

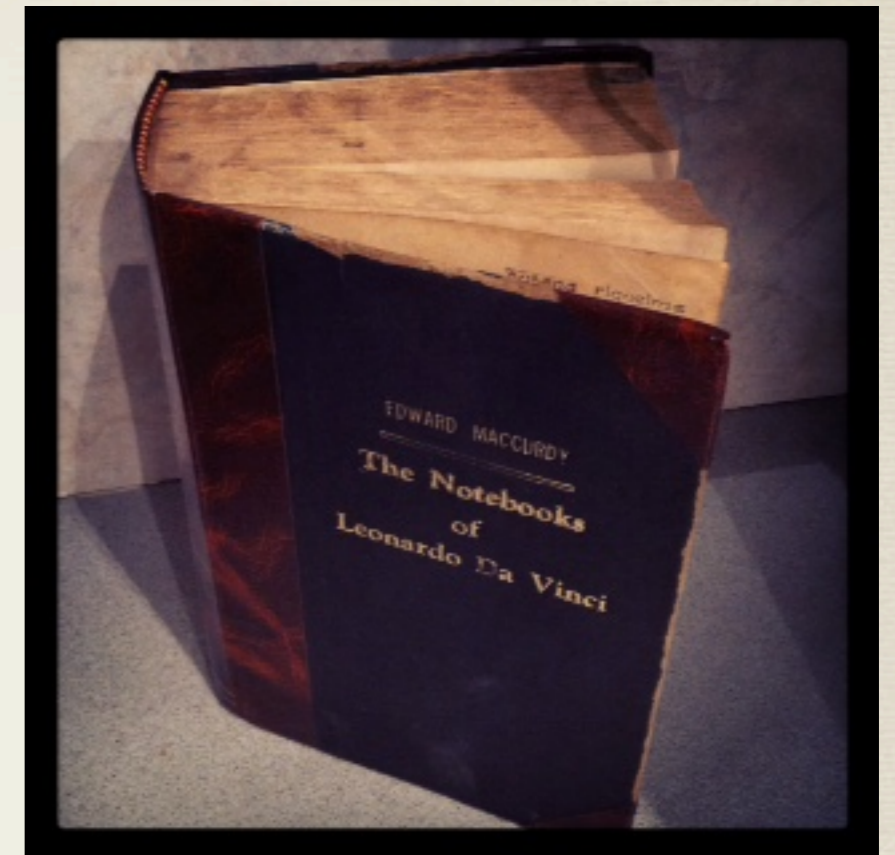
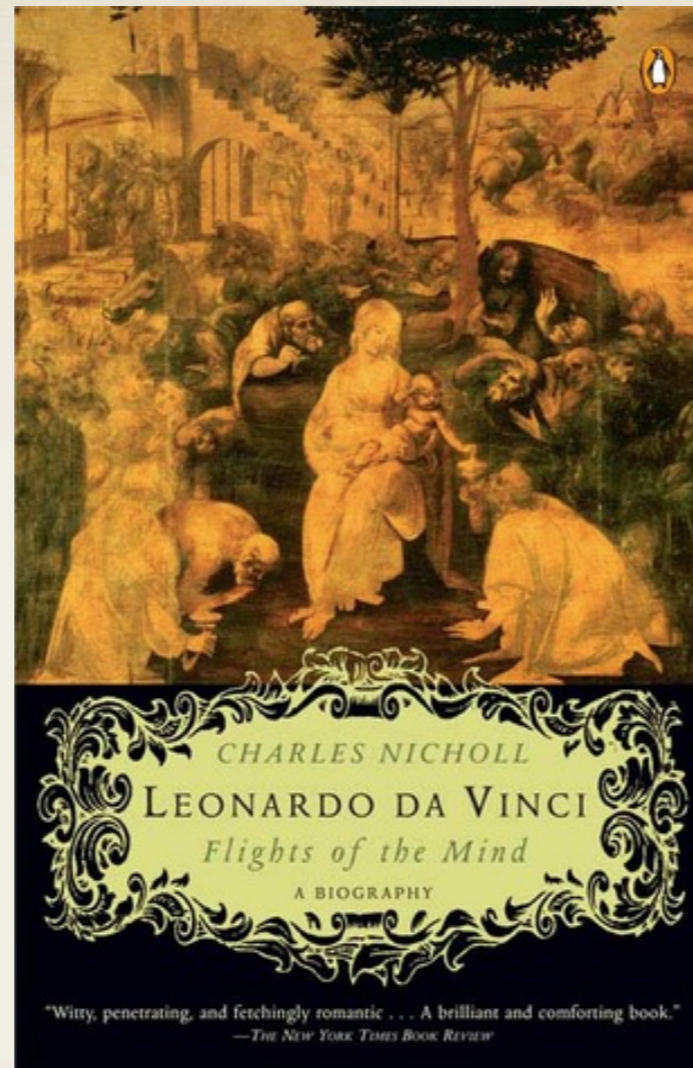
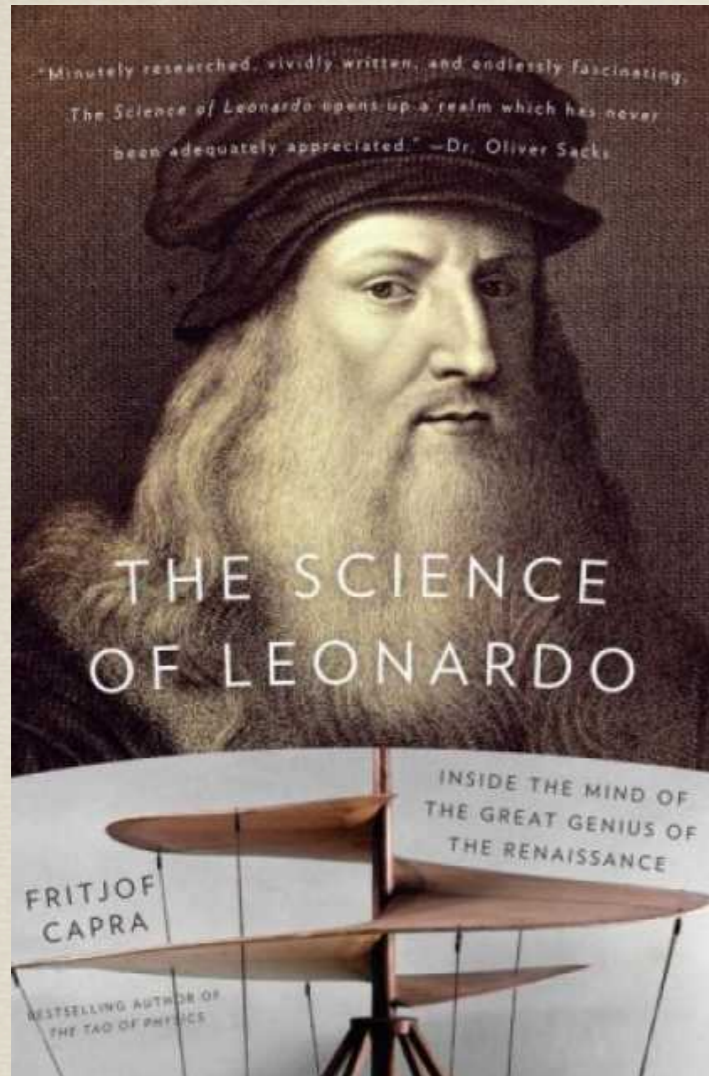


# LEONARDO DA VINCI

Yaron Hadad



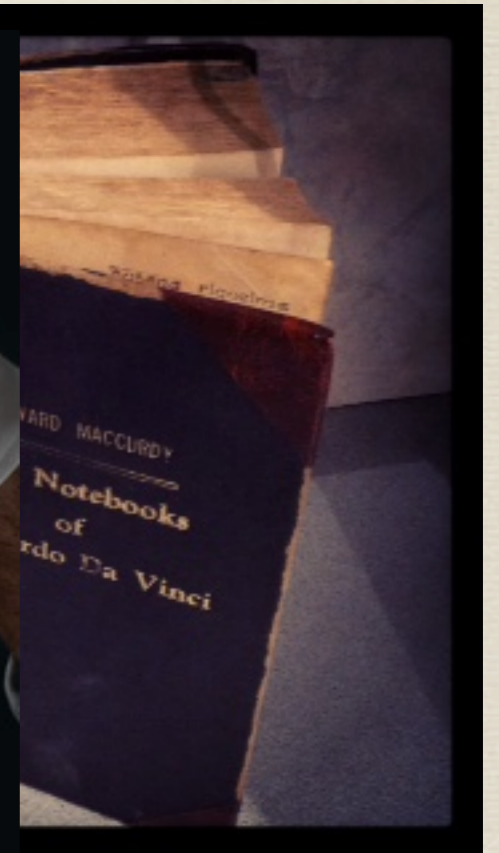
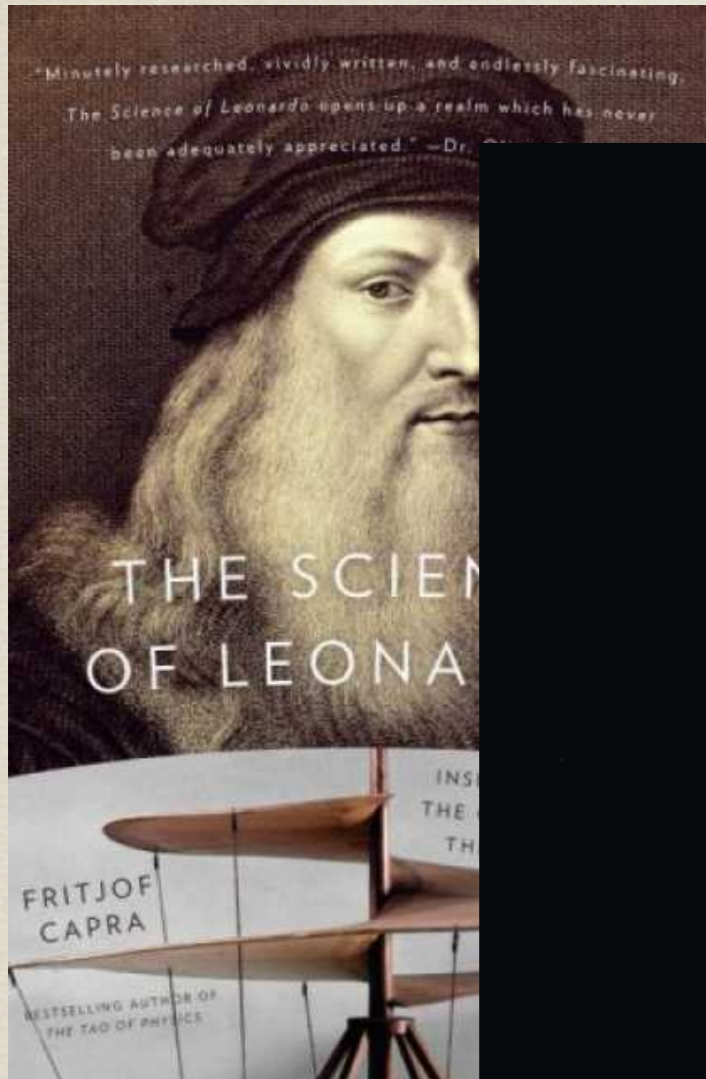
# References



- Giorgio Vasari's "Lives of the Artists" (1550)
- More than 17,000 pages written by Leonardo
- Most of his writings were discovered during the last century (e.g. Madrid 1967) => It is estimated he wrote at least twice this amount



# References



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# What was Leonardo?

- ✂• Painter
- ✂• Sculptor
- ✂• Architect
- ✂• Engineer
- ✂• Inventor
- ✂• Scientist
- ✂• Musician
- ✂• Philosopher
- ✂• Mathematician
- ✂• Anatomist
- ✂• Geologist
- ✂• Cartographer
- ✂• Botanist
- ✂• Writer
- ✂• Producer
- ✂• Mountaineer
- ✂• Futurist
- ✂• Animal rights activist
- ✂• Mountaineer
- ✂• Zoologist
- ✂• Costumes designer
- ✂• Mechanist
- ✂• Astronomer
- ✂• Story teller
- ✂• Joker
- ✂• Viticulturist

“...undoubtedly the most curious man who ever lived.”  
(The art historian Kenneth Clark)



# Childhood (1452-1466)

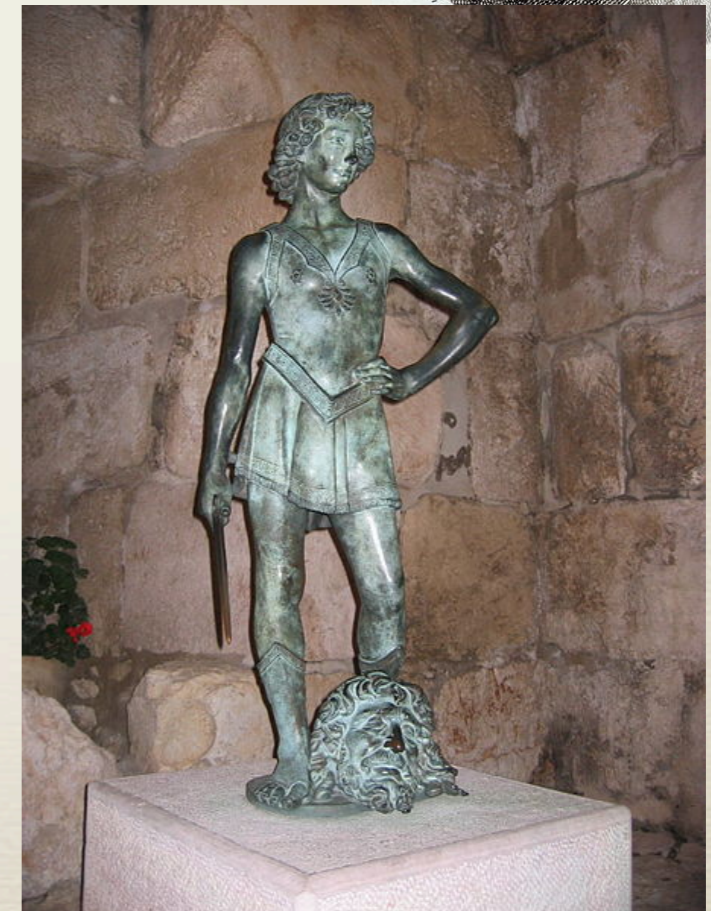
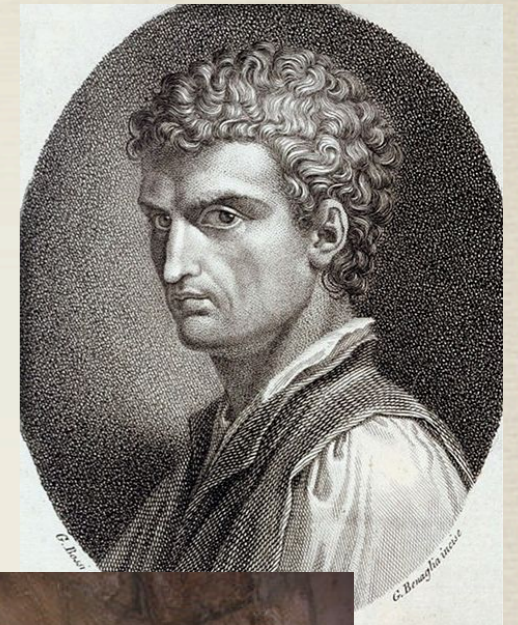
- \* Born on April 15, 1452 in the town of Vinci in Tuscany
- \* Out-of-wedlock son of Messer Piero da Vinci (wealthy legal notary) and Caterina (probably a peasant)
- \* Both of his parents married (his dad three times) to other people.
- \* Lived for five years with his mom, then until 1466 with his dad.
- \* In his 50's he mentions his first memory of himself, as a baby in a cradle being hit by a falcon in his face





# Apprenticeship (1466-1477)

- \* In 1466 his dad arranged Leonardo to do an apprenticeship at the workshop of Andrea del Verrocchio in Florence.
- \* Leonardo's role model was Leon Battista Alberti.
- \* It is believed that Leonardo was the model of Verrocchio's David sculpture (1466)
- \* Vasari describes in details many exercises by Leonardo, none of which is present today. They are described as the work of a true master.
- \* In 1475 his dad married again and had a second child, who became his legal heir.





# Apprenticeship (1466-1477)



Ginevra de' Benci  
(~1474)



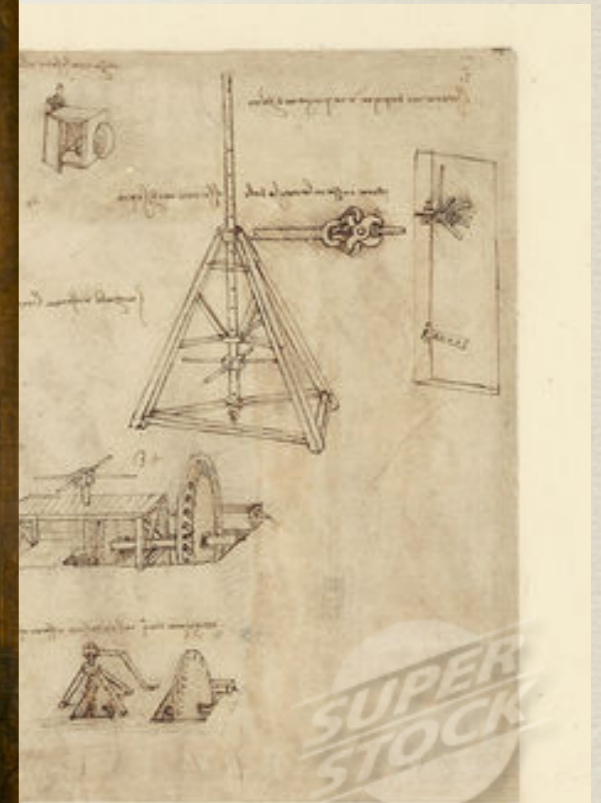
- \* Vasari claims that after Leonardo drew the angel in the 'Baptism of Christ' in a manner so superior to his master's, Verrocchio put down his brush and never painted again.



# Leonardo's Workshop (1477)

- \* In the 90's a letter from 1478 discussing the young Paulo da Leonardo, an Italian mechanical engineer
- \* It turned out that Leonardo was not only a painter but also a mechanical engineer
- \* Designed numerous musical instruments and devices to improve the human condition
- \* Started working on the design of a flying machine
- \* Composed the first opera, *L'Orchestra*
- \* Drew the *Ad Vitruvium* and *Ad Vitruvium* when he left to Milano.

Machines to lift water, lantern and prison gate





# Letter to Duke of Milano

Having, most illustrious lord, seen and considered the experiments of all those who pose as masters in the art of inventing instruments of war, and finding that their inventions differ in no way from those in common use, I am emboldened, without prejudice to anyone, to solicit an appointment of acquainting your Excellency with certain of my secrets.

1. I can **construct bridges** which are very light and strong and very portable, with which **to pursue and defeat the enemy**; and others more solid, which resist fire or assault, yet are easily removed and placed in position; and **I can also burn and destroy those of the enemy**.
2. In case of a siege I can cut off water from the trenches and make pontoons and scaling ladders and other similar contrivances.
3. If by reason of the elevation or the strength of its position a place cannot be bombarded, **I can demolish every fortress if its foundations have not been set on stone**.
4. I can also **make a kind of cannon** which is light and easy of transport, with which to hurl small stones like hail, and of which the smoke causes great terror to the enemy, so that they suffer heavy loss and confusion.
5. I can **noiselessly construct** to any prescribed point **subterranean passages** either straight or winding, passing if necessary underneath trenches or a river.
6. I can **make armored wagons carrying artillery**, which shall break through the most serried ranks of the enemy, and so open a safe passage for his infantry.
7. If occasion should arise, I can construct cannon and mortars and light ordnance in shape both ornamental and useful and different from those in common use.
8. When it is impossible to use cannon I can supply in their stead **catapults**, mangonels, trabocchi, and other instruments of admirable efficiency not in general use—**I short, as the occasion requires I can supply infinite means of attack and defense**.
9. And **if the fight should take place upon the sea** I can **construct** many engines most suitable either for attack or defense and **ships which can resist the fire of the heaviest cannon**, and powders or weapons.
10. In time of peace, I believe that I can give you as complete satisfaction as anyone else in the construction of buildings both public and private, and in conducting water from one place to another.

I can further **execute sculpture in marble, bronze or clay**, also in **painting** I can do as much as anyone else, whoever he may be.

Moreover, **I would undertake the commission of the bronze horse**, which shall endue with immortal glory and eternal honor the auspicious memory of your father and of the illustrious house of Sforza.—

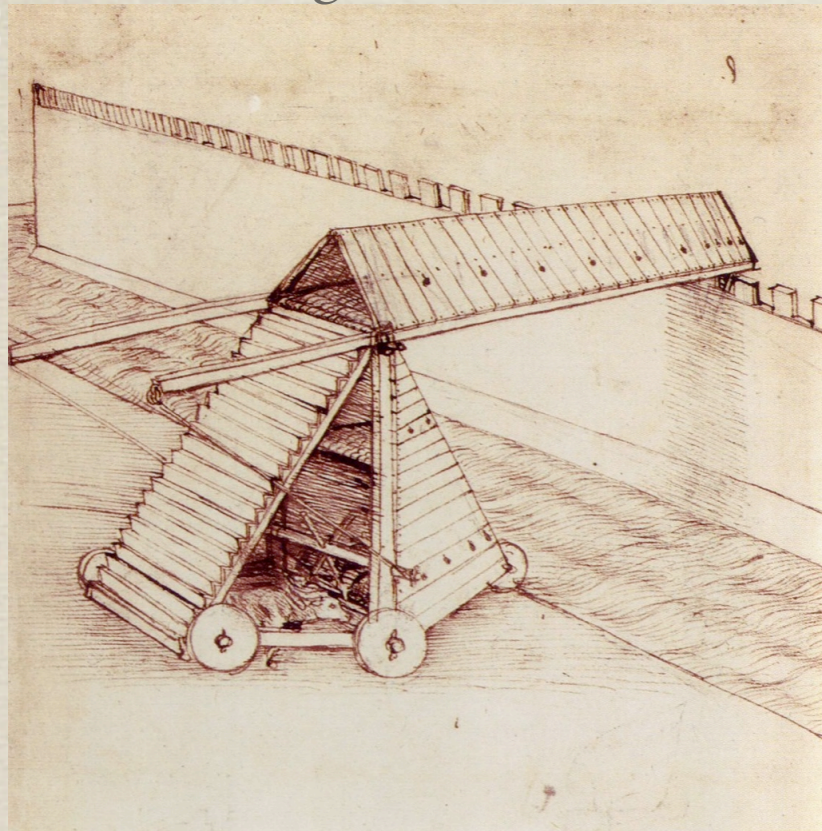
And if any of the aforesaid things should seem to anyone impossible or impracticable, I offer myself as ready to make trial of them in your park or in whatever place shall please your Excellency, to whom I commend myself with all possible humility.

Leonardo Da Vinci

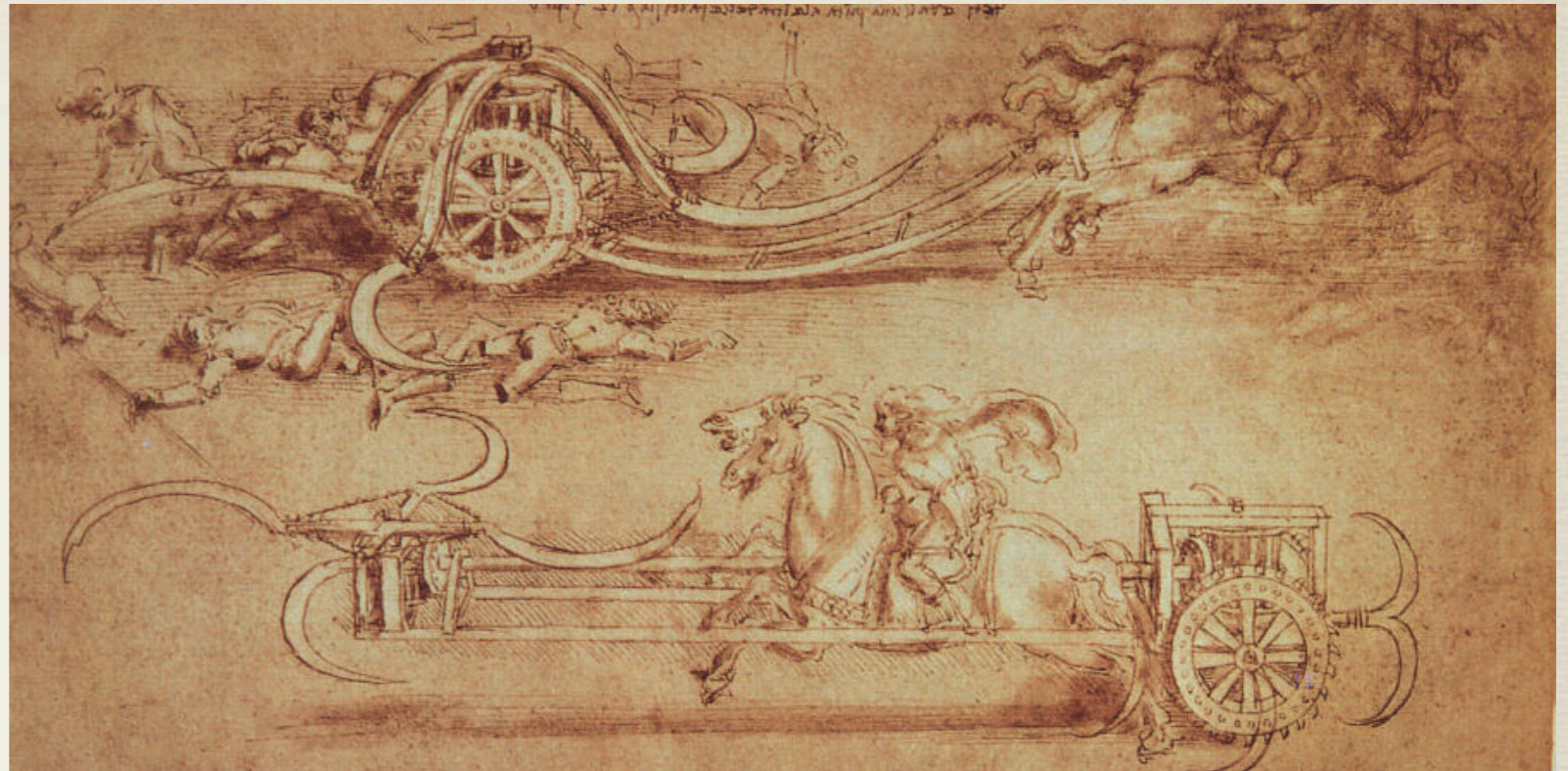


# Weapons

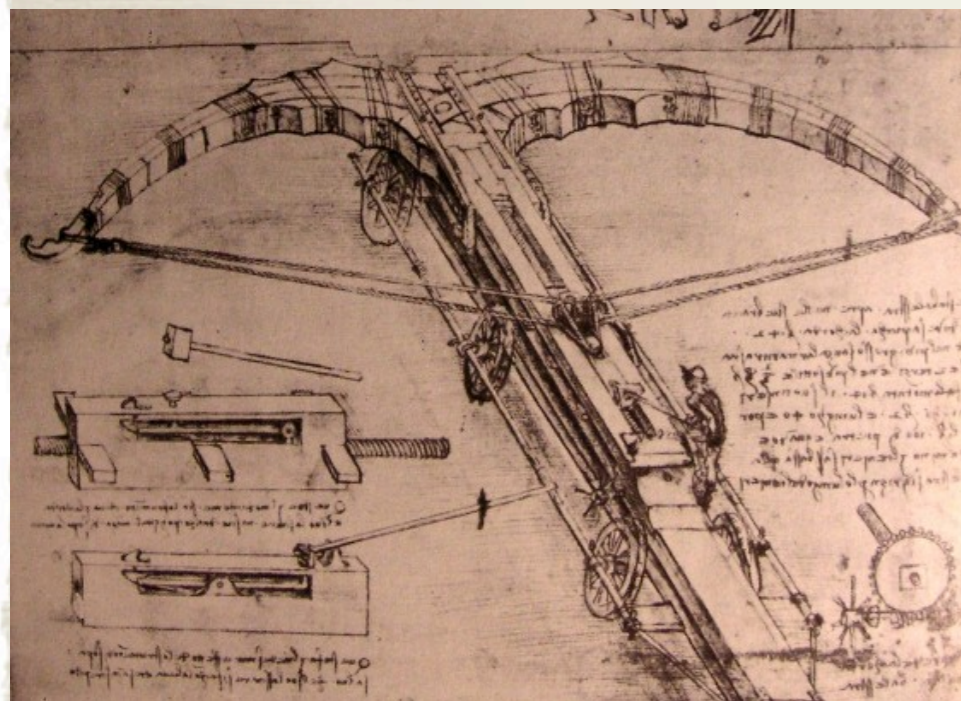
Siege Machine



Assault Chariot

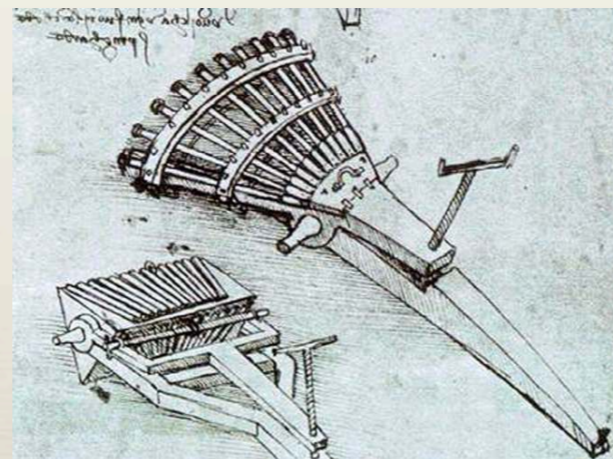


Giant Crossbow



Tank

Organ Gun



[Link to video of tank](#)



# War according to Leonardo

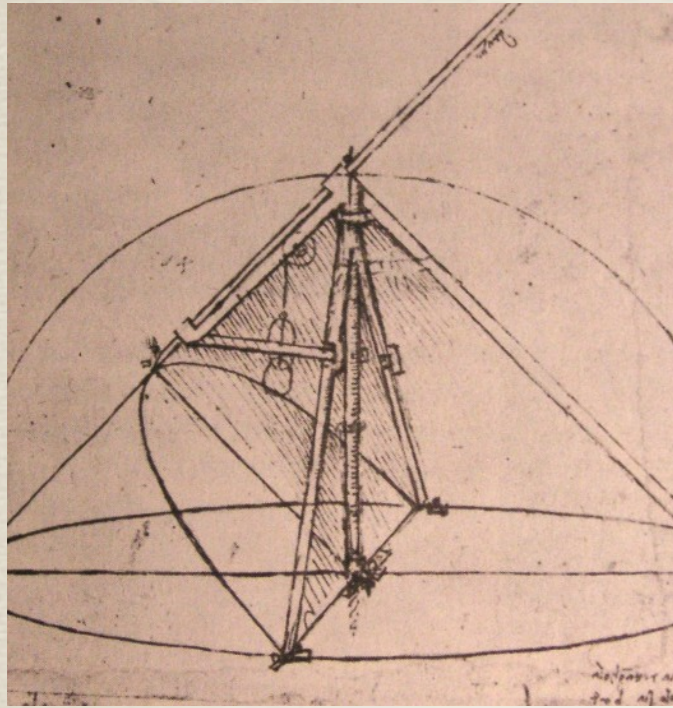




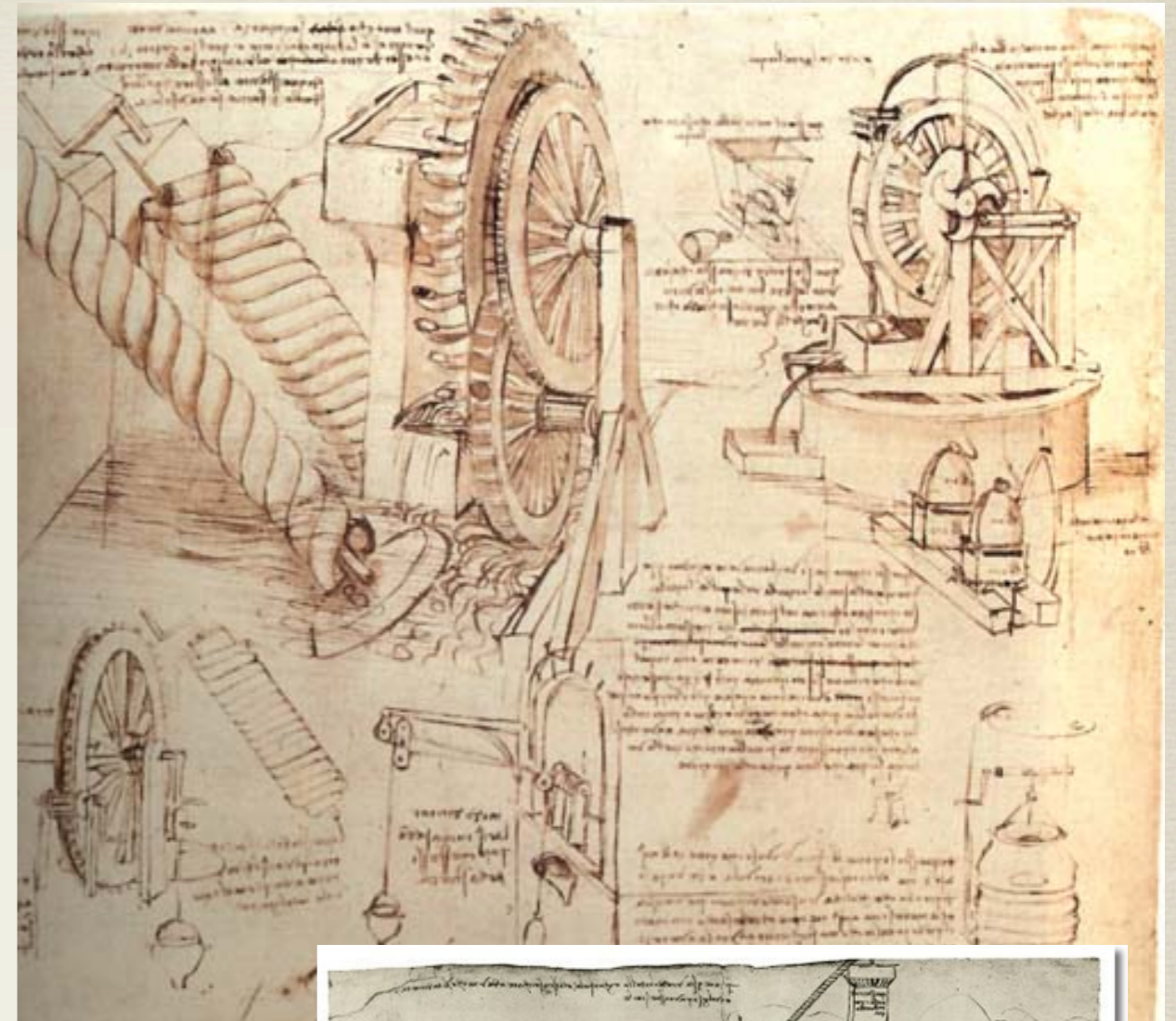
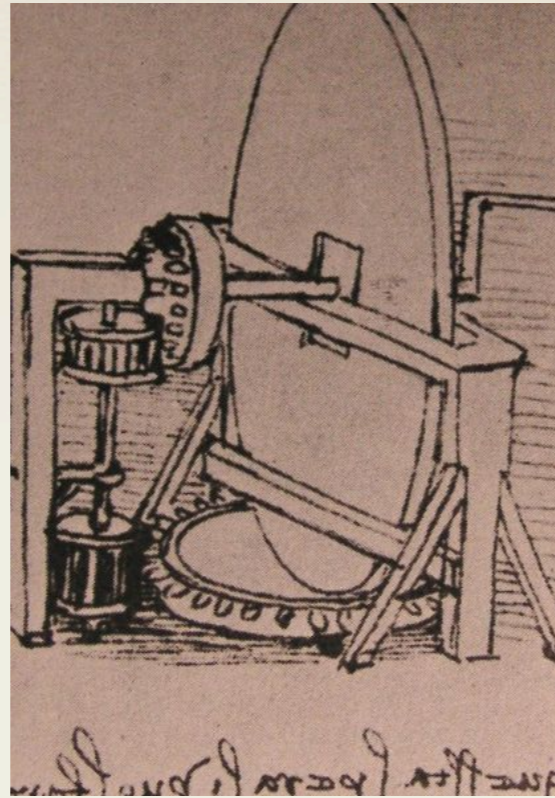
# Machines

Hydraulic Pumps

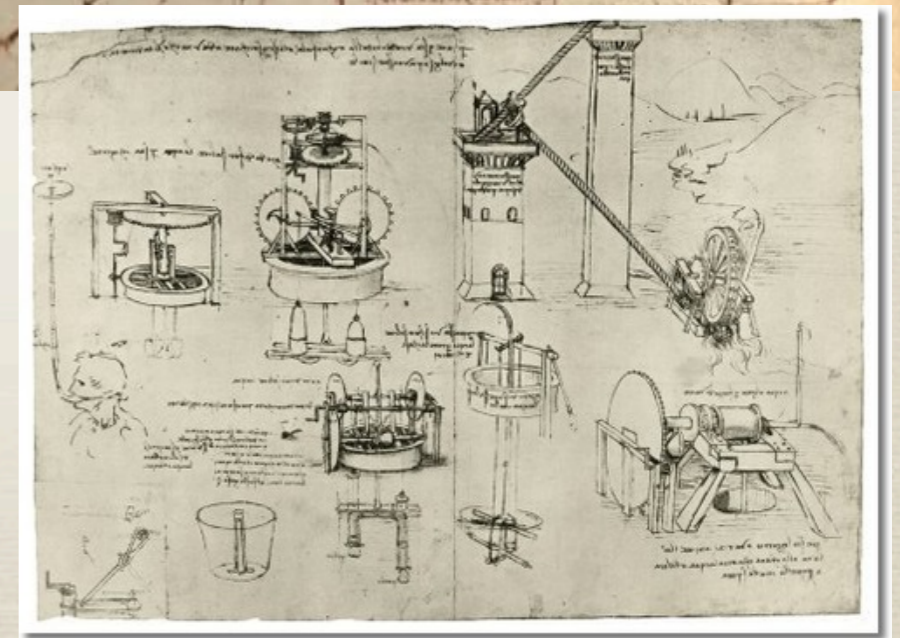
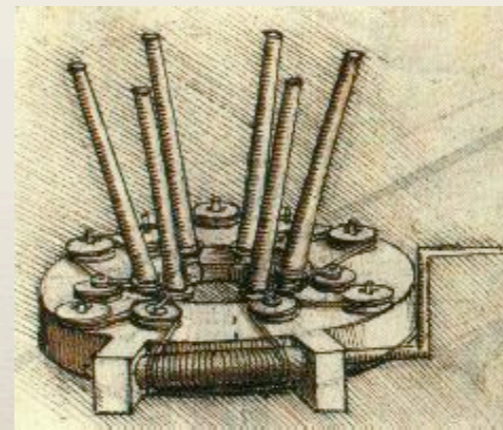
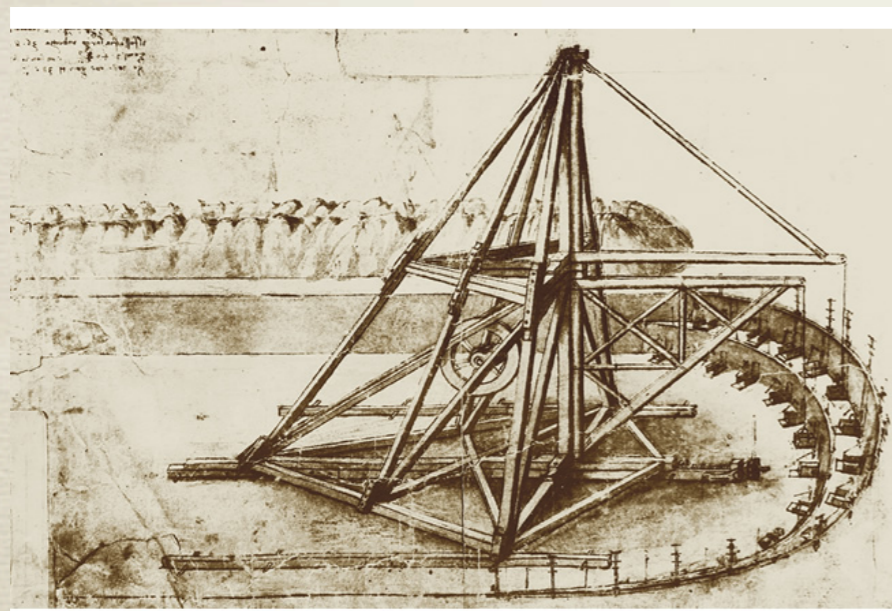
Parabolic Compass



machine for grinding lenses

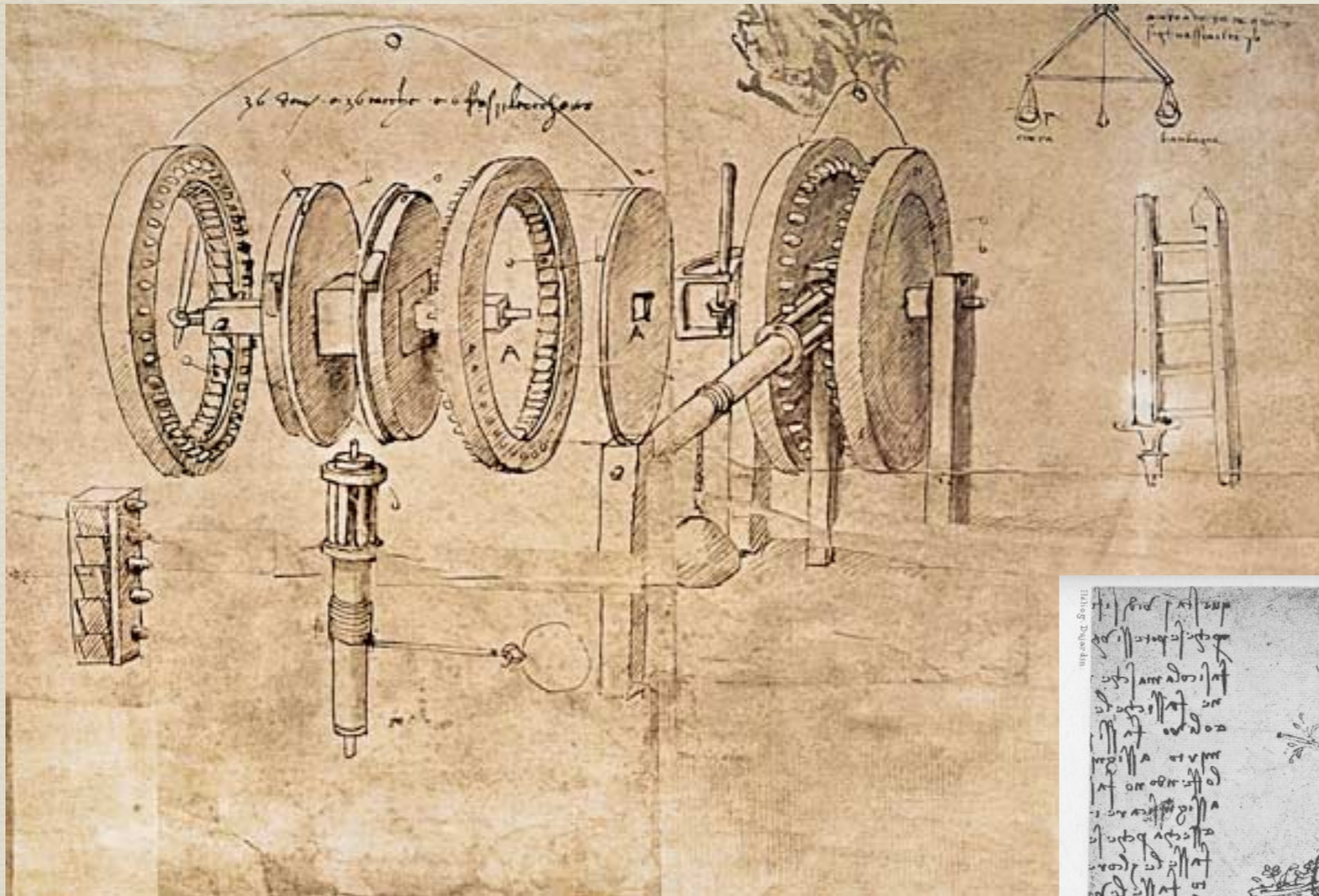


What is this?





# More designs





# Virgin of the Rocks

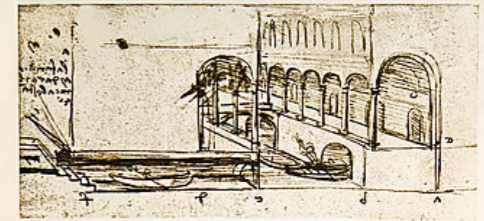
- \* Three versions were made.
- \* Probably because Leonardo did something completely different than what the church asked for.
- \* Art experts consider this to be a special piece since Leonardo did not use a prior sketch of it



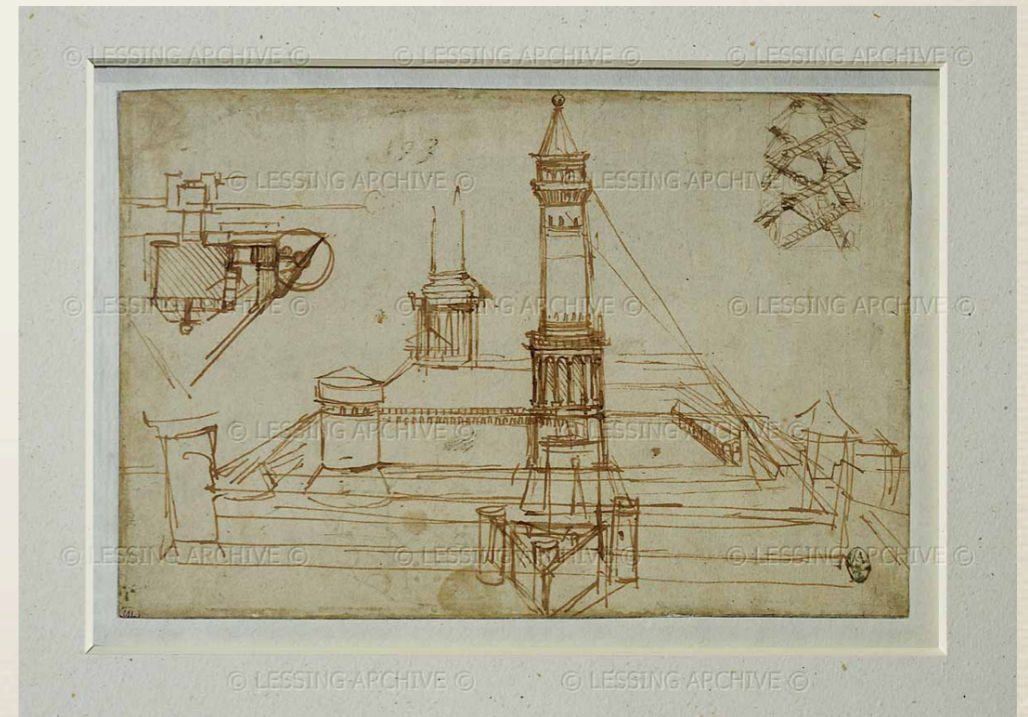
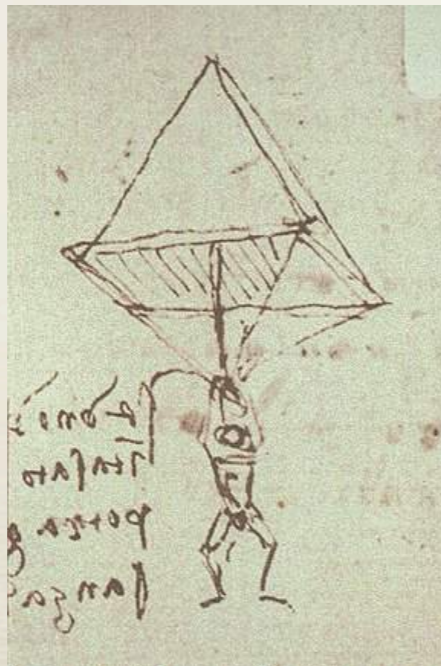


# The 1485 plague

- \* In 1485 a plague started in Milano.
- \* Leonardo developed a (false?) medicine for it
- \* Due to the chaos in the streets, he started his interest in city architecture. He designed 'the ideal city'. Later he also designed machines to escape the city..

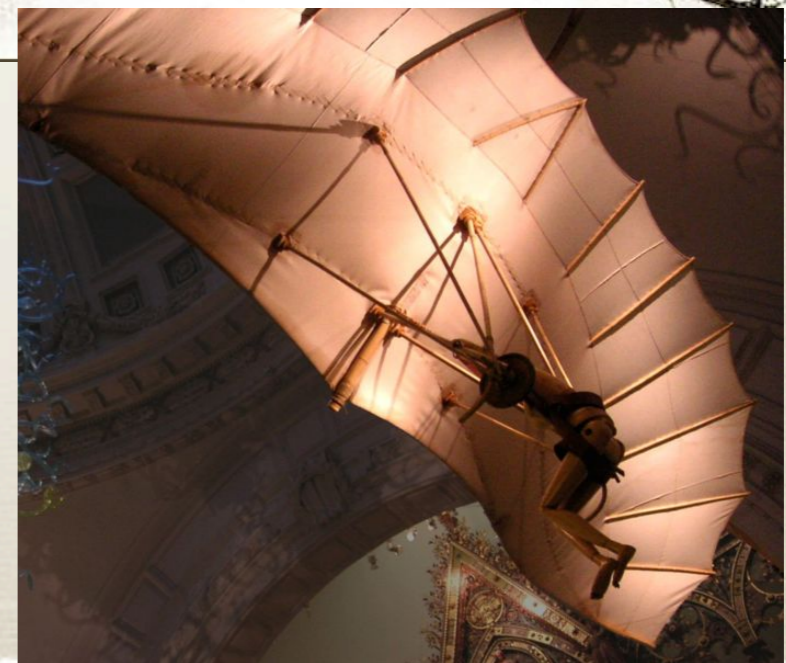
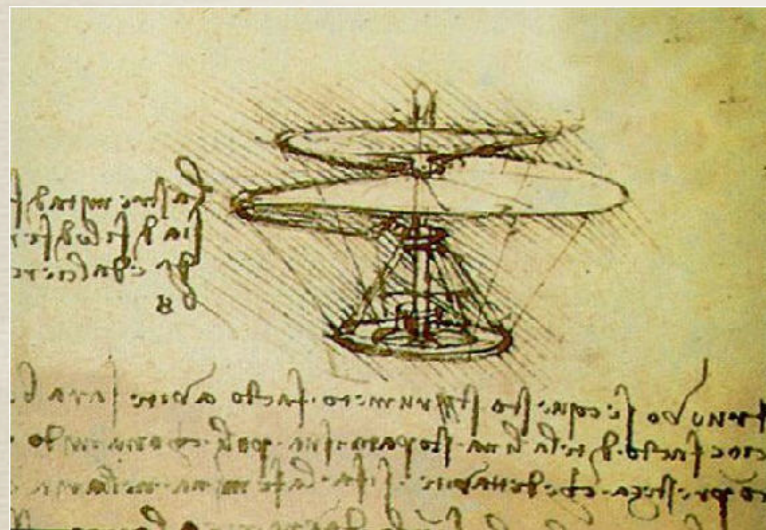
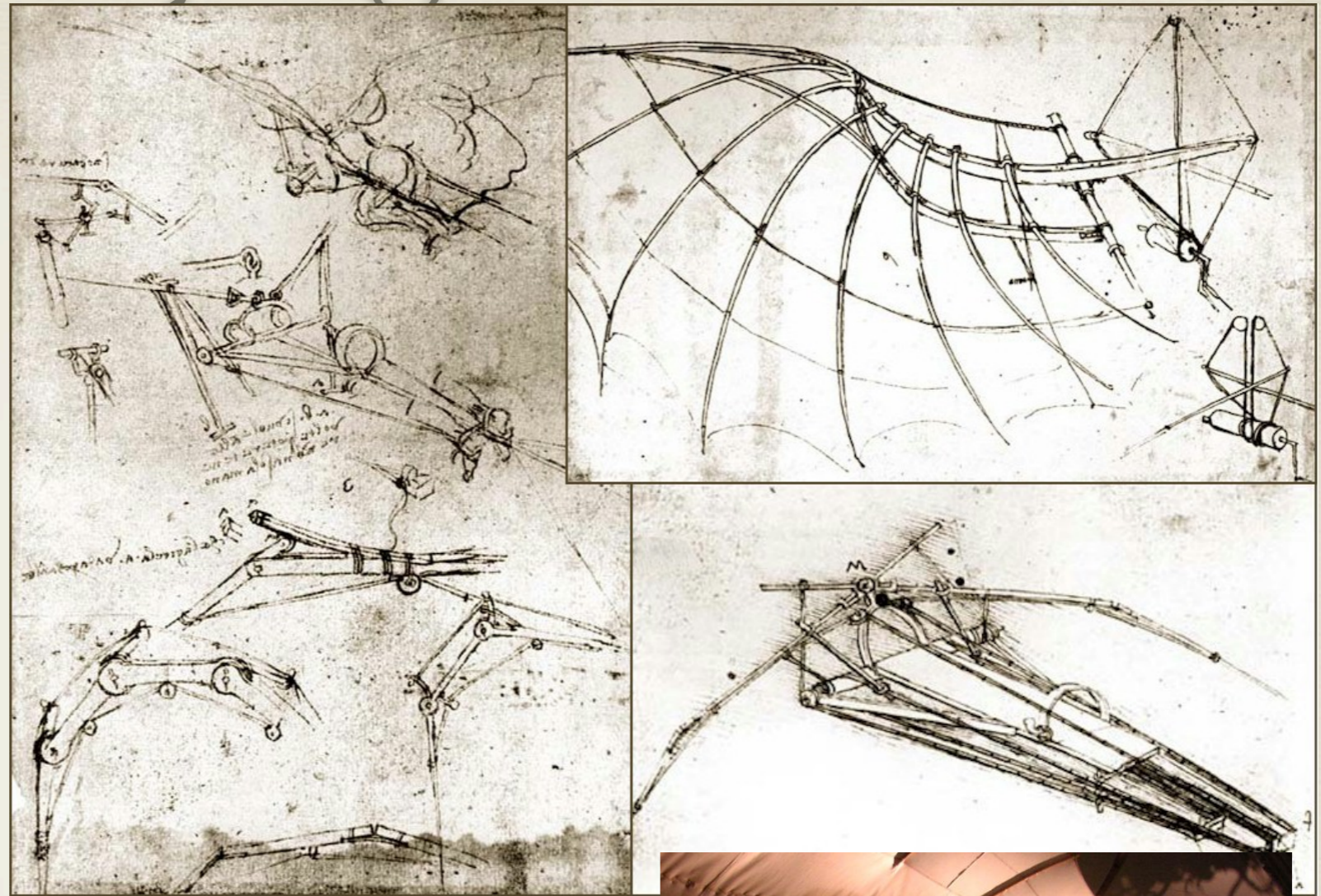
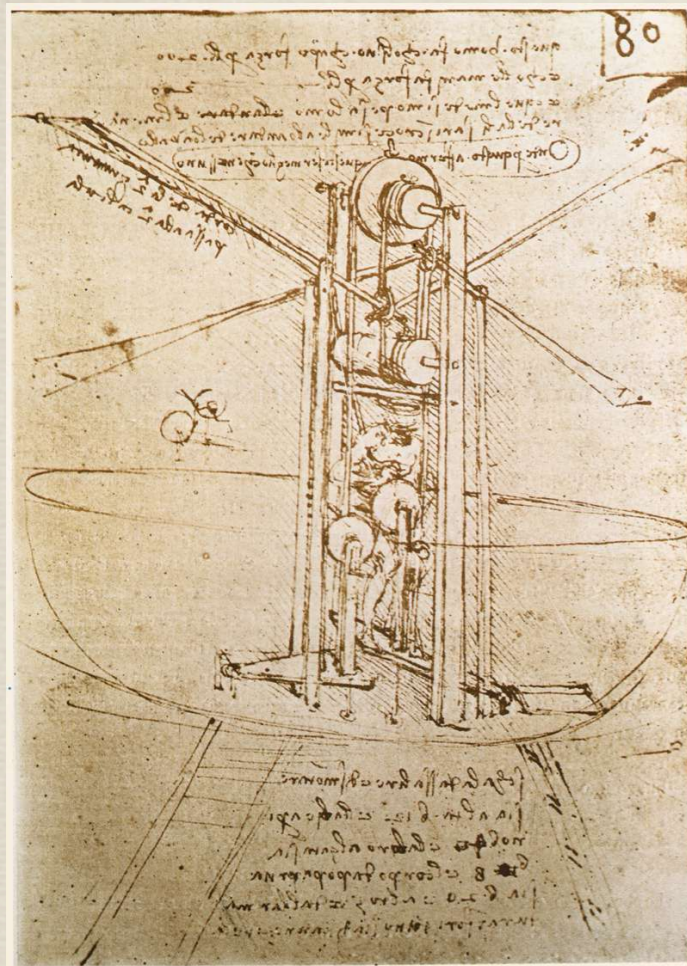


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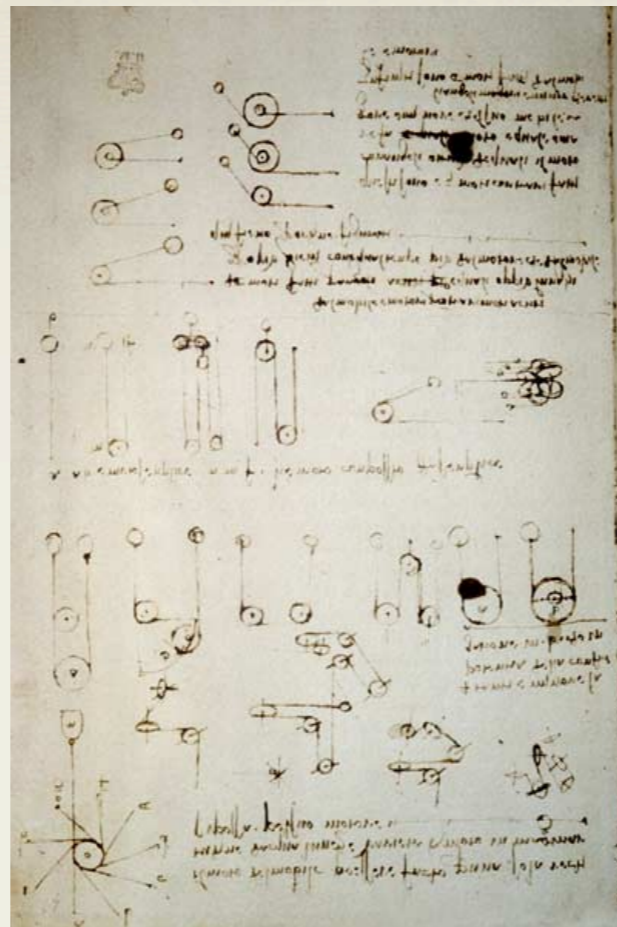
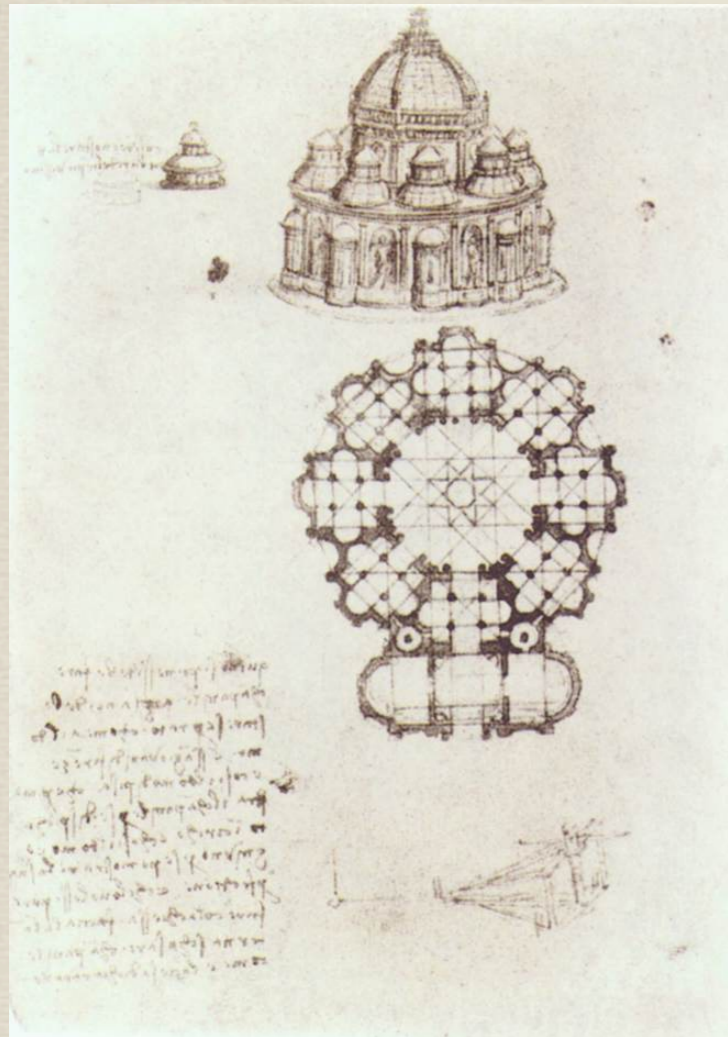


# More flying machines

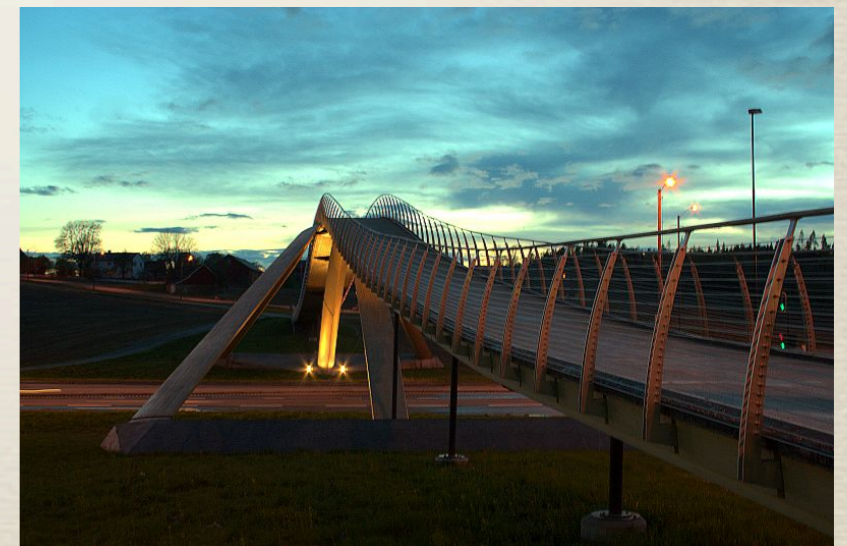
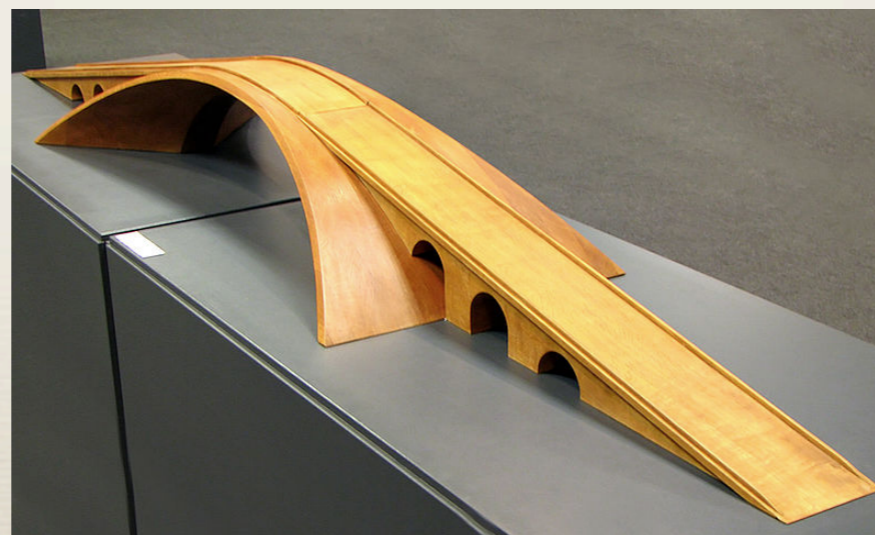
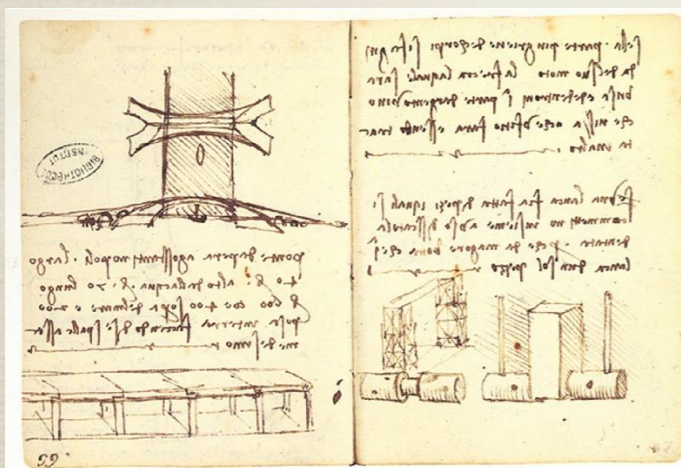




# More designs



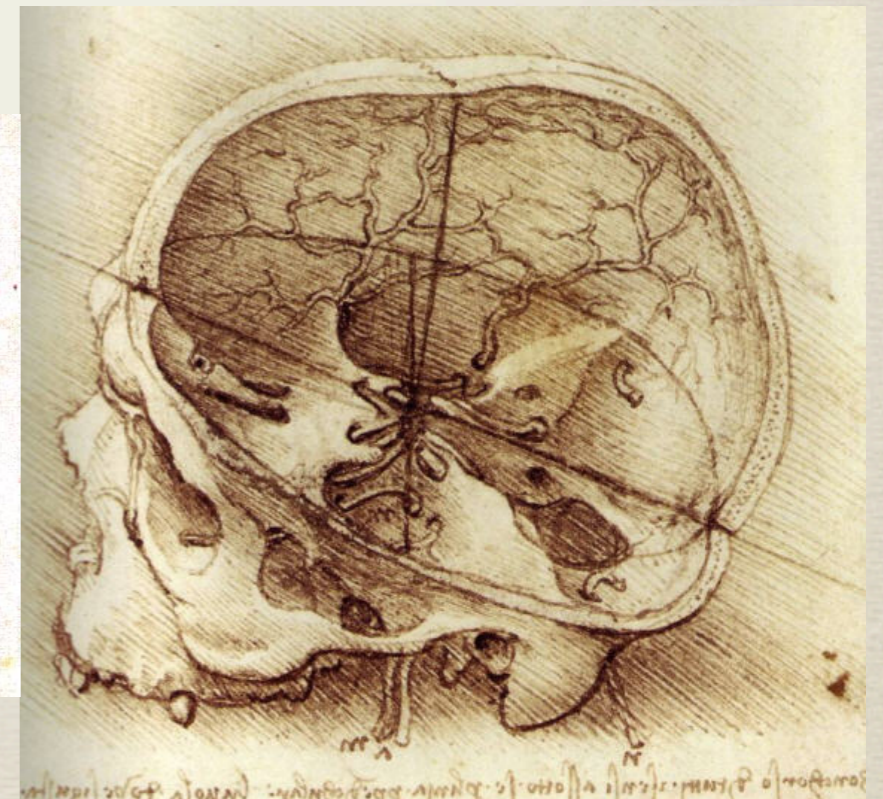
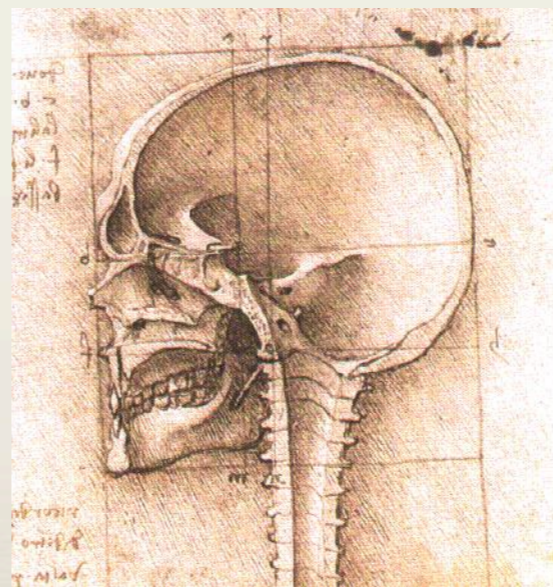
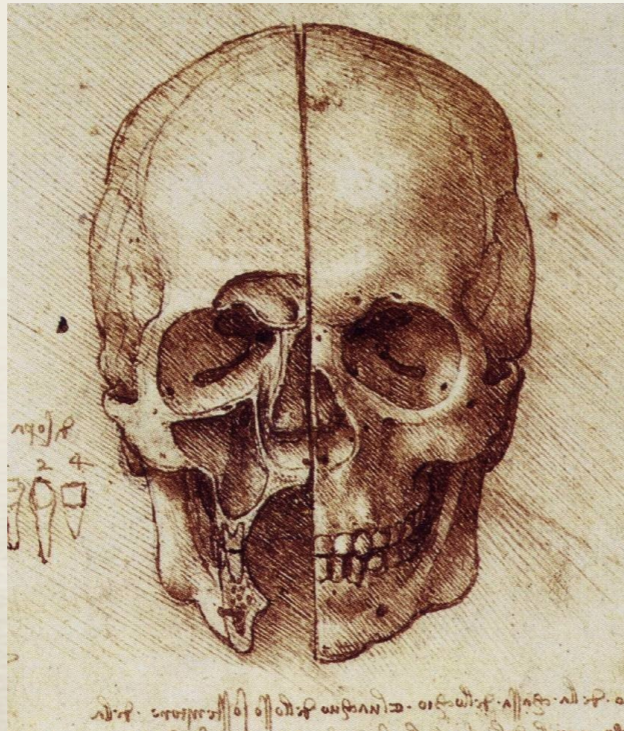
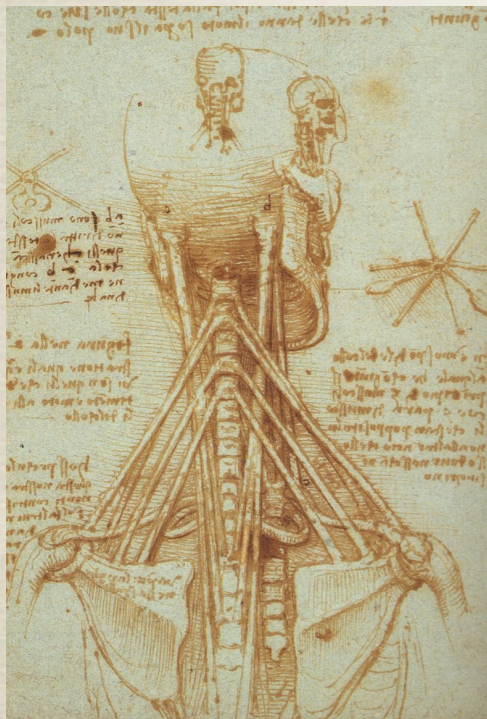
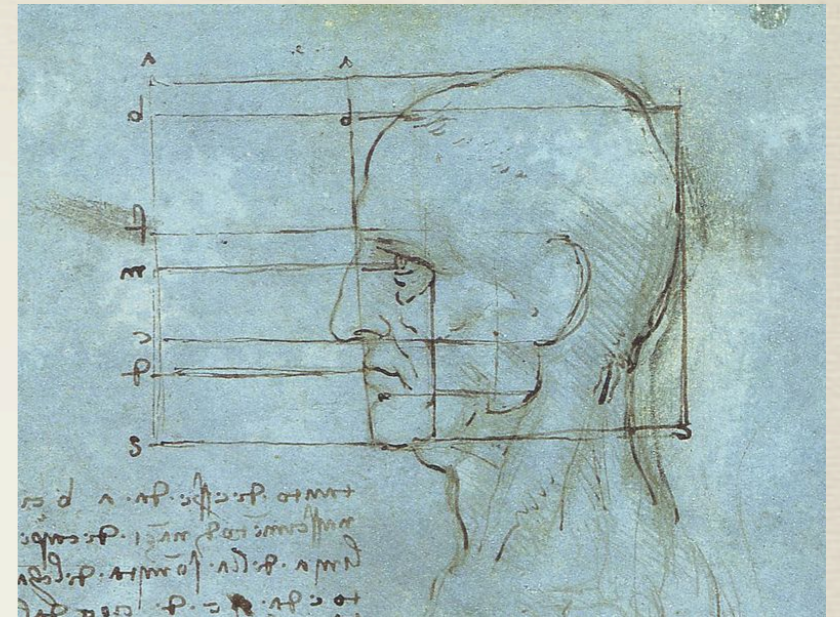
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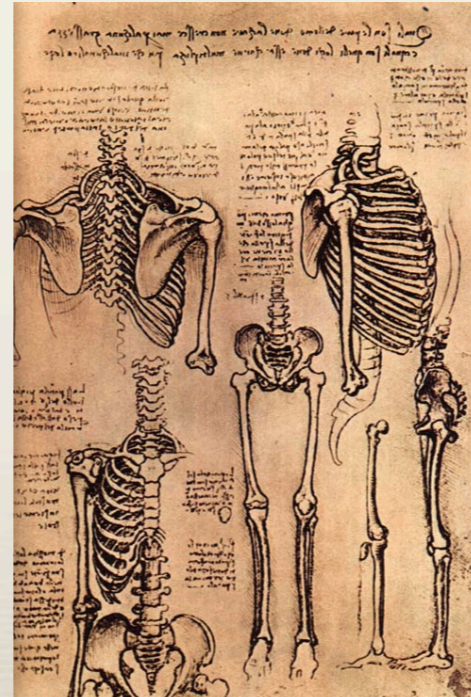
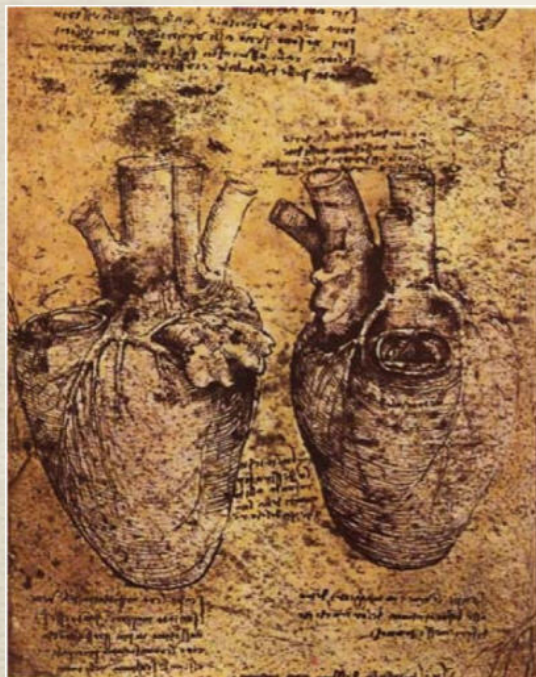
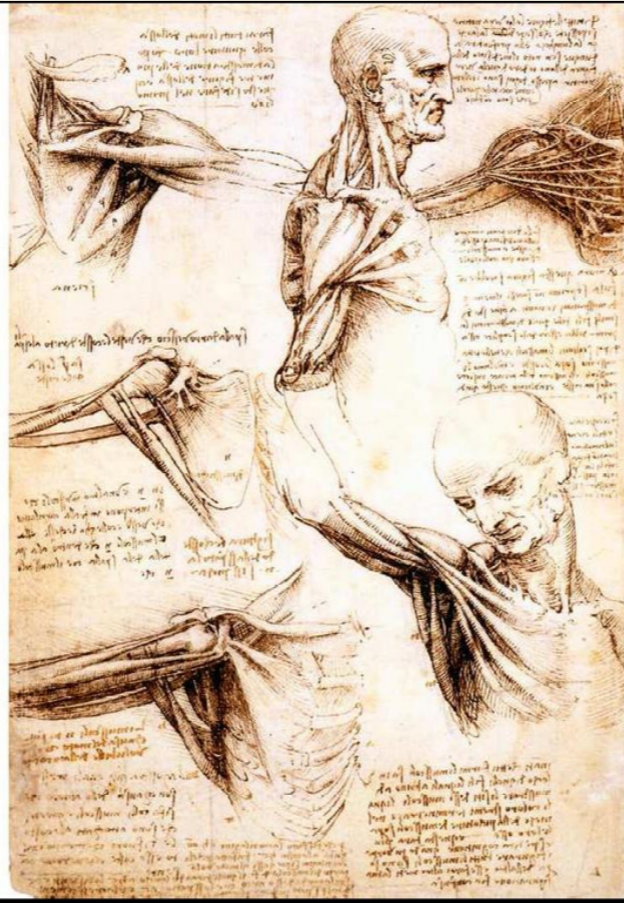
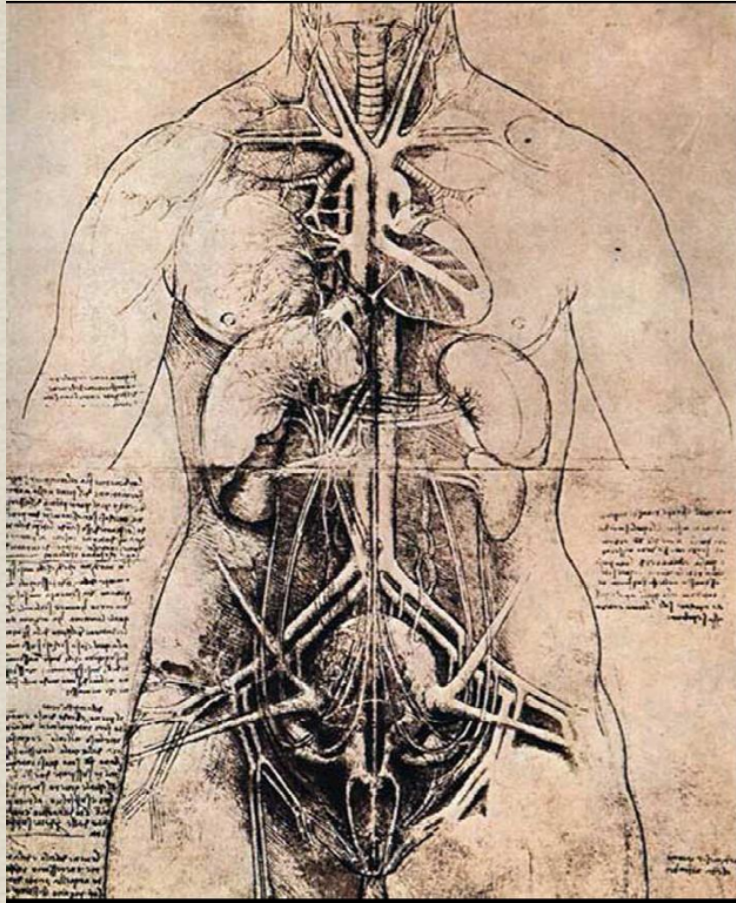
# Anatomy (1480-1509)

- \* In the last 1480's Leonardo start his interest in anatomy
- \* In 1489 he mentioned in his notebook his treatise 'De figura umana' (lost piece).
- \* He listed every muscle, tendon and bone, including what happens to the rest of the body when each muscle is moved separately.





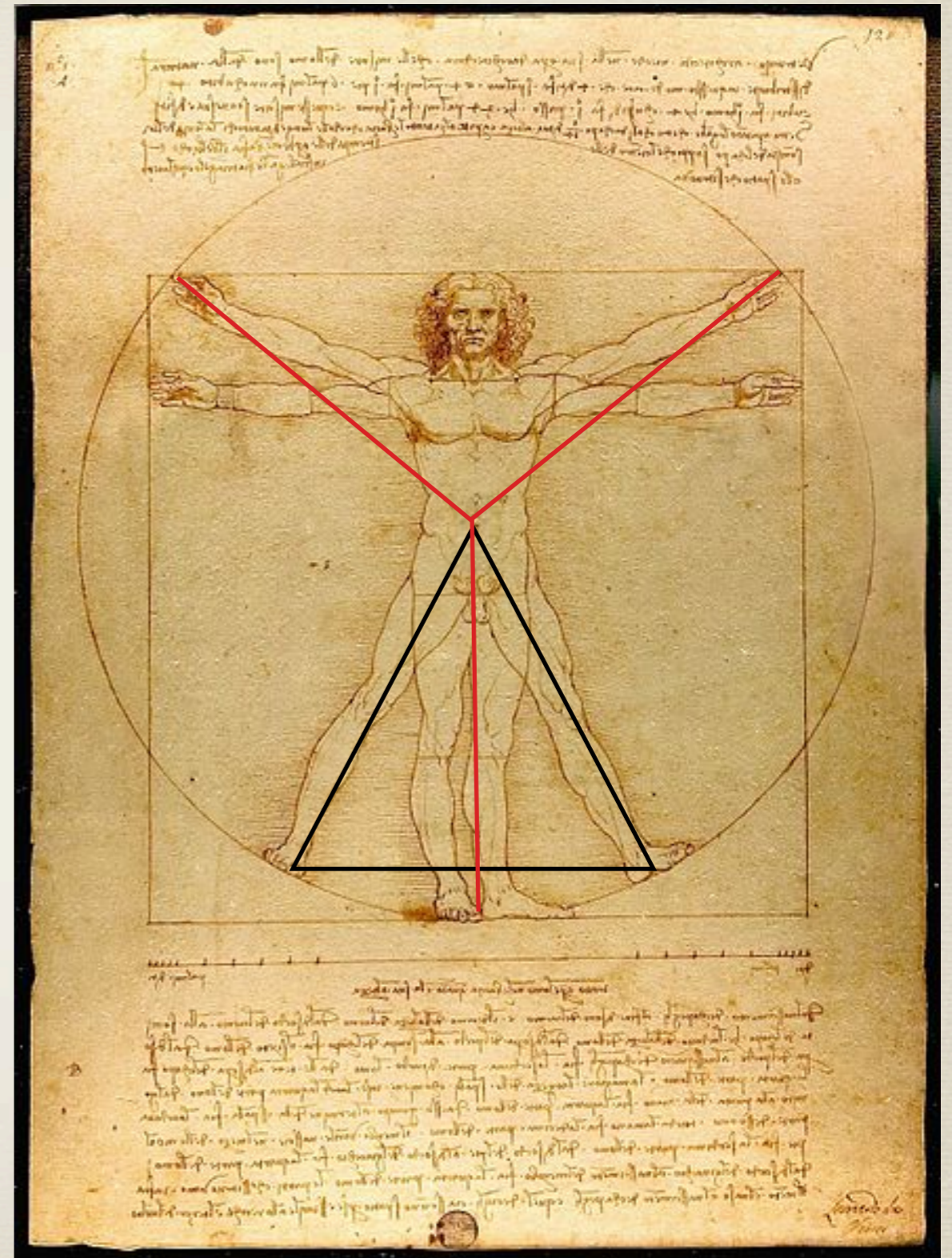
# Anatomy





# The Vitruvian Man (1487)

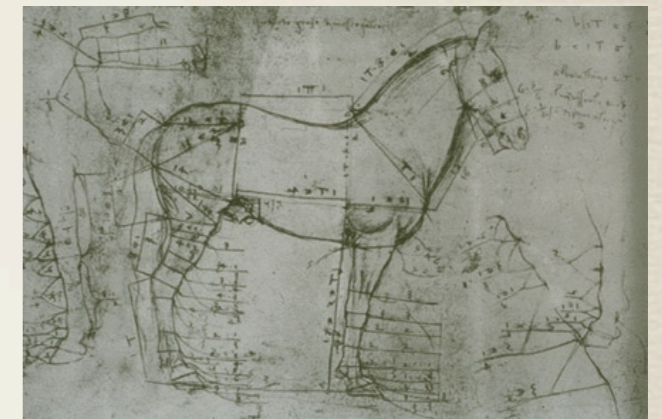
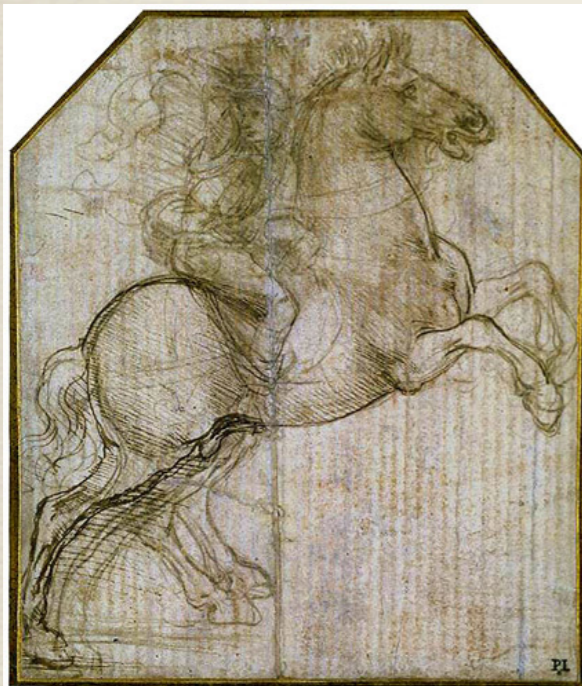
- \* The Vitruvian man is probably Leonardo da Vinci
- \* Found dozens of geometrical relationship in our body, for example:  
“if you open your legs enough that your head is lowered by one-fourteenth of your height and raise your hands enough that your extended fingers touch the line of the top of your head, know that the centre of the extended limbs will be the navel, and the space between the legs will be an equilateral triangle”





# Leonardo's horse (1482-92)

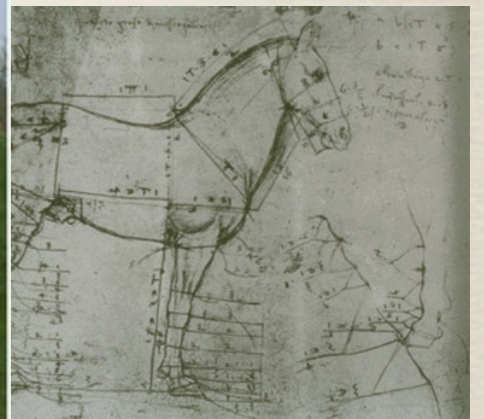
- \* The sculpture was commissioned of Leonardo da Vinci in 1482 by Duke of Milan Ludovico il Moro for his dad.
- \* In 1492 he finished a clay model (was destroyed later in a war)
- \* The bronze used for the casting of the horse ended up used for cannons...





# Leonardo's horse (1482-92)

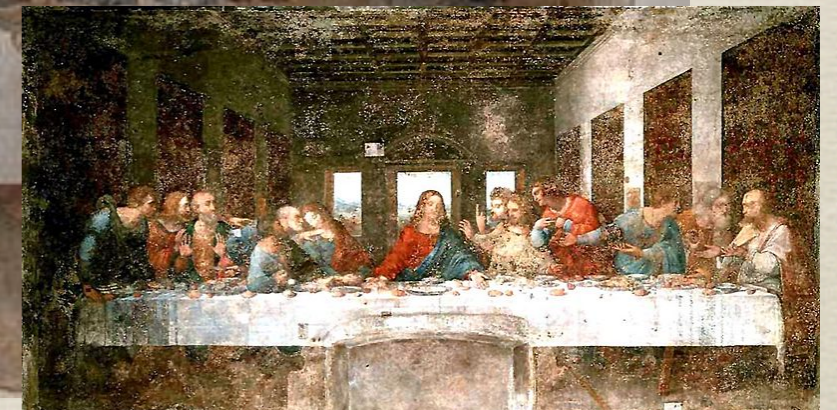
- \* The sculpture was commissioned of Leonardo da Vinci in 1482 by Duke of Milan L...
- \* In 1492
- \* The bro... annons...





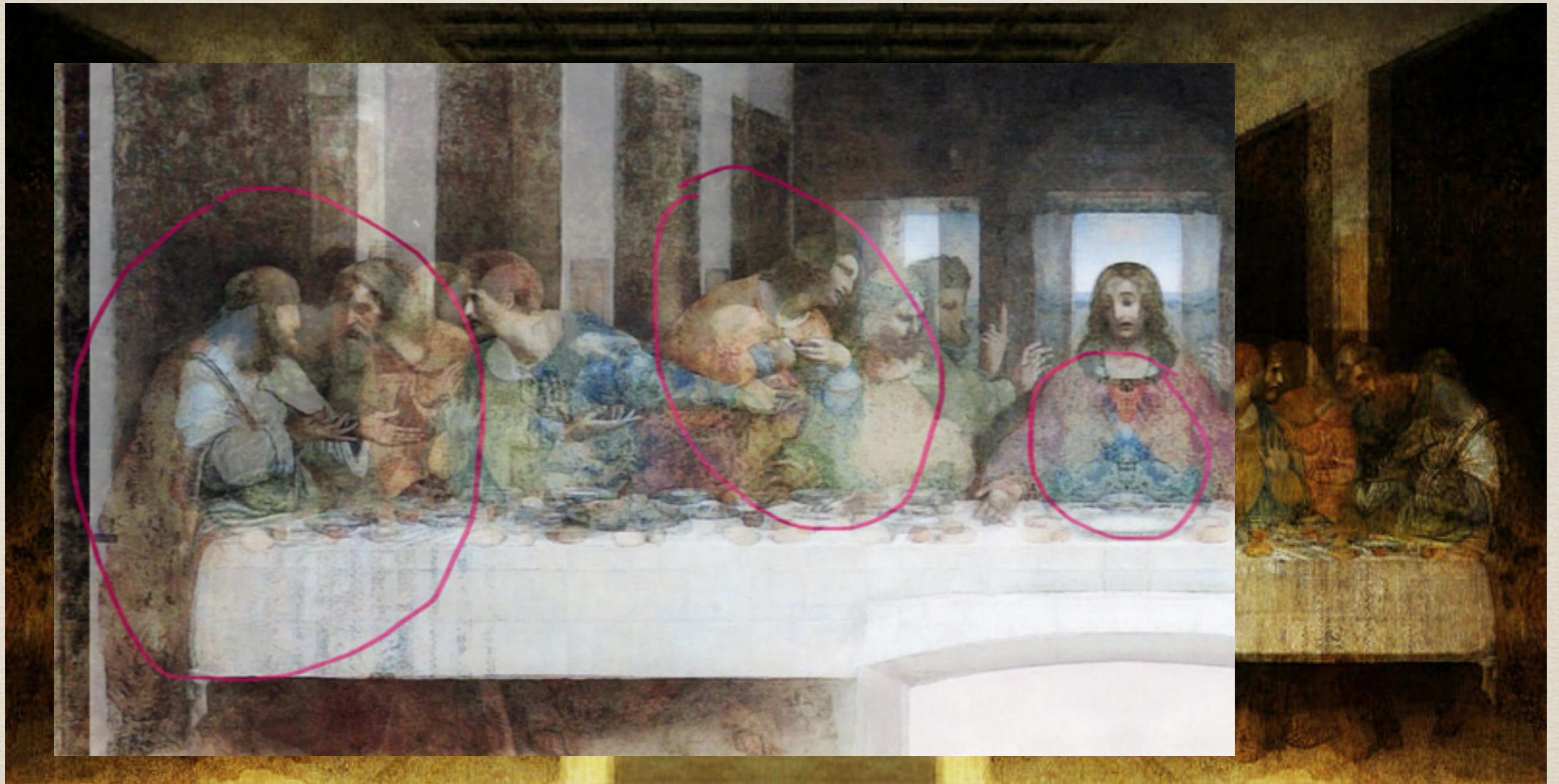
# The Last Supper (1495-8)

- \* Created for his patron Duke Ludovico Sforza
- \* Located at the monastery of Santa Maria delle Grazie in Milan.
- \* It is the most reproduced religious painting of all time.





# The Last Supper (1495-8)





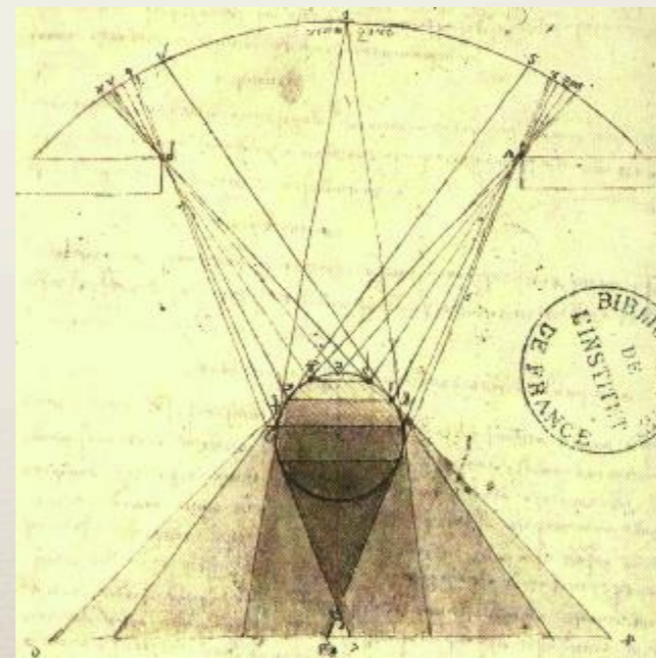
# Leonardo the Scientist

- \* Ertijof Capra: “experimentation followed clear scientific method approaches, and his theorising and hypothesising integrated the arts and particularly painting; these, and Leonardo's unique integrated, holistic views of science make him a forerunner of modern systems theory and complexity schools of thought.”
- \* “I cannot quote from eminent authors as they can, these trumpeters and reciters of the works of others. I know that all knowledge is vain and full of error when it is not born of experience, and so experience will be my mistress.”

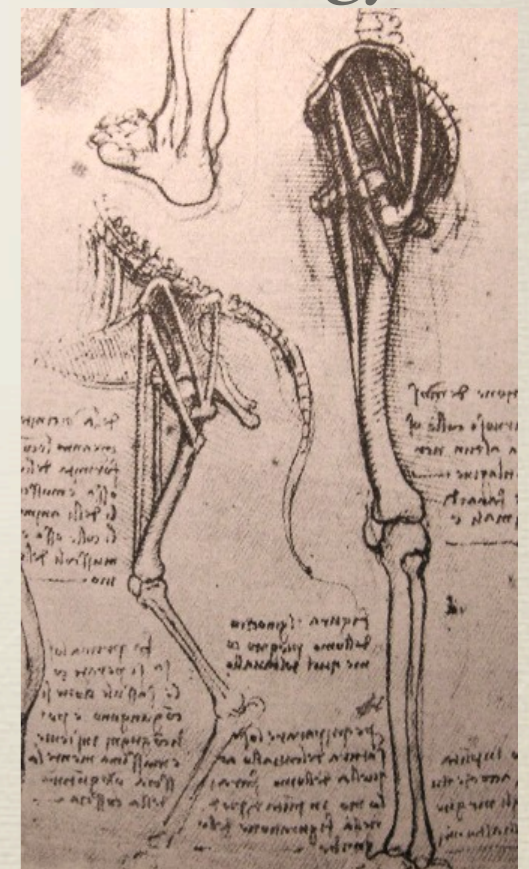
Perspective



Optics



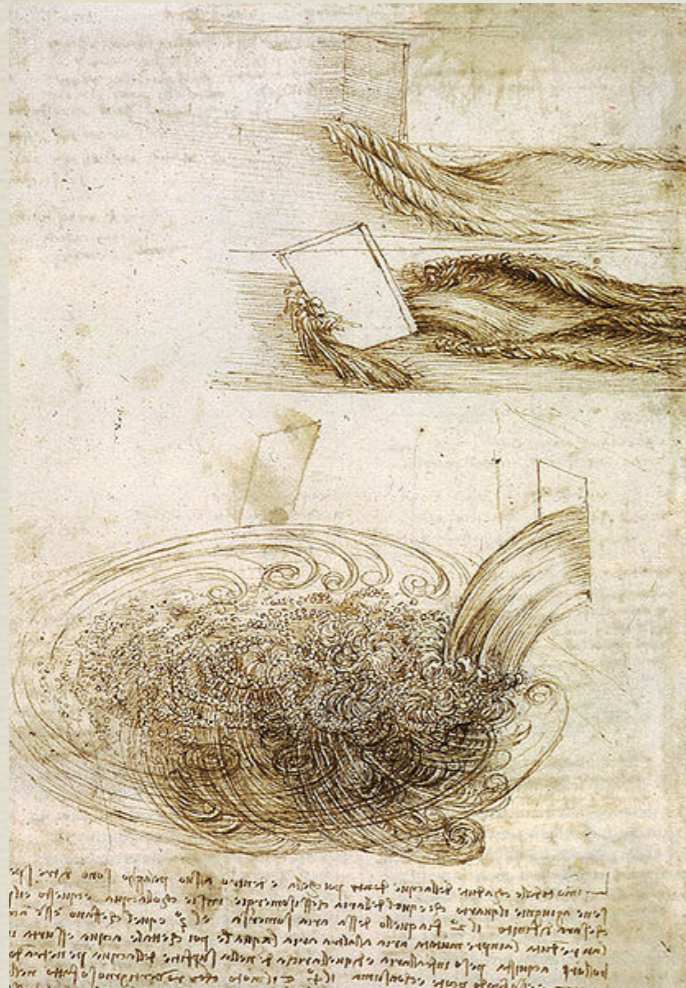
Biology





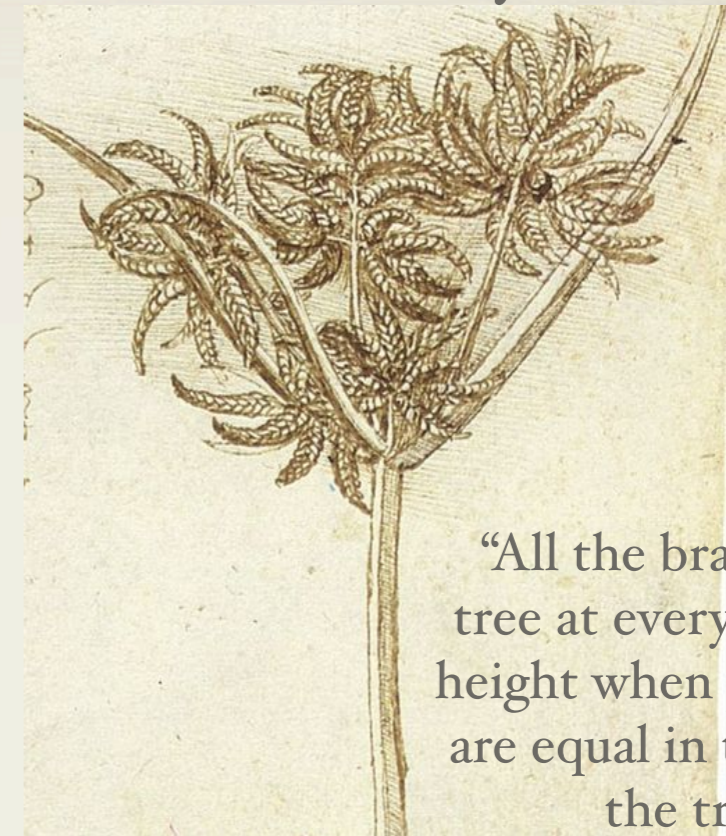
# Leonardo the Scientist

## Hydrodynamics



“All the branches of a water [course] at every stage of its course, if they are of equal rapidity, are equal to the body of the main stream”

## Botany



“All the branches of a tree at every stage of its height when put together are equal in thickness to the trunk”

“The earth is not in the centre of the Sun’s orbit nor at the centre of the universe, but in the centre of its companion elements, and united with them. And any one standing on the moon, when it and the sun are both beneath us, would see this our earth and the element of water upon it just as we see the moon, and the earth would light it as it lights us.”

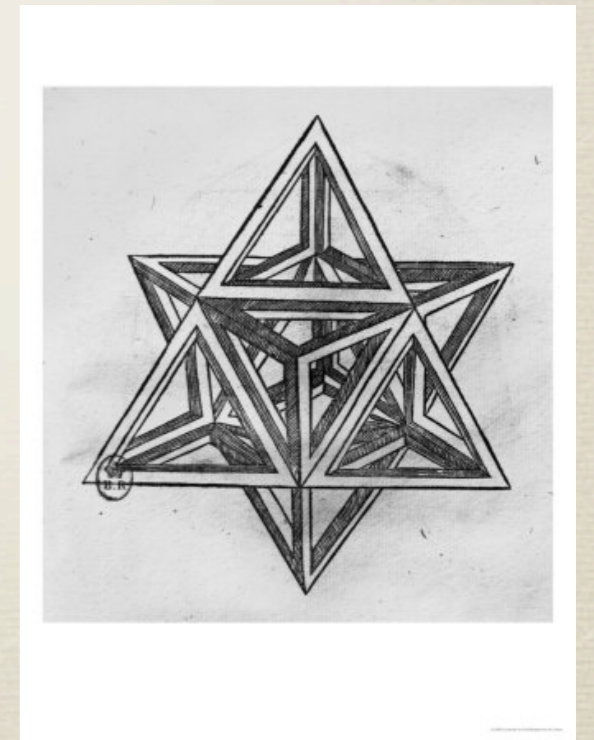
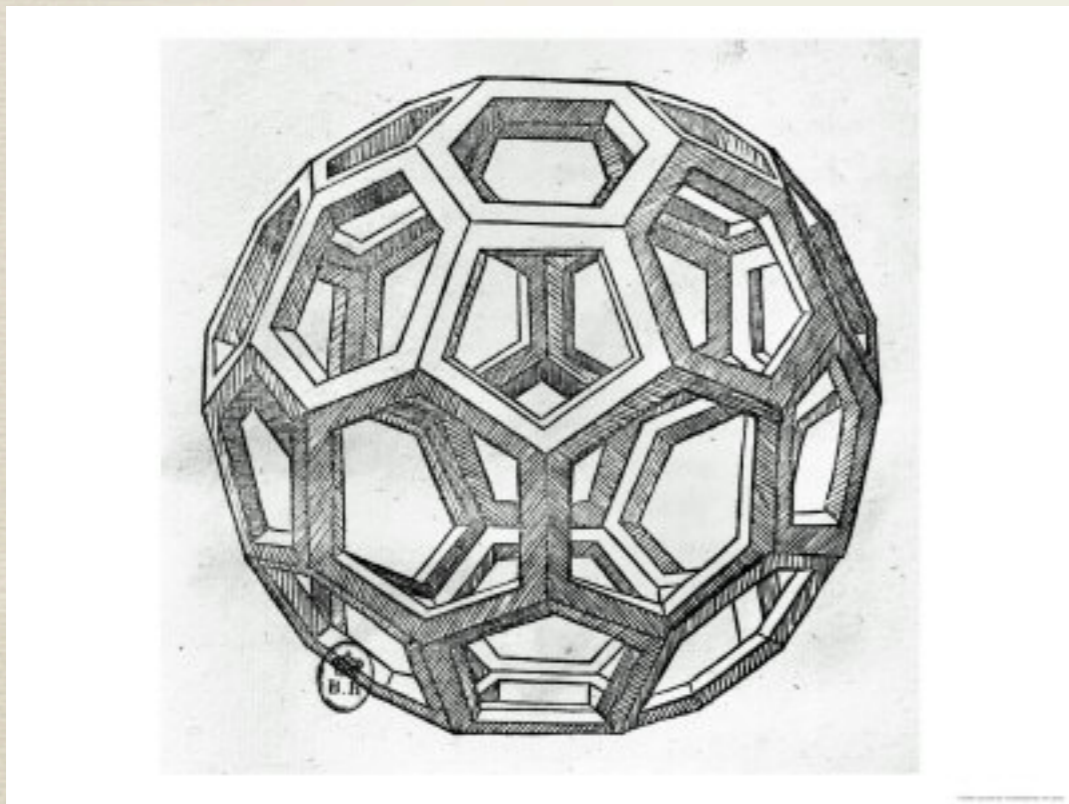
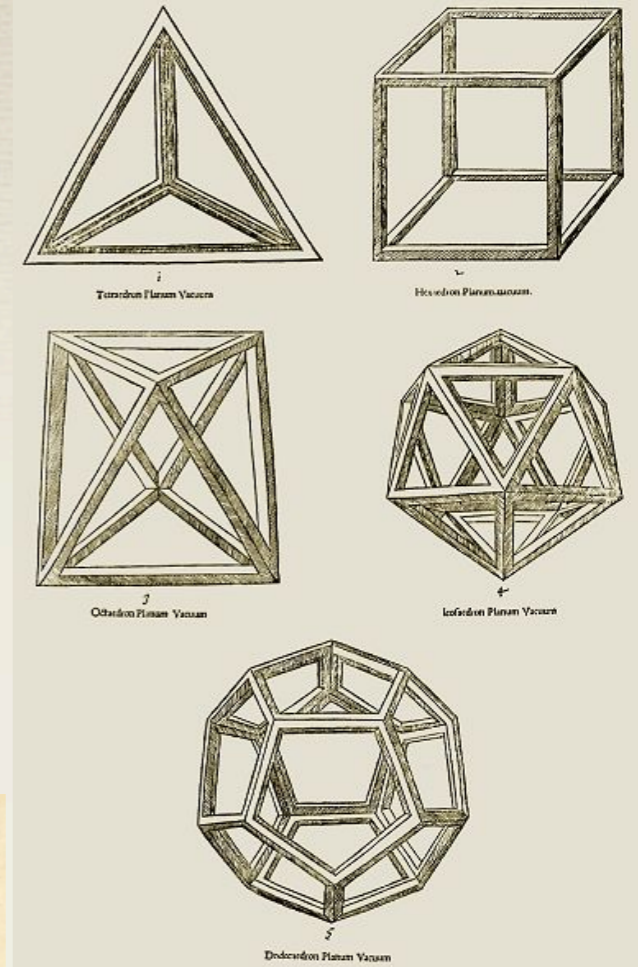
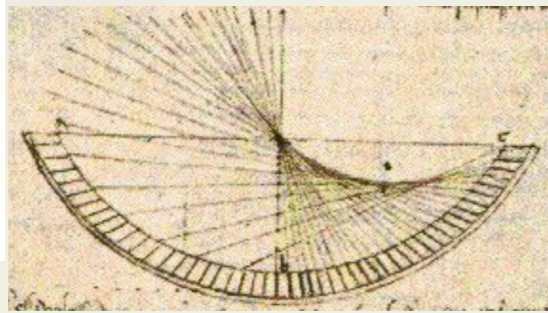
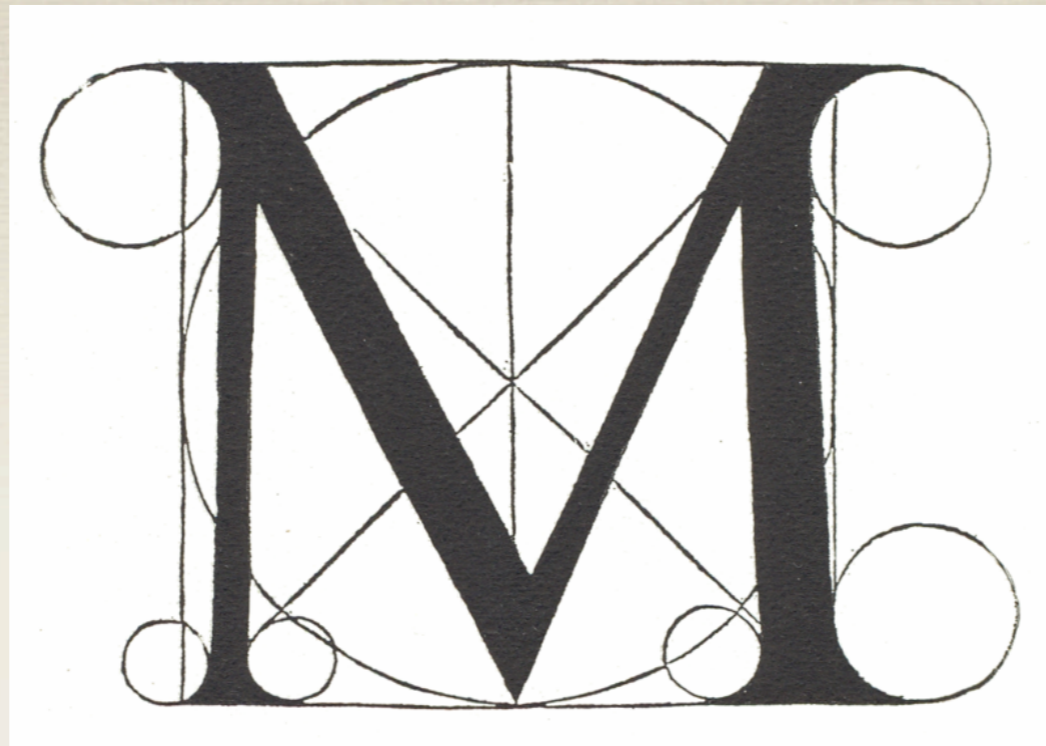
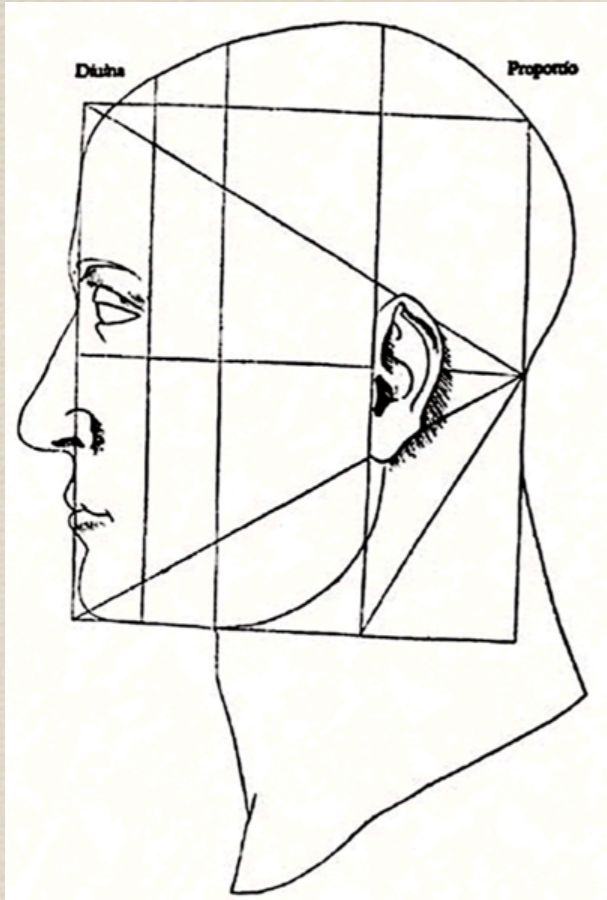


# The Mathematician

- \* In 1492 he was sent to Pavia to work on a cathedral.
- \* He discovered an enormous library at the Visconti castle and worked regularly with the mathematician Fazio Cardano.
- \* In 1496 he met regularly with the mathematician Luca Pacioli, who taught him Euclid's Elements.
- \* They wrote a book together:  
'De Divine Proportione' about
  - (1) the golden ratio
  - (2) applied math to architecture
  - (3) geometry of solids
- \* Two of the original copies of the book still exist.







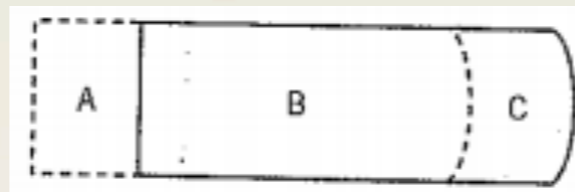


# Theory of Transformations

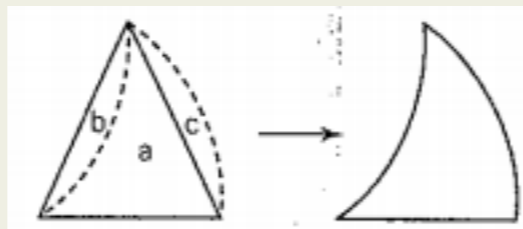
- \* Leonardo developed three types of transformations, to turn a complicated region to a simpler one.

Isabella d'Este (1501-...)

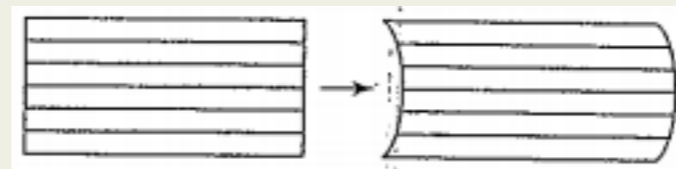
- \* Type I: "Squaring"



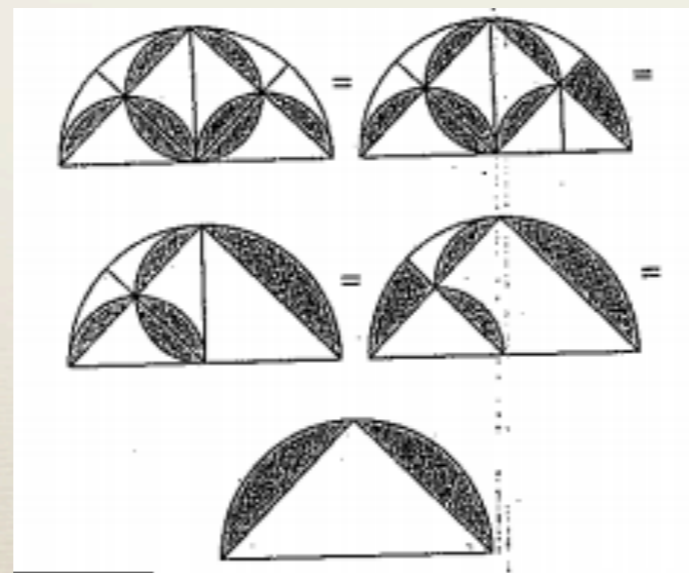
- \* Type II: "Patching"



- \* Type III: "Deforming"



**Example:**



**“Let no man who is not a Mathematician read the elements of my work.”**



# Traveling...

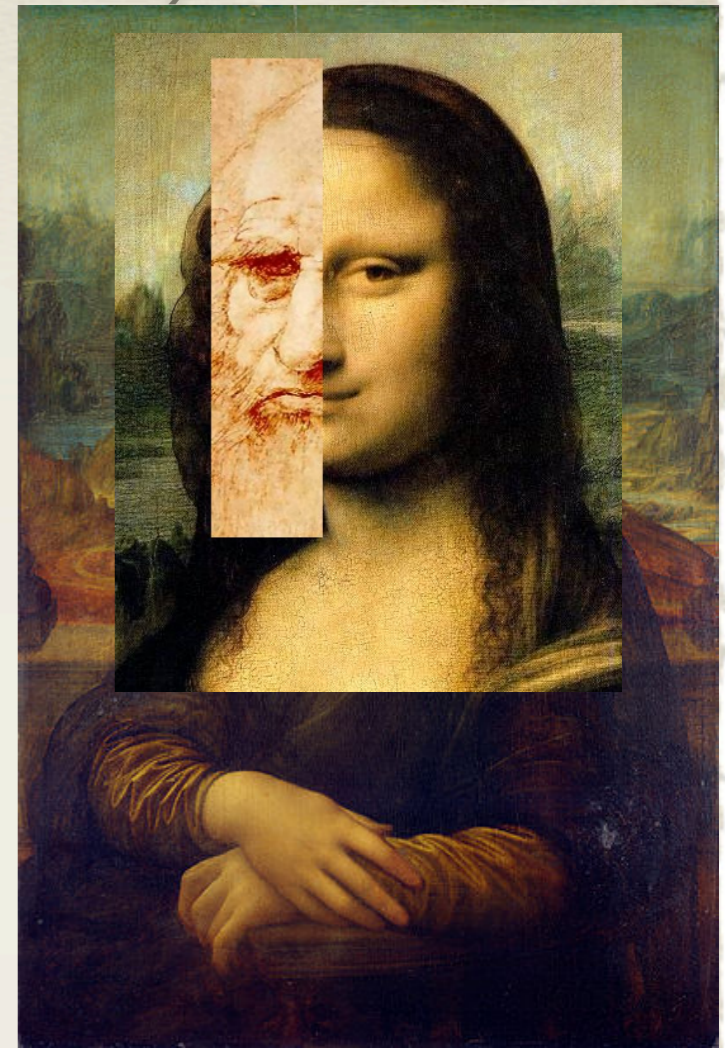
- \* In 1502 he started working for Cesare Borgia, the illegal son of Pope Alexander VI.
- \* Leonardo mapped large regions of Italy for him, which helped him conquer big parts of current day Italy / Switzerland.
- \* One history book of the time mentions Leonardo's improvisation of a bridge that allowed Cesare's military to cross a river for of his conquests.
- \* Leonardo was not happy under Cesare. 'War is the cruelest form of madness'.





# Mona Lisa (1503-6)

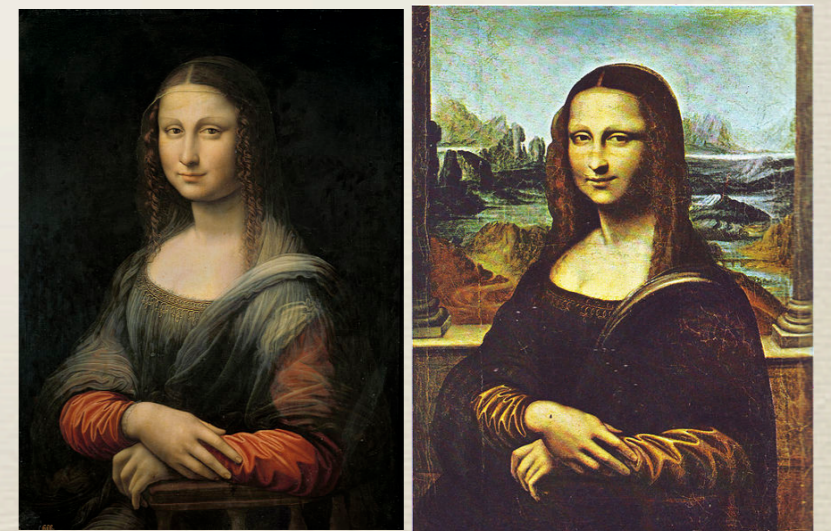
- \* Wife of Francesco del Giocondo (In Italy, the Mona Lisa is called 'La Gioconda')
- \* She was documented to travel in several places while Leonardo was there.
- \* Was stolen from the Louvre in 1911
- \* Researchers from the University of Amsterdam ran the painting's image through "emotion recognition" computer software.



Found the smile to be:

83% happy, 9% disgusted, 6% fearful,  
2% angry, <1% neutral, and 0% surprised

- \* Jan. 2010, Pathological anatomy professor Vito Franco published a paper about the Mona Lisa's high cholesterol....





# The “Lost” Leonardo

- \* “The Battle of Anghiari” (1505)
- \* Believed to be still hidden beneath one of the later frescoes (by Vasari) in the Salone dei Cinquecento in the Palazzo Vecchio, Florence



Copy by Peter Paul Rubens'



Copy of Michelangelo's work by Aristotele da Sangallo





# Final Years

- \* Traveled around Italy (Milan, Rome with Raphael and Michelangelo).
- \* Those days Milan was conquered by the Francis I of France.
- \* Leonardo designed a mechanical lion that walked and opened its chest to reveal lilies, impressing Francis.
- \* He finally settled in France to be the personal teacher of the King of France Francis I
- \* He died at Clos Lucé, on May 2, 1519.
- \* Francis: “There had never been another man born in the world who knew as much as Leonardo, not so much about painting, sculpture and architecture, as that he was a very great philosopher”





# Quotes

- \* Poor is the pupil that does not surpass his master.
- \* Necessity is the mistress and guardian of Nature.
- \* The motive power is the cause of all life
- \* Simplicity is the ultimate sophistication (disputed)
- \* Leonard on humanity and animals: 'We make our life by the death of others'.
- \* From countless numbers will be taken away their little children and the throats of these shall be cut, and they shall be quartered most barbarously.
- \* Of asses which are beaten, O indifferent nature, wherefore art thou so partial, being to some of thy children a tender and benignant mother, and to others a most cruel and pitiless stepmother? I see thy children given into slavery to others, without any sort of advantage, and instead of remuneration for the services they have done, they are repaid by the severest suffering, and they spend their whole life in benefiting their oppressor.
- \* When fortune comes seize her in front firmly, because behind she is bald.
- \* If you are as you have described yourself the king of the animals — it would be better for you to call yourself king of the beasts since you are the greatest of them all! — why do you not help them so that they may presently be able to give you their young in order to gratify your palate, for the sake of which you have tried to make yourself a tomb for all the animals? Even more I might say if to speak the entire truth were permitted me.