Novel Bioactive Phenolics from Kangaroo Island Propolis

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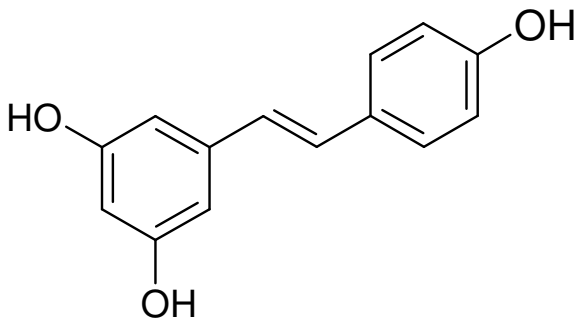
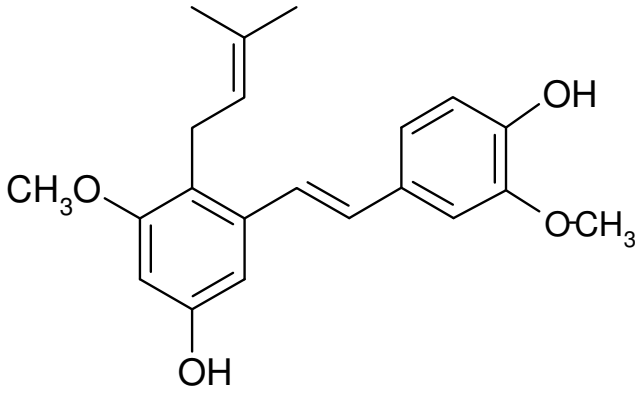
Why Kangaroo Island propolis?

- Bee sanctuary
- Relatively undisturbed abundant native flora.
- Propolis from Kangaroo Island has unique chemical composition – prenylated hydroxystilbenes (resveratrol-like compounds)



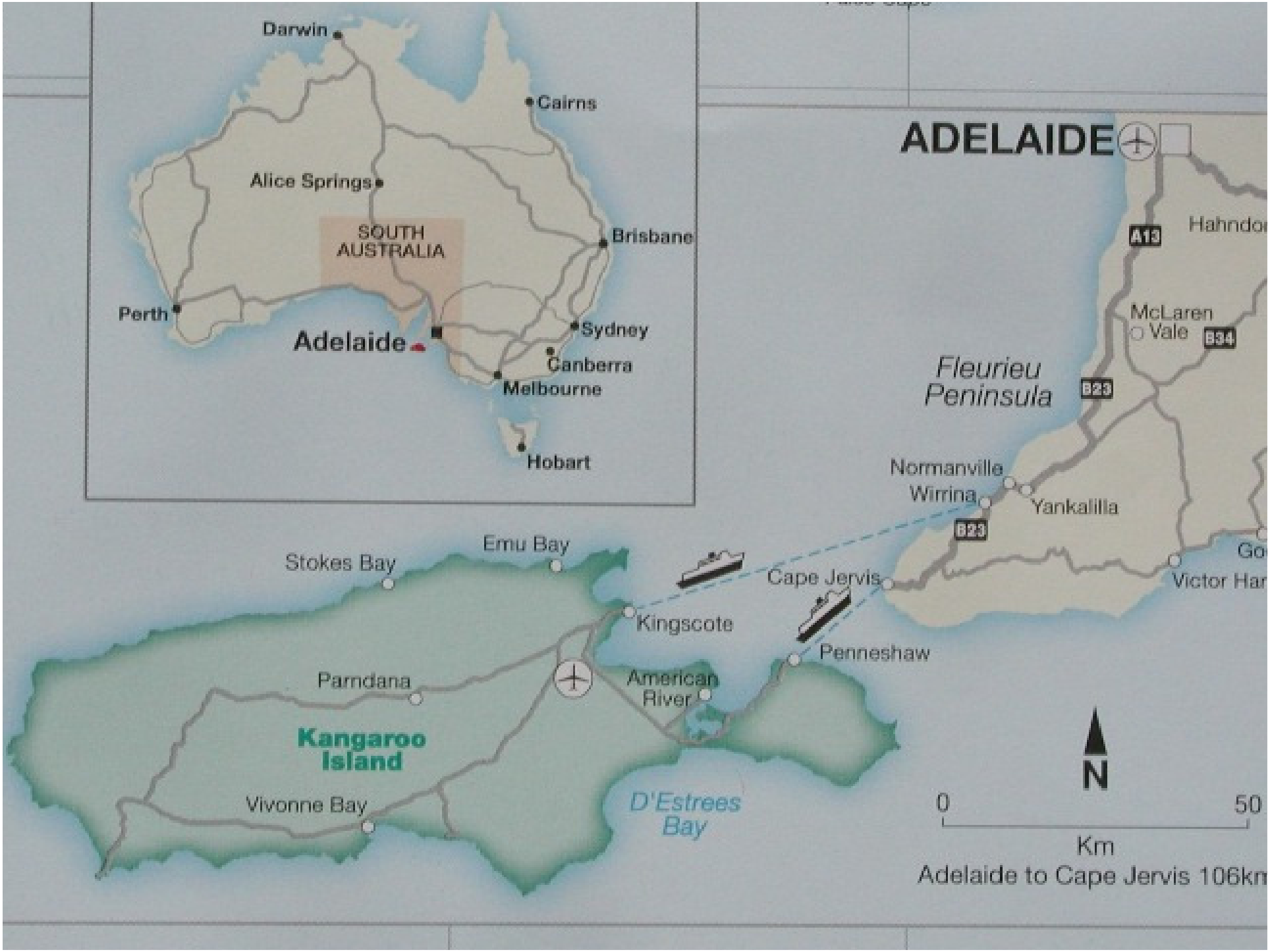
resveratrol

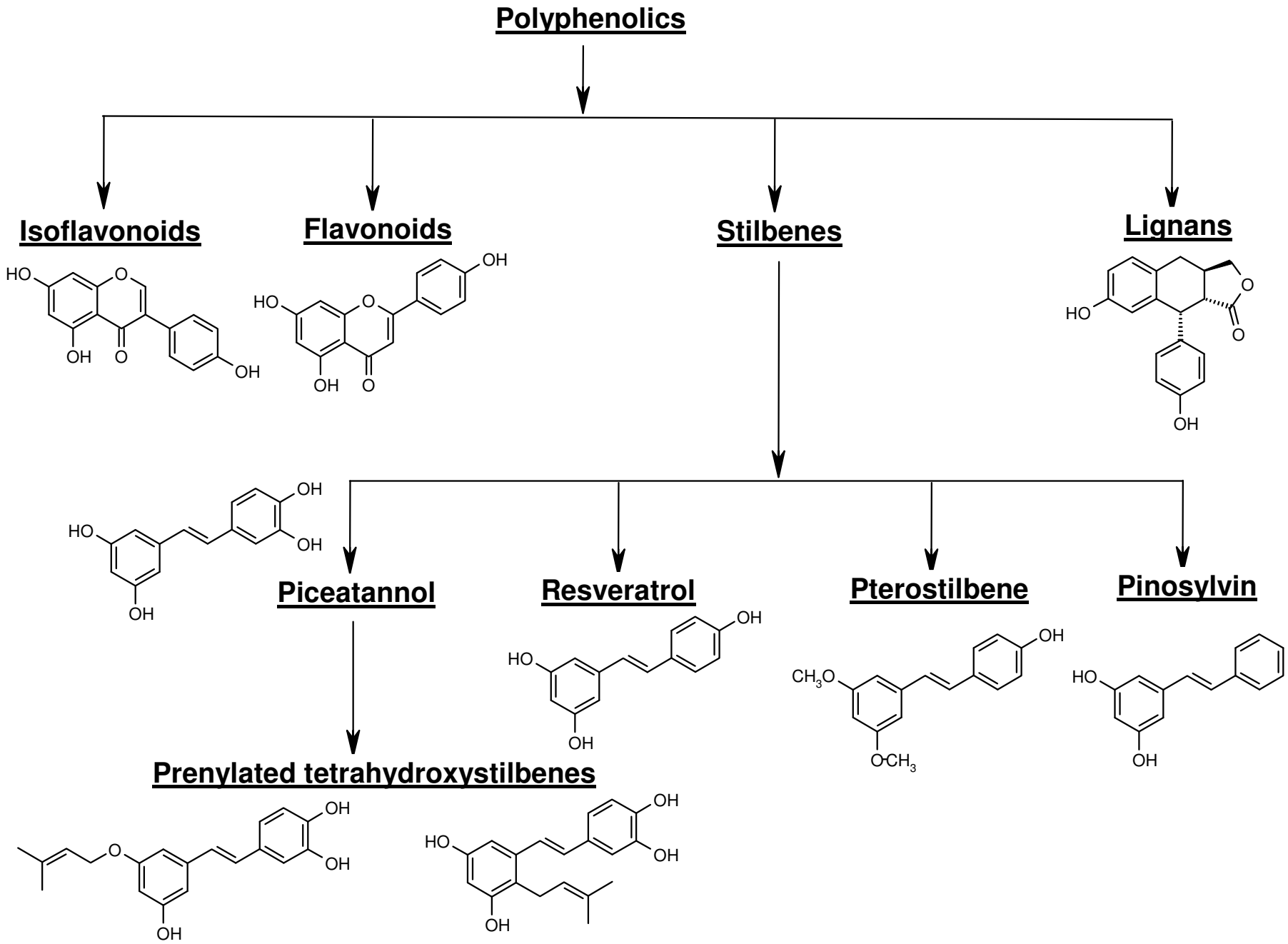


prenylated hydroxystilbenes

Published Biological Activities of Resveratrol and Tetrahydroxystilbenes

- **Resveratrol**, a naturally occurring stilbene found in various foods, including mulberries, peanuts, grapes and the red wines, has reputation as **"French paradox medicine"** and was extensively studied for anti-tumour, anti-oxidative and anti-inflammatory activities.
- However, there only appears to be **a few reports of resveratrol detected in propolis**
- In general, **tetrahydroxystilbenes were found to exhibit higher activities** than its congener resveratrol in most of tests including antioxidant and apoptotic (anticancer) activities.
- There are **no reports of tetrahydroxystilbenes detected in propolis**


Darwin
Cairns
Alice Springs
SOUTH AUSTRALIA
Brisbane
Perth
Adelaide
Sydney
Canberra
Melbourne
Hobart
ADELAIDE
A13
Hahndorf
McLaren Vale
B34
Fleurieu Peninsula
B23
Normanville
Wirrina
Yankalilla
B23
Victor Harbor
Stokes Bay
Emu Bay
Cape Jervis
Kingscote
Penneshaw
Parndana
American River
Kangaroo Island
Vivonne Bay
D'Estrees Bay
N
0
50
Km
Adelaide to Cape Jervis 106km


Polyphenolics
Isoflavonoids
Flavonoids
Stilbenes
Lignans
Piceatannol
Resveratrol
Pterostilbene
Pinosylvin
Prenylated tetrahydroxystilbenes

*The **aim** of this study is:-*

(1) to determine the chemical constituents contributing to the biological properties of Kangaroo Island propolis,

(2) identify biologically active components that may be used to define medicinal propolis products of consistent quality

Methods:

- Samples of propolis from various locations
- Fractionation of the propolis by chromatography and spectroscopic analysis of the fractions to detect and characterise major and minor components.
- Biological properties of detected substances are evaluated from published literature or from in-house testing of pure isolated substances.

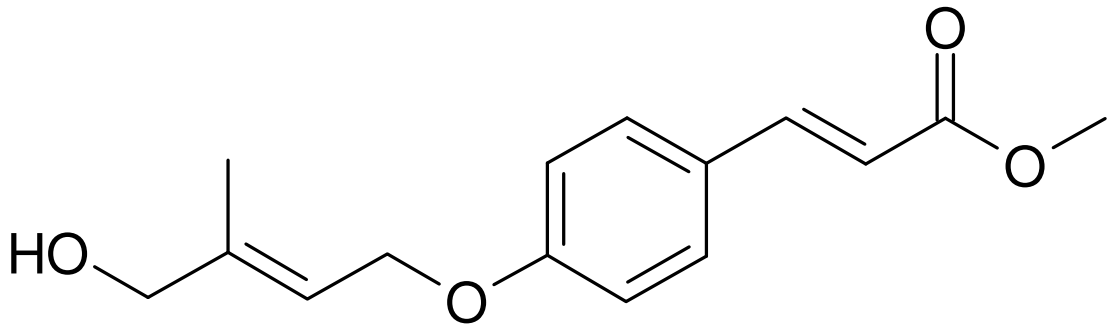
RESULTS

Kangaroo Island propolis:-

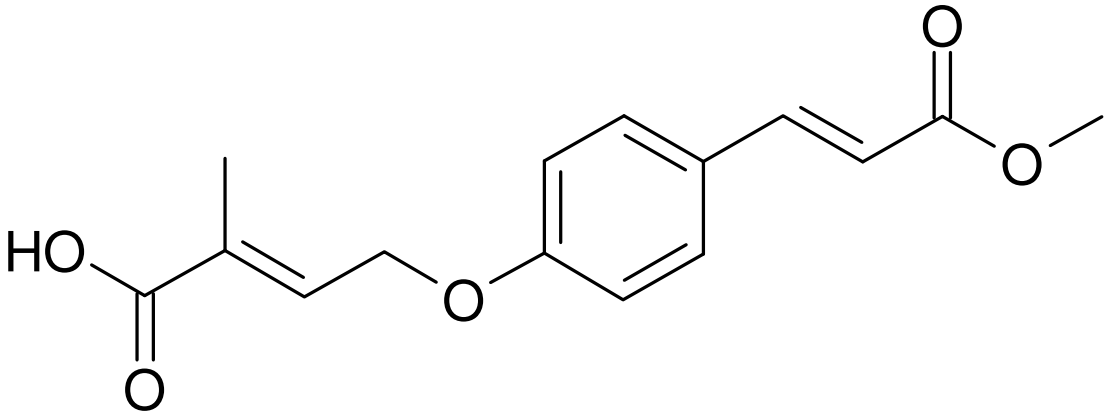
- ✓ prenylated phenolic substances (70%)
- ✓ O-prenylated cinnamate acid derivatives (3%).

- ❑ Identification of novel prenylated phenolic substances
- ❑ Detailed study on availability of propolis with unique composition from a variety of sites

O-prenylated methyl cinnamate derivatives

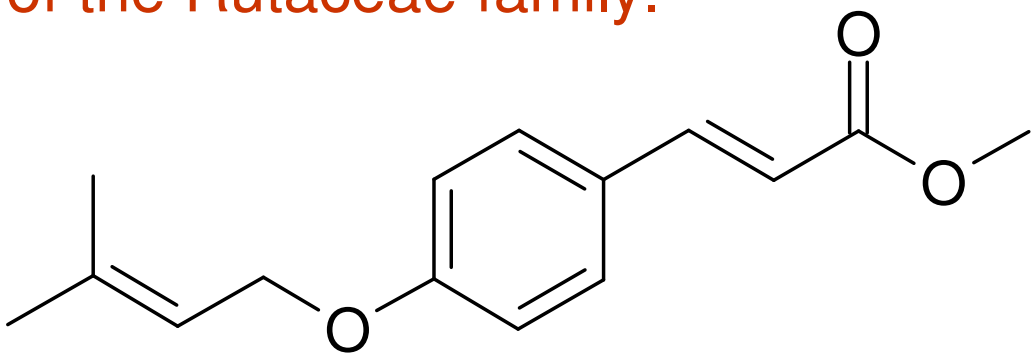


methyl (E)-4-(4'-hydroxy-3'-methylbut-(E)-2'-enyloxy)cinnamate
Comp (1)

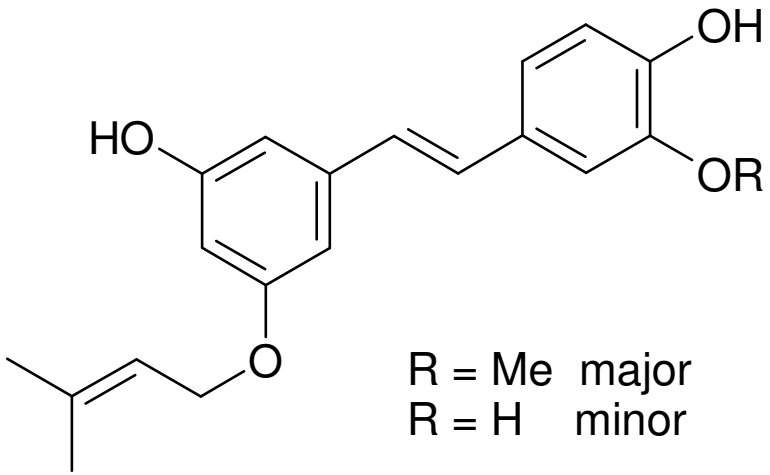


methyl (E)-4-(3'-carboxybut-(E)-2'-enyloxy)cinnamate
Comp (2)

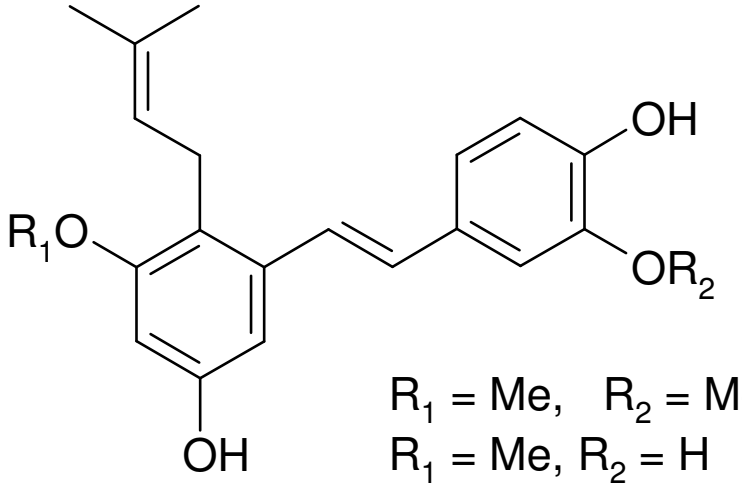
Comp (1) and (2) appear to be metabolites of methyl (E)-4-(3'-methylbut-2-enyloxy)cinnamate found in *Cotula australis* and other plants of the Asteraceae family, also, in Pink Waxflower, *Eriostemon australasius* subsp. *Banksii,* and other plants of the Rutaceae family.



Prenylated tetrahydroxystilbenes isolated from Kangaroo Island propolis

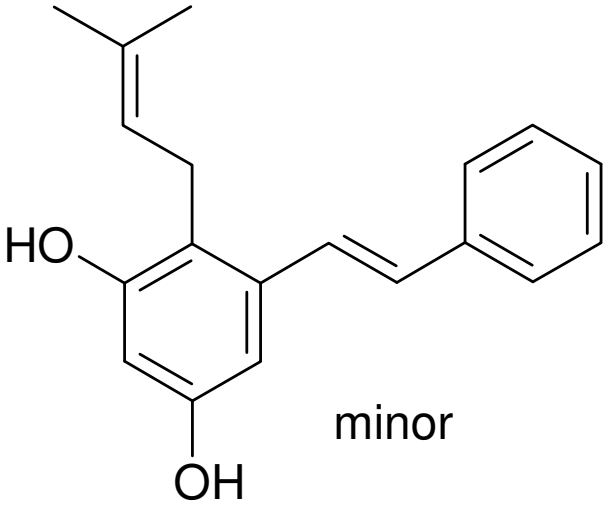


R = Me major
R = H minor

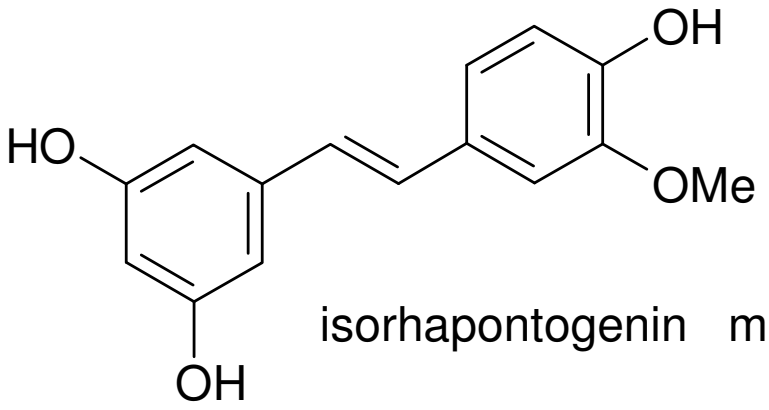


R_1 = Me, R_2 = Me major
R_1 = Me, R_2 = H minor
R_1 = H, R_2 = H minor

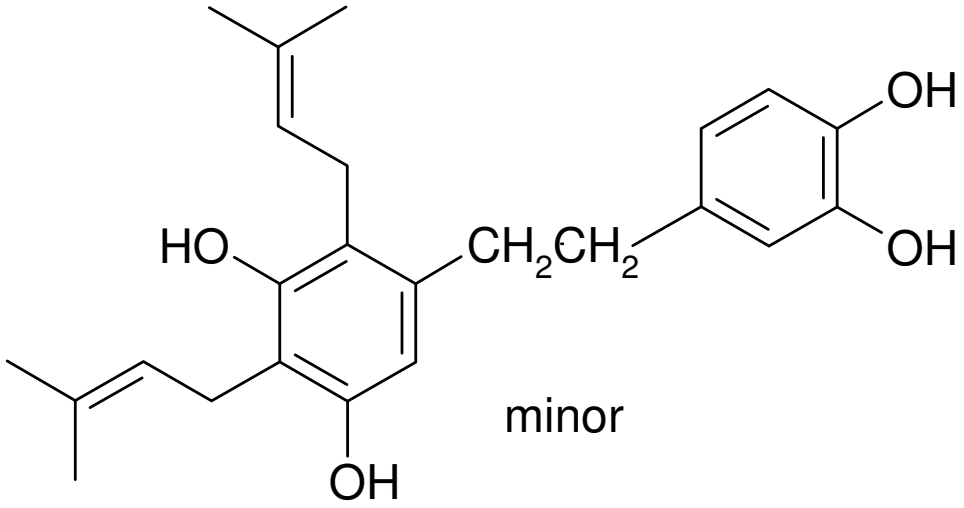
Other stilbene derivatives isolated from Kangaroo Island propolis



minor



isorhapontogenin minor



minor

Reported natural occurrence of tetrahydroxystilbenes
(oxyresveratrol and picetannol)

Myrtaceae family

Angophora cordifolia, Callistemon rigidus, Eucalyptus species (reported in 33 species of Eucalyptus), Melaleuca leucadendron

Other families, genera and species

Moraceae family

Morus species, heartwood of five Morus species, Morus alba diseased mulberry Artocarpus gomezianus, Artocarpus dadah bark and twigs

Leguminoseae/Fabaceae

Centrolobium robustum wood, Arachis hypogaea L peanut, Maackia amurensis Rupr. et Maxim., heartwood

Cassia species

Cassia marginata flowers and C. javanica wood, C. marginata heartwood

Senna species

Senna skinneri roots, S. wislizeni

Other species

Vaccinium Berries, Rheum undulatum L. Root, Cissus quadrangularis stem, Euphorbia lagascae seeds, Picea abies bark (picetannol)

Further Scientific Objectives

Characterisation of propolis at different seasons

Analysis of level of prenylated hydroxystilbenes, thereby, determination of optimal collection time

Determination of the floral source(s) of **this unique propolis** collected by honey bees.

Acknowledgements

- The authors are grateful for major funding support from a National Health and Medical Research Council Complementary and Alternative Medicine (CAM) Grant for $285,000 over three years
- Provision of propolis samples for research from beekeepers, in NSW, in particular Mr Eric Whitby for provision of propolis from Helensburgh, NSW.
- Kangaroo Island collection of propolis samples and ongoing research collaboration by Mrs Betty McAdam (JH & E McAdam, Hog Bay Apiary, Penneshaw, Kangaroo Island, South Australia) is very much appreciated.
- Research contributions from Mr Stephen Wong, Ms Seok Kwan Tan and Mr Joseph Severino, Advanced Pharmaceutical Chemistry students, Faculty of Pharmacy, University of Sydney, are part of this presented work.
- Mr Bruce Tattam is thanked for mass spectral analyses of propolis samples and isolated constituents.

University of Sydney Research Team 2009