Editorial

Biman Nath, Associate Editor

The scientist we pay homage to in this issue is Fritz Haber, who is known for his synthesis of ammonia, among other things. It is perhaps difficult to appreciate the impact of the first chemical synthesis of ammonia after a span of a century, as we have grown very used to the idea of chemical fertilizers now. It was not so in the nineteenth century, when the increased demand for nitrogen based fertilizers exceeded the existing supply, with the growth of population and industrialisation. One particular incident shows how desperate the situation was at that time. Around 1850 there was a mad rush to go to Peru – and it was not really a 'gold rush' – when it was discovered that whole cliffs of guano, the soluble nitrogen-rich excreta of seabirds, had piled high on a few rainless islands off the shores of Peru.

Ammonia is an essential ingredient in the manufacture of fertilizers and any number of important chemical products. It is a building block for proteins and biochemical compounds essential for life. Although ammonia makes up a significant fraction of the atmospheres of some of the gaseous planets (and some comets), there is very little free ammonia on the Earth. Life has, therefore, evolved different mechanisms to produce ammonia. For example, the bacteria that grow on plants like peas and lentils have evolved the ability to produce ammonia necessary for the plants.

Although there is abundant nitrogen in the atmosphere, the strong triple bond of the nitrogen molecules makes it very unreactive, and difficult to 'fix' it in a form that could be supplied to the soil. Fritz Haber cleverly used some newly discovered ideas of physical chemistry to be able to produce this wonder molecule in an industrial scale. The lucidly written article by Jayant Modak in this issue brings out the essence of

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this breakthrough, and the excerpt from Haber's Nobel lecture emphasises the importance of the nitrogen cycle in our lives.

Unfortunately there is also another side of the story of ammonia, like many other instances in the history of science. Fixed nitrogen is as essential for military explosives as it is for farming. Soon after the World War I started, the factory in Germany that was synthesizing ammonia following Haber's method, started producing explosives. Fritz Haber also became a controversial name after his involvement in preparations for chemical warfare. His wife Clara (who was a talented chemist herself) shot herself after the first use of chlorine gas in France by German army. He died a unhappy man though. When the Nazi party began their anti-Jewish activities in earnest, prominent Jewish chemists in the institute that Haber founded were dismissed. Haber was a Protestant of Jewish descent, but he was not immediately threatened because of his stature. He nevertheless left the country that he served all his life with a broken spirit and died in Switzerland within a year.

There are two articles in this issue which connect life with light; one explains how surrounding light affects the biological rhythm in organisms, and another tells the story of wonderful insects that flash light.

Many of us view mathematics with trepidation, for its abstraction and apparent alienation from our daily life problems. We are privileged to be able to publish an article on topology that can prove such fears wrong. I have no doubt that M S Raghunathan's article will become one of the '*Resonance*' classics in the future. Shriya Anand's article on Polya's theorem, with numerous examples from real life problems, also shows the beauty of mathematics.