

CURRICULUM VITAE

PERSONAL INFORMATION

NAME: MAXWELL KELVIN BILLAH
NATIONALITY: GHANAIAN



CURRENT CONTACT ADDRESS:

Department of Animal Biology & Conservation Science,
University of Ghana
Box LG. 67, Legon-Accra, GHANA

PROFESSIONAL INTERESTS & RESEARCH AREAS:

1. Taxonomy, systematics and biology of parasitic Hymenoptera and their use in biological control,
2. Use of parasitoids in environmentally safe management of crop pests,
3. Morphometric comparison of biological control agents to establish their taxonomic status and application of such knowledge in conservation.
4. Fruit fly identification, taxonomy, monitoring and management
5. Monitoring of Invasive species, and
6. Study of developmental stages of pests by micro-morphological changes

EDUCATION

University of Ghana, Legon-Ghana	PhD Zoology (Biosystematics)	2004
University of Ghana, Legon, Ghana	M.Phil Zoology (Taxonomy & Systematics)	1998
University of Ghana, Legon, Ghana	B.Sc (Hons) Zoology with Botany	1992

PhD THESIS TITLE

“Biosystematic Studies of *Psytalia* species (Hymenoptera: Braconidae): Parasitoids Attacking Fruit-Infesting Flies (Diptera: Tephritidae) in Africa”.

M Phil THESIS TITLE

“Revision of the Afrotropical members of the genus *Kiefferulus* Goetghebuer, 1922 (Diptera: Chironomidae), and a description of one new species”.

PROFESSIONAL MEMBERSHIPS AND INTEREST GROUPS

- African Association of Insect Scientists – AAIS
- EAFRINET – East African Regional LOOP of BioNET International.

Also Listed in;

- The World Taxonomist Directory (<http://www.eti.uva.nl/Database/WTD.html>),
- The Morphometric Interest Group (<http://life.bio.sunysb.edu/morph/>)
- The Tephritid Workers Database (www.tephritid.org)
- Tephritid Workers of Europe, Africa & the Mediterranean region (TEAM)
- The Integrated Pest Management Resource Centre (<http://www.ipmrc.com/lib/contact/shtml>)
- The International Society for Pest Information (<http://www.pestinfo.org/scientists.htm>)

WORK & TEACHING EXPERIENCE

1. Sept 1992-Sept 1993 - Teaching/Research Assistant

- General Entomology - Department of Zoology, University of Ghana.

2. Nov/Dec. 1993-August 1999 - Science Examiner

- The West African Examinations Council (WAEC).
 - Basic Education Science
 - O & A Levels.

3. Feb.-Dec., 1995 - Practical Attachment

- Joint FAO/National Water Hyacinth Committee of the National Biocontrol Committee of Ghana.
 - Rearing, release and monitoring of Biological control agents of three aquatic weeds: Water hyacinth, *Eichhornia crassipes*, Water fern, *Salvinia molesta* and Water lettuce, *Pistia stratiotes*

4. Dec 1995- Sept 1996 - Science Teacher

- St. Peter's Mission Secondary School, Madina Accra.

5. Sept 1997-August 1999 -Teaching/Research Assistant

- General Entomology - Department of Zoology, University of Ghana.

6. March-Dec 2003: - Member: Emergency Fruit Fly Survey Team, Kenya

- Conducted emergency trapping surveys across Kenya to determine the extent of spread of the invasive fruit fly, *Bactrocera invadens* after its initial detection.

7. June 2004-September 2008: Consultant (Taxonomy & Systematics)

- African Fruit Fly Programme (AFFP)/Biosystematics Unit, ICIPE, Nairobi

Duties:

- Provision of taxonomic services and support to the African Fruit Fly Programme
- Curation of specimens (preparation, identification and preservation)
- Update and maintenance of Fruit Fly reference database
- Conduct practical taxonomic training exercises for and on behalf of AFFP
- Conduct non-target studies of AFFP operations

8. Aug/Sept, 2005. Taught Basic Taxonomy and Systematics course at the Master and PhD students of the ARPPIS programme in Nairobi, Kenya.

Additional Responsibilities:

- **In-Charge** (2003-2006) - Biosystematics Unit, *icipe* (Until substantive Head was appointed in Dec. 2006).
- **Keeper** – ICIPE/AFFP Insect Collection Facility (2003- 2006).
- **Database Manager** - African Fruit Fly Programme (AFFP) relational database.

LIST OF PUBLICATIONS

Peer-Reviewed Articles

1. Abdullahi, G., Obeng-Ofori, D., Afreh-Nuamah, K. and **Billah, M. K.** (2011). Perception of Ghanaian mango farmers on the pest status and current management practices for the

- control of the African invader fly, *Bactrocera invadens* (Diptera: Tephritidae). *New York Science Journal*, **4(2)**: 74-80.
2. Abdullahi, G., Obeng-Ofori, D, Afreh-Nuamah, K.. and **Billah, M. K.** (2011). Laboratory evaluation of the susceptibility of adult African Invader Fly, *Bactrocera invadens* (Diptera: Tephritidae) To NuLure-based bait of some selected insecticides commonly used by mango farmers in Ghana. *Global Journal of Science Frontier Research*, **(11)1**: 1-8.
 3. Ekesi, S., **Billah, M.K.**, Nderitu, P.W., Lux, S.A. and Rwomushana, I. (2009). Evidence of competitive displacement of the mango fruit fly, *Ceratitis cosyra* by the invasive fruit fly, *Bactrocera invadens* (Diptera: Tephritidae) on mango and mechanisms contributing to the displacement. *Journal of Economic Entomology*. **102(3)**: 981-991.
 4. **Billah, M. K.**, Kimani-Njogu, S. W., Overholt, W. A., Wharton, R. A., Wilson, D. D. & Cobblah, M. A. (2008) Cross mating studies of *Psytalia* species (Hymenoptera: Braconidae): Potential implications for biological control of tephritid pests. *BioControl*, **53 (5)**: 709-724.
 5. **Billah, M. K.**, Kimani-Njogu, S. W., Wharton, R. A., Woolley, J. B. & D. Masiga (2008). Comparison of five allopatric fruit fly parasitoid populations (*Psytalia* species) (Hymenoptera: Braconidae) from coffee fields using morphometric and molecular methods. *Bulletin of Entomological Research*, **98 (1)**: 63-75.
 6. **Billah, M. K.**, Wilson, D. D. Cobblah, M. A., Lux S. A. and Tumfo, J. A. (2006). Detection and preliminary survey of the invasive fruit fly, *Bactrocera invadens* (Diptera: Tephritidae) in Ghana. *Journal of the Ghana Science Association*, **2 (8)**: 138-144.
 7. Barr, N.B., Robert S. Copeland, R.S., De Meyer, M., Masiga, D., Kibogo, H.G., **Billah, M.K.**, Osir, E., Wharton, R.A. & McPherson, BA. (2006) Molecular diagnostics of economically-important fruit fly species (Diptera: Tephritidae) in Africa using PCR and RFLP analyses. *Bulletin of Entomological Research*, **96**: 505–521.
 8. **Billah, M. K.**, Kimani-Njogu, S., Overholt, W. A., Wharton, R. A., Wilson, D. D. & Cobblah, M. A. (2005). The effect of host larvae on three *Psytalia* species (Hymenoptera: Braconidae): parasitoids of fruit-infesting flies (Diptera: Tephritidae). *International Journal of Tropical Insect Science*, **25(4)**: 168-175.
 9. Lux, S.A., Copeland, R.S. White, I.M., Manrakhan, A. & **Billah, M.K.** (2003). A new Invasive fruit fly species from the *Bactrocera dorsalis* (Hendel) group detected in East Africa. *Insect Science and Its Application*, **23(4)**: 355–361.

Books

1. Ekesi, S. & **Billah, M. K.** (Eds.) (2006) (**2ND Edn., 2009**). *A Field Guide to the Management of Economically Important Tephritid Fruit Flies in Africa*. ICIPE Science Press, Nairobi, Kenya. 106 pp.

Book Chapters

1. **Billah, M. K.** (2006) (**2ND Edn., 2009**). *Handling, packaging and shipment of specimens*, pp G1-13. *In*: Ekesi, S & Billah, M. K. (Eds.). *A Field Guide to the Management of Economically Important Tephritid Fruit Flies in Africa*. ICIPE Science Press, Nairobi, Kenya. 106 pp.
2. **Billah, M. K.**, Mansell, M. W., De Meyer, M. & Goergen, G. (2006) (**2ND Edn., 2009**). *Fruit fly taxonomy and identification*, pp H1-19. *In*: Ekesi, S & Billah, M. K. (Eds.). *A Field Guide to the Management of Economically Important Tephritid Fruit Flies in Africa*. ICIPE Science Press, Nairobi, Kenya. 106 pp.

3. Lux, S.A., Ekesi, S., Dimbi, S., Mohamed, S. & **Billah, M. K.** (2003). *Mango-infesting fruit flies in Africa: Perspectives and limitations of biological approaches to their management*, pp. 277-293. In: Neuenschwander, P., Borgemeister, C. & Langewald, J. (Eds.). *Biological Control in IPM Systems in Africa* CAB International, Wallingford, UK.

Technical Reports

1. **Billah, M.K.**, Owusu, E.O. Biney, K.. & Agboka, M.. (2010). Field evaluation of *SUCCESS® APPAT* (GF-120) against fruit flies in three citrus orchards in the Central region of Ghana. Final Report. Joint Field Trial exercise between GTZ-MOAP and the Marketing & Quality Awareness Project (EMQAP) of MOFA. February, 2010.
2. **Billah, M.K.**, Owusu, E.O. Biney, P.M., Biney, K., Agboka, M. & Edmund, J.C. (2009). Field Evaluation and validation of the novel fruit fly food bait, *SUCCESS® APPAT* (GF-120) in mango orchards across different agro-ecological zones and registration of the product for incorporation into IPM packages in Ghana. Joint Field Trial exercise between the Crops Services and the Plant Protection and Regulatory Services Directorates (CSD & PPRSD) of the Ministry of Food and Agriculture, the Environmental Protection Agency (EPA), the Market-Oriented Agriculture Programme of the German Technical Corporation (MOAP-GTZ) and the Marketing & Quality Awareness Project (EMQAP) of MOFA. April-November, 2009.
3. Stonehouse, J.M., Ritchie, M., Paqui, T., Ndiaye, M., Tchiboza, S., Dabire, R., Jobe, L. & **Billah, M. K.** (2008). Scoping Study on the damages inflicted by Fruit Flies on West Africa's fruit production and action plan for a coordinated Regional Response. Final Report. ItalTrend in association with IAK, SOPEX, ADAS, HYDRO R&D and MEP. (**EC Consultancy Service on behalf of ECOWAS**).
4. Lux S.A, Ekesi, S., **Billah, M. K.** & Manrakhan, A. (2004). Development of food baits (The African Fruit Fly Programme). *icipe Annual Scientific Report 2002-2003*: 79-80.

Proceedings

1. Ekesi, S., Hanna, R., **Billah, M. K.**, Goergen, G., Lux, S. A, Mohamed, S. A., Gnanvossou, D. & Vayssieres, J-F. (2008). ***The African Fruit Fly Initiative (AFFI): Developing and Introducing Affordable Technologies and Skills for Management of Fruit Flies in Africa***. *Proceedings of the 7th International Symposium on Fruit Flies of Economic Importance, September 10-15, Salvador, Bahia, Brazil*.
2. Ekesi, S., Lux, S.A. **Billah, M. K.** (2007). Field comparison of food-based synthetic attractants and traps for African tephritid fruit flies, pp. 205-222. In: ***Development of Improved Attractants and Their Integration into Fruit Fly SIT Management Programmes***. *Proceedings of a final Research Coordination Meeting by the Joint FAO/IAEA Programme of Nuclear Techniques in Food and Agriculture. Vienna, 5-7 May 2005*.

MAJOR RESEARCH ACHIEVEMENTS

1. Generating field validation data used by the Environmental Protection Agency (EPA) for the importation of the fruit fly food bait, *SUCCESS APPAT* (GF-120) into Ghana (2009-2010)
2. Recording of eight (8) natural enemies (5 larval, 1 egg and 2 pupal) of the invasive fruit fly species, *Bactrocera invadens* in its aboriginal home of Sri Lanka (2007/2008)
3. First detection of **five fruit fly species in Ghana** – *Ceratitis fasciventris* (2002), *Perilampus* sp. (2004), *Bactrocera cucurbitae* (2004), *Bactrocera invadens* (2005) and *Ceratitis rubivora* (2010).

4. First detection of the Solanum fruit fly, *Bactrocera latifrons* in Kenya (2007 – IAEA Project. Research Contract No: 14160/RO of 2006 **(and renewed in 2007)**)
5. First detection of the Invader fly, *Bactrocera invadens* in Africa (2003 in Kenya).
6. First species occurrence record of the fruit fly parasitoid, *Psytalia perproxima* in East Africa since the search begun in 1936 (2004).
7. First complete dissection and glass mounting of ovipositor of female fruit fly parasitoids as compared to pressing and mounting of the whole female abdomen (2004).
8. Description of one new species of freshwater chironomid, *Kiefferulus abagnae* (1996 - named after my late mother).

SHORT COURSES/TRAINING WORKSHOPS:

1. Training of Phytosanitary Inspectors on Marketing Quality Standards and Phytosanitary Control. EussBett Hotel, Sunyani. **July 18- 29, 2011 (As Resource Person).**
2. Fruit fly Awareness creation and management training workshop for Northern region Agric, Plant quarantine staff and farmers. Tamale. **13-14 June, 2011 (As Chief Trainer).**
3. Training of Phytosanitary Inspectors on Marketing Quality Standards and Phytosanitary Control. Travel Express Hotel, Accra. **April 4- 15, 2011 (As Resource Person).**
4. Fruit fly Awareness creation and management training workshop for Agric, Plant quarantine staff and farmers in the Volta region. Catholic Retreat Centre, Ho. **15-18 Feb., 2011 (As Chief Trainer).**
5. Training of Trainers workshop for Plant Protection Officer from the 10 regions of Ghana under the auspices of the National Fruit Fly Management Committee. 21-24 November, 2010. Marina Hotel, Dodowa **(As Chief Trainer)**
6. Fruit fly awareness training workshop and the possibility of the use of Weaver ants against fruit flies. ITFC, Tamale. May 6-8, 2010 **(As Resource Person).**
7. Training of Trainers and Pilot orchards agents workshop. Of the West African Fruit Fly Initiative (WAFFI) – Ghana. **June 24-25, 2009.** Forest Hotel, Dodowa **(As Resource Person)**
8. Orientation Workshop for stakeholders on GF-120 (Fruit fly pesticide) field trial to control mango fruit flies in Ghana. **March 27, 2009.** Marina Hotel, Dodowa **(As Resource Person).**
9. Joint FAO/National Group Training Course on Fruit fly management. Kibaha, Tanzania. **September 2008. (As Resource Person).**
10. Trainers' course and IV International workshop on conservation and utilization of commercial insects. Kenya and Uganda. 14 November-9 December, 2006 **(Resource person).**
11. First mobile fruit fly school activity and awareness creation on economically important fruit flies. Wad Medani, Sudan. April, 2006. **(Resource person).**
12. Trainer of Trainer/Farmer training on Fruit flies of economic importance in mango production in the Coast province. Kilifi, Kenya. February, 2006. **(Resource person).**
13. First Trainer of Trainer (ToT) and Mobile Fruit Fly School Activities on awareness creation and management of *Bactrocera invadens* & other economically important fruit flies. Kibaha Sugar Research Institute, Tanzania. December 2005 **(Resource person).**
14. First International Group Training Course on African Fruit Fly Management from 14 African countries. ICIPE, Nairobi October, 2005 **(Co-organizer & Resource person).**
15. Basic Taxonomy & Systematics course for ARPPIS MSc & PhD Scholars, ICIPE, Nairobi. Aug – Sept, 2005 **(Course coordinator, Resource person & Host Lab)**

16. Fruit fly Identification & Management Training workshop for Quarantine and Entry Port Inspectors in East Africa (Kenya, Uganda & Tanzania) July 2005 (**Resource person & Host Lab**). Fruit fly Management Training workshop for District Agricultural Officers, Eastern Province, Kenya. May 2004 (**Resource person**).
17. Regional Training Workshop on Tree health and fruit fly control in East and Southern Africa. Nairobi, November 2003 (**Resource person**)
18. Invasive Alien Species workshop for East & Southern Africa, Nairobi, October, 2004 (**Resource Person**)
19. **First** and **Second** Group Training workshop FAO/TCP for the East African Region. February 2004 and March 2004 (**Resource person**)
20. International Group Training Workshop on Biological Control of Cereal Stemborers in East and Southern Africa. March 2002 (**Resource person**)
21. Identification of Thrips Associated with Onion Ecosystems in Kenya. (May 2001) (**Resource person**)
22. Group training workshop for Collaborators of the African Fruit Fly Initiative (AFFI) March 2001 (**Resource person**)

SELECTED CONFERENCES:

1. 1st Meeting of the Tephritid Workers of Europe, Africa and the Mediterranean Region (TEAM). **April 7-8, 2008**. Palma de Mallorca, Spain (**Oral Presentation**).
2. Annual conference of the Japanese Agricultural Entomology and Zoological (AEZ) Society. **26-28 March, 2008**. Utsunomiya, Japan (**Oral Presentation**).
3. 7th International Symposium on Fruit Flies of Economic Importance, **September 10-15, 2006**. Salvador, Bahia, Brazil (**Poster Presentation**).
4. 6th International Symposium on Fruit Flies of Economic Importance, **May 6-10, 2002**. Stellenbosch, South Africa (**Poster Presentation – Award Winner**).

INVITED PRESENTATIONS

1. State of the fruit fly trapping and monitoring activities in Ghana. Presented to the Lebanese Trade and Industry Team on behalf of the Plant Quarantine Unit of PPRSD (MoFA). Accra, **November, 2010**.
2. Planning meeting on the state of the fruit fly situation in Ghana and how it can be managed. Ministry of Food and Agriculture (MOFA) Conference Centre, Accra. **Feb. 25, 2010**.
3. Graduate School of Life and Environmental Sciences, Tsukuba University, Japan. **April, 2008**.
4. Tokyo University of Agriculture, Tokyo, Japan, **April, 2008**.
5. Bioresources & Management Lab, Faculty of Agric, Kyushu University, Japan. **March, 2008**.
6. Department of Zoology, Ruhuna University, Matara, Sri Lanka. **Jan, 2008**.
7. Horticultural Research and Development Institute (HORDI), Peradeniya, Sri Lanka. **May, 2007**.

ATTACHMENTS/RESEARCH VISITS

1. Mar-April 2008
 - **Faculty of Agriculture , Kyushu University, Japan**
 - **Plant Protection HQ, Yokohama, Japan**
2. Horticultural Research and Development Institute (HORDI), Peradeniya, Sri Lanka Feb –July, 2007 and Nov 07-Feb 2008– **to explore for natural enemies of B. invadens**.

3. **Department of Entomology, Texas A&M University, USA** Sept – Nov 2002 - experience in **morphometric data analyses** and application to taxonomy.
4. **University of Bergen, Norway** Feb–Dec 1996 Museum of Zoology, Department of Natural History, - experience in taxonomic drawings and phylogenetic data analyses as applied in **taxonomy and systematics**

CURRENT RESEARCH PROJECTS/ACTIVITIES

1. Development of a fruit fly management manual, posters and flyers to be adapted for use by the Ministry of Food and Agriculture (MOFA) in Ghana.
2. Year-Long fruit fly monitoring activities to relate fly populations with the phonological events of two cash crops (Mango and Citrus) in four agro-ecological zones in Ghana. May 2010-May 2012. (**As Principal Scientific Investigator**).
3. **Proposal to set up demonstration farms in selected fruit producing regions to teach farmers on practical workable IPM options for the management of fruit flies.** This will involve the use of affordable, locally-available products to give them a list of available options to choose from for integrated use. Collaborative work with the Export Market Quality Assurance Project (EMQAP) of the Ministry of Food and Agriculture (MOFA). August 2009 - to Date. (**As Principal Scientific Investigator**).

HONOURS & AWARDS

1. **Best Achiever Award in Post-Doctoral Science** – African Regional Postgraduate Programme in Insect Science (ARPPIS) Silver Jubilee Anniversary (1983-2008), Nairobi, Kenya, November, 2008. For the first detection of the Invader fly, *Bactrocera invadens* in Africa (and later in Ghana), and subsequent exploratory missions to the aboriginal home (Sri Lanka) in search of natural enemies for possible use in classical biological control in Africa.

RESEARCH EXPERIENCE/SKILLS

Morphology

- Identification fruit flies and their parasitoids.
- Phylogenetic analyses using morphological data.

Morphometrics

- Use of body parts measurements to separate organisms into natural populations and determined main contributing characters for distinguishing between populations and separation of cryptic species.
- Assignment of populations of unknown identity to species groups by use of multivariate analyses.

Reciprocal Crossing and Mating Behaviour

- Studies on reciprocal crossing and mating behaviour of closely related species as a taxonomic tool to test their biological validity (Biological Species Concept).

AFLP

- Total genome comparison populations for polymorphic bands, and use of genetic distance data to establish relationships between them.
- Combined use of morphology, morphometrics and AFLP as complementary tools in species separation.

Slide Preparations and Specimen Measurements

- Experience in dissection and preparation of high quality glass slides for morphometric comparison.

Rearing Biological Material

- Experience in rearing fruit flies and their parasitoids (on both natural and artificial diets).

Field work

Field collection experience in different countries, under different climatic conditions and terrain (Ghana, Kenya, Togo, Burkina Faso, Cote d'Ivoire, , South Africa, Sudan, Uganda, Tanzania and Sri Lanka.

Other Skills

- Strong interest in Digital imaging and macro photography for field and lab documentations.
- Standard computer software packages – Microsoft Office, Excel, Word, PowerPoint and an eye for internet literature search.
- Maintenance, handling, care and use of microscopes.

OUTREACH/SOCIAL/VOLUNTARY ACTIVITIES

- **Reviewer** - General taxonomy, morphometry and Systematics, Ecology & Biological Control
 - *International Journal of Tropical Insect Science.*
 - *Bulletin of Entomological Research.*
 - *International Journal of Biological and Chemical Sciences.*
 - *Journal of Agricultural Science.*
 - *African Entomology.*
- **March 2009 & January, 2011.** Voluntarily cleaned and serviced a number of microscopes belonging to DABCS for general student use in the labs.
- **Conducted a self-sponsored survey** (with Dr. David Wilson and Ms. Millicent Cobblah, Zoology Dept., Legon) in February 2005 and detected presence of *B. invadens* in 3 regions in Ghana (Eastern, Greater-Accra and Volta). (**Results published** in the Ghana Journal of Science (Billah *et al.*, 2006).
- Public Lecture at the World Environmental Day on “**Insects and the Environment**”, Nairobi, 2004.
- Helped identify fruit fly samples in the collections of the School of Botany and Zoology, University of KwaZulu Natal, Pietermaritzburg, on my sampling visit to South Africa.

1. **Dr. Marc DE MEYER,**
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2. **Dr. Bill OVERHOLT**
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3. **Dr. Susan W. KIMANI-NJOGU**
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