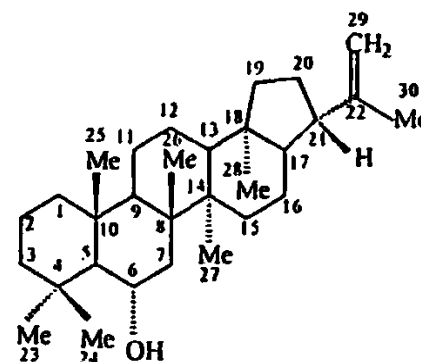


Chemistry of five lichens of Sri Lanka and sequestration of lichen compounds by a Lycaenid butterfly *Talicada nyseus*

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Lichen is not a single life form but it is a symbiotic relationship of algae or cyanobacteria and fungi. It grows on rocks, poorly developed soils or as epiphytes on trees or shrubs. According to the thallus type it can be divided into three such as crustose, foliose and fruticose. Lichens are used as medicine, food, dye, perfume and bio-indicators of air pollution. Lichen substances show antibiotic, anti tumour and anti mutagenic, anti herbivore, growth inhibitory, nematocidal activity etc.

For this study five lichens growing in Sri Lanka were selected; namely *Pyxine consocians*, *Usnea* sp., *Heterodermia leucomelos*, *Lepraria atrotomentosa* and *Leproloma sipmanianum*. The first three lichens are common macrolichens from the montane zone while *Lepraria atrotomentosa* (new species) and *Leproloma sipmanianum* (new record) are two leprarioid lichens. The lichens were cleaned, air dried and the compounds from the extracts and the powder of the lichens were isolated and identified. There were three new compounds among the isolated compounds and they are cabraleadiol monoacetate, methyl ether of menegazziaic acid and a hopane triterpenoid. The bioactivity of isolated compounds was tested against the second instar larvae of *Aedes aegypti* (major dengue vector in Sri Lanka and Asia). Some of the newly identified compounds and some others were found to be new to the specific genus and active against the dengue mosquitoes.

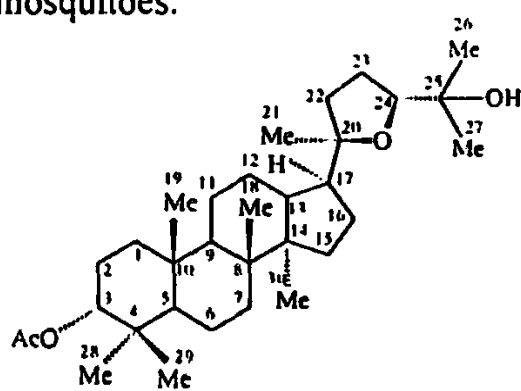


Hopane triterpenoid

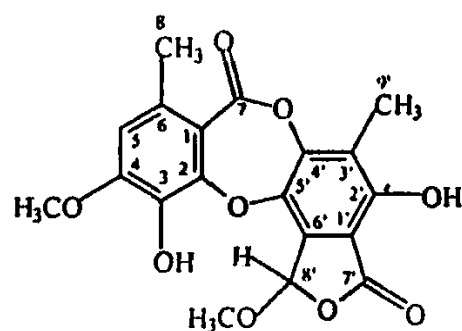
Observations always play a major role in inventions and discoveries in the science world. It was reported that monarch butterflies belonging to the family Nymphalidae, accumulate toxic cardiac glycosides in milk weeds, which are used by the adults to deter predators. Lichen compounds are sequestered by many snails and slugs (class: Gastropoda) and moths of the family Arctiidae feed on lichens. The ecological role of the sequestered lichen compounds may be chemical defence against the predators or pathogens. This study reports the new finding of the sequestration of the compounds isolated from the lichen *Leproloma sipmanianum* by a lycaenid butterfly *Talicada nyseus* and the investigations regarding the stage of entry of lichen compounds into the life cycle of the butterfly. Further, the life history studies on *Bryophyllum calycinum* (host plant, Sinhala: *Akkapana*) and *B. laciniata* (a related species) are described. *Talicada nyseus* is a butterfly founded in the region (from) Sri Lanka to Indo-China. The sexes of this insect are similar and flies through out the island below 4000 feet.

In the life cycle study wild caught adults from the Royal Botanical Gardens, Peradeniya were brought to the green house and allowed to lay eggs on potted *B. calycinum* and *B. laciniata* plants. Adults of the resulting generation were used to study the life history of *T. nyseus*. Five pairs of male and female butterflies were introduced to five separate cages. Average life-time (days) of different stages of *T. nyseus* as well as the number of eggs laid by a single female, the time taken for the eggs to hatch, how the larva eats and moves, how it changes its features and colour as it grows, the changes and the time taken from the larval to pupal stages and the time taken for adults to emerge from pupae and the life span of the adults with and without the artificial food were determined.

In the life cycle study, the average time taken for oviposition was 4-5 days. Further this study revealed that the eggs hatched on an average between 2-8 days, the larval development took an average of 3-16 days, the larvae pupated in 5-12 days, the average life span



Cabraleadiol monoacetate



Methyl ether of menegazziaic acid

of the adult was 4-16 days and the total life cycle of *T. nyseus* was 21-57 days.

In the study of stage of entry of lichen compounds into the life cycle of the butterfly, the butterflies were reared with *B. calycinum*, a piece of rock covered with *Leproloma sipmanianum* lichen and both the lichen and *B. calycinum* plant. Here both wild-caught (two collections made in February 2003 and May 2003) and laboratory reared specimens (larvae (10), larval waste, pupae (5) and the imagines (5) which emerged from the larvae from each generation) of *T. nyseus* were freeze dried, ground in a mortar and extracted with

$\text{CH}_2\text{Cl}_2$ . The Solvent was removed under reduced pressure using a rotavapor. The  $\text{CH}_2\text{Cl}_2$  extract of each specimen was analysed by High Performance Liquid Chromatography (HPLC) and Thin Layer Chromatography (TLC).

The presence of lichen compounds in both the larvae and larval waste collected from Beragala suggests that the adult butterfly was presumably accumulating the lichen compounds through the larvae. Thus, our results indicated that the butterfly larvae use the lichen as an alternative food source, probably when the natural food source *B. calycinum* is not plentiful.

### **Furbishment of Headquarters of the Institute of Chemistry Ceylon**

The Headquarters Building at No. 341/22, Kotte Road, Rajagiriya was built at a cost of nearly Rs. 30 million using the funds which have been carefully and meticulously saved over the past 25 years. Only limited donations have been received and collected through special efforts such as the Golden Jubilee Raffle, P.P.G.L. Siriwardene Auditorium, J.N.O. Fernando Lecture Hall, R.S. Rasmakrishna Laboratory, M.U.S. Sultanbawa Laboratory, C.L.M. Nethsingha Library, Instrument Centre, Information & Communication Centre and the office have to be fully furnished in a manner that will make the building functional and commensurate with the huge investment made.

The Building Committee of the Institute earnestly requests members, academics in the Universities, Graduates of the Institute of Chemistry and Universities who were students of the distinguished chemists in whose names the important areas of the building are named and well-wishers to forward their generous contribution towards furnishing the various parts of the building. The donations could be made by crossed a/c payee cheques drawn in favour of the Institute of Chemistry, Ceylon stating to which area you wish to contribute or the area you wish to contribute to..

### **New Staff Appointments**

#### **Full Time Teaching Assistant (on contract) College of Chemical Sciences, Institute of Chemistry Ceylon**

Ms. G G D Nilushika & Ms. M Dunuwille have been appointed as Full Time Teaching Assistants (on contract basis) with effect from 1<sup>st</sup> September 2006.

Ms. G G D Nilushika, Graduate Chemist of the Institute of Chemistry Ceylon and has obtained a First Class at the Graduateship Examination in Chemistry conducted by the Institute of Chemistry Ceylon. She has also completed the B.Sc. Special Degree in Pharmacy conducted by the University of Colombo & awaiting results.

Ms. M Dunuwille has graduated from the University of Colombo with a B.Sc. (Special) Degree Second Class (Upper Division) in Chemistry.

### **Forthcoming Training Seminars/Workshops**

The following seminars/workshops will be organized by the Institute of Chemistry Ceylon

- Millennium approach in pharmaceutical and cosmoceutical industry (November 2006)
- Packaging material and industrial outlook (March 2007)
- Applications of biotechnology (May 2007)

The following seminars/workshops are organized by the College of Chemical Sciences

- Pesticide Residues in the Environment (6<sup>th</sup> – 7<sup>th</sup> December 2006)
- Panel Discussion on Coconut in the Sri Lankan Diet. (30<sup>th</sup> November 2006)
- Certificate Course on 'Chemistry in the sustainable use of water resources in Sri Lanka' (9<sup>th</sup>, 16<sup>th</sup> & 23<sup>th</sup> February 2007)

Further details could be obtained from the Registrar, Institute of Chemistry Ceylon