YOU'VE ASKED

1. Question: Conversion of milk into curd is due to the reaction of micro organisms, but on adding chilly or lemon drops to kilk, it is not counverted in to curd? Whi is it so?

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Answer: The milk is converted into curd by the action of bacteria called *Lactobacillus*. *Lactobacillus* is a kind of bacteria which can convert a sugar into an alcohol and then into an acid by means of anaerobic respiration. When milk is heated to a temperature of 30-40 degrees celsius and a small amount of curd is added to it, the *lactobacillus* present in the curd sample get activated and multiply. These convert the lactose, a kind of sugar, present in the milk into lactic acid, which imparts the sour taste to curd. Thus, these bacteria increase the acidity of milk and at the same time cause the milk proteins (casein) to tangle into solid masses, or curds. On the other hand, when we put the lemon drops or chilli, the milk is not converted into curd but the fats present in the milk get coagulated and its water content gets separated. The citric acid present in lemon juice converts unsaturated fats of milk into saturated fats, which begin to form lumps. This process is known as coagulation. Other solid (colloids) particles, such as those of proteins present in the milk, also get trapped in the process of formation of lumps of fats and the resultant product is commonly known as cottage cheese or *paneer*.

2.Question: In places with hot climate it is advised that outer walls of houses be painted white. Explain.

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Answer: White or light coloured surfaces are good reflectors of light and heat. Since sunlight carries both light and heat, the outer walls of a building exposed to sunlight become hot by absorbing its heat and in turn rooms inside the building also get heated. However, if the outer walls of the building are painted white or with a light shade, a greater part of the heat gets reflected back. This helps in keeping inside of the building comparatively cool, particularly during summers.

3. Question: **Who publishes red data book?**

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Answer: Red Data Book provides the list of endangered animal and plant species. At international level it is prepared by the International Union of Conservation of Nature or Natural Resources (IUCN). For India the Red Data Book for endangered animals is published by the Zoological Survey of India, Kolkata while that for plants is published by Botanical Survey of India, Kolkata.

4.Question: **Why the region above hills, the sky and the water in oceans and deep rivers/lakes looks blue from a distance?**

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Answer: You may be aware that sunlight or the white light is a mixture of light of seven different colours; namely red, orange, yellow, green, blue, indigo and violet. When a ray of light enters from one transparent medium like air into another such medium like glass or water it bends from its straight line path in the first medium and begins to move in a different direction, although along a straight line path, in the other medium. This phenomenon is called refraction. However, in the case of white light or sunlight the extent to which different colours in a ray light bend is different. As a result, a thin beam of white light on entering a drop of water or a glass prism splits into its component colours and gives rise to a spectrum on emerging out on the other side of it. This phenomenon is known as dispersion of light.
However, if the size of the water drop is very small, say the size of a dust particle, the light exhibits another phenomenon called scattering. The light falling on such small particles is first absorbed by them and then emitted. The process of absorption and emission of light takes place in less than a

microsecond. However, the direction in which the light gets reemitted is different from its initial direction of propagation, the angle between the initial direction of propagation and that of scattered light is called angle of scattering. The brightness we observe around us after sun rise even if a place is not directly illuminated by sunlight, is due to scattering of light by the dust particles present in air. The light of different colours present in sunlight too gets scattered in different directions, angle of scattering is different for light of different colours. But, we usually do not perceive it, as our eyes receive light from all possible angles due to scattering by a large number of particles and the combined effect of these give us the impression of white light. The blue colour of the sky is one of the most familiar examples to perceive the effect of difference in the angle of scattering for light of different colours. As the sunlight enters upper regions of atmosphere, the fine dust particles present there scatter light of different colours in different directions. The red light is scattered the largest angle while the violet and blue are scattered least. As a result, red, orange, yellow and green components of sunlight get scattered away while blue, indigo and violet components get scattered towards the surface of the earth. As our eyes are more efficient to perceive blue colour as compared to indigo and violet, we see the sky as blue. The region above hills appears blue for a similar reason though the scattering in this case is by the fine droplets of water that evaporates from the soil or transpires from the trees that cover it.

When sunlight falls on the surface of water in oceans or deep lakes/rivers, a fraction of light gets reflected, a part gets refracted while rest of it gets absorbed. Water absorbs more of the red light present in sunlight; the water also enhances the scattering of blue light. The part of the sunlight that penetrates the water is scattered by its particles and also by ripples in the water. In deep water, much of the sunlight is scattered by the oxygen dissolved in the water, and this scatters more of the blue light. That is why the water in oceans and deep lakes or rivers appears blue to us. This phenomenon inspired Chandrasekhar Venkata Raman to investigate scattering of light which led to the discovery of the phenomenon now known as Raman Effect. Raman was awarded the Nobel Prize in 1930 for his work on light.