CHAPTER 4

CONCLUSION

The Guttiferae species (*Hypericum hookerianum*, *Garcinia speciosa*, *Garcinia xanthochymus*, *Cratoxylum formosum* ssp. *pruniflorum*, *Calophyllum polyanthum*) and the Schisandraceae specie (*Schisandra verruculosa*) from the northern part of Thailand were studied. The crude extracts were screened for free radical scavenging and antitumor activity. No previous reports on chemical constituents of *H. hookerianum* and *S. verruculosa*. *H. hookerianum* exhibited high activities on the screening test. So, both of them were selected for isolation, purification and tested for the bioactivities. The results from this study can be concluded as the following:

1) *H. hookerianum*, *G. speciosa*, *G. xanthochymus*, *C. formosum* ssp. *pruniflorum*, *C. polyanthum* and *S. verruculosa* were extracted by methanol and chloroform. The extracts were screened for free radical scavenging activity using DPPH assay. All extracts showed a dose dependent antioxidant activity. The most potent with the lowest IC_{50} values were observed in the methanol extracts from the wood of *G. speciosa* which were 2.5 and 5.3 folds more potent than the two standard antioxidants, ascorbic acid and α-tocopherol, respectively. Free radical scavenging activities ranging from moderate to high were observed in both methanol and chloroform fraction of the methanol extracts from *H. hookerianum*, *C. formosum* ssp. *pruniflorum*, *G. xanthochymus*, *S. verruculosa and C. polyanthum*.

2) The extracts were tested for antitumor activity on HeLa, KB and B16F10 human cancer cell lines using SRB assay. All extracts showed the effect on the

2) The extracts were tested for antitumor activity on HeLa, KB and B16F10 human cancer cell lines using SRB assay. All extracts showed the effect on the growth of human cancer cell lines with a dose response relationship. The chloroform fraction of the methanol extracts from leave of *G. speciosa* gave the most potent with the lowest concentration that cause 50% inhibition of cancer cell growth (GI_{50}) of 4, 6.6 and 3.7 μg/ml on HeLa, KB and B16F10 cell lines respectively.

3) The chloroform fraction of the methanol extraction of the woody stems of *H. hookerianum* furnished 5-hydroxy-2-methoxyxanthone (**HH1**), 2-hydroxy-3-methoxyxanthone (**HH2**), the xanthonolignoid *trans*-kielcorin (**HH3**) and two cinnamate ester derivatives, 4-hydroxy-3-methoxyphenyl ferulate (**HH4**) and betulinic acid-3β-yl caffeate (**HH5**). 4-Hydroxy-3-methoxyphenyl ferulate (**HH4**) have not been reported for the chemical constituents previously.

4) *Schisandra verrucolosa* also has not been studied for the chemical constituents earlier. One part of the chloroform fraction of the methanol wood extract was eliminated of chlorophyll, fractionated and purified to give vanillic acid (**S1**) and abscisic acid (**S2**). Another part of the crude extract was isolated and purified to give methyl 4-hydroxybenzoate (**S3**), 4-hydroxybenzaldehyde (**S4**), methyl 3,4-dihydroxy benzoate (**S5**), 1-(4-hydroxy-3-methoxyphenyl)-3-hydroxy-propan-1-one (**S6**), 1,2-bis-(4-hydroxy-3-methoxyphenyl)-3-hydroxy-propan-1-one (**S7**) and 4-hydroxy benzoic acid (**S8**).

5) The effect of compounds **HH1-HH5** from *H. hookerianum* was investigated against the growth of human cancer cell lines. The results showed that cinnamate esters **HH4** and **HH5** exhibited strong inhibitory effects (GI_{50}<20 μM)

against four cancer cell lines; that of *trans*-kielcorin **HH3** was moderate while the inhibitory effects of xanthones **HH1** and **HH2** were only weak (GI_{50}>100 μM).

6) The effect of compounds **HH1-HH5** on the mitogenic response of human lymphocytes to phytohemagglutinin (PHA) was also evaluated and the concentrations able to cause 50% inhibition of proliferation were calculated. Again xanthones **HH1** and **HH2** exhibited weaker antiproliferative effects than cinnamate esters **HH4** and **HH5** while *trans*-kielcorin was devoid of activity.

7) The compounds **S1-S8** from *S. verruculosa* were also evaluated for their capacity to inhibit growth of human tumor cell lines as well as on the proliferation of human lymphocyte. The results showed that only compound S5 exibited moderated inhibitory activity on three cell lines and on human lymphocyte proliferation.

8) All of the isolated compounds were determined for the free radical scavenging activity. Only compound **S5** from *S. verruculosa* was showed a strong activity while compound **HH4** and **HH5** gave moderate activity.

The results from this study suggested a potential of the selected plants with significant biological activities for further study and development to new pharmaceuticals.