

definite knowledge. But even this knowledge is meagre. The substance of what we know is that its surface is surrounded by layers of what look like dense clouds, through which nothing can certainly be seen.

I have already spoken of the heat of the sun and its probable origin. But the question of its heat, though the most important, is not the only one that the sun offers us. What is the sun? When we say that it is a very hot globe, more than a million times as large as the earth, and hotter than any furnace that man can make, so that literally "the elements melt with fervent heat" even at its surface, while inside they are all vaporized, we have told the most that we know as to what the sun really is. Of course we know a great deal about the spots, the rotation of the sun on its axis, the materials of which it is composed, and how its surroundings look during a total eclipse. But all this does not answer our question. There are several mysteries which ingenious men have tried to explain, but they cannot prove their explanations to be correct. One is the cause and nature of the spots. Another is that the shining surface of the sun, the "photosphere," as it is technically called, seems so calm and quiet while forces are acting within it of a magnitude quite beyond our conception. Flames in which our earth and everything on it would be engulfed like a boy's marble in a blacksmith's forge are continually shooting up to a height of tens of thousands of miles. One would suppose that internal forces capable of doing this would break the surface up into billows of fire a thousand miles high; but we see nothing of the kind. The surface of the sun seems almost as placid as a lake.

Yet another mystery is the corona of the sun. This is something we should never have known to exist if the sun were not sometimes totally

eclipsed by the dark body of the moon. On these rare occasions the sun is seen to be surrounded by a halo of soft white light, sending out rays in various directions to great distances. This halo is called the corona, and has been most industriously studied and photographed during nearly every total eclipse for thirty years. Thus we have learned much about how it looks and what its shape is. It has a fibrous, woolly structure, a little like the loose end of a much-worn hempen rope. A certain resemblance has been seen between the form of these seeming fibres and that of the lines in which iron filings arrange themselves when sprinkled on paper over a magnet. It has hence been inferred that the sun has magnetic properties, a conclusion which, in a general way, is supported by many other facts. Yet, the corona itself remains no less an unexplained phenomenon.

A phenomenon almost as mysterious as the solar corona is the "zodiacal light," which any one can see rising from the horizon just after the end of twilight on a clear winter or spring evening. The most plausible explanation is that it is due to a cloud of small meteoric bodies revolving round the sun. We should hardly doubt this explanation were it not that this light has a yet more mysterious appendage, commonly called the *Gegenschein*, or counter-glow. This is a patch of light in the sky in a direction exactly opposite that of the sun. It is so faint that it can be seen only by a practised eye under the most favorable conditions. But it is always there. The latest suggestion is that it is a tail of the earth, of the same kind as the tail of a comet.

We know that the motions of the heavenly bodies are predicted with extraordinary exactness by the theory of gravitation. When one finds that the exact path of the moon's shadow on the earth during a total eclipse is