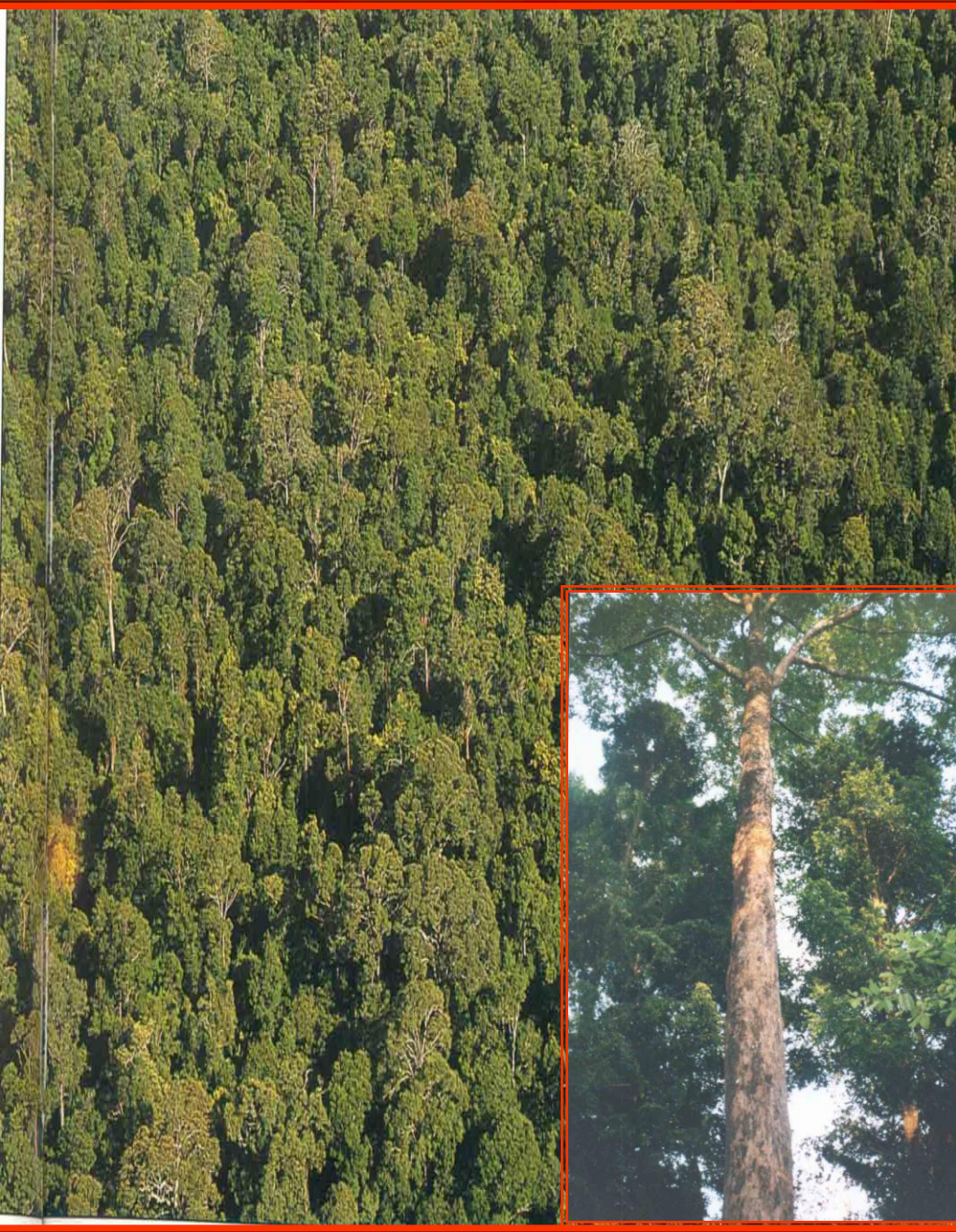


PHYTOCHEMICAL STUDY OF OLIGORESVERATROL FROM SOME SPECIES OF *HOPEA*

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Hopea is one the main genus of Dipterocarpaceae, consisting of approximately 100 species and widely distributed in Indonesia specially in Kalimantan

The local name is “ cengal, merawan hitam or pengarawan”. The plant usually can be used as material building, plywood etc.

This family of plant is known to produce a variety of resveratrol oligomer

These structures are very interesting and showed interesting biological activity, such as antibacterial, anticancer, antihepatotoxic, and anti-HIV

Objective

The following discussion will focus on the structure diversity of oligoresveratrol that have been found, biogenetic relationship, and biological activity of the compound, that has been reported until 2008

How to isolated oligoresveratrol ?

Sample: milled dried stem bark

Extraction by organic solvent :
acetone or methanol

EKSTRAK

By fractionated (VLC)

Fr. A

Fr. B

Fr. C

Fr. D

Repeated Chromatography

elucidation structure by
spektroskopi metode
(UV, FT-IR, NMR, MS)

Pure compounds
S-1, S-2, ... dst

Activity test

**BIOACTIVE
COMPOUNDS**

**STRUCTURE
MOLECULE**

HOW TO ISOLATED COMPOUNDS FROM NATURAL PRODUCT



Macerated by
organic solvent



removal of the
solvent under
reduced
pressure



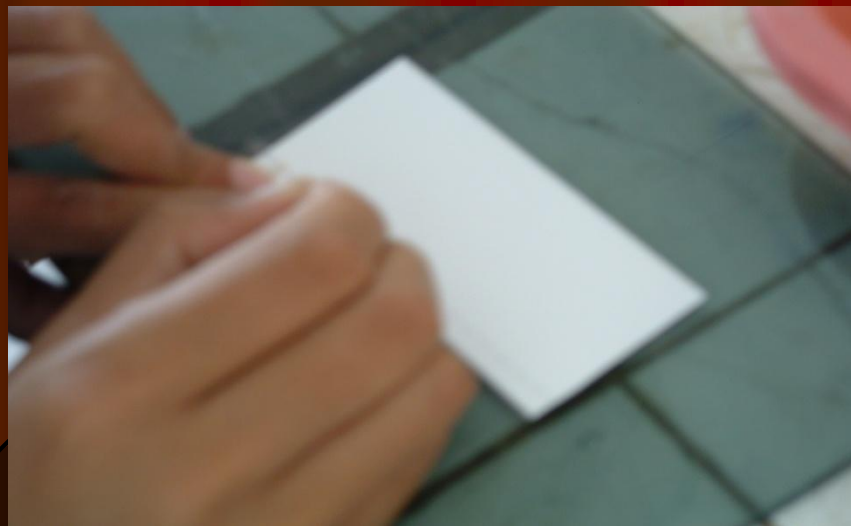
Prepared for VLC



VLC



Series of fraction

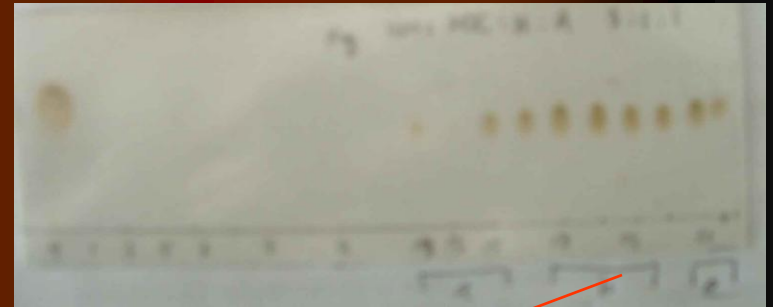


chromatogram from chromatography column

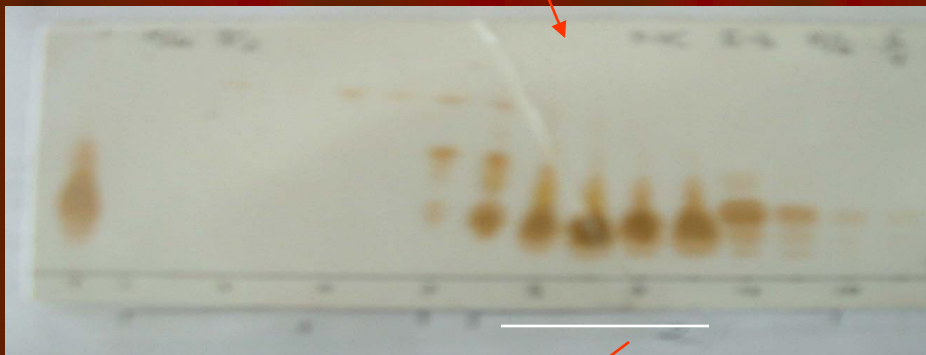
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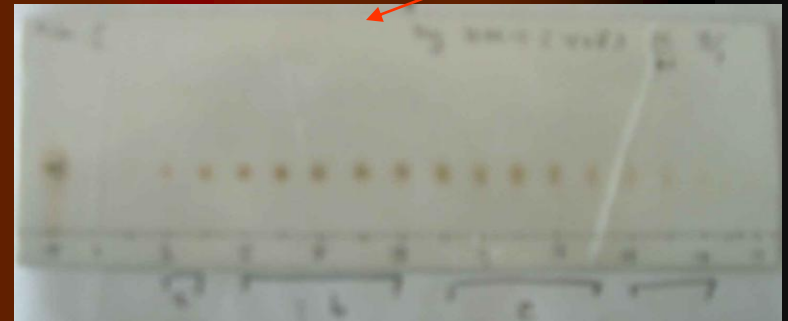
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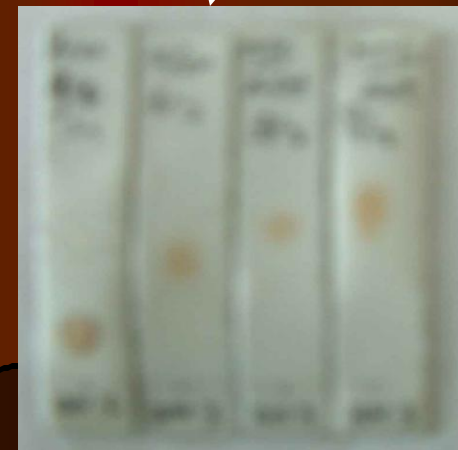
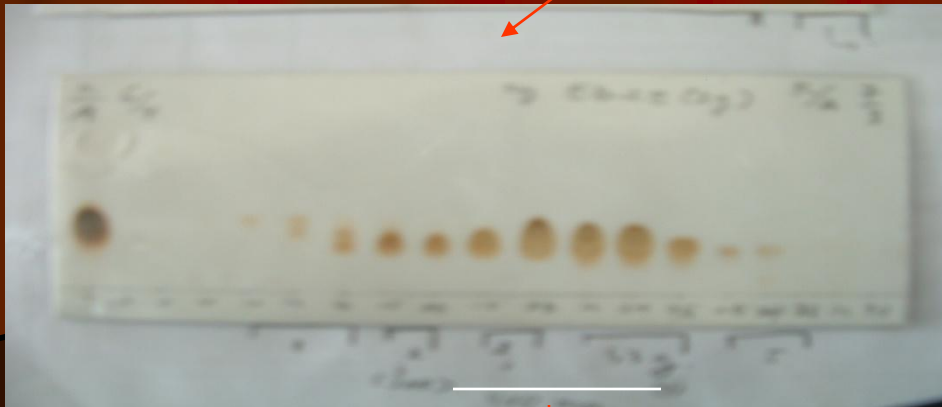
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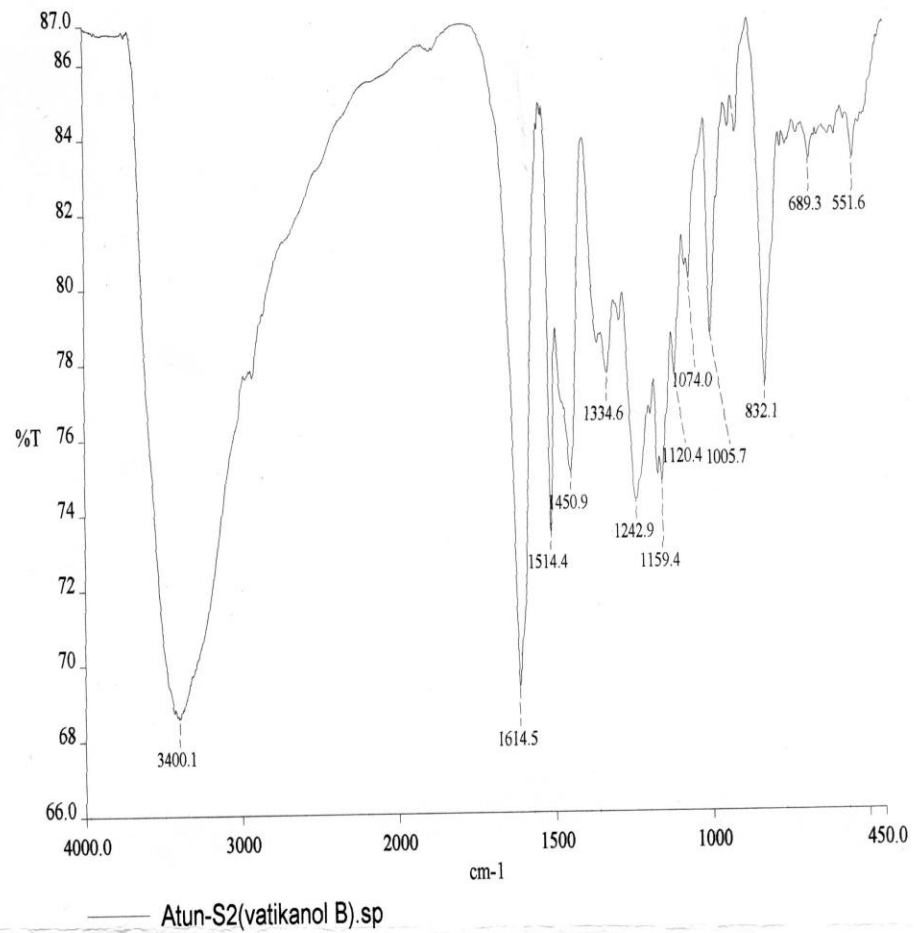
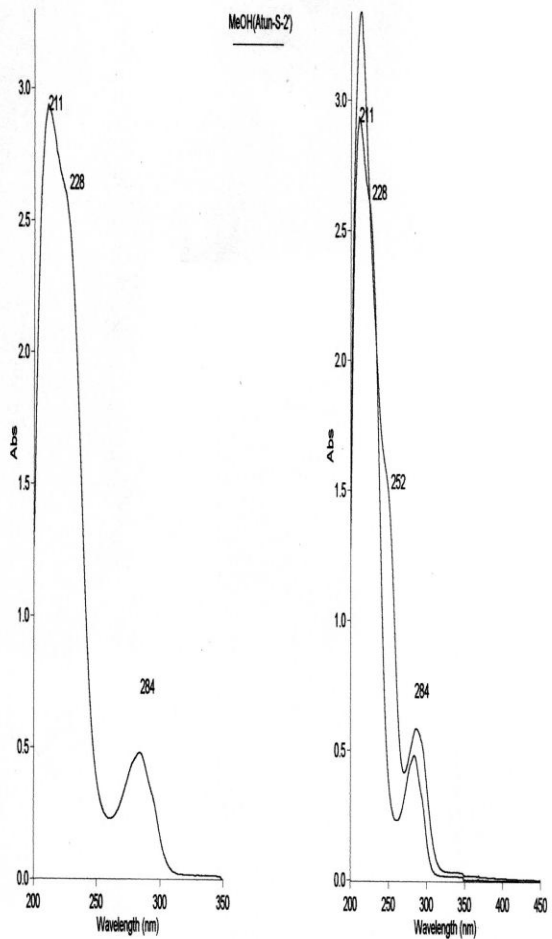
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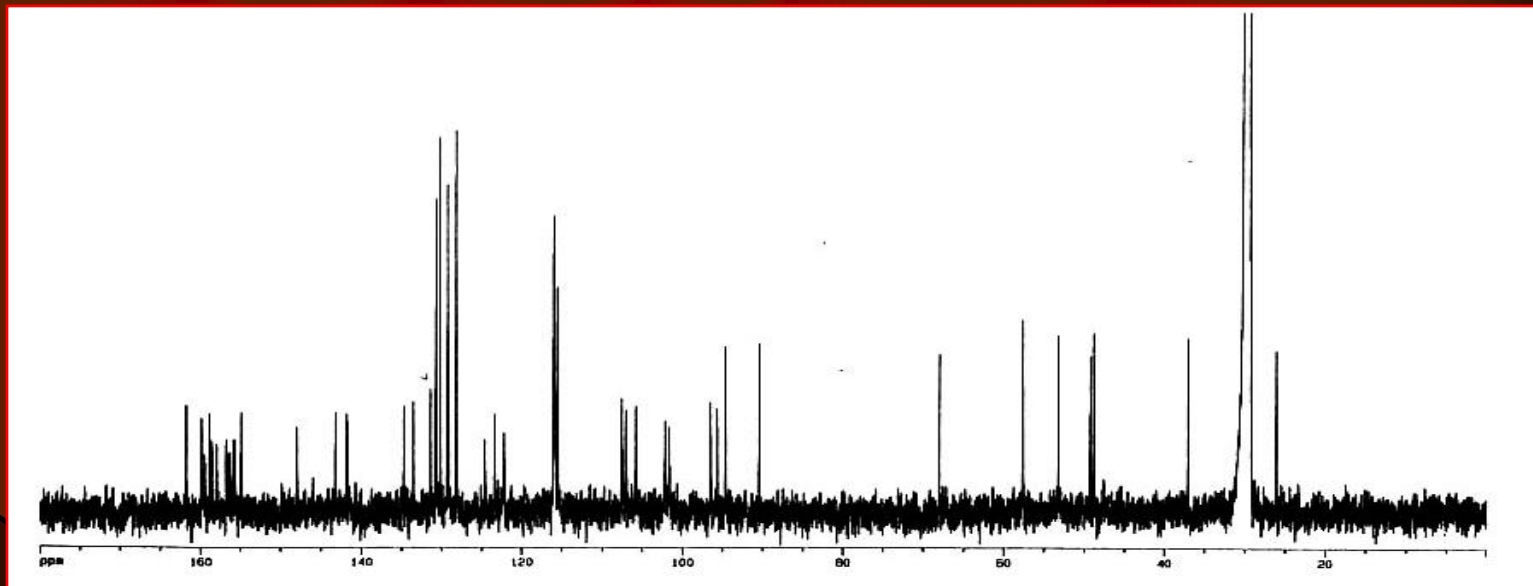
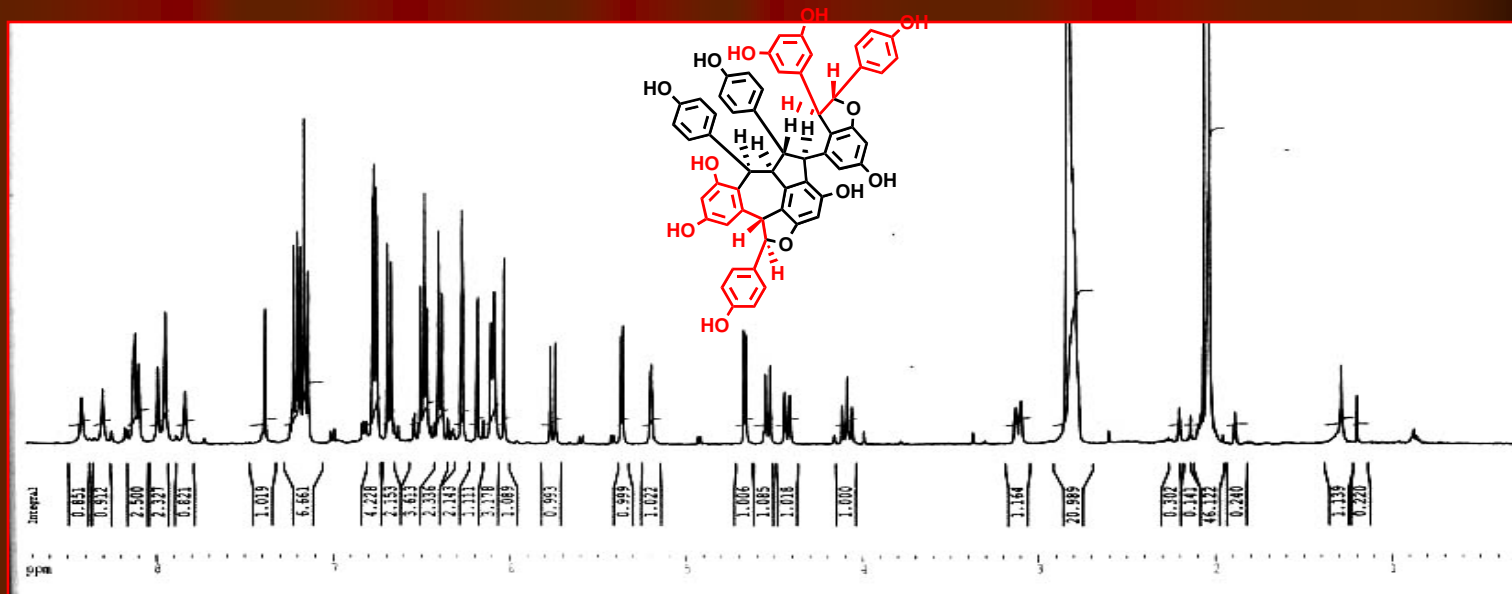


How to identification these
structure ?



Spektrum UV dan IR Vaticanol B

Spectrum ^1H and ^{13}C NMR of vaticanol B



Spectrum H-H COSY NMR of vaticanol B

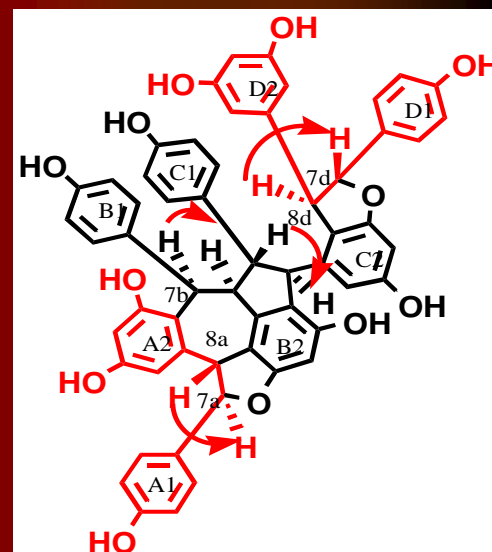
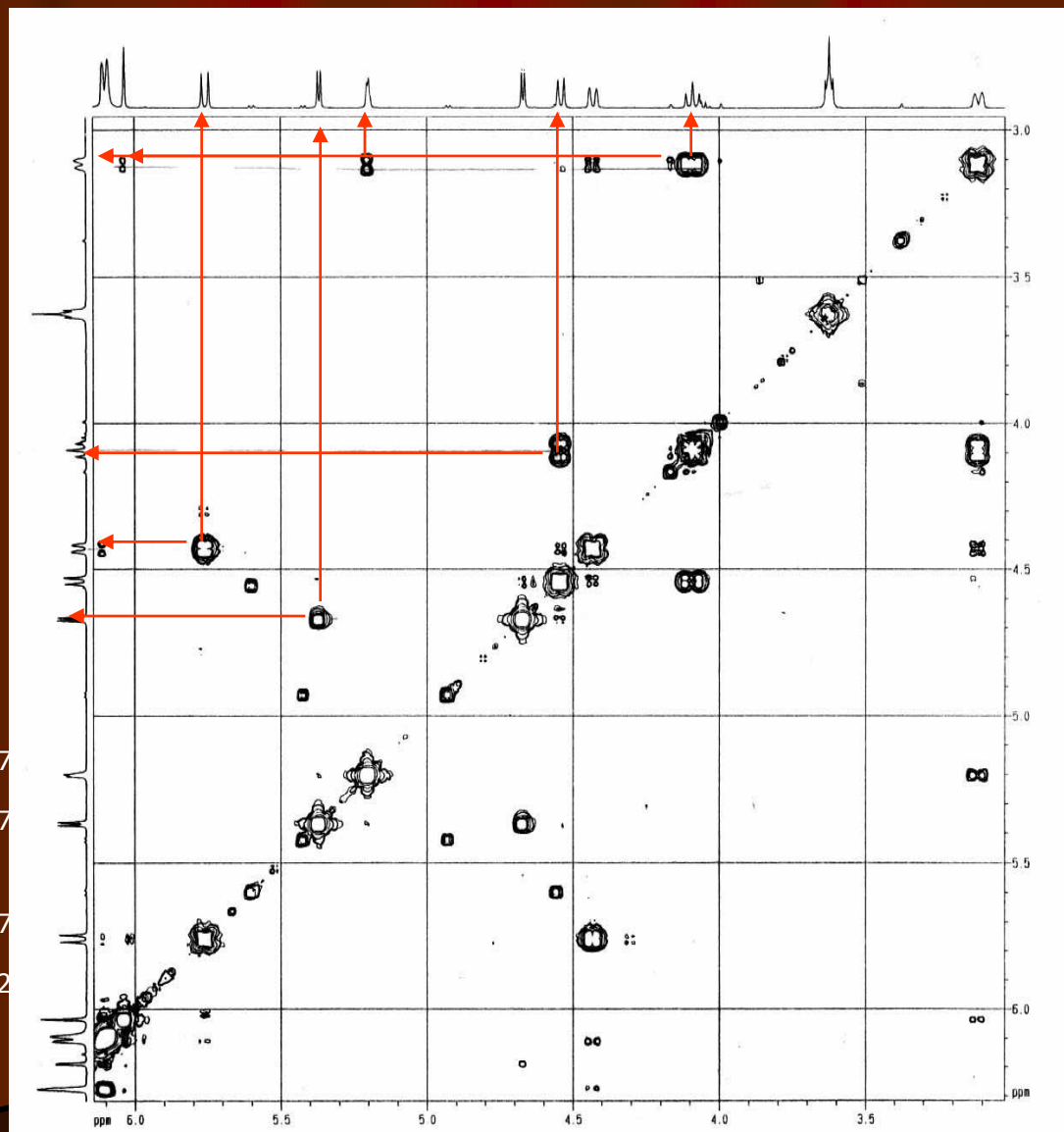
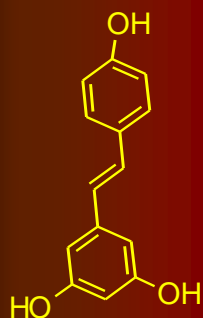


Table 1. Oligoresveratrol compounds from some species of *Hopea*

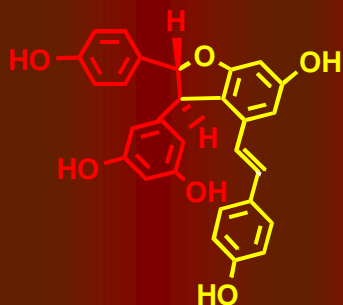
Species	Oligoresveratrol
<i>H. odorata</i> (Cogon, 1970),	Hopheaphenol
<i>H. cardifolia</i> (Sotheesswaran, 1983)	copaliferol A; stemonoporol
<i>H. jucunda</i> (Diyasena, 1985)	Hopeaphenol
<i>H. malibato</i> (Dai, 1998),	malibatol A; malibatol B ; dibalanokarpol
<i>H. parviflora</i> (Tanaka, 2000),	(-)- ϵ -viniferin ; (-)-ampelopsin A; balanocarpol; (+)-parviflorol ; hopeaphenol
<i>H. utilis</i> (Tanaka, 2001)	vaticanol B; hopeaphenol
<i>H. sangal</i> (Sri Atun, 2004),	(-)-ampelopsin A ; (-)- ϵ -viniferin ; vaticanol B; hopeaphenol
<i>H. bancana</i> (Tukiran, 2004)	(+)- α -viniferin ; hopeaphenol
<i>H. mengarawan</i> (Sri Atun, 2006)	Balanocarpol; heimiol A; vaticanol G; vaticanol B;
<i>H. odorata</i> (Sri Atun, 2005-2006)	balanokarpol; hopeafenol; ampelopsin H; hemlesyanol C
<i>H. nigra</i> (Sri Atun, 2006)	Vaticanol G

Diversity structure oligoresveratrol from *Hopea*

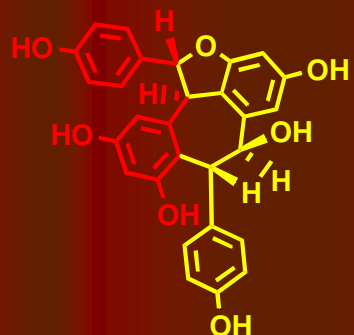
Monomer and dimer resveratrol



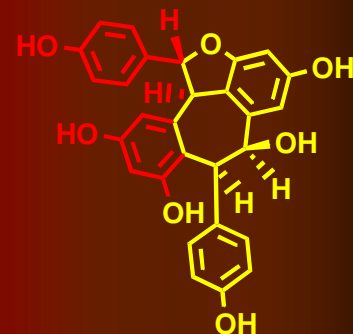
Resveratrol
(*H. utilis*)



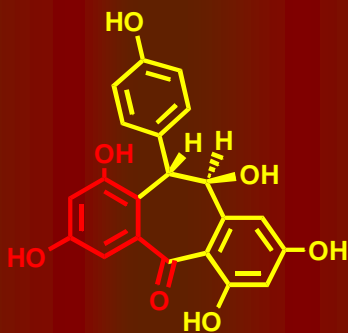
ε-viniferin
(*H. parviflora*)



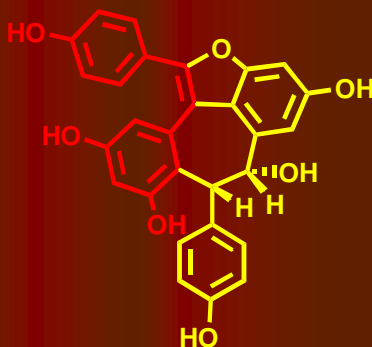
(-)-ampelopsin A
(*H. parviflora*,
H. sangal)



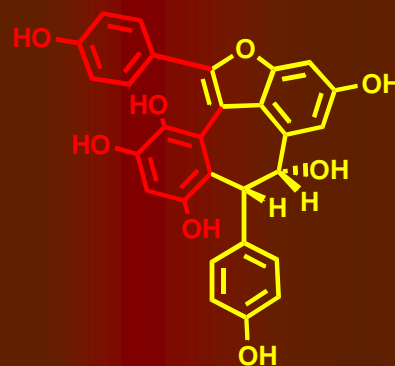
(-)-balanokarpol
(*H. parviflora*)



(+)-parviflorol
(*H. parviflora*)



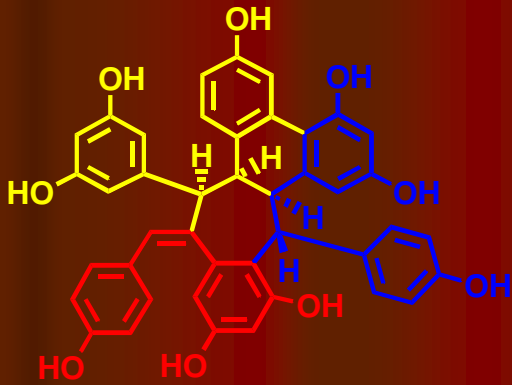
Malibatol A



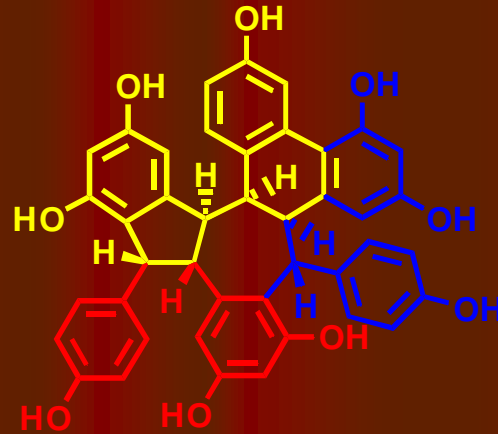
malibatol B

(*H. malibato*)

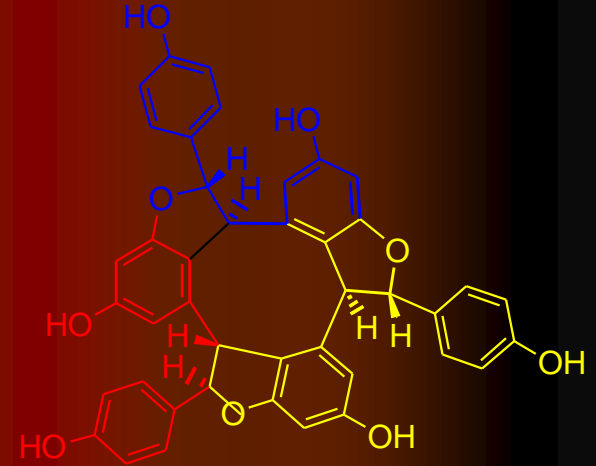
Trimer resveratrol



Stemonoporol
(*H. cardifolia*)

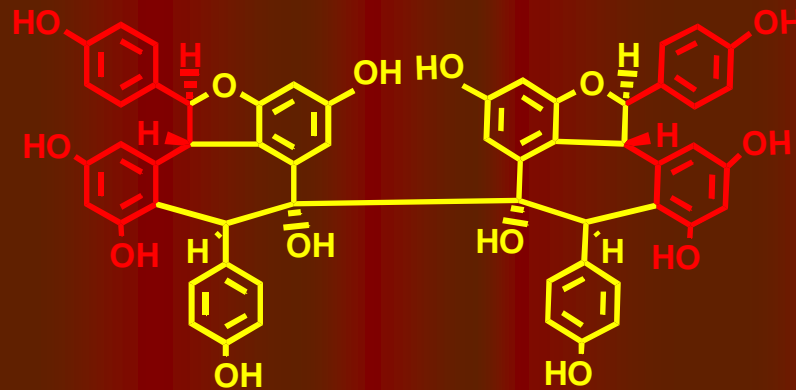
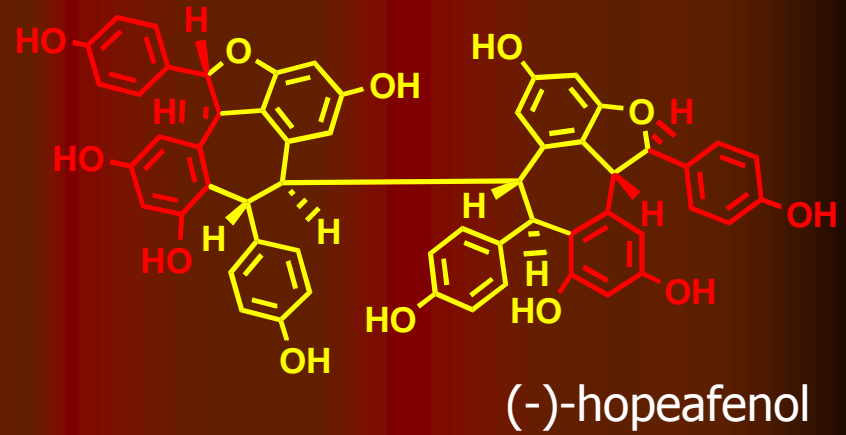
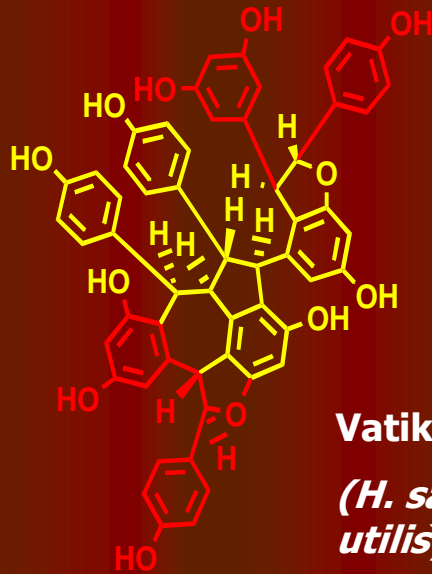


Kopaliferol A
(*H. cardifolia*)

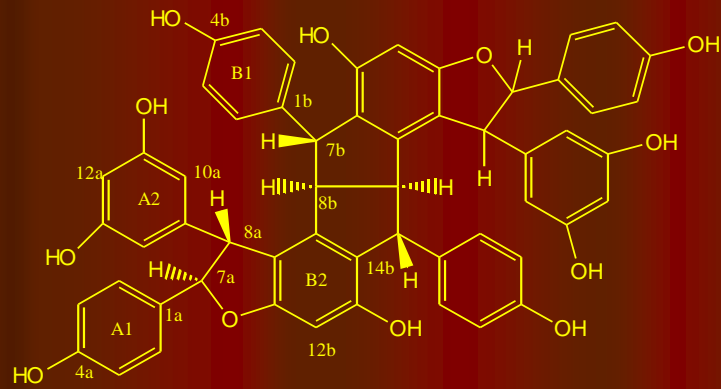


α -viniferin
(*H. bancana*)

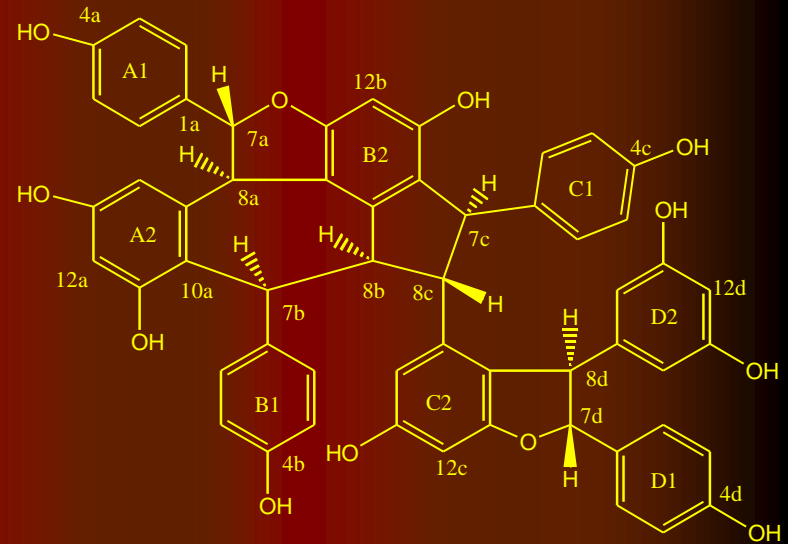
Tetramer resveratrol



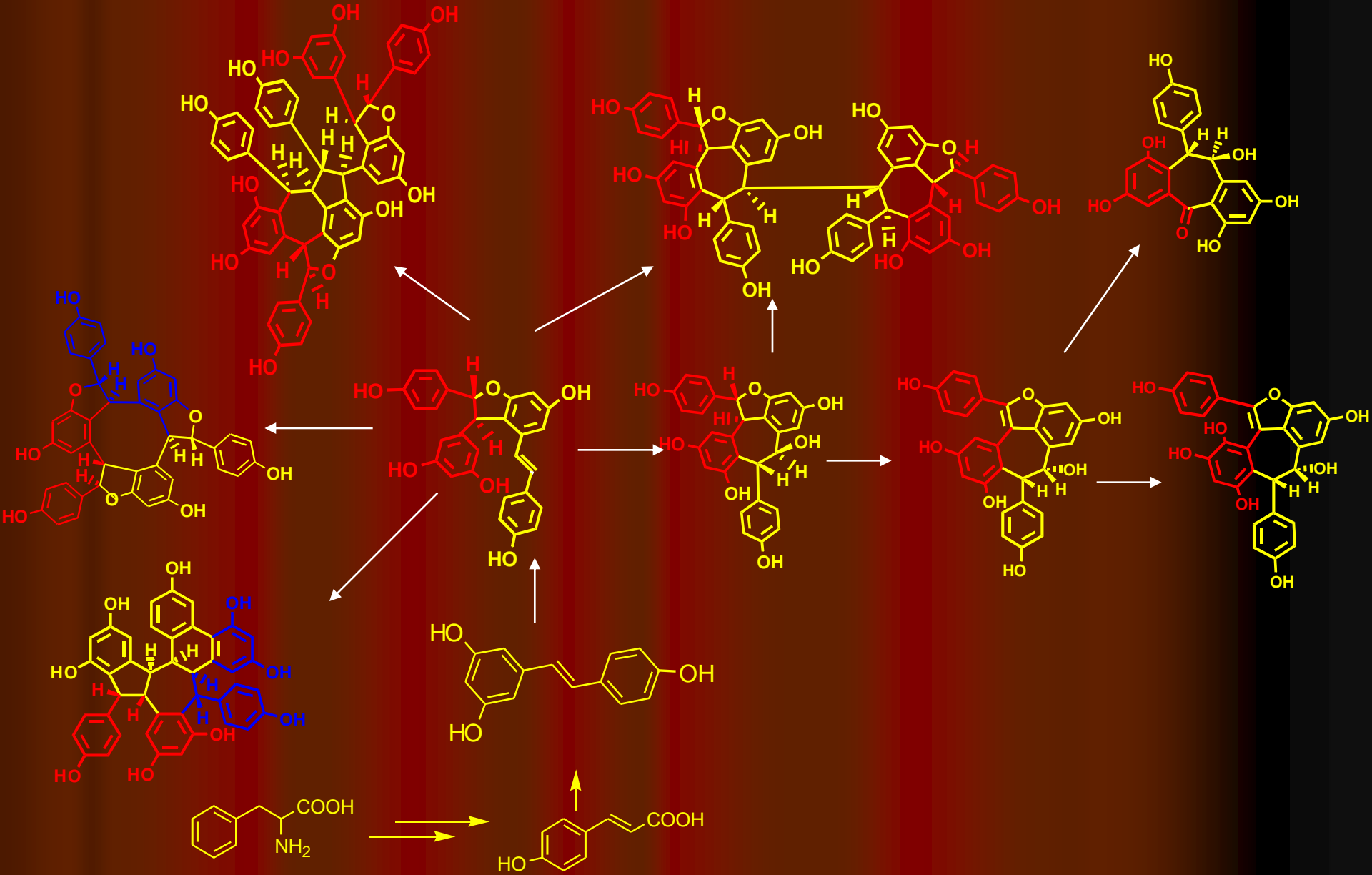
Tetramer resveratrol



Ampelopsin H (*H. odorata*)
(Sri Atun, 2005)



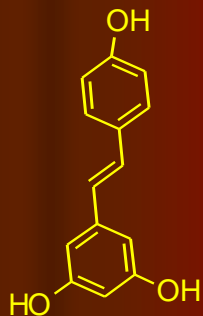
Hemlesyanol C (*H. odorata*)
(Sri Atun, 2006)



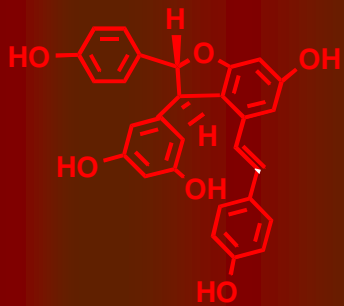
Biogenetic relationship of oligoresveratrol structure from *Hopea* genus

Carbohydrate

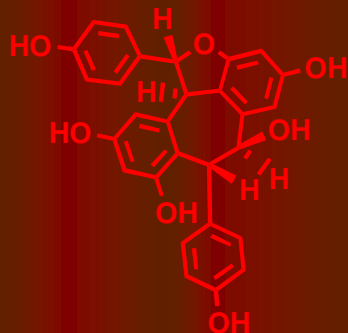
Biological activity of oligoresveratrol compounds from *Hopea*



Resveratrol
anticancer



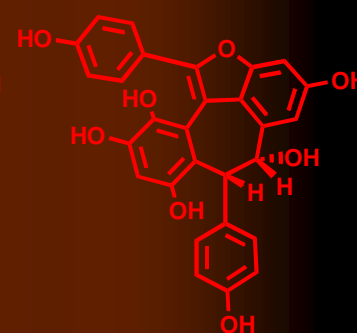
ε-viniferin
antibacterial



(-)-ampelopsin A
sitotoxic

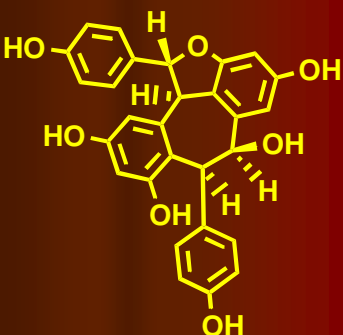


Malibatol A



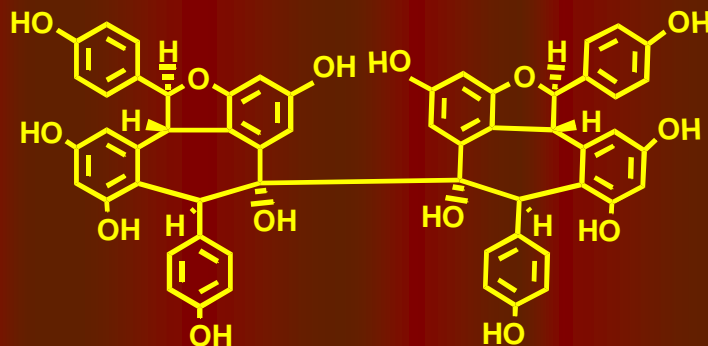
malibatol B

sitotoxic



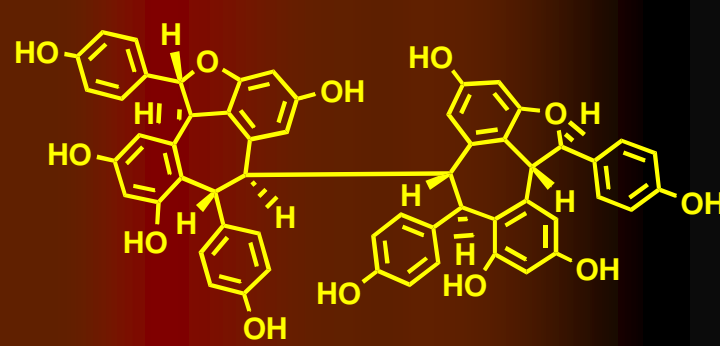
(-)-balanokarpol

Anti HIV



Dibalanokarpol

Anti-HIV



(-)-hopeafenol

(sitotoxic)

Table 2. Data activity test as hydroxyl radical scavenger

Sample	IC ₅₀ (μg/ml)	Note
Balanocarpol	1802,3	Less active
Heimiol A	4575.3	Less active
Vaticanol G	683.96	active
Vaticanol B	2146.6	Less active
Hopheaphenol	61,8	High active
Ampelopsin H	4840,0	Less active
Hemlesyanol C	425,5	active
Ascorbat acid	83,9	High active
<i>Butylated Hydroxy Toluene</i> (BHT)	1328,1	Less active

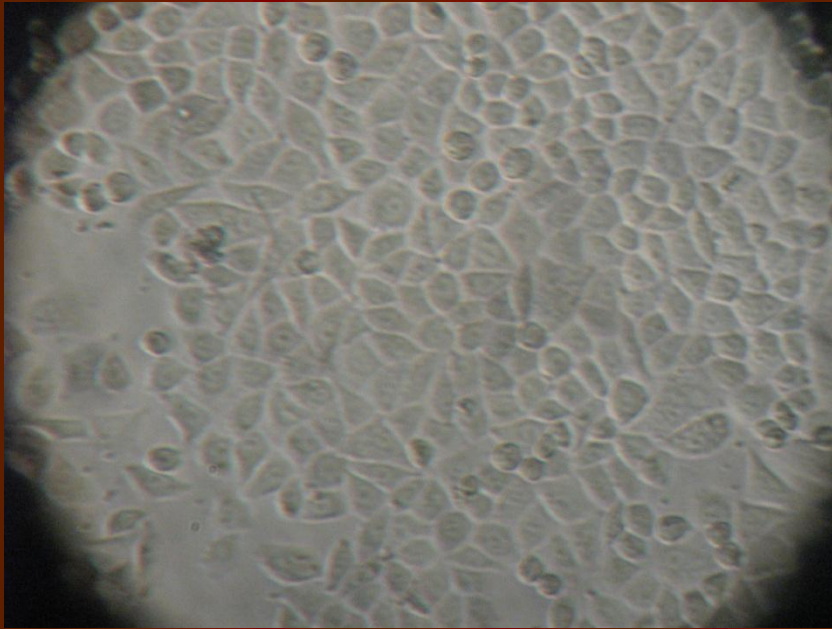
Table. 4. LC₅₀ of some compounds from steam bark of *Hopea* against HeLa-S3 cell

No	Sample	LC ₅₀ µg/ml	Note
1	Balanocarpol	682,16	Less active
2	Heimiol A	Very high	Not active
3	Vaticanol G	Very high	Not active
4	Ampelopsin H	8,12	Very active
5	Vaticanol B	92,04	Very active
6	Hopeaphenol	1931,52	Less active
7	Hemsleyanol C	531,00	Active
8	Doksorubisin (positif control)	96,27	Very active

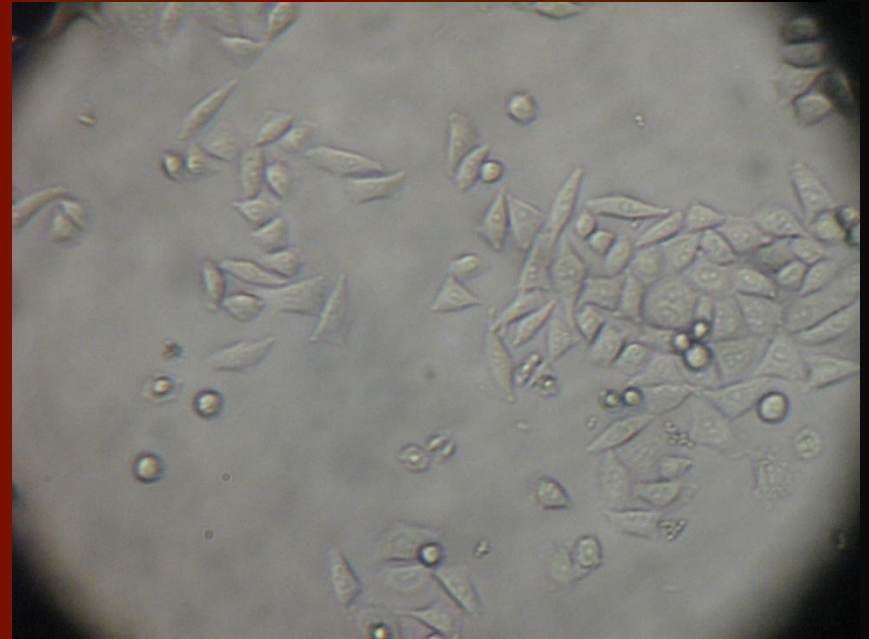
Table. 5. LC₅₀ of some compounds from steam bark of *Hopea* against Raji cell

No	Sample	LC ₅₀ μg/ml	Note
1	Balanocarpol	277,58	Active
2	Heimiol A	Very high	Not active
3	Vaticanol G	11050,96	Not active
4	Ampelopsin H	91,07	Very active
5	Vaticanol B	107,00	Very active
6	Hopeaphenol	135,64	Active
7	Hemsleyanol C	166,84	Active
8	Doksorubisin (positif control)	156,64	Active

Cytotoxicity test by *Hela S3* cell lines

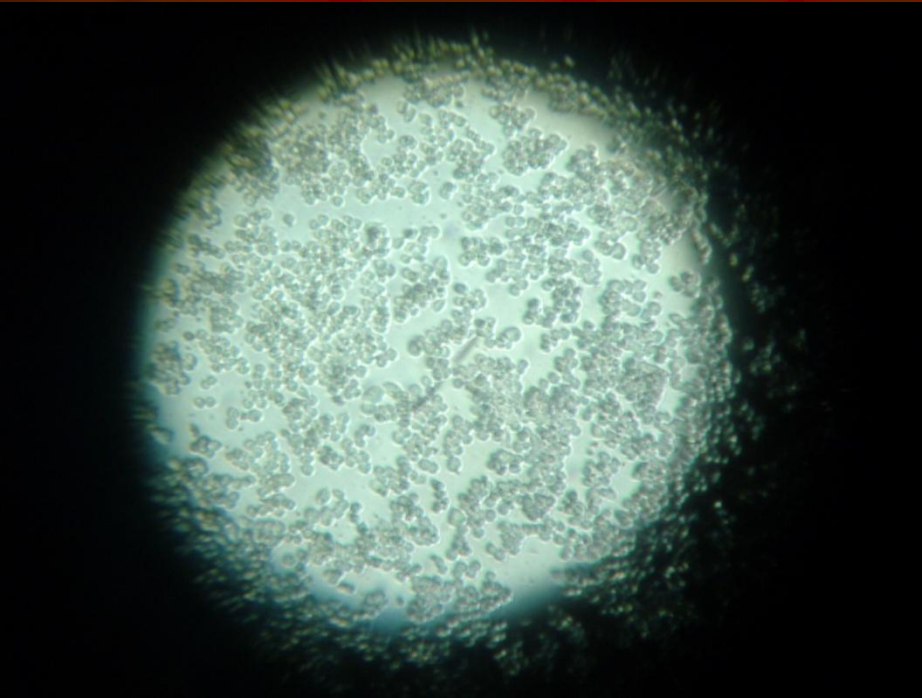


***HeLa S3 cell lines
before experiment***

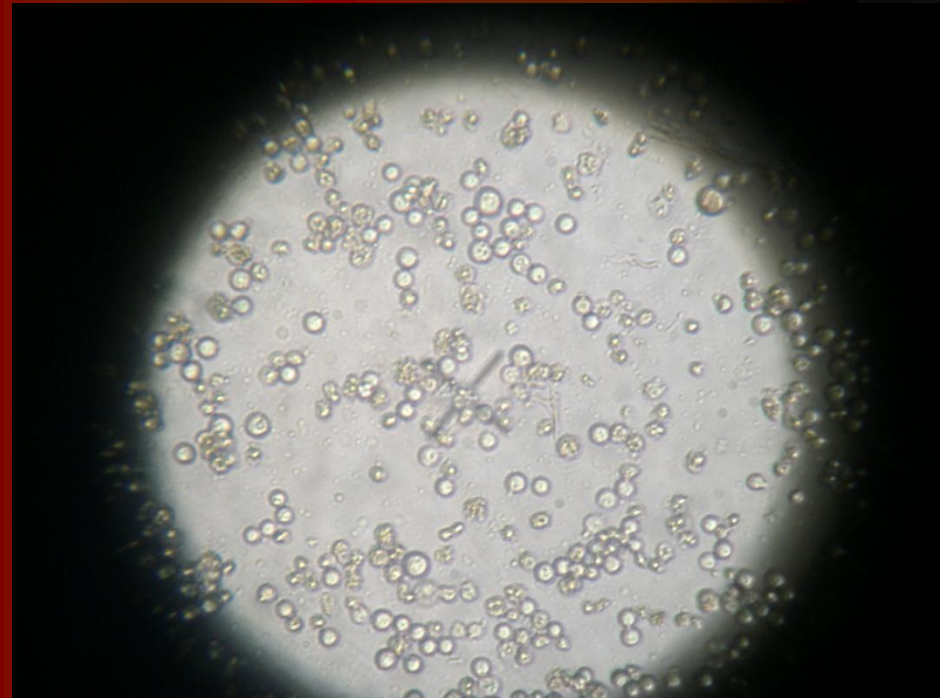


***HeLa S3 cell lines
after experiment***

Cytotoxicity test by *Raji* cell lines

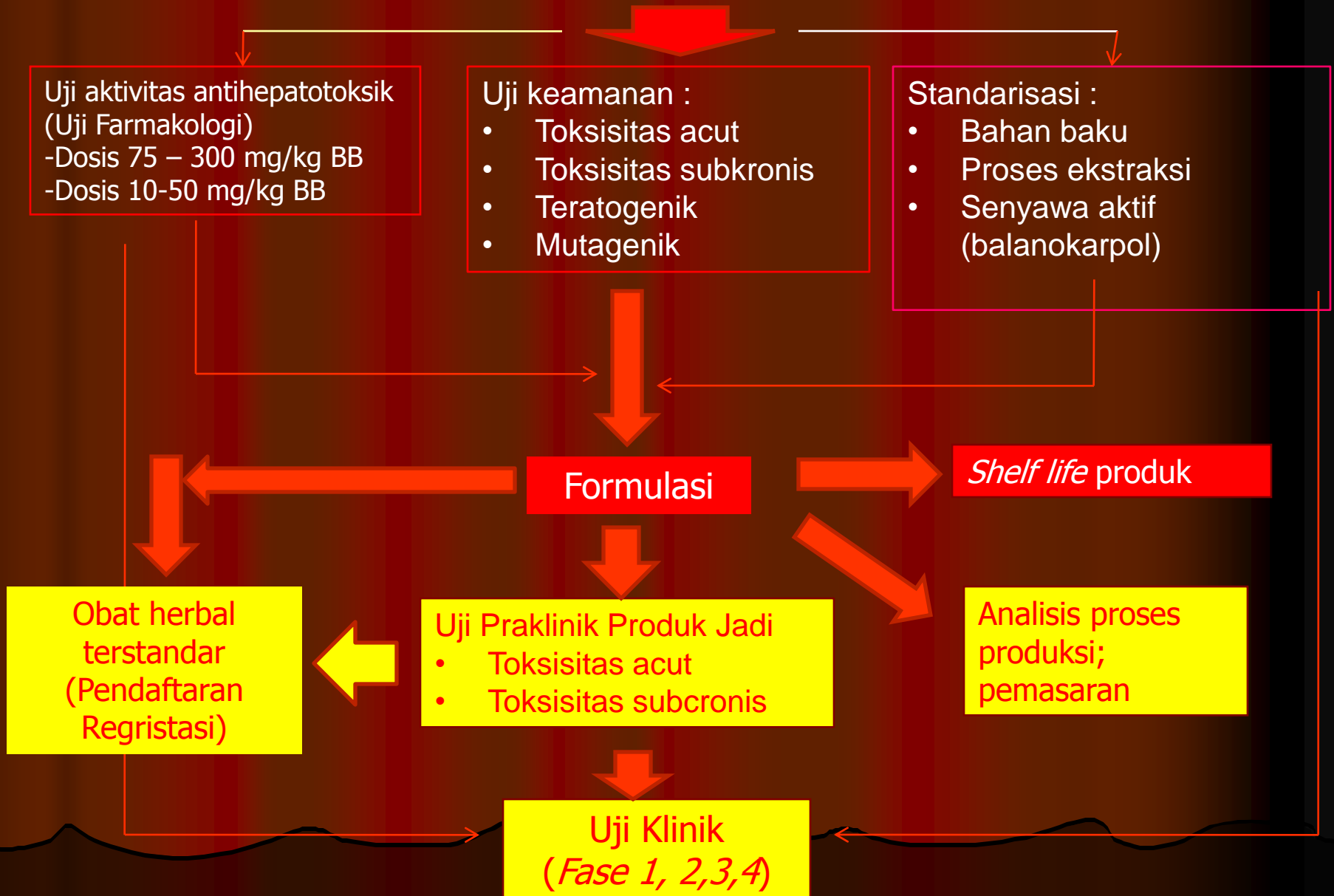


***Raji cell lines
before experiment***



***Raji cell lines
after experiment***

FITOFARMAKA ANTIHEPATOTOKSIK EKSTRAK TUMBUHAN *H. MENGARAWAN*



Conclusion

Molecular structure of oligoresveratrol have been found in the *Hopea* genus included dimer, trimer and tetramer with resveratrol. The structures of the oligoresveratrol isolated contain a heterocyclic ring namely *trans*-2-aryl-2,3-dihydrobezofuran, originated from oxidative coupling between two unit of resveratrol to produce (-)- ϵ -viniferin (2) and other compounds. These structures are very interesting and showed interesting biological activity, such as antibacterial, anticancer, antihepatotoxic, and anti-HIV

Acknowledgements

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