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DITERIMA

27 DEC 2011

AKADEMI SAINS MALAYSIA

TAN KENG HONG

Malaysian • Born: 25th June, 1944 • Married since 1969

Higher Education

Ph.D. in Applied Entomology and D.I.C 1970-1973 Imperial College of Science & Technology, University of London

- Completed in 2 years 9 months
- 4 papers published in scientific journals
- Work published in New Scientist – “A dastardly way to limit moth population.” (1972) vol. 55: p.71, and “Permanent copulation is an end to the species.” (1975) vol. 65: p.766; and televised on BBC television programme “Down to Earth”
- Invited by Professor T. Mann, A.R.C. Unit of Reproductive Physiology and Biochemistry, *University of Cambridge* for discussion on insect reproduction in January, 1973.

M. Sc. in Zoology, University of Malaya, Kuala Lumpur 1968-1970

B. Sc. (Hons.) in Zoology University of Malaya, Kuala Lumpur 1964-1968

Academic Appointments

- Tutor - Department of Zoology, University of Malaya, May, 1968-May, 1970.
- Internship lecturer - School of Biological Sciences, Universiti Sains Malaysia, Penang, June, 1970 - November, 1970.
- Lecturer - School of Biological Sciences, Universiti Sains Malaysia, September 1973-March 1978.
- Associate Professor - School of Biological Sciences, Universiti Sains Malaysia, Penang - March, 1978 - Dec. 1989.
- Professor - School of Biological Sciences, Universiti Sains Malaysia, Jan. 1990 - Sept. 1996.
- Senior Professor - School of Biological Sciences, Universiti Sains Malaysia, Oct, 1996 - June, 1999 (Statutory retirement).
- Contract Professor - School of Biological Sciences, Universiti Sains Malaysia, June, 1999 – Dec. 2000.

Professional appointments

1. Technical Panel member on fruit flies

International Plant Protection Convention (IPPC), FAO	2004-2008
& Interim Commission on Phytosanitary Measures (ICPM)	2009-2013

2. **Bactrocera Science Advisory Panel member**
California Department of Food and Agriculture, USA 2007-2016
3. **Consultant**, International Atomic Energy Agency (IAEA) 2003-2004
2009-2013
4. **International Advisor**,
Hawaii Area-Wide Fruit Fly Integrated Pest Management,
United States Department of Agriculture (USDA) 2000-2004
5. **Advisor** – Research Institute for Subtropics, Okinawa, Japan 2002-2003
6. Proceedings on Recent Trends on Sterile Insect Technique and Area-Wide Integrated Pest Management.
7. **Chairman** of Entomology Programme 1982-87; 1989-97
Co-ordinator - Applied Entomology programme 1976-1979
School of Biological Sciences, Universiti Sains Malaysia

Visiting Professorships/Appointments

1. USDA, Hilo, Hawaii 2003 & 2004
2. University of Southampton, England 1997
3. USDA, Hilo, Hawaii 1997
4. University of Sydney, Australia 1994
5. University of Hawaii, Manoa, Honolulu, Hawaii 1980
6. Imperial College of Science and Technology, London 1989

Awards and Grants

Awards

1. The Royal Society Developing Country Fellowship (Nuffield Foundation)
2. USM Excellent service award - two years running
3. Academic Links and Interchange Scheme (British Council)
4. Inter-Universities Council Senior Award (Nuffield Foundation)
5. Academic Staff Training Scheme (University of Penang)

Research Grants

1. IAEA Coordinated Research Activities – D41023, Resolution of cryptic species complexes of Tephritid pests to overcome constraints to SIT application and international trade 2010 - 2015. Chief Investigator K.H. Tan (Research contract No. 16160).
2. IAEA Coordinated Research Activities - D41021 Development of Mass Rearing for New World (*Anastrepha*) and Asian (*Bactrocera*) Fruit Fly Pests in Support of Sterile Insect Technique (SIT) 2004 - 2010. L.T. Tan (Chief Investigator, University College London) & K.H. Tan (Research contract No 13962)
3. Joint FAO/IAEA grant - Project leader 1997 – 2001 (Research contract No. 10570).
4. Seventh Malaysian Plan - Project leader 1996-2000.
5. Sixth Malaysian Plan, Research and Development - under USM's Agricultural Sector - Co-ordinator for Integrated management of agricultural pests and

- diseases programme (Six projects), 1991-1995
6. Fifth Malaysian Plan, Research and Development - under USM's Agricultural Sector (Co-ordinator for Biological control programme - Six research projects), 1988 – 1990
 7. Universiti Sains Malaysia Short-term Research Grant 1984-1985 (Co-ordinator); 1987 - 1989 (Co-ordinator)
 8. Malaysian Agricultural Research and Development Institute (MARDI) grant-in aid 1974-1981; 1985-1986. (Co-ordinator)
 9. Sabah Department of Agriculture Grant 1975-1985. (Co-ordinator)

Research Expertise

1. [Scholarly articles for Bactrocera sex pheromone methyleugenol](#) by Google search
[... after methyl eugenol consumption in the Bactrocera ...](#) - Tan - Cited by 65
[... methyl eugenol and attraction of females to male sex ...](#) - Hee - Cited by 38
[... defence and mating strategies of the fruit fly, Bactrocera ...](#) - Keng Hong - Cited by 46
2. [Scholarly articles for Orchid pollination synomone](#) by Google search ‘
[Floral synomone of a wild orchid, Bulbophyllum cheiri, ...](#) - Tan - Cited by 28
[... a wild orchid, Bulbophyllum patens, and Bactrocera ...](#) - Tan - Cited by 34
[Zingerone in the floral synomone of Bulbophyllum ...](#) - Tan - Cited by 8
3. Chief Investigator, Co-ordinated Research Project, FAO/IAEA Joint Division, IAEA 2010 - 2015
4. Bactrocera Science Advisory Panel member, California Department of Food and Agriculture, California, USA Since 2007
5. Panel member, Fruit Fly Technical Panel, International Plant Protection Convention, Food and Agriculture Organisation, UN. 2004-2008; 2009-2013, and current term to be extended to July, 2015
6. Consultant, Insect Pest Control Division, IAEA, Vienna, Austria 2003-2004; 2009 – 2015
7. Foreign Advisory Board, **APACE Conference 2007 Tsukuba Committee** 2007
<http://www.wdc-jp.com/apace2007/committee.html>
8. Advisor to Research Institute for Subtropics, Okinawa, Japan 2002-2003
9. Advisor, United States Department Agriculture - Fruit Flies Area-Wide Management Project, Hawaii. 2000-2004
10. External Assessor for promotion of Academic Staff for
 University of Hawaii at Manoa, Honolulu 2000
 Universiti Putra Malaysia, Kuala Lumpur 1994-2000

Independent Recognition of Research Contributions

1. A tribute “the guru of the chemical ecology of Bactrocera species” given by Dr. T. E. Shelly, USDA, Honolulu, in “Improving Sterile Male Performance in Fruit Fly SIT Programmes” Third Research Coordination Meeting of the FAO/IAEA Coordinated Research Project, held in Valencia, Spain, 1-5 April, 2008. **Appendix I**
2. A tribute to work on fruit flies as pollinators of orchids by Peter O’Byrne (Orchid taxonomist) posted in April 2005 **Appendix II**
<http://www.orchidspng.com/discus/messages/6/8508.html?1114674110>
3. A tribute to work on methyl eugenol as pheromonal precursor by David C.

Robacker and Cirilo Rios (2005) in their paper “GRAPEFRUIT OIL ENHANCES ATTRACTION OF MEXICAN FRUIT FLIES TO A SYNTHETIC FOOD-ODOR LURE,” Journal of Chemical Ecology, 31: 1039-1049. Third paragraph of **Appendix III**

4. A research paper (Journal paper No. 27 listed below) on orchid pollination by fruit fly used as reading and teaching materials in a course entitled: “**Plant Sexual Reproduction: Evolutionary and Molecular Aspects**” offered by Harvard University. 2001-2004
<http://www.courses.fas.harvard.edu/~bio95hfn/syllabus/readings.htm>
<http://www.courses.fas.harvard.edu/%7Ebio95hfn/syllabus/readings.htm>
5. Todd Shelly (2001) Citation given during the Second Asia-Pacific Conference on Chemical Ecology. **Appendix IV**
6. Marquis Who's Who - biographical profile in the 5th Edition of Who's Who in America Science and Engineering (1998)
7. New Scientist (1975) vol. 65: p.766 – “Permanent copulation is an end to the species.”
8. B.B.C. television broadcast in 1972 in the programme 'Down to Earth'.
9. New Scientist (1972) vol. 55: p.71 – “A dastardly way to limit moth population.”

Editorial Services

- as Editorial Board Member
Applied Entomology and Zoology 2003-2004
- as editor for:
 - i) Joint Proceedings of the FAO/IAEA International Conference and the 5th International Symposium on Fruit Flies of Economic Importance.
 - ii) Journal of Plant Protection in the Tropics (1987-94).
 - iii) Proceedings of the Symposium on Pest of stored Products, SEAMEO-BIOTROP (1988).
- as a reviewer for:

1. Journal of Chemical Ecology	2001- present
2. Medical Science Monitor	2002- present
(International Medical Journal for Experimental & Clinical Research)	
3. Journal of Applied Entomology	2007- present
4. Entomologia experimentia et applicata	2007- present
5. Journal of Crop Protection	2009
6. Bulletin of Entomological Research	2008
7. Ecological Entomology	2003
8. Florida Entomologists	2002 – 2004
9. Annals of Entomological Society of America	2000
10. Pertanika - currently J. Tropical Agric. Sc.	1990 – 2000
11. Journal of Malaysian Applied Biology	1986 – 2000
12. Journal of Plant Protection in the Tropics	1984 - 1995
13. MARDI Research Bulletin	1985-90
14. Malayan Nature Journal	1976-88
15. First Regional Symposium in Biological Control, K.L.	1984

- | | |
|---|------|
| 16. 1st International Conference in Plant Protection | 1983 |
| 17. Pesticide Application Technology Seminar, Malaysia | 1982 |
| 18. Symposium on Pest Ecology and Pest Management, Bogor, Indonesia | 1979 |
| 19. BIOTROP-BULOG Symposium on Pests of Stored Products,
Bogor, Indonesia. | 1978 |
- Member of the National committee for the Dictionary of Biological terms,
Dewan Bahasa dan Perpustakaan, Ministry of Education, Malaysia 1988 - 98
 - Member of the National Language Terminology Committee - Biology among
local Universities 1983-89

Professional Activities

- Chairperson for session on Biochemicals, First Meeting of the FAO/IAEA Co-ordinated Research Project: Enhanced SIT application for Cryptic complexes of tephritid pest species to facilitate International Trade, Vienna.
- Plenary 1 Speaker - "Insect-Plant Chemical Ecology", Fifth Asia-Pacific Conference on Chemical Ecology – Exploring diversity in life's workings: A celebration of Chemical Ecology, October 26-30, 2009, Honolulu, Hawaii.
- One of five 'Experts' invited to draft the proposal for the FAO/IAEA Co-ordinated Research Project: Enhanced SIT application for Cryptic complexes of tephritid pest species to facilitate International Trade, Vienna 8-10 July, 2009.
- One of four Consultants to draft the proposal for the FAO/IAEA Co-ordinated Research Project: Improving sterile male performance in fruit fly SIT programmes. Vienna, Austria 20-24 October, 2003.
- Co-Chairperson, Session 1: Country Report, and Session 4: Discussion on Visiting Research Fellowship Program, Workshop on Fruit Fly Control Cooperation in the Asia-Pacific Region. Okinawa, Japan. March 18-23, 2002.
- Chairperson, Session 3: Fruit Fly Control. Expert Group Meeting on the Formulation of a National Programme for Fruit Fly Management, 7-8, February, 2002, Bukit Kiara, Kuala Lumpur.
- Co-Chairman, Local Organising Committee for the Second Asia-Pacific Conference on Chemical Ecology Nov.1999 - August, 2001.
- Scientific committee member - First Asia-Pacific Conference on Chemical Ecology - "Chemical Ecology for Asian Agriculture and Forestry" Nov. 1999, Shanghai, China.
- Chairman, Local Organising Committee, FAO/IAEA International Conference on Area-Wide control of Insect Pests integrating the sterile insect and related nuclear and other techniques 1998, Penang, Malaysia.

- Secretary, Organising Committee for the 5th International Symposium on Fruit Flies of Economic Importance (1994-98).
- Chairman of Insect Pest Ecology Workshop in Bogor, Indonesia, 1979.
- Conference Chairman for Insect Pests in BIOTROP-BULOG Symposium on pests of Stored Products, Bogor, Indonesia, 1978.

Professional Membership

- Past President - Pacific Association of Chemical Ecologists 2006 – 2007.
- President, Asia-Pacific Association of Chemical Ecologists 2003 – 2005.
- Vice President, Asia-Pacific Association of Chemical Ecologists 2001 – 2003.
- Councilor, Asia-Pacific Association of Chemical Ecologists 1997 – 2001.
- Chairman, Malaysian Fruit Fly Research Group 1989-1999.
- Technical Panel Member, International Commission on Phytosanitary Measures on Pest Free Areas and Systems Approaches for Fruit Flies, International Plant Protection Convention, Food and Agriculture Organisation, UN 2004-2015.
- Member of
 1. Technical Subcommittee, Malaysian Cocoa Board, Sabah, Malaysia, 1998 – 2002.
 2. International Steering Committee for Global Fruit Fly Group 1992 - 98.
 3. Rice Advisory Committee of the Scientific Council, Malaysian.
 4. Agricultural Research and Development Institute (MARDI), 1978-82.

Other Activities

Chairman, Board of Directors	Tan Hak Heng Holding Sdn, Bhd. Tan Hak Heng Sdn. Bhd. H & L Sdn. Bhd	since 2001
Director	Hong Meng Sdn. Bhd.	since 1978

Other Interests

Swimming and Tennis

Represented University in:

Squash: i) Penang League	1977-79
ii) Inter-Universities	1981-84
Tennis - Inter-Universities	1984-86

Represented the School in the following sports:
Badminton, squash, swimming, table-tennis and tennis.

List of scientific publications (in peer-reviewed journals) [Number of citations in blue](#)

1. Tan, K.H. and Nishida, R. (2012) Methyl eugenol – its occurrence, distribution, and role in nature, especially in relation to insect behavior and pollination. Journal of Insect Science, [in press].
2. Wee, S.L. and Tan, K.H. (2012) Examining the role of pre- and post-zygotic reproductive isolation between two fruit fly sibling species of the *Bactrocera dorsalis* complex. Animal Behaviour, (revised manuscript submitted).
3. Tan, L.T. and Tan, K.H. (2012) Automated tephritid fruit fly semiochemical mass feeding structure: design, construction and testing. Journal of Applied Entomology, [in press] Article first published online : 5 DEC 2011, DOI: 10.1111/j.1439-0418.2011.01680.x. [Cited by 1](#)
4. Tan, L.T. and Tan, K.H. (2012) Alternative air vehicles for sterile insect technique aerial release. Journal of Applied Entomology, [in press] Article first published online : 8 JUL 2011, DOI: 10.1111/j.1439-0418.2011.01649.x.
5. Ong, P.T. and Tan, K.H. (2012) Three species of *Bulbophyllum* Section *Racemosae* pollinated by *Drosophila* flies. Malesian Orchid Journal, 9: 45-50.
6. Tan, K.H., Tokushima, I., Ono, H. and Nishida, R. (2011) Comparison of phenylpropanoid volatiles in male rectal pheromone gland after methyl eugenol consumption, and molecular phylogenetic relationship of four global pest fruit fly species - *Bactrocera invadens*, *B. dorsalis*, *B. correcta* and *B. zonata*. Chemoecology, 21: 25-33.
7. Ong, P.T., Hee, A.K.H., Wee, S.L. and Tan, K.H. (2011) *Bulbophyllum* (Orchidaceae) flowers attractive to *Bactrocera* fruit flies (Diptera: Tephritidae). Malesian Orchid Journal, 8: 93-102.
8. Ong, P.T. and Tan, K.H. (2011) Fly pollination in four Malaysian species of *Bulbophyllum* (Section *Sestochilus*) – *B. lasianthum*, *B. lobbii*, *B. subumbellatum* and *B. virescens*. Malesian Orchid Journal, 8: 103-110.
9. Tokushima, I., Orankanok, W., Tan, K.H., Ono, H. and Nishida, R. (2010) Accumulation of phenylpropanoid and sesquiterpenoid volatiles in male rectal pheromonal glands of the guava fruit fly, *Bactrocera correcta*. Journal of Chemical Ecology, 36: 1327–1334. [Cited by 3](#)
10. Tan, K.H. 2009. Fruit fly pests as pollinators of wild orchids. Orchid Digest, 73(3): 180-187. [Cited by 2](#)

11. Tan, K.H. and Nishida, R. (2007) Zingerone in the floral synomone of *Bulbophyllum baileyi* (Orchidaceae) attracts *Bactrocera* fruit flies during pollination. Biochemical Systematics & Ecology, 31: 334-341. [Cited by 8](#)
12. Wee, S.L., Tan, K.H. and Nishida, R. (2007) Pharmacophagy of methyl eugenol by males enhances sexual selection of *Bactrocera carambolae* (Diptera: Tephritidae). Journal of Chemical Ecology, 33: 1272-1282. [Cited by 10](#)
13. Wee, S.L. and Tan, K.H. (2007) Temporal Accumulation of phenylpropanoids in male fruit flies, *Bactrocera dorsalis* and *B. carambolae* (Diptera: Tephritidae) following methyl eugenol consumption. Chemoecology, 17: 81-85. [Cited by 8](#)
14. Tan, K.H., Tan, L.T. and Nishida, R. (2006) Floral phenylpropanoid cocktail and architecture of *Bulbophyllum vinaceum* orchid in attracting fruit flies for pollination. Journal of Chemical Ecology, 32: 2429-2441. [Cited by 13](#)
15. Hee, A.K.H. and Tan, K.H. (2006) Methyl eugenol-derived sex pheromonal components transport in the male fruit fly, *Bactrocera dorsalis*. Comparative Biochemistry and Physiology Part C, 143: 422-428. [Cited by 14](#)
16. Hee, A.K.H. and Tan, K.H. (2005) Transportation of methyl eugenol-derived sex pheromonal components in male fruit fly, *Bactrocera dorsalis*. Bulletin of Entomological Research, 95: 615–620. [Cited by 7](#)
17. Wee, S.L. and Tan, K.H. (2005) Male endogenous pheromonal component of *Bactrocera carambolae* (Diptera:Tephritidae) deterred gecko predation. Chemoecology, 15: 199-203. [Cited by 5](#)
18. Khoo, C.C.H. and Tan, K.H. (2005) Rectal gland of *Bactrocera papayae*: ultrastructure, anatomy and sequestration of auto fluorescent compounds upon methyl eugenol consumption by the male fly. Microscopy Research and Technique, 67: 219-226. [Cited by 12](#)
19. Wee, S.L. and Tan, K.H. (2005) Female sexual response to male rectal volatile constituents in the fruit fly, *Bactrocera carambolae* (Diptera: Tephritidae). Applied Entomology and Zoology, 40(2): 365-372. [Cited by 10](#)
20. Wee, S.L. and Tan, K.H. (2005) Evidence of natural hybridization between two sympatric sibling species of *Bactrocera dorsalis* complex based on pheromone analysis. Journal of Chemical Ecology, 31(4): 845-858. [Cited by 9](#)
21. Tan, K.H. and Nishida, R. (2005) Synomone or Kairomone? - *Bulbophyllum apertum* (Orchidaceae) flower releases raspberry ketone to attract *Bactrocera* fruit flies. Journal of Chemical Ecology, 31(3): 509-519. [Cited by 2](#)
22. Hee, A.K.W. and Tan, K.H. (2004) Male sex pheromonal components derived from methyl eugenol in the haemolymph of fruit fly *Bactrocera papayae*. Journal of Chemical Ecology, 30: 2127-2138. [Cited by 12](#)

23. Nishida, R., Tan, K.H., Wee, S.L., Hee, A.K.W. and Toong, Y.C. (2004) Phenylpropanoids in the fragrance of the fruit fly orchid, *Bulbophyllum cheiri*, and their relationship to the pollinator, *Bactrocera papayae*. *Biochemical Systematics & Ecology*, 32: 245-252. [Cited by 14](#)
24. Nishida, R. and Tan, K.H. (2003) Floral fragrances of tropical Asian orchids that aid pollination by and to boost pheromonal functions of lured pest fruit flies. *Koryo, Terupen oyobi Seiyu Kagaku ni kansuru Toronkai Koen Yoshishu* (in Japanese), 47: 115-117.
25. Wee, S.L., Hee, A.K.W. and Tan, K.H. (2002) Comparative sensitivity to and consumption of methyl eugenol in three *Bactrocera dorsalis* complex sibling species. *Chemoecology*, 12: 29-33. [Cited by 16](#)
26. Tan, K.H., Nishida R. and Toong, Y.C. (2002) *Bulbophyllum cheiri*'s floral synomone lures fruit flies to perform pollination. *Journal of Chemical Ecology*, 28:1161-1172. [Cited by 28](#)
27. Wee, S.L. and Tan, K.H. (2001) Allomonal and hepatotoxic effects following methyl eugenol consumption in *Bactrocera papayae* male against *Gekko monarchus*. *Journal of Chemical Ecology*, 27: 953-964. [Cited by 14](#)
28. Khoo, C.C.H. and Tan, K.H. (2000) Attraction of female *Bactrocera papayae* to sex pheromone components with two different release devices. *Journal of Chemical Ecology*, 26: 2487-2496. [Cited by 14](#)
29. Tan, K.H. (2000) Fruit Flies (*Bactrocera* spp.) as pests and pollinators. *Sabah Society Journal*, 17: 37-56.
30. Khoo C.C.H. and Tan, K.H. (2000) Attraction of both sexes of melon fruit fly, *Bactrocera cucurbitae*, to conspecific males - a comparison after pharmacophagy of cue-lure and a new attractant - zingerone. *Entomologia Experimentalis et Applicata*, 97: 312-320. [Cited by 8](#)
31. Tan, K.H. (2000) Sex pheromonal components in the defense of the melon fly, *Bactrocera cucurbitae*, against Asian House gecko, *Hemidactylus frenatus*. *Journal of Chemical Ecology*, 26: 697-704. [Cited by 13](#)
32. Tan, K.H. and Nishida, R. (2000) Mutual reproductive benefits between a wild orchid, *Bulbophyllum patens*, and *Bactrocera* fruit flies via a floral synomone. *Journal of Chemical Ecology*, 26: 533-546. [Cited by 34](#)
33. Wee, S.L. and Tan, K.H. (2000) Sexual maturity and intraspecific mating success of two sibling species of the *Bactrocera dorsalis* complex. *Entomologia Experimentalis et Applicata*, 94: 133-139. [Cited by 17](#)
34. Tan, K.H. and Nishida, R. (1998) Ecological significance of a male attractant in the defence and mating strategies of the fruit fly pest, *Bactrocera papayae*. *Entomologia Experimentalis et Applicata*, 89: 155-158. [Cited by 46](#)

35. Hee, A.K.W. and Tan, K.H. (1998) Attraction of female and male *Bactrocera papayae* to conspecific males fed with methyl eugenol and attraction of females to male sex pheromone components. Journal of Chemical Ecology, 24(4): 753-764. [Cited by 38](#)
36. Tan, K.H. and Nishida, R. (1995) Incorporation of raspberry ketone in the male rectal glands of the Queensland fruit fly, *Bactrocera tryoni* Froggatt (Diptera: Tephritidae). Applied Entomology and Zoology, 30: 494-497. [Cited by 10](#)
37. Lim, E.H. and Tan, K.H. (1995) Changes in esterase isozymes involved in insecticidal resistance of green leafhopper *Nephotettix virescens* (Distant) population in Malaysia. Journal of Plant Protection in the Tropics, 10:11-17.
38. Tan, K.H. and Serit, M. (1994) Adult population dynamics of *Bactrocera dorsalis* (Diptera: Tephritidae) in relation to host phenology and weather in two villages of Penang Island, Malaysia. Environmental Entomology, 23(2): 267-275. [Cited by 17](#)
39. Nishida, R. and Tan, K.H. (1993) Phenylpropanoids sequestered in the rectal glands by males of *Bactrocera dorsalis* complex. Nippon Nogeikagaku Kaishi (Suppl.) (in Japanese), 69: 210.
40. Nishida, R., Iwahashi, I. and Tan, K.H. (1993) Accumulation of *Dendrobium* (Orchidaceae) flower fragrance in the rectal glands by males of the melon fly, *Dacus cucurbitae* (Tephritidae). Journal of Chemical Ecology, 19: 713-722. [Cited by 34](#)
41. Setakana, P. and Tan, K.H. (1991) Insecticide resistance and multiresistance in two strains of *Culex quinquefasciatus* Say larvae in Penang, Malaysia. Mosquito-Bourne Diseases Bulletin, 8(2): 40-44.
42. Lim, E.H. and Tan, K.H. (1991) Effect of soil incorporation and water broadcast of carbofuran against various development stages and three local strains of green leafhopper, *Nephotettix virescens*. Journal of Plant Protection in the Tropics, 8(1): 69-75.
43. Serit, M. and Tan, K.H. (1991) Immature life-table of a natural population of *Dacus dorsalis* in a village ecosystem. Tropical Pest Management, 36: 305-309. [Cited by 7](#)
44. Lim, E.H. and Tan, K.H. (1990) Insecticide susceptibilities of various green leafhopper, *Nephotettix virescens* populations in Peninsular Malaysia. Journal of Plant Protection in the Tropics, 7: 155-164.
45. Nishida, R., Tan, K.H., Takahashi, S. and Fukami, H. (1990) Volatile components of male rectal glands of the melon fly, *Dacus cucurbitae* Coquillett (Diptera: Tephritidae). Applied Entomology and Zoology, 25: 105-112. [Cited by 14](#)

46. Tan, K.H. and Serit, M. (1988) Movements and population density comparisons of native male adult *Dacus dorsalis* and *Dacus umbrosus* (Diptera: Tephritidae) between three ecosystems in Tanjong Bungah, Penang. Journal of Plant Protection in the Tropics, 5: 17-21.
47. Nishida, R., Tan, K.H., Serit, M., Lajis, N.H., Sukari, A.M., Takahashi, S., and Fukami, H. (1988) Accumulation of phenylpropanoids in the rectal glands of male Oriental fruit fly, *Dacus dorsalis*. Experientia, 44: 534-536. [Cited by 76](#)
48. Nishida, R., Tan, K.H. and Fukami, H. (1988) Cis-3.4-dimethoxycinnamyl alcohol from the rectal glands of male Oriental fruit fly, *Dacus dorsalis*. Chemical Express, 3(4): 207-210.
49. Lim, J.L. and Tan, K.H. (1986) The effect of *Pseudomonas aeruginosa* on the larvae of *Spodoptera mauritia* (Boisd). Journal of Plant Protection in the Tropics, 3: 75-80.
50. Tan K.H. and Jaal, Z. (1986) Comparison of the male adult population densities of the oriental and artocarpus fruit flies *Dacus* spp. (Diptera: Tephritidae) in two nearby villages in Penang, Malaysia. Researches in Population Ecology, 28: 85-89.
51. Tan, K.H. (1985) Estimation of native populations of male *Dacus* spp. by Jollys stochastic method using a new designed attractant trap in a Penang village, Malaysia. Journal of Plant Protection in the Tropics, 2:87-95. [Cited by 13](#)
52. Chey, V.K. and Tan, K.H. (1985) *Dacus arecae* (Diptera:Tephritidae) unattracted by cue-lure and methyl eugenol. Malaysian Applied Biology, 14: 55-56.
53. Tan, K.H. (1984) Description of a new attractant trap and the effect of placement height on two *Dacus* species (Diptera: Tephritidae). Journal of Plant Protection in the Tropics, 1:117-120.
54. Tan, K.H. (1983) A new species of Tephritid fly (Diptera) found in Malaysia. Malaysian Applied Biology, 12: 43-44.
55. Tan, K.H., Chua, T.H., Lim, G.S., Ooi, A.C.P., and Sudderuddin, K.I. (1982) The ecology of pests: insects. Protection Ecology, 4: 179-199.
56. Tan, K.H. and Lee, S.L. (1982) Species diversity and abundance of *Dacus* (Diptera : Tephritidae) in five ecosystems of Penang, West Malaysia. Bulletin of Entomological Research, 72: 709-716. [Cited by 18](#)
57. Tan, K.H. (1982) Effect of permethrin and cypermethrin against *Dacus dorsalis* in relation to temperature. Malaysian Applied Biology, 11: 41-45.

58. Tan, K.H. (1982) Irritancy response to temperature after sub-lethal action of pyrethroids against cabbage white caterpillars *Pieris brassicae* (L.). Entomologia experimentalis et applicata, 32: 151-154. [Cited by 5](#)
59. Tan, K.H. (1981) Antifeeding effect of cypermethrin and permethrin at sub-lethal levels against *Pieris brassicae* larvae. Pesticide Science, 12: 619-626. [Cited by 34](#)
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Books and Miscellaneous Publications.

1. Draft **International Standards For Phytosanitary Measures** on “Systems Approaches for Pest Risk Management of Fruit Flies” developed and awaiting adoption by the **Standards Committee of the International Plant Protection Convention [IPPC]**.
2. Draft appendix to **International Standards For Phytosanitary Measures** No. 26 on “Fruit Fly Trapping” developed and awaiting adoption by the **Standards Committee of IPPC**.
3. Draft **International Standards For Phytosanitary Measures** on “Phytosanitary Procedures for Fruit Fly (Tephritidae) Management”

- developed and awaiting adoption by the **Standards Committee of IPPC.**
4. **International Standards For Phytosanitary Measures No. 30**
Establishment of areas of low pest prevalence for fruit flies (Tephritidae) developed and drafted by The Technical Panel on pest free areas and systems approaches for fruit flies (TPFF) [1 of 14 members].
 5. **International Standards For Phytosanitary Measures No. 26**
Establishment of pest free areas for fruit flies (Tephritidae) developed and drafted by The Technical Panel on pest free areas and systems approaches for fruit flies (TPFF) [1 of 14 members]; and adopted by the Standards Committee of IPPC.
 6. **Area-Wide Control of Fruit Flies and Other Insect Pests.** USM Press. 2000, xxxiv + 782 pp (Editor - K. H. Tan). (Marketed world-wide by Commonwealth Agricultural Bureau International - 2,000 copies printed). Book Review by Juan Rull, Department of Entomology, University of Massachusetts, USA, in *Annals of the Entomological Society of America: Vol. 94, No. 6, pp. 960-961.* "I believe that Area-Wide Control of Fruit Flies and Other Insects Pests, is not only an excellent reference book for SIT practitioners and fruit fly control specialists but also a rich source of information for the general entomologist involved in teaching or research on agricultural pests. A complete perspective on the broad topic of pest management cannot be achieved without thorough knowledge of area-wide pest management. This book is an excellent updated review of the topic that can serve as the basis to build such knowledge."
 7. Research methods in toxicology and insecticide resistance monitoring of rice planthoppers. Heong K.L., Tan, K.H., Garcia, C.P.F., Fabellar, L.T. and Lu Z. (2011) Los Banos, Philippines: International Rice Research Institute. 101 pp.
 8. Kamus Biologi: Entomologi (Dictionary of Biology – Entomology) by Tan, K.H. and Jambari Ali. Dewan Bahasa dan Pustaka, Ministry of Education, Malaysia, 1996, 150 pp.
 9. Translation into Bahasa Malaysia a book by Shepard, B.M., A.T. Barrion, and J.A. Litsinger entitled "Helpful insects, Spiders, and pathogens." 1989, 136 pp. International Rice Research Institute, Phillipines. (5,000 copies printed).
 10. Kamus Biologi - Histologi dan Sitologi (Dictionary of Biology - Histology and Cytology). One of nine authors. Dewan Bahasa dan Pustaka, Ministry of Education, Malaysia. 1990, 280 pp.
 11. Kamus Biologi - Fisiologi (Dictionary of Biology - Physiology). One of four authors. Dewan Bahasa dan Pustaka, Ministry of Education, Malaysia. 1990, 107 pp.
 12. Istilah Biologi Bahasa Inggeris-Bahasa Malaysia. Biological Terms English-Malay). One of eight authors in the National committee, Dewan Bahasa dan Pustaka, Ministry of Education, Malaysia. 1988, 414 pp.
 13. Istilah Sains Biologi. (Biological terms English - Malay) 1987, 160 pp. School of Biological Sciences' publication as the Chairman (K.H. Tan), Bahasa Malaysia Terminology Committee.
 14. Tan, K.H. (1987) Masalah kerintangan pestisid di Malaysia. (Pesticide resistance problems in Malaysia) Perantara Jil. 5 Bil. 4: 6-8.

GUEST LECTURES BY INVITATION OF:-

1. Professor J. Obrycki, Chairman, Department of Entomology,
University of Kentucky, Kentucky, U.S.A. Sept 2005
 - a) **Chemical Ecology of Fruit flies** and
 - b) **Pollination of Bulbophyllum orchids by Bactrocera fruit flies.**
2. Dr. E. B. Jang, Research Leader, USDA, ARS, PBARC Hilo, Hawaii
July 2004 **Enhanced sex appeal and defence in Bactrocera dorsalis after consuming methyl eugenol.**
3. Dr. J. Hendrichs, Head, Insect control Section, FAO/IAEA Joint Division,
Vienna, Austria, in Vienna International Center April 2003
'Viagra' of Bactrocera dorsalis: Fruit fly-plant relationship - mutual benefits derived from methyl eugenol.
4. Dr. Tadashi Teruya, Director, Research Institute for Subtropics, in Okinawa
International Center, Okinawa, Japan March 2002
5. **Chemical Ecology of Fruit Flies - Interbreeding, Anti-predation mechanism and fruit fly interrelationships with plants.**
6. Dr. W. H. Loke, CABI Oct 2001
 - a) **Semiochemicals & Behaviours** and
 - b) **Chemical Ecology' of Fruit Flies**
7. Dr. J. Knapp, Department of Biology, Southampton University May 1998
Chemical Ecology of Fruit flies.
8. Dr. E. B. Jang, USDA, Hilo, USA, Feb 1997
Fruit fly a friend?
9. Dr. R.A.I. Drew, Department of Primary Industries, Australia May 1992
Ecology of fruit flies of economic importance in Malaysia.
10. Dr. K.Y. Lum, President, Malaysian Plant Protection Society, KL. Oct 1991
Chemical Ecology of fruit flies.
11. Professor P.E. Howse, Director, Department of Chemical Entomology,
Southampton University, England Sept 1988
The ecology of fruit flies in Malaysia.
12. Mr A.Yunus, Director General, Dept. of Agriculture, Malaysia Oct 1982
Pheromones and Para-pheromones.
13. Secretary, Hawaiian Entomological Society, Honolulu, Hawaii Aug 1980
Sub-lethal action of pyrethroids.
14. Dr. G.N.J. le Patourel, Department of Zoology and Applied Entomology,
Imperial College, London April 1980
Irritancy and antifeeding responses to sub-lethal levels of pyrethroids.
15. Dr.R.M. Perrin, I.C.I. Bracknell, England Feb 1980
Antifeeding effects at sub-lethal levels of pyrethroids against Pieris brassicae.
16. Dr. M. Soerjani, Center for Environmental Studies, BIOTROP, Sept 1979
Indonesia **Hormones for the control of pests.**
17. Dr.C.E.Dyte, Pest Infestation Laboratory, Slough, England. Feb 1973
Effect of hemel on the neuroendocrine function of Ephestia.
18. Professor T. Mann, University of Cambridge, England. Jan 1973
Neuroendocrine Dysfunction resulting in permanent copulation.

Current Research

Pollination of wild orchid flowers, *Bulbophyllum* spp. by *Bactrocera* fruit flies (in collaboration with R. Nishida, & H. Ono, Kyoto University, Japan; Ong Poh Teck, FRIM; and N. Howcroft, PNG)

Joint FAO/IAEA Research Coordination Projects **CRP D4.10.23** on “Resolution of Cryptic Species Complexes of Tephritid Pests to Overcome Constraints to SIT application and International Trade” with A.K.Hee, S. L. Wee, and R. Nishida:

- I Sex pheromones of pestiferous of *Bactrocera dorsalis* sibling species – *B. dorsalis* s.s., *B. correcta*, *B. papayae*, *B. philippinensis* and *B. invadens* (Diptera: Tephritidae).
- II) Mating compatibility of economically important cryptic species in the *Bactrocera dorsalis* complex.

Courses Taught

Formal University Courses:-

Instrumentation and Biological Techniques	1976-79; 1981-86; 1988-99
Structure and function of insects	1976-79
Invertebrate Zoology	1981-82
Systematics, structure and function of insect	1981-84; 1988-89
Insect Biochemistry and Physiology	1990-2000
Agriculture, forest and stored products entomology	1976-79; 1981-86; 1988-89
Insect Pest Management	1981-86; 1988-2000
Zoo-physiology	1988
Cell Biology	1989-90
Field course/trips organized for:	
Agriculture, forest and store products entomology	1976-79; 1981-85; 1988-89
Insect Pest Management	1981-83; 1988-99
Project for Third Year Students' Field Course	1980-84; 1988

Supervision of Research Projects

Master of Science	5
Master of Science (University of Southampton)	1
Doctor of Philosophy	6
Post-Doctoral Fellow (W.T.Vorley, 1983-85; M. Serit 1988-89)	2

ASSOCIATION/SOCIETY MEMBERSHIP

Asia-Pacific Association of Chemical Ecologists (Honorary)
 Malaysian Plant Protection Association (life member)
 Malaysian Society of Applied Biology (life member)
 Penang Symphony Society (life member).

Appendix I

Introductory remarks –

Delivered by Dr. Todd E. Shelly (Todd.E.Shelly@aphis.usda.gov), US Dept Agriculture, at the FAO/IAEA Third CRP conference on Improving Sterile Male Performance in Fruit Fly SIT Programmes. 1-5 April 2008, Valencia, Spain.

“Thanks, Don, for that introduction.

Thanks, too, for previously mentioning my contributions to understanding the pheromone biology of *Bactrocera dorsalis*, the Oriental fruit fly. However, I need to mention that my work only follows in the footsteps of the major advances made by Prof. Nishida of Japan and Prof Tan of Malaysia. Prof. Tan, who happily has joined us here in Valencia, is, in my mind, the guru of the chemical ecology of *Bactrocera* species.

To give you an idea of how much more Prof. Tan knows about *Bactrocera* flies than I, allow me to relay the following information.

I have seen Prof. Tan three times in the last two years, September 2006 in Brazil, September 2007 in Japan, and here in Spain. Now, it may seem hard to believe, but I made a mental note of all the questions exchanged between us during these three meetings.

As it so happens, I asked Prof. Tan 897 questions related exclusively to the biology and ecology of *Bactrocera* fruit flies. He is such an incredible wealth of information that I felt I had to extract – like gold from the earth – as much knowledge as I could.

Conversely, and indicative of my recent arrival to the research area, Prof. Tan asked me a whopping total of 9 questions. There were so few that I even remember each one.”

One time, he asked, “What did you say your name was?”

Another time, he asked, “Where’s that \$5 you owe me?”

Another time, he asked, “How do you say ‘beer’ in Portuguese?”

Another time, he asked, “When will you stop nagging me with all your questions?”

And 5 times, he asked, “Hey, do you know where there’s a bathroom?”

So, before I go on, I just want to acknowledge Prof Tan for his important work and for his deep influence on my own development as a fruit fly biologist.....

Appendix II

Orchid Spring Discussion Board Website – An email paying tribute to work done on Fruit fly-Orchid association by an orchid taxonomist:

[< http://www.orchidspng.com/discus/messages/6/8508.html?1114674110 >](http://www.orchidspng.com/discus/messages/6/8508.html?1114674110)

Nev,

are yuo familiar with the fascinating work of Tan Keng-Hong and Ritsuo Nishida on *Bactrocera* fruit flies and (a) *Bulbophyllum patens* and (b) *B. cheiri* ?

They determined that *B. patens* attracts male fruit flies of several (at least 4) *Bactrocera* species using zingerone as the attractant. Male flies of one of these species use the zingerone as a pheromone to attract females. A different species converts the zingerone into zingerol, which is released via the rectal gland; also to attract females. Fruitflies are classified as attracted to either methyl eugenol or raspberry ketone; *B. patens* is the first known plant species capable of attracting flies from both groups ... and it uses a single attractant to do this. *J. Chem. Ecol.* 26 (2): 533-546 (2000)

B. cheiri uses methyl eugenol as an attractant, and attracts males of at least 4 species of *Bactrocera* fruitfly, but only those of the ME-seeking group. Raspberry-ketone-seeking flies ignore this species. *J. Chem. Ecol.* 28 (6): 1161-1172 (2002)

All the fly species mentioned in these articles are common pests with a wide distribution.

Cheers,

Peter

with peel-damaged grapefruits learned the odor of grapefruits and subsequently increased their attraction to low concentrations of grapefruit peel extracts (Robacker and Fraser, 2005). In the current work, the results suggest that flies that learned grapefruit odor did not recognize grapefruit oil as the same odor. The apparent lack of recognition could be due to quantitative differences (low vs. high concentrations) or qualitative differences. The grapefruit oil used in this work probably was qualitatively different from the odor of Rio Red grapefruit to which flies were exposed. The oil was purchased from Now Foods and most likely was not derived from Rio Red grapefruit. However, exposure to grapefruits increased attraction to oranges in a previous work (Robacker and Fraser, 2003) even though the odor of oranges is noticeably different from that of grapefruit.

The nature of the attraction response to grapefruit oil is not known at this time but it appears to be different from the nature of responses of Mexican fruit flies to fruit odors tested in earlier work. To summarize the evidence for this assertion: (1) attraction to grapefruit oil was weak compared with attraction to fermented chapote odor; (2) grapefruit oil enhanced attraction to a blend of attractive nitrogenous chemicals but a combination of chapote-odor chemicals inhibited attraction to the same blend of nitrogenous chemicals; and (3) attraction to grapefruit oil did not increase after exposure to grapefruit whereas attraction to a low concentration of grapefruit-peel extract did increase after exposure to grapefruit.

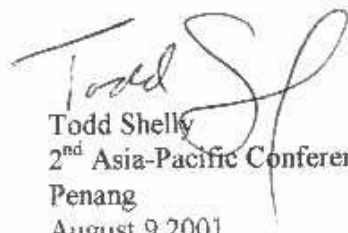
Although the nature of the attraction is not known, it is interesting that the origin of the attraction is a plant essential oil. The “parapheromone” methyl eugenol, a powerful attractant to males of numerous *Bactrocera* species, was discovered as a minor constituent of citronella oil, another plant essential oil (Howlett, 1915). As recently as 15 years ago, parapheromones such as methyl eugenol were considered by some as “one of the great mysteries of tephritid biology” (Cunningham, 1989). The physiological basis of the attraction to methyl eugenol was not unraveled until the last decade led in part by the efforts of Shelly, Tan, and Nishida (Shelly and Dewire, 1994; Tan and Nishida, 1996). What seemed mysterious attraction just 15 years ago now has been explained as attraction of males to a chemical that serves both as a precursor to a pheromone that attracts females and as an allomone that deters predation (Tan and Nishida, 1998). While the nature of the attraction of Mexican fruit flies to grapefruit oil is very different from the attraction of *Bactrocera* to parapheromones, the possibility exists that the ultimate source of the attractiveness may be a minor component of the oil that may be highly attractive at greater concentrations.

Also relevant to our work is the finding that female papaya fruit flies respond to papaya odor differently depending upon the odor concentration and their mating status (Landolt et al., 1992). Papaya odor, mixed with a constant amount

Citation given by Dr. Todd Shelly (APHIS, USDA, Honolulu, Hawaii, USA; and Editor, Annals of Entomological Society America) during the Second Asia-Pacific Conference on Chemical Ecology

For Drs. Tan and Nishida:

....From my vantage, their research represents the epitome of chemical ecology, forging a rigorous union between pheromonal chemistry, on the one hand, and mating behavior and predator deterrence, on the other. Although perhaps far from their thoughts, I have the subversive hope that the *Bactrocera*-orchid interaction will, before too long, replace the widely cited, but poorly substantiated, euglossine bee-orchid story as the chief textbook example regarding the integral function of floral fragrances in pheromone synthesis among male insects.

A handwritten signature in dark ink, appearing to read 'Todd Shelly', with a large, stylized flourish extending from the end of the name.

Todd Shelly

2nd Asia-Pacific Conference on the Chemical Ecology of Insects

Penang

August 9 2001