



## SCIENCE IN ART

### Raphael's "School of Athens"

by E. C. WATSON

**T**HE "SCHOOL OF ATHENS" is one of the outstanding achievements of that great and versatile artist, Raphael Sanzio (1483-1530). This noble fresco, painted in the years 1510-1511, still adorns one wall of the Papal Signature Room of the Vatican. It depicts with consummate skill an assembly of the great philosophers and men of science of ancient Greece arranged, posed and executed in such a way as to display not only the highest artistic genius but also a very considerable knowledge of the history of philosophy and science.

In the center of the picture stand Plato, the idealist, and Aristotle, the realist, flanked by philosophers of their respective schools, the idealists on the left, the

realists on the right. On the lower level, the two corresponding schools of scientific thought are portrayed, on the left the Pythagoreans who believed and taught that pure reason alone can reveal ultimate truth, and on the right the Archimedean who held that reliable knowledge of the physical universe cannot be attained without observation and experiment. The whole composition symbolizes the essential harmony between philosophy and science, between idealism and realism, between analysis and empiricism, between reason and experiment.

The popular explanations of that great painting that are encountered in travelers' guides and in descriptions of the art treasures of the Vatican are that Raphael



*Enlargement of the lower left hand portion of the painting, showing the Pythagoreans.*

has symbolized in it the course of development of Greek philosophy and that it is possible to assign definite names to all the individual figures. Such explanations go much further than is warranted; nevertheless it is evident that the figure at Plato's right, talking with gestures to the youth in armor, represents Socrates, the man lying on the steps is Diogenes, central figures of the two lower groups are probably Pythagoras (left) and Archimedes (right), and the individual in the lower right-hand corner wearing a crown and carrying a globe in his hand is Ptolemy, for common tradition confused the astronomer with the Egyptian king of the same name.

### The Pythagoreans

The skill with which Raphael has "clad abstract ideas in forms of life and beauty" is nowhere better displayed than in the group of Pythagoreans at the lower left of the painting. (The picture above is an enlargement of this group). Pythagoras himself is seated and is writing his discoveries about harmony and numbers in a book held on one knee. The oriental figure peering over his shoulder probably symbolizes the effect of the mysticism of the East upon his thinking. The boy holding before his master the number diagrams that he has drawn upon a board may well symbolize the hope that the seemingly "infinite complexity of nature is really as simple as a child's arithmetic." That Pythagorean science was broad, human and universal in its appeal is made clear by the various ages, sexes

*Enlargement of the lower right hand portion of the painting, showing the Archimedean.*

and nationalities represented in the group. The solitary individual seated at the right probably does not belong to the group proper and is usually identified as Democritus because he is booted in the manner of his countrymen, the Abderites.

### The Archimedean

The spirit and procedures that characterize teaching and learning at their best are beautifully depicted throughout the picture and give it its modern name, the "School of Athens." Thus, in the group at the lower right-hand corner of the painting (shown enlarged below), Archimedes bends down and draws geometric diagrams on a blackboard. Four pupils surround him and listen attentively to his demonstration. In them Raphael has pictured with unexcelled skill the degrees of understanding and the process of gradual mastery of the subject matter. One boy kneels on the earth and follows with close attention the hand of the teacher; he imitates the master's motions, but he does not understand. Leaning over him, stands another boy; his face, as well as the motions of his hands, indicates that he understands what he sees. A third boy with uplifted face, having mastered the demonstration, imparts it to the fourth boy. And the face of the fourth reflects the joy of achievement and complete understanding; he is able to conceive of the far-reaching consequences of the theorem that has been proved.



*One of a series of articles devoted to reproductions of prints, drawings and paintings of interest in the history of science—drawn from the famous collection of E. C. Watson, Professor of Physics and Dean of the Faculty of the California Institute.*