

laboration" achieved in the United States, the report says. Putting it another way, the report says European universities lack the "entrepreneurial spirit" of their American counterparts.

In all three countries under study, the major share of fundamental research is carried out through a dual system—the universities plus what the report terms a "peripheral" system. In Britain this peripheral system is made up primarily of government laboratories, in which scientists make careers as researchers outside the universities. In France, the Centre National de la Recherche Scientifique (CNRS) and other government agencies support separate laboratories and individuals on a scale that matches the university research apparatus. In Germany, the Max Planck Institutes and other peripheral research institutions provide the alternative to university research.

The report asserts that university expansion and reform, in the three coun-

tries, while substantial, has had little operational effect on research. In fact, the drive toward departmentalization in France and Germany may carry the danger of creating large, self-contained units, based on a single discipline, which get little stimulus to be outward looking and are resistant to interdisciplinary work.

The report's authors see little mitigation of the Old World lack of mobility among scientists. Only in Germany is there evidence of willingness to move from university to university and from university to industry.

There are, of course, other national patterns reflecting political and administrative habits and histories. The French system for science is the most highly centralized of the three, with budgeting and policy-making powers concentrated in a top-level interministerial body. The British operate the most pluralistic system, with research funds coming from a number of gov-

ernment agencies. The British system is influenced by the so-called Haldane doctrine, which calls for a separation of authority over fundamental and applied research, with applied research funded through the "technical" ministries and fundamental research support allocated through research councils dominated by nongovernment scientists. The report describes the German system as the British system "adjusted in the light of federalism," which means that the central government and the Land, or state, governments join to support research institutions in a variety of financing patterns.

Despite such national differences, the report identifies major problems common to all three countries. One of these is the "aging" process in laboratories operated by the government.

As the authors put it, "The question obviously does not arise in recently established and still expanding agencies for which the difficulty is still rather

Patents: To Combine or Not to Combine

In New York on 29 March the antitrust division of the U.S. Department of Justice filed a suit against 20 of the nation's biggest aircraft manufacturers, alleging that for 44 years they illegally agreed to cross-license each other's patents on airplane parts, to the exclusion of other companies. The effects have been "restricting and suppressing competition . . . in the research, manufacture, and sale of airplanes" and "hindering and delaying the research and development of patentable inventions for airplanes." Government economists say the agreement has effectively discouraged innovation within the industry.

The list of 20 defendants includes the granddaddies of the U.S. aircraft industry, many of whom are the country's largest defense and space contractors: Boeing Co., Curtiss-Wright Corp., Fairchild Hiller Corp., General Dynamics Corp., Grumman Aircraft Engineering Corp., Ling-Temco-Vought, Inc., Lockheed Aircraft Corp., Martin Marietta Corp., McDonnell Douglas Corp., North American Rockwell Corp., and United Aircraft Corp. Named also is the organization formed in 1928 to administer the agreement, Manufacturers Aircraft Association, Inc. (MAA). The suit calls for the termination of the agreement and for MAA's dissolution.

Ironically, the suit was filed one week after the President's technology message was issued, which in one section stressed the desirability of having firms combine on R & D efforts which are too costly or risky to attempt singly. "Especially in highly fragmented industries," the message said, "formal or informal combinations of firms provide one means for hurdling these barriers. . . . In general, combinations which lead to an improved alloca-

tion of the resources of the nation are normally permissible, but actions which lead to excessive market power for any single group are not." In an "on the other hand" passage, the technology message rules undesirable "joint efforts among leading firms in highly concentrated industries." This view is a page borrowed from the book of the January *Economic Report of the President*, which says, in its R & D section, that consortia among private firms are desirable in highly fragmented industries. But "joint efforts" among leading firms in "highly concentrated industries" are undesirable. Evidently the Justice Department has now decided that the airplane manufacturers' agreement falls in the latter category.

The problem is one of relativity. What agreements are considered "desirable" is liable to shift from time to time. For example, the aircraft companies' agreement on patents, says one MAA spokesman, was first drawn up in 1917, as a direct result of U.S. preparations to enter World War I. Then, there was a need to create a fleet of 25,000 airplanes from an aircraft industry that was, at the most, nascent. Not only did the government, including the then Assistant Secretary of the Navy, Franklin D. Roosevelt, encourage the companies to get together and utilize each other's patents at that time, but the agreement has been reviewed by Justice since then and found legal. Now, the Justice Department has decided the agreement violates the 1890 Sherman antitrust act. Hence, while the suit may have little immediate impact on aerospace R & D, it does indicate which way the winds are now blowing in Washington on combinations of firms in "highly concentrated" industries.

—DEBORAH SHAPLEY