MOLECULAR PHARMACOGNACY

Pharmacognosay Lecture stage 2

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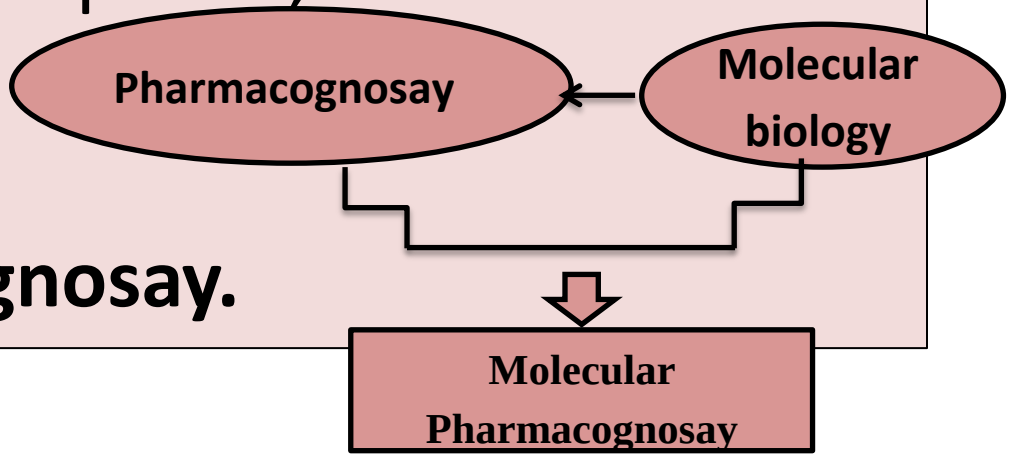
Molecular Pharmacognosay

Plants have been an important source of medicine for thousands of years. Even today, the World Health Organization estimates that up to 80 per cent of people still rely mainly on traditional remedies such as herbs for their medicines. Plants are also the source of many modern medicines. The most popular **analgesic**, **aspirin**, was originally derived from species of ***Salix*** and ***Spiraea*** and some of the most valuable anti-cancer agents such as **paclitaxel** and **vinblastine** are derived solely from plant sources.

Molecular Pharmacognosay

Molecular Pharmacognosay is based on molecular identification technologies and has provided an identification basis of crude drugs at the gene level , molecular identification of medicinal raw materials, controlling metabolic pathways and biosynthetic regulation of secondary metabolites in plants, **Molecular Pharmacognosay is a combining molecular biology and Pharmacognosay.**



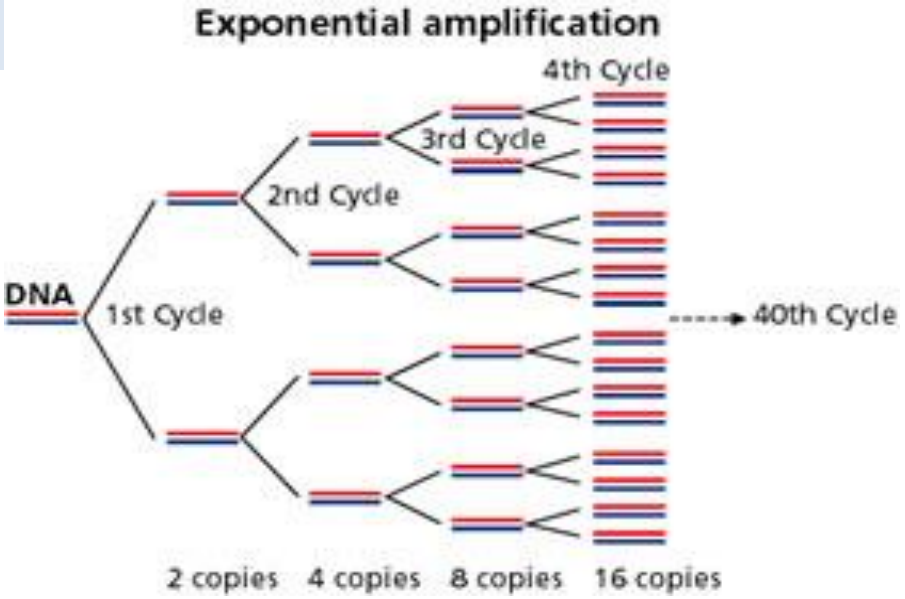
and its also involved methods of modern biotechnology, genetic engineering, tissue culture technology and production of pollution-free medicinal plants. Many techniques of molecular biology are applied to Pharmacognosay, such as **molecular markers**, **recombinant DNA** and **gene chip technique**

Molecular Marker

DNA sequence with a known location on a chromosome and associated with a particular gene. **DNA markers** based tools for molecular identification of traditional medicinal materials are based on **PCR techniques (Polymerase chain reaction). technology**

Polymerase chain reaction (PCR)

Is a method widely used to make many copies of a specific DNA segment. Using PCR, a single copy (or more) of a DNA sequence to generate thousands to millions of more copies of that particular DNA segment.



Recombinant DNA technology.

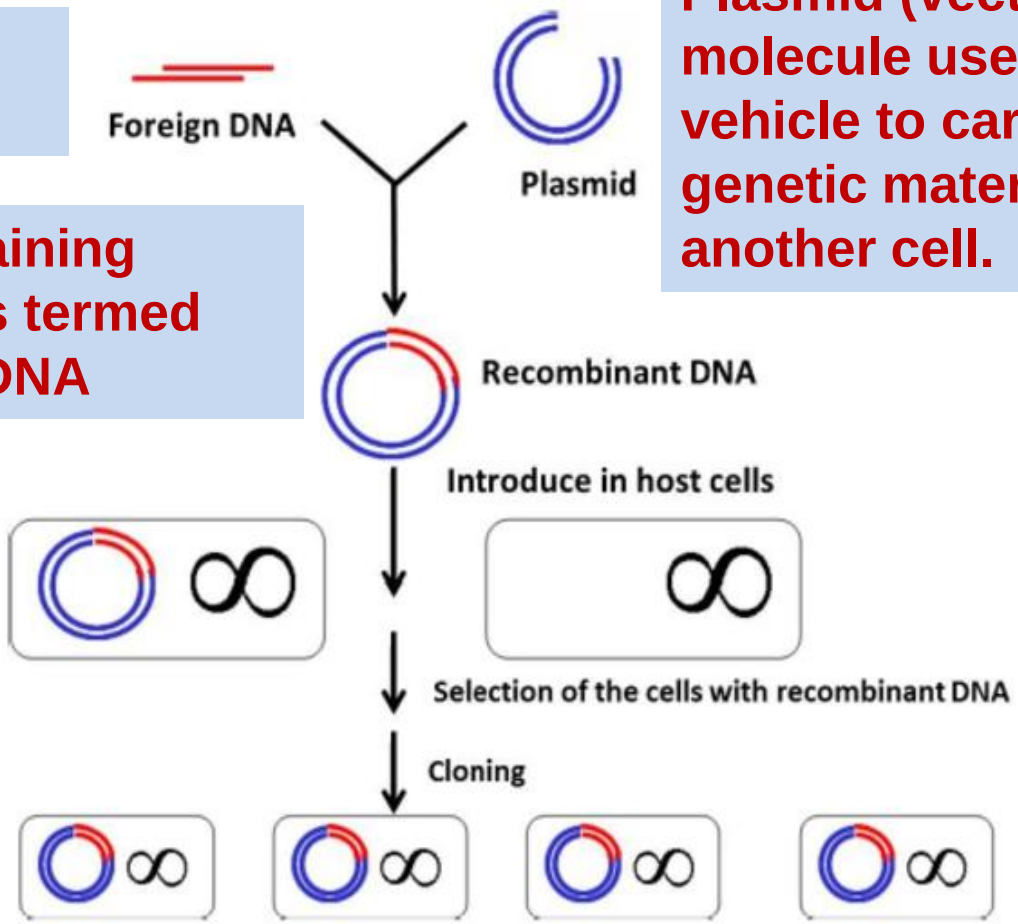
Joining together of DNA molecules from two different species that are inserted into a host organism to produce new genetic combinations that are of value to science, medicine, agriculture, and industry. Recombinant DNA technology engineers microbial cells for producing foreign proteins.

Recombinant DNA

Target DNA molecule

Plasmid (vector) is a DNA molecule used as a vehicle to carry foreign genetic material into another cell.

A vector containing foreign DNA is termed recombinant DNA



Plant Transformation

Genetic engineering also has made it possible to use plants as factories for pharmaceutical protein production. Plant-made pharmaceuticals are made by inserting a segment of DNA that encodes the protein of choice into plant cells. The plants or plant cells are essentially factories used to produce the desired proteins and are only grown for the purpose of pharmaceutical applications.

Transformation is the process by which DNA from one organism is incorporated into the DNA of another organism, that have been established through biotechnology to produce transgenic plants, which, in turn, could be used to create the plants used to make pharmaceutical proteins. **There are two common methods of plant transformation techniques** include the ***Agrobacterium tumefaciens*-mediated** transformation system and **biolistics**.

Agrobacterium tumefaciens

Is a soil bacterium that naturally infects plants and causes crown gall disease. It is very useful for the production of transgenic plants because it has the ability to transfer a segment of its DNA, called **T-DNA**, into the nucleus of the plant cells which is located on a **Ti plasmid** .

The T-DNA from *A. tumefaciens* is then integrated into the plant and transcribed, causing **crown gall disease**.

Scientists have used *A. tumefaciens* to their advantage by inserting their DNA of interest between the T-DNA to create a plant with qualities such as herbicide resistance, or pesticide resistance, as well as many others

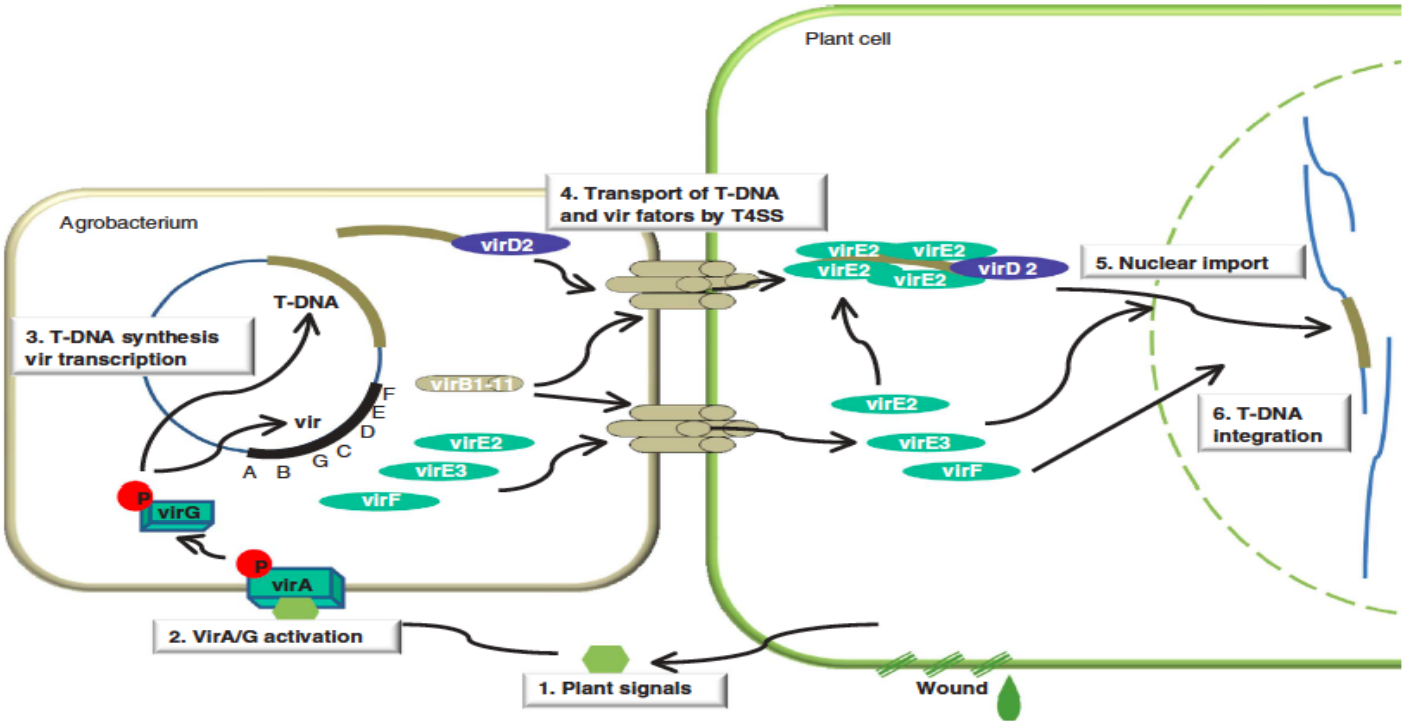


Figure 1 Overview of the *Agrobacterium*–plant interaction. **1**. Plant signals induce **2**. VirA/G activation and thereby **3**. T-DNA synthesis and *vir* gene expression in *Agrobacterium*. **4**. Through a bacterial type IV secretion system (T4SS) T-DNA and Vir proteins are transferred into the plant cell to assemble a T-DNA/Vir protein complex. **5**. The T-DNA complex is imported into the host cell nucleus in which **6**. the T-DNA becomes integrated into the host chromosomes by illegitimate recombination.