

## TOXIC CONSTITUENTS OF SOME INDIAN PLANTS

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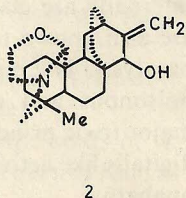
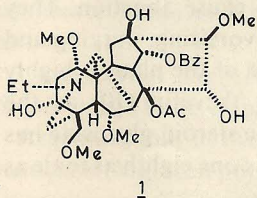
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A TOXIC substance can be classified in one of several ways, according to (i) its physiological manifestations *e.g.* as nerve and muscle poison, (ii) its chemical constitution *e.g.* alkaloid, glycoside or (iii) its botanical origin. It has been estimated that in India there are about 700 poisonous species belonging to over 90 families of flowering plants<sup>1</sup>. In this article, which is not comprehensive, we have classified some important poisonous plants found in India, into four categories and surveyed the nature of their toxic principles.

### I. PLANTS USED IN MEDICINE OR OF POTENTIAL USE IN MEDICINE

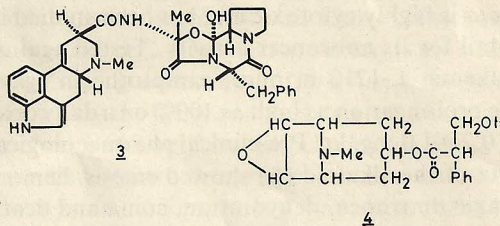
1. *Aconitum balfourii* Stapf. (Garhwal—Banwa), *A. heterophyllum* Wall. (Sanskrit—*Ativisha*) (Fam. Ranunculaceae).

The roots of these plants have been used in the Indian and Chinese systems of medicine as analgesic and anti-inflammatory agents. Plants belonging to the *Aconitum* species have been largely used as arrow poison in different parts of the world. There are 300 species belonging to this genus and more than 20 species are found in the Himalayan region<sup>2</sup>. They owe their toxicity to complex C<sub>19</sub> and C<sub>20</sub> diterpenoid alkaloids like aconitine (1) and atisine (2), the latter type being less toxic than the former. Aconitine has LD<sub>50</sub> in mice at 0.166 mg/kg. The signs of toxicity include loss of muscular control, trembling and ultimately respiratory paralysis. At low doses, 0.01–0.05 mg/kg *i.v.* in cats and rats, aconitine causes bradycardia and hypotension. At higher doses there are positive inotropic and chronotropic effects.



2. *Claviceps purpurea* (Fr.) Tul. (Fam. Hypocreales)

The fungus (ergot) which affects rye and wheat finds use in medicine as vasoconstrictor, especially as an oxytocic and in migraine. The toxic symptoms of ergot are vomiting, diarrhoea, CNS disturbances, mental confusion and gangrene. The toxins are alkaloids containing lysergic acid, dimethylpyruvic acid, proline and phenylalanine joined in amide linkages *e.g.* ergotamine (3) is toxic at LD<sub>50</sub> *i.v.* in rat<sup>3</sup> 62 mg/kg.



3. *Datura metel* Linn. (Hindi—*Sadah-dhatura*) (Fam. Solanaceae)

The leaves of *D. metel* var. *fastuosa* and *D. stramonium* have been used from ancient times as parasympatholytic agent for relaxation of G.I., biliary and G.U. tracts and the seeds are smoked as a treatment of asthma. Almost no other plant has such a history of crime as *datura* and the seeds are the favourite poisons used for this purpose. The clinical symptoms of poisoning due to *datura* are thirst, visual disturbance, flushed skin, convulsions, coma and death. The toxic ingredients are the tropane alkaloids—atropine, hyoscyamine and scopolamine (4).

4. *Gloriosa superba* Linn. (Hindi—*Kalihari*; Sanskrit—*Shakrapushpi*) (Fam. Liliaceae)

The roots have been used to bring about abortion. Colchicine (5), the major alkaloid of the plant, is used for the treatment of gout, for the treatment of mammary tumours and is a research tool used in plant genetics. The signs of poisoning are numbness, nausea, convulsions and inflammation of gastric mucous membrane.

