

behaviour are very stable and are not altered substantially by exposure to pornographic material. "Straight" forms of pornography are more stimulating than the perverse varieties and "while males tend to judge erotic stimuli as more arousing than females (*sc.* than females do), the sexes do not differ substantially in physiological-sexual response to these stimuli"—meaning, presumably, that women and men are equally aroused by explicit sexual material but the former are less inclined to say so.

## COOPERATION

### Europe, DOD and the Shuttle

by our Astronomy Correspondent

IN Washington as in Paris, views are crystallizing around the space tug concept as the possible European contribution to the next-but-one phase of NASA's manned spaceflight programme, the space shuttle project which NASA expects to be concentrating on once the Skylab programme is over. A European contribution of not more than \$1,000 million is being talked of, which would still be enough to give Europe the ten to fifteen per cent share in the entire programme which, it is felt in Paris, would give Europe a say in the programme. About \$6,000 million spread over six years is the anticipated United States expenditure if the shuttle is to be working by 1977 or 1978. This year \$80 million has been requested for vehicle and engine definition and preliminary design, and \$35 million for technology studies. In June, contracts were awarded to McDonnell Douglas and to North American Rockwell to produce preliminary designs for the vehicle, and to Aerojet General, Rocketdyne and Pratt and Whitney for designs of the main engines. Lockheed has a contract to study the impact of the shuttle on payload design and costs.

But an additional variable in the European negotiations revealed last week by Mr Dale D. Myers, associate administrator for manned space flight, is that the Department of Defense is also interested in taking part in the shuttle activities. A joint committee with representatives from NASA and the Air Force representing the Department of Defense has been meeting since last spring. The Air Force, of course, has always longed to consider manned space flight as a logical extension of its activities, until its hopes were finally dashed by the cancellation of the Manned Orbiting Laboratory last year. What the implications of the DOD's involvement are for European participation is not yet known. Would European payloads be allowed to sit in the cargo bay of the shuttle next to military equipment, for example, and would the DOD expect to have the use of the space tug? It is understood, however, that the Department of State does not see any problem in the DOD involvement in the shuttle, although the question was not mentioned during last month's talks with representatives of the European Space Conference. It seems to be generally assumed that the DOD would be free to use any part of the space transportation system.

NASA is not saying how large a European contribution they would like to see, but several ways in which Europe could participate have been drawn up by the previous administrator of NASA, Dr Thomas O. Paine, and Dr H. A. Kissinger, assistant to the President for

national security affairs. For example, there could be a multinational agreement to build something like the space tug, in which case the project would be managed by the European space agency which is expected to arise phoenix-like out of the ashes of ESRO and ELDO. As an alternative, European companies could work as subcontractors for the main United States contractors, but without any transfer of United States dollars across the Atlantic so that the European companies would be supported by their governments. A third possibility is direct participation by European governments through their national laboratories. Dr W. von Braun has pointed out that the cyclic temperature facility developed at the Royal Aircraft Establishment for work on Concorde could be applied to the heating problems of the shuttle, for example.

ELDO has placed two study contracts on the space tug with groups of European companies, and according to NASA a phase A study—a preliminary analysis for feasible concepts—might be started in eighteen months or so. Like the lunar module in the Apollo programme,

### Priorities in Space

by our Astronomy Correspondent

WITH disenchantment at NASA's future programme running high, more than usual interest surrounds the next report of the Space Science Board of the National Academy of Sciences. The report, which is unlikely to be published before the beginning of December, will review relative priorities and levels of support for space science activities for the next ten years. Areas covered will include lunar and planetary science, astronomy, and the life sciences. It is believed that the report now being drafted will give first priority to the High Energy Astronomy Observatory, an unmanned satellite now being considered by NASA for the mid-seventies which would be devoted to cosmic ray, X-ray and gamma ray observations. In the planetary sciences, the report will probably recommend that preference be given to in-depth studies of the planet Jupiter rather than to the two grand tour missions due to be launched in 1977 and 1979. As well as worries about developing the technology of the grand tour spacecraft, the feeling is that only scant information will be returned from the close approaches to the outer planets. The report will probably say that if a choice has to be made it would recommend more detailed studies of a single planet, almost certainly Jupiter which is coming to be regarded in much the same way as the Moon used to be as the Rosetta Stone for the solar system. It is true that to cancel the grand tour missions would be to let a rare chance arrangement of the planets go by, but the attitude of the Space Science Board would probably be that nuclear rockets that can make the journey without gravitational boosts will be available by the time knowledge of the outer planets becomes necessary. The report, "Priorities in Space", will be based on a three week conference at Woods Hole, Massachusetts, organized by the Space Science Board and with H. Friedman in the chair.