

## Spinal and Peripheral Nerve Poisons



### I. Spinal Poisons

#### A. *Strychnos Nux vomica*

[A] *Strychnos* is a genus of tropical woody plants, many of them trees, in the family **Loganiaceae** (order Gentianales). There are about **190 species**. Several are important sources of drugs or poisons, eg *S. Nux vomica* (source of strychnine) and *S. toxifera*, a native of South America (source of curare). A few species are valued locally for their sweet fruits, including *S. unguacha* and *S. spinosa* (Natal orange). *S. potatorum*, found in India is used as a coagulant to purify water. *S. Nux vomica* (**poison nut**) was first used in medicine by the Arabians, who described it in 1540. In the 16<sup>th</sup> century in Germany, it was used as a rat poison. In the 18<sup>th</sup> century, it was used in Europe, as a tonic, with poor results. Strychnine's use was extended considerably in the 19<sup>th</sup> century, following the introduction of the homeopathic remedy, nux vomica. *S. Nux vomica* is known as **Kuchila** in India. Other names are **Dog button** (because sometimes used to kill stray dogs) and **Quaker Buttons**. [B] **Tree** - *Strychnos nux-vomica* (Common Name: Nux-Vomica Tree) is a small evergreen tree native to Asia. (i) **Flowers** - It has yellowish-white tubular flowers which grow in terminal clusters. (ii) The **leaves** - are ovate growing to about 2 by 3.5". (iii) The **fruit** is round, 1.5" across and hard shelled; it varies in color from yellow to orange and resembles a small grapefruit (Fig 42.1).



Fig. 42.1: Fruit of *Nux vomica*

(iv) **Seeds** - On breaking open, the fruit reveals white or pale yellow jelly like pulp. Each fruit contains about **3-5 coin sized gray velvety seeds** that look like coat buttons (Fig 42.2, Fig 42.3). Size is 2.5 cm in diameter and 0.6 cm in thickness. They are flat, circular discs, or sometimes slightly convex on one side and concave on the other. Color is ash-grey or light brown. They have a shining surface and are

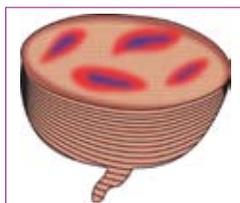


Fig. 42.2: Cross section of the fruit of *Nux vomica* showing position of seeds inside



Fig. 42.3: Seeds of *Nux vomica*

covered with shiny silky fibres. They are very hard, tough and difficult to pulverize. (v) **Active principles:** (a) The **whole tree**, including the seeds, is poisonous. The active principles are alkaloids **strychnine** and **brucine**. Strychnine is about 10-20 times more poisonous than brucine. The alkaloidal content of the seeds ranges from 1.8 to 5.3%. They also contain a glucoside **loganin**. (b) **Leaves** - contain **vomicine** (major constituent), brucine (1.6%) and strychnine (0.025%). (c) **Bark** - The bark contains 9.9% total alkaloids (brucine 8%, strychnine 1.58%); pseudostrychnine, pseudobrucine and beta-colubrine in small amounts. (d) **Roots** - contain 0.99% alkaloids (brucine 0.28%, strychnine 0.71%). (e) **Fruit pulp** - has very low strychnine content (vi) **Use** - (a) used as **rodenticides**, and for **killing stray dogs**. The commercial baits available contain < 0.5% strychnine and are dyed red or green to make them distinctive. (b) Once used as a **tonic** and a reflex stimulant of gastric secretion (because of its bitter taste) (c) **Analeptic and Respiratory stimulant** - But only in toxic doses. [C] **Strychnine** - Strychnine was first isolated from the beans of *Strychnos ignatii* (**St. Ignatius bean**) by **Pelletier** and **Caventou** in **1818**. Its structure was determined by Sir Robert Robinson and Herman Leuchs. It occurs as colorless, odorless rhombic prisms, and has an intensely bitter taste. Strychnine is one of the **most bitter substance known**; its taste is detectable in a dilution of **1:70,000**. Despite its intensely bitter taste, surprisingly strychnine has been used for homicide quite commonly. It is because it was usually mixed in bitter alcoholic drinks (already bitter in taste), and if the subject is already under the influence of drink, he is further less likely to detect it. Strychnine is also found in **Upas tree** (*S. tieuté*), from which the Malaysian natives used to obtain poison for their arrows and darts.

#### 1. Absorption and Excretion

(1) Strychnine is rapidly absorbed from the GIT, nasal mucosa, and all parenteral sites. (2) It is rapidly metabolized in the liver (up to 80%) by microsomal enzymes. (3) The highest concentrations of strychnine are found in the liver, kidneys and blood. (4) Strychnine taken up by liver and muscles may be released into