



AWOLOLA TAIWO SAMSON (PhD)

Deputy Director (Research) & HOD, Public Health Division
Coordinator Malaria Research Program

Dr. Sam Awolola is a Deputy Director (Research), Head Malaria Research Group and Head of Department of Public Health at the Nigerian Institute of Medical Research. With over 20 years of postdoctoral research experience in Malaria Prevention and Control, Dr. Awolola worked in a number of International Research Institutions including the South African Institute of Medical Research, The University of the Witwatersrand, Johannesburg and The UK Medical Research Council Laboratory, The Gambia. A recipient of many research grants in malaria vector control from WHO-TDR, the Wellcome Trust and a European Union. Served as a member of the WHO/MIM-TDR Task Force on Malaria Research Capacity Strengthening in Africa and at various time as Consultant to WHO-TDR in Geneva Switzerland. Participated in the Nigerian Malaria Program Review and the NMEP Strategic Plans. Currently a Technical Consultant to the Nigerian National Malaria Elimination Program. Dr. Awolola was born 17th November, 1965 and he is from Osun State in Nigeria. He is married with children.

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UNIVERSITY DEGREES (with dates):

- (i) Doctor of Philosophy (PhD) Parasitology, 1997.
(Awarded by the University of Ibadan, Ibadan)
- (ii) Master of Science (M.Sc) Cellular and Molecular Parasitology, 1992.
(Awarded by the University of Ibadan, Ibadan)
- (iii) Bachelor of Science (B.Sc.) Hons. Zoology, 1990.
(Awarded by the University of Ibadan, Ibadan)

EMPLOYER: Nigerian Institute of Medical Research, Lagos

CURRENT POSITION: Deputy Director (Research), Coordinator Malaria
Research Program & HOD, Public Health Division

WORKING EXPERIENCE

- Deputy Director (Research) and Head of Department of Public Health, Nigerian Institute of Medical Research 2011 to date
- Senior Research Scientist: University of the Witwatersrand, Johannesburg 2010 to date.
- Chief Research Fellow: Nigerian Institute of Medical Research, Lagos, Nigeria, 2008 to date.
- Senior Entomologist: UK Medical Research Council Laboratory, The Gambia 2008-2010.
- Senior Research Fellow: Nigerian Institute of Medical Research, Lagos, Nigeria, 2005-2007.
- Postdoctoral Research Fellow/Lecturer: University of The Witwatersrand Department of Medical Entomology, South African Institute of Medical Research, Johannesburg, South Africa. 2001-2003
- Research Fellow II: Nigerian Institute of Medical Research, Lagos, Nigeria, 1998 – 2001
- Junior Research Fellow: Nigerian Institute of Medical Research, Lagos, Nigeria, 1996 - 1998.

DISSERTATION OF THESIS

- Studies on the dynamics of transmission of human onchocerciasis in selected rainforest and savannah foci in Nigeria” PhD Theses, Department of Veterinary Microbiology and Parasitology, Faculty of Veterinary Medicine, University of Ibadan, Ibadan, (1997), 206pp.
- Natural antibodies to malaria parasites in a community Babalesin in South Western Nigeria” M.Sc. Dissertation: Molecular Parasitology, Department of Zoology, University of Ibadan, Ibadan, (1992), 64pp.
- Toxicity of Abate (Temephos®) and potassium permanganate on the copepods intermediate host of Guinea worm Disease and non-target fish species. B.Sc. Project Report, Department of Zoology, University of Ibadan, Ibadan (1990), 30pp.

AWARDS

FELLOWSHIPS:

- (i) Awarded a WHO travelling Fellowship to attend the 56th Annual Meeting of the American Society of Tropical Medicine and Hygiene, Philadelphia, USA (2007).

- (ii) Awarded “The University of The Witwatersrand Postdoctoral Fellowship (2000). Department of Medical Entomology, South African Institute of Medical Research/ School of Pathology, University of the Witwatersrand Johannesburg, South Africa 2001-2002.
- (iii) Awarded a WHO Training Fellowship (1998): Training program on application of the Polymerase Chain Reaction for monitoring transmission of human onchocerciasis. WHO Molecular Biology Laboratory, Bouake, Cote D’ Ivoire, January–April, 1998.

RESEARCH GRANTS

- (i) PRINCIPAL INVESTIGATOR: WHO-TDR Project, Understanding the impact of insecticide resistance on the efficacy of IRS and LLIN in 3 ecological settings of Mali, Benin and Nigeria (2014-2016).
- (ii) PRINCIPAL INVESTIGATOR: Vestergaard Frandsen, SA. Assessment of Bio-efficacy, longevity and acceptability of long-lasting Insecticidal nets in Nigeria, 2009–2012.
- (iii) PRINCIPAL INVESTIGATOR (Nigeria): European Network for Advance Research on Olfaction of Malaria Transmitting Insect Control (ENAROMaTIC) European Union F6 Grant: 2008-2011
- (iv) PRINCIPAL INVESTIGATOR: MIM-TDR/WHO Malaria Research Capability Strengthening Grant (Project ID. A60039), 2006-2009. Project title: “Field and laboratory study on insecticide resistance in the Malaria vector mosquitoes in Nigeria”
- (v) PRINCIPAL INVESTIGATOR: MIM-TDR/WHO Malaria Research Capability Strengthening Grant (Project ID. A30026), 2003-2005. Project title: “Capacity building in characterization and insecticide resistance study of the malaria vector mosquitoes in Nigeria”
- (vi) PRINCIPAL INVESTIGATOR: Wellcome Trust Grant (UK) Project title: Species characterization and insecticide resistance Studies on The *Anopheles funestus* group in Nigeria 2003 - 2005.
- (vii) CO-INVESTIGATOR: WHO/TDR Research Grant, 1999 Project title “Epidemiological mapping of bancroftian filariasis in Nigeria”

9. COMPLETED RESEARCH

- **Epidemiological mapping of bancroftian filariasis in Nigeria**
This work commenced in 1999. We surveyed bancroftian filariasis in south western Nigeria using an antigen-based rapid diagnostic test (RDT). This works fall within neglected tropical disease research. Using this RDT, microscopy and GPS, we provided detailed information on foci of the disease and its major mosquito vector species in southwestern Nigeria (Publication

19). These unique data sets provided the basis for prioritising control intervention by the State Ministry of Health.

- **Characterization and insecticide resistance Studies of the *Anopheles funestus* group in Nigeria**
This work started in 2003. It was carried out in collaboration with Prof. Maureen Coetzee group at the Vector Control Reference Unit, School of Pathology, University of The Witwatersrand, Johannesburg. It constitutes my major contribution to studies on the *Anopheles funestus* group and the first molecular characterisation of this mosquito group in Nigeria. Using a cocktail PCR assay, we have shown that the *funestus* group in Nigeria consists of at least 3 species (Publication 14) with only *Anopheles funestus* involved in malaria transmission thereby stressing the importance of vector identification in malaria control program.
- **Capacity building in characterization and insecticide resistance study of the malaria vector mosquitoes in Nigeria**
Insecticide resistance is a major challenge facing malaria control in sub-Saharan Africa. Pyrethroid is the only class of insecticide approved for treating nets but resistance is becoming a threat and wide spread in West Africa. At the time of this investigation, there was little information on pyrethroid resistance in Nigeria. This project commenced in 2004 in collaboration with the Vector Control Reference Unit, School of Pathology, University of The Witwatersrand, Johannesburg. It provided: (i) baseline information on the susceptibility status of the principal malaria vector to insecticides used for malaria control (publication 6 & 12) and (ii) established a molecular entomology laboratory and trained a pool of human resources for resistance monitoring.
- **Field and laboratory study on insecticide resistance in the Malaria vector mosquitoes in Nigeria**
Work on this project started in 2006 to investigate underline insecticide resistance mechanisms in *Anopheles gambiae*. Thus far, bioassay and PCR analysis showed the *kdr*-based resistance mechanisms. Synergist and biochemical assay revealed increased level of monooxygenase in resistant mosquito while microarray analysis using the *Anopheles gambiae* detox chip implicated cuticular genes in insecticide metabolism (Publication 1 & 7).
- **European Network for Advance Research on Olfaction of Malaria Transmitting Insect Control (ENAROMaTIC)**
This work started in 2009 and falls within the frontiers of Modern Entomology with the aim of interrupting malaria transmission by disrupting the mosquito host recognition. Using the knowledge of mosquito host location, different *Anopheles* attractants were produced to mimic human odour for mass trapping. Results are currently being interpreted.
- **Assessment of Bio-efficacy, longevity and acceptability of long-lasting Insecticidal nets in Nigeria**
This study evaluated the effectiveness of PermaNet® 3.0 (a prototype long lasting net: treated with deltamethrin and synergised with piperonyl butoxide).

This small village trial showed the efficacy, safety and acceptability of PermaNet® 3.0 under natural field condition.

MAJOR ACHIEVEMENT:

- Established The Molecular Entomology and Vector Control Research Laboratory at the Nigerian Institute of Medical Research, Lagos
- Developed the Malaria Entomology Profile for Nigeria: supported by The Vector Control Unit of the WHO Regional Office for Africa
- Established NIMR Experimental hut field site at Kainji, New Bussa: Field site with experimental hut facilities for studying mosquito behaviour

MEMBERSHIP OF LEARNED SOCIETIES

- Member, Academic Staff Union of Nigerian Research Institute, 1997 to date
- Member, Entomological Society of Nigeria, 1998 to date
- Member, Parasitological Society of Nigeria, 1997 to date
- Member, Zoological Society of Nigeria, 1999 to date
- Member, African Network for Vector Resistance to Insecticide, 2003 to date
- Member, American Association for Advancement of Science 2004 to date

DETAILS OF STUDENTS PROJECT SUPERVISION

(a) UNDERGRADUATE

- **Sulyman R** (2003) Survey of the major malaria vector in Ojo Local Government of Lagos State: B.Sc. Project submitted to the Department of Zoology, Lagos State Univesity, Ojo.
- **Nwokedi R.C** (2006) Morphological and molecular identification of malaria vectors in the University of Lagos and surrounding communities. A Dissertation submitted for the award of B.Sc. degree, Department of Zoology University of Lagos
- **Ogharanduku OIT** (2008) Molecular Identification and distribution of malaria vectors in Abraka, a rainforest zone of the Niger Delta. B.Sc. project, Delta State University, Abraka, Nigeria

(b) POSTGRADUATE

M.SC.

- **Sulyman R.** (2005) Vector abundance, species composition and biting activities of *Anopheles* mosquito in two coastal communities in Badagry, Lagos State: M.Sc. Dissertation, Lagos State Univesity, Ojo.
- **Ajayi M.B.** (2006) Identification of Endophagic mosquitoes among human population in Ajumoni Estate Ijoko, Ogun State South western Nigeria MSc. Dissertation, Ambrose Alli University Ekpoma

- **Obansa J.** (2007) Susceptibility status of the malaria vector *Anopheles gambiae* to pyrethroid insecticide in urban Lagos. MSc. Dissertation, College of Medicine, University of Lagos
- **Betson M** (2008) Investigation on the current susceptibility/resistance status of malaria vectors to insecticides used for malaria vector control in The Gambia. MSc. Project, London School of Hygiene and Tropical Medicine.

PhD

- **Oduola A** (2010) Molecular characterisation, transmission dynamics and insecticide susceptibility status of Malaria Vectors in South Western Nigeria. PhD Thesis, University of Lagos, Lagos.
- **Oyewole I.O** (2010) Characterisation and bionomics of malaria Vector in relation to transmission of parasite in two macro ecological areas of South Western Nigeria. PhD Thesis, Department of Zoology, Lagos State University Ojo, Lagos
- **Djouaka R.** (2011) Study of mechanisms of pyrethroid resistance developed by *Anopheles gambiae* in southern Nigeria and Benin. PhD Thesis, Department of Zoology, University of Ibadan, Ibadan.

SELECTED PUBLICATIONS

Awolola T.S, Adeogun O.A, Olojede B.J, Oduola OA, Oyewole OI, Amajoh NC (2014). Impact of PermaNet 3.0 on entomological indices in an area of pyrethroid resistant *Anopheles gambiae* in south-western Nigeria. *Parasites & Vectors* 2014, 7:236 doi:10.1186/1756-3305-7-236.

Oduola AO, Olojede JB, Oyewole IO, Otubanjo OA, Awolola TS. (2013). Abundance and diversity of *Anopheles* species (Diptera: Culicidae) associated with malaria transmission in human dwellings in rural and urban communities in Oyo State, Southwestern Nigeria. *Parasitological Research*.112:3433-9.

Oduola A.O., Idowu E.T., Oyebola M.K, Adeogun O.A., Olojede B.J., Otubanjo O.A., **Awolola T.S.** (2012). Evidence of carbamate resistance in urban populations of *Anopheles gambiae* s.s. mosquitoes resistant to DDT and deltamethrin insecticides in Lagos, South-Western Nigeria. *Parasites & Vectors* 2012, 5:116 doi:10.1186/1756-3305-5-116

Adeogun, A.O, Olojede, J.B, Oduola, A.O, **Awolola, T.S.** (2012). Village-Scale Evaluation of PermaNet 3.0: an enhanced efficacy combination long-lasting insecticidal net against resistant populations of *Anopheles gambiae* s.s. *Malaria Chemotherapy, Control & Elimination*. Article ID 235543, 9 pages doi:10.4303/mcce/235543

Jawara, M., **Awolola T.S.**, Pinder, M., Jeffries, D., Smallegange, R., Takken, W. and Conway, D. (2011) Field testing of different chemical combinations as odour baits for trapping wild mosquitoes in the Gambia. *PLoS ONE (Open Access)*: 6: **e19676**

Oyewole, I.O., C.A. Ibidapo, O.O. Okwa, A.O. Oduola, G.O. Adeoye, H.I. Okoh and **Awolola, T.S.** (2010) Species composition and role of *Anopheles* mosquitoes in malaria transmission along the Badagry axis of Lagos lagoon, Nigeria. *International Journal of Insect Science* **2**, 51-57.

Oduola A.O., Obansa, J. B. Ashiegbu C.O. Adeogun, A. O, Otubanjo, O.A. and **Awolola, T.S** (2010) High level of DDT resistance in the malaria mosquito: *Anopheles gambiae s.l.* from rural, semi urban and urban communities in Nigeria. *Journal of Rural and Tropical Public Health*, **9**, 114-120.

Awolola TS, Oduola OA, Strode C, Koekemoer LL, Brooke B & Ranson H (2009). Evidence of multiple pyrethroid resistance mechanisms in the malaria vector *Anopheles gambiae sensu stricto* from Nigeria. *Transactions of the Royal Society of Tropical Medicine & Hygiene*, **103**: 1139-1145.

Jawara M, Smallegange R, Jeffreis, D, Nwakanma DC, **Awolola TS**, Knols BGJ, Takken W & Conway DJ (2009). Optimising odour baited trap methods for collecting mosquitoes during the malaria season in The Gambia. *PLoS ONE (Open Access)*: **4**: 12, **e8167**

Betson M, Jawara M & **Awolola TS** (2009). Status of insecticide susceptibility in *Anopheles gambiae s.l.* from malaria surveillance sites in The Gambia. *Malaria Journal*, **8**:187.

Idowu ET, **Awolola TS**, Mafe MA & Otubanjo OA (2008). Identification of three members of the *Simulium damnosum* (Diptera Simuliidae) group in South Western Nigeria. *African Journal of Medical Sciences*, **37**: 71-76.

Awolola TS, Oduola AO, Obansa JB, Chukwurar NJ & Unyimadu JP (2007). *Anopheles gambiae s.s.* breeding in polluted water bodies in urban Lagos, southwestern Nigeria. *Journal of Vector Borne Diseases*, **44**: 241-244.

Awolola TS, Oduola AO, Oyewole IO, Obansa JB, Amajoh CN, Koekemoer LL & Coetzee M (2007). Dynamics of knockdown pyrethroid insecticide Resistance alleles in a field population of *Anopheles gambiae s.s.* in South Western Nigeria. *Journal of Vector Borne Diseases*, **44**: 181-188.

Kengne P, Antonio-Nkondjio C, Awono-Ambene HP, Simard F, **Awolola TS** & Fontenille D (2007). Molecular differentiation of three closely related members of the mosquito species complex, *Anopheles moucheti*, by mitochondrial and ribosomal DNA polymorphism. *Medical and Veterinary Entomology*: **21**: 177-182.

Oyewole IO, **Awolola TS**, Ibidapo CA, Oduola AO, Okwa OO & Obansa JA (2007). Behaviour and population dynamics of the major anopheline vectors in a malaria endemic area in southern Nigeria. *Journal of Vector Borne Diseases*, **44**: 56-64.

Awolola, TS, Idowu, ET, Adeneye, AK, Mafe MA, Oduola AO, Ogunrinade, AF, Appelt B & Coetzee M (2006). Entomological survey and infection rates of *Plasmodium falciparum* and *Wuchereria bancrofti* in mosquito populations in the Kainji Lake Area, Nigeria, *Nigerian Journal of Parasitology*, **27**: 58-61.

Samdi LM, Ayanwu, GI, Molta NB, Oduola AO, Obansa JB, **Awolola TS**, Wabila LM & Oguche S (2006). Determination of malaria vectorial status of *Anopheles* mosquitoes of the Sahel, Northern Nigeria. *Journal of Life and Environmental Sciences*, **8**: 442-448.

Oyewole IO & **Awolola TS** (2006). Impact of urbanization on bionomics and distribution of malaria vectors in Lagos, south western Nigeria, *Journal of Vector Borne Diseases*, **43**: 173-178.

Awolola TS, Oyewole IO, Amajoh CN, Idowu ET, Ajayi MB, Oduola A, Manafa OU, Ibrahim K, Koekemoer LL & Coetzee M (2005). Distribution of the molecular forms of *Anopheles gambiae* and pyrethroid knock down resistance gene in Nigeria, *Acta Tropica*, **95**: 204-209.

Olukosi YA, Iwalokun BA, Magbagbeola OA, Akinwande AI, Adewole TA, Agomo PU & **Awolola TS** (2005). Pattern of rural-urban acquisition of *Pfcr1 T76* allele among Nigerian children with acute uncomplicated *Plasmodium falciparum* malaria. *African Journal of Biotechnology*, **4**: 361-366.

Awolola TS, Oyewole IO, Koekemoer LL & Coetzee M (2005). Identification of three members within the *Anopheles funestus* (Diptera: Culicidae) group and their role in malaria transmission in two ecological zones in Nigeria, *Transactions of the Royal Society of Tropical Medicine & Hygiene*, **99**: 525-531.

Du W, **Awolola TS**, Howell P, Koekemoer LL, Brooke B, Benedict MQ, Coetzee M & Zheng L (2005). Independent mutations in the *Rdl* locus confer dieldrin resistance to *Anopheles gambiae* and *An. arabiensis*. *Insect Molecular Biology*, **14**: 179-183

Oyewole IO, Ibidapo AC, Oduola AO, Obansa JB, & **Awolola TS** (2005). Molecular identification and population dynamics of the major malaria vectors in a rainforest zone of Nigeria. *Biokemistri*, **17**: 171-178.

Oyewole IO, Ibidapo AC, Oduola AO, Obansa JB & **Awolola TS** (2005). Anthropophilic mosquitoes and malaria transmission in a tropical rain forest area of Nigeria. *Acta SATECH*, **2**: 6-10.

Masendu HT, Hunt RH, Govere J, Brooke BD, **Awolola TS** & Coetzee M (2004). The Sympatric occurrence of two molecular forms of the malaria vector *Anopheles gambiae* Giles sensu stricto in Kanyemba, in the Zambezi valley, Zimbabwe. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, **98**: 393 -396.

Awolola TS, Manafa OU, Idowu ET, Adedoyin JA & Adeneye AK (2004). Epidemiological mapping of lymphatic filariasis in southwestern Nigeria. *African Journal of Clinical and Experimental Microbiology*, **5**: 231-234.

Garros C, Koekemoer LL, Kamau L, **Awolola TS**, Van Bortel W, Coetzee M, Cooseman M & Manguin S (2004). RFLP method for the identification of major African and Oriental malaria vectors within the *Funestus* and *Minimus* groups. *American Journal of Tropical Medicine and Hygiene*, **70**: 260-265.

Hargreaves K, Hunt RH, Brooke BD, Mtembu J, Weeto M, **Awolola TS** & Coetzee M (2003). *Anopheles arabiensis* and *Anopheles quadriannulatus* resistance to DDT in South Africa. *Medical and Veterinary Entomology*, **17**: 417-422.

Awolola TS, Ibrahim K, Okorie T, Hunt RH & Coetzee M (2003). Species composition and biting activities of anthropophilic *Anopheles* mosquitoes and their role in malaria transmission in a holoendemic area in south-western Nigeria. *African Entomology*, **11**: 78-82.

Awolola TS, Brooke B, Koekemoer LL & Coetzee M (2003). Absence of the kdr mutation in the molecular M form suggest different pyrethroid resistance mechanisms in the malaria vector mosquito *Anopheles gambiae s.s.* *Tropical Medicine and International Health*, **8**: 420-422.

Manafa OU, **Awolola TS** & Isamah AN (2002). Onchocerciasis in Osse, Nigeria: Effective of motivational strategies in sustaining compliance with community ivermectin therapy. *International Quarterly of Community Health Education*, **21**: 177-189.

Awolola TS, Brooke B, Hunt RH & Coetzee M (2002). Resistance of the malaria vector *Anopheles gambiae s.s.* to pyrethroid insecticides in Nigeria. *Annals of Tropical Medicine and Parasitology*, **96**: 849-852.

Awolola TS, Rotimi O, Coetzee M & Hunt RH (2002). Dynamics of the malaria-vector populations in coastal Lagos, south-western Nigeria. *Annals of Tropical Medicine and Parasitology*, **96**: 75-82.

Manafa OU, **Awolola TS**, Araoyinbo ID & Isamah AN (2002). Health behaviour, perception, treatment pattern and social impact of onchocerciasis infected people in Oji River, *Nigerian Journal of Tropical Biosciences* **2**: 49-54.

Referees

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