



NEW OXYGENATED LUPANES FROM
Pleurostyliia opposita (Wall) Alston (Celastraceae)
AND
PHYCOCOLLOIDS FROM SOME SEaweEDS
OF SRI LANKA,



Presented by,

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ABSTRACT

The work reported in this thesis consists of two parts. A survey of lupane triterpenes which have been isolated from the Celastraceae, and di- and tri-oxygenated lupane derivatives isolated from the higher plants is included in the first part of the thesis.

Chemical investigation of the benzene extract of the stem bark of *Pleurostyliia opposita* (Celastraceae) yielded several triterpenes including α -amyrin, β -sitosterol pristimerin and six lupane derivatives. Chemical interconversions, $^1\text{H-n.m.r.}$ spectral data including lanthanide induced low field shifts and mass spectrometry were used to establish the structure of these lupanes as lup-5,20(29)-diene-3-one(9), 20-hydroxy-lupane-3-one (10), 6β ,20-dihydroxy-lupane-3-one(11), 3β , 6β -dihydroxy-lup-20(29)-ene (12), 3β ,20-dihydroxy-lupane (13) and 6β ,28-dihydroxy-lup-20(29)-ene-3-one (14). This is the first report of the occurrence of these triterpenes in the Celastraceae and compounds (9), (11), (12) and (14) are new compounds which have not been previously either synthesized or isolated from natural sources. This also constitutes the first report of lupanes bearing a β -hydroxy substituent at C-6. Careful examination of the $^1\text{H-n.m.r.}$ spectra revealed marked deshielding of the tertiary methyl groups. The deshielding has been attributed to 1,3-diaxial interaction with the 6β -hydroxy group.

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brown The major fragment ions in the mass spectra of related lupane derivatives were studied and common fragmentation patterns were observed.

Complete assignment of the ^{13}C -n.m.r. chemical shifts of the compound (14) was made. Partial analysis of the ^{13}C -n.m.r. spectra of compounds (10), (11) and the diketone of (11) were also carried out. ^{13}C -n.m.r. assignments supported the structures which had been assigned to these lupane derivatives.

An investigation of the phycocolloid content of agar and alginate bearing seaweeds is reported in the second part of the thesis. Eight species of red algae were investigated for their availability, seasonal growth and phycocolloid content. *Gracilaria edulis* and *G. salicornia* was found to be the most suitable for commercial exploitation in terms of the ease of harvesting, yield and gel forming properties. The moisture, ash, soluble Na^+ , K^+ , Ca^{++} and sulphate contents are also reported.

The alginate content of five brown seaweeds was studied using different methods. The most commonly occurring brown seaweed (*Sargassum sp.*) was found to bear a low percentage of sodium alginate

which had favourable flow properties. The high alginate yielding brown seaweeds *Hormophysa triquetra* and *Stoechospermum marginatum* were found to be more difficult to harvest and showed marked seasonal abundance.

Plants belonging to this family are found mainly in tropical and sub-tropical regions of the world. In Sri Lanka the family Celastraceae is represented by twenty two species distributed among twelve genera² (Table I). Of the twenty two species eleven are endemic.

The family Celastraceae has been the subject of investigations which have led to the isolation of various types of organic compounds.³ The types of compounds from this family include alkaloids, flavonoids, terpenes, glycosides and also saponins. The study of these is of chemotaxonomic significance. The compounds examined contained the following:

A wide range of compounds have been isolated from plants of this family. For example, alkaloids, flavonoids, terpenes, glycosides and saponins have been obtained from various species. Moreover, the study of these systems of compounds is of taxonomic importance. The study of these compounds is of taxonomic importance. The study of these compounds is of taxonomic importance.