PHARMACOLOGICAL POTENTIAL OF THE HYACINTHACEAE:

DEVELOPING HOMOISOFLAVONOIDS AS A TREATMENT FOR MACULAR DEGENERATION

28-29th June, 2023.

WORKSHOP REPORT:

The conference was attended by over 30 delegates from 10 countries (USA, UK, Ghana, Kenya, South Africa, Thailand, Malaysia, South Korea, Spain and Austria). Wisley Gardens and the Royal Botanic Gardens at Kew were represented. PhD students from Surrey, Reading and Kingston Universities attended.

Wet age - related macular degeneration (AMD) is one of the leading causes of blindness worldwide and we have shown that homoisoflavonoids, a class of compounds from the Hyacinthaceae, show great potential for treating this condition. As homoisoflavonoids are small molecules, the aim is to produce an eye drop formulation for the treatment of this condition. The purpose of the workshop was to bring together experts in related fields: natural products and synthetic chemists, botanists, pharmacologists, computer modelers and clinical practitioners to accelerate this study. We aimed to bring together existing collaborators and new potential collaborators to get the most promising homoisoflavonoids to the clinical trial stage as quickly as possible. Professor Neil Crouch from SANBI, South Africa, opened the meeting with a talk on the ethnobotany of the genus which really set the scene for what was to follow. Geraldine Hoad of the Macular Society and Dr Walter Knirsch, a practicing ophthalmologist, described wet age-related macular degeneration and the problems experienced by people with the condition. Pharmacologist, Professor Tim Corson, from the Indiana University School of Medicine, USA, described the “Evidence so far” for using homoisoflavonoids for the treatment of this condition and proposed future studies. Synthetic chemists, Dr Seo Seung-Yong, from Gachon University, South Korea, and Surrey PhD student, Elisha Griffin, discussed their synthetic methodologies for synthesising the naturally occurring homoisoflavonoids and making synthetic derivatives, and the results of screening these compounds. As many of these plant species are endangered in the wild, the need for synthetic methodology to produce these compounds was emphasized. It was agreed that the mode of action of these compounds is not fully understood and Surrey PhD students will be using computer modelling docking studies to support Prof Corson’s proposed mode of action for these compounds with collaborators Prof Daniela Shuster and Dr Veronika Temml at the Paracelsus University Medical University in Salzburg, Austria.

Discussions on the taxonomy of the Hyacinthaceae, new species, and how they are related was an important theme of the conference. Being able to isolate novel compounds from previously un-investigated species is important in providing new compounds for screening.

Results of recent taxonomic research were given by Professor Mario Martinez Azorin and Dr Maria Angeles Alonso Vargas of the University of Alicante, Spain, Professor Martin Pfosser from the Biocenter, Linz, Dr John David of Wisley Gardens, and Dr Michael Pinter, from University of Graz, Austria. The lack of funding for taxonomical research was highlighted and the need for collaboration between botanists, chemists and pharmacologists to obtain funding was stressed.

Lectures on natural products research into Madagascan and African members of the Hyacinthaceae were presented by Dr Eduard Mas-Claret of Kew Gardens and Dr Linda Langat and PhD student, Hannah Jefford, of Surrey. Dr Langat showed her promising results on anticancer screening of compounds from the Hyacinthaceae, done in collaboration with the National Cancer Institute in the USA. It was noted by several delegates that the anti-inflammatory properties and potential for use in treating cardiovascular conditions of these compounds and other potential uses remains to be explored fully.

The poster session provided a range of topics of interests from taxonomy to natural products to synthetic chemistry, again highlighting the multidisciplinary nature of the event.

Social events

Overseas delegates were taken on a Historical Tour of Guildford on the first evening. This was most informative, even to the locals who accompanied the guests, and most enjoyable.

The conference dinner was held at the Albury Vineyard. The weather was very kind and we were told about the vineyard by owner Nick Wenman. We heard about the joint field trials being undertaken with the Mulholland group at the vineyard. This joint project aims to control a grapevine pest using organic farming methods.

The last afternoon was enjoyed at Wisley Gardens. Dr John David from Wisley Gardens took the botanists present on a tour of the new state of the art Herbarium at the Hillside Centre.

Comments from delegates:

This workshop was a unique opportunity for scientific exchange amongst diverse researchers interested in the Hyacinthaceae, including botanists, chemists, and pharmacologists. The discussion was excellent and will enhance existing collaborations and spur new ones. (Prof Tim Corson, Indiana University School of Medicine, Indianapolis, USA)

The workshop gave the opportunity to network with the global community of researchers working on the plant family Hyacinthaceae, to receive state of the art information on different subdisciplines that include chemistry, taxonomy and pharmacology/drug discovery. My experience of enhanced collaborations following the last workshop organised at Surrey in 2012 was a prime motivation in participation this year, and I was not disappointed. The 2023 event has cemented existing collaborations and opened up new collaborations; altogether highly worthwhile and appreciated. (Prof Neil Crouch, South African National Biodiversity Institute, South Africa)

I have hardly ever experienced a similarly stimulating and successful meeting that immediately led to new interdisciplinary scientific cooperation! (Professor Martin Pfosser, Biocenter Linz of the Museum of Upper Austria)

Next steps – Outcomes

- A review entitled "The Ethnobotany, Phytochemistry and Pharmacology of *Eucomis* (Hyacinthaceae)" is being prepared for a special issue of the Journal of Ethnopharmacology.
- Professors Mulholland and Corson have been invited to visit Gachon University in South Korea to discuss developing synthetic methodology of homoisoflavonoids.
- Opportunities for applying for EU funding to further the understanding of Hyacinthaceae taxonomy and to provide novel compounds for screening for anti-angiogenic activity (for treatment of diabetic and wet age-related macular degeneration, cardiovascular disease and inflammation) will be investigated.
- Students from the Mulholland group will spend a month in Salzburg, Austria, undertaking docking studies of targets suggested by collaborators at the meeting.
- To investigate holding the next meeting in two years' time at the Rockefeller Bellagio Centre in Italy.

Acknowledgements

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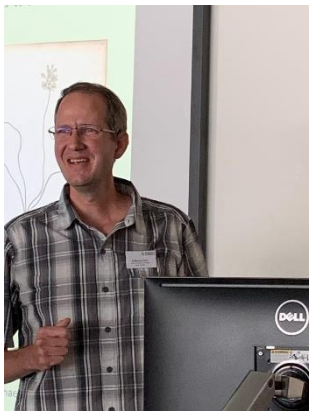
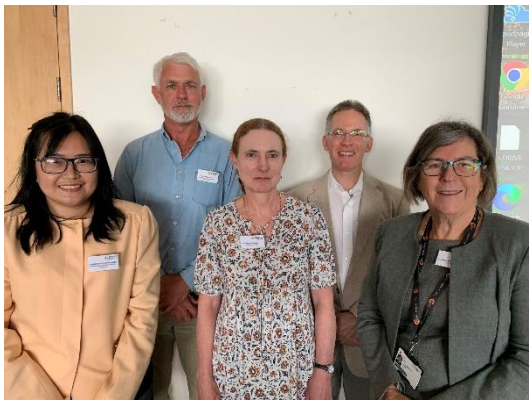
members of the organising committee for their assistance and, in particular, to Linda Bennett and Louise Jones, our Administrators.

Dulcie Mulholland,
Workshop Chairperson.





Conference attendees

Historical Tour of Guildford

Evening at Albury Vineyard

Conference attendees: group photograph.

Group photograph at Wisley Gardens

Enjoying Wisley Gardens