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MOZART, OETINGER, ALCHEMY AND NUMBER

by

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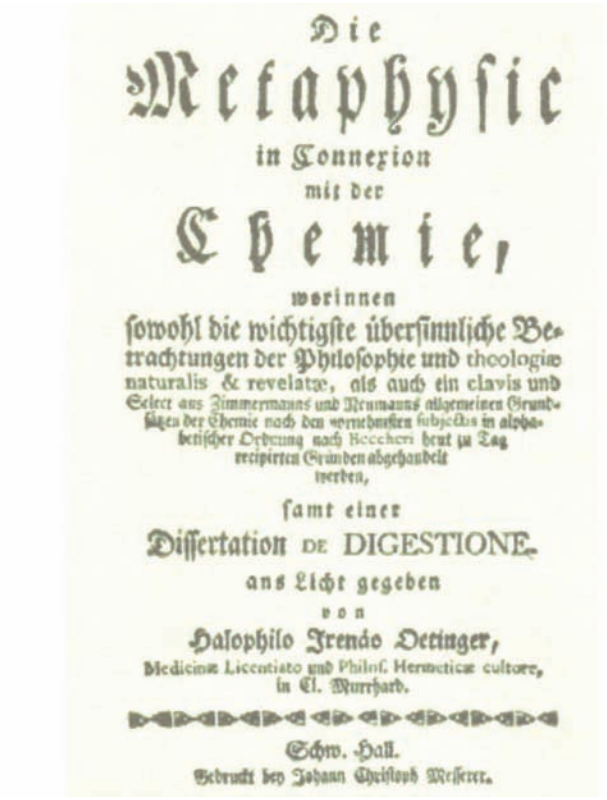
Abstract

In addition to his regular contact with the ideas and thoughts of Ignaz von BORN and Karl Ludwig GIESECKE circulating in the Masonic lodges of Vienna, WA MOZART was familiar with alchemy by his reading of a scientific book entitled "Die Metaphysic in connexion mit der Chemie" [MiCmdC] (Figure 1) by Friederich Christoph OETINGER (Figure 2).



Die
Metaphysic
in Connexion
mit der
Chemie,
worinnen
sowohl die wichtigste übersinnliche Betrachtungen der Philosophie und theologiæ naturalis & revelatæ, als auch ein clavis und Select aus Zimmermanns und Neumanns allgemeinen Grundsätzen der Chemie nach den vornehmsten subjectis in alphabetischer Ordnung nach Becchers heut zu Tag recipirten Gründen abgehandelt werden,
samt einer
Dissertation DE DIGESTIONE,
ans Licht gegeben
von
Halophilo Irenäo Oetinger,
Medicinæ Licentiato und Philos. Hermeticæ cultore,
in Cl. Murrhard.
Schw. Hall.
Gedruckt bey Johann Christoph Messerer.

Figure 1
Title page of Die Metaphysic in Connexion mit der Chemie by Friederich Christoph OETINGER. (1702-1782).

Figure 2
Portrait of Friederich Christoph OETINGER. (1702-1782).

1. MOZART, OETINGER, alchemy and the great Lisbon Earthquake of 1755.

The year 2005-2006 marks the 250th anniversary of MOZART's birth (he was born on January 27, 1756, in Salzburg, Austria). It is timely to remember this event now not only because of the importance of the date, but also because recently in the year 2005 on Boxing Day (26 December) there occurred the Indian Ocean tsunami and earthquake which resulted in such terrible damage to property and human life. The link to MOZART's birth is particularly memorable to Earth Scientists, not only because of the dates, but also because of the fact that in the year prior to his birth Europe had experienced the great Lisbon Earthquake of 1755 (Figure 3), which not only caused great devastation and damage to many parts of Europe, but also triggered a huge change in human thinking in science, philosophy and the arts. The Lisbon experience introduced many profound changes, for example those which eventually led to historical events such as the French Revolution. The 1755 events, judging by contemporary accounts and observations, were very similar to those of 2005, although that year did not enjoy the philosophical comments of a modern VOLTAIRE and his European contemporaries.

Figure 3
The Lisbon Earthquake of 1755 and its accompanying tsunami from a contemporary account.

The epicentre of he earthquake has been subsequently suggested as being located about 90km SW of Lisbon in the Atlantic Ocean. It has also since been suggested that it was perhaps a very severe magnitude 9 quake on the Richter scale and is especially remembered because it happened on All Saints' Day (1st November 1755) and was by far the greatest earthquake of the eighteenth century, described by various observations from a variety of authors.

It was said that for nearly ten minutes Lisbon was convulsed by huge seismic heaves which ripped apart soil and buildings, while at the same time engulfing men women and children. Great fires followed and thousands of residents streamed to the port where their temporary refuge became another killing field. Apparently it then seemed as though the harbour took a deep breath while the water emptied from it, only to return moments later in a series of tsunamis. They swept through the downtown area, and then rushed back to sea carrying, in the debris-speckled foam, hundreds of human victims. Some ninety thousand people are alleged to have died in Lisbon, - more than one third of its population. Another ten thousand lives were lost in south west Spain and in Morocco. The tremors were felt as far away as Finland and Barbados. The earthquake also had a profound effect on Europe's political and cultural landscapes. VOLTAIRE himself quickly published his poem on the Lisbon disaster.

Unhappy mortals! Dark and mourning earth!
Affrighted gathering of human kind!
Eternal lingering of useless pain!

VOLTAIRE reveals from these opening lines the despair of a thinker who is stymied and greatly puzzled by the intellectual consequences of this event. Soon after this VOLTAIRE inserted the earthquake into CANDIDE's absurdly catastrophic life. From a ship in Lisbon harbour, as the good drown and the wicked survive, his friend MARTIN concludes that if the world has any purpose at all, it is to drive us mad (LIENHARD, 2006).

In this story, CANDIDE was a student of PANGLOSS, who maintains that everything is for the best in this best of all possible worlds. This idea is a reduced and simplified version of various Enlightenment thinkers, most notably LEIBNIZ. To these thinkers the existence of any evil in the world would have to be a sign that God is not entirely good nor all-powerful, and the idea of a non perfect God to them was nonsensical or impossible to conceive. One of the most glaring flaws of PANGLOSS's optimism is that it is based on abstract philosophical argument rather than real-world evidence. In this sense it is easy to see and understand the important influence of the Lisbon earthquake on the political and cultural intellectual development of Europe at this time. Many Europeans, although certainly not all, during the period from the sixteenth through to the eighteenth centuries, thought that the universe was governed by *natural law*, a set of physical laws that could be discovered by the use of reason, even if those laws could not be changed. With every new discovery, the number of people increased, and their desire to learn even more about the physical world grew. Additionally, many people concluded that natural laws governed human affairs and, if humans could discover those laws they could act in accordance with them and create an orderly, equitable, and prosperous society. The period during which these ideas dominated European thought is usually called the *Age of Enlightenment* or, using a term made famous by Tom PAINE, *The Age of Reason*.

Naturally, of course, organised religion opposed this point of view and upheld the traditional Christian belief that the universe and everything that happened within it was an expression of God's Will. When ecclesiastical power was strong enough, the speculations of the natural philosophers were limited by force, and prominent advocates of the use of reason often suffered prison, exile, or even the possibility of death for publishing their beliefs.

Then, too, there was a spirit of rebellion in the air which eventually led to the Age of Liberalism and gave rise in due course to the French Revolution and the twelve years in which Napoleon BONAPARTE dominated Europe and swept away many of the last remnants of the old and discredited regimes of the Enlightenment. Appropriately enough the earthquake and its accompanying Tsunami (Figure 3) triggered the birth of seismology as a scientific discipline, and because of it the Portuguese Minister, the Marquis of POMBAL, ordered a questionnaire to be sent to all the parishes of the country regarding the earthquake and its effects. Questions included:

1. How long did the earthquake last?
2 .how many aftershocks were felt?
3. What kind of damage was caused?
4. Did animals behave strangely?
5. What happened in wells and waterholes?

In this respect the Marquis of POMBAL is regarded as a forerunner of modern seismological scientists It is now known of course that earthquakes are usually associated with the movement of tectonic plates and in this particular case in 1755, the African plate moved north and the American plate moved westwards on the other side of the mid-Atlantic ridge. In addition to the Lisbon damage, in the Algarve, there was great destruction and nearly all buildings were damaged. Churches came down on congregations who had been attending the Holy Day Mass. Two-storey buildings were flattened. Spain and Morocco were also badly hit while the Quayside in Lisbon sank into the river Tagus and the recording of the human tragedy began with the report that six hundred people had disappeared with the destruction of the quays. Terrible fires broke out in the city. Even people on the Orkney Isles in northern Scotland felt the tremor. The undersea quake generated a Tsunami, during which the sea retreated, revealing the seabed and many survivors rushing to see the unusually exposed ocean floor, but then they were rapidly overwhelmed by the thundering wall of water returning. The wave reportedly crashed over the cliffs at Sagres, at a height approaching 30m or more. All along the south coast the boats were swept clear away from the little fishing villages, some ending up at least a kilometre or two inland. Buildings that lay on the east side of the bays, already ruined by the tremors, were totally demolished. The Tsunami reached Cadiz 78 minutes after the quake.

To the north, Lisbon was struck by the wave at about eleven am, when the force and height were greatly enhanced by the funnelling effect of the Tagus estuary. Possibly 5m high, the wave engulfed the thousands who had flocked to the open square next to the river, mistakenly believing these areas to be safer.

Further north still the wave, now only 2m high, reached Cornwall in southern England a little after two pm and then swept up to the Orkney islands and even up to the Baltic sea, where it was observed in Finland along with the occurrence there of seiches.

After sweeping Madeira, to the west, at about the same time that it hit Lisbon, The Tsunami thundered on across the Atlantic, to be recorded in the Bahamas, Martinique and Newfoundland with a height of between one and two metres.

Friedrich Christoph OETINGER (1702-1782) was a protestant theologian and theosophist born on the 6th May 1738 in Goeppingen as the son of a city and office recorder. He spent much of his life in Murrhardt as one of the Swabian fathers of Pietism. On the completion of his university course he spent some years travelling and as part of this in 1730 he visited Count ZINZENDORF at Herrenhut remaining there for several months as a teacher of Hebrew and Greek. At the University of Halle he studied medicine. After some delay he was ordained to the ministry and held several pastorates. While pastor at Waldorf near Berlin from1746, he studied alchemy and made many experiments. After spells in Schnaitheim and Waldorf, OETINGER was posted by Duke Karl EUGENE as the prelate in Murrhardt apparently in the hope that the alchemical and natural science interests of OETINGER might be useful for a Murrhardt mining enterprise. Doubtless the Duke was aware of the many occurrences of metaliferous mineral deposits and both potassium and sodium salts in the Triassic rocks of various parts of central Europe.
OETINGER's theology is an unlikely mixture of biblical-pietistic theology with mystical elements derived from Jacob BOEHME, Kabala, alchemy and natural science. The mainstream of alchemical thought in the late eighteenth century can be regarded as the Second Mystic, or the PARACELSAN tradition in central Europe (see LLEWELLYN 1982). These ideas flowed through Europe from the sixteenth century via the work of LEIBNIZ, WOLFF and NEWTON and eventually partly materialise yet again in the Age of Reason in German Romanticism.

One of the main sources of new material and ideas on these topics comes from my study of one of the books found on MOZART's bookshelf when he died in 1791. The book is entitled *"Die Metaphysic in Connexion mit der Chemie"* (MiCmdC), item number31 of MOZART's book collection (see DEUTSCH 1990, ROBBINS LANDON 1991 and TILL 1992). It seems likely that MOZART's interest in the MiCmdC was twofold; firstly in the alchemy therein, of immediate interest in the composition of the Magic Flute and, secondly, in its number-related mathematical relevance to his lifelong interest in numbers especially the mathematics associated with the proportions relevant to equal temperament. In particular, MOZART was akin to Sir Isaac NEWTON in studying the proportionality of string length of the Monochord which related the emerging physical sciences with the arts and especially music. The book (MiCmdC) in question was published in the year1770 (OETINGER) and I have a copy of it on microfilm from the British Library Collection and have been working on it for several years now, with interesting results. The book (MiCmd C) contains amongst other things a description of contemporary eighteenth century chemistry and has never been commented on by anyone with a professional scientific background and training as far as I am aware. The chemistry is actually reasonably sound and fairly objective in its description, despite the fact that OETINGER was a follower of Jacob BOEHME (1575-1624) and Rosicrucianism, and thus, ultimately, of PARACELSUS (1493-1541). From the book it is clear that OETINGER was thoroughly imbued with this philosophy and many of his metaphysical thoughts stem from alchemy and Rosicrucianism.

With regard to alchemy and MOZART's Magic Flute, one important observation that was missing from WHITTAKER's (1998) account was the failure to mention the work of George STARKEY (Eiranus PHILALETHES) the seventeenth century American alchemist, whose illustrations of the alchemical processes made it plain that that the opera's code of dress for the two armoured men, for a long time such a serious puzzle to musicologists, shows CADMUS of Greek mythology fame and who slayed the serpent; the illustrations are replicated almost directly in the well-

known Magic Flute SCHAEFFER illustrations of 1794. The armoured men can be identified very easily and are closely correlated in dress to the illustrations in the Golden Fleece of La Toyson D'Or (Splendor Solis). If the SCHAEFFER illustrations really are representations of an early production of the Magic Flute, which I believe to be the case, then clearly one or more of the authors had seen some of these alchemical works too and doubtless must have been very familiar indeed with the associated alchemical procedures.

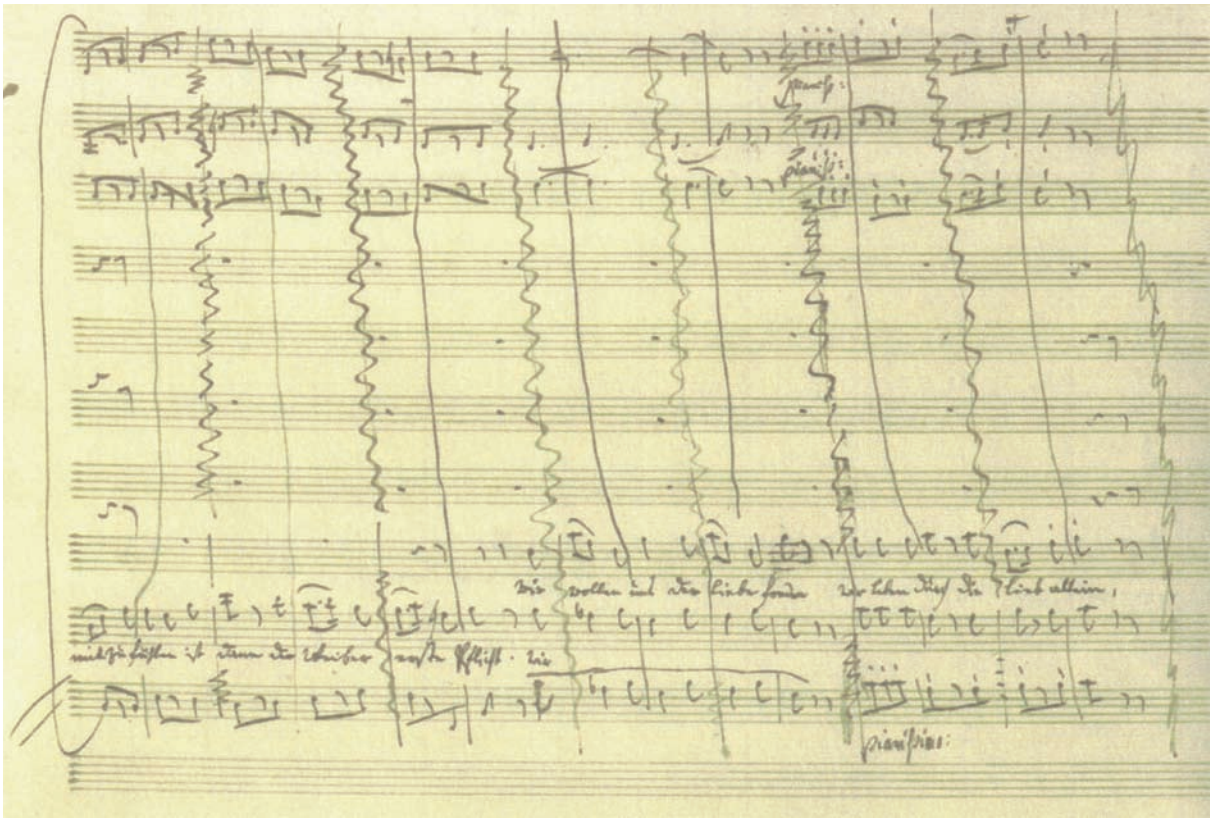
2. MOZART, OETINGER, FRICKER and number

Interestingly, in addition to chemistry and alchemy, the book (MiCmdC) has a detailed comparative account of the musical theories of EULER and another German mathematician named FRICKER. OETINGER was keen on the ideas of FRICKER (see HENCK 2001) and described FRICKER's musical number theory, which centred on various numbers known to be of great significance and importance in Die Zauberfloete, but especially the prime numbers 7 and 11. These numbers were also utilised by contemporary philosophers in the division of philosophy and metaphysics into an earthly (so-called Irdische) component (by the number 7) and a heavenly (so-called Himmlische) component (by the number 11) which were akin and very similar to SWEDENBORG's ideas. Thus MOZART not only shared a great interest in alchemy (see WHITTAKER 1998, 2001) but also in number and number theory, with Friedrich Christoph OETINGER (1702-1782). In fact OETINGER used his knowledge for symbolic purposes. These practices exposed him to the attacks of persons who misunderstood him. 'My religion' he once said 'is the parallelism of Nature and Grace'. OETINGER translated SWEDENBORG's philosophy of the heavenly (himmlisch) and earthly (irrdisch) and added notes and ideas of his own. Eventually in 1766, OETINGER became prelate at Murrhardt, where he eventually died on the 10th of February 1782.
Of great relevance to these arguments is the fact that they followed in the wake of the terrible Lisbon earthquake, an event that happened on Friday the 1st November 1755.

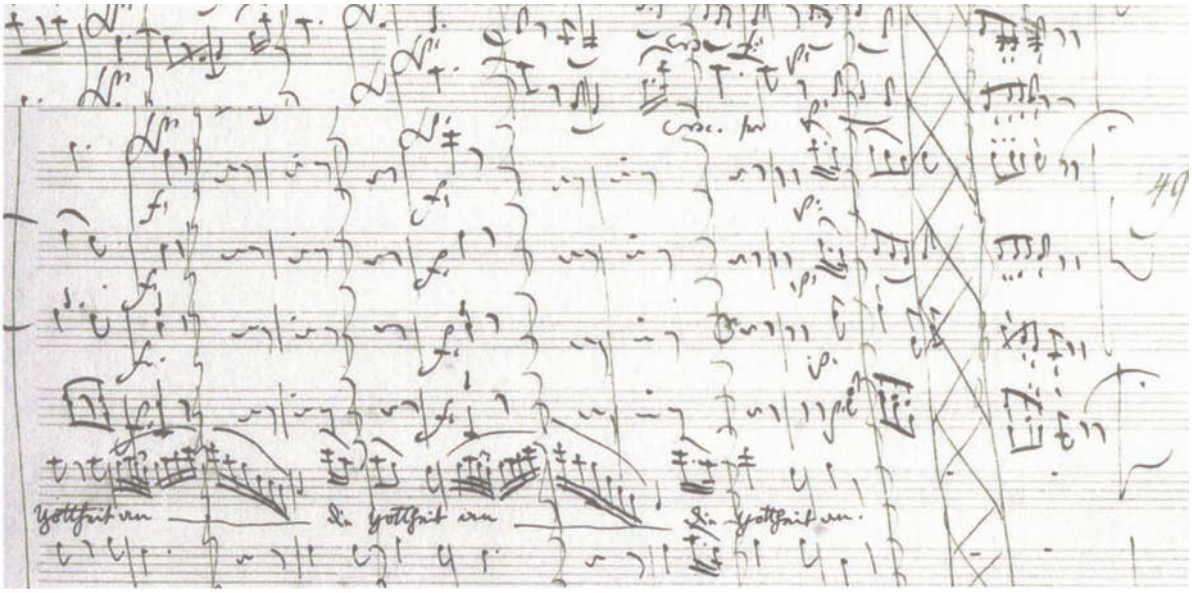
With regard to number, there is considerable evidence suggesting that MOZART very much enjoyed, and was talented in, mathematics. According to his sister Nannerl, he talked of nothing and thought of nothing but figures and mathematics during his schooldays. In fact he jotted mathematical calculations in the margins of some of his compositions. John F. PUTZ (1995) described his investigation of whether the golden ratio appears in MOZART's piano sonatas. According to PUTZ, *"In MOZART's time, the sonata form movement was conceived in two parts: the Exposition, in which the musical theme is introduced, and the Development and Recapitulation in which the theme is developed and revisited…"* it is this separation into two distinct sections which gives cause to wonder how MOZART apportioned these works). That is, did MOZART divide his sonatas according to the golden ratio, with the Exposition as the shorter segment and the Development and Recapitulation as the longer part? PUTZ (1995) represented the two sections – the Exposition and the Development and Recapitulation by the number of bars in each. For example, in the first movement of the piano Sonata number 1 in C major the exposition and the Recapitulation and Development consist of 38 and 62 measures respectively.

"This is a perfect division", PUTZ writes, *"According to the golden section in the following sense: A 100-measure movement could not be divided any closer (in natural numbers) to the golden section than 38 and 62"*. An equally good approximation to the golden section exists in the second movement of this sonata. The third movement, however, deviates from the golden section.

In total PUTZ examined 29 movements from MOZART's piano sonatas – the ones that consist of two distinct sections. Then he plotted the number of measures in each movement so that some of the results fitted the golden section very well indeed, although others did not. Further comments on MOZART and number were given by GRATTAN GUINESS (1992) and by WHITTAKER (1998). This last work incorporated a study of MOZART's Magic Flute and demonstrates that the introduction comprises a ratio of 81:130 bars of music which is a golden proportion of 0.623.



Figures 4 and 5
Two portions of the autograph score (KOEHLER Karl Heinz 1979) showing the MOZART-induced corrections and the total bar count (49) in MOZART's own hand. MOZART clearly very carefully counted the bars in this piece of music to adjust and correct the total number of bars from 50 to 49: see in particular FREYHAN (1986, 1991 & 2006).



Another prime example of numerology which in addition also brings in astrology was mentioned by WHITTAKER (1998). This was the recognition of a *'leitmotif'* in many parts of the opera, of a descending 7-note scale which appears prominently in many parts of the opera but especially in the duet *'Bei Maennern'* sung by Pamina and Pagageno (as item number 7) that is the magic number 7. For example, the older alchemy and related magic which wanted to create a sympathetically constructed work of art would need to attract or to simulate the bringing down of the desired good influences from the celestial sphere, (say, from the star of first magnitude Cor Leonis or Regulus such as in the case of alchemy via the seven planetary spheres down to the Earth by using a descending scale of seven notes. Another use of numerology is the fact that MOZART went to such great trouble to count many of the bars in much of the Magic Flute, which is obvious from the autograph score (see KOEHLER, 1979). In particular the duet *'Bei Maennern'* (Figures 4 and 5) shows how MOZART regularly counted the bars and the trouble he took to ensure that the final magic number 49 (7x7) bars is present in the duet. In the figures illustrated the numbers are shown in MOZART's own handwriting, from the autograph score.

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