The study of the motions of satellites and space probes indeed follows the methods of celestial mechanics, and gives us information on the physics of the forces acting on these devices — and as we have shown, not only gravitational forces. However, these artificial celestial bodies do not actually resemble real celestial bodies as far as their own physics is concerned. Now while it is important to know how the external medium acts on heavenly bodies, it remains equally necessary to learn how these bodies react to these outside influences, which condition their very nature. This is a first reason for attempting to 'produce', within their natural medium, artificial celestial bodies similar in nature to real objects. Of course these cannot be stars or planets. On the other hand it seems natural to produce artificial comets and artificial meteoroids. Indeed, real comets and meteoroids occur in the immediate vicinity of the earth, and even enter the atmosphere, where they can be destroyed by explosion or volatiliza-

By producing false comets and false meteoroids in this way, we can hit two birds with one stone. We can study the reaction of the object to the environmental conditions; repeating the experiment several times, we will become familiar with its own reactions, more familiar than would be possible with natural objects, whose nature is not well known and moreover whose appearance is generally unexpected. So, to begin with, we advance our knowledge of the environment.

Besides this (and perhaps more importantly!), the nature of true comets, or of true meteoroids, becomes clearer, and our knowledge advances where before it was imperfect. This is a major step.

The first realistic proposal of experiments of this type was no doubt that of F. Zwicky. It is well known how many extremely interesting results have been obtained from the study of real meteoroids by space devices. Zwicky's proposal was to produce artificial meteor showers. The first attempts in 1946 were unsuccessful, but later experiments succeeded in 1957 — and since then other authors have continued analogous work. The problem is to eject self-luminous objects from the head of the rocket. The reaction of aluminum with ferric oxide (2 Al + Fe₂O₃) was suggested for this purpose. Ejection from the rocket was at an altitude of 60 km. With this sort of experiment one can in principle verify the theory of atmospheric braking of natural meteors and meteorites, as well as the theory of their volatilization. The minimum dimensions of observable meteors can also be estimated from the experiment, and this clarifies the interpretation of observations of real meteors.

In fact what is involved here is the production and study of an artificial 'meteor'
phenomenon, rather than artificial 'meteoroids'; the nature of the object itself is hardly involved (see Figure 26).

We are far less advanced where comets are concerned. We have to recognize that comets are rare objects, while meteoroids fill interplanetary space. Space probes can study the distribution and properties of meteoroids quite well; however, while the physical exploration of a comet by a nearby passage of a space probe has been envisaged, it has not yet been attempted, and it will no doubt be difficult.

The fabrication of an artificial comet can also be envisaged. Among the problems