Two PhD positions to work on Tungiasis under the Human Health Theme at the International Centre of Insect Physiology and Ecology, Kenya

General Background
*Tunga penetrans* has not received any attention by entomologists during the last 40 years, resulting in a poor understanding of the life cycle. Nothing is known regarding the ecology of off-host stages, and there is a total lack of knowledge of transmission dynamics, including the physical, psychosocial and economic environment, linking the human, the domestic animal and the sylvatic animal cycle.

In addition, little is known about the impact of infection. The inflammation, pain and itching have been reported anecdotally to affect children’s ability to sleep, walk, attend school and pay attention in class, thus reducing their school performance, but this has not been studied systematically. It was recently demonstrated that tungiasis significantly impacts a child’s Quality of Life using a modified Dermatological Quality of Life Index. However, most of the studies on impact so far have had a very limited sample size and have not looked at the impact of this condition in an extensive or comprehensive manner, nor have they looked at the potential impact of this condition and its co-occurring factors on child development and well-being.

We are consequently keen to investigate the ecology and transmission dynamics of tungiasis in Kenya as well as the potential impact of tungiasis on neurocognitive, mental health and scholastic outcomes of children using mixed method approaches developed by members of the scientific project team.

Another important knowledge gap is the absence of information on the socio-cultural determinants or contributors to infestation among children and households. Most studies on potential risk factors have not adequately looked at potential contributions of factors such as parenting behaviour, and caregiver physical and mental health among other risk factors which have been reported to contribute to poor childhood outcomes in other medical conditions.

*Icipe* is offering two PhD positions, one working on entomological research questions and one working on clinical and sociological research questions.

**Project 1: Ecology of Tungia penetrans in Kenya and Uganda**

This project aims to investigate the transmission sites of *Tunga penetrans*, the conditions necessary for off-host development and the efficacy of Insect
Growth Regulators (IGRs) to inhibit development both off and on-host. Molecular tools will be developed to quickly and accurately identify *T. penetrans* from samples using PCR. Soil samples will be collected from schools and homesteads participating in survey in Siaya, Kwale and Bugiri in Uganda, and processed at icipe Mbita, Kenya to detect the location of off-host stages. Measurements of biotic and abiotic factors in the field combined with manipulation of conditions in laboratory experiments will identify optimal development conditions for off-host stages. A range of IGRs will be assessed in the laboratory experiments and on pigs in Uganda. Small scale metagenome analysis will be used to identify and compare the bacterial communities causing superinfections in lesions from pigs and humans.

**Applicant requirements specific for project 1:** The successful applicant will hold an excellent Master’s degree with both coursework and research in the field of entomology and molecular biology.

**Project 2: Understanding determinants of severe morbidity in tungiasis**

This project aims to investigate the risk factors for and the impact severe tungiasis has on children age 8-14 years. School and household surveys will identify risk factors for severe tungiasis. A sub-sample of children identified through the surveys will be selected to participate in the impact studies. These will include clinical pathology, infra-red thermography to assess inflammation and mobility assessments. Moreover, to get children’s own perceptions of the impact of tungiasis on their lives participatory qualitative approaches will be used to collect data on their lived experiences of tungiasis. Some of the potential methods include the dermatological Quality of Life Index, body mapping, photo voice and focus group discussion.

**Applicant requirements specific for project 2:** The successful applicant will hold an excellent Master’s degree with both coursework and research in the field of Educational Psychology, Developmental Psychology, Medical Sociology & Anthropology or related field to the PhD project. Proven interest in the study of developmental delays and impairments among children exposed to various health problems.