have no difficulty in paying the first instalment due early next year.

The first opportunity for the affair to come to a head is late in November at the next ESRO council meeting when next year's budget will be on the agenda. The organization's level of resources for the three-year period 1969–71 has, however, already been approved by a unanimous decision at last November's council, and approval of the 1970 budget requires only a majority decision by seven out of ten states to make it legally binding on all members. Thus, barring the unlikely event of a wholesale retrenchment by the other members, the optimistic view is that France may be persuaded to reconsider the cut.

It must be upsetting for ESRO that this threat to its finances comes so soon after the doubts of last year when even the existence of the organization was being questioned. Nevertheless the calm which has settled over the affairs of the organization since the European Space Conference last November means that this is as good a time as any for ESRO to face a challenge. To some extent critics of the organization have been mollified by the success of the three satellites orbited so far, and a fourth—the spare flight model of ESRO 1—is to be launched on October 1. Even so, ESRO finances are only just enough to keep the organization in its role of carrying out space research which is beyond the reach of individual members. But it will be 1972 and the launching of the TD-1 satellite before ESRO can truly be said to have produced a satellite in this category—the satellites so far have hardly been beyond the capabilities of individual states except in the rate at which they have been launched. Therefore any threat to the organization's resources at the moment is likely to be serious.

SPACE

Moon and Mars

from our Astronomy Correspondent

AFTER a mercifully uneventful seven weeks in the Lunar Receiving Laboratory in Houston, the 60 pounds of material collected by Apollo 11 was released from quarantine on September 12 and is being packaged and distributed to the scientific investigators. According to NASA, the distribution process is expected to last several weeks. During the stay in the laboratory, traces of Moon dust were given to mice, squirrels, insects, fish, oysters and shrimps, and fed to a variety of plants without any apparent effect. But, as the distribution begins, the 142 principal investigators who are to receive samples have surprisingly little to go on, at least as far as public announcements from the Lunar Receiving Laboratory go. In the long run the news that the surface of the Sea of Tranquillity is between 3,100 and 4,500 million years old is likely to be the most valuable piece of information to have come out of the first phase of investigations.

The second important discovery is that as much as fifty per cent of the lunar dust is made up of tiny glass spheres and rods. This is interpreted by Dr Guy E. Rindone of Pennsylvania State University as evidence for wide-scale volcanic activity on the Moon at one time. His argument is that the tiny glass spheres can only be formed if there is an atmosphere present—otherwise the glass spheres show a phenomenon known as "seizure" and stick to each other so strongly that they cannot be separated without damage. Dr Rindone suggests that the volcanic eruptions which produced drops of molten gas will also have released enough gas to form an atmosphere while the drops cooled. Meteorite bombardment cannot explain the glass beads, he says, because without an atmosphere they would tend to be irregularly shaped and fractured.

The third surprising piece of news is that the investigators responsible for the lunar seismometer have retracted their initial statements that the Moon is layered and has a hot core, and now favour the view that the Moon is made up of highly fractured material which muffles seismic vibrations. This is to explain the peculiar nature of the signals picked up by the seismometer, which, according to one of the principal investigators, Dr Gary Latham, are like no signals picked up on Earth. They are, it seems, far more scattered and of low efficiency. One view, supported by Dr Latham, is that the cracks were caused by meteoritic impacts, and that the Moon is made up of heterogeneous material which was never fully molten. The seismometer is now reported to be out of action following a fault which allows overheating during the lunar day, but during its 21 days of activity more than 100 events were recorded.

Analysis of the two hundred photographs of Mars by Mariners 6 and 7 is at a similar early stage. Despite the superficial similarity, Mars seems to have a number of surface features different from anything found on the Moon. Dr Robert Barth of the California Institute of Technology reports what seems to be an extensive region of "collapsed and jumbled land", of area 469,000 square miles, which he compares in appearance but not in extent to a slumped area which appeared around Anchorage, Alaska, after the 1964 earthquake. There is also a large flat region which seems to be featureless except for the occasional scarp or rille.

Not surprisingly, Dr George Pimentel of the University of California at Berkeley has had to retract his statement about the existence of gaseous methane and ammonia over the southern polar cap, and any chance of finding life on Mars now seems thin indeed. What was being detected, it seems, was the infrared signature of carbon dioxide. There is no evidence of the legendary canals, and it looks as if what astronomers have been reporting is the involuntary joining up of surface features by eye. There may be, however, underlying structures of fault lines or chains of craters which would have stimulated the effect.

It also seems certain that the material of the pole cap is basically carbon dioxide, although possibly with some water ice included. This view is supported by Dr Guido Munch of Caltech, even though the temperature at the south pole seems to be a few degrees above the temperature of carbon dioxide ice. But the project's chief television experimenter, Dr Robert Leighton, feels that a water ice cap cannot be ruled out, although he also favours a layer of carbon dioxide ice a few inches thick.

Carbon dioxide also makes up at least 98 per cent of the atmosphere, and the small amount of water vapour present is not enough to make liquid water, according to Dr Norman Horowitz of Caltech. The atmosphere also seems to contain a slight haze, between five and ten miles deep and starting ten miles above the surface, but which is too insubstantial to cause any shadowing.