# 京大過去問　１９９３年　第１問

次の文の下線をほどこした部分(1)~(3)を和訳せよ。

Appearances to the contrary, frost does not fall in the same way that snowflakes are attracted earthward. A coating of frost is mainly the child of chance, the consequence of myriads of atmospheric water molecules coming together by way of independent and haphazard paths. (1)Although snowflakes are directed by the pull of gravity, water molecules hardly know it exists, moving so rapidly that it shapes their paths only slightly. They come under the influence of forces organizing them into frost only when exceedingly close to surfaces.

The path of a snowflake from its birthplace high in the atmosphere to where it is incorporated into snow on the ground is a more or less smooth vertical line. But (2)a water molecule that finds itself on a blade of grass fringed with frost arrived there by a zig-zag path, the direction of its motion having been changed frequently and abruptly by collisions with other air molecules.

Air is a mixture of gases, water vapor one of its constituents. A spoonful of even the driest Saharan air contains a million times more water molecules than the population of the earth, and they are moving at average speeds greater than that of a bullet exiting the muzzle of a rifle.

Any surface exposed to such a dense and frantic swarm of water molecules will be bombarded by them at a stunningly high rate. Some molecules will stick or condense, but some leave the surface after a brief visit there, evaporating back into the air whence they came. The surface will remain perceptibly free of water if the rates of evaporation and condensation are equal. If condensation exceeds evaporation, water accumulates as tiny drops of dew or, if the surface is cold enough, as delicate ice crystals of frost.

But (3)why doesn’t frost form every wintry night when temperatures drop so low that water in a pail placed outside at sundown will have acquired a hard coating of ice by sunrise? It seems that subfreezing temperatures are necessary but not sufficient for frost formation. Indeed, frost may form when the air temperature is above freezing.

*molecule: 分子