Chapter I: General Introduction

PART-A: Asthavarga plants and terpenoids and sterol based natural product

'*Ashtvarga*' a group of eight medicinal plants('Asht' means eight and 'Varga' means group), namely, Vriddhi, Ridhi, Meda , Mahameda, Jeevak, Rishvak, Kshirakakoli and Kakoli , distributed in North West Himalayan regionin small patches with an altitudinal range of 1600–4000 m from the sea level.

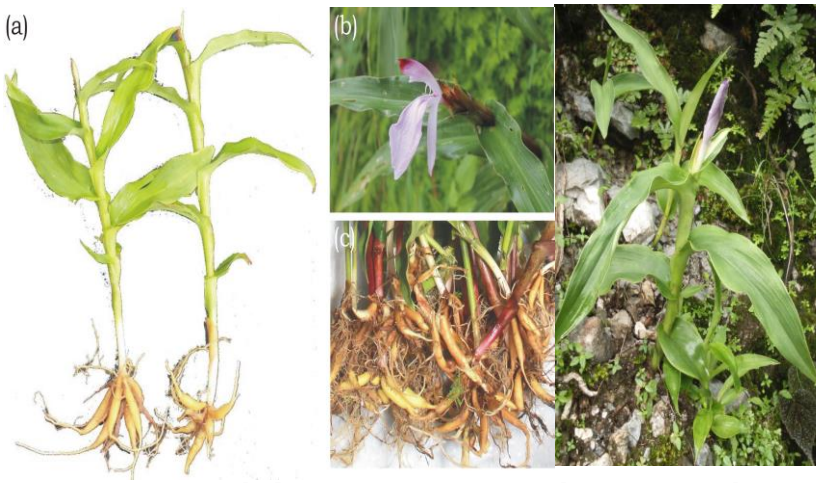


Figure 1: Kakoli (*Roscoea purpurea*) plants in Himalaya

Terpenoids and sterols are extractable from plants, and terpenoids with one or more hydroxyl and/or carboxyl groups the terpenoids opened up a new era for the study of their self-assembly properties in different liquids.

PART-B: Self-Assembly and supramolecular Gel

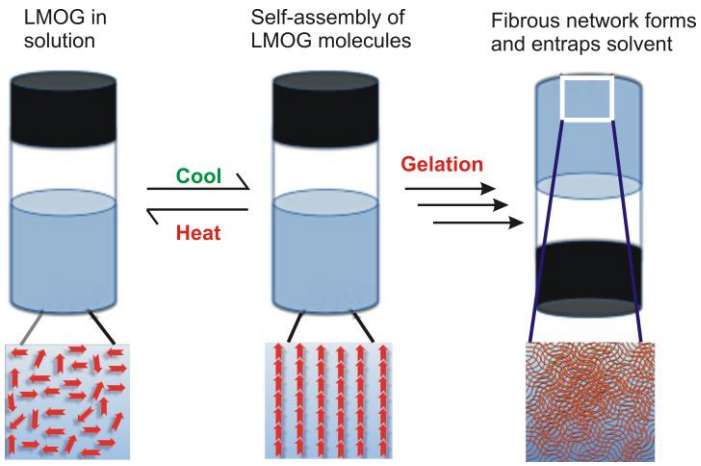
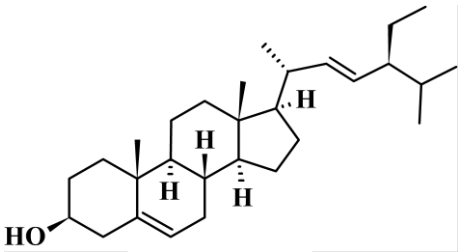


Figure 2: Schematic representation of formation of gel via self-assembly of LMOG's(Low molecular weight gelators)

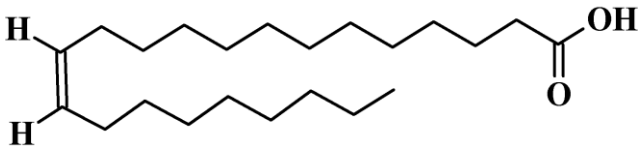
Molecular self-assembly is the assembly of molecules in to an organized structure with the aid of multiple intermolecular forces including relatively weak non-covalent interactions, such as hydrogen bonding, π-π stacking, electrostatic, van-der Waals, co-ordination and ion-dipole interactions.

Chapter II. Chemical investigation on "Astavarga" plants and their antioxidant property

Stigmasterol and Erucic acid are two compounds isolated from leaves *Roscoea purpurea(kakoli)* and pseudobulb of *Crepidium acuminatum(Jeevak)* plant respectively. These two plants are the most important plant of "*Astavarga*" group. Astavarga plants are found in Himalayan area of India.



Stigmaster



Erucic acid

Chapter III. Self-assembly study of Stigmasterol in organic liquids

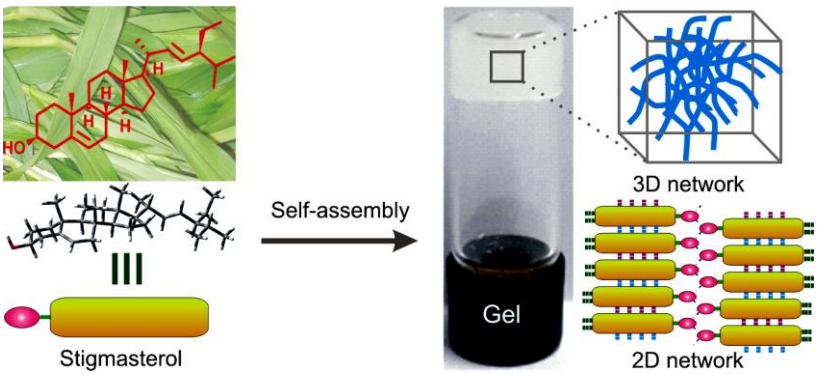


Figure 3: Scematic representation of self-assembly of stigmasterol

Stigmasterol, a naturally occurring 6-6-6-5 monohydroxy phytosterol, was extracted from the leaves of Indian medicinal plant Roscoea purpurea, commonly known as Kakoli. The molecule self-assembled in organic liquids yielding supramolecular gels in most of the liquids studied via the formation of fibers and belt-like architectures of nano-to micrometer diameter.

Chapter IV. First Vesicular Self-Assembly of Crotocembraneic Acid, a Nano-Sized Fourteen Membered Macrocyclic Diterpenic Acid

Crotocembraneic acid was extracted from the leaves of *Croton oblongifolius Roxb*. The carboxyl group forming a polar head group and the macrocycle forming a highly hydrophobic tail, crotocembraneic acid turned out to be a unique macrocyclic amphiphile for the study of its self-assembly properties in various

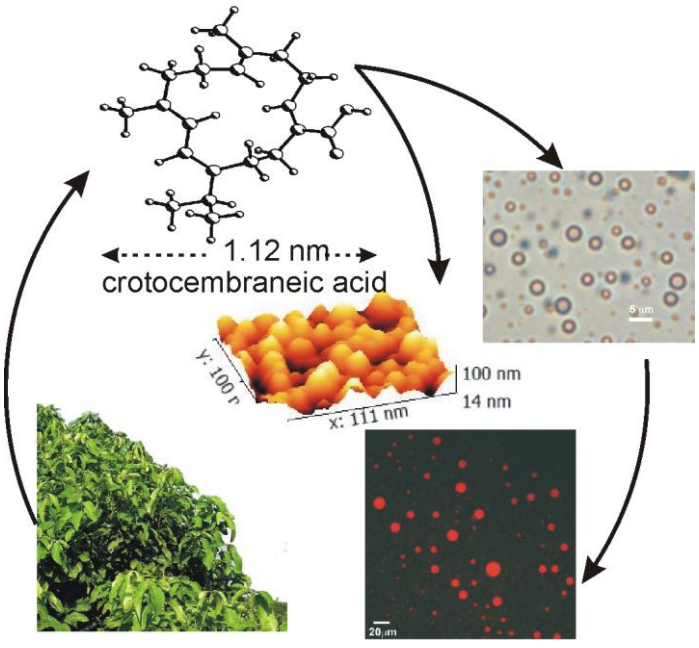


Figure 4: Scematic representation of vesicular self-assembly of Crotocembraneic acid liquids.