Letter to the Editor

Proposal for an Annual "World Medical Entomology Day" to Honour a Discipline Critical to Global Health

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Dear Editor

Vector-borne diseases remain among the most persistent and dynamic threats to global health. According to the World Health Organization (WHO), these diseases account for more than 700,000 deaths annually and impose a disproportionate burden on tropical and subtropical populations, particularly in low- and middle-income countries (1). Mosquitoes, ticks, sand flies, triatomines, black flies and other hematophagous arthropods transmit pathogens responsible for malaria, dengue, lymphatic filariasis, leishmaniasis, Chagas disease, yellow fever, Zika, chikungunya, tick-borne encephalitis and numerous emerging zoonoses. Rapid urbanization, globalization, environmental degradation, climate change and insecticide resistance are reshaping the epidemiology and geographic distribution of these infections, increasing both their incidence and unpredictability (2, 3).

Medical entomology-the scientific discipline devoted to the study of arthropods of medical and veterinary importance-provides the critical evidence base for understanding transmission dynamics, vector ecology, surveillance systems and control interventions. Despite its foundational importance to public health, the field often operates outside broader public awareness. In recognition of its historic contributions and contemporary relevance, we propose the formal establishment of an annual "World Medical Entomology Day" to honor the discipline, elevate its visibility and strengthen global commitment to vector-borne disease prevention in alignment with Sustainable Development Goal 3 (Good Health and Well-being) and the WHO Global Vector Control Response (GVCR) 2017–2030 (4).

Historical foundations of medical entomology

The scientific foundations of medical entomology were established during the late nineteenth century, a transformative period that reshaped infectious disease theory. Although earlier observations suggested associations between insects and disease, experimental confirmation of arthropod transmission marked a paradigm shift from miasmatic theories to vector-borne etiologies.

Sir Patrick Manson is widely regarded as the father of medical entomology. In 1877, he demonstrated that mosquitoes (*Culex quinquefasciatus*, then referred to as *Culex pipiens fatigans*) served as intermediate hosts for filarial parasites causing lymphatic filariasis (5). This discovery provided the first experimental evidence that insects could transmit human pathogens and introduced the concept of biological transmission.

Shortly thereafter, Sir Ronald Ross demonstrated in 1897 that malaria parasites undergo development within *Anopheles* mosquitoes, confirming the mosquito-malaria link and earning

the Nobel Prize in Physiology or Medicine in 1902 (6). Giovanni Battista Grassi and colleagues independently elucidated key aspects of human malaria transmission by *Anopheles* species, contributing to the definitive understanding of the parasite life cycle (7). In parallel, Alphonse Laveran had earlier identified the malaria parasite in human blood, an achievement recognized with the 1907 Nobel Prize.

Carlos Juan Finlay proposed in 1881 that *Aedes aegypti* was the vector of yellow fever, a hypothesis later experimentally confirmed by Walter Reed and the U.S. Yellow Fever Commission in 1900 (8, 9). These findings collectively established the vector paradigm that underpins modern disease control.

Comparable advances occurred in veterinary and zoonotic medicine. Theobald Smith and Frederick Kilbourne demonstrated tick transmission of *Babesia bigemina* (Texas cattle fever) in 1893, providing the first proof of arthropod transmission of any pathogen (10). David Bruce subsequently identified tsetse flies (*Glossina* spp.) as vectors of African trypanosomiasis (nagana and sleeping sickness), reinforcing the broader applicability of vector transmission principles (11).

Together, these discoveries marked what has often been termed the "golden age" of medical and veterinary entomology, fundamentally transforming epidemiology, tropical medicine, and public health.

Public health impact and operational achievements

The translation of entomological knowledge into public health action yielded immediate and dramatic results. William C. Gorgas applied mosquito control strategies during the construction of the Panama Canal, implementing environmental management, larval source reduction and vector suppression measures that virtually eliminated yellow fever and dramatically reduced malaria among workers (12). This achievement demonstrated that vector control, grounded in entomological science, could alter the trajectory of major infrastructure and development projects.

Throughout the twentieth century, vector control programs, including insecticide-based interventions, environmental management and later insecticide-treated nets and indoor residual spraying, contributed substantially to reductions in malaria and other vector-borne diseases. The WHO's Global Malaria Programme and expanded vector surveillance systems have continued to rely fundamentally on entomological expertise (13).

Contemporary challenges and the one health imperative

In the twenty-first century, vector-borne diseases remain dynamic and evolving. Climate variability influences vector breeding cycles and altitudinal range expansion. Urbanization facilitates *Aedes* proliferation in peri-urban environments. Global trade and travel accelerate the spread of invasive vectors such as *Aedes albopictus*. Insecticide resistance in *Anopheles*, *Aedes* and other vectors threatens the sustainability of existing control tools (2, 14).

Medical entomology has correspondingly evolved. The discipline now encompasses molecular vector biology, genomics, insecticide resistance monitoring, pathogen–vector interaction studies, ecological modeling and innovative genetic approaches such as Wolbachia-based strategies and gene-drive technologies (15). These advances operate within a broader One Health framework, recognizing the interconnected health of humans, animals and ecosystems (16).

The WHO Global Vector Control Response 2017–2030 emphasizes integrated vector management, strengthened surveillance, intersectoral collaboration and capacity building, each dependent upon a skilled and adequately supported medical entomology workforce (4). However, many countries face shortages of trained entomologists, limited laboratory infrastructure and declining academic investment in taxonomy and field ecology.

Recognition of underrepresented contributors

It is also essential to acknowledge contributors whose work was historically underrecognized. Dr Clara Southmayd Ludlow advanced mosquito taxonomy and ecology during a period when women faced systemic barriers in science. Dr Muriel Robertson made seminal contributions to understanding the development and transmission of *Trypanosoma brucei gambiense* in tsetse flies. Recent scholarship has further highlighted the contributions of women and scientists from endemic regions whose work shaped modern vector biology (17). A commemorative day would provide an opportunity to promote a more inclusive and representative historical narrative.

Rationale for establishing a World Medical Entomology Day

The establishment of an annual World Medical Entomology Day would serve several interrelated objectives:

1. Recognition and education: To honor historical pioneers and contemporary practitioners while enhancing public understanding of vector-borne diseases.

2. Advocacy and policy engagement: To elevate awareness among policymakers regarding the need for sustained investment in surveillance systems, research funding and workforce development.

3. Global collaboration: To strengthen partnerships among academic institutions, ministries of health, professional societies and international organizations.

4. Capacity building: To promote training programs, particularly in endemic regions where entomological capacity gaps are most acute.

By aligning with SDG 3 targets and the GVCR monitoring framework, such a day would reinforce global commitments to reducing the burden of communicable diseases.

Potential dates for commemoration

Several historically significant dates warrant careful consideration for the proposed commemoration. One appropriate option is 20 August, marking Ronald Ross's 1897 demonstration of malaria parasites' development within mosquitoes, a discovery now observed as World Mosquito Day. Expanding the scope of this established observance to encompass all medically important arthropod vectors would build upon existing international recognition while broadening its disciplinary inclusiveness. Alternatively, 3 December, the birth anniversary of Carlos Juan Finlay (1833), offers a meaningful opportunity to honor a pioneering Latin American scientist whose hypothesis regarding *Aedes aegypti* transmission of yellow fever profoundly shaped modern epidemiology. Commemorating this date would not only recognize Finlay's foundational contribution but also underscore the global and historically diverse character of medical entomology.

The selection of an appropriate date should follow broad consultation among international entomological societies and public health bodies to ensure global consensus and inclusivity. Other potential dates worthy of consideration include the birth anniversaries of Sir Patrick Manson (3 October), Clara Southmayd Ludlow (27 December), or Theobald Smith (31 July), each representing foundational contributions or underrepresented voices in the history of medical entomology.

Implementation strategy

Leadership for this initiative could be coordinated through the World Health Organization, particularly the Department of Control of Neglected Tropical Diseases and the Global Malaria Programme. Key partners may include the American Society of Tropical Medicine and Hygiene, the Royal Entomological Society, the World Federation of Public Health Associations, as well as regional entomological societies across Africa, Asia, Europe, and the Americas, whose collective expertise and global networks would be instrumental in advancing and coordinating this initiative.

A phased implementation strategy could include:

1. Publication of joint editorials endorsing the proposal.
2. Submission of a formal petition to WHO.
3. Organization of inaugural global events, including lectures, webinars, policy dialogues and educational campaigns.
4. Integration into existing vector surveillance and GVCR monitoring initiatives.

Conclusion

Medical entomology has profoundly shaped modern public health, transforming our understanding of infectious disease transmission and enabling life-saving interventions across continents. Yet, the discipline's visibility and institutional support do not consistently reflect its indispensable role in global health security. Establishing a World Medical Entomology Day would symbolically and practically reinforce the importance of sustained research, surveillance, training and cross-sector collaboration. In an era of climate change, emerging pathogens and ecological disruption, strengthening the scientific foundations of vector control is not optional-it is imperative. Formal recognition of this discipline would affirm its central role in protecting human and animal health worldwide.

Conflict of interest statement

The authors declare that there are no conflicts of interest.

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