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BERNHARD ZEPERNICK & WOLFGANG MERETZ

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Abstract

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The background of Christian Konrad Sprengel's leisure time dedication to nature observation, which led to the founding of pollination biology, is reconstructed from the scattered sources available, focusing on his family and career. In a Christian family with an inclination to natural sciences he grew up as the youngest of fifteen children. His father was an archdeacon, his paternal grandfather organist and teacher, and the same professional path was mapped out for Christian Konrad and his brothers. As headmaster of a grammar school Christian Konrad had, however, constant problems with students, their parents and his supervisors. In a personal crisis in 1782, his doctor, Ernst Ludwig Heim, advised him to seek relaxation and recovery from these problems in the study of nature. On this advice he began his time consuming observations, which eventually brought further accusations that he was neglecting his pupils, and finally, in 1794, he was forced to retire. However, the results of his observations were published and acknowledged immediately by several botanists. The family tree and a table of the major events of his life are provided.

Careers in Sprengel's family

The Bible says "Be fruitful and multiply" (Genesis 1: 28), and thus Ernst Victor Sprengel, the archdeacon of St Gotthard Church in Brandenburg, had a reason to be proud when his fifteenth and final child was born to him at the advanced age of 64. This last child, born on 22 September 1750, was a boy and was christened Christian Konrad. Not all fifteen children were from the same woman; the first seven children were from his first wife, the last eight were from his second wife (see Fig. 1). Ernst Victor's father was an organist and teacher, and he himself was a choirmaster, then a teacher, and finally an archdeacon (the second pastor for a protestant city church). It was clear that Christian Konrad, like his brothers and sisters, would grow up in the Christian faith and eventually have a career in the church.

From Ernst Victor's first marriage, two of his sons had religious careers. In 1741, Johann Christoph Gottlieb began studying theology at the University of Halle. He then became a teacher at the Realschule (a technical secondary school) in Berlin. Finally, in 1754, he was ordained at St Peter's Church in Berlin, after which he took over a pastoral position in Christinendorf near

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Thomas Sprengel
Married to
Sabina Blanke(ns)
on 17 Oct 1685
Organist and teacher in Oebisfelde

Ernst Victor
Baptized 17 Sept. 1686
†12 Jul 1759
Archdeacon of St. Gotthard Church in Brandenburg
Married to
2.
1.

Laurentius
* 7 Jun 1688

Joachim Heinrich
* 11 Nov 1690
Matriculated university of Helmstedt 7 Mar. 1719

Johann Paul
* 29 Oct.1692

Katharina Elisabeth Krause
on 17 Oct 1718
Baptized 1 Sep 1692
Buried 21 Dec 1732

Samuel Ernst Friedrich
Baptized 11 Oct 1719

Paulus Andreas Victor
Baptized 24 Sept 1721

Johann Christoph Gottlieb
Baptized 22 Aug 1723
Teacher at Realschule in Berlin, ordained at St. Peter's in Berlin 17 Jul 1754
pastor at Christinendorf near Trebbin 1754-1778
Married to
1. **Johanna Juliane Busch**
† 26 May 1757
2. **Christiane Luise Voss**

Joachim Friedrich
* 20 Feb 1726
in Altbrandenburg (Mittelmark)
Baptized 24 Feb 1726
† 8 Jan 1808 in Kotelow (Mecklenburg-Strelitz)
Teacher at Realschule in Berlin 1749,
headmaster at a public school in Anklam, 1753,
in Altbrandenburg 26 Apr 1756,
pastor at Boldekow and Putzar near Anklam, 10 Feb 1760
Married to **Christiane Sophie Adelung**, daughter of his predecessor as pastor in Boldekow, **Johann Paul Adelung** * 5 May 1702, † 24 Jan 1759)

Katharina Sophia
Baptized 29 Aug 1728
Married to **Krüger** in Potsdam

Dorothea Elisabeth
Baptized 20 Aug 1730

Friedrich
Baptized 3 Nov 1732
† 5 Nov 1732

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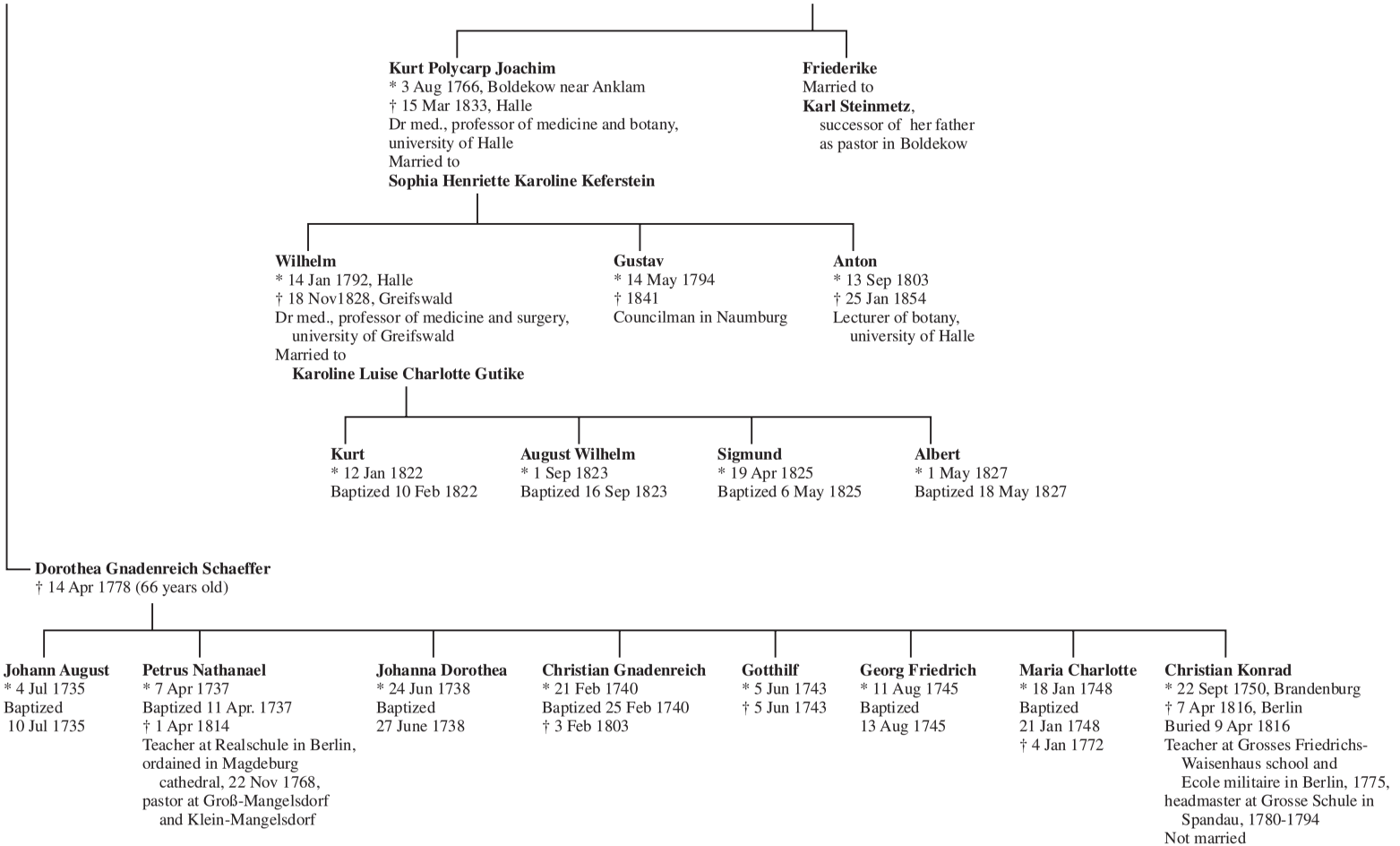


Fig. 1. Christian Konrad Sprengel – family tree.

Trebbin. His younger brother, Joachim Friedrich, also studied theology at the University of Halle, beginning in 1744. In 1749, he too became a teacher at the Realschule in Berlin. Four years later he became the headmaster at the Stadtschule (a public school) in Anklam and then moved on to become the headmaster at the Große Schule in Neustadt in Altbrandenburg (Mittelmark) in 1756. In 1760, he finally became a pastor in Boldekow and Putzar in the district of Anklam. Twice after that, in 1765 and again in 1766, he was asked to assume the positions of pastor in the second parish church of St Mary Magdalene in Breslau (now Wrosław) and inspector of the new Realgymnasium there, but both times he declined the offer (Joachim Friedrich Sprengel in Stavenhagen 1773).

The sons from Ernst Victor's second marriage followed similar paths. Petrus Nathanael became a teacher at the Realschule in Berlin like his half-brothers. In 1768, he was ordained in the Magdeburg Cathedral and then took up a pastoral position in the villages of Groß-Mangelsdorf and Klein-Mangelsdorf. It was thus natural for Christian Konrad to follow in the footsteps of his brothers, and like them, he too studied theology at the University of Halle, beginning in 1770. In 1775, he became a teacher at the Großes Friedrichs-Waisenhaus (orphanage) in Berlin, and at the same time he taught at the Royal Ecole Militaire. In 1780, he became the headmaster of the Große Schule (a Lutheran public school) in Spandau (today a district of Berlin). But unlike his brothers, the expected pastoral position did not materialize. In 1794, he ended his school services and retired.

The schooling situation at the time

Since the Middle Ages, education had been tied very closely to the church. In the fourteenth century a monastery school was founded in Spandau (Lamprecht 1903, Schich 1983, Escher 1983). The grammar schools in Berlin, which were founded after the Reformation (e.g. the Gymnasium zum Grauen Kloster in 1574, the Joachimsthalsches Gymnasium in 1650, the Friedrichswerdersches Gymnasium in 1681 and the Französisches Gymnasium in 1685), were mainly focused on the arts. After the Industrial Revolution in the middle of the eighteenth century, the sciences were brought into the educational system. Physics and chemistry were the first to be taught, particularly at the technical schools. In 1747, such a school was founded in Berlin, namely the Realschule at which Sprengel's two half-brothers, Johann Gottlieb and Joachim Friedrich, and his full-brother, Petrus Nathanael, were teachers. However, secondary education was voluntary, and indeed it was only achievable for children from upper class families because one had to pay for the privilege to learn.

In Prussia in 1717, education became mandatory for all children as decreed by King Frederic William I and part of the Prussian Common Law, but due to a lack of teachers and schoolrooms this law could not be fully implemented. The situation for the poor did not improve until the nineteenth century (Timler & Zepernick 1982).

Sprengel as a headmaster in Spandau

The Lutheran public school, where Christian Konrad Sprengel was headmaster, was a grammar school. Since it was a secondary school, only the affluent and thus influential families from Spandau could afford to send their children there. Some of the parents believed that because of their wealth and social status, they could demand all types of privileges and special treatment for their children. This made the headmaster's job difficult, particularly when he was a man who believed in equal rights for all. Indeed, the headmaster position that Sprengel received in 1780 had been vacant for this reason. The previous headmaster had resigned due to the exasperating mother of one of the schoolboys, and no one, as his supervisor wrote, "could induce him to stay". This did not bode well for Sprengel, who eagerly began his new job. Sprengel taught German with exercises in letter writing, Latin, Greek and French. He also taught religion, elementary mathematics and natural history. The school also had a choir, which was directed by the

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choirmaster. The building, which does no longer exist, was located near St Nicolai Church and had three classrooms (Hoffmann 1966).

Because the high school was a Lutheran public school, it was under the control of both the town council and the church. Sprengel thus had two supervisors, Superintendent Daniel Friedrich Schulze (1739-1811), who was the pastor at St Nicolai Church, and the Spandau town council. Schulze was himself supervised by Berlin's consistory. On 25 April 1780, Sprengel began his job with the inaugural speech, "Von dem Nutzen der griechischen und lateinischen Sprache" (On the usefulness of the Greek and Latin languages). The following month he submitted a revised teaching plan to his supervisors. At the end of 1781, with a year and a half of experience at this school, he made a further recommendation for changes. Up to that point, two, sometimes even four classes were combined for lessons. But "because of the large number and differing abilities of the students", he wanted to stop this practice and instead teach each class individually. In order to do this he wanted to replace the students' morning worship, which was quite long, with a short morning prayer. Sprengel wrote (quoted after Hoffmann 1920):

"Until now I have given the German lessons to the combined first two classes on Thursday and Friday afternoons. But I must confess that because of the overly large number and the very different abilities of the students, these lessons have not been as beneficial as I would have wished. In addition, on Friday mornings all classes are brought together and the four teachers rotate in giving the lessons. It is easy to understand that this produces even less benefit, both because of the yet greater number and disparity of the students, as well as because of the constant change in teachers. It would therefore be very advantageous if I would teach the first and second classes on Thursday and Friday afternoons alone and if another teacher would teach the third and fourth classes. On Friday mornings the students should be divided into two groups, where each group receives lessons from its own teacher. In this way four new lesson periods a week will be created, and the question is how they can be taught without the teachers complaining about an increase in work. My proposal would be the following:

The morning worship is in no doubt well meant, but it brings, in my opinion, little or no benefit. They pray and sing, a chapter of the Bible is read, and two students test each other on a part of the catechism. But this all happens without an explanation. It also appears that the parents of the students deem the morning worship superfluous, for the number of students present at this hour is the smallest of any. When the choirmaster or the sexton hold the morning worship, many students stay away ... Until now I have not said anything in response because it has taken me enough time and effort to get them to properly attend the normal lesson periods, and they do not actually miss much by staying away during the morning worship. If, however, this worship were abolished and instead each teacher allowed the students of his class to prepare for the lesson with a short prayer, the four proposed lesson periods could be created without an increase in work".

Sprengel's wishes were agreed to, but rather reluctantly because supervisors do not generally like when their subordinates develop their own ideas. And Sprengel had not only one but two supervisors. Since his supervisor of the church, Pastor Daniel Friedrich Schulze, kept a chronicle, "Zur Beschreibung und Geschichte der Stadt Spandau gesammelte Materialien" (Collected material for an account and history of the city of Spandau), in which he described in detail his constant quarrelling with Sprengel, we are well informed, at least from Schulze's point of view, about Schulze and Sprengel's discord. All of the portions of Schulze's chronicle pertaining to Sprengel were published by Mittmann (1893). The chronicle was edited and published in its entirety by Recke (see Schulze 1913).

Regarding Sprengel's two proposals for improvements, Schulze wrote in his chronicle, "We put up with both of them". However, in the following year 1782, they had serious contentions. Sprengel was reprimanded for being "cruel when disciplining the students and treating his lessons arbitrarily". For example, he punished the mayor's son by making him stand during an entire lesson. Another time Sprengel hit the boy near the eyes with a stick and afterwards the child needed treatment from a doctor for some time. The nine-year old son of a councilor once had to sit in the school penitentiary for three hours and was not allowed to take part in the private les-

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sons. Another time the same child was beaten so badly that he could not lie down for some nights. The son of the verger was said to have stolen plums from Sprengel's tree and was beaten black and blue. The son of a shoemaker was hit on the head with a stick until he bled because he had not understood what Sprengel had said and had asked a fellow student. The son of another shoemaker was so badly beaten that both of his shoulders were black and blue and his back was completely bloodshot because he snatched a piece of paper out of the hands of another boy on the street. Another child was given thirty-one strokes because he played a trick on someone.

We do not know to what extent these accusations of brutality are valid because we only know Schulze's account. It is possible that his punishments at times did exceed the common level. It should be noted, however, that these incidents were only reported with such frequency in the year 1782, when Sprengel seems to have been in a particularly poor mental and spiritual state. Schulze's chronicle reports only one such incident in any other year. After Easter of 1784, the son of a doctor received twenty strokes and then was thrown in the school penitentiary because he did not know a Greek vocabulary word. As a result, Sprengel was ordered to the town hall, where he promised to behave differently in the future. He did as he promised; as Schulze described it, "the headmaster went to the other extreme. He showed indifference towards whether the children learned anything or not and hardly made an effort. He grumbled and let everything go". At the end of June 1784, Sprengel cancelled all the private lessons he had been giving.

The doctor's wise advice

How can we understand this strange and unexpected change in Sprengel? Even before this point, Sprengel had been feeling that things could not go on as they were. The continuous struggle against students, parents and supervisors had made him ill. It was for this reason that in his particularly bad year of 1782 he visited the famous Spandau city and district medical officer Dr Ernst Ludwig Heim (1747-1834), who was living in a house to the right of St Nicolai Church at Reformationsplatz 2 (Jahn 1971). Heim was only three years older than Sprengel and had also studied in Halle. When Sprengel arrived in Halle, Heim already had a practice there, where in particular students went to be treated (Körner 1989). It is therefore possible that Sprengel actually knew Dr Heim from Halle. At the very least, Sprengel's trust in Heim would have been strengthened by the fact that they had Halle in common. Dr Heim, who was particularly interested in botany and was an expert on mosses, advised Sprengel to seek relaxation in the study of nature. He also gave Sprengel his first lesson in botany (Mägdefrau 1992), which certainly is not one of a doctor's normal tasks, but which, in this case, fit his treatment plan. As early as 1782, Pastor Schulze recorded that Sprengel, then 32 years old, was going on walks for health reasons. Later, these walks became actual trips. In the following year, Dr Heim closed his practice in Spandau and moved to Berlin. However, it is safe to assume that Sprengel continued consulting him.

The observation of nature was, in Sprengel's opinion, a special kind of church service, a way of beholding all the things that "the wise Creator of nature had produced". Indeed, this activity gave him the peace and joy he so greatly needed. He no longer took the conflicts at school, or even school in general, as seriously, and he was able to resign from giving private lessons, which naturally resulted in a loss of income for him. He wandered through the Spandau environs and made floristic discoveries, which, in 1787, were published by Carl Ludwig Willdenow in his "Florae berolinensis prodromus" (Willdenow 1787). Some of Sprengel's herbarium notes are preserved in the Willdenow herbarium at the Botanical Museum Berlin-Dahlem (Meyer 1953). One of the plant species discovered by Sprengel and described by Willdenow is *Silene chlorantha* (Willd.) Ehrh. *(Caryophyllaceae),* for which the Berlin district is the westernmost border of its area of distribution, and its survival in this district is currently endangered.

Sprengel then decided to investigate the interaction between flowers and pollinators. In the introduction to his work he wrote, "in the summer of 1787, as I was attentively studying the flower of the wood cranesbill *(Geranium sylvaticum),* I found that the insides and both margins

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of the lowest portion of the petals were equipped with delicate and soft hairs. Convinced that the wise Creator of nature had not produced even a single tiny hair without a special purpose, I thought about what purpose these hairs could serve. And here it soon occurred to me that if you assume that the five drops of nectar, which are secreted by an equal number of glands, are meant to be food for certain insects, then it would not be unlikely that this nectar should be protected from being spoiled by the rain. And in order to achieve this purpose, these hairs would be attached here just like a person's eyebrows and eyelashes hold up and hinder a drop of sweat from flowing down a person's forehead into his eyes. These hairs, however, would in no way hinder an insect from reaching the drops of nectar. Hereupon I examined other flowers ..." (Sprengel 1793: 1).

This research required detailed field observations, which consumed a lot of his time – more than he originally expected. As early as 1788 a publication was announced in Zürich's newly founded "Magazin für die Botanik", the first botanical journal in the world. There it is said, "in the near future Mr Sprengel, headmaster in Spandau near Berlin, will publish a paper about nectaries, in which he will disclose several of his own new observations and comments" (Mag. Bot. 2(4): 186. 1788). A year later, similar announcements were published in other journals, among them the "Gothaische Gelehrte Zeitungen" and the "Intelligenzblatt der Jenaer Allgemeinen Literaturzeitung" (Meyer 1967). In 1790, Sprengel made his own announcement in the "Magazin für die Botanik". There he said, "I am now able to personally announce the upcoming publication of my philosophical-botanical book that was announced in the 'Magazin für die Botanik'. It will be available under the title 'Versuch, die Konstruktion der Blumen zu erklären' [An attempt to explain the structure of flowers], from Mr Vieweg in Berlin presumably around the time of next year's Easter book fair". Sprengel concluded his announcement with the noteworthy words, "Incidentally, what the book itself contains is the least of its value; its most valuable part is what it does not actually contain. Although some very good discoveries can be found in this book, they are just a trifle. They are only a minor point in comparison with the glorious discoveries that will be made in the future by philosophical botanists, who will be brought on the right track by this book. I predict this with great confidence" (Sprengel 1790). In other words, Sprengel was certain that he had founded a new branch of biology.

It took another three years until the book finally appeared in print, now with the title we know, "Das entdeckte Geheimniss der Natur im Bau und in der Befruchtung der Blumen" (The secret of nature discovered in the structure and pollination of flowers). The delay is understandable because in the course of writing, Sprengel needed to verify each new result, which caused the book to become more and more comprehensive. In all, he worked on this book for six years, and during that time he examined 461 different plant species, both wild and cultivated ones. An example is *Asclepias,* and Sprengel mentioned a walk to Charlottenburg to study one that was blooming there in the palace gardens. His book includes twenty-five copperplates documenting his observations in 1117 individual depictions, which can be traced back to his own drawings (Ascherson 1893, 1894, Mägdefrau 1992, Endress 1992).

The question is how could a theologian and classical scholar, a man who so far had occupied himself with both protestant theology and Greek and Latin literature, create such a work. Here, too, we need to look back to Sprengel's family, where we find a clear affinity to scientific activities. His half-brother, Joachim Friedrich, who was a teacher at the Realschule in Berlin starting in 1749, taught history, mineralogy and botany (Kümmel 1991). He wrote "Beschreibung der Harzer Bergwerke" (A description of the mines in the Harz mountains), Berlin 1753, and "Vorstellung der Kräuterkunde in Gedächtnistafeln" (A presentation of the study of herbs by way of memory boards), Greifswald 1754. Joachim Friedrich's son, Kurt, became a professor of medicine and botany in Halle. Of Kurt Sprengel's sons, Wilhelm became a professor of medicine and surgery in Greifswald, and Anton became a private lecturer of botany in Halle. Kurt, beginning in 1809, and his son, Wilhelm, joining his father seven years later, were both members of the scientific society "Gesellschaft Naturforschender Freunde", in Berlin. Christian Konrad evidently also inherited his inclination towards science through his paternal line.

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Sprengel's further fate at school

What happened at his school after 1784? After Sprengel withdrew into himself, the city council tried to force him to start giving private lessons again. Sprengel was able to avoid this though, because it was not part of his contract. Pastor Schulze wanted to get Sprengel transferred to another school, but the consistory did not grant Schulze his wish. After these two incidents, the next five years were dominated by relative peace. The request to give private lessons first surfaced again in 1790, but again Sprengel was able to refuse. One year later an unexpected event occurred, Sprengel received a raise in his income. A Spandau citizen had written in his will that the interest earned on his estate should go to the public school's headmaster in the form of a raise in his salary. Thereupon Sprengel's supervisors once again demanded that he give private lessons, this time for free because the school was unable to reach its goals with the normal lessons. Once again Sprengel rejected this request on legal grounds, but starting in 1792, he was obliged to give an additional six normal lessons a week.

There is one aspect that is worth noting and has not yet been pointed out. While Schulze recorded in detail all the disagreements between Sprengel and himself, his students and their parents, he only mentioned difficulties between Sprengel and the teachers once. This was in Sprengel's crisis year in 1782 in the form of one single, blanket statement. In his chronicle, Schulze reproduced a letter he wrote to the consistory, and it is here that he wrote, "the colleagues of this man have often made bitter complaints about him" (Mittmann 1893). This sentence, however, is not made in reference to a specific event and we can regard it as a rather "ornamental" accessory. We gather from this that there were no substantial difficulties between headmaster Sprengel and his teachers.

Had Sprengel's life passed like that of his brothers', he would have obtained a pastoral position somewhere because at that time theologians considered teaching merely to be in preparation for a better paid position as a pastor (Ascherson 1894). Instead, in September 1794, after fourteen years at the Große Schule, he took early retirement with a pension of three-fifths of his headmaster salary. He left Spandau and moved to Berlin where his last address was Chausseestrasse 126, or (according to Ascherson 1894) on Hausvogteiplatz. In Berlin he gave private lessons in botany and classical languages and organized study tours on Sundays (Bastine 1961). But above all, he now no longer had interruptions and was able to concentrate on his own botanical studies. He also had time to become involved with languages again, and in fact, he even learned English (Biltz 1819). In 1811, a small book entitled "Die Nützlichkeit der Bienen und die Notwendigkeit der Bienenzucht, von einer neuen Seite dargestellt" (The usefulness of bees and the necessity of beekeeping presented in a new way) was published. In it he emphasized the importance of bees for the pollination of fruit trees. In 1815, his last work, "Neue Kritik der klassischen römischen Dichter in Anmerkungen zum Ovid, Virgil und Tibull" (A new critique of the classical roman poets with comments on Ovid, Virgil and Tibull) was published. Here he examined the problems of the degeneration of text passages by successive copiers and editors. Botanists (e.g. Wunschmann 1893) have maintained that Sprengel abandoned botany out of disappointment and that was why he returned to classical languages. Apparently people who have such one-sided interests cannot understand that a man like Sprengel is at home working in multiple fields of knowledge. There are no pictures of Sprengel, but according to a student's description of him in his last years of life, he was a very impressive figure: tall and slim with a firm and upright carriage. His face showed much expression with a fresh complexion and bright eyes. He wore his hair, which was going gray, long and hanging loose on his shoulders (Biltz 1819).

"... The former headmaster and outstanding naturalist ..."

Artists usually do their work independently of approval or disapproval, and Sprengel did so as well. He did not care about what people thought. He knew how carefully he had worked and he was convinced of the value of his work. A year before he died, in the preface of his new book, "A

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new critique of the classical Roman poets", he made a comparison between this and his old book, "The secret of nature discovered". He wrote, "both works are based on real discoveries and the new ways of viewing things that these discoveries have lead to".

It has been said (e.g. Bastine 1961), that Sprengel's discoveries went unnoticed. However, as early as July 1793, the director of the Botanical Garden in Göttingen, Georg Franz Hoffmann, gave Sprengel's book, "The secret of nature discovered", a very favorable review in the "Göttingische Anzeigen von gelehrten Sachen". He had verified several of Sprengel's observations and advised readers likewise to learn from Sprengel's approach (Wagenitz 1993). Sprengel's doctor, Heim, was also pleased because, after all, he had originally introduced Sprengel to botany (Kessler 1846). Dr Heim wrote in a diary entry on 11 October 1794, that he had read Sprengel's work with indescribable pleasure. He admired Sprengel's astuteness, powers of observation, untiring diligence and clear descriptions. "His work is a masterpiece, an original of which all of Germany can be proud" (Meyer 1953). Of course Heim could also be proud because seldom does a doctor's advice have such far-reaching consequences for biology. In 1796, Moritz Balthasar Borkhausen gave a very detailed description of Sprengel's work in the series "Der Botaniker, oder Compendiöse Bibliothek alles Wissenswürdigen aus dem Gebiete der Kräuterkunde" (The botanist or compendious library of everything worth knowing from the field of the study of herbs). Although it was 45 pages long, it concluded with the words, "we hope to introduce our readers to this worthy naturalist with various astute observations in the following issues of this library in more detail" (Borkhausen 1796). In 1801, Kurt Sprengel emphasized the significant work of his uncle in the preface to a dissertation on nectaries ("De nectariis") by Karl Ernst August Weihe, who was studying for his doctorate under Kurt Sprengel (Kaiser & Völker 1982). In 1802, he mentioned it again in the first part ("Von dem Bau der Gewächse") of his "Anleitung zur Kenntnis der Gewächse in Briefen" (Guide to the knowledge of plants in letters). Also in 1802, Carl Ludwig Willdenow incorporated Sprengel's pollination biology into his third edition of his "Grundriss der Kräuterkunde zu Vorlesungen" (Outline of the study of herbs for lectures), and on pages 405-412 he presented it in detail. Nevertheless it must be said that Sprengel's work first really became known through Charles Darwin.

Sprengel was also honored as a botanist. In 1794, the English botanist James Edward Smith, founding member and first president of the Linnean Society of London, later Sir J. E. Smith, named a new plant genus of Australian *Epacridaceae, "Sprengelia"* in honor of Christian Konrad Sprengel (Meyer 1967, Stafleu & Cowan 1985, Mägdefrau 1992). In 1799, Christian Konrad and his nephew, Kurt Sprengel, were nominated to become members of the "Regensburgische Botanische Gesellschaft" in Regensburg, the oldest botanical association of the world that is still in existence. This was likewise a sign of distinction (Ilg 1984).

Even on Sprengel's death certificate his achievements were mentioned (Hoffmann 1920). After Sprengel died on 7 April 1816, at the age of 65, the doctor who wrote out the certificate declared, "the former headmaster of the school in Spandau and the great and outstanding naturalist, discoverer and botanist, who was well-known to me, is really dead". He was buried on April 9 in the Dorotheen and Friedrichswerder parish graveyard. But his work is living on, "and it is by no means a mere historical document but a treasure of anthecological data, still useful and worth citing today" (Vogel 1996).

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Appendix

Dates from Sprengel's life, job and scientific work

1750 September 22: Birth in Brandenburg an der Havel.
1770 Beginning of theological studies at the University of Halle.
1775 Teacher at the Großes Friedrichs-Waisenhaus (orphanage) and at the Royal Ecole Militaire in Berlin.
1780 April 25: Becomes headmaster of the Große Schule in Spandau (today: Berlin-Spandau).
1782 Critical time of particularly poor mental and spiritual state caused by continual struggle against students, parents and supervisors.
Beginning of medical treatment by Dr Heim. Heim gives him his first lesson in botany.
1784 Following renewed struggle he completely changes his behavior – he is no longer strict with the students and is instead indifferent.
At the end of June he cancels all private lessons.
1787 His floristic discoveries in the Berlin district are published in Willdenow's "Florae berolinensis prodromus".
Summer: Begins his studies of pollination biology.
1788 First announcement of his book in the "Magazin für Botanik".
1789 Further announcements in other journals.
1790 New, more descriptive announcement in the "Magazin für Botanik" with the title "Versuch, die Konstruktion der Blumen zu erklären".
Attempt to force him to start giving private lessons again.
1792 He is obliged to give an additional six normal lessons a week.
1793 His book is published with the title "Das entdeckte Geheimniss der Natur im Bau und in der Befruchtung der Blumen".
July: First review of the book in the "Göttingische Anzeigen von gelehrten Sachen".
1794 In his honor a plant genus is named *Sprengelia*.
September: Early retirement and move to Berlin.
1796 Detailed review of his book in "Der Botaniker, oder Compendiöse Bibliothek alles Wissenswürdigen aus dem Gebiete der Kräuterkunde".
1799 Becomes member of "Regensburgische Botanische Gesellschaft".
1801 Kurt Sprengel mentions Sprengel's work in the preface to K. E. A. Weihe's "De nectariis".
1802 Willdenow incorporates Sprengel's pollination biology into the third edition of his "Grundriss der Kräuterkunde zu Vorlesungen".
Kurt Sprengel mentions it in his "Anleitung zur Kenntnis der Gewächse in Briefen".
1811 His small book, "Die Nützlichkeit der Bienen und die Notwendigkeit der Bienenzucht von einer neuen Seite dargestellt", is published.
1815 His last publication: "Neue Kritik der klassischen römischen Dichter in Anmerkungen zum Ovid, Virgil und Tibull".
1816 April 7: Death in Berlin.
April 9: Burial in the Dorotheenstadt and Friedrichswerder parish graveyard.

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