Selected Articles from

Shoshichi Kobayashi[1]
Mathematicians Who Lost Their Faces:
*Essays in Idleness on Mathematics*

Translated by
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The following is an English translation of selected articles from Shoshichi Kobayashi's essay book [1] (see right for its front cover) published in Japanese posthumously in July 2013. The complete table of contents can be found on his memorial website [3]

Pure versus Applied[4]

We sometimes categorize mathematics into pure mathematics and applied mathematics. For example, when a university has an Applied Mathematics Department in addition to a Mathematics Department, the latter refers to a department of pure mathematics. Even universities which have only a Mathematics Department may create an applied mathematics program for required courses and differentiate students who major in applied mathematics.

How different then are pure mathematics and applied mathematics? Generally speaking, pure mathematics is considered to be represented by the three major areas: geometry (including topology), algebra (including number theory), and analysis (calculus, the theory of functions, functional analysis, etc.). All other areas of mathematics seem to be considered as applied mathematics. There are some cases, such as probability theory, where the boundary is not so

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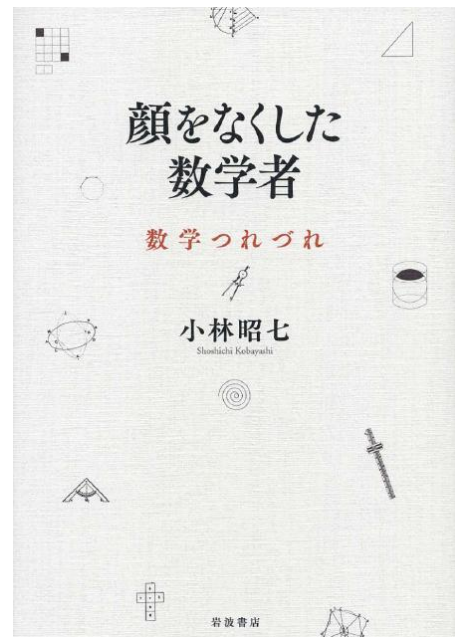
[1] Was Professor Emeritus of Mathematics at the University of California at Berkeley. Was born on January 4th 1932 and died on August 29, 2012.
[2] The Sherman Fairchild University Professor Emeritus of Electrical Engineering and Computer Science and a former Dean of the School of Engineering and Applied Science, Princeton University.
[3] http://www.shoshichikobayashi.com/recent-publications/

[4] The first article of [1], pp. 2-4.

clear; some part of probability theory is treated as pure mathematics and some part, as applied mathematics.

Some of the ordinary people who are not familiar with the field of mathematics consider that pure mathematics is abstract and useless, whereas applied mathematics is linked with the real world and useful. But what do we mean when we say that something is useful or useless?

It is now widely known that number theory, which has been considered to be especially pure among pure mathematics, plays an essential role in the theory of cryptography. Without it, the banking system would not function, so it goes far beyond the argument of it is useful or useless. When a mathematician is asked "How will your research work be used?" he or she may answer by saying "No, it will not be useful for anything," but such an answer means that he or she is doing research just out of curiosity and is not expecting at that point that the work will be actually used.

There was a mathematician who said that "I cannot foresee at all what kind of application will develop. At least my research work will not harm the world." Some say: "World War I was a war by chemistry, WWII was a war by physics. The next war will be one by mathematics." No one really knows what the future holds.

To begin with, mathematics, astronomy and mechanics have been like brothers since the ancient Greek period. One may say that Calculus was created by Isaac Newton (1642-1727) to explain the motion of a celestial body, and Pierre-Simon Laplace (1749-1827) who wrote a five volume book, *Mécanique Céleste*, was a mathematician and astronomer at the same time. Differential geometry for curvature by the famous Carl Friedrich Gauss (1777-1856) is the theory he created motivated by his duty to make a survey of Hanover Park. Henri Poincaré (1854-1912) not only did great work in many fields of pure mathematics, but also was a physicist who contributed to celestial mechanics such as the three-body problem.

When we entered the twentieth century, Hermann Weyl (1885-1995) was the last mathematician who could work on everything by himself, but the bond between mathematical physics and geometry remains strong so that we still find even today some people for whom we cannot be sure whether their specialty is differential geometry or physics. Therefore, it is unnatural to divide mathematics into pure versus applied and treat them separately.

Likewise it is also unnatural to divide mathematics into useful mathematics and useless mathematics. But we can distinguish mathematics between what is pursued by intellectual curiosity and what is investigated with the purpose of using it in the real world.

Research in mathematics does not cost as much as that of natural sciences. Nevertheless it goes without saying that we need to support the living costs of researchers, and provide

financial support of trips necessary for research, etc. Governments should provide research funding without taking a short-term view whether the research will become immediately useful, or without expecting profits in the first place. Sometimes research that appears to be useless for anything may later turn out to produce unimaginable benefits. The same thing can be said for every science: even the research that led to discovery of DNA was motivated by intellectual curiosity to unveil the mystery of life, not by making it useful in medicine.

However, research grants of a government comes from taxpayers' money. Many people pay taxes from their earnings obtained from the kind of work that may not necessarily be enjoyable. We mathematicians who are doing research out of intellectual curiosity should not forget this fact even for a moment. After all, our research may never turn out to be of any use. As a requital to the society, we must, at the least, make earnest efforts in education that will harness the next generation.

Two Mathematicians Who Lost Their Faces[5]

The Mathematical Research Institute of Oberwolfach in "The Black Forest" of Germany has a collection of photos of many mathematicians in the world, and continues to collect more photos. Nowadays, even a mobile phone is equipped with a camera, and the world is flooded by photos. But not until the mid 20th century did a majority of people own a camera, and we used to have our picture taken at a photo studio only in special occasions such as the Shichi-Go-San Festival day[6].

Up until the mid nineteenth century when the camera was introduced, portrait painters played the role of photo studios. Leonhard Euler, whose portrait is on the five franc bill of Switzerland has several portraits besides those drawn by such painters as Johann Georg Brucker and Jakob Emanuel Handmann, but most mathematicians had only one portrait at most.

At any rate we know faces of famous mathematicians in the past only through copies of their portraits found in books on history of mathematics. For ancient mathematicians such as Archimedes, not even portraits exist, so we only know their figures drawn by painters of later generation out of their imaginations.

Adrien-Marie Legendre (1752-1833) was born into a wealthy family of Paris. He studied physics and mathematics, graduated in 1770 and taught at the École Militaire in Paris from 1775 to 1780, and became a professor of the École Normale Supérieure in 1795.

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[5] [1] pp. 40-45. The original articles did not contain the portraits or photo cited in this translation.
[6] The Shichi-Go-San (or Seven-Five-Three) Festival is a traditional Japanese event to celebrate the healthy growth of children, held on November 15, in which three and five year-old boys and three and seven year-old girls, dressed up in Kimono or dresses, are taken by their parents to a shrine to have Shinto purification ritual. Many families take commemorative pictures at photo studios (This footnote is provided by the translator).

Legendre was a mathematician who represented France in the French Revolution (1789) period, together with Joseph-Louis Lagrange (1736-1813), Marquis de Condorcet (1734-1794), Gaspard Monge (1746-1818), Pierre-Simon Laplace (1749-1827) and Lazare Nicolas Marguerite Carnot (1753-1823). Monge, Carnot and Condorcet were activists for the Revolution, whereas Lagrange, Laplace and Legendre did not engage in political activities.

In mathematics, his book on geometry, in which he rewrote the "Elements" of Euclid in a textbook style, was a huge success, but his important contributions encompass many fields, ranging from elliptic integrals, Legendre's notation in the law of quadratic reciprocity, the Legendre transformation, to Legendre polynomials.

Legendre's portraits (lithographs) that appear in histories of mathematics were all identical (see the figure on the right [7]). But it caused a bit of stir in 2005, when two students at the University of Strasbourg discovered that this portrait was the face of the politician Louis Legendre (1752-1797) and has nothing to do with the mathematician Legendre.

Details on the sequence of events can be found in an article by Peter Duren, of the University of Michigan, published in the December 2009 issue of Notices of the American Mathematical Society.[2]   There is a 1793 lithograph of a "group portrait" of 21 members of the far-left party known as the Montagnards that always took seats in benches at the highest place in the Parliament immediately after the French Revolution. The two students found that what had been believed to be the portrait of the mathematician Legendre was nothing but Louis Legendre among this group portrait. Someone mistook it as Adrien-Marie Legendre and used it, which was then quoted in a series of books on mathematical history.

Louis Legendre was born in the same year as Adrien Legendre (1752) but died at age 45. Adrien lived out his natural life until age 80. Louis was originally a butcher, but joined the Revolutionary movement and was one of the leaders who spearheaded to the Storming of the Bastille. (The day to celebrate the Revolution Day is called Le quatorze juillet (meaning July 14th), but is known as "Paris-Sai" (meaning Paris Festival) in Japan, an influence of the Japanese translation of the 1932 film "Quatorze Juillet").

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[7] Figure caption: The politician Louis Legendre's portrait which was mistaken at the mathematician Louis Legendre: Source: [2].

Now that what had been believed to be his portrait turned out to be wrong, an effort began to search for the true portrait. It was not until 2008 that it was found that his portrait exists in a rare book in the library of the French Academy (Institut de France) (see the figure on the right [8]. It was an album of water color portraits of 73 academy members in 1820. However, the portraits were not ordinary paintings but caricatures. They may capture the features but are not realistic. Now you can view it online (search Adrien-Marie Legendre on the Internet). [9]

Joseph Fourier is depicted next to Legendre on the same page. There are several portraits of Fourier, so I compared them. In 1820, Fourier was 52 years old, so by comparing it with his portraits that were presumably painted around the same period, they resemble each other pretty well, including the way he was chubby. So the caricature of Legendre must have depicted him pretty well.

The man of the next episode is János Bolyai (1820-1860) of Hungary. He was a mathematician about a half century later than Legendre. He was born in Transylvania (which became a Romanian territory after World War II) of Hungary, and his father was the mathematician Falkas Bolyai. Because of the influence of his father, who devoted his entire life to his attempt to prove Euclid's parallel postulate (Postulate 5), from the Postulates 1 through 4. János also tackled this problem. After a while he found that the parallel postulate is independent of the other postulates, and published an article "The Science of Absolute Space (*Scientiam Spatii absolute veram Exhibens*)" as an appendix to his father's book, *Tentamen*, in 1932. The article came to be known by the title "Appendix."

In the mean time, Nikolai Lobachevsky (1792-1856) of Kazan University, Russia, published his article "On the Foundation of Geometry" in his university's journal, the Kazan Messenger, in 1829-1830. Carl Friedrich Gauss (1777-1855) had been aware for a long time of the existence of geometry in which the fifth postulate does not hold, but refrained from publishing it for fear that he might be caught up in a controversy with Emanuel Kant (1724-1804) who denied the existence of any geometry other than Euclidean geometry. More details of the sequence of events can be found in "Mathematics in the 19th Century: Volume 2" edited by Kolmogorov and Yushkevich (translated into Japanese by Shoshichi Kobayashi and Hirotaka Fujimoto, Asakura Shoten Publisher, 2008). An exposition on non-Euclidean geometry can be found in my book (in Japanese), *From Euclidean Geometry to Modern Geometry*, (Nihon Hyoron-Sha, 1990).

Returning to Bolyai, in the January 2011 issue of the *Notices of American Mathematical Society*, the Hungarian mathematician Tamás Dénes published an article "Real Face of János Bolyai"[3] in which he said that there were two portraits of János Bolyai, but both were lost and that the

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[8] Figure caption: The caricature portrait of Adrien-Marie Legendre. Source: [2].
[9] http://en.wikipedia.org/wiki/Adrien-Marie_Legendre (provided by the translator).

portraits used in mathematical history books are fake, and may not even resemble János. One of his true portraits was lost as early as in 1837 according to some information sources, and the other portrait of him in a military uniform was torn up by János himself. Dénes says that an investigation by two Romanian mathematicians substantiates that no portraits of János Bolyai survived.

In 1960, the 100th jubilee of János Bolyai's death, the Hungarian and Romanian governments both published commemorative stamps. The portraits of young Bolyai have thereafter been widely used as his true portraits. An explanation of the sequence of events is as follows.

A Hungarian painter Mór Adler (1826-1902) made a large portrait in 1864, but the name of the person depicted does not appear anywhere on the painting. But a portrait painter, Károly Lühnsdorf (1893-1958), who studied at the Hungarian Academy of Arts and created portraits of many famous individuals, drew a portrait entitled János Bolyai with a note stating that he drew Bolyai's picture based on Adler's original painting from life. Thus, Adler's painting is now on the walls of the János Bolyai Mathematical Society, and the aforementioned stamps were designed based on it. However, Bolyai must have been 24 years old when Adler was born in 1826, and Bolyai must have been over 40 by the time Adler started his artistic career. Adler's biographical data show that he traveled around Europe and finally returned to Hungary in 1848, when Bolyai was 46 years old. Furthermore by 1864 when the painting in question was made, Bolyai had already died. By any stretch of the imagination, it is impossible that Adler saw young Bolyai. Tamás Dénes, the author of the article in the Notices of AMS further investigated. He visited the town of Marosvásárhely, Bolyai's birthplace and discovered that on the façade of the Culture Palace were the carved stone reliefs of six great men who contributed to the culture of Hungary in the nineteenth-century, and that the two figures (the third and fourth from the left) were Falkas and János Bolyai. [10]

The five men other than János Bolyai have also their portraits, and Tamás Dénes writes that their stone reliefs are readily recognizable from their portraits. Furthermore, Tamás Dénes learned from an historian that János Bolyai looked very much like General György Klapka, and János' son Dénes Bolyai (1837-1913) reportedly stated that he resembled his father. Tamás Dénes writes that he was fascinated by the fact that the János' relief looked so similar to the portraits of General Klapka and Dénes Bolyai.   He concludes that the relief must surely resemble János Bolyai judging from the fact that many people who knew János, as well as

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[10] Figure caption: The authentic relief of Janos Bolyai. Source: [3]

Dénes Bolyai, must have been alive in the town in the 1911-1913 period when the Culture Palace was built.

Revisiting Ancient Greek Mathematics[11]

As is evident from the murals of animals that have been found in caves in France such as Grotte Chauvet, Grotte de Lascaux, Grotte de Pech-Merle and many other caverns in Europe, the human race, unlike other animals, has not been content with just eating, but has sought something intellectual. It is also known that human have enjoyed music since thousands of years ago.

Some individuals who watched countless stars that twinkled in the completely dark sky (which we may no longer be able to experience unless we go deep into the countryside) might have become poets. Some others might have noticed that certain stars moved in a strange manner, and astronomy was born. In ancient Egypt, people had to survey their lands over again each time the Nile River overflew its banks, which happened every year. They measured distances using ropes, made right-angled triangles (using the side lengths of 3: 4: 5), calculated the areas, etc. Thus, the word "geometry" (a Greek word that means surveying of land) was born.

In ancient Greece, although much later than the age of murals in caves, the "things to study" were geometry, number theory, astronomy and music. Astronomy at that time included spherical geometry, and the mathematics of harmonics was discussed in the study of music. Any of these subjects was considered to be something one had to study rigorously from its principles.

Furthermore, the Greeks treated number theory geometrically as follows. They fixed the length of a certain object and considered it as unity or 1. Then lengths that are twice, three times, … are considered as 2, 3, … A length that is six times as long was treated as 6, but 2 x 3 was treated as the size (i.e., area) of a rectangle having 2 and 3 as the sides, and was distinguished from the length 6. In other words, 6 cm and 6 cm^2 were distinguished, where the unit length is 1 cm.

Likewise, 2 x 3 x 5 was regarded as 30 cm^3, i.e., it was considered as a three-dimensional object whose volume is equivalent to that of 30 unit cubes, each having the volume of 1 cm^3. Therefore, in order to solve a quadratic equation such as

$$x^2 - 5x + 6 = 0,$$

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[11] [1] pp. 62-64.

x and 5 are lengths, whereas x^2 and $5x$ are areas, and 6 should represent an area as well. Items whose dimensions are different cannot be summed. In Euclid's "Elements," algebra was treated from the geometric viewpoint as illustrated above.

Plato (427 BC-347 BC), who was a disciple of Socrates (circa 470BC-399 BC), visited the Pythagorean School in Italy when he was young, and learned the value of geometry. Upon returning to Athens, he posted at the entrance of his school of philosophy a signboard "Those who do not know geometry should not enter this gate."   He left his mark on what is called Plato's regular polyhedron, which includes the regular tetrahedron, regular hexahedron, regular octahedron, regular dodecahedron, and regular icosahedrons (see Figure 1[12]).

正4面体　　　　　　　正6面体　　　　　　　正8面体
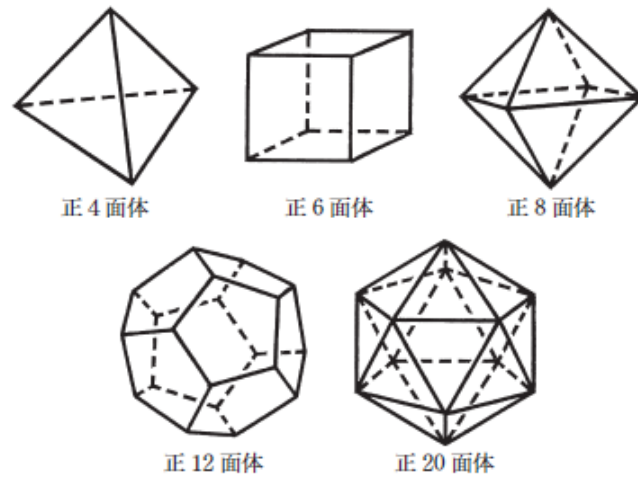
正12面体　　　　　　正20面体

図1　プラトンの正多面体

But his more significant contribution to mathematics was that he taught the importance of making precise definitions, clear hypotheses, and rigorous and logical proofs, and that he advocated the value of pursuing geometry as a purely intellectual activity, as opposed to utilitarianism that sought its useful applications. This became the origin of the term "platonic love," which means purely spiritual love.

In reference to my earlier statement that Plato visited the Pythagorean School, Pythagoras (circa 582 BC-500 BC) was born in Samos Island, and after making a tour to Egypt and Babylon while he was young, he established a kind of secret society based on mathematics and philosophy, at Crotone in southeast Italy, and he primarily investigated number theory. Since Pythagoras died several decades before Plato was born, the people he met were probably the second or third generations of the Pythagorean School.

All of the ancient civilizations have all left their mathematical heritages. But among these civilizations, the Greek mathematics, which was represented by Euclid's *Elements*, was exceptional and its influence is felt even today.

President Lincoln and Euclid[13]

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[12] Figure Caption: Plato's Regular Polyhedrons: Upper three figure, from left: regular tetrahedron, regular hexahedron, and regular octahedron. Lower two figures, from left: regular dodecahedron and regular icosahedron

[13] [1] pp. 65-67.

The reason why Greek mathematics distinguished itself from the mathematics of the Egyptians, Babylonians and other ancient civilizations is found in its philosophy in that by starting from several principles, definitions and axioms, it clearly stated a proposition and rigorously proved it. They allowed no compromise and proved a series of propositions by going through step by step, starting from five postulates that could not be reduced any further.

It is really strange that mathematics in which a proposition was proved by a rigorous demonstration was developed only in the Greek civilization. According to Prof. Shuntaro Ito, who studied the history of Greek science, such "demonstrative mathematics" could be formed in the city-state of ancient Greece, only because it was a society where every citizen, standing on equal footing, expressed his/her opinion and, when asked for its basis, persuaded others by explaining it logically. It would have been difficult under an autocratic regime, which produced a cultural climate in which even knowledge was given from its authority and was inherited as a tradition without questioning "why?" (cf. Shuntaro Ito, *Mathematics of the Greek*, Kodan-sha Gakujutsu-bunko, 1990).

Mr. Ito's explanation has something in common with the following anecdote about Abraham Lincoln. Even primary school children know the story about Lincoln that he was born in a log cabin in a countryside of Kentucky, barely attended even a primary school, raised by parents who could not read, yet he taught himself to become a lawyer, jumped in the world of politics and became the sixteenth American President, and achieved the emancipation of slaves.

It is less known, however, that when he ran for President, he stated in his resume that he "studied the first six volumes of Euclid's '*Elements*'." (cf. Salomon Bochner, *Role of Mathematics in the Rise of Science*, Princeton University Press, 1966; translated into Japanese by Tamotsu Murata, Misuzu Shobo Publisher, 1970). When Lincoln was asked why he studied Euclid, his answer was, "A lawyer is always asked to 'demonstrate' (i.e., to prove by reasoning or evidence). I thought therefore that in order to learn what 'demonstration' is, studying Euclid's *Elements* should be the best."

In order to win in a court case, a lawyer must convince the judge and jurors by demonstrating his claim in a systematic manner. This seems very similar to Prof. Ito's theory about the mathematics of ancient Greece. (Incidentally, Q.E.D. stated at the end, when proving a proposition, is an acronym of the Latin phrase "quod erat demonstrandum," i.e., "which had to be demonstrated," where "to demonstrate" here means "to prove.")

As Mr. Ito used the expression "without making any compromise or concession," in characterizing Greek mathematics, we feel about Greek mathematics something more than its emphasis on demonstration. I recall that the poet Ms. Chimako Tada (1930-2003) wrote a long time ago in a journal, probably in *Bungei-shunju* something like "The reason why we are

attracted to ancient Greece is because we are attracted to the youthfulness of its civilization. The fact that their period was ancient means that they were young as a human race. We are four thousand years older than the human race of 2000 BC." In fact, the characteristic described as "without making any compromise or concession" is an indication of youthfulness.

Just like poets find the youthfulness in Homer's poems, mathematicians feel the youthfulness of the Greek civilization in the mathematics of the Greek.

Archimedes and Cicero[14]

Archimedes (circa 287 BC- 212 BC), who was born ten-odd years later than Eratosthenes (275 BC-154 BC), was also a friend of Eratosthenes. I will briefly write about the life of Archimedes, by referring to Chapter 1 of *Archimedes: Works*, by Thomas L. Heath, who compiled all the works of Archimedes (although only his works that remained without getting lost).

Archimedes, born in around 287 BC in the town of Syracuse in the south-eastern part of the island of Sicily, is said to be a relative of the King of Syracuse, and his father was an astronomer. So in any event he must have been born into a well-to-do family.

He stayed in Alexandria for a long period while he was young, and learned mathematics from the disciples of Euclid (he did not have a chance to lean directly from Euclid himself, since Euclid died around 275 BC). In Alexandria, he became well acquainted with Conon of Samos (circa 280 BC-220 BC) in addition to Eratosthenes. He informed Conon of any new result that he obtained, before he published it.

After returning to Syracuse from Alexandria, Archimedes devoted himself to the research of mathematics. He was well known for frequent inventions of clever mechanical devices. But he did such work for a change for relaxation after concentrating on mathematics, and considered such inventions unimportant; thus, he did not leave any written record of them.

The following anecdote is widely known even to school children. Archimedes was asked by the king of Syracuse to examine whether his royal crown was made of pure gold or contained some other material. While taking a bath, he noticed that the level of water in the tub rose, as he got in the tub. Archimedes then went out to the street naked, exclaiming "Eureka!" (meaning "I have found it").

The above story was probably made up to explain the principle of buoyancy in an interesting way, just like the story of Newton's apple regarding the discovery of the law of universal gravitation. There are several other anecdotes about Archimedes including the one related to

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[14] [1] pp. 84-86.

the principle of leverage in that he was said to claim "Give me a place to stand on and a sufficiently long lever. Then I can move even the earth."

In the Second Punic War, the town of Syracuse, which took sides with Carthage, was attacked by the overwhelming Roman army, but the new machines and weapons that Archimedes produced one after another vexed the Roman soldiers. His ingeniously designed ballista could fire arrows or stones against the enemies at a distance as well as those nearby.

A crane-like machine hoisted the bow of the enemy's ship. So whenever a new device appeared on the fortress, the Roman soldiers retreated in terror. Thus, the Roman General Marcellus took an enveloping maneuver instead of making attacks that were unlikely to succeed. The Syracuse army was besieged, and after having resisted for nearly three years (from 214 BC to 212 BC), they finally surrendered in 212 BC. Marcellus, who respected the genius Archimedes, ordered his soldiers to capture Archimedes without killing him. Nevertheless, Archimedes who was absorbed in mathematics by drawing a circle on the ground, ignored the Roman soldiers and would not move, and thus was stabbed by a soldier.

As for the story about Archimedes' life at the end, there are several versions that are slightly different. What we know today about Archimedes relies heavily on the biography of the general Marculles written in the first century by the Greek biographer Plutarch (circa 46 AD-120 AD). I saw in a museum of Frankfurt, Germany a mosaic floor that depicted the last scene of Archimedes. There may be some other things that depict similar scenes.

In accordance with his will, a tombstone was built, consisting of a cylinder that circumscribes a sphere.[15] This is evidence that Archimedes was most proud of his two-part article "*On the Sphere and Cylinder*." When Cicero (106 BC-43 BC), who is remembered for his rare gift of eloquence, became a Quaestor (a senior rank officer) of Sicily, he repaired Archimedes' tomb that had been neglected, but we do not know today even the location of the tomb.

Mathematicians and Politicians[16]

Ms. Margaret Thatcher (1925-2013), who was the Prime Minister of the United Kingdom, graduated from the Department of Chemistry, the University of Oxford. The current Chancellor of Germany, Ms. Angela Merkel (1954 -) studied physics at Leipzig University from 1973 till 1978, and obtained her Ph.D. in physics in 1990 from Berlin. She published several articles besides her doctoral thesis on quantum chemistry.

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[15] In his letter to Eratosthenes, Archimedes showed how he proved that the ratio of the volume of a sphere to the volume of the cylinder that circumscribes it is 2:3. He also proved that the ratio of the surface area of the sphere to the surface area of the surface of the cylinder is also 2:3. (cf. Shoshichi Kobayashi, "Archimedes and the volume of a sphere," in *Mathematicians Who Lost their Faces: Mathematical Essay in Idleness*, pp. 99-103.)

[16] [1] pp.121-122.

In France, there was Joseph Fourier (1768-1830) as a mathematician who participated in politics. He was involved in many political movements, but was primarily on sides with Napoleon, and was appointed to "Prefect" (a governor-like position) of the Isère Department (in Grenoble).

Pierre-Simon Laplace (1749-1827, celestial mechanics) was also appointed by Napoleon to the Minister of Interior, but it did not last six months.

Émile Borel (1871-1956, measure theory, probability theory) became very active in his later years, as a member of the National Assembly in 1924-36, as the Minister of Marine in 1925 (in the cabinet of fellow mathematician Paul Painlevé), and as a member of the French Resistance during World War II.

Paul Painlevé (1863-1933, nonlinear second-order differential equations) served two terms as Prime Minister, both of which were short-lived (Sept 12-Nov. 13, 1917, and April 17-Nov. 22, 1925) in the unstable period, of the French Third Republic (1870-1940) that included World War I (1914-18), when the cabinets were formed and fell one after another. He also served as Minister of War and Minister of Education for many years since around the period of World War I.

The former president of Peru, Alberto Fujimori (1938 -) earned his Master's degree in mathematics from the University of Wisconsin in Milwaukee.

Let us turn our attention to Japan. Dairoku Kikuchi (1855-1917) went to study in England at age of 11 in 1866 under the order of the Tokugawa shogunate, and received the Bachelor's degree in Mathematics-Physics from St. John's College of the University of Cambridge at age 15. After returning to Japan, he later became the president of Tokyo Imperial University and then served as the Minister of Education in 1901-1903.

But among the Japanese mathematicians, one who became a full-fledged politician is a former Governor of Hiroshima City, Tadatoshi Akiba (1942-). After receiving his Bachelor's and Master's degrees in mathematics from the University of Tokyo in 1966 and 1968, respectively, he went to Massachusetts Institute of Technology (MIT) and received his Ph.D. under the guidance of John Milner. His specialty is topology. After teaching at the State University of New York at Stony Brook for two years, he taught at Tufts University in Massachusetts from 1972-1986, and returned to Japan in 1986. After teaching at Hiroshima Shudo University from 1986 to 1987, he ran for member of the House of Representative from the Social Democratic Party in 1990 and won the election and served as a member of the House of Representative until 1999. From 1999 till 2011 he served as the Mayor of Hiroshima, indeed for 12 years. He adhered to his position for the total abolition of nuclear weapons as a member of the Social Democratic

Party and as Mayor of Hiroshima. He must have seriously carried out the administration of the City, judging from the fact that he lasted as long as 12 years.   (Incomplete)[17]

Acknowledgments

References

[1] Shoshichi Kobayashi, *Mathematicians Who Lost Their Faces: Essays on Mathematics in Idleness* (in Japanese), Iwanami Shoten Publisher, Tokyo, July 30, 2013.

[2] Peter Duren, Peter (December 2009). "Changing Faces: The Mistaken Portrait of Legendre". *Notices of the AMS* **56** (11): 1440–1443, 1455. http://www.ams.org/notices/200911/200911-full-issue.pdf

[3] Tamás Dénes (2011) "Real Face of Janos Bolyai," *Notices of the AMS*, **58** (1) : 41-52. http://www.ams.org/notices/201101/rtx110100041p.pdf

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[17] This article was not part of the initial manuscript that Shochichi sent to the editor in April 2012. The rough manuscripts of this article and another article "Mathematical Education" were found in his house at Berkeley in the spring of 2013, several months later after his death.