chapter 2

Lightsaber

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With the invention of the electricity bulb in the early 20th century, the world changed from the use of candlesticks and torch fires to a much more clean light. Since then, incandescent light bulbs were seen everywhere, ubiquitous for nearly half a century before the creation of fluorescent lamps. At first, fluorescent lamp had its drawbacks, it needed a booster for the electron to travel through the vacuum tube between the two side conductors, and it wasn't until the 1980s that household affordable ballasts were invented for use with fluorescent lamps.

In the 1960s, light amplification by stimulated emission of radiation (LASER) was invented. As it is coherent, collimated, monochromatic, and immune to electromagnetic fields, laser was used only for military applications. However, since the discovery of fibre optics in the 70s, the usage of laser widened, and now it is the backbone for our telecommunication networks, covering not only telephony, but most importantly data transmission from one point to the other by connecting the world via submarine fibre optic cables. On the other hand, the light emitting diode (LED) has the opposite properties of laser; they are incoherent and are lower in cost compared to lasers. A type of solid state lighting, LEDs use a semiconductor to convert electricity into light, are often small in area (less than 1 square millimeter), and emit light in a specific direction, reducing the need for reflectors and diffusers that can trap light. LEDs are widely used for signage, decoration, and lighting as shown in 'A Cupful of Light,' which the exhibitor decorated with many different LEDs.

LEDs can be tailored to emit at a specific wavelength. Since it is cheap, it is now used as artificial sunlight to help plants with the process of photosynthesis. The exhibit 'Artificial Photons' shows that different plants need a specific kind of colour (wavelength) to grow, providing researchers with the idea to grow plants in jars containing the appropriate nutrients and in a sterile medium. This technique, known as plant tissue culture, can generate hundreds to thousands of identical plants for a sustainable future.

'The Gold Particles' exhibit shows the usage of gold nanoparticles as one of the most widely used nanomaterials for academic research. It is an integral component in point-of-care medical devices and industrial products worldwide. Gold is known to be stable at room temperature and have good interaction with lights, allowing it to be used in many light related applications.

The optical microscope is an essential equipment in human life. It is used in many areas from biology, chemistry, physics, to medical, and material engineering. It was invented nearly 2000 years ago to observe the stars in the sky. Taking advantage of the technology of lenses nowadays, ' En'light'ening Journey' brings visitors on a nano and micro scale journey of a mouse's hippocampus (Thy1-EGFP M-line) under the observation of a modern microscope.