Art and Science: The Analysis and Communication of Biological Form

AAAS Symposium • 30 December 1968

Dallas, Texas

Historians and students of culture are taking an increasing interest in the interdependence of art and science throughout the course of their development. A symposium during the AAAS Annual Meeting, Dallas, Texas, will be devoted to a survey of the contributions of concepts of form to the progress of biology in relation to the use of biological motifs in art. Evidence will be considered which may induce a reassessment of the commonly held view that natural science exercises its formative influence on culture autonomously. In broad historical compass, appropriate for a meeting which coincides with that of the History of Science Society, the most important reciprocal interactions between biology and art will be described and illustrated.

The advent of naturalism in the description of biological form in the modern era, supplanting the symbolic and stylized modes which characterized medieval illustration, occurred in the decorative arts. The depiction of plant and animal forms in the sculptured capitals of columns and the pages of illuminated manuscripts reveals naturalism as a potent and very general esthetic value about two centuries before it became a decisive influence in the depiction of organisms in bestiaries and herbals. G. Evelyn Hutchinson (Yale University) will discuss psychological and esthetic factors implicated in progress toward realism during the period A.D. 1280 to 1480. The development of the artistic style commonly known as scientific naturalism among miniaturists and sculptors will be illustrated by reference to a number of important and little known works.

Biology entered its second major phase of development by advancing beyond descriptions of external morphology to discover internal fine structure and to elucidate the physical causes of form. Concepts of organic form had been widely discussed by literary scholars and philosophers before biologists succeeded in generalizing problems of form to the degree required for successful scientific investigation and explanation. The speculative naturalists of the "Naturphilosophie" school aspired to discover universally significant forms which were transcendental and ideal rather than drawn from organisms themselves. They postulated schemes for organic structure, such as the doctrine that protozoa were endowed with all of the organ systems of the higher animals, which revealed a basic misunderstanding of the characteristics of organisms. The idea of organic form as used by Coleridge and others emphasized the role of developmental processes in the achievement of form by living things and the emergent properties of form, whereby the form of the whole organism manifests patterns and other characteristics not found in the parts of which it is composed. Philip C. Ritterbush (Smithsonian Institution) will describe the contributions to nineteenth-century morphological thought resulting from the application of the idea of organic form in elucidating the role of the cell and discovering the fundamental character of symmetry properties in the forms of organisms.

Artists in the early years of this century, in their search for powerful new modes of expression, availed themselves of the concept of form which had guided nineteenth-century biologists. Ernst Haeckel, the comparative anatomist, published an influential series of lithographs of vividly colored scientific illustrations under the title *Art Forms of Nature*. Paul Klee's careful studies of the architectural principles underlying plant form and his interest in analogies between music and rhythms of growth played a very large role in his artistic development and are reflected in much of his work. The use of biomorphic imagery by the surrealists testifies to their interest in the scientist's vision of form. Gyorgy Kepes (Massachusetts Institute of Technology) has made many important studies of the use of biological form in the fine arts and experimental arts of the twentieth century and will illustrate that art and science share a dependence upon a modern capacity for imaginative vision in the service of understanding.

The study of barely visible fine structure and its role in the complex processes of organic development challenges the biologist's imagination to the utmost. C. H. Waddington (University of Edinburgh) has been especially aware of the scientist's kinship with the artist in the exploration of visual characteristics of form. He will discuss this subject with special reference to contemporary embryological problems, illustrated by studies of fine structure and morphogenesis.

As a complement to the presentations in the symposium a small exhibit of paintings by twentieth-century artists influenced by biological concepts of form will be shown in the lobby of the Sheraton-Dallas Hotel, along with a number of reproductions of Haeckel's lithographs and panels of text illustrating historic examples bearing upon this theme.

The symposium should be of interest to faculty members concerned with general education at the undergraduate level and to students of the history of science and its cultural influences, as well as to biologists interested in the central role which the faculty of vision has played in the development of their science.

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