REFERENCES

1. Engler, A. Syllabus Der Pfanzeenfamilien Band II, pp. 300-304, Gebruder Borntrager, Berlin Nilolassee, 1964.

2. Merril, E.D. A Flora of Manila No. 5, pp. 309-312, Keystone Printing Press Makati, Manila, 1974.

3. Craib, W.G. Florae Siamensis Enumeratio Vol. I, Polypetalae, pp. .302-316, Siam Society, Bangkok, 1931.

4. Smitinand, T. Thai Plant Names (Botanical Names-Vernacular Names), 2nd ed., pp. 81-82, Funny Publishing, 1980.

5. Bernays, H.L. "Poisoning by Virginian Creeper" Brit. Med. J. 2(1876): 32.

6. Warren, L.E. "A Note on the Poisonous Properties of *Partheno-cissus quinquefolia*" Am. J. Pharm. 84(1912): 51-53.

7. Gorup-Besanez, von. "Benzkatechin in dem Beerensafte von *Ampelop-sis hederaceae*" Neves. Repert. Pharm. 20(1874): 180-181.

8. Holm, T. "Medicinal Plants of North America 57. *Ampelopsis quin-quefolia* L.C. Rich." Merck's Rept. 20(1911): 309-311.

9. Balley, P.R.O. "Native Medicinal and Poisonous Plants of East Africa" Kew Bull. (1937): 10-26.

10. Watt, J.M. and Breyer-Brandwijk, M.G. Medicinal and Poisonous Plants of Southern and East Africa 2nd ed., pp. 1056-1061, Edinburgh and London: E&S Livingstone, 1962.

11. Kirtikar, K.R. and Basu, B.D. Indian Medicinal Plants Vol. I, pp. 602-616, Bishen Singh Mahendra Pal Sing, Dehra Dun, 1980.

12. Chopra, R.N., Nayar, S.L. and Chopra, I.C. Glossary of Indian Medicinal Plants pp. 66-67, Catholic Press, India, 1965.

13. Sillans, M.R. "Plantes Medicinales d'Afrique Centrale Vol. II," Ann. Pharm. Fr. 11(1953): 364-383.

14. Udupa, K.N., Amkiar, H.J. and Singh, L.M. "Experimental Studies of the Use of *Cissus quadrangularis* in Healing of Fractures: Part II" Indian J. Med. Sci. 15(1961): 551-557.

15. Singh, L.M. and Udupa, K.N. "Studies on *Cissus quadrangularis* in Fracture by Using Phosphorus^{32}: Part II" Indian J. Med. Sci. 16(1962): 926-931.

16. Udupa, K.N. and Prasad, G.C. "Further Studies on the Effects of *Cissus quadrangularis* in Accelarating Fracture Healing" Indian J. Med. Res. 52(1963): 26-35.

17. Williams, B.L. and Wender, S.H. "The Isolation and Identification of Quercetin and Isoquercitrin from Grapes (*Vitis vinifera*)" J. Am. Chem. Soc. 74(1952): 4372-4373.

18. Stern, D.J., Lee, A., McFadden, W.H. and Stevens, K.L. "Volatile from Grapes" J. Agric. Food Chem. 15(1967): 1100-1103.

19. Koeppen, B.H. and Basson, D.S. "The Anthocyanin Pigments of Barlinka Grapes" Phytochemistry 5(1966): 183-187.

20. Somers, T.C. "Grapes Phenolic: The Anthocyanin of *Vitis vinifera* var.*shiraz*" J. Sci. Food Agric. 17(1966): 215-219.

21. Bhatia, V.K., Madhav, R. and Seshadri, T.R. "A Note on the Proanthocyanidins of White Grapes" Curr. Sci. 38(1968): 582-583.

22. Su, C.T. and Singleton, V.L. "Identification of Three Flavan-3-ols

fom Grapes" Phytochemistry 8(1969): 1553-1558.

23. Sen, S.P. "Study of the Active Constituents (Ketosteroids) of *Cissus quadrangularis* Wall." Indian J. Pharm. 26(1964): 247-248.

24. Udupa, K.N., Prasad, G.C. and Sen, S.P. "The Effect of Phytogenic Anabolic Steroid in the Acceleration of Fracture Repair" Life Sci. 4(1965): 317-327.

25. Sen, S.P. "Studies on the Active Constituents of *Cissus quadrangularis*: II," Curr. Sci. (1966): 317.

26. Langcake, P., Cornford, C.A. and Pryce, R.J. "Identification of Pterostilbene as a Phytoalexin from *Vitis vinifera* Leaves" Phytochemistry 18(1979): 1025-1027.

27. Acree, T.E., Braell, P. and Butts, R.M. "The Presence of Damascenone in Cultivars of *Vitis vinifera* (L.), *V. rotundifolia* (Michaux) and *V. labruscana* (Baily)" J. Agric. Food Chem. 29(1981): 688-690.

28. Saifah, E., Kelley, C.J. and Leary, J.D. "Constituents of the Leaves of *Cissus rheifolia*" Lloydia 46(1983): 353-358.

29. Trousdale, E.K. and Singleton, V.L. "Astilbin and Engeletin in Grapes and Wine" Phytochemistry 22(1983): 619-620.

30. Bhutani, K.K., Kapoor, R. and Atal, C.K "Two New Tetracyclic Triterpenoids from *Cissus quadrangularis*" Indian J. Pharm. Sci. (1983): 48.

31. Arthur, H.R. and Cheung, H.T. "A Phytochemical Survey of the Hong Kong Medicinal Plants" J. Pharm. Pharmacol. 12(1960): 567-570.

32. Kiang, A.K., Douglas, B. and Morsingh, F. "A Phytochemical Survey of Malaya Part II, Alkaloids" J. Pharm. Pharmacol. 13(1961): 98-104.

33. Earle, F.R. and Jones, Q. "Analyses of Seed Sample from 113 Plants Families" Econ. Bot. 16(1962): 221-250.

34. Jones, Q. and Earle, F.R. "Chemical Analyses of Seeds II: Oil and Protein Content of 759 Species" Econ. Bot. 20(1966): 127-155.

35. Persinos, G.J. and Quimby, M.W. "Nigerian Plants III: Phytochemical Screening for Alkaloids, Saponins, and Tannins" J. Pharm. Sci. 56(1967): 1512-1517.

36. Kapoor, L.D., Kapoor, S.L., Srivastava, S.N., Singh, A. and Sharma, P.C. "Survey of Indian Plants of Saponins, Alkaloids, and Flavonoids II" Lloydia 34(1971): 95-102.

37. Desai, H.K., Gawad, D.H., Govindachari, T.R., Joshi, B.S., Kamat, V.N., Parthasarathy, P.C., Ramachandran, K.S., Shanbhag, M.N., Sidhaye, A.R. and Viswanathan, N. "Chemical Investigation of Some Indian Plants: Part VIII" Indian J. Chem. 13(1)(1975): 97-98.

38. Hartley, T.G., Deenstone, E.A., Fitzgerald, J.S., John, S.R. and Lamberton, J.A. "A Survey of New Guinea Plants for Alkaloids" Lloydia 36(1973): 217-319.

39. Pongboonrod, S. Maitet Mueang Thai pp. 428-429, Kasembanakij Press, Bangkok, 1950.

40. Stahl, E. Thin-Layer Chromatography 2nd ed., pp. 6-27, Springer-Verlag, New York, 1969.

41. Still, C.W, Kahm, M. and Mitra, A. "Rapid Chromatographic Technique for Preparative Separation with Moderate Resolution" J. Org. Chem. 43(1978): 2923-2925.

42. Hunt, B.J. and Rigby, W. "Short Column Chromatography" Chem. Ind. (1967): 1868-1869.

43. Konno, C., Saito, T., Oshima, Y., Hikino, H. and Kabuto, C. "Structure of Methyl Adenophorate and Triphyllol, Triterpenoids of *Adenophora triphylla* var. *japonica* Roots" Planta Med. 42(1981): 268-274.

44. Jain, M.C. and Seshadri, T.R. "Triterpenoids from *Alnus rubra*" Indian J. Chem. 9(1971): 1026-1027.

45. Uvarova, N.I., Oshitok, G.I., Suprunov, N.I. and Elyakov, G.B. "Triterpenoids and other Constituents from the Far-Eastern Species of *Alnus*" Phytochemistry 11(1972): 741-743.

46. Chatterjee, A. and Srimany, S.K. "Isolation of Lupeol from *Asteracantha longifolia* Nees" J. Indian Chem. Soc. 34(1957): 882-884.

47. Tripathi, V.D., Agarwal, S.K. and Rastogi, R.P. "An Antibacterial Biphenyl Derivatives and other Constituents of *Atylosia trinervia*" Phytochemistry 17(1978): 2001-2003.

48. Subramaniam, S.S. and Vedantham, T.N.C. "Chemical Components of *Avicennia officinalis*" Indian J. Pharm. 36(4)(1974): 105-106.

50. Lima, R.A. and Gottieb, O.R. "Xanthones from *Caraipa densiflora*" Phytochemistry 11(1972): 2307-2309.

51. Appleton, R.A. and Enzell, S.K. "Triterpenoids and Aromatic Components of Deertongue Leaf" Phytochemistry 10(1971): 447-449.

52. Chatterjee, A., Srimany, S.K., Mukherjee, R. and Bhattacharjee, S. "Isolation of Lupenone from *Cassia siamea* Lam." J. Indian Chem. Soc. 43(1966): 63-64.

53. Gonzalez, A.G., Fraga, B.M., Gonzalez, P. and Ravelo, A.G. "Triterpenes from Latex of *Euphorbia balsamifera*" Phytochemistry 15(1976): 427-429.

54. Hui, W.H. and Li, M.M. "Lupene Triterpenoids from *Glochidion eriocarpum*" ibid. 15(1976): 561-562.

55. _____ "Further Triterpenoids from the Stem of *Lithocarpus polystachya*" ibid. 16(1977): 111-112.

56. Hui, W.H., Ko, P.D.S., Lee, Y.C., Li, M.M. and Arthur, H.R. "Triterpenoids from *Lithocarpus species* of Hong Kong" ibid. 14(1975): 1063-1066.

57. Kotaiah, Y., Lakshmi, N.K.M., Rao, E.V. and Rao, D.V. "Chemical Constituents of the Flowers and Leaves of *Notonia grandiflora*" Indian J. Pharm. 38(5)(1976): 130-131.

58. Hui, W.H., Li, M.M. and Wong, K.M. "A New Compound, 21α-hydroxy-friedel-4(23)-en-3-one and other Triterpenoids from *Phyllanthus reticulatus*" Phytochemistry 15(1976): 797-798.

59. Dantanarayana, A.P., Kumar, N.S., Muthukuda, P.M. and Wazeer, M.I.M. "A Lupane Derivative and the ^{13}C nmr Chemical Shifts of Some Lupanols from *Pleurostylia opposita*" ibid. 21(1982): 2065-2068.

60. Kumar, N.S. and Seshadri, T.R. "Triterpenoids of *Pterocarpus santalinus*, Constitution of a New Lupene Diol" ibid. 14(1975): 521-523.

61. Ulubelen, A., Brieskorn, C.H. and Özdemir, N. "Triterpenoids of *Salvia horminum*, Constitution of a New Diol" ibid. 16(1977): 790-791.

62. Anjaneyulu, A.S.R. and Murty, S.V. "Two Rare Tetramethyl Ethers of Quercetin from *Sterculia foetida* Linn." Indian J. Chem. 20B(1981): 87-88.

63. Guise, G.B., Rasmussen, M., Ritchie, E. and Taylor, W.C. "Some Constituents of *Rejoua aurantiaca* Gaud. and *Voacanga papuana* (F. Muell.) K. Schum" Aust. J. Chem. 18(1965): 927-931.

64. Hui, W.H. and Sung, M.L. "An Examination of the Euphorbiaceae of Hong Kong II, The Occurence of Epitaraxerol and other Triterpenoids" Aust. J. chem. 21(1968): 2137-2140.

65. Sahu, N.P. and Chakravarti, R.N. "Constituents of *Argyreia speciosa*" Phytochemistry 10(1971): 1949.

66. Pegel, K.H. and Rogers, C.B. "Constituents of *Bridelia micrantha*" Phytochemistry 7(1968): 655-656.

67. Slatkin, D.J., Doorenbos, N.J., Harris, L.S., Masoud, A.N., Quimby, M.W. and Schiff, P.L. "Chemical Constituents of *Cannabis sativa*" J. Pharm. Sci. 60(12)(1971): 1891-1892.

68. Betacor, C., Freire, R., Gonzalez, A.G., Salazar, J.A., Pascard, C. and Prange, T. "Three Triterpenes and other Terpenoids from *Catha cassinoides*" Phytochemistry

19(1980): 1989-1993.

69. Bhakuni, D.S., Satish, S., Shukla, Y.N. and Tandon, J.S. "Chemical Constituents of *Diospyros buxifolia, D. tomentosa, D. ferra, D. lotus, Rhus parviflora, Polygonum recumbens, Balanites aegyptiaca* and *Pyrus pashia*" Phytochemistry 10(1971): 2829-2831.

70. Pashi, B., Bishay, D.W., Kowalewski, Z. and Rompel, H. "Chemical Investigation of *Euonymus europaea*" Planta Med. 38(1980): 391.

71. Anjaneyulu, V., Rao, D.N. and Row, L.R. "The Crystalline Constituents of Euphorbiaceae: Part VII. The Triterpenes of *Euphorbia antiquorum* Linn." J. Indian Chem. Soc. 44(2) (1976): 123-126.

72. Silva, M. and Sammes, P.G. "A New Diterpenic Acid and other Constituents of *Haplopappus foliosus* and *H. angustifolius*" Phytochemistry 12(1973): 1755-1758.

73. Wagner, H. and Burghart, J. "Spermidine Alkaloids and Triterpenes from *Maytenus heterophylla* and *Pleurostylia africana*, Chemical Constituents of the Celastraceae-IV" Planta Med. 32A(1)(1977): 9-14.

74. Kiang, A.K., Sim, K.Y. and Yoong, S.W. "Constituents of *Mikania cordata* (Burm. F.) B.L. Robinson (Compositae)-II" Phytochemistry 7(1968): 1035-1037.

75. Banerji, A. and Das, R. "Constituents of *Piper aurantiacum* Wall.: Isolation of Triterpenoids from a *Piper species*" Indian J. chem. 15B(4)(1977): 395-396.

76. Sharma, S.C., Shukla, Y.N. and Tandon, J.S. "Constituents of *Colocasia formicata, Sagittaria sagittifloria, Arnebia nobilis, Ipomoea paniculata, Rhododendron niveum, Paspalum scrobiculatum, Mundulea sericea* and *Duabanga sonneratiodes*" Phytochemistry 11(1972): 2621-2623.

77. Arthur, H.R., Tam, S.W. and Angsusingh, V. "Triterpenoids Consti- Constituents of the Hong Kong Ericaceae" Aust. J. Chem. 13(1960): 506-509.

78. Gunsekera, S.P., Uvais, M., Sultanbawa, S. and Balasubramaniam, S. "Triterpenes of Some Species of Flacourtiaceae" Phytochemistry 16(1977): 788-789.

79. McLean, J., Rettie, G.H. and Spring, F.S. "Triterpenoids from Peat" Chem. Ind. 15(1958): 1515.

80. Candy, H.A., McGarry, E.J. and Pegel, K.H. "Constituents of *Syzygium cordatum*" Phytochemistry 7(1968): 889-890.

81. Pakrashi, S.C., Roy, S.K. and Bhattacharyya, J. "Studies on Indian Medicinal Plants X., Isolation of Neutral Components from *Glycosmis arborea* (Roxb.) DC." J. Indian Chem. Soc. 41(10)(1964): 651-654.

82. Kennard, O., Sanseverine, L.R., Vorbrüggen, H. and Djerassi, C. "The Complete Structure of the Triterpene Arborinol" Tetrahedron Lett. 39(1965): 3433-3438.

83. Vorbrüggen, H., Pakrashi, S.C. and Djerassi, C. "Terpenoide, LIV, Arborinol, ein neuer Triterpen-Typus" Justus Liebigs Ann. Chem. 668(1965): 57-76.

84. Hui, W.H. and Li, M.M. "Triterpenoids and Sterols from *Hedyotis*

acutangula" Phytochemistry 16(1977): 1309-1310.

85. Gunasekera, S.P., Kumar, V., Sultanbawa, S. and Balasubraminiam, S. "Triterpenoids and Steroids of Some Sapotaceae and their Chemotaxonomic Significance" Phytochemistry 16(1977): 923-926.

86. Abe, H., Kawashima, T., Maruta, I., Kodama, M. and Ito, S. "Neutral Constituents of *Orixa japonica*" ibid. 10(1971): 3330-3331.

87. Palmer, M.A. and Bowden, B.N. "Variations in Sterol and Triterpene Contents of Developing *Sorghum bicolor* Grains" ibid. 16(1977): 459-463.

88. Ogunkoya, L., Olubajo, O.O. and Sondha, D.S. "A New Triterpenoids Alcohol from *Trema orientalis*" ibid. 16(1977): 1601-1608.

89. Pouchert, C.J. The Aldrich Library of Infrared Spectra 2nd ed., Aldrich Chemical Company, U.S.A., 1975.

90 Pouchert, C.J. and Cambell, J.R. The Aldrich Library of NMR Spectra Vol. X., pp. 101, Aldrich Chemical Company, U.S.A., 1974.

91. Ruzicka, L. "History of the Isoprene Rule" Proc. Chem. Soc. (1959): 341-361.

92. Nakanishi, K., Goto, T., Ito, S., Natori, S. and Nozoe, S. Natural Products Chemistry Vol. 1, pp. 315, Academic Press, New York and London, 1974.

93. Ruzicka, L. and Lardon, F. "Zur Kenntnis der Triterpene. Uber das Ambrein, einen Bestandteil des Grauen Ambra" Helv. Chim. Acta 29(1946): 912-921.

94. Jones, E.R.H. and Meakins, R.J. "The Oxidation of Lupenyl Esters" J. Chem. Soc. 87(2)(1940): 1335-1339.

95. Stork, G., Uyeo, S., Wakamatsu, T., Grieco, P. and Labovitz, J. "The Total Synthesis of Lupeol" J. Am. Chem. Soc. 93(19)(1971): 4945-4947.

96. Corey, E.J. and Ursprung, J.J. "The Structure of the Triterpenes Friedelin and Cerins" J. Am. Chem. Soc. 78(1956): 5041-5051.

APPENDIX

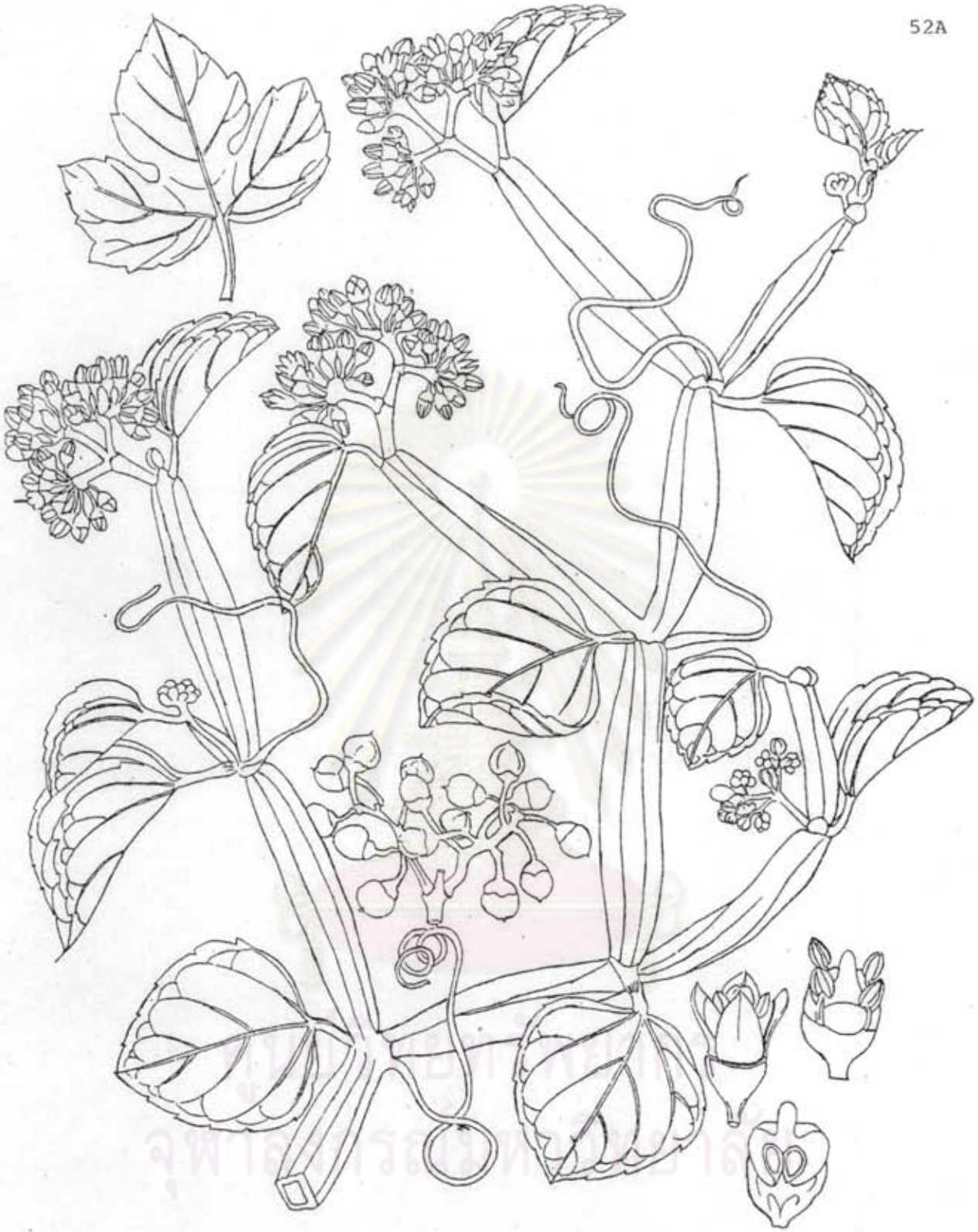

Figure 4: เพ็ชรสังฆาต *Cissus quadrangularis* Linn., Vitidaceae

(After Kirtikar and Basu)

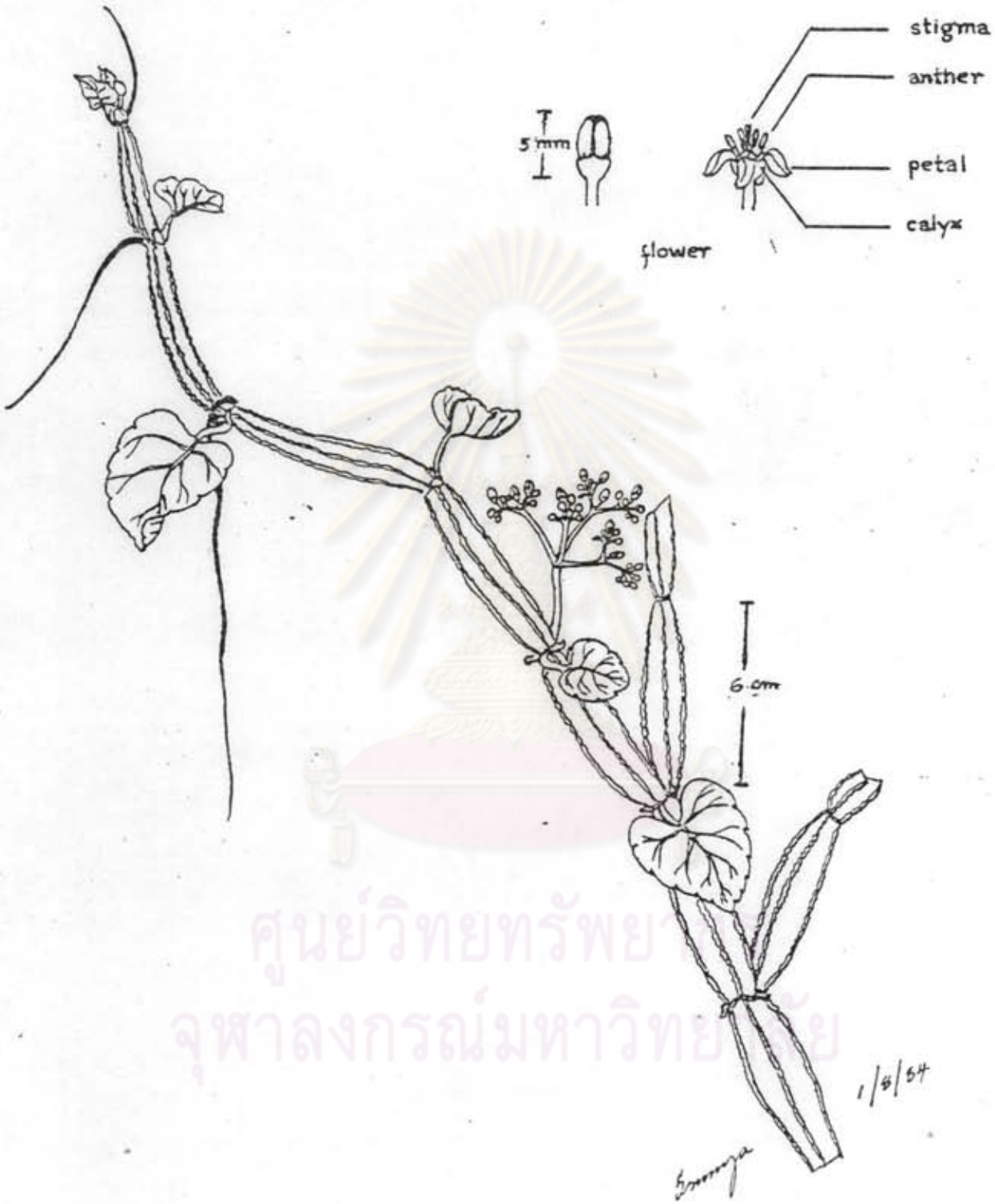

Figure 4 : เพ็ชรสังฆาต *Cissus quadrangularis* Linn. Vitidaceae

a. benzene : chloroform (1:1)

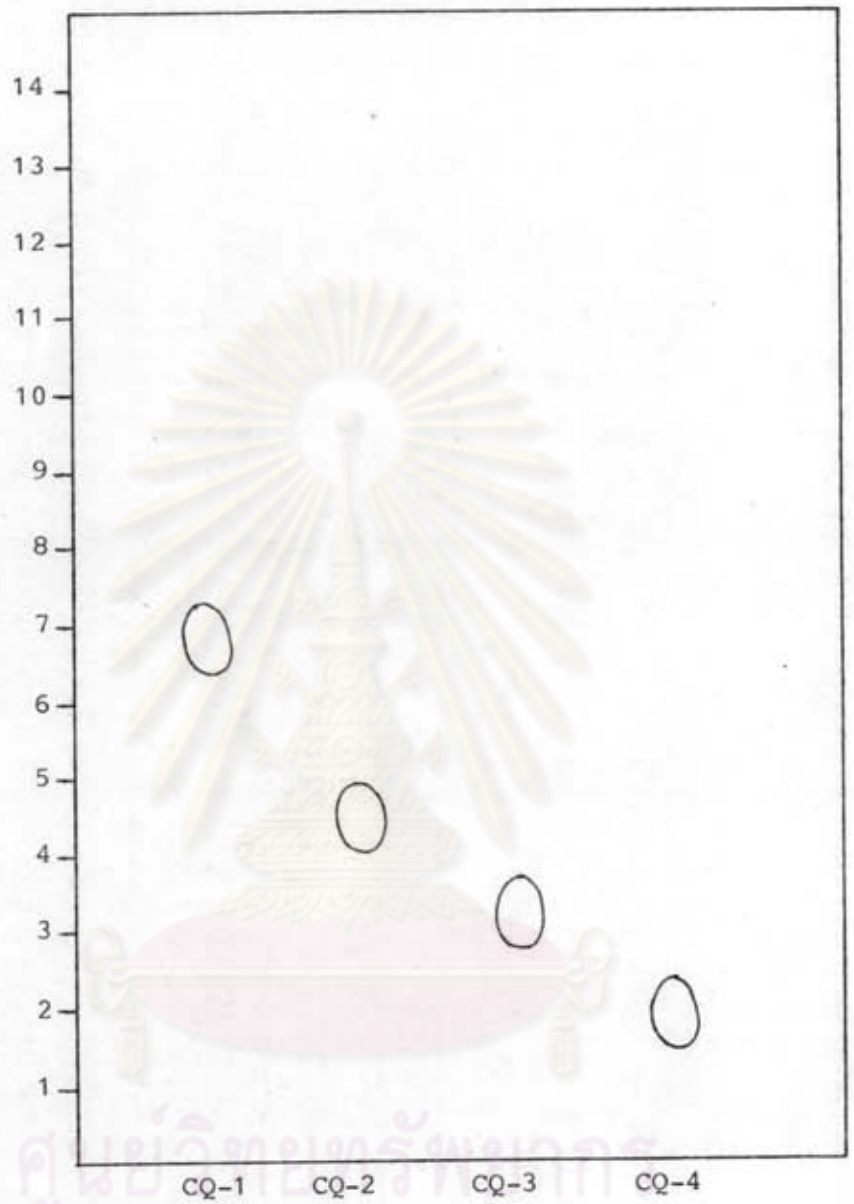

Figure 5. Thin Layer Chromatogram of CQ-1 to CQ-4

CQ-1 = Lupenone

CQ-2 = Epifriedelinol

CQ-3 = Isoarborinol

CQ-4 = β-sitosterol

b. petroleum ether : benzene (1:5)

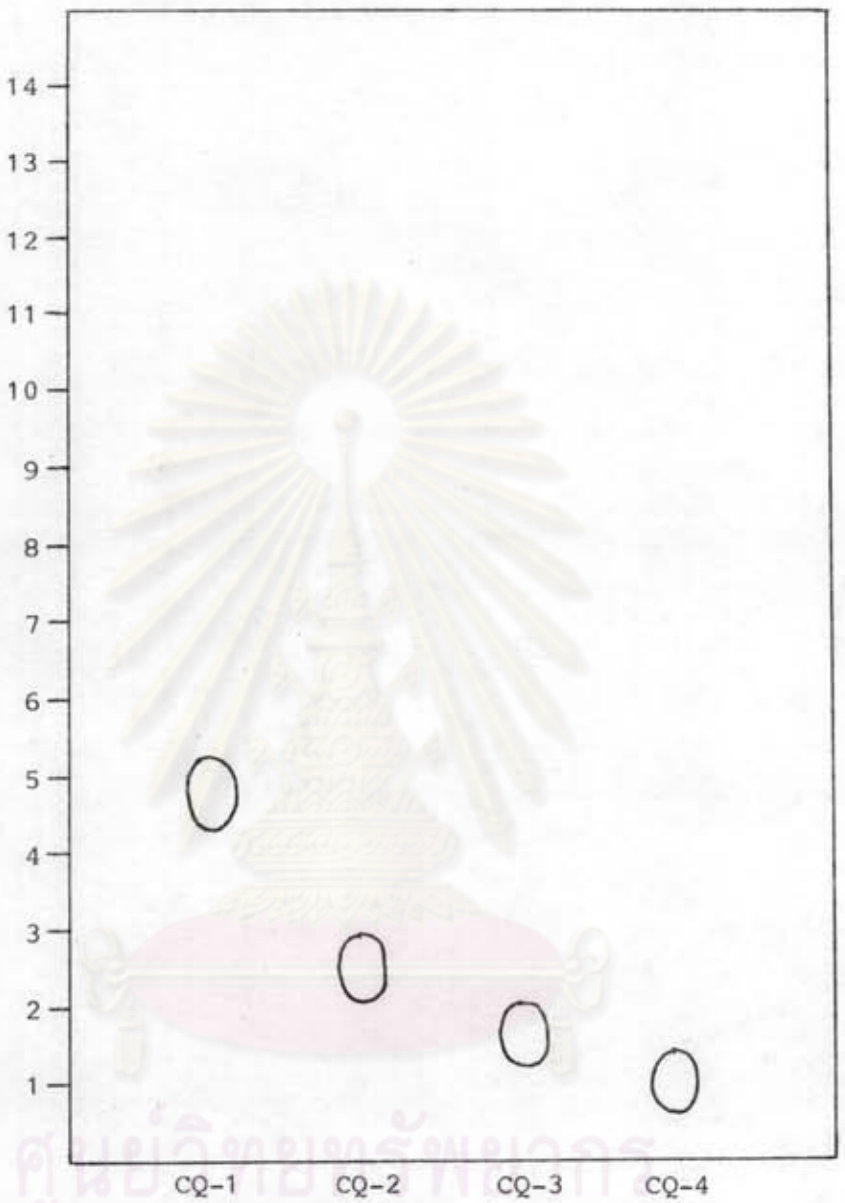

Figure 6. Thin Layer Chromatogram of CQ-1 to CQ-4

CQ-1 = Lupenone

CQ-2 = Epifriedelinol

CQ-3 = Isoarborinol

CQ-4 = β-sitosterol

c. petroleum ether : dichloroethane (1:1)

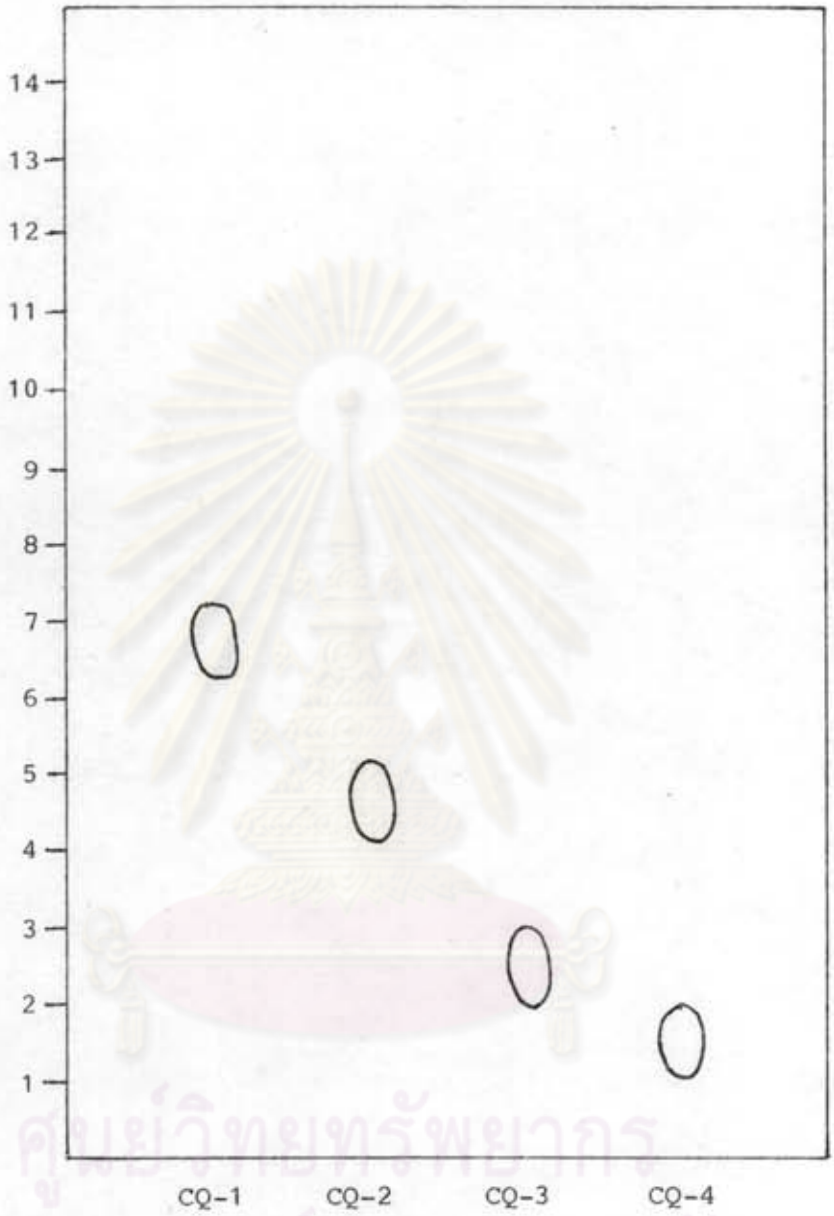

Figure 7. Thin Layer Chromatogram of CQ-1 to CQ-4

CQ-1 = Lupenone

CQ-2 = Epifriedelinol

CQ-3 = Isoarborinol

CQ-4 = β-sitosterol

d. chloroform : methanol (99:1)

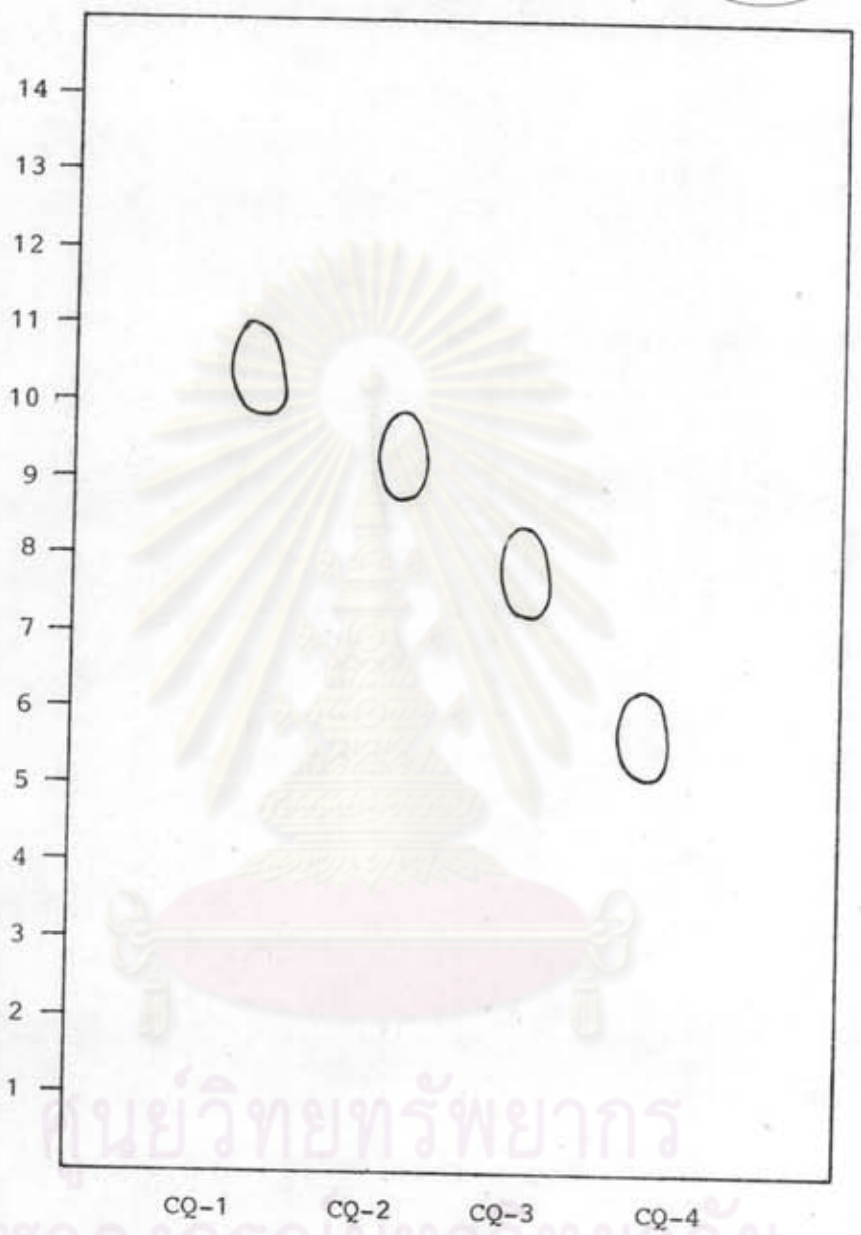

Figure 8. Thin Layer Chromatogram of CQ-1 to CQ-4

CQ-1 = Lupenone

CQ-2 = Epifriedelinol

CQ-3 = Isoarborinol

CQ-4 = β-sitosterol

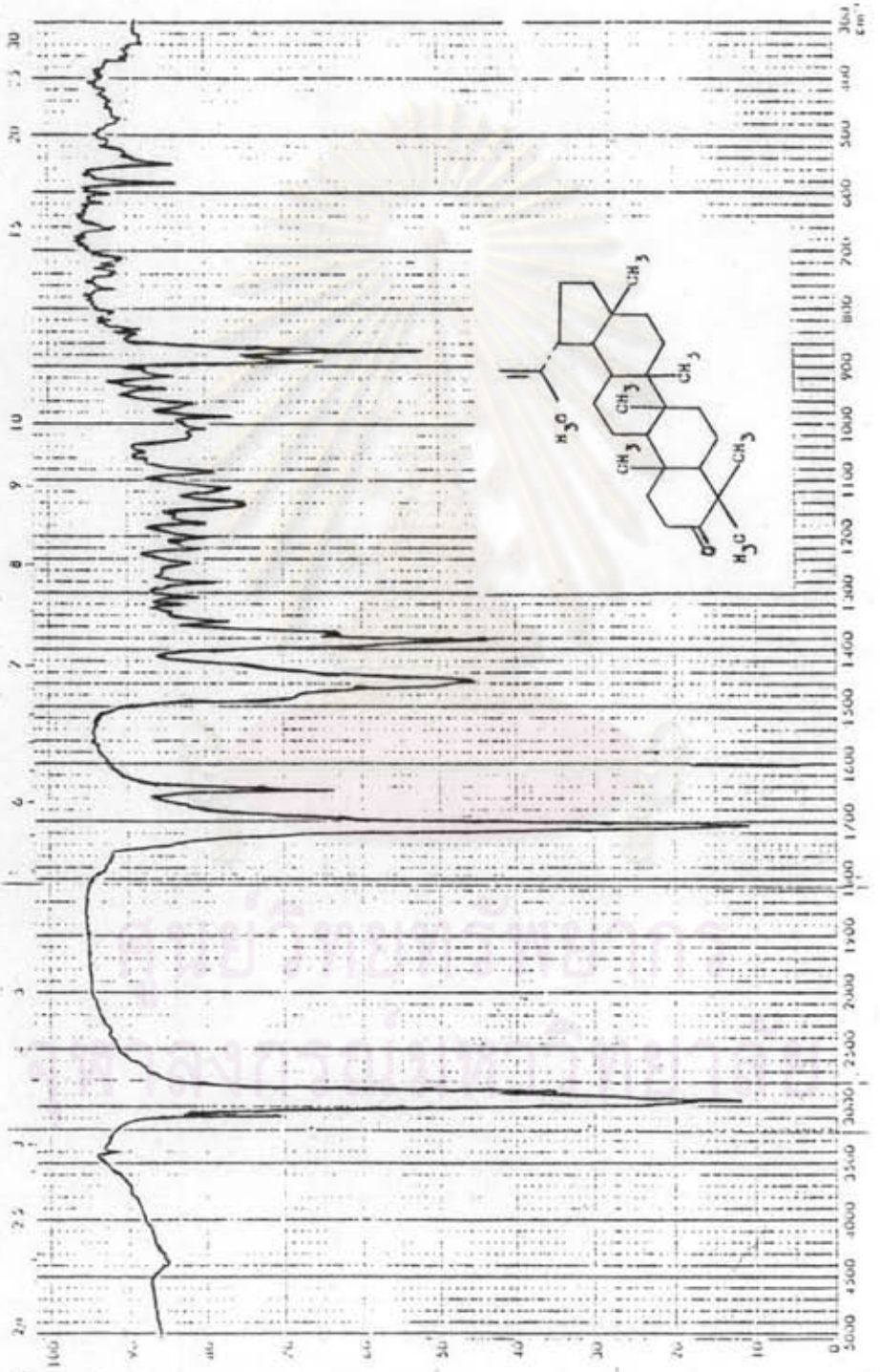

Figure 9 : Infrared absorption spectrum of CQ-1

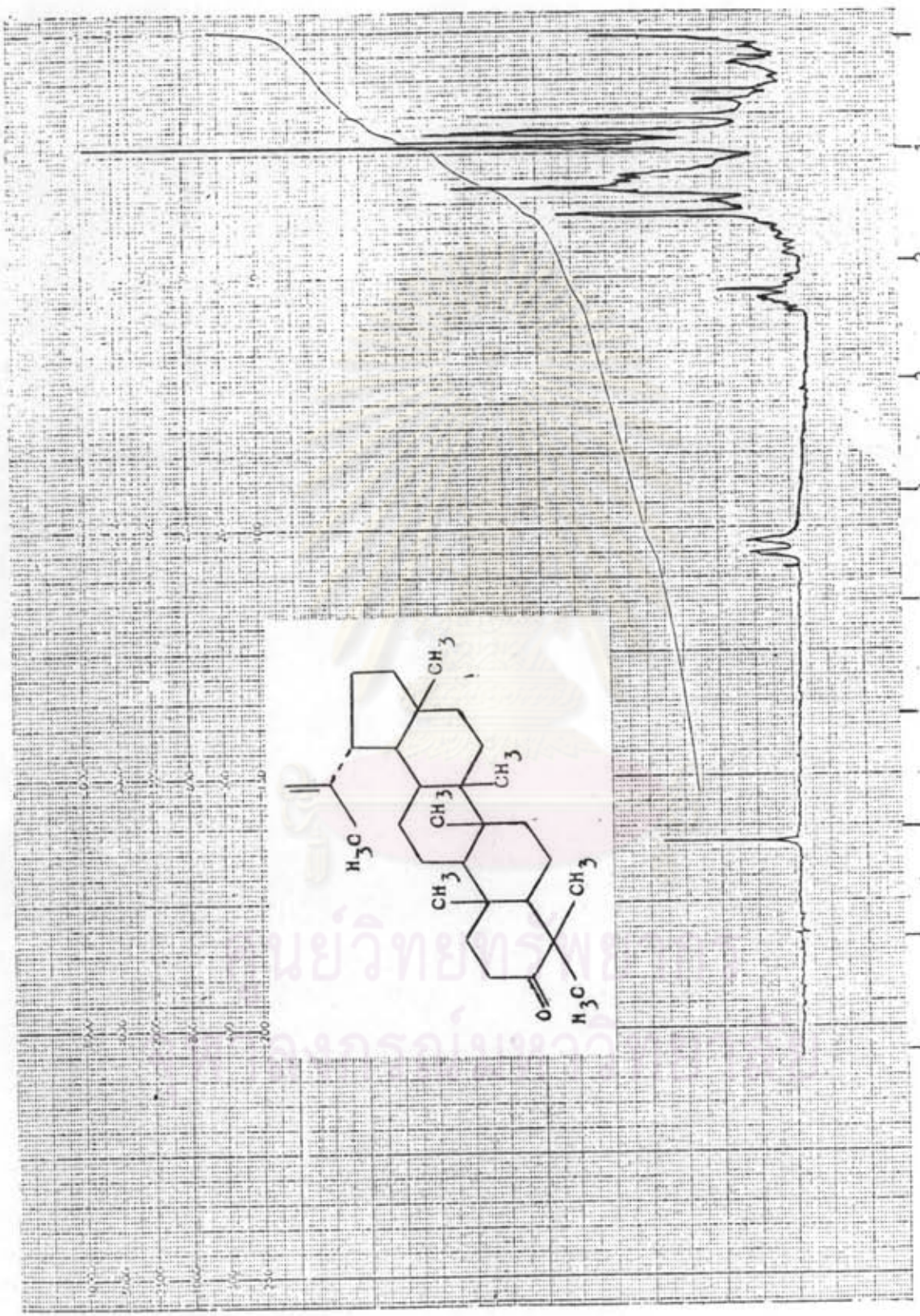

Figure 10. Proton nuclear magnetic resonance spectrum of CQ-1

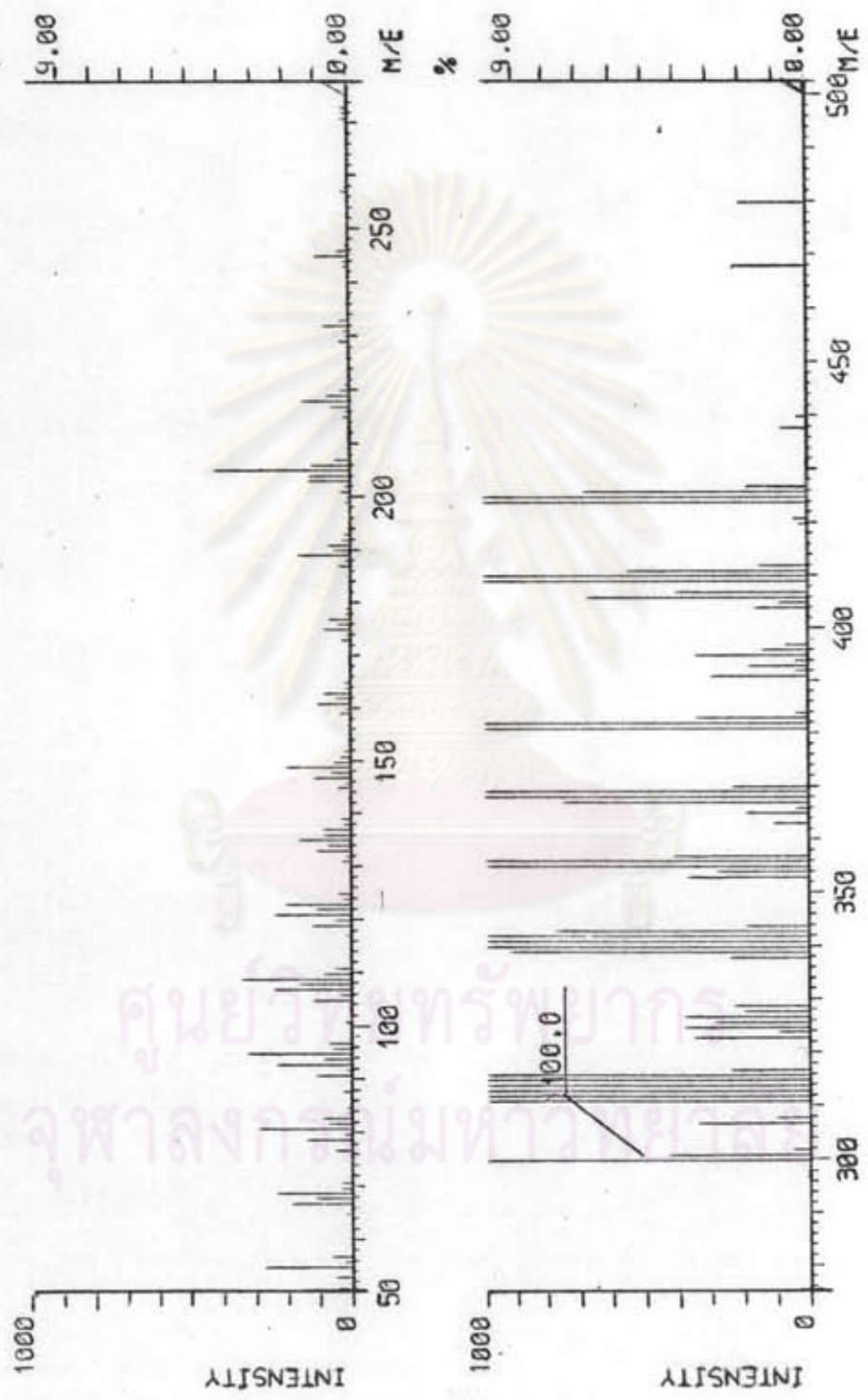

Figure 11 : Mass spectrum of CQ-1

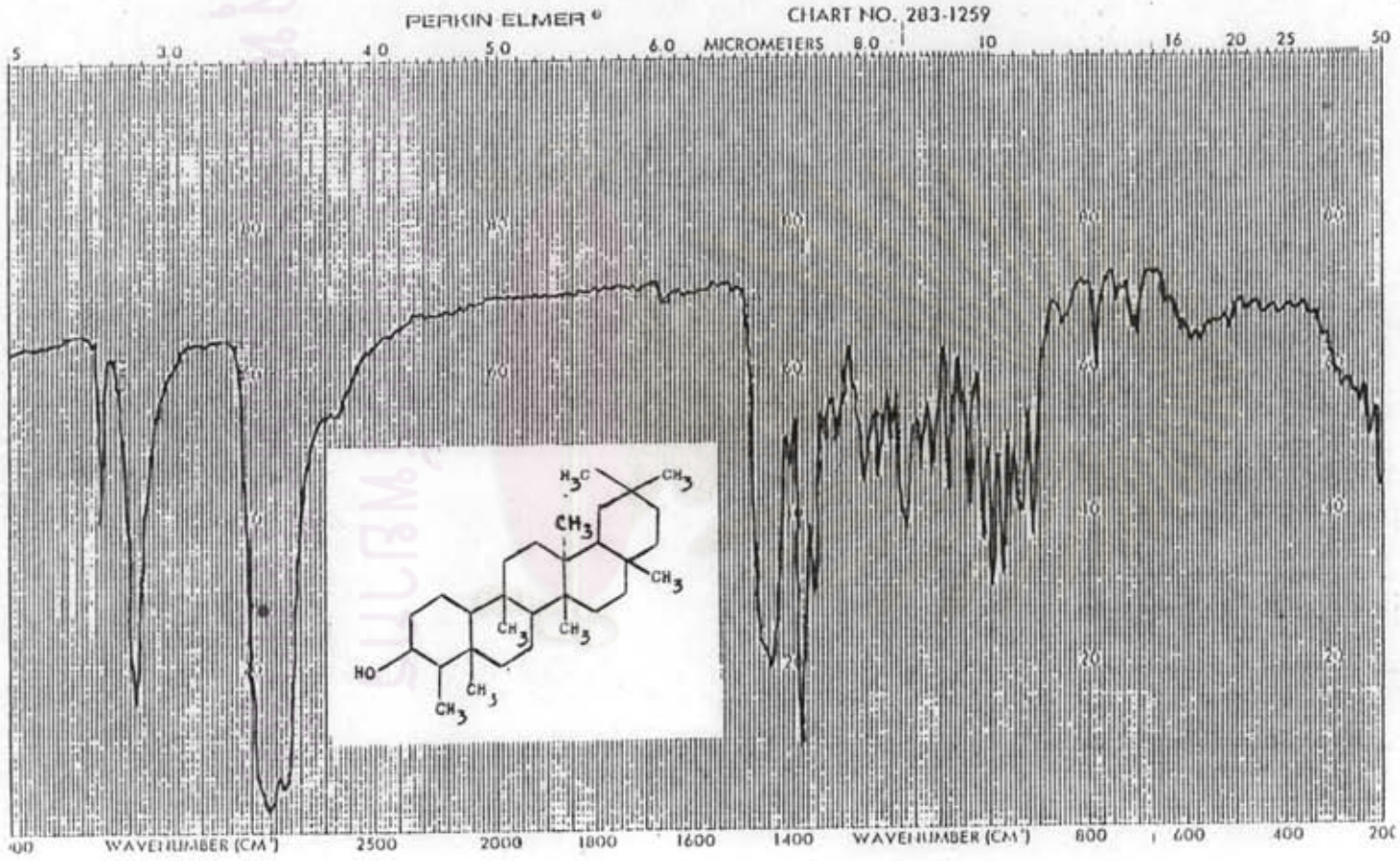

Figure 12 : Infrared absorption spectrum of CQ-2

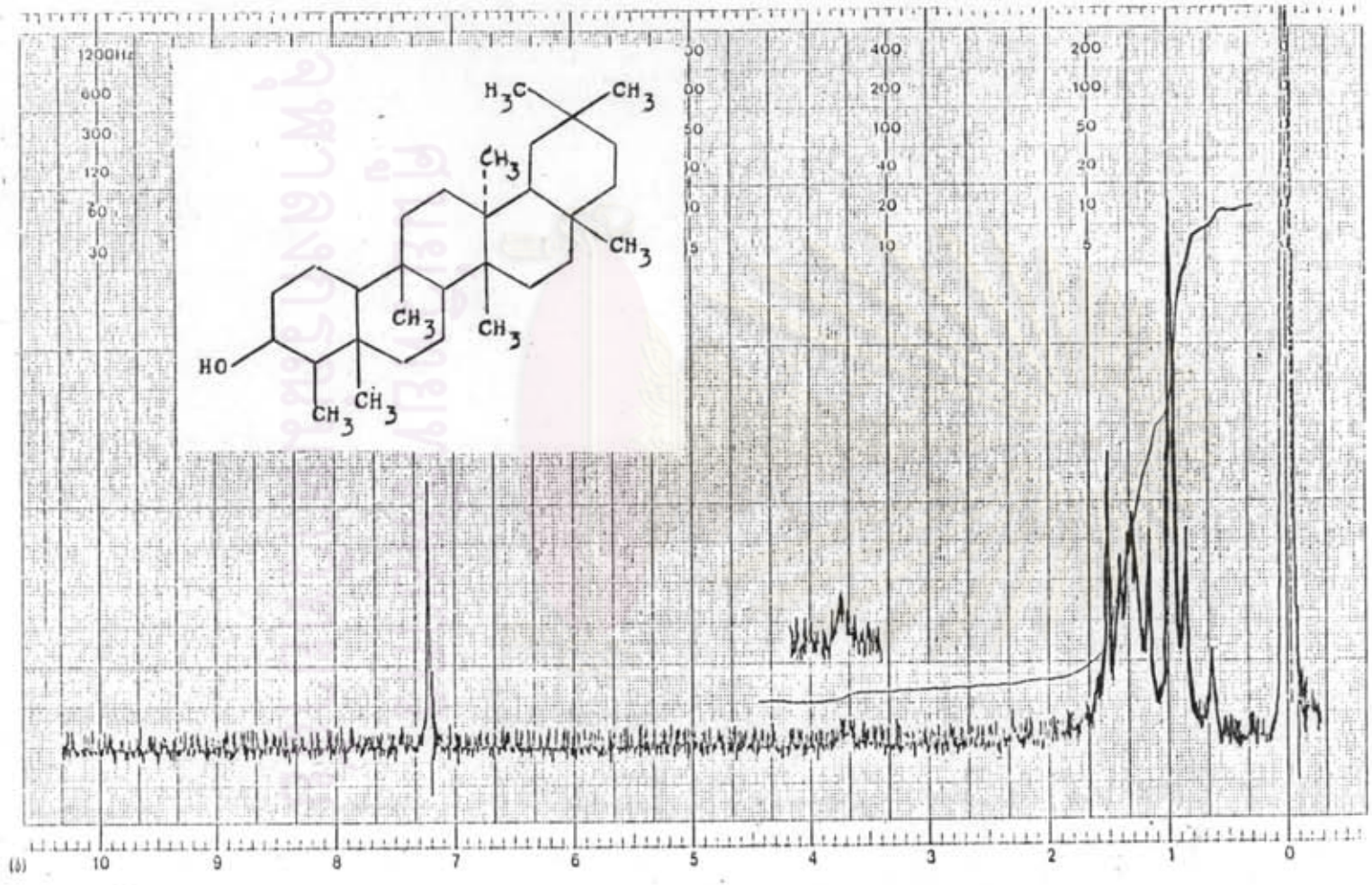

Figure 13 : Proton nuclear magnetic resonance spectrum of CQ-2

Figure 14 : Mass spectrum of CQ-2

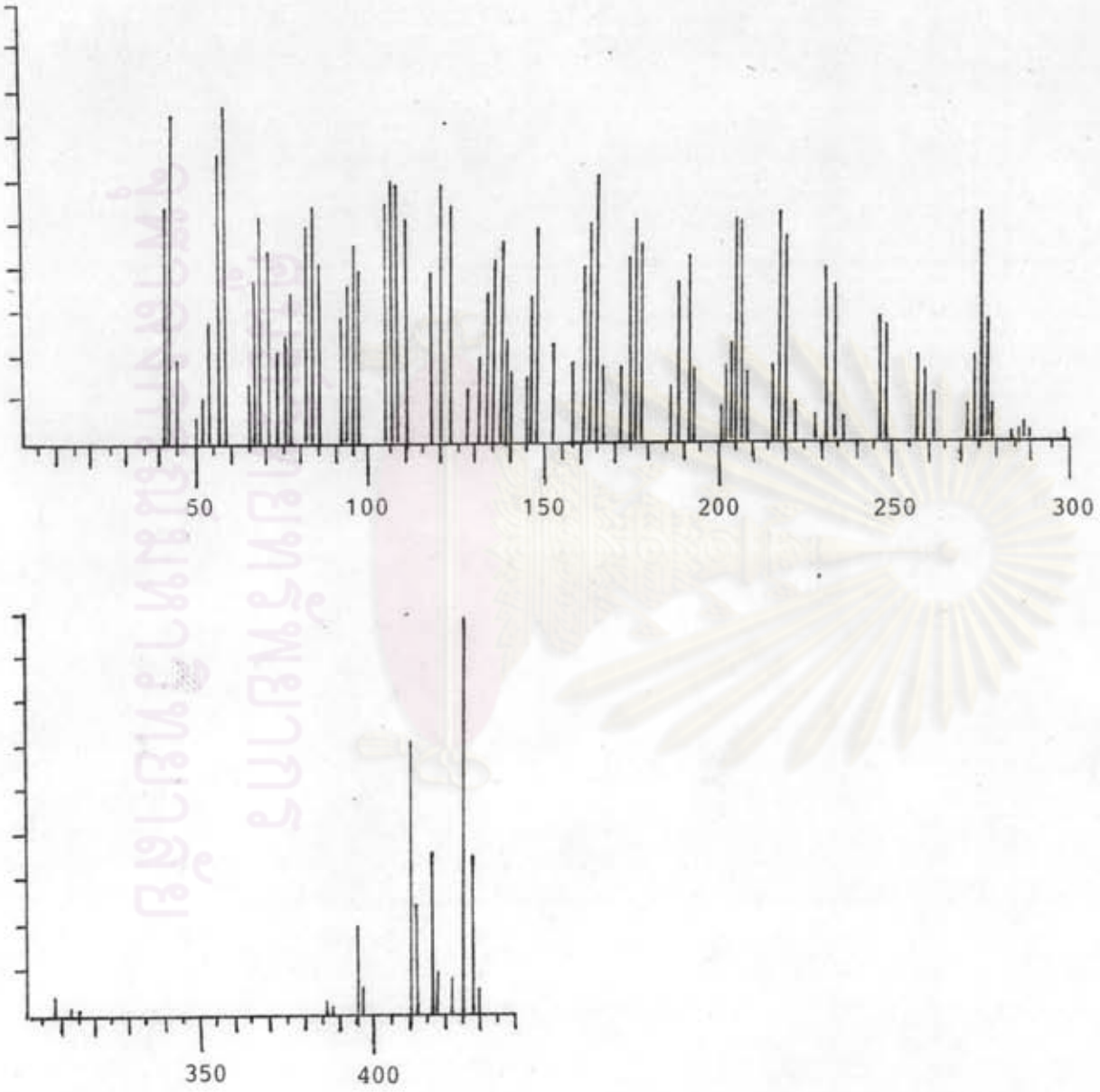

Figure 15 : Mass spectrum of D:A-Friedooleanan-3-ol, (3.beta.)-

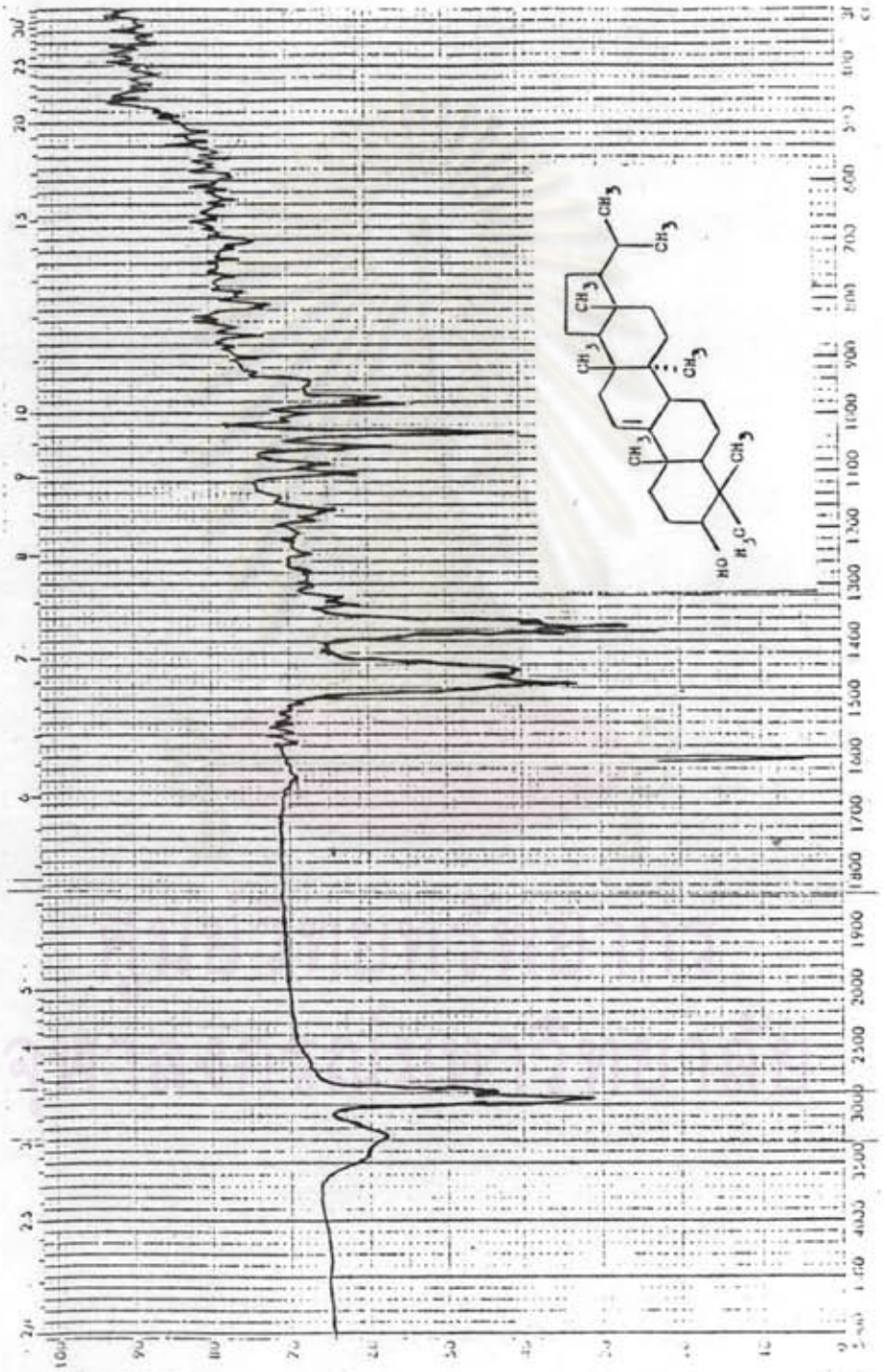

Figure 16 : Infrared absorption spectrum of CQ-3

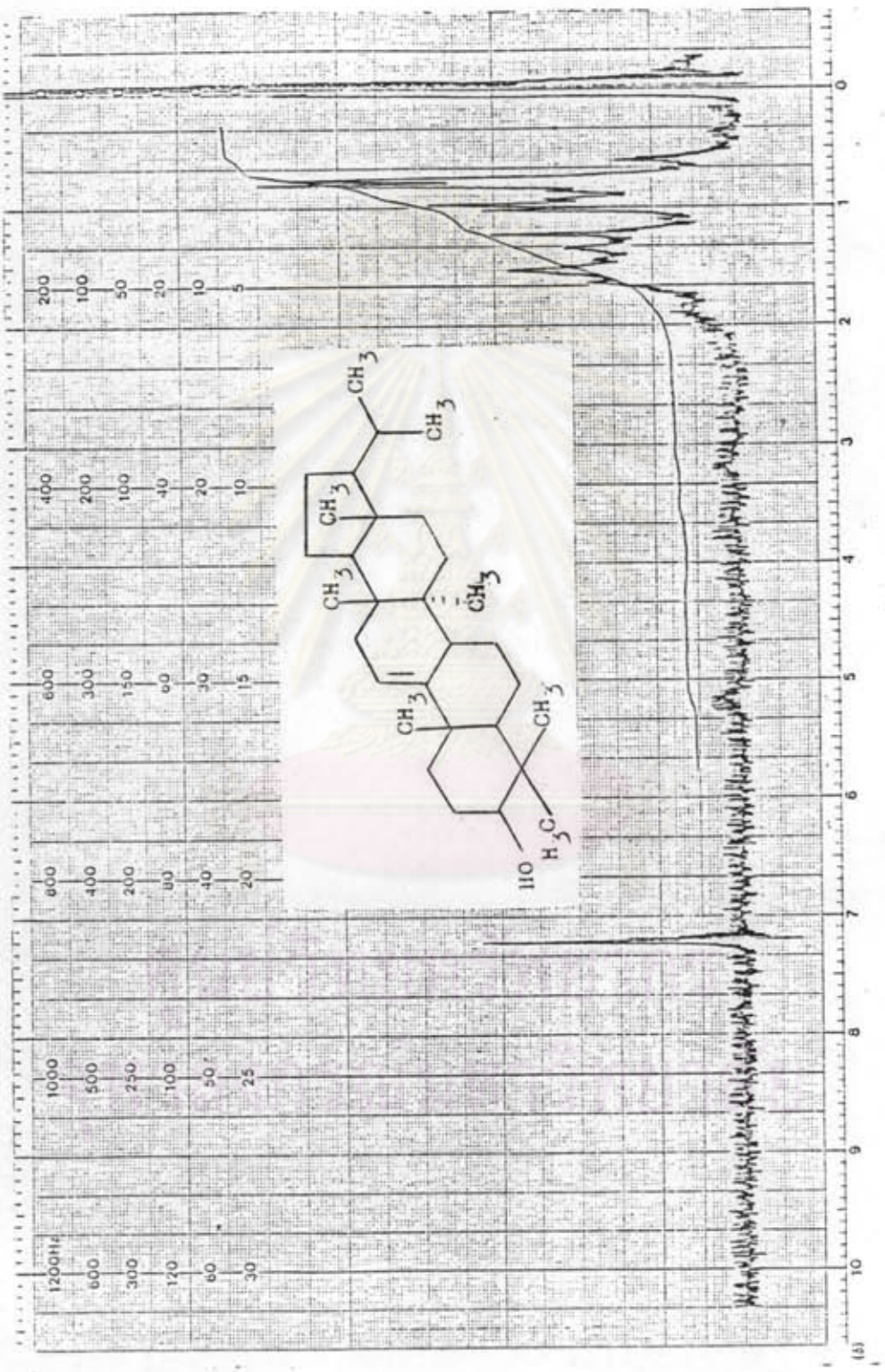

Figure 17 : Proton nuclear magnetic resonance of CQ-3

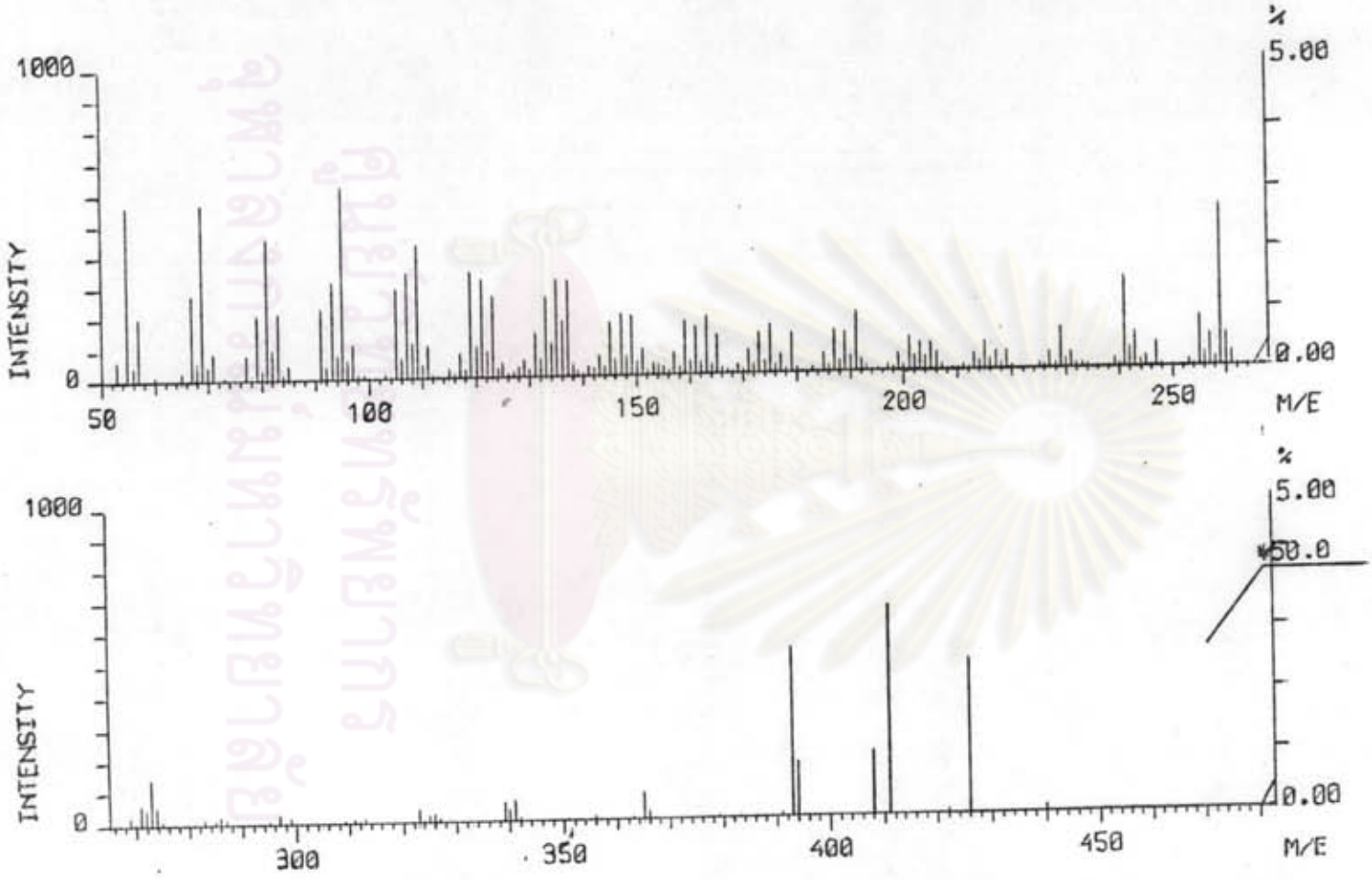

Figure 18 : Mass spectrum of CQ-3

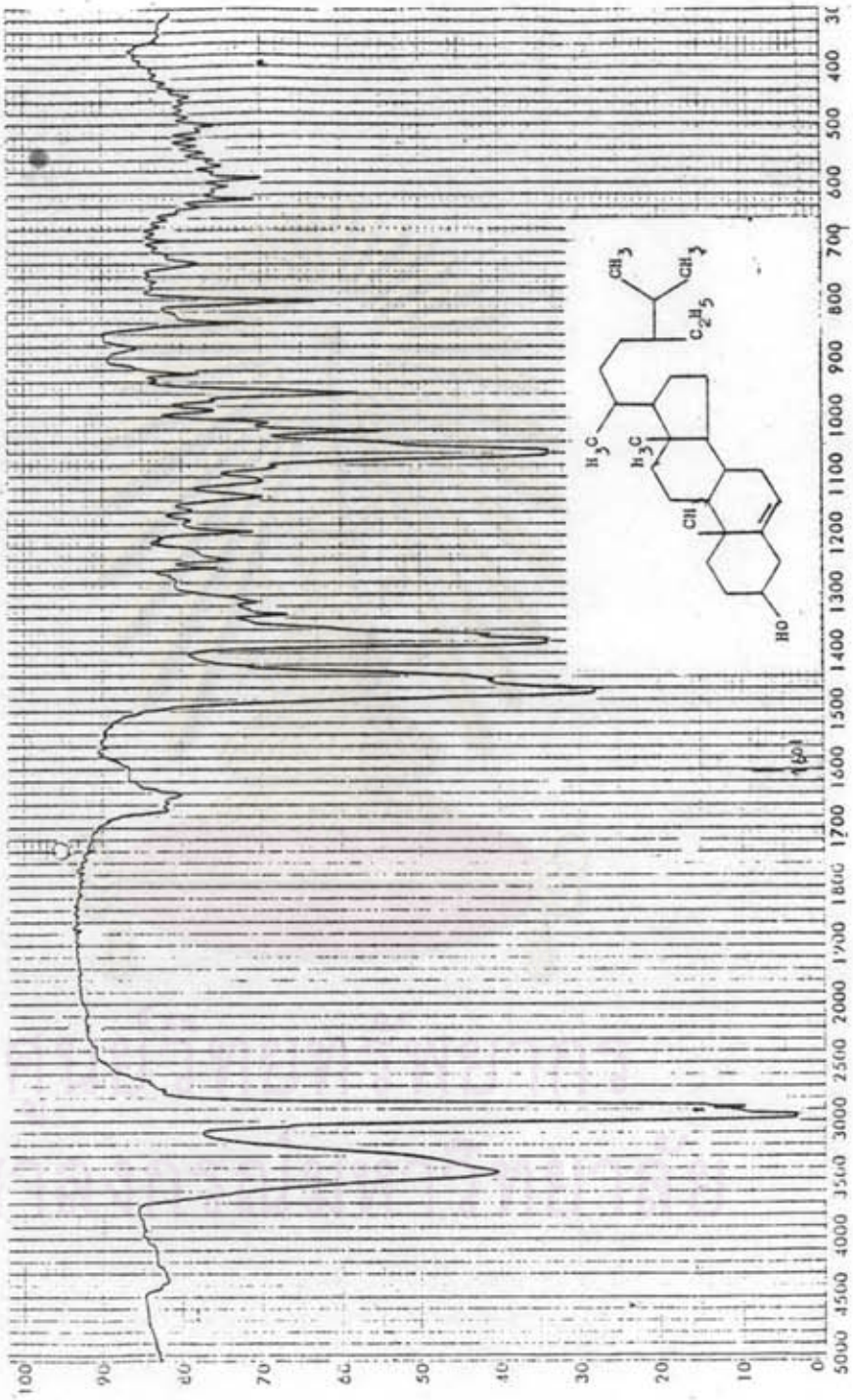

Figure 19 : Infrared absorption spectrum of CQ-4

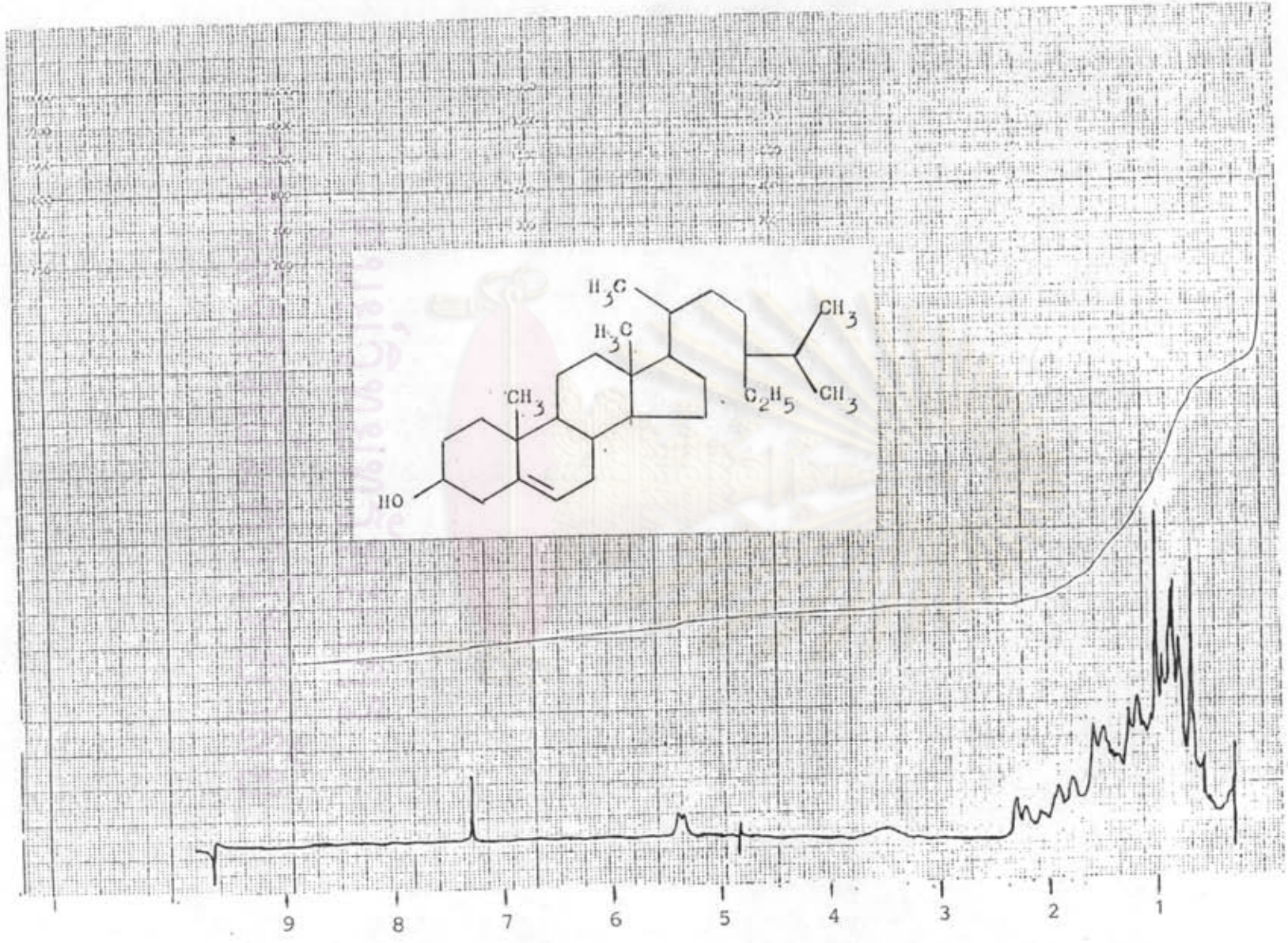

Figure 20. Proton nuclear magnetic resonance spectrum of CQ-4

VITA

Miss Thidarat Pluemjai was born on August 21, 1956 in Surat Thani, Thailand. She recieved the degree of B. Sc. in 1980 from the Department of Biology (Botany), Faculty of Science and Art, Kasetsart University.