

## REFERENCES

- Alvi, K.A., Tenenbaum, L. and Crews, P. 1991. Anthelmintic polyfunctional nitrogen-containing terpenoids from marine sponges. J. Nat. Prod. 54 : 71-78.
- Barnes, R.D. 1974. Invertebrate zoology (3rd ed.). Tokyo : W.B. Saunders.
- Bergquist, P.R. 1978. Sponges. London : Hutchinson.
- Bergquist, P.R. and Wells, R.J. 1983. Chemotaxonomy of the Porifera : The development and current status of the field. In P.J. Scheuer (ed.), Marine natural products, Vol.II, pp.1-50. New York : Academic Press.
- Biard, J.F., Grivois, C.M., Roussakis, C., Cotelle, P., Henichart, J.P., Debitus, C. and Verbis, J.F. 1994. Lissoclimides, cytotoxic diterpenes from *Lissoclinum voeltzkowi* Michaelsen. Nat. Prod. Lett. 4 : 43-50.
- Blunden, G. 1996. Biologically active compounds from marine organisms. In W.C. Evans (ed.), Trease and Evans' Pharmacognosy, p. 18. London : The Bath Press.
- Braekman, J.C., Daloze, D., Gregoire, F., Popov, S. and Soest, R.V. 1994. Two new kalihinenes from the marine sponge *Acanthella cavernosa*. Bull. Soc. Chim. Belg. 103 : 187-191.
- Braekman, J.C., Daloze, D., Deneubourg, F., Huysecom, J. and Vandevyver, G. 1987. 1-Isocyanoaromadendrane, a new isonitrile sesquiterpene from the sponge *Acanthella acuta*. Bull. Soc. Chim. Belg. 96 : 539-543.
- Brusca, R.C. and Brusca, G.J. 1990. Invertebrates. Sunderland : Sinauer Associates.
- Burgoyne, D.L., Dumdei, E.J. and Andersen, R.J. 1993. Acanthenes A to C : A chloro, isothiocyanate, formamide sesquiterpene triad isolated from the Northeastern Pacific marine sponge *Acanthella* sp. and the dorid nudibranch *Cadlina luteomarginata*. Tetrahedron 49 : 4503-4510.
- Carpon, R.J. and Faulkner, D.J. 1984. Antimicrobial metabolites from a Pacific sponge, *Agelas* sp. J. Am. Chem. Soc. 106 : 1819-1822.
- Chan, W.R., Tinto, W.F., Laydoo, R.S., Manchand, P.S., Reynold, W.F. and McLean, S. 1991. Cembrane and *Pseudopterogorgia acerosa*. J. Org. Chem. 56 : 1773-1776.

- Chang, C.W.J., Patra, A., Roll, D.M. and Scheuer, P.J. 1984. Kalihinol-A, a highly functionalized diisocyano diterpenoid antibiotic from sponge. J. Am. Chem. Soc. 106 : 4644-4646.
- Chang, C.W.J., Patra, A., Baker, J.A. and Scheuer, P.J. 1987. Kalihinols, multifunctional diterpenoid antibiotics from marine sponge *Acanthella* spp. J. Am. Chem. Soc. 109 : 6119-6123.
- Ciminiello, P., Magno, S., Mayol, L. and Piccialli V. 1987. *cis*-Eudesmane nitrogenous metabolites from the sponge *Axinella cannabina* and *Acanthella acuta*. J. Nat. Prod. 50 : 217-220.
- Corey, E.J. and Magriotis, P.A. 1987. Total synthesis and absolute configuration of 7,20 diisocyanoadociane. J. Am. Chem. Soc. 109 : 287-289.
- D' Ambrosio, M., Guerriero, A. and Pietra, F. 1987. Sarcodictyin A and sarcodictyin B, novel diterpenoidic alcohols esterified by (*E*)-*N* (1)-methylurocanic acid. Isolation from Mediterranean stolonifer *Sarcodictyon roseum*. Helv. Chim. Acta, 70 : 2019-2027.
- D' Ambrosio, M., Guerriero, A. and Pietra, F. 1988. Isolation from the Mediterranean stoloniferan coral *Sarcodictyon roseum*. of sarcodictylin C,D,E and F, novel diterpenoidic alcohols esterified by (*E*) or (*Z*)-*N* (1)-methylurocanic acid. Failure of the carbon-skeleton type as a classification (Criterion). Helv. Chim. Acta, 71 : 964-976.
- Fathi-Afshar, R. and Allen, T.M. 1988. Biologically active metabolites from *Agelas mauritiana*. Can. J. Chem. 66 : 45-50.
- Faulkner, D.J., 1984. Marine natural products. Metabolites of marine invertebrates. Nat. Prod. Rep., pp. 551-598.
- Fusetani, N., Yasumuro, K., Kawai, H., Natori, T., Brinen, L. and Clardy, J. 1990. Kalihinene and isokalihinol B, cytotoxic diterpene isonitriles from the marine sponge *Acanthella klethra*. Tetrahedron Lett. 31 : 3599-3602.
- Fusetani, N., Wolstenholme, H.J., Shinoda, K., Asai, N. and Matsugana, S. 1992. Two sesquiterpene isocyanides and a sesquiterpene thiocyanate from the marine sponge *Acanthella* cf. *cavernosa* and the nudibranch *Phyllidia ocellata*. Tetrahedron Lett. 33 : 6823-6826.
- Garson, M.J. 1986. Biosynthesis of the novel diterpene isonitrile diisocyanoadociane by a marine sponge of the *Amphimedon* genus : Incorporation studies with sodium [<sup>14</sup>C] cyanide and sodium [2-<sup>14</sup>C] acetate. J. Chem. Soc. Chem. Commun., 35-36.

- Garson, M. J. 1989. Biosynthetic studies on marine natural product. Nat. Prod. Rep., pp. 143-170.
- Gulavita, N.K., de Silva, E.D., Hagadone, M.K., Karuso, P. and Scheuer, P.J. 1986. Nitrogenous bisabolene sesquiterpenes from marine invertebrates. J. Org. Chem. 51 : 5136-5139.
- Hagadone, M.R., Scheuer, P.J., and Holm, A. 1984. On the origin of the isocyano function in marine sponges. J. Am. Chem. Soc. 106 : 2447-2448.
- Hirata, Y. and Uemura, D. 1986. Halichondrins - Antitumor polyether macrolides from a marine sponge. Pure & Appl. Chem. 58 : 701-710.
- Iengo, A., Santacroce, C. and Sodano, G. 1979. Metabolism in Porifera. X. On the intermediary of a formamide moiety in the biosynthesis of isonitrile terpenoids in sponge. Experientia. 35 : 10-11.
- Iguchi, K., Nishimura, K., Yamazaki, K., Iwashima, M. and Yamada, Y. 1992. New cembranolide diterpenes with a dimethylamine group from the Okinawan soft coral (*Simularia* sp.). Chem. Lett.. 127-130.
- Ireland, C.M., Roll, D.M., Morinski, T.F., McKee, T.C., Zabriskie, T.M. and Swersey.J.C. 1988. Uniqueness of the marine chemical environment : Categories of marine natural products from invertebrate. In Fautin, D.G. (ed.), Biomedical importance of marine organisms, pp. 41-57. San Francisco : California Academy of Sciences.
- Ishida, K., Ishibashi, M., Shigemori, H., Sasaki, T. and Kobayashi, J. 1992. Agelasine G, a new antileukemic alkaloid from the Okinawan marine sponge *Agelas* sp. Chem. Pharm. Bull. 40 : 766-767.
- Kashman, Y., Hirsch, S., Koehn, F. and Cross, S. 1987. Reiswigins A and B, novel antiviral diterpenes from a deepwater sponge. Tetrahedron Lett. 28 : 5461-5464.
- Kazlauskas, R., Murphy, P.T., Wells, R.T. and Blount, J.F. 1980. New diterpene isocyanides from a sponge. Tetrahedron Lett. 21 : 315-318.
- Kobayashi, M., Ishizaki, T., Miura, N. and Mitsuhashi, H. 1987. Marine terpenes and terpenoids III : Isolation and structures of two cembrane diols from the soft coral *Sinularia mayi*. Chem. Pharm. Bull. 35 : 2314-2318.
- Konig, G.M., Wright, A.D., Sticher, O. and Fronczek, F.R. 1992. Two new sesquiterpene isothiocyanates from the marine sponge *Acanthella klethra*. J. Nat. Prod. 55 : 633-638.

- Look, S.A., Fenical, W., Matsumoto, G.K. and Clardy, J. 1986. The pseudopterosins : A new class of antiinflammatory and analgesic diterpene pentosides from the marine sea whip *Pseudopterogorgia elisabethae* (Octocorallia). J. Org. Chem. 51 : 5140-5145.
- Luckner, M. 1990. Secondary metabolism in microorganism, plants and animals. 3rd ed. Berlin : Springer-Verlag.
- Mayol, L., Piccialli, V. and Sica, D. 1987. Nitrogenous sesquiterpenes from the marine sponge *Acanthella acuta* : Three new isocyanide-isothiocyanate pairs. Tetrahedron 43 : 5381-5388.
- Minale, L., Riccio, R. and Sodano, G. 1974. Acanthellin-1, a unique isonitrile sesquiterpene from the sponge *Acanthella acuta*. Tetrahedron 30 : 1341-1343.
- Molinski, T.F., Faulkner, D.J., van Duyne, G.D. and Clardy, J. 1987. Three new diterpene isonitrile from a Palauan sponge of the genus *Halichondria*. J. Org. Chem. 52 : 3334-3337.
- Morales, J.J. and Rodriguez, A.D. 1992. (-)-Agelasidine C and (-)-Agelasidine D, two new hypotaurocyamine diterpenoids from the Caribbean sea sponge *Agelas clathrodes*. J. Nat. Prod. 55 : 389-394.
- Nakamura, H., Wu, H., Kobayashi, J., Kobayashi, M., Ohizumi, Y. and Hirata, Y. 1985. Agelasidines, novel hypotaurocyamine derivatives from the Okinawan sea sponge *Agelas nakamurai* Hoshino. J. Org. Chem. 50 : 2494-2497.
- Okino, T., Yoshimura, E., Hirota, H. and Fusetani, N. 1995. Antifouling kalihinenes from the marine sponge *Acanthella cavernosa*. Tetrahedron Lett. 36 : 8637-8640.
- Omar, S., Albert, C., Fanni, T. and Crews, P. 1988. Polyfunctional diterpene isonitriles from marine sponge *Acanthella cavernosa*. J. Org. Chem. 53 : 5971-5972.
- Patra, A., Chang, C.W.J. and Scheuer, P.J. 1984. An unprecedented triisocyano diterpenoid antibiotic from a sponge. J. Am. Chem. Soc. 106 : 7981-7983.
- Pham, A.T. Carney, J.R., Yoshida, W.Y. and Scheuer, P.J. 1992. Haumanamide, a nitrogenous spongiann derivative from a *Spongia* sp. Tetrahedron Lett. 33 : 1147-1148.
- Rinehart, K.L., Sakai, R., Holt, T.G., Fregeau, N.L., Perun, T.J., Seigler, D.S., Wilson, G.R. and Shield, L.S. 1990. Biologically active natural products. Pure & Appl. Chem. 62 : 1277-1280.

- Rodriguez, J., Castro, R. and Riguera, R. 1991. Holothurinosides : New antitumor non-sulphated triterpenoid glycosides from the sea cucumber *Holothuria forskolii*. Tetrahedron 47 : 4753-4762.
- Rodriguez, J., Nieto, R.M., Hunter, L.M., Diaz, M.C. and Crews, P. 1994. Variation among known kalihinol and new kalihinene diterpenes from the sponge *Acanthella cavernosa*. Tetrahedron 50 : 11079-11090.
- Ruppert, E.E. and Barnes, R.D. 1994. Invertebrate zoology (6th ed.). Tokyo : Saunder College.
- Rutzler, K. 1986. Phylum Porifera. In W. Sterrer (ed.), Marine fauna and flora of Bermuda : A systematic guide to the identification of marine organisms, pp. 111-127. New York : John Wiley & Sons.
- Shoji, N., Umeyama, A., Motoki, S. and Arihara, S. 1992. Potent inhibitors of histamine release, two novel triterpenoids from the Okinawan marine sponge *Penares incrustans*. J. Nat. Prod. 55 : 1682-1685.
- Shoji, N., Umeyama, A., Teranaka, M. and Arihara, S. 1996. Four novel diterpenoids, including nakamurol A with a unique thelepodane skeleton, from the marine sponge *Agelas nakamurai*. J. Nat Prod. 59 : 448-450.
- Sugano, M., Sato, A., Iijima, Y., Yoshima, T., Furuya, K., Kuvano, H., Hata,T. and Hanzawa,H. 1991. Phomactin A : A novel PAF antagonist from a marine fungus *Phoma* sp. J. Am. Chem. Soc. 113 : 5463-5464.
- Talpir, R., Rudi, A., Kashman, Y., Loya, Y. and Hizi A. 1994. The new sesquiterpene hydroquinones from marine origin. Tetrahedron 50 : 4179-4184.
- Tanaka, J., Higa, T., Suwanborirux, K., Bernadinelli, G. and Jefford, C.W. 1993. Bioactive norsesterterpene 1,2-dioxanes from a Thai sponge, *Mycale* sp. J. Org. Chem. 58 : 2999-3002.
- Tinto, W.F., John, L., Reynolds, W.F. and McLean, S. 1991. Novel pseudopteranoids of *Pseudopterogorgia acerosa*. Tetrahedron Lett. 47 : 8679-8686.
- Trimurtula, G. and Faulkner, D.J. 1994. Six new diterpene isonitriles from the sponge *Acanthella cavernosa*. J. Nat. Prod. 57 : 501-506.
- Vennesland, B., Conn, E.E., Knowles, C.J., Westley, J. and Wissing, F. 1981. Cyanide in biology. London : Academic Press.

- Wratten, S.J., Faulkner, D.J., Hirotsu, K. and Clardy, J. 1978. Diterpenoid isocyanides from the marine sponge *Hymeniacidon amphilecta*. Tetrahedron Lett., 4345-4348.
- Wu, H., Nakamura, H., Kobayashi, J., Ohizumi, Y. and Hirata, Y. 1984. Agelasine-E and -F, novel monocyclic diterpenoids with a 9-methyladeninium unit possessing inhibitory effects on Na,K-ATPase isolated from the Okinawan sea sponge *Agelas nakamurai* Hoshino. Tetrahedron Lett. 25 : 3719-3722.



## VITA

Miss Khanitha Deepralard was born on May 12, 1973 in Saraburi, Thailand. She received her Bachelor of Science (Botany) from Kasetsart University, Bangkok, Thailand in 1994. She was granted a scholarship for graduate study in Thailand from National Science and Technology Development Agency (June 1996 - October 1997 ).

### Publication

Juntawong, N. and Deepralard, K. 1996. Effects of prehydration, sucrose concentration and developmental stage of anther on pollen germination of chili cv. Kheenuu (*Capsicum frutescens* L. cv. Kheenuu). Kasetsart J. (Nat. Sci.) 30 : 373-377.