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5th Period AP European History 11 November 2011 Unit 4 Essay 3. Isaac Newton once said, “ I have stood on the shoulders of giants. “?? Explain this statement and explain how Newton was the product of time and circumstance. When Isaac Newton said, “ I have stood on the shoulders of giants,” he demonstrated that he knew his place in the scientific community. In the relay race of astronomic science, Newton was the last of the runners to be passed the baton, and he, adding to the work of many great scientific minds before him, sprinted the home stretch.

Newton understood that his findings weren’t entirely his; they merely, but greatly, added to and reinforced the claims of past scientists. Before the Revolution in Astronomy, the Aristotelian-Ptolemaic System of the Universe was accepted by all and questioned by none. Abnegation of this theory all started with Nicholas Copernicus. He was the first to propose a heliocentric universe in place of a previously accepted geocentric one. This means that he got the ball rolling for the argument that the sun was the center of the universe, rather than the earth. His book, On Revolutions of Heavenly Spheres, was published at his death.

The astronomer was afraid of living through the repercussions of such a controversial claim. As all authoritative figures and church leaders interpreted from the Bible that the earth was the center of the universe, he surely would have been dubbed a heretic and made to suffer serious consequences. Our first runner may not have been a courageous one, but he surely got things moving in the direction of a more realistic, thoughtful world society. The punishments feared by Copernicus were made a reality by Giordano Bruno. Bruno both supported and contributed to Copernicus’s heliocentric theory.

He said that the sun not only is the center of the universe, but also is fundamentally a star, not a planet. With this finding, he went even further so as to claim that since the sun is a star, and all the planets (that we knew of) revolve around the sun, then all the stars have a possibility of having their own little system of planets revolving around them. Furthermore, he drew the conclusion that there are likely other worlds inhabited by intelligent life forms, much like humans. He was burned at the stake for his heresy, proving the magnamity of the challenge facing the astronomic sector of the scientific community.

However, scientists were clever people, and taking Bruno’s approach to asserting heliocentrism as a mistake to learn from, they found ways to assert their theories while pleasing the Church and those invested in scripture. Tycho Brahe exemplified this effort with his extrageoheliocentric theory. As an inhabitant of Denmark, Brahe had access to a better view of the stars than astronomers in other regions of Europe may have had. With this advantage and his many observational instruments, he collected much data about the stars and the planets.

He concluded, like other astronomers, that all planets revolve around the sun. BUT to pacify the ardent Christian geocentric theorists, Brahe said that while the planets make an orbit around the sun, they then make a simultaneous loop around the earth. This way, the earth is still special but it was also acceptable to admit what really happens in space. Through the aforementioned collection of data, Brahe’s assistant Johannes Kepler, who was given the task of continuing Brahe’s work after his death, gathered a basis for his 3 Laws of Planetary Motion.

Kepler, being a religious man, saw the sun as a symbol of God the Father. Thus he concluded that the sun was what forced all the planets to move in the manner they do. He then from there determined that the force that the sun exacts on the planets is weakened as distance from the sun increases. This means that a planet’s orbit speed increases and decreases as it gets closer and further from the sun. For this to be possible, the planets’ orbit physically cannot be perfectly circular, as previously accepted. Therefore, the rotation of the planets around the sun must be elliptical.

Kepler’s conclusion provided one basis among many for Newton to create his theory of universal gravitation. Kepler also improved the pre-existing telescope using his research in optics. Galileo Galilei caught wind of the enhanced invention, and couldn’t resist getting his hands on one. Kepler obliged and Galileo, having improved the telescope even further, began a long process of viewing and plotting which, when published in his Starry Messenger, eventually earned him the title, “ father of modern observational astronomy. ” Galileo was a firm believer of the heliocentric theory, and even went so far as isiting Rome so he could appeal to Catholic Church authorities lest they ban the theories of Copernicus. He conceded that yes, the Scripture may have several verses suggesting the geocentrism of the universe. Galileo believed, however, that scripture might not be intended for such literal interpretation. Though the church denied his request and still commanded him to never hold the Bible-contradicting belief that the earth revolves around the sun. However, they did not deny him the ability to simply discuss the heliocentric theory.

And, with the formal approval of the church and the Pope, that’s exactly what he did in his Dialogue on Two Chief Systems. When the work was published however the church was greatly displeased. Though disguised as a mere discussion, the work did all but completely assert that geocentrists are the unintelligent peers of heliocentrists. Galileo was summoned before the Inquisition when the Pope felt personally insulted by the work. While Galileo followed the Pope’s request in not formally asserting the Copernican theory, his views were clear in his Dialogue.

The inquisition recognized this and condemned him as a heretic, first forcing him to denounce his claims, then sentencing him to a lifetime of house arrest. Last comes sir Isaac Newton. Synthesizing the ideas of his scientific predecessors (the so-called “ giants”), Newton further advanced the Scientific Revolution by eliminating the last shred of doubt about the heliocentric theory. When he published Principia Mathematica, Newton asserted the Law of Universal Gravitation and introduced his three legendary laws of motion.

He exhibited the parallel ideas of his theory of gravitation and Kepler’s laws of planetary motion, thus proving that the same set of natural laws applies to the motion of both terrestrial and celestial bodies. Newton understood that all the astronomers who lived before him set the stage for his breaking through the die-hard Christian barriers. If he had simply been born earlier, he would’ve been a contributor rather than the finisher. However, lucky for him, he was born when he was, so he was in fact the finisher.