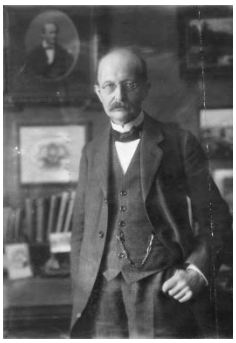
Max Planck on Johannes Kepler and Faith in Science



Max Karl Ernst Ludwig Planck received the Nobel Prize in Physics in 1918 "in recognition of the services he rendered to the advancement of Physics by his discovery of energy quanta". Planck made many contributions to physics, but is remembered primarily for his role as the originator of quantum theory. This selection is from an interview. Planck responds to a question from James Murphy about the general skepticism found in the world, a skepticism which Murphy says attacks religion, art, and literature, as well as science.

PLANCK: The churches appear to be unable to supply that spiritual anchorage which so many people are seeking. And so the people turn in other directions. The difficulty which organized religion finds in appealing to the people nowadays is that its appeal necessarily demands the believing spirit, or what is generally called Faith. In an all-round state of skepticism this appeal receives only a poor response. Hence you have a number of prophets offering substitute wares.

MURPHY: Do you think that science in this particular might be a substitute for religion?

PLANCK: Not to a skeptical state of mind; for science demands also the believing spirit. Anybody who has been seriously engaged in scientific work of any kind realizes that over the entrance to the gates of the temple of science are written the words: Ye must have faith. *It is a quality which the scientists cannot dispense with.*

The man who handles a bulk of results obtained from an experimental process must have an imaginative picture of the law that he is pursuing. He must embody this in an imaginary hypothesis. The reasoning faculties alone will not help him forward a step, for no order can emerge from that chaos of elements unless there is the constructive quality of mind which builds up the order by a process of elimination and choice. Again and again the imaginary plan on which one attempts to build up that order breaks down and then we must try another. This imaginative vision and faith in the ultimate success are indispensable. The pure rationalist has no place here.

MURPHY: How far has this been verified in the lives of great scientists? Take the case of Kepler, whose 300th anniversary we were celebrating, you remember, that evening when Einstein gave his lecture at the Academy of Science. Wasn't there something about Kepler having made certain discoveries, not because he set out

after them with his constructive imagination, but rather because he was concerned about the dimensions of wine barrels and was wondering which shapes would be the most economic containers?

PLANCK: These stories circulate in regard to nearly everybody whose name is before the public. As a matter of fact, Kepler is a magnificent example of what I have been saying. He was always hard up. He had to suffer disillusion after disillusion and even had to beg for the payment of the arrears of his salary by the Reichstag in Regensburg. He had to undergo the agony of having to defend his own mother against a public indictment of witchcraft. But one can realize, in studying his life, that what rendered him so energetic and tireless and productive was the profound faith he had in his own science, not the belief that he could eventually arrive at an arithmetical synthesis of his astronomical observations, but rather the profound faith in the existence of a definite plan behind the whole of creation. It was because he believed in that plan that his labor was felt by him to be worth while and also in this way, by never allowing his faith to flag, his work enlivened and enlightened his dreary life. Compare him with Tycho de Brahe. Brahe had the same material under his hands as Kepler, and even better opportunities, but he remained only a researcher, because he did not have the same faith in the existence of the eternal laws of creation. Brahe remained only a researcher, but Kepler was the creator of the new astronomy.

—from *Where is Science Going?* (London, 1933), pages 214-16