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Introductory Remarks

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Introductory remarks

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Edmund Halley was one of the world's greatest scientists. The Royal Society is proud of Halley's almost lifelong intimate involvement in its affairs. He himself belonged to the first generation of astronomers to make telescopic observations of the comet that bears his name. We belong to the first generation to send missions to make effective material contact with that comet. Here we have the privilege of the presence among us today of some of the pioneering participants in that enterprise.

I shall not say, 'Little did Halley think...' On the contrary, everything we know about his vision and foresight should convince us that he would not be totally surprised at the sort of observations about which we shall hear. And it is meet that as nearly as possible the first public discussion of the results should be in Halley's native London at a meeting of the Society to which he contributed so much.

This means, however, that the organizers had to arrange a programme before they knew what material would be available. Indeed, when they started to arrange it the comet must have been still about as far away as Jupiter, and it was to be a year or more before any of the space missions to observe it had left the ground. Also, no matter how successful the missions have been, it is still too soon to expect to be told their detailed results. This may be all to the good because it has, we hope, resulted in a programme such that what we shall learn about Comet Halley will be seen in a wider astronomical context.

Astronomers must naturally emphasize the extent to which their knowledge of anything outside the Earth comes from the electromagnetic radiation they are able to receive from it. But that is not quite the whole story. Bits of stone and iron do fall upon Earth from outside; smaller fragments enter the atmosphere and burn up; other interplanetary dust and gas is detected in other ways; material particles from the Sun produce aurorae; other more energetic (cosmic ray) particles may come from the Sun but mostly come from far outside the Solar System, some probably from outside the Galaxy. As regards the dust and gas, astronomers still do not know how much is orginal Solar-System material and how much is picked up as the System endlessly threads its way through its galactic environs.

One feature plays a special role. A 'new' comet (in the accepted sense) comes to the vicinity of Earth from a distance comparable to that of the Sun's nearest stellar neighbours, and it may return to such a distance. Thus we recognize that we are in some sense materially linked to our stellar surroundings by portions of matter that travel to and fro between us and them. So we may have to regard a comet as a bit of the astronomical Universe that is somehow shared between us and the rest of that Universe. On the other hand, the Solar System may possess a huge store of comets forming a vast surrounding cloud from which, from time to time, one gets deflected into a motion that brings it sufficiently close to the Sun for us to have sight of it; indeed, as a 'new' comet. Were this so, new comets would be specimens of material of the Solar System that has been in deep freeze ever since the System was formed, presumably some four-

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and-one-half billion years ago. Comets would then be significant as a link between the Solar System and its own past, rather than a link with its present surroundings.

This last is a main reason why astronomers are so eager to have a close inspection of a cometary nucleus. They cannot hope to obtain this in the case of a 'brand new' comet, because there would never be time between the discovery of the comet and its subsequent disappearance sufficient for the mounting of a *Giotto*-type mission to observe it. Comet Halley provides the best known compromise. It does spend most of its time in a state of deep freeze, but it comes back in a well-predictable fashion.

The first half of the meeting will begin with the general study of comets, and of sorts of material that may have gone into their formation. Then we are to learn about the physical state and behaviour of small bodies and diffuse matter now in the Solar System, and the significance of all this for knowledge of the past evolution of the System.

The second half will be very much Halley's day. Special attention is naturally to be given to observations made during the present apparition of Comet Halley, with some review of the significance of what has already been learned from these observations. But there is to be some attention to other cometary topics as well.

Anyone acquainted with the field is likely to wonder why some particular topic does not figure explicitly in the programme. Some such will be found simply to be subsumed under a more comprehensive heading; others will be dealt with in brief contributions, or in the discussion sections.

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