On the Determination of The Orbit of Carl Gauss

Tarrajna Dorsey, a LaRouche Youth Movement researcher into the discoveries of Gauss, presents Part II of our series of reports from "The Basement Team."

Bernardo: Last night of all,
When yon same star that's westward from the pole
Had made his course to illume that part of heaven
Where it now burns, Marcellus and myself,
The bell then beating one,—

***Enter* Ghost.**

Marcellus: Peace, break thee off; look, where it comes again!
Bernardo: In the same figure, like the king that's dead.
Marcellus: Thou art a scholar, speak to it, Horatio.
Bernardo: Looks it not like the king? Mark it, Horatio.
Horatio: Most like: it harrows me with fear and wonder.
Bernardo: It would be spoke to.
Marcellus: Question it, Horatio.
Horatio: What art thou that usurp'st this time of night,
Together with that fair and warlike form
In which the majesty of buried Denmark
Did sometimes march? By heaven I charge thee, speak!
Marcellus: It is offended.
Bernardo: See, it stalks away!
Horatio: Stay! speak, speak! I charge thee, speak!

***Exit* Ghost.**

Marcellus: 'Tis gone, and will not answer.

The year is 1799. The dusk of the century hangs in the air, and all of Europe awaits with bated breath the dawn of the new century: What answers may it hold? Several questions have already been made their reply: The American Revolution, the shining daughter of the best of European culture, now ripens beneath a distant sun, while the French Revolution, intended as her twin, lies forsaken in the dust. In France, Napoleon Bonaparte leads a coup d'état in the French government, and assumes power on Nov. 9. The young naturalist, Alexander von Humboldt, sets off from Paris on his five-year journey through the Americas. In the small town of Brunswick, in Germany, the young Carl Friedrich Gauss submits his first work and dissertation on the "Fundamental Theorem of Algebra" to Göttingen University. There, "the leading adornment of Göttingen," in Gauss's words, Georg Christoph Lichtenberg, collaborator of Abraham Kästner and physicist, dies. Kästner follows several months later, and with him, the height of the great Classical period of Germany is interred. On Dec. 16, Gauss writes to his good friend Wolfgang Bolyai:

> This letter will hardly reach you this year; tell me in your next one when you received it; the last day of December will at least be the last day which we call seventeen hundred (if micrological exegets[1] now postpone the end of the century one more year), and will be especially sacred to me. Note that when it is midnight here for us, midnight is already an hour past with you. On such festive occasions my mind passes into a loftier mood, into another spiritual world; the partitions of the room disappear, our filthy, paltry world with everything that appears so big to us, makes us so happy and so unhappy, disappears, and I am an immortal pure spirit united with all the good and noble who adorned our planet and whose bodies space or time separated from mine, and I enjoy the higher life of those greater joys which an impenetrable veil conceals from our eyes until death.…

1. Those who are concerned with the minutiae of chronology (esp. Biblical).

The Dilemma

When the eager soul, who has heeded the advice of states man Lyndon LaRouche,[2] and taken to the investigation of the development of physical science from Johannes Kepler through Gauss and Bernhard Riemann, arrives at the threshold of Gauss's investigations, he or she will undoubtedly open to the preface of the *Theory of the Motions of Heavenly Bodies Moving About the Sun in Conic Sections* and find written the following words:

> Several astronomers wished me to publish the methods employed in these calculations immediately after the second discovery of Ceres; but many things—other occupations, the desire of treating the subject more fully at some subsequent period, and, especially, the hope of a further prosecution of this investigation would raise various parts of the solution to a greater degree of generality, simplicity, and elegance,—prevented my complying at the time with these friendly solicitations. I was not disappointed in this expectation, and have no cause to regret the delay. *For, the methods first employed have undergone so many and such great changes, that scarcely any trace of resemblance remains between the method in which the orbit of Ceres was first computed, and the form given in this work* [emphasis added].

A sketch of the "elusive" Carl F. Gauss by his student J.B. Listing.

Thus, the eager souls find themselves presented with an entirely new problem: to rediscover, independently of any aid from Gauss himself, Gauss's discovery. Perhaps an eager soul will wonder at the elusiveness of Gauss. While Kepler is effusive, exuberant about everything, and eager to impart his every thought, Gauss appears as the man behind the smokescreen, remaining ever quiet and removed. He does not lay out his mind, transparently, before the reader—in fact he even throws up false signals at times to throw him off the trail! What pedagogy, or what trickery is this?!

The intent of this author, is not to make any excuses for Gauss, who needs none, but to portray for eager souls the cultural processes which shaped, and to some extent limited, the actions of Gauss, so that they might find their own answers. As will be seen, no insight into the answer to this general question will be found in searching for some "tragic flaw" of Gauss, in and of himself. The answer will be sought in the fabric and the culture of the time, which underlay his actions and those of his contemporaries.

Universal History

Had our eager souls been young students in the late 18th Century, attending Jena University, they would have had the opportunity of gleaning an insight into the answer to this question directly from Friedrich Schiller (1759-1805), the great German thinker and poet, during his first lecture as professor of universal history, delivered May 26, 1789, two months before the French Revolution broke out (July 14, 1789). After a great procession of the students to find a larger auditorium, as the original one could not hold the hundreds of students who were eager to hear a lecture from Schiller, he remarked:

> Even that *we* found ourselves together here at this moment, found ourselves together with this degree of national culture, with this language, these manners, these civil benefits, this degree of freedom of conscience, is the result perhaps of all previous events in the world: The entirety of world history, at least, were necessary to explain this single moment.

Although the entirety of human history is hardly a subject that could be covered in the scope of the present discussion, there is a specific unfolding of events beginning with the end of the German Classical period, and extending through the 1814-15 Congress of Vienna and the 1819 Carlsbad Decrees, that must be illustrated here if we are to gain any insights at all. Yet one more crucial lesson from our teacher of universal history must be noted here.

Recall any institutional education concerning the subject of history that you have been exposed to over the course of development of your existence: Of what relevance was it to you? What do you remember of it, if anything at all? (The funny quirks of your teacher and the number of spots on the wall that look like animals do not count.) For the reason that we have largely been robbed of a true, living sense of history, in which we play a decisive role, we must again become students of another time, where this concept was better under-

2. In order to gain an extensive insight into the curriculum that Lyndon LaRouche has laid out for the LaRouche Youth Movement (LYM), and the reason why it is organized as it is, see "From Kant to Riemann: The Shape of Empty Space," *EIR*, Oct. 7, 2005, as well as "Science, Religion, and Politics; For Today's Young Adults: Kepler and Cusa," *EIR*, March 2, 2007. Both papers were written with the youth of today expressly in mind, and are recommended to be read in their entirety, numerous times, by all. For a review of the work done by the LYM on this subject, see www.wlym.com/~animations/

stood. As was clearly known and taught by Schiller in his lectures on universal history that same year[3], the essence underlying the specific events of any particular period of history, is the battle over what the view of mankind is that will govern the society, and whether or not man will be allowed to develop his creative mental powers, in order to increase his happiness—i.e., knowledge of the universe in which he exists. From the ancient battle of Prometheus and Zeus[4], to the constitution of Athens as contrasted with that of Sparta, to the American Revolution, to the fight for the development of nuclear power today, this has always been the essential pivot-point of history. Are human beings inherently destructive, selfish, arrogant, and foolish beings—even worse than animals? Do we exist according to the doctrine of "the survival of the fittest"? Or do we exist as a species which transcends the law of the jungle; a species which is subject to a higher law of morality based upon reason, and our likeness to the Creator? Here lies the stage upon which the entirety of the events and characters of the following discussion will appear.

Enter Ghost

Carl F. Gauss is born in the year 1777—a time when the eyes of millions of people throughout the world still sparkle with optimism at the prospects of the American Revolution. After centuries of war and oppression, the possibility of a better existence for a greater portion of mankind is no longer a myth, or a far-off dream, but a tantalizing and attainable idea. Conceptions which had long lain dormant, are now closer than ever to actually being realized politically. The talk in the humanist circles across Europe is giddy with expectation. Dr. Benjamin Franklin meets with French statesman Jean-Sylvain Bailly in Paris. Wolfgang Amadeus Mozart is there as well, meeting with the circles which end up facilitating the production of his opera *Le Nozze di Figaro* (*The Marriage of Figaro*), first performed before Viennese nobility in 1786, three years before the French Revolution begins. Among these circles is Pierre de Beaumarchais, author of *Le Nozze di Figaro*, and a generous contributor of cannon to the American Revolutionary army. The *Courier de l'Europe*, directly subsidized by the French government, publishes the Declaration of Independence, and extracts from Thomas Paine's *Common Sense* are published in periodicals across Europe. The excitement is infectious.

Like the runner who, nearing the goal after a long race, hears the footsteps of his competitor still close behind, and yet draws new strength from the prospect of victory close at hand, and bursts forward across the finish line—so the founding fathers of the true age of reason in Europe continued their work, in hopes of achieving a twin victory.

Chief among these men were Gotthold Ephraim Lessing (1729-81), Moses Mendelssohn (1729-86), and Abraham Kästner (1719-1800). From their earlier collaboration to defend against the attacks on the universal genius Gottfried Wilhelm Leibniz[5] at the Berlin Academy, to their work to create a Classical renaissance in the literature, art, and language culture of Germany, these great men were driven by a passion and love for the reasoning capacity of mankind. As the poet Heinrich Heine (1797-1856) later put the role of Lessing so well:

> …[W]e Germans modeled our clumsy temple of art after the bepowdered Olympus of Versailles.… Lessing was the literary Arminius[6] who emancipated our

3. See *Sources*. Two such lectures are, *The Legislation of Lycurgus and Solon* and *The Mission of Moses*.

4. Prometheus recounting the sorry conditions of man prior to his gift, and what he gave—his crime against Zeus:

"…[L]isten to the sad story of mankind, who like children lived until I gave them understanding and a portion of reason; yet not in disparagement of men I speak, but meaning to set forth the greatness of my charity. For seeing they saw not, and hearing they understood not, but like as shapes in a dream they wrought all the days of their life in confusion. No houses of brick raised in the warmth of the sun they had, nor fabrics of wood, but like the little ants they dwelt underground in the sunless depth of caverns. No certain sign of approaching winter they knew, no harbinger of flowering spring or fruitful summer; ever they labored at random, till I taught them to discern the seasons by the rising and the obscure setting of the stars. Numbers I invented for them, the chiefest of all discoveries; I taught them the grouping of letters, to be a memorial and record of the past, the mistress of the arts and mother of the Muses. I first brought under the yoke beasts of burden, who by draft and carrying relieved man of their hardest labors; I yoked the proud horse to the chariot, teaching him obedience to the reins, to be the adornment of wealth and luxury. I too contrived for sailors sea-faring vessels with their flaxen wings. Alas for me! such inventions I devised for mankind, but for myself, I have no cunning to escape disaster."

—Aeschylus, *Prometheus Bound*, translation by Paul Elmer More (Boston: Houghton Mifflin, 1899).

5. To understand the direct lineage from Leibniz to the humanists of the time, we seek out the words of Jean-Sylvain Bailly, one of the leaders of the republican movement of France who will be further discovered to the reader later in this report, who in his 1768 *Eulogy of Leibniz* writes, "Nature is just; she equally distributes all that is necessary to the individual put on earth to live, work, and die; she reserves to a small number of human beings, however, the right to enlighten the world, and by entrusting them with the lights that they must diffuse across their century, she says to one, you shall observe my phenomena, to the other, you shall be a geometer; she calls on this one for the purpose of legislation; she calls on this other one to paint the morals of people, of revolutions, and of empires. These geniuses pass away after they have perfected human reason, and leave behind them a great memory. But all of them have traveled on different routes: Only one man elevated himself, and dared to become universal, a man whose strong will synthesized the spirit of invention, and the spirit of method, and who seemed to have been born to tell the human race: Behold and know the dignity of your species! These are the traits by which Europe has given recognition to Leibniz."

6. Arminius was the head of the coalition of Germanic forces who successfully beat off the attack of Roman Emperor Tiberius's nephew, Caesarius Claudianus Germanicus, in his attempt to recapture the entire region east of the Rhine River in the great Battle of the Teutoburger Forest (9 A.D.). Arminius, in Latin, or Hermann in German, became a figure who was used by some to represent the German cause during the Napoleonic wars and French occupation.

A scene from the Phaedon, by the famous German painter, sculptor, and contemporary of Gauss, Johann Gottfried Schadow (1764-1850), with one more guest added in: Moses Mendelssohn (on the left, looking directly out at the viewer). Socrates is at the center.

> theater from that foreign rule.... But not only by his criticism, but also through his own works of art, did he become the founder of modern German original literature. All the paths of the intellect, all the phases of life, did this man pursue with disinterested enthusiasm. Art, theology, antiquarianism, poetry, dramatic criticism, history,—he studied these all with the same zeal and with the same aim. In all his works breathes the same grand social idea, the same progressive humanity, the same religion of reason, whose John he was, and whose Messiah we still await.

The same could be said of Kästner, as well as Mendelssohn. Mendelssohn had grown up in a Jewish ghetto in Dessau, a town near Berlin, in a family which cherished, and later preserved, the music of Bach.[7] In his partnership with Lessing, he provided the sharp wit needed to shame into silence the cynicism and spreading disease of Voltaire, Leonhard Euler, and Pierre-Louis Maupertuis (the chief anti-humanist/anti-Leibnizians of the time). Kästner had grown up in the city of Leipzig, where the presence of Leibniz, one of its most distinguished inhabitants, and where the music of Johann Sebastian Bach, permeated the atmosphere—a testimony to the cultural activity of the city in general. After he had accepted the professorship of mathematics at Göttingen in 1756, Kästner taught geometry, physics, and astronomy, among many other things, while at the same time writing a tremendous work on the foundations of mathematics—which reviews the works of Nicholas of Cusa and Johannes Kepler extensively, among others, as part of a larger project on the entire history and development of science.[8] On top of this, he pens a wealth of beautiful, as well as biting poems[9], and heads up the work at the observatory. More will be developed concerning the environment at Göttingen leading up to 1795, the year of Gauss's arrival. Here, it suffices to call upon the words of Heine once again, himself a student at Göttingen many years later, in order to capture the fighting essence of this humanist triumvirate[10]:

7. This includes his well-known grandson, the composer Felix Mendelssohn-Bartholdy, who conducted a 400-person performance of Bach's *St. Matthew's Passion* in 1829 and his granddaughter, Fanny Mendelssohn-Bartholdy, who had memorized the entire *Well-Tempered Clavier* by the age of 13.

8. For the English translation of Kästner's reviews of Cusa's work, see *Dynamis*, June 2007, www.wlym.com/~seattle/dynamis/issues/june07.pdf

9. "La Pucelle" was the name given to Joan of Arc, who freed France from the British and was burned at the stake in 1431, at the age of 19. Voltaire, whom Mozart judged as "that arch-scoundrel," wrote a lying, pornographic story in verse about her.

Der Autor der Pücelle.	To the Author of *La Pucelle*
(Nach dem Griechisen.)	(in the Greek style)
Den Legionen in der Hölle	Voltaire's *Pucelle* was read in Hades
Las Beelzebub Voltaire's Pücelle,	By Satan, to his lords and ladies
Und jeder Teufel war ganz Ohr;	And every demon was all ear;
Ihr schmeichelt keinen Adamssohne,	"Don't give this mortal too much credit,"
Sprach Lucifer vom Flammenthrone,	Sneered Lucifer once he had read it,
Er schrieb nur, ich sagt' es ihm vor.	"I wrote for him what you now hear."

—Abraham Kästner
(translated by Sky Shields, LaRouche Youth Movement)

10. These three boldly led the charge to defend Leibniz from numerous vicious attempts by the circles of Voltaire, Leonard Euler, and Maupertuis to erase him from history. Leibniz had been under the constant attack of this dirty circle since his brainchild, the Berlin Academy of Sciences, was taken over by them in 1744. Taking advantage of the thriving discussions of Leibniz's concepts which were then dominant in the scientific community, the new heads of the Academy used the underhanded method of Paolo Sarpi to subvert the community—i.e., instead of taking Leibniz head-on, they created several decoys in the form of prize essays, with the challenge either to argue with Euler, now the head of the Academy, or to argue with an "Euler" falsely bearing Leibniz's name. A few examples are, the attacks on Leibniz's concept of the monad in 1747, and on his least-action principle in 1755; in both "contests," the prizes were given to mediocre essays which attacked Leibniz.

Kästner, who dominated the curricula at Göttingen University and was an amazing organizer, had led an unrelenting defense of Leibniz worldwide,

> [Lessing] was a whole man, who, while with his polemics waging destructive battle against the old, at the same time created something newer and better. "He resembled," says a German author, "those pious Jews, who, at the second building of the Temple, were often disturbed by the attacks of their enemies, and with one hand, they would fight against the foe, while with the other hand, they continued to work at the house of God." This is not the place to discuss Lessing more fully, but I cannot refrain from saying that, in the whole range of literary history, he is the author whom I most love.

A Great Moment?

And what became of the life's work of these great men? What became of the hopeful expectations of Europe? What became of the much anticipated twin Revolutions? The year of 1789 best illustrates the case. On April 30, Gauss's 12th birthday, George Washington delivers his first inaugural address as the first President of the Constitutional Republic of the United States of America:

> …[T]here is no truth more thoroughly established than that there exists in the economy and course of nature an indissoluble union between virtue and happiness; between duty and advantage; between the genuine maxims of an honest and magnanimous policy and the solid rewards of public prosperity and felicity; since we ought to be no less persuaded that the propitious smiles of Heaven can never be expected on a nation that disregards the eternal rules of order and right which Heaven itself has ordained; and since the preservation of the sacred fire of liberty and the destiny of the republican model of government are justly considered, perhaps, as deeply, as finally, staked on the experiment entrusted to the hands of the American people.

On June 17, in France, which had been a great supporter of the American Revolution, a National Assembly is convened, where the intention to usher in a constitutional monarchy is introduced. An oath swearing commitment to this intent, the famous "Tennis Court Oath," is taken on June 20th.[11] The high-pressure environment surrounding Paris and Versailles is seemingly quiet, but tense—foreboding the storm. Essentially, two factions are at work to gain the support of the King, Louis XVI: the collaborators of Bailly, president of the National Assembly convening in Versailles, including the vice president and American Revolution veteran the Marquis de Lafayette, and Lazare Carnot, military leader and head of the educational ministry, versus the collaborators of Jacques Necker, Finance Minister to the King, including his accomplices the Duke of Orléans (a.k.a. Philippe Egalité), the pawn of the head of the British Foreign Office Jeremy Bentham (which reveals the true interests at hand), and their lackeys Georges Danton and Maximilien Robespierre, leaders of the "leftist" Jacobin mob. While Bailly's National Assembly deliberates over a constitution, and gathers a militia in order to secure its defense, Necker sends in tens of thousands of the National Guard to pressure and intimidate the participants of the National Assembly. The storm bursts on July 14, 1789, when the mob of Danton and Robespierre floods the streets, and storms the Bastille prison, intentionally unhindered by Necker's National Guard, and the "revolutionary" bloodbath begins. From this moment onward, despite the continued efforts of the republican faction to take back the reins, the situation is swept out of control, and the moment is lost.

The Poet's Reply

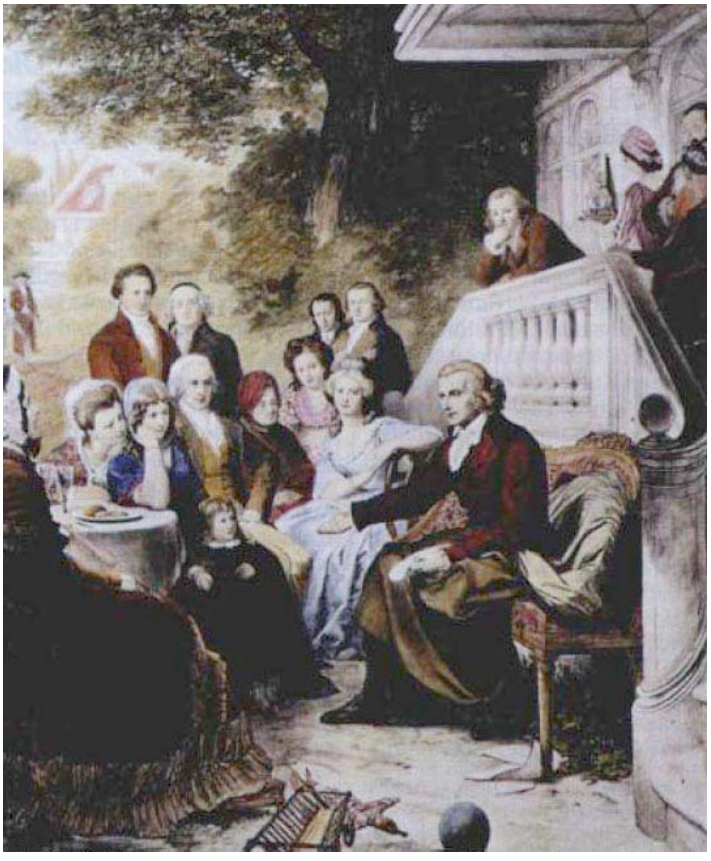
And what of the sparkling eyes of our optimistic and expectant spectators across the world? What became of them? Let us ask the greatest humanist poet of the time, and of all time for that matter, Friedrich Schiller, who looked on from Germany. He says, "The attempt of the French people to gain possession of the rights of man and to win political freedom has only shown its incapacity and unworthiness, and has swept back along with it a considerable part of Europe into barbarism and serfdom." Schiller, along with many of the humanists and supporters of the republican cause, was severely disappointed with the outcome of what he had seen as a "great moment." Nonetheless, Schiller continues his labor to elevate

which was clearly reflected in his textbooks, lectures, and other publications, including a prize essay on Leibniz's concept of predetermination in 1753.

In 1754, Kästner's student from Leipzig, Lessing (who had written his famous *Der Junge Gelehrte* [*The Young Scholar*, 1748] under his tutelage), published Mendelssohn's *Philosophische Gespräche* (*Philosophical Conversations*), a critique, in lucid German (hitherto not much used in scientific discourse), of the nation's attack on its native philosophers, especially Leibniz. Immediately afterwards, Lessing and Mendelssohn published a collaborative work called *Pope a Metaphysician!*, which satirically criticized the Berlin Academy's dubious deeds. (Published in *Fidelio*, Winter 1999, www.schillerinstitute.org/fid_97-01/994_pope_metaphysician.html).

In 1763, Euler's letters to Princess d'Anhalt Dessau, niece of Prussian King Frederick II, were released, all of which were explicit attacks against Leibniz, systematically addressing each one of Leibniz's concepts with short, pitiful arguments. In response, a series of counter-attacks was dealt by this triumvirate. Immediately, Kästner gave several lectures, polemically attacking Euler and his concepts by name. In 1765, Kästner and Erich Raspe managed to publish Leibniz's *New Essays on Human Understanding*, with an introduction by Kästner, officially disqualifying Euler's assertion that extension and impenetrability are self-evident principles. This achievement had worldwide effects, especially in the wake of the American Revolution and of the disastrous 1763 Treaty of Paris. Benjamin Franklin, himself another amazing worldwide organizer, received a copy and met with Raspe while in Hanover. Following this, he visited Kästner at Göttingen University. That same year, Lessing published his *Laocoön*, arguing that concepts are bounded in space and time, thereby requiring different mediums of expression. In the next year, 1767, both Kästner and Mendelssohn published papers on the immortality of the soul, including the latter's famous *Phädon, or On the Immortality of the Soul*. [Footnote contributed by Liona Fan-Chiang.]

11. See Pierre Beaudry, "Jean-Sylvain Bailly: The French Revolution's Benjamin Franklin," *EIR*, Jan. 26, 2001.



Friedrich Schiller's home in Jena (1797). From the left: Goethe, Christoph Wieland (translator of Shakespeare's works), Alexander and Wilhelm von Humboldt, among others.

and educate mankind through his works and interactions. It is in this period that he corresponds with the Danish Prince Friedrich Christian (*Letters on the Aesthetical Education of Man*), as well as authoring some of his most beautiful and thoughtful works on the means by which man and society are ennobled: *On the Sublime, On Grace and Dignity, On the Pathetic*, etc. In these flourishing years, Ludwig von Wolzogen, who will later become the chief military figure to devise the policy by which to defeat the "invincible" Napoleon Bonaparte, meets and collaborates with Schiller regularly on the latter's historical studies, including his voluminous work on the history of the Thirty Years War. This is also the time that Schiller launches his political literary journal, *Die Horen* (*The Graces*), where he enlists such notable collaborators as Johann Gottlieb Fichte, Johann Wolfgang von Goethe, Johann Gottfried Herder, both of the von Humboldt brothers (Alexander and Wilhelm), Friedrich Heinrich Jacobi, and Friedrich von Matthison, among others. Wilhelm von Humboldt, who will also later become a crucial figure in the development of education and the liberation of the Prussian nation, spends hours on end in conversation with Schiller over the course of four years. These discussions are indelibly imprinted upon the minds of these young men, and Schiller himself thrives from the joy of having young, enthusiastic minds with whom he could discuss his ideas. Following his death in 1805, Humboldt publishes their correspondence, and in the introduction, captures the towering quality of a man who was committed to the ennoblement of mankind, and who was not limited to achieving this purely through his works:

> There is a more direct and fuller influence which a great mind has than through his works. These show but a portion of his being. In the living presence, it overflows purely and completely. In a manner which permits of no detailed demonstration or investigation, which thought itself is not able to follow, it is assimilated by his contemporaries and passed on to succeeding generations. The quiet and, as it were, magical influence of great spiritual natures is that in particular which allows ever developing thought to germinate, ever more powerfully and extensively, from generation to generation, from people to people. Written works and literature carry it, so to speak, locked away and mummified, over great chasms which the living potency is unable to span. Peoples, however, always made the principal steps in their spiritual progress before writing, and in those darkest, but most important, periods of human creation and formation, only living potency is possible. Nothing, therefore, attracts consideration more than any attempt, however weak in itself, to investigate how one of the remarkable men of the century permeates in his individual way the course of all thought: uniting law with appearance, striving out from the finite to the infinite.

We now turn to the beloved English poet and republican, Percy Bysshe Shelley (1792-1822), contemporary of Heine, to perhaps provide further insight into the response following the revolution. He says:

> The French Revolution may be considered as one of those manifestations of a general state of feeling among civilized mankind, produced by a defect of correspondence between the knowledge existing in society and the improvement or gradual abolition of political institutions. The year 1788 may be assumed as the epoch of one of the most important crises produced by this feeling. The sympathies connected with that event extended to every bosom. The most generous and amiable natures were those which participated the most extensively in these sympathies. But such a degree of unmingled good was expected, as it was impossible to realize. If the Revolution had been in every respect prosperous, then misrule and superstition would lose half their claims to our abhorrence, as fetters which the captive can unlock with the slightest

motion of his fingers, and which do not eat with poisonous rust into the soul. The revulsion occasioned by the atrocities of the demagogues and the re-establishment of successive tyrannies in France was terrible, and felt in the remotest corner of the civilized world.

The Ecole Polytechnique and Göttingen University

It certainly was. In the decade following the events of 1789, first Robespierre's "Reign of Terror," and then the "revolutionary" Thermidorians, ran France (after guillotining Robespierre), abolishing religion, establishing a new "scientific" calendar[12], and executing hundreds of people, including top scientists. In the midst of this frenzy, France came under external attack from all sides. Wars with Prussia, Austria, Britain, Russia, the Netherlands, and Spain ensued, threatening the utter destruction of France in her weakened state. The key figure whose leadership prevented this, was a military leader and statesman known as "the Organizer of Victory," Lazare Carnot. Carnot, who had been shaped by the ideas of Leibniz in his youth, and later studied the principles of physical economics under Gaspard Monge at the Mézière engineering academy, was elected to the Legislative Assembly in 1791. He served on the Committee for Public Instruction, where he began to create true revolutionary reforms in the concepts of the structure of the military. The essence of Carnot's policies was the idea that an educated citizenry, a developed productive capability, and an orientation toward innovation is what strengthens the military corps of a nation, primarily its strategic defense capacity, rather than increased magnitudes or various "strategies" in and of themselves. As part of his effort to create a quality education system, Carnot presented a new constitutional "Declaration of the Rights of Citizens" in March of 1793, wherein the conceptual foundations for the Ecole Polytechnique, to be established by him the following year, are outlined in Articles VIII and IX: "Society has the right to demand that any citizen be instructed in a useful profession.... It also has the right to establish a mode of national education to prevent the evils which could be inflicted upon it by ignorance or by the corruption of morals," and, "Each citizen has the reciprocal right to expect from society the means of acquiring the knowledge and instruction which can contribute to his happiness in his particular profession and to public usefulness in the employment his fellow citizens may wish him to fulfill."

Lazare Carnot, France's "Organizer of Victory," mobilized the nation by infusing patriotism with education in science and technology.

During this time, France is engaged in bloody battle with England. Hanover, the state encompassing Göttingen, is controlled by the British Crown, and must supply troops to the battlefield. Among these, is a young military student, Gerhard Johann David Scharnhorst, who fights his first battle against Carnot's troops in 1793. A deep impression is made upon him by the versatility and utter superiority of the French forces, to the extent that he later writes a book on the revolution in military campaigns effected by the French, in the time of Carnot's leadership, in which he remarks, "We will only be able to defeat the French, if we have learned ... how to awaken the public's spirit, i.e., if we, with the same vigor and relentlessness, mobilize all the nation's resources, its bodies, its abilities, its spirit of inventiveness, its devotion to its home soil, and last but not least, its love of ideas." This insight will become crucial in Scharnhorst's later role in developing the Prussian military, the consequent defeat of Napoleon's forces in Russia, and during the Liberation Wars.

After Danton is thrown off of the Committee for Public Safety, Carnot steps in, and it is from here, that he begins to launch the institutional reform of the military. All of his earlier collaborators from the engineering school, including Monge, are called upon to assist in the reorganization, as well as scientists, mathematicians (including Adrien-Marie Legendre), and engineers. In September of 1794, between maneuvering to maintain his head (which Robespierre had been especially covetous of), he collaborates with a fellow member

12. Because it is somewhat indicative of the time, and because it is simply funny, a brief description is included of this "revolutionary calendar," concocted by one Gilbert Romme, mathematician. The intent was to reject the religious content of the Roman calendar, and to instate something more scientifically accurate, "more in phase with the movements of the heavens, the seasons, and tradition." The year commenced on the Autumnal equinox, and consisted of 12 months: Vendemiaire—"Wine Harvest," Brumaire—"Foggy," Frimaire—"Frosty," Nivose—'Snowy,' Pluvoise—"Rainy," Ventose-"Windy," Germinal-"Seeding," Floreal—"Flowering," Prairial—"Grassy," Messidor—"Wheat Harvest," Thermidor—"Hot Season," Fructidor—"Fruitful." Each month was made up of three "decades" of ten days each: primidi, duodi, tridi, quartidi, quintidi, sextidi, septidi, octidi, nonidi, and décadi. There were 10 hours in each day, 100 minutes in an hour, and 100 seconds in each minute. This system lasted for 13 years. An English critic of the calendar came up with the following satire for the names of the months: Wheezy, Sneezy and Freezy; Slippy, Drippy and Nippy; Showery, Flowery and Bowery; Wheaty, Heaty and Sweety. (www.bbc.co.uk)

of the Safety Committee, Prieur de la Côte d'Or, to create the Ecole Polytechnique. D'Or later describes the event to Carnot's son, Hippolyte:

> We had often discussed, your father and I, the necessity of creating a school for the recruitment of diverse classes of engineers; it was one of our favorite occupations. But the torrent of immediate business dragged us along, urgent matters tyrannized us. After the 9th of Thermidor [July 27, 1794—the arrest of Robespierre], we talked about it again. Carnot had stayed in the Committee, I had left it; he told me to use my leisure time to develop that idea; which I did. As soon as the idea seemed to be ripe, we conferred with Monge, our former professor from Mézière, who took hold of it with his usual enthusiasm, and became the cog of the Commission to prepare the teaching program.... Its direct aim was the application of scientific studies to all the needs of the state.

This seedling soon swells into the greatest hub of scientific thought, bursting onto the stage of European science around the time of the sighting of the asteroid Ceres.

A flurry of activity is simultaneously taking place at Göttingen. Kästner lectures extensively on the Platonic and Archimedean solids.[13] Georg Christoph Lichtenberg, a close collaborator of Kästner's who had undoubtedly met Dr. Benjamin Franklin during his Göttingen visit in 1766, conducts various electricity experiments (Göttingen University was the first location in Europe to build one of Franklin's lightning rods, the residence of Alexander von Humboldt being the second). Nicholas Forkel, the renowned biographer of Bach, acts as music director, professor, as well as organist, while also giving clavichord lessons to the students.[14] Christian Gottlob Heyne, the successor of Johann Matthias Gesner (rector at the St. Thomas Schule in Leipzig when Bach was the music director there;[15] founder of the first school of philology at Göttingen), teaches philology classes (Gauss was originally one of his most eager students, as well as the von Humboldt brothers earlier). G. Dunnington, one of Gauss's most thorough biographers, speaks of the environment thus:

> ...German youth from every corner of the land, especially the West and South, people of rank, princes and counts, in fact almost everybody who had an interest in general culture soon streamed into Göttingen. Foreign countries, England above all, took notice of Göttingen. Students came from northern Europe. The faculty included such men as Gatterer, Archenwall, Schlözer, Spittler, and later Heeren, so that at the end of the eighteenth century one could almost speak of a Göttingen historical school. These men exerted a very strong influence.
>
> That was the foundation for the activity of the man to whom Göttingen owes the most, except perhaps Münchhausen: Christian Gottlob Heyne, the successor of Gesner. Heyne was a pure classicist; the ancient humanities and classical literature, he thought, were the means of every nobler "training of the mind" for the true, the good, and the beautiful.... The fate of the university was tied up with him until the close of the eighteenth century. Just as Hollman kept the university from the deeper shocks of the impact of the French occupation at the time of the Seven Years' War, so Heyne during the Westphalian period, knew how to sweep away the danger of Göttingen's being transformed according to a French model. Into this atmosphere came young Gauss.

13. For an English translation of the reports of Kästner's lectures, see *Göttingische Gelehrte Anzeigen* (*Göttingen Announcements of Learned Matters*): June 26, 1783, June 7, 1794.

14. Johann Nicolaus Forkel lived from 1749 to 1818. Not only was he the key figure in the efforts to revive Bach's life and works, which had nearly been forgotten after the composer's death, but he was also the first man of his time who worked to compile musical works and bibliographies into reference compendiums. Notable, is the story of the meticulous work he did to score two full collections of masses from the early 16th Century. He had just finished the engravings, corrections had been made to the first proofs, which were ready to be printed, when the Napoleonic Wars struck, and all of the engraving plates were melted down for bullets. He dedicated his biography of Bach to Baron Gottfried van Swieten, who served as the reviver and preserver of Bach's works in the second half of the 18th Century. It was van Swieten who brought Bach's music to Beethoven, Haydn, and Mozart.

15. The following is a description of Bach, written by Gesner in the time that he worked with him at the Thomas-Schule. "You would think but slightly, My dear Fabius, of all these [the accomplishments of the citharoedists], if, returning from the underworld, you could see Bach (to mention him particularly, since he was not long ago my colleague at the Leipzig Thomas-Schule), either playing our clavier (*polychordum*), which is many citharas in one, with all the fingers of both hands, or running over the keys of the instrument of instruments (*organon organorum*), whose innumerable pipes are brought to life by bellows, with both hands and, at the utmost speed, with his feet, producing by himself the most various and at the same time mutually agreeable combinations of sounds in orderly procession. If you could see him, I say, doing what many of your citharoedists and six hundred of your tibia players together could not do, not only, like a citharoedist, singing with one voice and playing his own parts, but watching over everything and bringing back to the rhythm and the beat, out of thirty or even forty musicians (*symphoniaci*), the one with a nod, another by tapping with his foot, the third with a warning finger, giving the right note to one from the top of his voice, to another from the bottom, and to a third from the middle of it—all alone, in the midst of the greatest din made by all the participants, and, although he is executing the most difficult parts by himself, noticing at once whenever and wherever a mistake occurs, holding everyone together, taking precautions everywhere, and repairing any unsteadiness, full of rhythm in every part of his body—this one man taking in all these harmonies with his keen ear and emitting with his voice alone the tome of all the voices. Favorer as I am of antiquity, the accomplishments of our Bach, and of any others that there may be like him, appear to me to effect what many Orpheuses, nor twenty Arions, could achieve. JOHANN MATTHIAS GESNER. 1738." For details, see *Sources*.

War in the Heavens and Upon the Earth

Gauss returns from Göttingen to Brunswick, his hometown, in 1798, where he seeks further support from his benefactor, Carl Wilhelm Ferdinand, the Duke of Brunswick. His financial situation is very uncertain, and the little income he was promised is entirely dependent upon the Duke; otherwise, he subsists on credit, as he confidentially admits to his closest friend, Wolfgang Bolyai. During this time, he stays with Johann Friedrich Pfaff, who had been one of Kästner's main mathematics students. It is during this interval that he works on his doctoral dissertation on the Fundamental Theorem of Algebra. When he completes it in 1799, he writes to Bolyai about it, describing his work thus: "The title indicates quite definitely the chief purpose of the essay; only about a third of the whole, nevertheless, is used for this purpose, the remainder contains chiefly the history and a critique of works on the same subject by other mathematicians (viz. d'Alembert, Bougainville, Euler, de Foncenex, Lagrange, and the Encylopedists … which latter, however, will probably not be much pleased) besides many and varied comments on the shallowness which is so dominant in our present day mathematics."

Already, Gauss has launched a military offensive on many fronts in the battlefield of science. He has demonstrated the regular divisibility of the circle into 17 parts (thought to be impossible since antiquity), and the higher reason allowing for this. He has investigated and figured out certain aspects of elliptical functions, as he notes in his journal in 1797.[16] And in 1801, the sighting of Ceres furnishes him with an opportunity to test out a new flank that he has been working on, as he recounts in the *Theoria Motus*:

> Some ideas occurred to me in the month of September of the year 1801, engaged at the time on a very different subject.... For just about this time the report of the new planet, discovered on the first day of January of that year with the telescope at Palermo, was the subject of universal conversation; and soon afterwards the observations made by that distinguished astronomer Piazzi from the above date to the eleventh of January were published. Nowhere in the annals of astronomy do we meet with so great an opportunity, and a greater one could hardly be imagined, for showing most strikingly, the value of this problem, than in this crisis and urgent necessity, when all hope of discovering in the heavens this planetary atom, among innumerable small stars after the lapse of nearly a year, rested solely upon a sufficiently approximate knowledge of its orbit to be based upon these very few observations. Could I ever have found a more seasonable opportunity to test the practical value of my conceptions, than now in employing them for the determination of the planet Ceres, which during these forty-one days had described a geo-centric arc of only three degrees, and after the lapse of a year must be looked for in a region of the heavens very remote from that in which it was last seen?

Most of his fellow mathematicians (including the revered Pierre-Simon LaPlace, author of the "authoritative" work on theoretical astronomy of the time, *Celestial Mechanics*), declare the problem to be impossible: "An opinion had universally prevailed that a complete determination from observations was impossible,—an ill-founded opinion—for it is now clearly shown that the orbit of a heavenly body may be determined quite nearly from good observations embracing only a few days; and this without any hypothetical assumptions."[17] When Ceres is sighted by Freiherr von Zach in the location posited by Gauss's hypothesis, at the beginning of 1802, the spotlight of the whole of Europe is suddenly turned upon him. All wish to know by what method this young German was able to submit this elusive star to the yoke of human knowledge, without recourse to any astronomical tools whatsoever. Heinrich Wilhelm Matthias Olbers, Gauss's lifelong friend and collaborator, writes to him in September of 1802:

> The whole of astronomical Europe impatiently awaits the disclosure of your method, and it seems to me, it were not quite proper to let universal expectation go altogether too long unsatisfied. Does it not perhaps appear other (you know that I am not capable of maintaining these petty thoughts), than that you wish to keep your method private, in order to perhaps be able to determine the orbit of a new planet discovered in the future, once again first and entirely on your own?

Meanwhile, the chaos and intrigue of the domestic situation in France rages on. Carnot has been ousted from power during the "18th Fructidor" (Sept. 4, 1797) coup of Barras, Danton's successor. Carnot is forced to flee the country. Two years later, the bloodshed, anarchy, and chaos of the time has run its course amongst the populace, and another coup is launched on the "18th Brumaire" (Nov. 9, 1799), bringing Napoleon Bonaparte to full power. Alexander von Humboldt, who has been studying in Paris, attempts to arrange for what later becomes his famous journey throughout the Americas. After running into numerous difficulties, he exclaims, "I am so hampered in all my projects that I daily feel inclined to wish I had lived either 40 years earlier or 40 years later. There is only one advantage to be gathered from the present state of things, and that is the extermination of the feudal system and of all the

16. From Gauss's journal on March 21, 1797: "The lemniscate may be divided into five parts geometrically."

17. Again, from the preface to the *Theoria Motus*. For more on this, see "Venetians and Empiricists Can't Handle Discoveries" by Peter Martinson (published in *EIR*, July 6, 2007, as "How the Venetians Tried To Erase Kepler From Science: Empiricism as Anti-Creativity").

Alexander von Humboldt, shown here during his travels through South America, was the greatest naturalist and one of the principal humanist political leaders of 19th-Century Europe. He was also a correspondent and supporter of Gauss. (Portrait by Friedrich Georg Weitsch.)

aristocratic privileges which have so long pressed upon the poorer and more intellectual classes of mankind." Wilhelm von Humboldt, who witnessed the Paris events of 1789 in person, in a prescient letter to a friend in August 1791, describes the phenomena well: "Mankind had suffered from an extreme and was obliged to seek salvation in another extreme." Napoleon recalls Carnot to France as his Inspector of War. Carnot resigns the next year over severe disagreements with Napoleon, and instead goes to work battling the efforts to reestablish a monarchy in the Senate, while simultaneously creating a revolution in the scientific world. It is during this interval that he produces his renowned scientific works, *Geometry of Position, On the Correlation of Geometrical Figures*, and *Fundamental Principles of the Equilibrium of Movement*. At this time, Gauss writes a letter to Olbers in October 1802:

> . . . [N]ext week a work by Carnot, *Geometry of Position*, will arrive, which I am extremely desirous of. This subject, which has lain almost entirely idle up until now, concerning which we had only some fragments from Euler and some from a geometer who is of very high esteem to me, Vandermonde [a collaborator of Carnot's from Mézière and at the Ecole], serves to open up a completely new field and to cultivate an entirely independent branch of the sublime mathematics of the utmost interest.

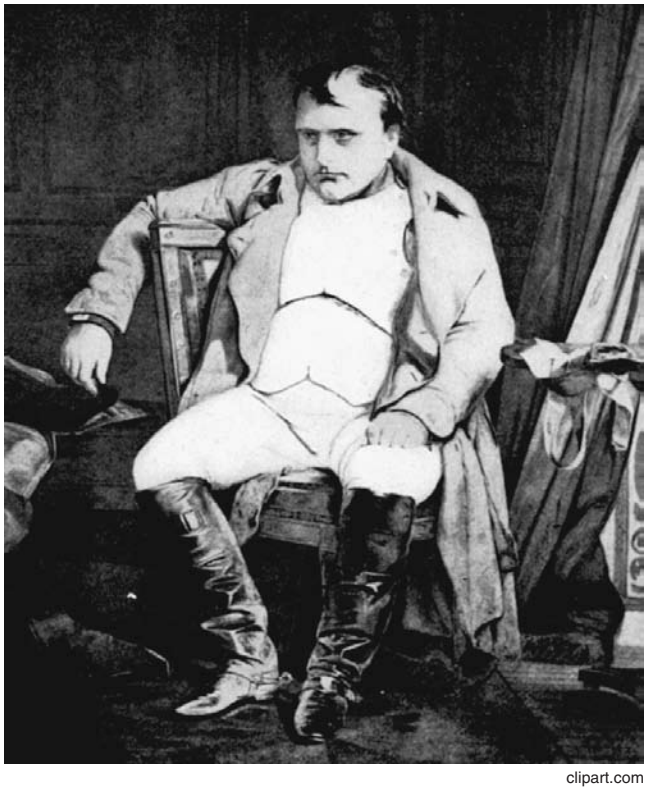
On the battlefields across Europe, however, the victories of science are not shared. All Europe is at odds, while the true imperial faction uses the melee to conduct a tremendous looting operation of the entire continent. Napoleon acts as the typical figurehead of this "Persian Model," which induces a nation to destroy itself through mad excursions into other lands and internal decay, while it ultimately carries out the desires of the oligarchical faction itself. Napoleon has crowned himself emperor (1804) in true Roman fashion, and thousands of Germans are being used as cannon-fodder in Napoleon's wars against the Spanish, Italians, and Austrians. The entire region West of the Rhine River in Germany has already been occupied by Napoleon, the very year that our aforementioned military student, Scharnhorst, leaves Hanover and accepts a commission for the Prussian military, teaching at the academy in Berlin, and establishing his own Military Society, a center of debate for military strategy (1801). Scharnhorst had first studied at the military school of Wilhelm Graf zu Schaumburg-Lippe, a collaborator of Moses Mendelssohn, who impressed upon him the necessity of improvement of the art of defense, as a means of diminishing the phenomenon of war in general. Now in Berlin, Scharnhorst begins to implement his earlier ideas concerning the superiority of a military based upon development of the powers of the mind of the population. He immediately tackles the stagnant policy which only permits nobility among the ranks of the officer corps, as well as the rigid structure of field strategy which is based purely on a top-down command structure, with no concept of strengthening the role of even the lowest non-commissioned officer in order to fortify the ability of the forces overall.

As Napoleon sets out to conquer Spain, tensions in Prussia rise. Some people, led by the head of the reform movement, Freiherr vom Stein (Minister in the King's Cabinet), have dire forebodings for the fate of the rest of the continent, and push for a great improvement in the educational and military capabilities of the nation. Others, hangers-on in the court of Prussian King Friedrich Wilhelm III, promote "appeasement" and "non-aggression" with France. When Napoleon crushes the Austrian and Russian forces in 1805, Prussia is compelled to annex the territory of Hanover (including Göttingen), which had been formerly under English control. The rotten elements of the Prussian court urge further bowing and scraping before Napoleon. When alliances are made among

France, Russia, and Austria, however, these court lackeys are forced to cease spewing the honey-coated, yet poisonous advice with which they had polluted the King's ear.

A great dilemma now arises for the poor King. It is expressly against his desire to condone any policy which allows for the education of a great portion of his subjects in learned matters, in part, fearing the exposure of his own ignorance, and partly due to the golden rule that the oligarchical ruler feels deep in his gut: Never let the people have access to wisdom, for they will soon desire freedom, and will see the oppressive yoke of subjection to a crown as a barrier to achieving it. For the lords of Europe, the American Revolution reinforced this lesson more strongly than ever. However, Napoleon's sights are now clearly set upon Prussia, and if the King shall maintain his power, there is no way around it—vom Stein, Scharnhorst, and the reformers must have their way. But the King waivers, despite numerous entreaties on the part of his top generals, warning him of the existential danger at hand. Ultimately, the deep-rooted fears of rebellion influence the King more than the voice of reason.

Napoleon's forces sweep through Prussia, completely routing the Prussian forces in nearly every battle. In March, the area surrounding the Rhine comes entirely under French rule. Napoleon gives command of the region to his brother-in-law, Joachim Bonaparte (a.k.a. Murat). The alliance of German dukedoms and principalities has now been completely shattered, leaving fragments of states comprised of a few towns scattered across the German countryside. Among these, is Düsseldorf on the Rhine, Heine's hometown. In his *Reisebilder,* he captures the sentiment of the moment, as seen through the eyes of his youth:



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Emperor Napoleon Bonaparte used Germans as cannon-fodder in his wars. After conquering Prussia, he marched on Russia in 1812, and a third of his soldiers were Germans; only a third of those survived.

> In those days princes were not the persecuted wretches they now are; the crowns grew firmly on their heads, and at night they drew their night-caps over it and slept peacefully, and their people slumbered peacefully at their feet, and when they awoke in the morning they said, "Good morning, father!" and he replied, "Good morning, dear children!"
>
> But there came a sudden change over all this. One morning when we awoke in Düsseldorf and would say, "Good morning, father!" the father had traveled away, and in the whole town there was nothing but dumb sorrow. Everywhere there was a funeral-like expression, and people slipped silently to the market and read the long paper on the door of the Town Hall.... An old invalid soldier from the Palatine read it rather louder, and at some words a clear tear ran down his white honorable old moustache. I stood near him, crying too, and asked why we were crying? And he replied "The Prince Elector has abdicated." And then he read further, and at the words, "for the long manifested fidelity of my subjects," "and hereby release you from allegiance," he wept still more. It is a strange sight to see, when an old man, in faded uniform, and scarred veteran's face, suddenly bursts into tears. While we read, the Princely Electoral coat of arms was being taken down from the Town Hall, and everything began to appear as anxiously dreary as though we were waiting for an eclipse of the sun.... I heard the little light-footed barber, as he made up his hair, narrate very minutely that homage would that morning be offered at the Town Hall to the Arch Duke Joachim. I heard, too, that the new ruler was of excellent family, that he had married the sister of the Emperor Napoleon, and was really a very respectable man, that he wore his beautiful black hair in curls, that he would shortly enter the town, and would certainly please all the ladies. Meanwhile, the drumming in the streets continued, and I stood before the house-door and looked at the French troops marching, those joyous and famous people who swept over the world, singing and playing, the merry, serious faces of the grenadiers.... I was so glad that soldiers were to be quartered in our house—my mother was not glad—and I hastened to the market place. There everything looked changed; it was as though the world had been new whitewashed. A new coat of arms was placed on

the Town Hall, its iron balconies were hung with embroidered velvet drapery, French grenadiers stood as sentinels, the old town councilors had put on new faces and Sunday coats, and looked at each other French fashion, and said, *Bon Jour*!

In October, the Prussian army, commanded by Gauss's Duke, to whom he had dedicated his work the *Disquisitiones Arithmeticae*, faces direct battle with Napoleon at Jena and Auerstedt. The Duke heads an army of 57,000 men, mostly untrained recruits, foreigners, and vagabonds. Many of them desert on the battlefield. Napoleon's army has 200,000 war-tested soldiers. The Prussian forces are completely defeated, the Duke, in his 71st year, is wounded, and a deputation is sent to request clemency from Napoleon, so that he might die in peace in his own country. They are jeered out of Halle, Napoleon spitefully mocking their efforts. The Duke is forced to flee, as the French army marches into Brunswick, as Gauss looks on. From Dunnington:

> Arrangements were made to protect the Duke from ignominious imprisonment at the hand of the enemy. The plan was to flee with him to England. Gauss had intended to flee also. He always told the following story with touching sadness. Living at the time at Steinweg 22, just opposite the castle gate, Gauss looked out his window on the morning of October 25 and saw a long carriage drawn by two horses leaving the castle yard. The gate opened and it moved on out toward the Wendenthor, so slowly and gloomily that several thought it contained a corpse. The wounded and dying Duke was within, on his flight to Altona, so that he might at least die in freedom. With stricken heart and in grieving silence Gauss saw the departure of his patron and friend. He was as though annihilated. A serious expression came over his face. He was quiet and speechless and bore this great sorrow without words and sounds of complaint. This same seriousness and quietude was prevalent among all the people. Although Gauss said very little, his thoughts and emotions were the more aroused by this fact. Poignant grief gained control of him, accompanied by rancor against the invaders of Germany, in whom he also hated the enemy of his beloved prince.

Heine, who was himself a product of the pessimism and ensuing troubled mood of the population, expresses the sentiment which set in amongst the Germans at this time:

> No people is more loyally attached to its rulers than are the Germans. And more even than the sorrowful condition to which the country was reduced through war and foreign rule did the mournful spectacle of their vanquished princes, creeping at the feet of Napoleon, afflict and grieve the Germans. The whole nation resembled those faithful old servants in the once great but now reduced families, who feel more keenly than even their masters all the humiliations to which the latter are exposed, and who in secret weep most bitterly when the family silver is to be sold, and who clandestinely contribute their pitiful savings, so that patrician wax candles and not plebeian tallow dips shall grace the family table—just as we see it so touchingly depicted in the old plays. The universal sadness found consolation in religion, and there ensued a pious resignation to the will of God, from whom alone help could come. And, in fact, against Napoleon none could help but God Himself.

Gauss himself flees Brunswick shortly after. The entire Dukedom of Brunswick, formerly independent, though allied with Prussia, has now become annexed into the newly created "Kingdom of Westphalia," artificially built out of clay, as it were, or rather, out of the war-torn ravages of recent battles across the German countryside (1807). Napoleon gifts his brother, Jerome, with this kingdom of clay, held together only by straw and a few feeble sticks. Prussia is forced to give up her entire territory west of the Elbe River, and Hanover is thrown into the mix. Thousands of young men are pressed by the French forces, compelled to join the Grand Army in its future exploits into Russia's frontier. Gauss has returned to Göttingen, now with a family, and takes on his first professorship, teaching astronomy under the new French regency.

The conditions across Europe worsen. Napoleon's demands for Roman-like war-tributes are tremendous, even impossible to pay. Berlin is now occupied by Napoleon, while the King has fled to the far eastern reaches of Prussia, which has suffered immensely. Nearly half the kingdom has been wrested from her grasp, to be doled out to other bootlickers of Napoleon. The people are forced to quarter the occupying troops. The military lies in ruin. France launches a continent-wide embargo with England. The harvest of the following year is a disaster. The currency is devalued by 50%. Consequently, hunger, poverty, and the death rates increase drastically.

Only now, in utter desperation, does the King turn to the proposals of Scharnhorst and vom Stein, appointing the former as the chairman of the newly created Military Reorganization Commission, the latter remaining as chief minister. It is vom Stein who calls Wilhelm von Humboldt back from his studies and position as Prussian Ambassador to Rome and designates him as the head of the educational ministry. In 1807, vom Stein abolishes the system of *villeinage*, which has subjected the majority of people to a virtual system of slavery, like to that of sharecroppers: serfs of the nobility's "company store." A year later, he passes a regulation condoning self-administration of the towns, like to the early colonial system on the American continent. With Scharnhorst heading the military reforms, and von Humboldt heading the educational re-

forms, advances are made in leaps and bounds. Scharnhorst now has the opportunity to implement the core of Carnot's military policy, while Humboldt has the chance to manifest his earlier discussions with Schiller in actual practice, both on the level of the entirety of the nation. (This is the year that Humboldt succeeds in founding the University of Berlin, which becomes a key bastion of scientific development!) Scharnhorst issues a statement from the Military Reorganization Commission on July 16, 1809, which captures the complete transformation in policy and thinking in the reform:

> The intelligence of the soldier must be addressed. He who is the best light-infantry soldier, is the least like a machine. In the sharpshooting exercises, all formulas must be thrown out the window. For a detachment to disband, means that every single soldier is shifted into a situation in which he should deploy himself according to his judgment of the terrain and the conditions existing at that moment.

Wilhelm von Humboldt's *Preliminary Thoughts on the Plan for the Establishment of the Municipal School System in [Prussian] Lithuania*, written the same year, reflects a humanist, republican character of the same quality (and the influence of Schiller is certainly felt here):

> …This complete education recognizes one, and only one, foundation: The soul of the lowliest laborer must be initially put into harmony with the soul of the most finely cultivated person, if the former is not to fall beneath human dignity and become crude, and if the latter is not to fail in human strength, becoming sentimental, fantasy-ridden, and eccentric.… In this way, even having learned Greek would be just as useful for the cabinet-maker, as would carpentry for the scholar.…
>
> If we survey this entire course, from the first elements to exit from the university, we find that from an intellectual standpoint, the education authorities must have this as their supreme (though only seldom expressed) principle: to bring forth the purest and most profound view of science, by bringing the entire nation—while preserving all individual difference—as quickly as possible along the path which, if further pursued, will lead to science, and to the point where it, and its results, can be variously intuited, grasped, seen, and practiced as talent and situation permit, thus aiding the individual by the enthusiasm awakened by perfect tempering of the whole.

These are the beginnings of the efforts to organize a unified German nation, which up until this time has been a confederacy of feudal states. But the oppressive conditions upon all Europe have by no means let up. Napoleon's army has occupied the great musical center of Europe, Vienna, the seat of the Austrian forces. In the Summer of 1809, the same year that Gauss publishes his first complete work on his astronomical discoveries, the *Theoria Motus*, Ludwig van Beethoven writes the following words from Vienna to his friends:

Wilhelm von Humboldt's statue at Humboldt University in Berlin. His educational reforms were based on the republican principle that "the soul of the lowliest laborer must be initially put into harmony with the soul of the most finely cultivated person, if the former is not to fall beneath human dignity and become crude, and if the latter is not to fail in human strength, becoming sentimental, fantasy-ridden, and eccentric."

> …The fatal period now approaching only allows me to write you a few lines in haste. First of all, the uncertainty of the post prevents me sending you anything.…
>
> …Heaven only knows how things will go on; I shall now probably have to change my residence.… What a disturbing, wild life all around me, nothing but drums, cannons, men, misery of all sorts.… I should be pleased if you would let me have by degrees the scores of the masters which you have, as for example, Mozart's *Requiem*, etc., Haydn's Masses, especially everything of the scores of, for instance, Haydn, Mozart, Bach, *Johann Sebastian Bach, Emmanuel*, etc.… If I change my place of residence, I will at once let you

know, but if you write at once, your answer will safely find me here. I hope Heaven will grant that I may not entirely have to give up Vienna as my settled abode. Farewell, all kind wishes to you so far as our wild period permits.…[18]

Liberation

It is precisely the military and educational policies of Scharnhorst and Wilhelm von Humboldt, as well as the pertinent historical studies of Friedrich Schiller, which cause the ultimate downfall of Napoleon. After vom Stein is forced into exile, by pressure exacted by Napoleon on the King, he immediately takes up counsel with the Russian Tsar, Alexander I. After several aggressive moves towards Russia on the part of Napoleon, war erupts. Despite the internal political fight on behalf of the reformers in Prussia to persuade the King to ally with Russia, he once again disregards their advice, and by 1812, signs a new treaty with Napoleon, allowing complete use of Prussian territory for marching routes, agreeing to pay the costs of supporting the troops, on top of augmenting the French forces with another 20,000 of their own (half of the entire Prussian military capability at that time). Many of the top officers and generals who have worked closely with Scharnhorst—Gneisenau, Boyen, and Clausewitz—immediately leave the Prussian military and flee to Russia to offer their services there. What an indication of the high stakes of this battle over the fate of man: that these dedicated men would sever their close bonds with the military that they themselves had raised up, in order to fight against an empire, and in so doing, fight in a battle to the death against their own kinsmen!

At the end of May 1812, Napoleon deploys 612,000 men into Russia. The story of the devastating Winter retreat from Moscow which follows several months later is well known. A third of the men who march to battle as part of the Grand Army are Germans. Out of this Grand Army, only 112,000 return alive from that Russian Winter, some practically crawling along at the end of the march for lack of transport, and many freezing to death along the way. The next year, when Prussia has regained some of her strength, and the opportunity is ripe, the Prussian leaders launch what are now known as the "Liberation Wars." Young and old are rallied to raise arms against the occupying forces. Many of those former students of Schiller, so eager to attend his lectures, now fight in battle against the occupying empire (which is where the well-known story comes from, of young soldiers carrying copies of Schiller's poems near their hearts during the battle). The old fire from the era of the American Revolution is rekindled, as the prospect of creating a unified German nation with a constitution, for the first time history, after expelling the occupying forces, appears more possible than ever. Schiller's collaborators, Wilhelm von Humboldt and Ludwig von Wolzogen, become key figures in the ensuing events. Military successes against the weakened French forces serve to provoke the question that begins to surface across all Europe: What kind of system and organization of formerly occupied nations will be established? The Kingdom of Westphalia has collapsed; Jerome has fled. Napoleon too, has fled, and remains in exile on the island of Elba.

In the Autumn of 1814, a great congress with representation from all of the powers of Europe is convened in Vienna, with the pretense of addressing this very question. As ambassadors representing the interests of Prussia, von Humboldt and vom Stein, make their way to Vienna. From France comes Charles-Maurice, Prince of Talleyrand-Perigord, "a shit in silk stockings" as Napoleon was said to have once spoken of him, after learning of yet another of his notorious betrayals. To give a sense of Talleyrand, he is once said to have declared Brie the "King of Cheeses"; upon hearing this, the response in the French salons was that, "this will be the only King he has not betrayed." Another charming figure, who slithers in from England, is Lord Castlereagh, hated by the English republicans. In his poem "The Mask of Anarchy," Shelley says of him, "I met Murder on the way—/ He had a mask like Castlereagh—/ Very smooth he looked, yet grim;/ Seven bloodhounds followed him.…"

The host, organizer, and kingpin of the entire congress is the Austrian Foreign Minister Prince Klemens Wenzel von Metternich, known as "Papillon Metternich" ("Butterfly Metternich"), due to his extravagant and extremely decadent proclivities. Metternich, with the assistance of his Secretary of the Congress, Friedrich von Gentz, creates the perfect conditions to prevent any breakthroughs from being made for the republican cause, including a German constitution. The best way to know how a man thinks about something is to ask him; then carefully listen to what he says, how he frames it, and reflect upon what this says about his mindset. Hence, we ask Metternich himself about the events of the congress. He answers:

> Those who at the time of the assembling of the Congress at Vienna had thoroughly understood the nature and objects of this Congress, could hardly have been mistaken about its course, whatever their opinion about its results might be. The grand phrases of "reconstruction of social order," "regeneration of the political system of Europe," "a lasting peace founded on a just division of strength," &c., &c., were uttered to tranquilize the people, and to give an air of dignity and grandeur to this solemn assembly; but the real purpose of the Congress was to divide amongst the conquerors the spoils taken from the vanquished. The comprehension of this truth enables us to foresee that the discussions of this Congress would be difficult, painful, and often stormy. But to understand how far they have

18. Dr. A.C. Kalischer, *Beethoven's Letters* (New York: Dover Publications, Inc., 1972), pp. 87-91. These quotes were taken from two of Beethoven's letters to Bernhard Christoph Breitkopf and Gottfried Christoph Härtel, the heads of the famous music publishing house in Leipzig.

An etching by Francisco Goya (1746-1828), who lived through the horrors of the Napoleonic Wars. This piece is taken from a series of etchings called, "The Disasters of War," and is titled, "Why?"

> been so, and why the hopes of so many enlightened men, but more or less ignorant of cabinet secrets, have been so cruelly disappointed, one must know the designs which the principal Powers had in presenting themselves on this great battlefield, and the development which particular circumstances and personal relations have given to these designs.[19]

Metternich has certainly revealed his own thinking to us.

Upon arrival, a myriad of parties and excursions are provided for the delegates, which serves to create an environment of fantasy and intoxication. Meanwhile, hundreds of Metternich's agents, orchestrated by Gentz, run around bribing people, sifting through the waste bins of the rooms and the pubs where the different factions meet, and generally use whatever methods necessary to thwart the humanist representatives from their cause. One of the most commonly used weapons of distraction is prostitution; hundreds of prostitutes are sent around to glean whatever details from the delegates they possibly can, sometimes jumping from the bed of a Russian delegate, to an Austrian one, etc., over the course of the same night! One can picture the disgusting atmosphere of corruption, bribery, deception, and degeneracy into which these supposed leaders of Europe are plunged. After eight months of this, little has been accomplished. Not a mention of a German nation has been allowed to come to the floor.

Those who have been promised a constitution by the Prussian King, and have instead found themselves part of a newly formed Holy Alliance and Restoration of the church with Metternich's Austria, are outraged.

Many of the youth who had fought and won the Liberation Wars, who were driven by the idea of building a free nation, unified around a constitution, are especially furious. These young students were the core of the society which kept the spirit of the earlier reforms alive, despite the results of the Congress. Student societies promoting and maintaining the ideas of liberation from foreign occupation and national unity form in numerous universities across the land. A great gathering convenes in Eisenach in 1817, commemorating the 300th anniversary of the Reformation, as well as celebrating the fraternity of their revolutionary group.

This event, as well as the assassination of the Russian Ambassador and well-known poet August von Kotzebue by a young student, provide the desperately sought-after pretext to summon an "emergency meeting," in order to discuss and pass measures which would crush this national humanist sentiment. Once again headed by Metternich, the gathering is held in Carlsbad, and ambassadors from all the surrounding regions attend. The decrees which are passed assign an agent of the government to preside over every university; order the firing of any teachers who are either sympathetic to the students' cause, or are teaching such "reprehensible" ideas in their classes; prohibit the formation of student fraternities;

19. Taken from the *Memoires of Prince Metternich*. The introduction by the aged Metternich, near his death, is a worthwhile read to gain an insight into the mind of a true, and highly slippery, oligarch. I would not recommend reading further, as the rest is quite distorted, as one could imagine.

France's Talleyrand (Napoleon called him "a shit in silk stockings") receives advice at the Congress of Vienna. Those who had fought to free Europe from feudalism and oligarchism, as in Germany's Liberation Wars, were bitterly disappointed in the outcome of the Congress.

and condone censure of the press and of literature. One of the statutes is included here to provide a sense of the rancid quality of thinking which produced this, so convoluted that it is nearly laughable:

> 3. Those laws which have for a long period been directed against secret and unauthorized societies in the universities shall be strictly enforced. These laws apply especially to that association established some years since under the name Universal Students' Union (Allgemeine Burschenschaft), since the very conception of the society implies the utterly unallowable plan of permanent fellowship and constant communication between the various universities. The duty of especial watchfulness in this matter should be impressed upon the special agents of the government.[20]

The Aftermath

> …There is a reflux in the tide of human things which bears the shipwrecked hopes of men into a secure haven, after the storms are past. Methinks, those who now live have survived an age of despair…
>
> —Shelley, 1817

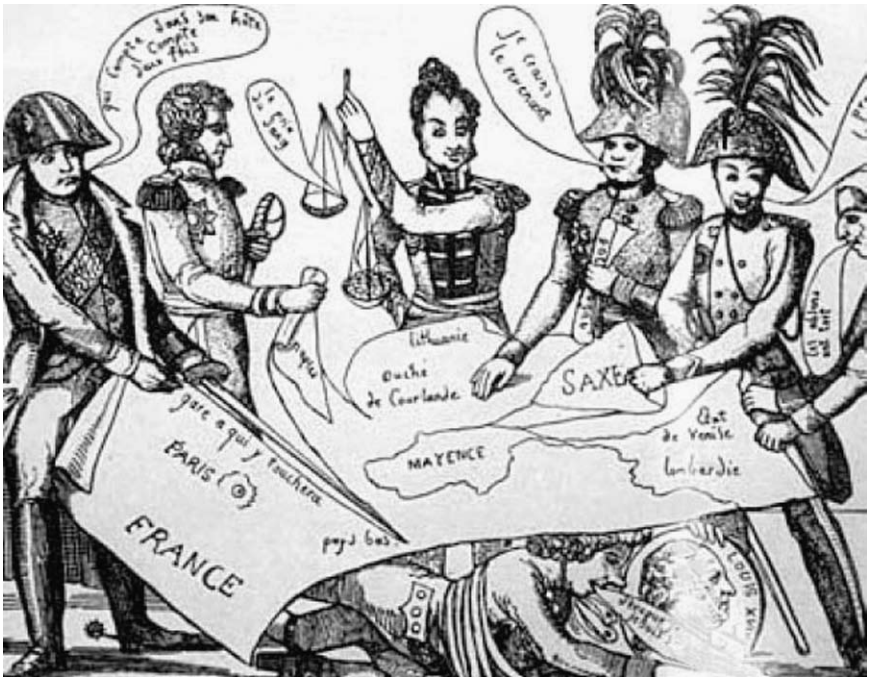
Imagine the sheer disgust of those who had so ardently fought for decades to wholly liberate the peoples of Europe from the deceptive yoke of feudalism and nobility. Bitter disappointment hangs in the shadows of every university, where the students and teachers alike speak furiously of the injustice of the times, albeit in angry whispers. In this atmosphere, Gauss continues to work and teach, now heavily engaged in his investigations of geodesy. Attempts are made to preserve the ideas and concepts of the Prussian reforms, the age of Lessing, Mendelssohn, and Kästner, and the "Weimar Period" of Schiller, Goethe, and their collaborators. Alexander von Humboldt plays the central role at this time, carrying out correspondences with American scientists, his French collaborators from the Carnot period at the Ecole Polytechnique, professors of a multitude of subjects across the continent, as well as Gauss himself. When Carnot was exiled by Napoleon in 1815, he fled to Magdeburg, where Alexander von Humboldt was present. Carnot, von Humboldt, and one of Scharnhorst's first students from the Berlin military academy, General von Müffling, meet frequently to discuss the establishment of a new Ecole Polytechnique in Germany. As part of this collaboration, von Humboldt and Müffling work to bring Gauss to Berlin, where they intend to establish the new Ecole. There are several letters written back and forth between Müffling and Bernhard von Lindenau[21], scheming to convince Gauss to come to Berlin, where they have found an open position for him. In a letter from Müffling to Lindenau on April 1, 1823, he writes:

> Gauss has now been recommended to the King (along with two others, Pfaff and Bessel) for Tralles' position at the Academy of Sciences.… Briefly, however with the utmost urgency, I have demonstrated the necessity and have thereby taken up my old project for an *école polytechnique*, for which Alexander Humboldt has also

20. For the rest of the document, see http://history.hanover.edu/texts/carlsbad.html.

21. Co-editor of Zach's *Monatliche Correspondenz*, and later Minister of the Interior for the region of Saxony. It is Lindenau who procures the 1802 outline of Gauss's first work on the determination of planetary orbits, the *Summarische Übersicht*, and publishes it in the 1809 issue of Zach's *Monatliche Correspondenz*. I include his appended footnote here:

"When I had the pleasure of making the personal acquaintance of Herr Professor Gauss some time back, I saw among his papers the following essay, already outlined many years ago and yet nowhere published, which contained the earlier method of the author for determining the orbit. In my cursory reading of this summary overview I was soon convinced that the method developed here by the author, for making a first approximation of two distances of the planets from the earth, was essentially different from that which the author has now publicly expounded upon in his larger work. So I asked him for permission that I might make this treatise known, with the assumption that it would be interesting to all connoisseurs to know the way in which the author succeeded at arriving at a complete solution—which differed from that of which an overview had been communicated to our readers in earlier issues. I originally had the goal to accompany the essay with some remarks for the purpose of making a comparison of the earlier and later methods of the author; but these, had they actually been explained, would be somewhat extensive, and without reference to the work itself, remain ever unclear. It thus appeared advisable to me to communicate the entire essay, without further addenda (which is more intended for connoisseurs who have the work itself at hand [the *Theoria Motus*], to the astronomical readers of this periodical, just as it was set down by the author in writing six years ago."



A contemporary rendering of the proceedings of the Congress of Vienna, dividing up the spoils of a Europe ravaged by war. Is that Austria's Prince Metternich on the floor?

> campaigned. However, from this opportunity I have gotten to know well, that our German philologists are just as intolerant as the Jesuits, and that a true fraternization occurs, which mathematics does not permit to emerge. I hope that the Gauss affair now finally pulls through, and that when he is here I find a supporter in him, whereby we uplift the Mathematics of our country somewhat. I have told the King, that the public instruction in mathematics is begun by other nations where ours ends, that indeed mathematicians are always produced by us, but that because they must cultivate themselves by self-study, the people are generally so gruff and one-sided, that the country ultimately has no use for them. And I see it that way here every day.…

Gauss never takes up the position, though the University of Berlin project continues, producing key figures such as Neils Heinrich Abel and Lejeune Dirichlet, who will later answer to von Müffling's call.

Horatio Speaks

Horatio: …And let me speak to the yet unknowing world
How these things came about: so shall you hear
Of carnal, bloody, and unnatural acts,
Of accidental judgments, casual slaughters,
Of deaths put on by cunning and forced cause,
And, in this upshot, purposes mistook
Fall'n on the inventors heads: All this can I
Truly deliver.

We have now examined certain aspects of the process in which Gauss was part. What remains to be considered, is the significance of the advent of Bernhard Riemann onto the stage of history. He arrives at Göttingen in 1846. In the intervening period, Gauss has been compelled to reveal his true thoughts only in private discussions and correspondences, such as the following remarks, made to his fellow mathematician Bessel, in 1829:

> Yet another subject which I have been thinking on during my scant free time, which for me is already almost forty years old, [is] the first foundations of geometry.[22]… Here also have I consolidated quite a lot, and my conviction that we cannot fully lay the foundations of geometry *apriori*, has, where possible, become even firmer. Meanwhile I shall probably not come to publishing my very extended investigations for a long time, and perhaps this shall never occur during my lifetime, as I am fearful of the screeching of the Böetians, were I fully to speak out my views. However it is curious, that apart from the known gap in Euclid's geometry—to fill which all efforts till now have been in vain, and which will never be filled—there exists another shortcoming, which to my knowledge no one thus far has criticized and which (though possible) is by no means easily remedied. This is the definition of a plane as a surface which wholly contains the line joining any two points. This definition contains more than is necessary to the determination of the surface, and tacitly involves a theorem which must first be proved.[23]

22. For a dramatic dialogue covering the development of scientific thought and the concept of knowability, see Merv Fansler, "Knowability," www.wlym.com/~animations/ceres/Interim/interim_merv.html

23. An Aside: The cries of the Böetians echo into our own times: The stink that Blood and Gore hedge fund proprietor and Bush-defeated Democratic Presidential candidate Al Gore has recently been making in today's pseudo-scientific world over, ostentatiously, anthropogenic climate change, should give us some insight into the atmosphere of the scientific world of Gauss's time. We find ourselves, of course, in different circumstances, but the principle that rotting corpses smell awful remains the same. It would be a good idea to locate the corpse, and rid ourselves of its rotten stench once and for all. As Hamlet replied upon questioning as to the whereabouts of Polonius's corpse, "if you find him not within this month, you shall nose him as you go up the stairs into the lobby." How does one survive as a scientist, regardless of one's time? Like the artist, the struggle is always between the passion to pursue and promote truth, despite the rocks that may be slung in one's direction, or the hunger pains of an impoverished body; or, to attempt to feed an impoverished

Riemann begins work on his doctoral dissertation in 1851, with Gauss as his supervisor. On June 10, 1854, Riemann delivers his dissertation, as the aged Gauss looks on with sparkling eyes:

> It is well known that geometry presupposes not only the concept of space, but also the first fundamental notions for constructions in space as given in advance. It gives only nominal definitions for them, while the essential means of determining them appear in the form of axioms. The relations of these presuppositions is left in the dark; one sees neither whether and in how far their connection is necessary, nor *a priori*, whether it is possible. From Euclid through Legendre, to name the most renowned of modern writers on geometry, this darkness has been lifted neither by the mathematicians nor by the philosophers who have labored upon it.

What do the implications of this proposition tell us about the changed political climate in which Riemann finds himself, such that he may so explicitly outline the foundations upon which so many of Gauss's investigations have been based? How have the cultural winds shifted, such that Riemann's investigations are made possible? With these questions, we now find ourselves prepared to address our original questions concerning the figure of Gauss. He is now fully revealed to us only by looking forward to what he was able to produce. And as any good farmer will tell you, the real way to know a man is by the fruits of his labor; which is where the next chapter of our chronicle shall lead.

Fin

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soul upon the fickle praise of the popular opinion of the time. Kepler and Leibniz chose the former treatment, and certainly suffered, in one sense, for it. Many "scientists" of today, competing to win the Gulliver Award for top Lagado Academy Physicist, have chosen the latter. Concerning matters of taste, let us learn the lesson of the dog: Often its "taste" is neither a matter of reason nor of health, as can be easily proven in any local dog park, where one dog will eagerly make an attempted sampling of the excrement of another. The International Panel on Climate Change comes to mind. The radio stations, television, and Internet echo with the hot phrases "peer reviewed" and "consensus." Anyone with half a noodle in their noggin should have alarm bells going off after contemplating the quality of consensus that was reached by the American population in the years 2000 and 2004. Little does the believer in the climate change hoax know, that they themselves are the peer-reviewers! Also, anyone who treats the idea of "climate change" as a new phenomenon, and something to be feared, should probably be compassionately shown to a doctor, or a mental facility. That will be an appropriate change of climate, which will actually be truly anthropogenic! Thankfully, there is a handful of the old-guard scientists left, who remember something that Kepler stressed five centuries ago: The Sun is the soul of our planetary system, and should be the chief suspect in the case of any changes in the Earth's climate. The credulous believers of the idea that scientists are impartial, and entirely unaffected by political affairs should perhaps consider a few key realities of this world. Money, status, prestige—all are easily promised lures, which serve to control the puppet strings of those who are not passionately committed to truth, and to silence those who are.

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