

ASTRONOMY

# Kepler's First Discovery

## "A Classic of Science"

Three hundred years ago today, Kepler, the mystic, the medieval astrologer and the modern astronomer, died.

It is perhaps unfair to represent Kepler by his famous but fanciful "law of the five regular solids." Yet he himself believed this one of his greatest astronomical discoveries, and it led to all his future greatness. It brought him the friendship of Galileo and other great astronomers, including Tycho Brahe, whose assistant and successor he became. The law of the five regular solids shows Kepler's belief in simple mathematical relations in the orbits of the planets. A lifetime of testing this belief led to the discovery of the laws which bear his name. He would not have found that the orbits of the planets are ellipses, that a line drawn from a planet to the sun sweeps over equal areas in equal times, and that the squares of the periods of the planets are proportional to the cubes of their mean distances from the sun, had he not puzzled over such numerical relations as those he found here.

*Prodromus Dissertationum Cosmographicarum, Continens Mysterium Cosmographicum a M. Joanne Keplero. Tübingae, MDXCVI (1596). Published in Joannis Kepleri Astronomi Opera Omnia. Edidit Ch. Frisch. Vol. I. Frankfurt. MDCCCLVIII (1858). Translated for the SCIENCE NEWS LETTER by Helen M. Davis.*

TO THAT most brilliant man, D. M. Michael Maestlin, most celebrated professor of mathematics in the Academy of Tübingen, teacher and advocate of that constant observation cultivated by himself:

We have all the measurements of the inscribed orbits, when the circumscribed have a total length of 10,000,000.

inscribed cube would be	5773503
pyramid	3333333
dodecahedron	7889445
icosahedron	7946545
quadrated octahedron...	7071066
true octahedron	5773503

Now, if we compare with these the measurements published by Copernicus, we will perceive that the differences are slight.

For if at minimum eccentricity we have

Saturn	8°39'23"
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Jupiter	4°58'49"
Mars	1°22'26"
Earth, without the Moon	0°57'30"
Venus	0°40'40"

then calling the maximum eccentricity 10,000,000, we have

Jupiter	6189712
Mars	3344302
Earth	7581886
Venus	7942029
Mercury	7278770
in the center	5831967

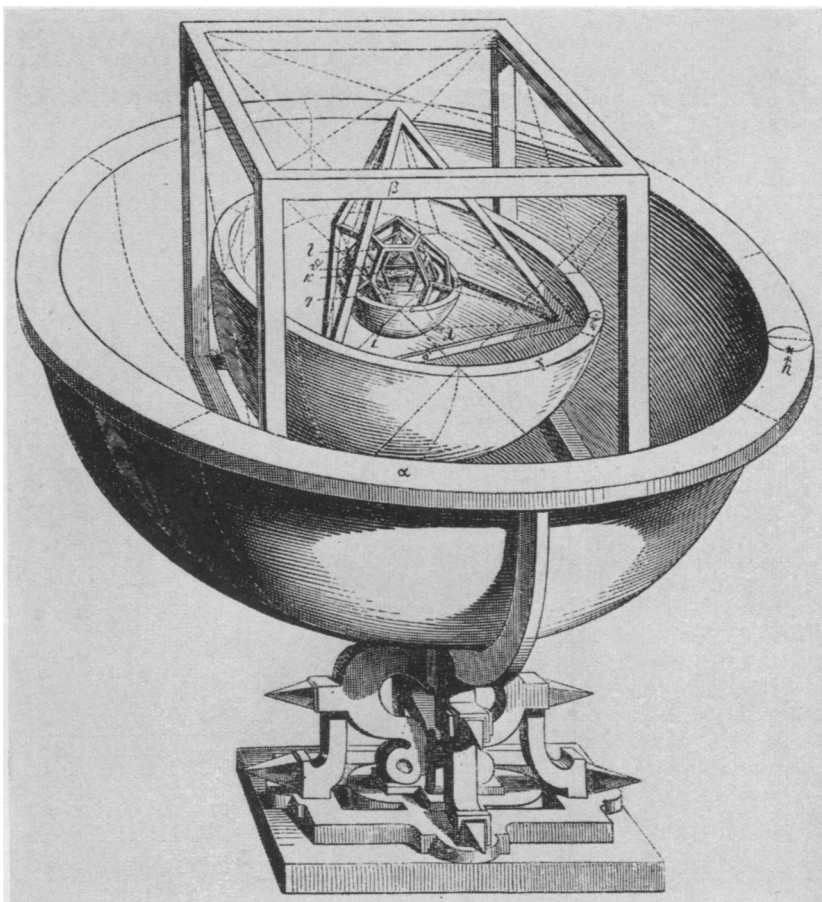
From this we reach other considerations. First that it is proved by the reasoning above that the dodecahedron comes before the icosahedron, and that

this is preferably placed between Mars and the Earth: thus this reasoning proves that the inscribed dodecahedron corresponds more nearly to the Earth, the icosahedron to Venus.

Then, the peculiarities in the motion and eccentricity of Mercury show a different variation compared to those of the others, so also, the octahedron alone has the property that the great circle tangent on four sides is far larger than the largest inscribed in the orbit. Which adds much probability to the theory.

For if the eccentricities were proportional to the distances (which I doubt, the findings not being perfect in all cases) Mercury ought to have for its greatest distance a little more than half: perhaps about 5900000.

Now while Venus comes out exceed-



PLANETS AND POLYGONS

The correspondence between astronomy and numbers, according to Kepler's fancy.

**THERE ARE NO GREY EYES****In the 142nd Classic of Science.****Next Week****BERTILLON,****the famous identifier of criminals,  
tells how eye color should be de-  
scribed.**

ingly small, Mercury ought to be less. Yet their common ratio points a finger toward the common ratio of the maximum distances from the sun, which forces us to consider the inscribed orbit of the body which is 5773503.

But since Mercury alone exceeds at its maximum the usual number inscribed in the other circle (for it is not admissible for this planet to substitute 57 for 72) therefore the octahedron alone is certainly right, since its 4 equal straight sides give room for a larger circle than any other, its radius is 7071066, again, little less than the maximum whose value is 72, just as before 57 was a little less than 59, the usual value.

I look forward to a great truth, whose outlines and substance seem to me ready. Yet because the calculation of these bodies does not agree perfectly with the opinion of Copernicus and with his numbers, those more ignorant of astronomical matters may believe all these calculations to be deceiving me.

*Science News Letter, November 15, 1930*

## ASTRONOMY

**Kepler's Memory Honored  
At Tercentenary of Death**

**G**ERMAN astronomers and mathematicians are now being joined by their colleagues from other countries to honor the memory of one of the greatest of their predecessors—Johann Kepler. He was born in the little town of Wiesel, near Stuttgart in Württemberg, on Dec. 27, 1571, and died at Ratisbon, in Bavaria, on Nov. 15, 1630, just three centuries ago. At the place of his death commemoration celebrations are being held, especially at a cenotaph which was erected there to his memory in 1803.

Kepler, whose name was recently included by George Bernard Shaw in a list of eight "universe makers" from Pythagoras to Einstein, was imperial mathematician to the Emperor Rudolph at Prague, for many years. He went there in 1600 to assist Tycho Brahe, the

great Danish astronomer who had taken refuge under Rudolph's protection after a new king in Denmark had failed to continue his predecessor's interest in science. Tycho died a year after Kepler came, but in that year Tycho turned over to him the observations which enabled him to discover the laws of the motion of planets.

Personally, Kepler described himself as lank, lean and spare, and said that "for observations his eye was dull and for mechanical operations his hand was awkward." Therefore, it was especially fortunate that he fell heir to the

observations of Tycho Brahe, who was one of the greatest astronomical observers of all time. Tycho's skill furnished the observations without which Kepler would have been helpless, while Kepler's mathematical perception enabled him to do things with them that would never have been possible for Tycho.

One of his chief characteristics was his great frankness. In his books he not only tells of his successful work, but also describes the errors that he committed before he saw the light.

*Science News Letter, November 15, 1930*

## MEDICINE

**Leprosy is Being Attacked  
By Chemical Warfare****Scientists Now Studying Tuberculosis Bacillus Given  
New Research Because of Similarity of Germs**

**S**CIENTISTS have resorted to chemical warfare in what is hoped will be a decisive attack on one of mankind's much-dreaded foes, leprosy. As a beginning in their efforts to find an agent useful in fighting the disease, the chemists will make an intensive study of the germs that have been grown from cases of leprosy, in contrast to the recently studied germs of tuberculosis, for the leprosy germ belongs to the same family.

The same group that is studying the secrets of the tuberculosis bacillus has been asked by the Leonard Wood Memorial to undertake the study of leprosy. The research will be directed by the Medical Research Committee of the National Tuberculosis Association, of which Dr. William Charles White, of the U. S. National Institute of Health, is the chairman.

As in the recent attack on tuberculosis, hundreds of thousands of leprosy bacilli will be grown in the laboratories of the H. K. Mulford Co. These will be taken to the Sterling Chemical Laboratory of Yale University where they will be analysed under the direction of Prof. Treat B. Johnson. At the same time the clinical studies with leprosy patients will be carried on at the government institutions for the care of lepers and in those of the Leonard Wood Memorial.

The tuberculosis investigators and

fighters have been called in to study leprosy because of certain similarities between the diseases. For instance, the germs causing the two diseases are members of the same family. They even grow in the same cells of the human body, the monocytes. The germs of tuberculosis, however, invade mainly certain parts of the body, such as the lungs, while the leprosy bacilli occur chiefly in the skin.

Some 15 or 20 strains of leprosy bacilli have been cultivated from human cases, but until recently it has never been possible to produce leprosy in any animal by transferring any of these germs to the animal's body. The accomplishment of this feat has just been announced by Prof. K. Shiga of the Imperial Medical Faculty at Seoul, Korea. He claims to be able to produce leprosy in rats by injecting the leprosy bacilli into rats whose powers of resistance were weakened by having lived on a diet lacking in vitamins.

Why vitamins protect against leprosy, if it is proved that they do, may be understood when scientists find out the chemical nature of the leprosy germs and also the chemical nature of the vitamins. At that time, also, a specific remedy for the disease may be found or developed. The only remedy used at present, chaulmoogra oil, has not fulfilled all the expectations held for it.

*Science News Letter, November 15, 1930*