Today’s teachers of science are confronted with an almost overwhelming volume of materials—texts, programs, pamphlets, etc.—purporting to provide information which will enable the student “to understand science”. Science kits with packaged laboratory exercises in many forms are available. It is suggested that by using these materials the student will learn how to “inquire”, will learn the “processes” of science. The possibilities of keeping students actively engaged in laboratory activities and well-supplied with reading material in most of the fields of science is no longer a problem. Rather, the problems reside in much more profound questions: have the students, as a result of doing the activities, reading, and discussing what they have read, indeed increased their understanding of science? What is the nature of science which they are to understand? Can aspects of the nature of science be identified and so specified as to provide for guidance in the selection and organization of elements which are to be included in science curricula?

Many articles in the professional literature suggest that it is the “processes” of science which are most important in teaching science rather than the teaching of the “products” of science. Other articles suggest that the “structure of science” as a discipline and the “processes of inquiry” are of the greatest importance. Many science guides developed within school districts emphasize the teaching of “science concepts” as well as “science processes”.

These many suggestions, and others could be cited, raised numerous questions for the writer. Not all of these questions have been fully explored, and for many it has been possible only to refine them for further investigation. Implicit in the suggestions for science teaching cited above was the separability, identifiability, and teachability of the processes and products of science. But can process be separated from product in science? How do product and process relate to the structure of science, and what is meant by the structure of science? Does this structure become most significantly stated as an array of products, concepts, facts, theories, and laws of nature? The list of questions may be expanded almost indefinitely;

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the study reported on here makes its central contribution in relation to the nature of what may be termed in current parlance "the structure of science".

In order to make some entry into this field of interrelated problems and with the purpose of searching for eventual clarification of the nature or structure of scientific knowledge which might become a framework to provide guidance in curriculum development in the secondary schools, an investigation into the nature of scientific knowledge seemed in order. With such a framework one might be able to develop answers to such questions as the following: Is the language used in instructional materials consistent with the structure of science? Are the scientific relationships developed in materials consistent with relationships which characterize the structure of science? While these questions were initial goals of the inquiry, more specific questions were to be found that could be formulated and more fruitful answers were to be proposed as a consequence of the study.

The dissertation was based upon an analysis of six writings concerned with the nature and organization of scientific knowledge: three written by physical scientists [1–3] and three written by biological scientists [4–6]. These writings were selected from a working bibliography of more than one hundred works. A preliminary list of writings was selected from this bibliography on the basis of publication date, authorship by men who had taken a Ph.D. or received recognition in biology, chemistry, or physics, and who had a special interest in the nature and organization of scientific knowledge. The list of writings of physical scientists was sent to a selected group of physical scientists and the list by biologists was sent to a selected group of biological scientists. The final selection of the six works used in the investigation was made on the basis of the responses of the scientists, the recency of publication, a balance of works by biologists and physical scientists, and the writer's judgment.

The framework or structure of science which will be presented below must be considered as preliminary, since it has been based on a limited number of writings and represents the writer's selection of those aspects of the writings which he evaluated as central to the formulation of a structure of science which would be relevant to education in the sciences.

The reporting of the findings from this dissertation will be carried forward in two phases. First, four aspects of the structure of science will be discussed. At the present time, it is these four aspects which the writer feels have particular significance for curriculum implementation: (1) the distinctions as between the correlational and the exact sciences, (2) the constructional nature of scientific reality (including the circuit of verification and the inextricable interrelationships of the processes of induction and deduction), (3) the processes of observation and the emergence of rules of correspondence, and (4) the considerations which lead to the verification and acceptance of scientific theories. Second, the writer will present a statement of selected understandings which characterize an individual who is growing in scientific literacy. While only four aspects of these understandings will be discussed in phase one in any detail, the