional equipment for studying the atomic nucleus.

The intimate relationship between theory and experiment proved fruitful for atomic physics, and this principle extended to the new studies of the atomic nucleus. In 1938, German physicists unexpectedly discovered that uranium atoms split in half when bombarded by neutrons. Two physicists at the Bohr Institute proposed a theoretical explanation based on Bohr's conception of the compound nucleus, which was subsequently confirmed by experiments, and they were the first to coin the term "fission" to describe the phenomenon.

At the beginning of 1939, Bohr travelled to the US accompanied by a junior colleague, the Belgian Léon Rosenfeld. Rosenfeld publicised the German experiments and offered an explanation for their results. American research institutions suddenly found themselves engaged in a race to conduct their own fission experiments and confirm the German results. In collaboration with the American John Archibald Wheeler at Princeton, Bohr produced pioneering theoretical work on nuclear fission.

During his stay in the US, Bohr also became president of the Royal Danish Academy of Sciences and Letters. He had been an active mem-



Werner Heisenberg coined the phrase the “Copenhagen Spirit”, referring to the special way of thinking about quantum physics at Bohr’s Institute. The phrase soon came to denote instead the scientific and social milieu there, especially between the two World Wars. As many a physicist has described in memoirs, this spirit arose out of the opportunities to discuss physics in an informal atmosphere without interruption. For a privileged few, there would be the added boon of discussing ideas with Niels Bohr, who relied upon such encounters in order to refine his ideas. This 1931 picture shows physicists Lev Landau, Eduard Teller and George Gamow with two of Niels Bohr’s sons, Aage and Ernest, in the snow in front of the Niels Bohr Institute.

ber since 1917, and often published the results of research at his institute in the Academy’s journal. He remained president of the Academy until his death – an exceptional tenure of 23 years.

In 1931, Bohr was offered – and accepted – the Carlsberg Foundation’s honorary residence, which was intended to house the most distinguished Danish intellectual of the day. Situated on the Carlsberg premises, this landmark mansion represented Danish scientific achievement, and would often be visited by foreign statesmen on official business in Denmark.

When Bohr accepted the presidency of the Academy, Hitler’s Nazi regime in Germany loomed large in his deliberations. Several of the German physicists with whom he had worked in Copenhagen were Jewish; ousted from their university posts, they had no future in Germany. Bohr used his connections with well-established scientists and foundations to get his former colleagues out of Germany. He let them stay at the Institute until they found posts elsewhere, often in the United States.

Bohr was acutely aware of nuclear fission’s destructive potential. However, in lectures in Denmark and Norway before the Nazi occupation in April 1940, he stated that the development of an atomic bomb would remain prohibitively difficult at least until after the war. He remained

convinced that he was right, even after Heisenberg told Bohr during a visit in late 1941 about his participation in the German atom-bomb project.

Bohr's position in occupied Denmark was precarious. In August 1942, a Nazi newspaper in Denmark referred to him as "the Jew, Professor Niels Bohr" at a time when he was rumoured to be the next vice chancellor of the University. The newspaper stressed that the authorities ought to "find a Danish man to occupy this high honorary office". Most Danish newspapers responded to the insinuation with disgust.

In early 1943, Bohr received an invitation to join his British colleague James Chadwick in England for "important scientific work". Though the phrasing was vague, Bohr knew that it concerned the development of an atomic bomb. Still convinced that such a thing was impossible, Bohr replied that occupied Denmark had greater need of him.

After the collaboration between the Germans and the Danish government came to an end in late 1943, the political situation in Denmark changed dramatically. Warned about the imminent arrest of the Danish Jews, Bohr and his family, like thousands of others, escaped to Sweden.

While in Sweden, Bohr received another invitation from England, and this time he accepted. He was flown to Scotland and then taken to London. A few days later, he was joined by his son Aage, then a fledgling 21-year-old physicist who would serve as his father's sounding board during their exile.

On his arrival in London, Bohr was briefed about the American atom-bomb project; he immediately changed his mind about the likelihood of developing such a weapon during the war. Worried about the German efforts mentioned by Heisenberg, Bohr joined the British contingent of the project. He was convinced that the bomb would "necessitate and facilitate" a new approach to international relationships, and that the first step must be to inform the Soviet Union about the project in order to prevent a post-war nuclear arms race.

Although they did not officially support Bohr, prominent members of the British nuclear weapon directorate, code-named Tube Alloys, sympathised with his views. The British ambassador to the United States covertly helped to make arrangements for Bohr to present his case to American President Franklin D. Roosevelt and British Prime Minister Winston Churchill. He failed to convince them – Church-

ill even suspected him of spying for the Russians – but Bohr nonetheless continued his mission after the war in pursuit of what he called an “open world” between nations. He continued to lobby statesmen, and wrote an open letter to the United Nations in 1950 – but all his efforts were in vain.

Bohr was not permitted to return to Denmark until after the atomic bombs had been dropped on Japan in August 1945. He was greeted as a hero in Denmark, and some newspapers even welcomed him as the man who had invented the atomic bomb. He continued to run and expand the Institute, and was a major player in the post-war expansion of physics institutions. He also played a key role in establishing the research facility at Risø, 30 kilometres from Copenhagen, the aim of which was to prepare for Denmark’s adoption of nuclear power – which never actually happened. Internationally, Bohr was active in the establishment of CERN, the European experimental particle physics facility near Geneva, as well as the Nordic Institute for Theoretical Atomic Physics (NORDITA), which until recently was located next to the Bohr Institute. Niels Bohr died on 18 November 1962.

He left an unmatched legacy in the field of physics, as well as an institute that continues to maintain his highest standards as one of the world’s leading centres of theoretical physics.



Niels Bohr’s bust in front of the University of Copenhagen



Danish society as a whole was affected by the German occupation of the country on 9 April 1940. However, the University of Copenhagen, as with the rest of Denmark, continued to function throughout World War II.

As a state institution, the University had to follow government orders and continue as normal – at least in the early years of the occupation. At the University's liberation celebrations on 4 June 1945, the Rector, Professor of Theology Jens Nørregaard, described the experience as follows: "Deep pain, uncertainty and confusion were the emotions that at first reigned in the small world of the University, as well as among the Danish people as a whole. The only thing on which we all agreed was that the work must go on with as little interruption as possible, and that we had to steer a clear Danish course, discreetly and with steadfast determination, in order to protect the University from foreign interference and guarantee the freedom of teaching and research."

In the beginning, the direct and visible consequences of the occupation were few and insignificant – e.g., a temporary ban on public meetings, which led to a six-month period without public defences of doctoral theses.

Official Danish policy during the first years of the occupation was that, as far as possible, life in Denmark should continue as if there were no German troops in the country. This policy, which later has been contested, but also approved, is known as the "policy of negotiation", the consequence of which was that Denmark was not subjected to a war regime as were other occupied countries. This did not prevent the German occupiers from pursuing active policies towards the University. The British Senior Associate Professor A. F. Colborn was deported in May 1940. And when the Social Democrat Member of Parliament Hartvig Frisch – who in his 1933 book *Pest over Europa*



The most visible sign of the German occupation's influence on the activities of the University of Copenhagen was perhaps the air-raid shelter on the University Square. Air-raid shelters were common in every Danish town at the time. The photograph illustrates the fact that even though war was raging around Denmark, life on the University Square still went on more or less as usual.

The 700th anniversary of the Law of Jutland in 1941. The Law of Jutland, which was introduced in 1241 and remained valid until 1683, occupies a special place in Danish history, and is considered the epitome of tradition, clarity and justice. In particular, the admonition of the preamble – *Med lov skal land bygges* (“By law shall the land be built”) – has assumed an iconic status in the Danish State and its legislation. In the early years of the German occupation, the Danish people rallied around national symbols, and the anniversary of the Jutland Law provided a source of national solidarity that could be celebrated without obviously offending the occupying power. A poster produced for the occasion depicted the Seal, the famous line from the preamble and pictures. The poster was displayed in schools and other official buildings. The University marked the event with a ceremony attended by the Prime Minister, the King and the Crown Prince. It was broadcast on Danish radio, and the University successfully resisted German demands that the speeches be approved prior to transmission.



(“Plague over Europe”) had issued a forceful warning about the totalitarian ideologies of Communism, Fascism and National Socialism – was appointed Professor of Classical Philology in 1941, the Germans banned him from making public speeches outside his parliamentary constituency.

More serious were the efforts to establish close co-operation between the University of Copenhagen and German academics. In the summer of 1940, the Germans requested that the University invite German researchers to give guest lectures, while, in turn, Danish researchers were asked to lecture at German universities. The University adopted a procrastination strategy. After six months of deliberation, it replied that the University of Copenhagen as such did not usually invite specific lecturers from abroad, but that it opened its doors to visiting lecturers who were invited, for example, by academic societies.

The same procrastination strategy was used once more when students from universities in northern Germany submitted far-reaching proposals for student-exchange programmes. A polite message of thanks was sent, but it was pointed out that the German proposal was so wide-ranging that it needed to be analysed in greater depth, and that a response would be forthcoming at a later date. In 1941, the German authorities requested that the inauguration of the German Institute, the purpose of which was to strengthen links between Denmark and Germany, should be held in the University's Ceremonial Hall. On this occasion, the University management similarly rejected this request – with determination and success.

The student newsletters of the time bear witness to growing student opposition to the German occupation. When Denmark joined the Anti-Comintern Pact in autumn 1941, sizable student demonstrations led to threats of German intervention, although this was avoided. However, at the government's behest, the Rector issued a proclamation on 26 November that outlawed demonstrations. Referring to this in 1945, Jens Nørregaard said: "... many people greeted these manifestations of student sentiment as valuable testimonials to the world at large that the attitude of the Danish people cannot be bent by orders enforced by government."

Conditions deteriorated in 1942, both at the University and in Denmark as a whole. The Danish resistance movement began to have an effect, and it became increasingly obvious that the vast majority of lecturers and students were against the government's policy of collaboration. In turn, this caused the Germans to take a tougher line. December 1942 saw the arrest of Professor Ole Chievietz – at the time an active member of the resistance movement, although the Germans were not aware of this and released him shortly afterwards. Another leading figure in the resistance was Professor Mogens Fog, who as a leading communist went under-



The members of the Danish Freedom Council. Professors C. A. Bodelsen and Mogens Fog are second and third from the left. Professor Ole Chievitz is seated on the armchair to the right. Professor Erik Husfeldt is on the far right.

ground. The attitude at the University remained ambiguous, for instance, as discernibly anti-Nazi professors like Hal Koch and Hartvig Frisch distanced themselves from the increased sabotage by resistance groups.

Several professors and teachers played an active part in the resistance movement. On 29 August 1943, the Danish government abandoned its policy of collaboration, which had been the official line since 1940, and tendered its resignation. The Danish Freedom Council, which rallied the resistance movement, began to function as an unofficial government in Denmark. It also facilitated contact between the resistance movement and the permanent heads of the ministries, who did their best to coordinate the national administration. In addition to Ole Chievitz and Mogens Fog, who were leading figures in the organisation, Professors Erik Husfeldt and C. A. Bodelsen were also members of the Freedom Council. Professor of Classical Philology Carsten Høeg was charged with the task of compiling an index of collaborators for use in the legal proceedings that were to follow the liberation.

In the winter of 1940-1941, the Student Council was already organising discussions – both in newsletters and in internal debates – about

the relationship between academics and the rest of society. The debate was marked by an almost unanimous agreement that academics had a duty to take part in the life of the surrounding society – an outcome that was to provide the background for student commitment to the resistance movement.

In late 1941, students began to play a prominent role in resistance groups. According to official figures, at least 53 of the 869 people killed in the resistance were students, including 25 from the University of Copenhagen. Among the others were 46 graduates, which indicates that people with higher education were well represented in the resistance movement.

Nevertheless, a small number of the University's teachers and students allied themselves with the Germans. Action was taken against Danish collaborators after the end of the occupation. Special measures were introduced in many companies, organisations and boards, and a commission at the University conducted a legal enquiry on the activities of 101 individuals. A few were turned over to the public prosecutor, while 20 were relegated for periods of varying lengths for their behaviour during the occupation. Three professors were brought before a special tribunal for civil servants, one was removed from his post, one was reprimanded and one was acquitted. An external lecturer at the Faculty of Law, the only avowed Nazi supporter among the teachers, received a 12-year prison sentence.

In the early years of the war, the occupation had relatively little impact on daily life in Denmark compared to other occupied countries. This changed rapidly after the policy of cooperation broke down on 29 August 1943. The Germans imprisoned eight professors and two associate professors – who were all released again within a few months. Aside from the absence of non-Scandinavian scientists, life went on largely as normal at the Niels Bohr Institute for Theoretical Physics – but opposition to the occupation was practically unanimous: the Danish physicists gave physicist Werner Heisenberg a hostile reception during his 1941 visit, and declined his invitation to attend a scientific conference at the newly established German Cultural Institute. In November 1943, after Bohr himself had fled to Sweden, the Germans seized control of his Institute, which they accused of conducting war-related experiments. It was handed back to the University in January 1944.

As time wore on, more and more students and teachers were forced to flee to Sweden because of their participation in the resistance movement.



An Honorary Doctorate of Philosophy was conferred upon Sir Winston Churchill on 10 October 1950 in the University's Ceremonial Hall. In attendance were the Royal couple, representatives from the government, the speakers of the two Houses, ambassadors from the Nordic countries, leading figures from the resistance movement, the Danish Freedom Council and the Civil Service, the heads of the armed forces, representatives of the other Danish universities, and many others. On the same occasion, Churchill became the first person to receive Denmark's most prestigious cultural award, the Sonning Prize, which the Universi-

ty of Copenhagen awards to "a man or woman who has significantly contributed to the advancement of European civilisation". Churchill donated the substantial prize money to his foundation, the Churchill Endowment Fund – the purpose of which is to facilitate study trips by Danish graduates to British universities, and vice versa. The photograph shows the University Rector, Professor H. M. Hansen, handing the honorary doctorate diploma to Churchill. Over Churchill's right shoulder is the nuclear physicist Niels Bohr, who met with Churchill during World War II to discuss the future use of nuclear power.

Others fled to Sweden when the German authorities attempted to arrest the Danish Jews in October 1943. The University of Copenhagen, along with the other Danish universities, made clear its opposition to this attack on the Danish Jews by closing for a week. Numerous teachers and most students who fled settled in Lund in southern Sweden, where provisions were made for many of them to continue or complete their education.

Looking back at the occupation in his speech at the liberation celebrations in 1945, Rector Jens Nørregaard found that, despite the difficulties, the University had succeeded in keeping its research, teaching and exams going. Throughout the occupation, the University had retained the right to elect its own management, and, unlike what had happened in Norway, it had never been forced to fill chairs according to other than academic criteria, nor had there been any break in the teaching activities of the University.



In 1984, American historian John Whitehead described the conditions at Danish universities prior to 1968 as follows:

“In the decades immediately preceding and following World War II, Denmark portrayed itself, at least in the eyes of many Americans, as a ‘society of the future’. This small nation’s social programs and institutions appeared to be among the most modern in the world. ‘Life-seeing’ tours, including visits to such places as nursery schools, elementary schools, folk high schools, housing projects and homes for the aged, were a staple for foreign visitors. These modern institutions could usually be identified by a specific set of buildings as well as by a high degree of social interaction within the buildings. These ‘life-seeing’ tours could easily give the visitor the impression that Denmark was a totally modern society. There was, however, one segment of Danish society that escaped such modernisation – the universities.

Until the 1960s, the Danish university, which was patterned on the 19th-century German model, was totally controlled by the holders of professorial chairs. The Danish professor was a feudal, even an Olympian, figure who made all decisions within his discipline concerning the curriculum and the hiring of lower levels of academic personnel. The university was little more than the professors assembled. University-wide decisions were also made by the professors through various faculty councils and the Senate or supreme governing council. The professors elected the rector of the university from among their number. Only the financial management of the university was entrusted to an appointee of the Ministry of Education.

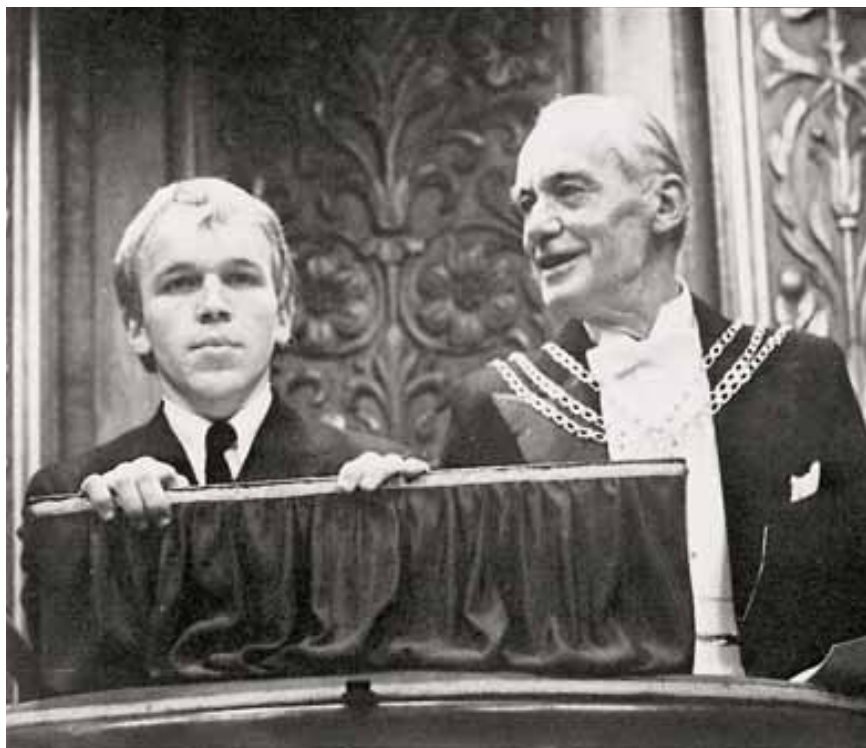
While politicians and the public at large left the professors alone, there was also little internal momentum for change. The professors were satisfied with their position of power and prestige, and before 1960, the number of other full-time faculty members was small. As the future of



The power of the professors is broken! The historic moment on the morning of 24 April 1968, when the student negotiator triumphantly held aloft the document that symbolised the end of centuries of professorial management: the agreement guaranteed 50% student representation on the Department of Psychology’s study board.

Student Finn Einar Madsen and Rector Mogens Fog at the University rostrum in 1968. On 21 November 1968, the annual University gala included something that was not on the official agenda: a demonstration in which students demanded that their voice be heard. It was an extraordinary expression of the movement that became known as “the student revolt” in Denmark. Although part of the wider youth movement (“The Student Protest”) that emerged in the Western world in the 1960s, this particular incident was also a tangible manifestation of disaffection with conditions at Danish universities – particularly the University of Copenhagen. Frustration had been growing for a long time, and its causes are easy to identify. Since the late 1950s, explosive growth had been the norm at universities in Denmark, and this led to demands for reforms of the university management, which had been established centuries before.

Since many journalists were present, the student demonstration at the University gala attracted great attention in the media. The picture of Madsen forcing the Rector off the rostrum made front pages all over the world. Since 1992 a representative for the students has been one of the official speakers at the annual gala.



the non-professor academics was so tied to decisions made by the professors, few were willing to risk their careers by challenging professorial power. Students had never been asked to voice an opinion on the management of the universities, and most were content as long as they secured the employment for which they were trained. As late as 1960, the Danish universities were among the least modern and least democratic institutions in the country.”

The picture Whitehead paints is not far off the mark. However, it is also a picture of a university in a state of rapid change, and one that was to disappear within a few short years. The principal reason for this was the explosive growth of the University, which is clearly illustrated by the number of students. In the mid-1930s, there were approximately 6,000 students at the University of Copenhagen, a number that fell to approximately 4,500 by 1956. However, from then on the numbers rose rapidly, reaching approximately 23,000 by 1971.

As a direct consequence, both teachers and buildings functioned under extreme pressure. Capacity did rise after 1960, but failed to keep pace with the explosive growth in enrolment. The following years were

characterised by overcrowded auditoria and an insufficient number of teachers.

The number of professors almost doubled between 1955 and 1971, but in the same period, the number of non-professorial teachers, who had previously played a modest role, increased by a factor of seven. Talent management and systematic training of junior researchers was not part of the traditional university culture in Denmark, and many of the new teachers were appointed immediately after their graduation. Some professors considered the University the place they delivered lectures rather than a framework for establishing scientific communities with junior colleagues and students. This implied that it was often up to individual teachers to take on research as well as their own research training since they could expect only sporadic guidance and support from the professors. It is telling that, in most university disciplines, students preparing doctorates – the acquisition of which was a precondition (albeit not a formal requirement) for attaining a professorship – had to guide themselves. These factors meant that there was little cooperation between junior teachers and professors, even though the young teachers depended heavily upon professorial goodwill for promotion and academic careers.

Students found that many professors moved in very rarefied air and did not interact with the students. They usually only met at lectures and examinations. The supervision of undergraduate theses, for example, would often be limited to a few comments after a lecture.

Inspired by events abroad, Danish students demanded a say in the management of the universities. The number of young people who had qualified for university entrance rose dramatically from the early 1960s. Until 1976-1977, Denmark offered free access to degree courses at universities to anybody who had passed the grammar school exam (*studentereksamen*), whereas access to more vocational long- and medium-study programmes, such as engineering, nursing or teaching, was restricted. Accordingly, the University's humanities and social-science programmes had to cope with large student enrolment. As the explosive growth in numbers continued, conditions in many degree programmes became increasingly difficult to manage, fuelling student dissatisfaction. In January 1968, a committee set up to examine university management recommended a level of student representation in university management that was so low that the more radical students considered it derisory.



Demonstration on the University Square. On 23 April 1968, 5,000 students demonstrated in front of the University of Copenhagen, calling for student participation in university management and better study conditions.

Since the late 19th century, Danish universities have been funded almost entirely through the annual State budget. Despite this, the general perception in Denmark was that the universities constituted their own little worlds – with specific tasks, including the training of civil servants for the Danish State: society at large should interfere as little as possible in their internal affairs.

But this could not go on forever, and around 1960, it became obvious that the necessary renewal of the Danish universities was a task for society as a whole and would require an unprecedented degree of intervention in university affairs. The enormous resources required for funding expansion in research and for construction of buildings called for societal and political involvement. In 1962, the government therefore set up the above-mentioned committee that was to propose modernisation of Danish universities and their management. The most innovative proposal in the special committee's final report in January 1968 was the institution of a three-level university management structure – namely, university, faculty and department – each with its own independent management. Management should no longer automatically be in the hands of professors, since their limited number and increasing academic specialisation made this system obsolete and wildly impractical. Instead, the management was to be elected from among the full professors and a few of the most prominent non-professorial teachers. Junior teachers and part-time instructors were to elect a few representatives to department-level advisory councils, and were granted two representatives on faculty councils and in the Senate. Students were to have two

members on the faculty councils, and one, without the right to vote, in the Academic Senate (*Konsistorium*).

It was no coincidence that a “rebellion” first broke out among those studying psychology, since enrolment in that department had grown to over 1,500 and teaching had collapsed under the pressure. On the night of 20 March 1968, psychology students painted metre-high slogans on walls near the Department of Psychology: “BREAK PROFESSORIAL POWER” and “STUDENT PARTICIPATION NOW”. The next few months saw a number of “weeks of debate”. These implied that in effect lectures and classes were boycotted; furthermore a series of demands for tangible participation was also issued – one of the most extreme being the establishment of “study boards” (see fact box p. 190) comprising equal numbers of staff and students. When the teachers failed to acquiesce right away, the students responded by occupying the Department of Psychology on 19 April 1968.

This “revolt” in Denmark took place before the famed student protests in Paris in May, when French students issued the same demands and, with the support of the trade unions, thus brought about the resignation of the French government and eventually forced François de Gaulle’s Fifth French Republic to its knees. Events in Denmark were less dramatic. The University Rector, Professor Mogens Fog, did his utmost to remain calm: when the head of the metropolitan police contacted him asking how his officers could be of assistance during the psychology students’ “occupation”, Fog replied: “By staying as far away as possible.”

On 23 April 1968, more than 5,000 academics representing all age groups staged a “solidarity demonstration”, the nature of which is best conveyed by their slogan: “We love Fog”. The following night, the University management bowed to the psychology students’ demands for parity on study boards – for the time being.

The turmoil of the spring of 1968 and subsequent events soon led to other demands. The student slogans emphasised two demands in particular. The first demand, the abolition of professorial management, was one they shared with the rapidly growing group of non-professorial full-time teachers, and it was relevant only as long as membership of the faculty councils and the Senate was restricted to full professors. The second demand, 50% student representation in all elective bodies involved in management, was obviously more controversial, and encountered resistance from all teachers, not just the professors.

Student demonstrators occupying the Rector's office in March 1970.



These and other demands were discussed during a series of fruitless negotiations in late 1968 and early 1969. The campaign turned nasty in the spring of 1969. Amongst other actions, the students set up physical blockades that kept members of management bodies from attending meetings, a tactic strongly criticised by Rector Fog.

Student action peaked when a proposal was put forward in Danish Parliament for an act governing university management in January 1970. It complied with some of the students' demands but the key demand of 50% representation in the management bodies was to extend only to study boards – students had to make do with one-third representation in the Senate, as well as faculty and department councils, while the teachers were to have two-thirds of the seats. In addition, the Student Council's demand to be recognised as the only representative body for all students was rejected. Highly dissatisfied, the Student Council called for a "week of debate", and held a meeting on the university square with a crowd of 4,000-6,000 students. The students continued the demonstration by occupying the offices of the Rector and the University administration. Although the occupation lasted less than 24 hours, it attracted major media attention – especially because Rector Mogens Fog angrily had commented that the protesters not only made a terrible mess, but even had allowed themselves to drink his sherry and smoke his cigars.

During the events of 1968-1970, Fog's tactics were in line with Herbert Marcuse's concept of *repressive tolerance*, which is best characterised as widespread compliance with the desire for negotiations, substantial personal charm and charisma – but unwilling to make genuine concessions. All parties gave Mogens Fog credit for ensuring that the student revolt in Copenhagen was rather peaceful – as opposed to the violence that characterised similar events in the same year in France, the US and Germany.

Since the democratisation initially led to a pronounced left-wing dominance of the universities, it is worthy of note that it was a centre-right government that passed the 1970 Administration of the Institutions of Higher Education Act with a large parliamentary majority. The new Act, which applied to institutions in Copenhagen, Århus and Odense, followed the proposals of the ministerial report of January 1968 with amendments on key points: the authority to make decisions was placed with elective bodies at university, faculty and department levels, where the students were given one-third and the teachers two-thirds of the votes. With professors and other staff being lumped together as “teachers”, this meant that real power shifted to the non-professorial teachers, who accounted for more than 75% of the teaching staff. Within a few years, junior teachers achieved full equality with professors on virtually all issues concerning formal appointment and competence issues, with the exception of salaries. It has gradually become apparent that the younger teaching staff were the real winners of the 1968 student rebellion.

The Administration of the Institutions of Higher Education Act was amended in 1973, and extended to cover almost all seats of higher learning in Denmark. In effect, the German-influenced Danish university structure, which differentiated between “universities” and specialised institutes of higher learning, was formally replaced with an Anglo-Saxon system. Under this system, all seats of higher learning were considered universities, regardless of subject area; they were administered according to the same set of rules and had to live up to the same requirements concerning education and research.

Secondly, the composition of the management bodies was changed so that scientific staff (VIPs) held half the seats, while the students and the technical and administrative staff (TAPs) each held a quarter. The representation of TAPs, which granted them significant formal influ-



Rector Mogens Fog wore the new Rector's gown for the first time at celebrations marking the 300th anniversary of Lund University in June 1968. He is here standing in front of Lund Cathedral. Rector Mogens Fog found it difficult, when he represented the University abroad, to take along the dress coat needed for wearing the official Rector's Chain in a dignified way. Inspired by his overseas colleagues' colourful and far more practical gowns, he submitted a proposal that the Rector should wear a gown when abroad. In March 1968, the Senate therefore passed a resolution that the Rector should procure an academic gown for use at festivities, conferences etc. The Rector's gown, however, was only for use abroad, and not for use in Denmark.

The University's 500th anniversary celebrations in 1979 included an academic procession. Despite strong student opposition, it was decided that the Rector should wear this gown in the procession, and that similar gowns should be procured for the pro-rector and deans. The gowns have been used at University festivities and other occasions ever since.

Study boards

In 1970, Danish universities established study boards (*Studienævn*) for all subjects, according to the model that had been introduced in the University of Copenhagen's Department of Psychology in April 1968. The model stipulated that there should be an equal representation of students and teachers on the boards and that the chairperson should be appointed alternatively by the two groups. The study boards were to keep the many curricula and exam requirements up to date. This met one of the crucial points of student criticism, namely that the curricula were too rigid, often out of touch with scientific developments, and that it was difficult and took a long time to implement changes that were needed and obvious to everybody.

The study boards were a tool that would aid the ongoing modernisation of Danish university degree programmes. However, they have also been criticised – many found that the composition of the study boards, with 50% influence for the students, went too far. And it is true that the work of some boards was sometimes impeded by tactical manoeuvres.

The framework for their activities has been modified since 1970, but the study-board institution was retained in the latest University Act (2003).

ence in university management, was something entirely new on the international scene.

In the years that followed, the students and TAPs managed to affect university policy directly on several occasions by dint of disciplined co-operation. In the growing public debate about conditions at the universities, it was an oft-made criticism that cleaning staff and students were allowed to make decisions on scientific and academic issues.

The criticism and sense of insecurity about what went on at the universities gradually spread throughout the political system and led to proposals for restrictions – none of which was ever carried out. In 1976-1977, the Danish government placed limits on student intake at universities (a *numerus clausus*), and thus brought to an end the unrestricted access to university education that had been a pivotal element in Danish education policy for hundreds of years. The reason was obvious – up to 50% of all Danish young ones now qualified for university entrance, which meant the universities were being overrun and levels of graduate unemployment were rising. This measure cut student numbers enrolment at the University of Copenhagen by approximately one-third in the six years after the limits were set in 1977.

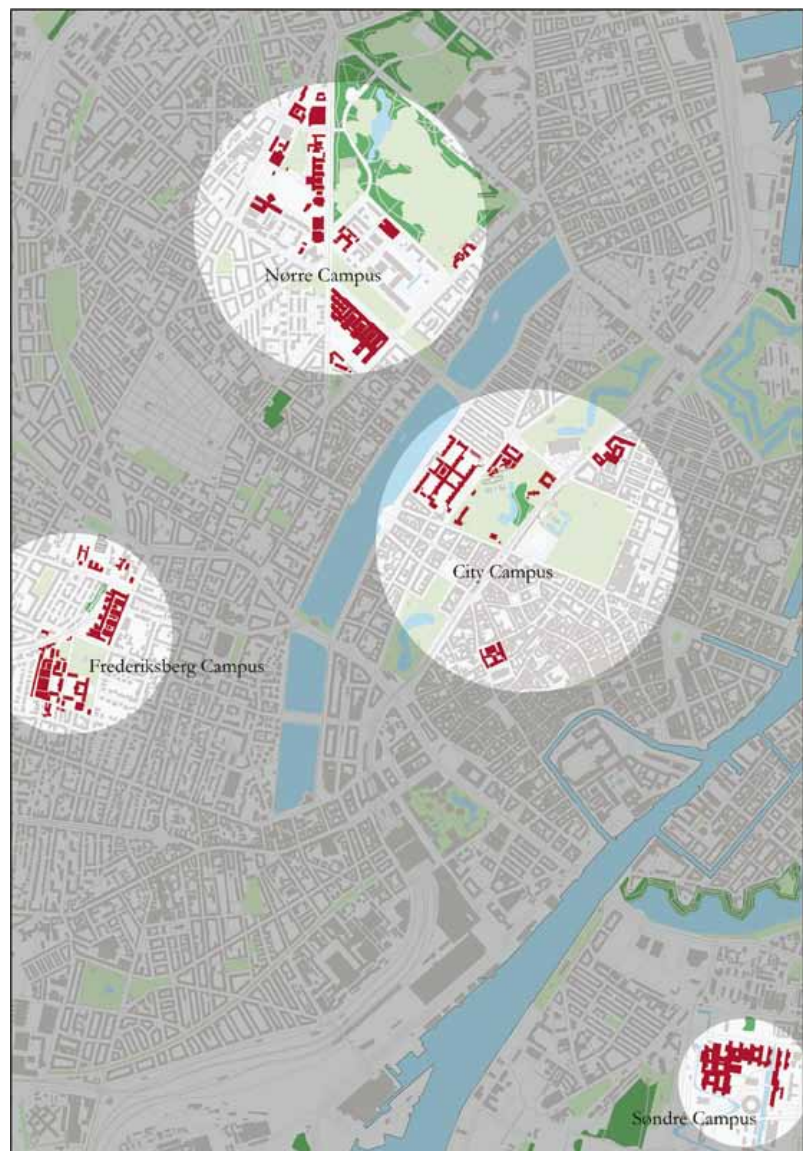
An important component of the State funding for universities was linked to student enrolment, and therefore the introduction of the *numerus clausus* had a major negative impact on the University's finances. In addition, a university budget reform that was imposed administratively in 1980 made it easy for successive governments to control Danish universities to an increasingly greater degree.

Many critics of conditions at the University of Copenhagen after 1973 claimed that the Administration of the Institutions of Higher Education Act had weakened the University management. They suggested that the management had been rendered incapable of making the decisions necessary to adapt successfully to demands deriving from fundamental changes in socio-economic conditions and the rapid growth in academic activities.

The criticism led to further amendments to the Act, in 1992, to strengthen management at all levels. The influence that students and TAPs had wielded in the management bodies since 1973 was drastically reduced, and from then on there would be two external representatives in the Senate and faculty councils. However, the principle that the staff and students elected the management – albeit with a weighting that now gave teachers a greater say in the selection of the Rector and deans – was not challenged.

The 1992 Act did not stifle the accusations of weak management. Indeed, in 2003, a broad parliamentary majority voted for management reform based on entirely different principles, i.e., the Senate and faculty councils should be replaced by, respectively, a board and an academic council in each faculty. Most members of the University Board are now external members, supplemented with a small number of elected teachers, administrative staff and student representatives. The Rector is appointed by the Board. In turn, the Rector appoints the deans, who are responsible for the appointment of the department heads. This reform came into force at the University of Copenhagen on 1 January 2005.

The “campus” University plan. In 2007, the Board of the University of Copenhagen passed the new “Campus Plan”, which was designed to consolidate the University’s activities. At present, its properties are spread over four campuses and 125 addresses in the Greater Copenhagen area – accounting for a total of approximately 1 million square metres. When the plan is completed the faculties of Humanities, Law and Theology will be gathered together on Søndre Campus; the Faculty of Social Sciences and the University administration will be in City Campus; Health Sciences, Pharmaceutical Sciences and Science will be located at Nørre Campus; and the Faculty of Life Sciences will be on Frederiksberg Campus. The establishment of the four campuses, as well as the planned new buildings will thoroughly modernise the University’s physical infrastructure.



Since its founding in 1479, the University of Copenhagen has had to fulfil obligations incumbent on it as the centre of learning in Denmark. The activities of the University of Copenhagen therefore have been shaped and circumscribed by the specific demands made of it within the Danish nation state – in which, for centuries, it was the only university.

For a long time, external institutions fulfilled the country's need for new types of specialised education that had come into being after the universities were founded in the Middle Ages. From the end of the 18th century onwards, Danish higher education was organised according to a German model, which differentiated between “real” universities and professional schools (German: *Fachhochschulen*). The univer-



The Copenhagen Dental College was set up in 1888, when dentistry, which had previously been taught at the University, was established as a separate subject area. In 1941, the Dental College achieved university status. In 1986, it moved to new facilities at the University of Copenhagen. In 1992, it became the Department of Odontology under the Faculty of Health Sciences at the University of Copenhagen.

Department of Sports. Sport was introduced as a minor subject for University students in 1909. The programme was divided into two components: the University provided the theoretical instruction, while from 1911 onwards, the practical-pedagogic component took place at the newly established State Gymnastics Institute, which changed its name to the Danish State Institute of Physical Education in 1941.

Until the mid-1970s, the programme was primarily based on scientific theories, but was then extended to include humanities and social-science subjects, such as sociology, history, educational theory and practice, and psychology. Instruction was increasingly underpinned by research conducted by staff at the Danish State Institute of Physical Education and the University's Centre for Sports Research, which was established in 1991. In 1997, as a result of increased activity in sports research, the two organisations were combined within the new Department of Exercise and Sports Sciences.



sities pursued pure sciences and their teaching was based on research and other scientific activities, in accordance with the ideals formulated by the Humboldt brothers in the early 19th century. The professional schools, on the other hand, were responsible for the continually growing number of vocational degrees designed to meet specific and manifest needs in society. The Veterinary School, founded in 1783, and the Surgical Academy (1785) are examples of such professional schools in Denmark and both were primarily set up to meet the special needs of the military. Other examples include: the *Polyteknisk Lærestalt* (College of Advanced Technology), which from 1829 until the 1960s existed in close symbiosis with the University of Copenhagen; the Royal Veterinary and Agricultural College (established in 1856-1858); and the Danish Pharmacy College (1892). The 20th century has seen the foundation of schools of dentistry and business schools in both Copenhagen and Århus.

Academic standards at these institutions were sometimes on a par with the universities from the very beginning – and with time, more and more institutions have reached university level. Yet this was not always the intention from the outset. And even when academic standards were high, this was not necessarily reflected in the length of the study programmes on offer: they were often significantly shorter than were those at the University of Copenhagen.



The Royal Veterinary and Agricultural University (KVL) was founded in 1856 and opened in 1858 in the Frederiksberg complex (architect G. Bindsbøll), which still houses KVL today. The Veterinary College, founded in 1773, was integrated in the new educational establishment for training veterinarians, farmers, chartered surveyors and, later in the century, horticulturists and forestry scientists. In the course of the 20th century, this group of subjects was extended to include disciplines such as dairy science, landscape architecture, food science and agricultural economics. The last quarter of the century included further specialisation of KVL's study programmes.

KVL was not initially a university-level educational establishment, nor was it intended to be. The study programmes were clearly oriented towards practical work in agriculture, forestry and horticulture, and, from the beginning, designed to be significantly shorter than univer-

sity programmes. The veterinary programme originally was a 2½-year programme and the agriculture programme took 1½ years, both including a significant work-experience placement. Since entrance did not require a grammar-school education, admission was open to all. The length of the study programmes increased over time, but did not reach the level of other university programmes until around 1970.

In 1935, KVL took an important step towards university status when it was granted permission to confer its own doctorate degrees: dr. agro. (Doctor of Agronomy) and dr. med. vet. (Doctor of Veterinary Medicine). The transition was completed in 1973 when the Royal Veterinary and Agricultural University was granted formal status as a university and was transferred from the Ministry of Agriculture to the Ministry of Education. In 2007, KVL merged with the University of Copenhagen as part of the Faculty of Life Sciences.

The University of Copenhagen has always cooperated with these institutions, and even merged with several of them. The first merger took place in 1842, when the Surgical Academy and the University's medical doctors came to form the Faculty of Health Sciences. As mentioned earlier this resolved several hundred years of disagreement between academic physicians and practically trained surgeons about which of the



The Royal Danish School of Pharmacy (DFH) presents itself. It was the first pharmaceutical educational institution in Denmark founded in 1892 by pharmacist and Councillor of State Christian Ditlev Ammentorp Hansen. It was built on Stockholmegade, at Hansen's own expense, and subsequently handed over to the State.

Pharmacy training in Denmark has a long history. Originally a form of craft apprenticeship under individual pharmacists, it was decided as early as 1672 that in order to get a licence to practice, pharmacists had to pass an examination at the University's Medical Faculty.

Like the study programmes at KVL, DFH programmes were of a highly practical bent from the start, and did not achieve parity with other university degrees until the 1970s. Other steps on the road towards university status were the establishment of DFU's first professorship in 1936, the introduction of the dr. pharm. (Doctor of Pharmacy) in 1942 and the lic. pharm. (licentiate) in 1945.

In 2007, DFH merged with the University of Copenhagen as the Faculty of Pharmaceutical Sciences.

two should be responsible for Danish medicine. The merger therefore marked the beginning of modern medical science in Denmark.

In response to the overarching political aim of strengthening higher education in Denmark, the University of Copenhagen merged with several smaller specialized university institutions in the late-20th and early-21st centuries. The idea is that bigger is better even when it comes to universities, because it is often difficult for small and highly specialised research and education institutions to adapt to ongoing scientific developments.

This point of view, which is not unconfested, found strong expression in the Ministry of Science, Technology and Innovation's major programme of mergers that was implemented at Danish universities and research institutions in 2006–2007.

The University of Copenhagen was included in this programme: the process actually began in 1990–1992, when the Copenhagen School of Dentistry was incorporated into the Faculty of Health Sciences as the Department of Odontology. The Danish State Institute of Physical Education also became part of the Faculty of Science in 1997.



The Biotech Research & Innovation Centre (BRIC) was established in 2003 by the Danish Ministry of Science, Technology and Innovation as an elite centre for biomedical research. The Centre's primary tasks are to perform interdisciplinary, cutting-edge research, establish a strong research education programme, attract

funding and new research projects, ensure that research results are used for the development of commercial products and promote exchange of ideas within the Danish biotech research community. Since 2007, BRIC has been a centre under the University of Copenhagen, with its own board of directors and excellent re-

search facilities in modern laboratories at the top of the new Copenhagen Biocenter. BRIC's research is organised according to 15 research groups, each covering a scientific or technical field, with disease-oriented research as the main focus area. In 2008, BRIC employed around 175 people.

The university merger of 2006–2007 included the Royal Veterinary and Agricultural University (KVL) and the Danish Pharmaceutical University (DFU) becoming two new faculties at the University of Copenhagen. One of the aims was to strengthen the life-sciences research environment at the University of Copenhagen even more.

In October 2008, the University of Copenhagen had a staff of 537 professors, 1377 associate professors and 37,570 students.



The Green Lighthouse – the winning project. In 2007, the University of Copenhagen decided it would work toward becoming one of the greenest universities in Europe. The initiatives under the umbrella of the “Green Campus” project include, e.g., energy and climate, green purchases, sustainable campus development, and participation in national and global partnerships.

The first tangible evidence of the green strategy is the Green Lighthouse project, which is the construction of an environmentally-friendly campus building in cooperation with private companies, the State and the City of Copenhagen. The design for this building (pictured) was the winning entry in an architecture competition. The first turf was cut in October 2008 and the building is part of the preparation for the UN Climate Conference (COP15) in Copenhagen in December 2009. The Green Lighthouse will be used for study administration, student services, meeting facilities and a faculty club.

Illustrations and quotations

1. Peregrinationes Academicæ

p. 9: *Students in Bologna, 1346*, Tomb of Bonifacio Galluzzi, by Bettino da Bologna, Bologna.

p. 10: *Sixtus IV's papal bull 1475*, The Danish State Archives, KU 11.02.01.

p. 11: *Christian I, fresco*, Andrea Mantegna 1474; Photo: The Royal Library, Copenhagen.

p. 11: *Christian I, medal*, Bartolomeo Melioli 1474; Photo: The Danish National Museum.

2. The foundation of the Copenhagen University

p. 12: *The Inauguration of the University 1479*, Wilhelm Marstrand in the University of Copenhagen's Ceremonial Hall 1871. Photo: Peter Schandorf.

p. 13: *The University Statutes*, The Danish State Archives, KU 11.02.01.

p. 14: *Quotation*: "students from Denmark, Norway, Iceland, Germany and the Netherlands" – a total of 80 people. Svend Erik Stybe: *500 Years of Science and Scholarship*, Copenhagen 1979, p. 21.

p. 14: *The University of Cologne Seal*, Photo: The University of Cologne.

p. 14: *The University of Copenhagen Seal*, Photo: The Royal Library, Copenhagen.

p. 14: *Quotation*: "knowledge of what is good and just, the most valuable knowledge of all", Statutes of the Faculty of Law, Jan Pinborg (ed.): *Universitas Studii Haffnensis*, Copenhagen 1979, p. 132.

p. 15: *The first University building*, Photo: The Royal Library, Copenhagen.

3. Reformation and University

- p. 16: *Hans Tausen protecting Joachim Rønnow*, Carl Bloch in the University of Copenhagen's Ceremonial Hall 1871. Photo: Kaj Leergaard.
- p. 17: *The University of Copenhagen Seal*, Photo: Christoffer Regild.
- p. 18: *Martin Luther*, Lucas Cranach the Elder, 1525.
- p. 18: *Philipp Melanchton*, Fresco painting in Åsted Church, Viborg Diocese, Photo: The Danish National Museum.
- p. 19: *Christian III*, silver engraving by Jacob Binck, 1535.
- p. 19: *The four Faculty Seals*, Photo: Christoffer Regild.
- p. 20: *Johann Bugenhagen*, Copperplate by Philip Galle 1567, after a painting from 1543 by Lucas Cranach the Elder. Photo: Royal Library, The Hague.
- p. 20: *Christian Morsing study catalogue*, 1537, Photo: The Royal Library, Copenhagen.
- p. 21: *The University Charter 1539*, The Danish State Archives, KU 11.02.01.
- p. 22: *Peder Palladius, The Frederiksborg Musum*, Hillerød.
- p. 22: *The Senate House*, Photo: Jan Friis Jensen.
- p. 23: *Wittenberg*, Photo: University of Copenhagen.
- p. 24 f: *Quotation*: "When he realised that the Holy Church needed good schools to maintain its status, schools that would educate the pious in a manner that would allow them to propagate the Christian gospel, he resurrected the University of Copenhagen, which had fallen into complete disarray at the time." Morten Fink-Jensen: *Fornuft under troens lydighed*, Copenhagen 2004, p. 52.
- p. 24: *The First Lecture List*, Photo: The Royal Library, Copenhagen.
- p. 25: *Niels Hemmingsen, The Frederiksborg Museum*, Hillerød.
- p. 26: *Doctoral hats*, Photo: The Danish National Museum.

4. Tycho Brahe

- p. 28: *Tycho Brahe receiving the King James VI of Scotland*, Carl Bloch in the University of Copenhagen's Ceremonial Hall 1878, Photo: Kaj Leergaard.
- p. 30: *Tycho Brahe at his mural quadrant*, Copperplate: Joan Blaeu: *Atlas Major*, 1665.
- p. 31: *Christian Longomontanus*, Engraving by Simon de Pas, 1644. Photo: The Royal Library, Copenhagen.

p. 32: *Quotation*: “In my native country, Denmark, I had already, thanks to a few books, particularly Ephemerides, made myself acquainted with the elements of astronomy, a subject for which I had a natural inclination.” John Christianson: *Tycho Brahe at the University of Copenhagen, 1559-1562*, *Isis*, Vol. 58, No. 2. (Summer, 1967), pp. 198-203.

p. 32: *Quotation*: [the King] “asked me to erect buildings [on the island of Hven] and produce instruments for the study of astronomy and chemistry, and was gracious enough to tell me that he would, in rich measure, defray the costs. [...] After a week’s consideration [...] I gave up my previous plan and agreed, not without pleasure, to the King’s wishes, especially since this island lies in isolation between Zealand and Scania. It would be a place where my work would not be interrupted by visitors, and I would have the peace and the comfortable conditions that I had sought elsewhere, in my native country, to which I owe so very much, rather than other countries.” *Dansk Naturvidenskabs Historie*, Vol I, 1000-1730, Aarhus 2006 p. 225 f.

p. 34: *The University Observatory 1642*, Drawing in Professor Holger Jacobæus: *Iterarium per Daniam, Germaniam ...* (“Travel Journal”), 1671-79, Photo: The Royal Library, Copenhagen.

p. 34: *The University Observatory 1858-61*, The Danish State Archives, KU 12.26.10.

p. 35: *The Brorfelde Observatory*, Photo: Erik Heyn Olsen.

p. 35: *The Ørsted Satellite*, Photo: Erik Hjørne.

5. Academic dynasties

p. 36: *Thomas Bartholin*, Unknown artist, *The Frederiksborg Museum*, Hillerød.

p. 37: *Quotation*: Bartholin “grasped the full implications and significance of the discovery before Rudbeck and in more detail.” *Dansk Biografisk Leksikon*, Vol I, 1979, p. 478.

p. 41: *Thomas Fincke*, *The Frederiksborg Museum*, Hillerød.

p. 42: *Ole Borch*, Johan Jepsen 1691, Photo: University of Copenhagen.

p. 44: *The Anatomy House*, Title copper in Thomas Bartholin: *Cista Medica*, 1662, Photo: The Royal Library, Copenhagen.

6. A cabinet of specimens

p. 46: *Museum Wormianum*, Engraving by G. Wingendorph, featuring the museum as it looked shortly before Worm's death in 1654), Photo: The Royal Library, Copenhagen.

p. 48: *Ole Worm*, Copper etching G. Wingendorph, based on a painting by Karel van Mander c. 1654, Photo: The Royal Library, Copenhagen.

7. Absolutism and the "Learned Republic"

p. 50: *Peder Schumacher interpreting the Scriptures for Frederik III*, Carl Bloch in the University of Copenhagen's Ceremonial Hall 1888, Photo: Kaj Leergaard.

p. 52: *Students defending Copenhagen during the Swedish assault on the city, 11 February 1659*, Vilhelm Rosenstand in the University of Copenhagen's Ceremonial Hall 1890, Photo: Kaj Leergaard.

p. 53: *Danish Law*, Photo: The Royal Library, Copenhagen.

p. 53: *Peder Griffenfeld*, Abraham Wuchters 1673, Photo: University of Copenhagen.

P. 54: *The University Prison*, Photo: Nina Lemvigh-Müller.

p. 54: *Ole Borch on a botanical excursion*, Drawing in Professor Holger Jacobæus': *Iterarium per Daniam, Germaniam ...* ("Travel Journal"), 1671-79, Photo: The Royal Library, Copenhagen.

p. 55: *The epitaph for the brothers Bent and Niels Andersen in the church of Sorø*, Photo: Steen Jensen.

p. 56: *The Refectory Building*, Copper Etching in Erik Pontoppidan: *Den Danske Atlas I*, 1764, Photo: The Royal Library, Copenhagen.

p. 56: *Regensen*, Photo: Jan Friis Jensen.

p. 57: *Valkendorfs Kollegium*, Photo: Jan Friis Jensen.

p. 57: *Borchs Hall of Residence*, Photo: Jan Friis Jensen.

p. 57: *Elers Kollegium*, Photo: Jan Friis Jensen.

p. 58: *Panorama of the University Courtyard*, Rach & Eegberg 1749, Photo: University of Copenhagen.

p. 59: *Professorial residence c. 1756*, Photo: Jan Friis Jensen.

8. Steno

p. 60: *Steno, Medicinsk Museion*, University of Copenhagen.

p. 63: *De solido*, Photo: The Royal Library, Copenhagen.

p. 64: *Shark tooth*, Photo: University of Copenhagen.

9. Ole Rømer

p. 66: *Ole Rømer*, Contemporary painting by unknown artist., The Astronomical Observatory, University of Copenhagen.

p. 68: *Ole Rømer's* home observatory, *Adversaria*, Photo: The Royal Library, Copenhagen.

10. Saving the Icelandic Sagas

p. 70: *Flateyjarbók*, Photo: The Árni Magnússon Institute, Iceland.

p. 72: *Quotation*: [Magnússon's first journey back to Iceland was] "both to collect relics from ancient times for his master (Thomas Bartholin) and to bid farewell to friends and family, as he did not expect to return again". Homepage, Árni Magnússon Institute for Icelandic Studies, Reykjavik.

p. 72: *Njal's Saga*, Photo: The Árni Magnússon Institute, University of Copenhagen.

p. 74: *Árni Magnússon*, Photo: The Royal Library, Copenhagen.

p. 75: *Return of the sagas*, Photo: The Árni Magnússon Institute, Iceland.

11. Doctors and surgeons

p. 76: *The Surgical Academy*, Photo: *Medicinsk Museion*, University of Copenhagen.

p. 78: *Quotation*: [Thomas Bartholin ...did not know of] "any other place where doctors were respected so little. People will barely deign to greet the doctor, erudite, experienced and educated; they will leave him to starve and pursue with him invective, and when extreme need and intense pain finally drives people to seek out the doctor, they pass misjudgement on his every deed. They neither obey the doctor's orders, nor countenance a methodical course of treatment." *Københavns Universitet 1479-1979*, Vol. VII 1979, p. 47.

p. 78: *Quotation*: that "he had pushed his way up from the barber's bowl to the doctor's hat, yes, even to professor of medicine at the University of Copenhagen". *Københavns Universitet 1479-1979*, Vol. VII 1979, p. 73.

p. 79: C.G. *Kratzenstein*, L. Spengler 1768, Photo: The Royal Library, Copenhagen.

p. 80: *The King Frederik Hospital*, Photo: *Medicinsk Museion*, University of Copenhagen.

- p. 80: *Grønnegården*, Photo: Pernille Klemp
- p. 81: *The General Hospital*, Watercolour by H.G. Holm, Photo: *Medicinsk Museion*, University of Copenhagen.
- p. 82: *P.C. Abildgaard*, F.C. von Breda, 1800, Photo: *The Frederiksborg Museum*, Hillerød.
- p. 82: *The Veterinary School in Christianshavn*, Watercolour by Fr. Harvendel, 1990, Faculty of Life Sciences, University of Copenhagen.
- p. 83: *J.C. Tode*, Jens Juel 1787, University of Copenhagen.
- p. 84: *The Municipal Hospital*, Photo: The Museum of Copenhagen.
- p. 85: *The Panum Institute*, Photo: Jan Mortensen, Dept. of Odontology, University of Copenhagen.
- p. 85: *P.L. Panum*, P.C.- Koch 1861, Photo: The Royal Library, Copenhagen.

12. The Danish Enlightenment

- p. 86: *Ludvig Holberg attends a performance at the Royal Theatre*, Vilhelm Rosenstand in the University of Copenhagen's Ceremonial Hall 1892. Photo: Kaj Leergaard.
- p. 87: *Ludvig Holberg*, Johan Roselius 1747-49, Sorø Akademi.
- p. 90: *Sorø Academy*, Copperplate, "His Majesty the King's arrival on 13 May in the afternoon at 1½", drawn by Poul Isac Grønvold. Photo: The Royal Library, Copenhagen.
- p. 91: *P. Kofod Ancher*, G. Fuchs 1787, The Danish High Court, Photo: Peter Schandorf.
- p. 92: *The University Almanac 1782*, Photo: University of Copenhagen.
- p. 94: *Konsistorium as matrimony court*, Rothés Rescriptor, Photo: The Royal Library, Copenhagen
- p. 95: *Carsten Niebuhr*, Hans Hansen after 1774, *The Frederiksborg Museum*, Hillerød.
- p. 96: *The Globe Flower, Flora Danica*, Vol. I, Table CXXXIII, 1764, University of Copenhagen.

13. The University of the 'Golden Age'

- p. 98: *The British bombardment of Copenhagen in September 1807*, G.L. Lahde efter C.W. Eckersberg, Photo: The Museum of Copenhagen.
- p. 100: *Defensor Pacis*, Photo: The Royal Library, Copenhagen.

- p. 100: *H.N. Clausen*, Bust by Vilhelm Bissen, 1880, Photo: Kaj Leergaard.
- p. 101: *N.S.F. Grundtvig*, C.A. Jensen, 1843, The Hirschsprung Collection.
- p. 102: *J.F. Schouw*, Bust by Vilhelm Bissen, 1875, Photo: Kaj Leergaard.
- p. 102: *The Tobacco Company*, W. Bendtz, 1828, Photo: University of Copenhagen.
- p. 103: *Søren Kierkegaard*, Luplau Janssen 1902, *The Frederiksborg Museum*, Hillerød.
- p. 104: *Adam Oehrlenschläger*, Unknown Artist, *The Frederiksborg Museum*, Hillerød.
- p. 104: *Anders Sandøe Ørsted*, C.W. Eckersberg ca. 1823, *The Frederiksborg Museum*, Hillerød.
- p. 105: *The University courtyard*, gouaches P.C. Rosengren ca. 1850 and 1855, Photo: University of Copenhagen.

14. Constructing the University Campus in the 19th Century

- p. 106: *The University Main Building*, gouache P.C. Rosengren ca. 1860, Photo: University of Copenhagen
- p. 107: *The Surgical Academy*, Photo: *Medicinsk Museion*, University of Copenhagen.
- p. 108: *The University Library*, Photo: Jens Frederiksen 1989.
- p. 108: *The Zoological Museum*, Photo: The Royal Library, Copenhagen.
- p. 109: *The new Astronomical Observatory*, Unknown Artist, University of Copenhagen, Photo: Ole Bang Berthelsen.
- p. 109: *The great auditorium in the University Annexe*, Photo: Nina Lemvig-Müller 1998.
- p. 110: *The Palm House in the Botanical Gardens*, Photo: Søren Rud.
- p. 110: *The Geological Museum*, Photo: Søren Rud.
- p. 111: *The College of Advanced Technology*, Photo: Søren Rud.
- p. 111: *Rigshospitalet*, Photo: *Medicinsk Museion*, University of Copenhagen.

15. H.C. Ørsted

- p. 112: *H.C. Ørsted*, C.W. Eckersberg 1822, The Danish National Museum of Science and Technology.

p. 114: *The Nordic Meeting of Natural Scientists in 1847*, Erik Henningsen in the University of Copenhagen's Ceremonial Hall 1896, Photo: Kaj Leergaard.

p. 115: *Mariebogården, Oslo*, Photo: Universitetshistorisk fotobase, Universitetet i Oslo.

p. 115: *Lunds Universitet*, Photo: Lunds Universitet.

16. The new democracy and the University

p. 118: *The 400th anniversary of the founding of the University of Copenhagen in 1879*, *Illustreret Tidende*, 1879, Photo: The Royal Library, Copenhagen.

p. 119: *J.N. Madvig*, Bust by Vilhelm Bissen, 1887, Photo: Kaj Leergaard.

p. 121: *Christian Albrecht University, Kiel*, Photo: University of Copenhagen.

p.123: *Georg Brandes*, Harald Slott-Møller 1889; Photo: The Royal Library, Copenhagen

p 125: *University of Iceland*, Photo: University of Iceland

17. Women and the University

p. 126: *Nielsine Mathilde Nielsen*, Photo: The Royal Library, Copenhagen.

p. 128: *Nanna Berg*, Photo: The Royal Library, Copenhagen.

p. 129: *Inge Lehmann*, Photo: The Royal Library, Copenhagen.

18. The University and the Royal Academy

p. 130-31: *A Meeting of the Academy of Science*, The Danish Royal Academy of Science.

p. 132: *Japetus Steenstrup*, Bust by Vilhelm Bissen, 1880, Photo: Kaj Leergaard.

p. 134: *Carlsberg's honorary residence*, Harald Slott-Møller 1914, Carlsberg.

19. Vilhelm Thomsen and comparative linguistics

p. 142: *Vilhelm Thomsen*, Julius Paulsen 1903, *The Frederiksborg Museum*, Hillerød.

p. 143: *Vilhelm Thomsen*, Bust by Ludvig Brandstrup 1929, Photo: Kaj Leergaard.

p. 144: *Rasmus Rask*, Photo: The Royal Library, Copenhagen.

- p. 145: *Karl Verner*, Photo: The Royal Library, Copenhagen.
p. 147: *Louis Hjelmslev*, Photo: The Royal Library, Copenhagen.

20. Arctic studies

- p. 148: *Arctic Station*, Photo: University of Copenhagen.
p. 150: *Moravian mission station*, Photo: Ilisimatusarfik, Nuuk.
p. 151: *Hinrich Rink*, Photo: Danish Polar Centre.
p. 152: *Knud Rasmussen*, Photo: Danish Polar Centre.
p. 153: *Knud Rasmussen receiving an honorary doctorate of philosophy*, Photo: Thv. Larsen, University of Copenhagen.
p. 154: *Willi Dansgaard*, Photo: University of Copenhagen.
p. 155: *Minik Rosing*, Photo: M. Mailand, University of Copenhagen.
p. 156: *Fróðskaparsetur Føroya*, Photo: Fróðskaparsetur Føroya, Thorshavn.
p. 156: *Ilisimatusarfi*, Photo: Danish Polar Centre.

21. August Krogh, Nobel Prizes and the University

- p. 158: *August Krogh*, Photo: The Royal Library, Copenhagen.
p. 160: *Niels Finsen*, Photo: The Royal Library, Copenhagen.
p. 161: *Johannes Fibiger*, Photo: The Royal Library, Copenhagen.
p. 162: *Henrik Dam*, Photo: The Royal Library, Copenhagen.
p. 162: *Aage Bohr*, Photo: The Royal Library, Copenhagen.
p. 163: *Ben Mottelsen*, Photo: The Royal Library, Copenhagen.
p. 163: *Niels Kaj Jerne*, Photo: The Royal Library, Copenhagen.
p. 164: *Jens Chr. Skou*, Photo: The Royal Library, Copenhagen.

22. Niels Bohr and his Institute

- p. 166: *Niels Bohr and Margrethe Nørlund*, Photo: The Niels Bohr Archive, University of Copenhagen.
p. 168: *The Niels Bohr Institute*, Photo: The Niels Bohr Archive, University of Copenhagen.
p. 169: *Niels Bohr and Ernest Rutherford*, Photo: The Niels Bohr Archive, University of Copenhagen.
p. 170: *Niels Bohr and George de Hevesy*, Photo: The Niels Bohr Archive, University of Copenhagen.
p. 171: *Albert Einstein and Niels Bohr*, Photo: The Niels Bohr Archive, University of Copenhagen.

- p. 172: *Niels Bohr and Werner Heisenberg*, Photo: The Niels Bohr Archive, University of Copenhagen.
- p. 173: *The Copenhagen Spirit*, Photo: The Niels Bohr Archive, University of Copenhagen.
- p. 175: *Niels Bohr*, Bust by Jørgen Gudmundsen-Holmgreen, 1965, Photo: Kaj Leergaard.

23. The University during World War II

- p. 176: *Air-raid shelter on the University Square*, Photo: Jon Als, 1945. University of Copenhagen.
- p. 178: *The 700th anniversary of the Law of Jutland in 1941*. Photo: The Royal Library, Copenhagen.
- p. 180: *The members of the Danish Freedom Council.*, Georg Jacobsen, 1951-53, *The Frederiksborg Museum*, Hillerød.
- p. 181: *Sir Winston receiving an honorary doctorate of philosophy*, Photo: The Niels Bohr Archive, University of Copenhagen.

24. 1968

- p. 184: *The power of the professors is broken*, Photo: University of Copenhagen.
- p. 185 f: *Quotation*: [In 1984, American historian John Whitehead described conditions at Danish universities prior to 1968 as follows:] "In the decades..... : John S. Whitehead: *The Democratization of Danish Higher Education: Causes, Responses and Adaptations*, *Higher Education*, Vol. 14, No. 1. (Feb., 1985), pp. 57-73.
- p. 186: *Finn Einar Madsen and Rector Mogens Fog*, Photo:, University of Copenhagen.
- p. 188: *Demonstration on the University Square*, Politiken 24 April 1968, Photo:, University of Copenhagen.
- p. 190: *Student demonstrators occupying the Rector's office in March 1970*, Photo:, University of Copenhagen.
- p. 191: *The new Rector's gown*, Photo:, Elsebeth Lassen

25. The University today

- p. 194: *The new "campus" University*, Photo:, Campus Plan & Building, University of Copenhagen.

- p. 195: *From the Copenhagen dental School, The Panum Institute*, Photo: Jan Mortensen, Dept. of Odontology 2008, University of Copenhagen.
- p. 196: *Department of Sports*, Photo: Jan Friis Jensen.
- p. 197: *The Royal Veterinary and Agricultural University*, Unknown artist, Photo: The University of Copenhagen.
- p. 198 *From the Faculty of Pharmaceutical Sciences*, Photo: Faculty of Pharmaceutical Sciences, University of Copenhagen.
- p. 199: *BRIC*, Photo: BRIC, University of Copenhagen.
- p. 199: *The Green Lighthouse*, Photo: Campus Plan & Building, University of Copenhagen.

Selected bibliography

General works about the University of Copenhagen

Jan Pinborg (ed.) *UNIVERSITAS STUDII HAFNENSIS*.

Stiftelsesdokumenter og statutter 1479. English Translation by Brian Patrick McGuire. 1979. With sources in Latin, English and Danish.

Svend Ellehøj, Leif Grane et al. (eds.): *Københavns Universitet 1479-1979*, Vol. I-XIV, 1979-2006:

Vol. I: *Almindelig Historie 1479-1788*, 1991,

Vol. II: *Almindelig Historie 1788-1936*, 1993,

Vol. III: *Almindelig Historie 1936-1979. Studenterne 1760-1967*, 1986,

Vol. IV: *Gods . Bygninger . Biblioteker*, 1980,

Vol. V: *Det teologiske Fakultet*, 1980,

Vol. VI.1: *Det rets- og statsvidenskabelige Fakultet-1: Jura*, 2006,

Vol. VI.2: *Det rets- og statsvidenskabelige Fakultet-2: Økonomi,*

Antropologi, Sociologi og Kultursociologi, 2001,

Vol. VII: *Det lægevidenskabelige Fakultet*, 1979,

Vol. VIII: *Det filosofiske Fakultet-1: Fakultetets almindelige historie,*

Klassisk Filologi, Semitisk-østerlandsk filologi, Indisk filologi,

Assyriologi, Ægyptologi, Koptisk og Demotisk, Iransk filologi, Tyrkisk

Filologi, Østasiatiske sprog, 1979,

Vol. IX: *Det filosofiske Fakultet-2: Dansk og nordisk sprog og*

litteratur, Norrøn filologi, Eskimologi, Æstetik og almindelig

litteraturhistorie, Romansk, Engelsk, Germansk og Slavisk sprog

og litteratur, Sprogvidenskab, Lingvistik og Fonetik, Teater- og

Filmvidenskab, 1980,

Vol. X: *Det filosofiske Fakultet-3: Filosofi, Pædagogik, Historie og*

Samfundsfag, 1980,

Vol. XI: *Det filosofiske Fakultet-4: Religionshistorie, Folkemindeviden-*

skab og Europæisk etnologi, Arkæologi, Kunsthistorie, Musik, 1979

Vol. XII: Det matematisk-naturvidenskabelige Fakultet-1: Fakultetets almindelige historie, Matematik, datalogi, Statistik, Forsikringsmatematik, Geodæsi, Astronomi, Fysik, Kemi, 1983,
Vol. XIII: *Det matematisk-naturvidenskabelige Fakultet-2: Zoologi, Botanik, Geologi, Dyre- og Plantefysiologi, Gymnastikteori, Genetik og Mikrobiologi*, 1979,
Vol. XIV: *Universitets- og videnskabshistorisk bibliografi*, 1990,

Svend Erik Stybe: *COPENHAGEN UNIVERSITY. 500 Years of Science and Scholarship*, 1979.

Helge Kragh et al. (ed.): *Dansk Naturvidenskabs Historie 1000-1970*, Vol. I-IV, 2005-06.

William Norvin: *Universitet i Middelalderen*, 1929.

William Norvin: *Universitet i Reformationens og Orthodoxiens Tidsalder*, Vol. I-II, 1937-40. (Vol. II with sources in Latin and Danish).

H.F. Rørdam: *Kjøbenhavns Universitets Historie fra 1537-1621*, Vol. I-IV, 1868-1877.

Professors at the University of Copenhagen

Ejvind Slottved: *Lærestole og Lærere ved Universitet 1537-1977*, 1978.

Students at the University of Copenhagen

S. Birket-Smith: *Kjøbenhavns Universitets Matrikel*, BD. I-III, 1890-1912. Vol. I: 1611-1677, Vol. II: 1677-1740, Vol. III: 1740-1829

Vello Helk: *Dansk-norske studierejser fra reformationen til enevælden 1660. Med en matrikel over studerende i udlandet*, 1987

Vello Helk: *Dansk-norske studierejser 1661-1813*, Vol. I-II, 1991

Buildings at the University of Copenhagen

HEAVENLY LIGHT. The University of Copenhagen in Our Lady's Square. A picture-book with photos by Jens Lindhe and text by Henrik Sten Møller. Copenhagen 1993

Art at the University of Copenhagen

Hannemarie Ragn Jensen & Øystein Hjort: *HOUSES OF KNOWLEDGE. Art at the University of Copenhagen*. Copenhagen 2002.

Archives at the University of Copenhagen

Københavnss Universitets Arkiv 1479 - ca. 1910, Danish State Archives, 1978.

Celebrated scientists at the University of Copenhagen

Abraham Pais: *Niels Bohr's Times : in physics, philosophy, and polity*, 1991.

Mosley, Adam: *Bearing the Heavens : Tycho Brahe and the astronomical community of the late sixteenth century*, 2007.

Bodil Schmidt-Nielsen: *August and Marie Krogh : lives in science*, 1995.

I. Bernard Cohen: *Roemer and the First Determination of the Velocity of Light*, 1944.

Harald Moe: *Nicolaus Steno: an illustrated biography : his tireless pursuit of knowledge, his genius, his quest for the absolute*, 1994.

Robert M. Brain; Robert Sonn  Cohen, 1923-; Ole Knudsen: *Hans Christian Ørsted and the Romantic Legacy in Science : ideas, disciplines, practices*, 2007.

Index of names

A

Abildgaard, Peder Christian, veterinarian, Professor, 81
Albertsen, Peder, University Vice-Chancellor, 12, 14
Andersen, Bent, student, 55
Andersen, Hans Christian, poet, 103
Andersen, Niels, student, 55
Andersen, Oluf, Mayor, 55
Anna, Queen of Scotland, 29

B

Banting, Frederik, physician, 158, 161
Bartholin, Caspar, Professor, 78
Bartholin, Rasmus, Professor, 67
Bartholin. Thomas, anatomist, Professor, 27, 36, 42 f. 44 f. 71, 77 f.
Bartholin. Thomas, historian, Professor, 71
Bekker-Nielsen, Hans, philologist, Professor, 74
Berg, Nanna, law graduate, 128
Bernstorff, Johan Hartvig Ernst, First Minister, 95
Bendtz, Wilhelm, painter, 102
Best, Charles, physician, 158, 161
Bissen, Herman Vilhelm, sculptor, 102
Bloch, Carl, painter, 17, 29, 51
Boas, Johan Erik Vesti, zoologist, 130-31, 138
Bodelsen, Carl Adolf Gottlieb, philologist, Professor, 180
Bohr, Christian, physician, Professor, 137, 140, 165
Bohr, Aage, physicist, Professor, 162, 173

Bohr, Ernst, 173
Bohr, Margrethe, 166, 167
Bohr, Niels, physicist, Professor, 134, 140, 159, 162, 166, 169, 170, 171, 172, 175, 182, 167-82
Bologna, Bettino da, 9
Borch, Martin, architect, 111
Borch, Ole, Professor, 27, 42, 45, 52, 54, 56, 77
Bording, Jacob, physician, Professor, 24
Brahe, Tycho, astronomer, 26 f. 28, 29-33, 30, 41, 45, 67
Brandes, Georg, literary critic, 122, 123, 132 f. 136
Brochmand, Jesper, Bishop, Professor, 50
Brøndsted, Johannes, archaeologist, Professor, 134
Brøndsted, Peter Oluf, archaeologist, Professor, 105
Buchwald, Johannes de, surgeon, Professor, 78
Bugenhagen, Johann, Lutheran reformer, 20, 22 f.
Bugge, Thomas, astronomer, Professor, 92

C

Caesar Gajus Julius, Roman statesman, 71
Cassini, Jacques, astronomer, 67, 69
Catherine II, Russian Tsarina, 96
Chadwick, James, physicist, 174
Chiewitz, Ole, physician, Professor, 179, 180

Christian I, King of Denmark, 10, 11,,
12, 14
Christian II, King of Denmark, 14
Christian III, King of Denmark, 17, 19,
22, 24,
Christian IV, King of Denmark, 29, 33,
44, 56, 90
Christian V, King of Denmark, 53
Christian Albrecht, Duke of Schleswig-
Holstein-Gottorp, 121
Christiansen, Christian, physicist,
Professor, 130-31, 135, 140
Churchill, Winston, Prime Minister,
174, 182
Clausen, Henrik Nicolai, 100, 101 f.
Colborn, A.F., Associate Professor, 177
Cook, Frederick A. polar researcher,
153
Coster, Dirk, physicist, 170

D

Dahl-Iversen, Dorte, geophysicist,
Professor, 154
Dam, Carl Peter Henrik, biochemist,
Professor, 162
Dansgaard, Willi, geophysicist, Pro-
fessor, 154
Darwin, Charles, naturalist, 130-31,
138
Descartes, René, philosopher, 61 f. 65
Dorothea, Queen of Denmark: 10,

E

Eckersberg, Christoffer Wilhelm,
painter, 99, 113
Edward VII, King of Great Britain, 96
Egede, Hans, missionary, 149
Egerod, Søren, sinologist, Professor,
134
Einstein, Albert, physicist, Professor,
169, 171
Eigtved, Nicolai, architect, 80
Eler, Jørgen, High Court Judge, 57
Erik of Pomerania, King of Denmark,
11
Erslev, Kristian Sofus August, histo-
rian, Professor, 130-31, 133

F

Fahrenheit, Daniel, physicist, 68
Fausbøll, Michael Viggo, philosopher,
Professor, 130-31, 135
Fibiger, Johannes Andreas Grib, medi-
cal researcher, Professor, 161
Fichte, Johann Gottlieb, philosopher,
105
Fincke, Thomas, physician, Professor,
37, 41
Finsen, Niels Rybjerg, physician, 159,
160
Fog, Mogens, physician, Rector, Pro-
fessor, 180, 186, 189-91, 191
Forsskål, Per, botanist, 95
Frederik I, King of Denmark, 17
Frederik II, King of Denmark, 26, 31
Frederik III, King of Denmark, 47, 50,
53, 71
Frederik V, King of Denmark, 79 f. 82
Frederik VI, King of Denmark, 96,
107
Frederik VII, King of Denmark, 120
Frederik VIII, King of Denmark, 130-
31, 132
Fridericia, Julius Albert, historian,
Professor, 130-31, 133
Frisch, Hartvig, philologist, Profes-
sor, 180
Fuioren, Henrik, physician, 44

G

Galluzzi, Bonifacio, 9,
Gamow, George, physicist, 173
Gertz, Martin Clarentius, philologist,
Professor, 130-31, 136
Goos, Carl, Law Professor, 119, 130-
31, 132
Gray, Thomas, poet, Professor, 71
Griffenfeld, Peder Schumacher, states-
man, 50, 53
Gram, Hans, Royal Historiographer,
Professor, 93
Grotefend, Georg Friedrich, philolo-
gist, 95
Grundtvig, Nicolai Frederik Severin,
theologian, 90, 100, 101

H

Hagedorn, Hans Christian, physician, Director, 158, 161
 Hansen, Christian, architect, 108
 Harvendel, Frederik, 82
 Hegel, Georg Friedrich Wilhelm, philosopher, 105
 Heiberg, Johan Ludvig, poet, 105
 Heiberg, Johan Ludvig, philologist, Professor, 130-31, 136
 Heisenberg, Werner, physicist, Professor, 170, 172, 174, 181
 Henningsen, Erik, painter, 114
 Hemmingsen, Niels, theologian, Professor, 23, 25,
 Hemmingsen, Ralf, psychiatrist, Rector, Professor, 148
 Henriksen, Jesper, Dean, Rector, 12, 14, 15.
 Herder, Johann Gottfried von, philosopher, 72
 Herholdt, Johan Daniel, architect, 108
 Hevesy, George de, physicist, Professor, 170, 171
 Hjelmslev, Louis, philologist, Professor,
 Hohlenberg, Matthias Hagen, theologian, Professor, 106,
 Holberg, Ludvig, author, playwright, Professor, 86, 87, 89 f., 94
 Holm, Edvard, historian, Professor, 130-31, 133
 Hostrup, Jens Christian, playwright, 102
 Hostrup, Emil, plant pathologist, 130-31, 137
 Husfeldt, Erik, physician, Professor, 180
 Høeg, Carsten, philologist, Professor, 180
 Høffding, Harald, philosopher, Professor, 130-31, 134-36, 140

J

Jacobsen, Jens Christian (I.C.), brewer, 93, 110, 134 f.
 Jacobæus, Holger, Professor, 27, 52
 James VI, King of Scotland, 28

Jensen, Jens Arnold Diderik, polar researcher, 152 f.
 Jerne., Niels Kaj, immunologist, Director, 163
 Johnstrup, Frederik, geologist, Professor, 151
 Jones, William, philologist, 143
 Jørgensen, Adolf Ditlev, historian, 130-31, 133
 Jørgensen, Sophus Madsen, chemist, Professor, 130-31, 140

K

Kant, Immanuel, philosopher, 105
 Kepler, Johannes, astronomer, 33
 Kierkegaard, Søren, philosopher, 102, 103
 Kirkeby, Per, painter, 64
 Kleinschmidt, Samuel, philologist, 150
 Koch, Lauge, polar researcher, 156
 Kofod Ancher, Peder, Law Professor, 91
 Kornerup, Andreas, polar researcher,, 153
 Kratzenstein, Christian Gottlieb, Professor, 79, 95
 Krogh, August, physiologist, Professor, 158, 159-65, 171
 Krogh, Marie, 160
 Kromann, Kristian Frederik Vilhelm, philosopher, Professor, 130-31, 133
 Krøyer, Henrik, zoologist, 137
 Krøyer, Peder Severin, painter, 132
 Koch, Hal, theologian, Professor, 180,
 Kylling, Peder, student, 54

L

Landau, Lev, physicist, 173
 Lange, Julius, art historian, Professor, 130-31, 140 f.
 Lange, Johan, botanist, 130-31, 137, 153
 Lehmann, Inge, scientist, 129
 Leibniz, Gottfried, mathematician, philosopher, 64, 69
 Lindhard, Jens Peter Johansen, physiologist, 160

Longomontanus, Christian Sørensen, astronomer, Professor, 31
 Lund, Peter Wilhelm, zoologist, 130-31, 137
 Luther, Martin, Church Reformer, 18, 19, 23 f.
 Lütken, Christian Frederik, zoologist, Professor, 130-31, 138

M

Madsen, Finn Einar, student, 186
 Madvig, Johan Nicolai, Professor, 119, 122, 130-31, 136
 Magnússon, Árni, philologist, Professor, 71-74, 74
 Malling, Peder, architect, 106
 Mantegna, Andrea, sculptor, 11
 Marsilius of Padua, author, 100
 Marstrand, Vilhelm, painter, 12,
 Matzen, Henning, Law Professor, 119
 Mehren, August Michael Ferdinand van, philologist, Professor, 130-31, 135
 Meinert, Frederik, zoologist, 130-31, 139
 Melanchton, Philip, Lutheran reformer, 18, 23, 25, 31
 Melioli, Bartolomeo, sculptor, 11,
 Michaelis, Johan David, theologian, 95
 Morsing, Christian, physician, Professor, 20,
 Mortensen, Oluf, Bishop, 12
 Mottelsen, Ben Roy, physicist, Professor, 162, 163
 Mylius-Erichsen, Ludvig, polar researcher, 152, 156
 Müller, Peter Erasmus, Forestry Professor, 130-31, 137
 Møller, Herman, philologist, 130-31, 135
 Møller, Poul Martin, poet, Professor, 105

N

Nellemann, Johannes, Minister of Justice, Professor, 119, 130-31, 132,

Newton, Isaac, astronomer, mathematician, physicist, 65
 Niebuhr, Carsten, explorer, 95
 Nielsen, Nielsine Mathilde, medical practitioner, 126, 127
 Nielsen, Rasmus, philosopher, Professor, 105
 Nørlund, Niels Erik, mathematician, Dean, Rector, 153
 Nørregaard, Jens, theologian, Rector, Professor, 177, 179

O

Oehlenschläger, Adam, poet, Professor, 99, 104
 Olav Haraldsson (Saint Olav), King of Norway, 71
 Olav Tryggvason, King of Norway, 71

P

Palladius, Peder, Bishop, Professor, 22, 23
 Panum, Peter Ludvig, physician, Professor, 85
 Pauli, Wolfgang, physicist, Professor, 172
 Paulli, Simon, Professor, anatomer, 42, 77
 Peary, Robert, polar researcher, 153, 155
 Pechüle, Carl Frederik, astronomer, 130-31, 139
 Percy, Thomas, Bishop, 71 f.
 Petersen, Julius, mathematician, Professor, 130-31, 139
 Petersen, Otto G., philologist, Professor, 130-31, 137
 Picard, Jean, astronomer, 67
 Prytz, Peter K., physicist, 130-31, 140

R

Rainwater, James, physicist, Professor, 163
 Ramus, Joachim Frederik, mathematician, Professor, 59
 Rask, Rasmus, philologist, Professor, 105, 143, 144

Rasmussen, Knud, polar researcher, 152, 153, 156 f.
 Ravn, Niels Frederik, polar researcher, 151
 Rink, Hinrich, chemist, geographer, geologist, 151
 Roosevelt, Franklin D, President, 174
 Rosenfeld, Leon, physicist, 172
 Rosengren, P.C., painter, 105 f.
 Rosenstand, Vilhelm, painter, 52, 86
 Rudbeck, Olof, anatomist, 37
 Rudolf II, Emperor, 33
 Rømer, Ole, astronomer, Professor, 45, 66, 67, 67-69, 94
 Rønnow, Joachim, Bishop, 16,
 Rosing, Minik, geologist, Professor, 155, 157
 Rutherford, Ernest, physicist, Professor, 167, 169

S

Saxtorph, Matthias, physician, Professor, 127 f.
 Schimmelmänn, Ernest, Minister of Finance, 107
 Schouw, Joachim Frederik, politician, botanist, Professor, 102
 Schiødte, Jørgen Mathias Christian, zoologist, Associate Professor, 130-31, 137 f.
 Schønheyder, Fritz, biochemist, Professor, 162
 Scotia, Petrus de, Dean, 12
 Scott, Walther, author, 72
 Shakespeare, William, playwright, 23
 Sibbern, Frederik Christian, Professor, 105
 Sixtus IV, Pope, 10 f.
 Skou, Jens Christian, biophysicist, Professor, 164
 Slott-Møller, Harald, painter, 123
 Smith, Henrik, Lutheran reformer, 23,
 Steenstrup, Japetus, zoologist, Professor, 130-31, 132, 133, 137-39
 Steenstrup, Johannes, historian, Professor, 130-31, 133
 Stensen, Niels (Steno), anatomist, geologist, 27, 44, 60, 61-65, 77

Strömgren, Bengt, astronomer, Professor, 134
 Sveinsson, Brynjólfur, Bishop, 71
 Sørensen, William, zoologist, 130-31, 138, 154, 165

T

Tausen, Hans, Lutheran preacher, 16,
 Teller, Eduard, physicist, 173
 Thile, Thorvald, mathematician, Professor, 130-31, 139
 Thomsen, Julius, chemist, Professor, 130-31, 133, 140
 Thomsen, Vilhelm, philologist, Professor, 130-31, 136, 140, 142, 143, 143-47
 Thurah, Lauritz de, architect, 80
 Tode, Johan Clemens, physician, Professor, 83
 Torm, Frederik Emanuel, theologian, Rector, Professor, 153

U

Uldall, Hans Jørgen, philologist, 147
 Ursin, Georg Frederik, astronomer, mathematician, 109
 Ussing, Johan Louis, philologist, Professor, 130-31, 136

V

Valkendorf, Christoffer, civil servant, 56
 Varming, Kristoffer, architect, 111
 Verner, Karl, philologist, Professor, 130-31, 135, 143 f, 145
 Viborg, Erik, veterinarian, Professor, 82
 Vinding, Rasmus, historian, Professor, 52

W

Warming, Eugen, botanist Professor, 130-31, 137
 Wimmer, Ludvig Frands Adelbert, ru-
 nologist, Professor, 130-31, 136
 Winstrup, Peder, Bishop, 40
 Whitehead, John, historian, Professor, 185 f.

Worm, Ole, Professor, 27, 42, 45, 47-49, 48, 62, 77

Z

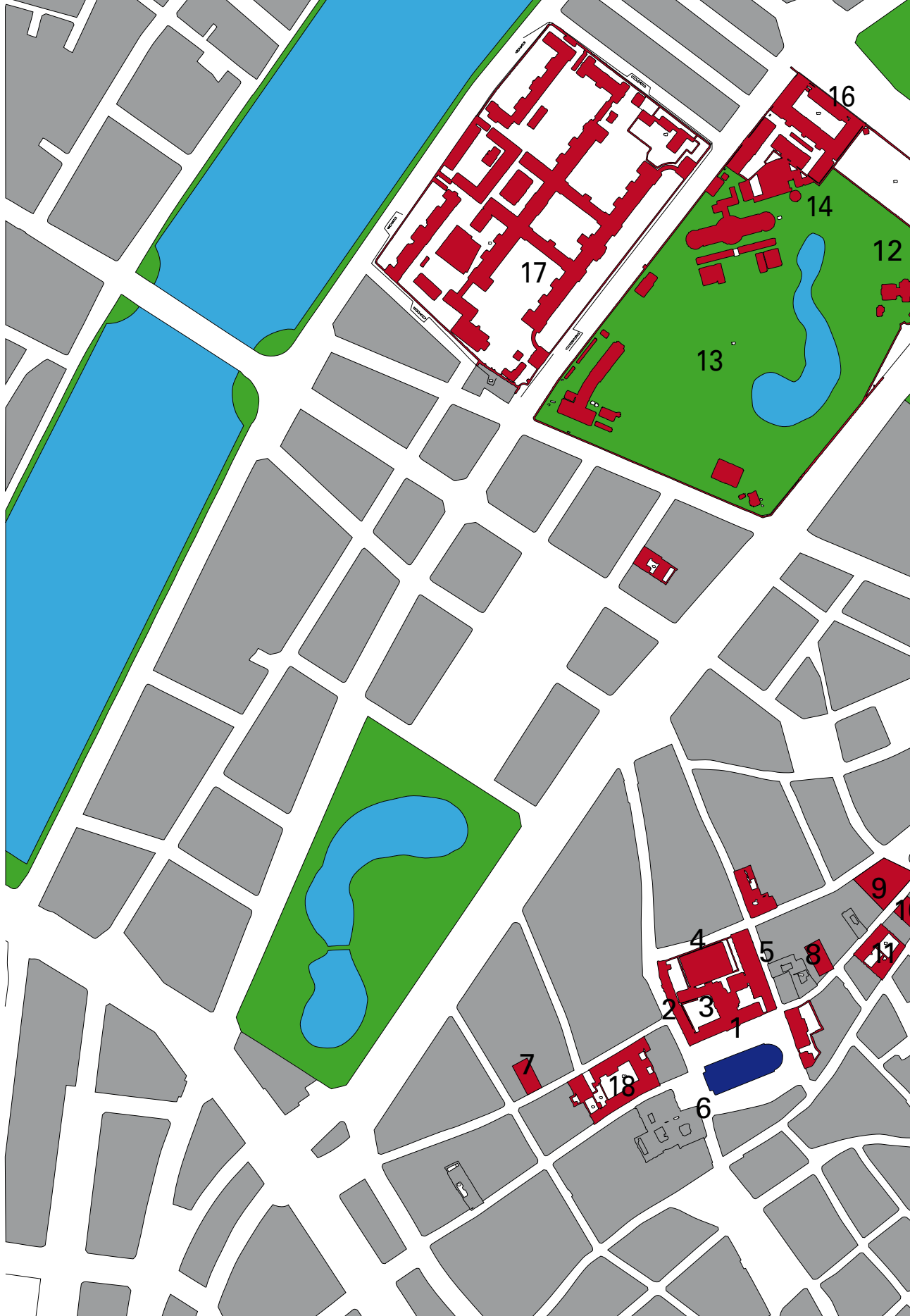
Zeuthen, Hieronimus Georg, Professor, 130-31, 136, 139

Zinzendorf, Nicolaus Ludwig, 150

Ø

Ørsted, Anders Sandøe, statesman, 102, 104, 119

Ørsted, Hans Christian, physicist, Professor, 102, 109, 112, 114, 113-116





University buildings in Central Copenhagen

- 1 The University Main Building
- 2 The Refectory Building
- 3 The Senate House
- 4 The old Zoological Museum
- 5 The University Library
- 6 Church of Our Lady
- 7 Valkendorf's Kollegium
- 8 Borch's Hall of Residence (*Collegium Mediceum*)
- 9 Regensen (*Collegium Regium*)
- 10 Elers Kollegium
- 11 Professorial residence ca. 1756
- 12 The New Observatory
- 13 The Botanical Garden with the Botanical Museum
- 14 The Palm House
- 15 The Geological Museum.
- 16 College of Advanced Technology 1890
- 17 The Municipal Hospital in Copenhagen, today
The Center for Society and Health.
- 18 The Faculties of Law and Social Science
- 19 Faculty of Theology

The Authors



Ejvind Slottved, born in 1943, has been University Historian at the University of Copenhagen since 1998. He is the author of several articles exploring Danish agricultural, administrative and university history, among them contributions to the history of the University of Copenhagen, *Københavns Universitet 1479-1979*, Vol. I-XIV (1979-2006), for which he was co-editor.



Ditlev Tamm, born in 1946, has been a Professor of Legal History at the University of Copenhagen since 1978. He is the author of several books in the fields of legal, political and cultural history. Among others, he is the author of a volume on the University of Copenhagen Faculty of Law, as part of the history of the University of Copenhagen, *Københavns Universitet 1479-1979*, Vol. I-XIV (1979-2006), for which he was co-editor.



UNIVERSITY OF
COPENHAGEN