central issue of our time. Public judgments arrived at through traditional democratic processes are as pertinent as ever. While "science does broaden and secure the ground on which men can make their choice," he says, it "offers no absolutes and no blueprints . . . to tell us what we want to live for."

Piel offers a provocative theory on the success of Russian science under the rigid monolith of a Marxist totalitarian society. The creative intellect craves freedom and dies without it. The nationalization of science in America since World War II has increasingly restricted the freedom of American science. On the other hand, the intellectual tradition of Russia, bred for generations in an atmosphere of repression and terrorism, has developed some immunity and "is perhaps . . . more cunning and clever in the way it resists and eludes the inquisitor." He is quick, however, to point out that "the things that are wrong with American science are the same things that are wrong with Soviet science."

In a sense, the basic issue raised by Piel and by the delegates of the emerging nations may be the same: Whether men will pursue the illusory symbols of scientific progress, or its real substance: the service of man. Both of these volumes are absorbing and disquieting. In place of the false optimism fostered by the Cult of Science, they point back to the inescapable hard problems of contemporary life. For the solution of these problems, science can do much, but it offers no quick and easy way.

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Students and Teachers

The American High School and the Talented Student. Frank O. Copley. University of Michigan Press, Ann Arbor, 1961. $3.95.

Here are two essays of interest to those who work with superior students in secondary schools. The first essay begins with and justifies general statements such as these: "Knowledge must precede criticism" and "conversation is not education." It then enumerates types of acceleration and enrichment and gives examples of each. The second essay describes (and praises) the advanced placement program, its meaning and organization, and various ways for schools to provide this program for students.

The tone of the whole discussion is practical but not detailed. On the other hand, a detailed treatment might have lost the clear thread of the argument. A reader must bring a background of teaching to this book; he will then find the generalizations very rewarding. The author shows a complete understanding of the problems that actually appear in schools.

One point will be debated by many: English study is for all, but mathematics only for those with special aptitude. It must be noted that the author, Frank Copley, teaches Latin. Also, one might question his statement: "There are few schools, public or independent, large or small, urban or rural, that could not institute Advanced Placement in one form or another and in at least one subject."

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A Historical Puzzle

Lavoisier. The crucial year. The background and origin of his first experiments on combustion in 1772. Henry Guerlac. Cornell University Press, Ithaca, N.Y., 1961. xix + 240 pp. Illus. $4.50.

Lavoisier belongs to that small and lucky band of scientists who effected a revolution in science by the introduction of new concepts. Small wonder, then, that he has attracted so much attention from scholars. Yet hitherto there has been no general agreement about what started Lavoisier on that important series of experiments on combustion, which led to his appreciation of Priestley's discovery of oxygen and to his own totally new idea that a gaseous constituent of air entered into chemical reactions. Here a distinguished historian of science undertakes to unravel what he rightly calls "this important historical puzzle." Henry Guerlac is a master at recounting a scholarly detective story in a manner at once entertaining and profound. One does not need to be a Lavoisier expert to enjoy this elegantly written book. Lavoisier scholars will find the documentation impeccable and the reasoning cogent.

Why did Lavoisier undertake the critical experiments which determined his career? It has been assumed that he was influenced by the work of Black on "fixed air" (CO_2), of Priestley on gases, of Cigna on sulfur and phosphorus, and of French chemists on the combustion of diamonds. It is here shown that the work of Black, Priestley, and Cigna was little known in France, especially to Lavoisier, and that the experiments on the diamond did not strike Lavoisier as combustion. Rather, he saw these experiments as examples of effervescence, a phenomenon with which he busied himself in connection with the reduction of metallic calxes, a phenomenon perhaps connected with the production of "fixed air" as described by Stephen Hales. Guerlac believes that Lavoisier's announced intention of studying the calcination of metals stemmed from Guyton de Morveau's elaborate experiments which showed that all metals gained weight on calcination in air. (But his argument that this was not generally known is weak, as his quotations show: the fact was known to Lavoisier's colleagues; it was the *explanation* that remained in doubt.) In 1772 Lavoisier actually undertook, instead, brilliantly revealing experiments on sulfur and phosphorus; he did so as the result of a series of accidents, skillfully detailed here. And, as a useful appendix, the relevant documents, many previously unpublished, are given in full.

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Scheele's Fluoric Acid Today

Advances in Fluorine Chemistry. vol. 2. M. Stacey, J. C. Tatlow, and A. G. Sharpe, Eds. Butterworth, Washington, D.C., 1961. 220 pp. Illus. $8.

This, the second volume of the series, consists of six reviews covering a very wide range of subject matter. The introductory essay by C. R. Patrick surveys the thermochemistry of organic fluorine compounds; an extensive compilation of the heats of formation is used to deduce bond dissociation energies of various organo-fluorine compounds. C. C. Finger, the American authority, provides a readable description of fluorine resources and utilization. The rapidly increasing application of precision mass spectrometry in organic chemistry makes J. R. Majer's review of the mass spectrometry of