Editorial

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This issue of *Resonance* focuses on the life and work of van der Waals, whose name is familiar to most people. His career should serve as an inspiration to everyone who aspires for a life in science (see the Article-in-a-Box by Arunan). Driven by ambition, hard work and a little bit of luck, he rose from a family that could not afford his secondary education to winning the Nobel Prize in 1910.

At that time the concept of atoms and molecules had not gained wide acceptance. Even those who accepted it thought of them as point particles having no size. It was then pointed out by Clausius that this cannot be true, because 'point-sized particles' would diffuse much faster than what is found in real gases and hence he argued that molecules should have a finite size and that the slower diffusion is due to collisions between them. This was taken up by van der Waals, who argued that the deviations from the ideal gas law, which were known at that time, could be explained assuming a finite size and attractive forces between molecules at short range. This led to the famous van der Waals equation of state. An understanding of the nature of these forces had to wait for the development of quantum mechanics. These forces, used as a general term, stands for a variety of intermolecular forces, like dispersion forces, dipole–induced dipole forces, the hydrogen bond, etc. They are responsible for a variety of phenomena, like condensation of gases, existence of liquid state, solidification of many solids and the working of the self-adhesive tape. In addition, it has been suggested to play roles in very unusual situations. For example the asteroid Ikotawa, which has a diameter of only about 100 meters, spins fast enough that gravitational force cannot hold it together. It has been suggested that the particles of the asteroid (and other similar-sized asteroids) are held together by van der Waals forces (see: arxiv.org/abs/1002.2478). The unusual climbing ability of the lizard gecko, which has its toes covered with pads having millions of microscopic hairs has been attributed to van der Waals forces between the hairs and the surface on which they stick (for details, see: http://geckolab.lclark.edu/dept/Welcome.html)

Arunan has been writing a series of articles on the types, nature and importance of these forces in *Resonance*. This issue contains the third article in the series. This issue also contains a description of atomic force microscopy, a technique used to measure such forces, and its utility in the area of biological sciences. Atoms can not only be 'seen' today, but the forces acting between them can be directly measured.