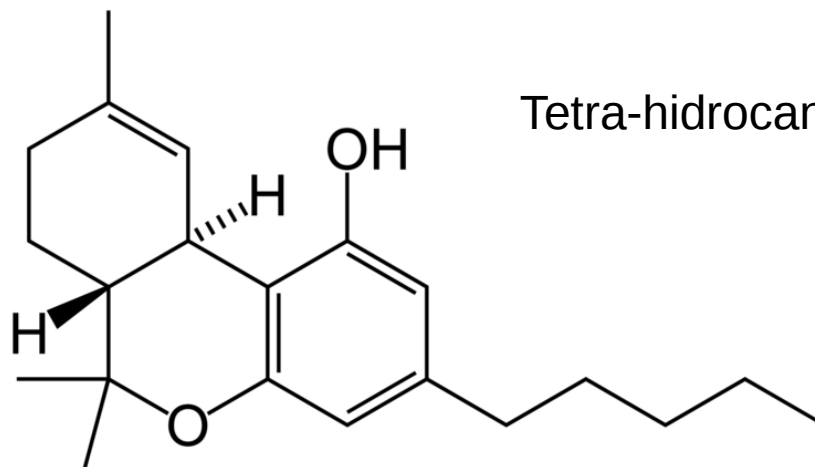
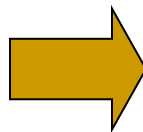
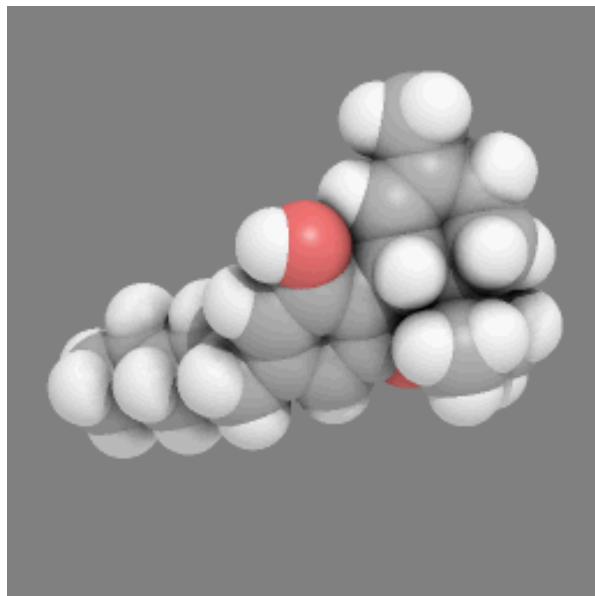


Grande parte dos
Fármacos foi obtida,
ou desenvolvida, a
partir de produtos
naturais



Tetra-hidrocanabinol

History

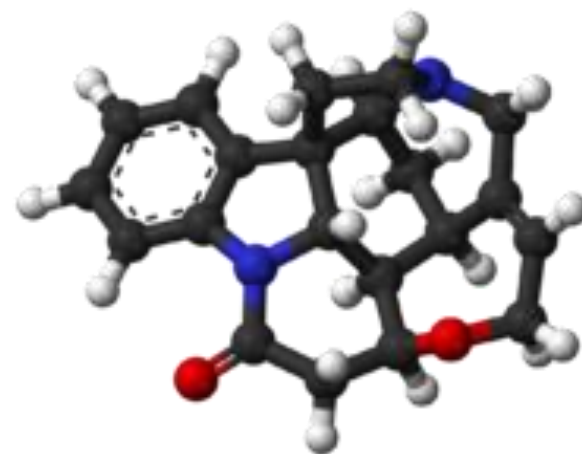
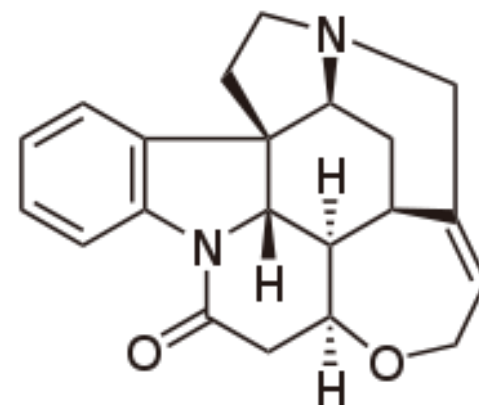
Structural elucidation of natural products used to be *very hard and take forever*.

Strychnine *alkaloid toxin*

Isolated by Pelletier & Caventou (1818)

Past: H. Leuchs worked on structure for **40 years** until R. Woodward (1954) beat him to it.

Today: <1 mg sample needed; **a weekend** would be enough.



Etapas para elucidação estrutural

- Determinação da Fórmula Molecular
- Caracterizar Grupos funcionais
- Degradação da Molécula e Síntese de Derivados

Atualmente

- Métodos Espectroscópicos

STRUCTURAL ELUCIDATION

- *Spectroscopic methods:*

- *Infrared (IR)*

- indicates presence of functional groups:

- C=O** ~ 1670 – 1750 cm⁻¹

- amide, ketone, ester

- OH, NH/NH₂** ~ 3100 cm⁻¹ to 3500 cm⁻¹

- Limitation; non polar and semi polar compounds only.

STRUCTURAL ELUCIDATION cont'd

➤ *Mass Spectrometry*

- Enables the determination of molecular weight.
- Aids structural elucidation – fragmentation peaks: loss of CO ($M^+ - 28$), loss of H₂O ($M^+ - 18$).
- Enables identification of mixtures; MS-MS.
- Various ionization techniques – to accommodate different compounds; polar, ionic, non-polar, macromolecules.
- Various Analyzers; usage (MS-MS, HRMS), cost.

NUCLEAR MAGNETIC RESONANCE

➤ *Nuclear Magnetic resonance:*

- ❑ Permits the establishment of the structural skeleton of the compound investigated.
- ❑ ^1H NMR showed resonances of protons while ^{13}C NMR showed the C resonances.
- ❑ **Allows to establish the connectivity between carbons and protons.**
- ❑ One dimensional and two dimensional techniques available:
 - COSY, HMQC, HMBC, NOESY etc.
- ❑ For ^1H NMR ~ 1-5 mg (pure) sufficient
- ❑ For ^{13}C NMR ~ 20 mg sufficient.