Rev. salud pública. 18 (2): 164-166, 2016

Editorial

DOI: http://dx.doi.org/10.15446/rsap.v18n2.57077

Medical entomology, a necessity

Arthropods that feed on human blood have waged biological warfare against humanity for millennia. Some of the earliest reports of arthropods of public health importance in Colombia, including mosquitoes (*Culicidae*), rodadores (*Culicoides*), and jejenes (*Simuliidae*), are found in the 1577 epic poem "Elegías de varones ilustres de Indias" by Juan de Castellanos. An excerpt highlights a fierce army of chiggers and fleas (1):

"Mas luego vieras sacudir las plantas
Y dar mil brincos al caballo laso
porque niguas y pulgas fueron tantas
que no se vio reposo mas escaso:
Y ansi cubiertos hasta las gargantas
los echan del lugar mas que de paso
de manera que les hicieron Guerra
en vez de los vecinos de la tierra."

Aedes aegypti, the yellow fever mosquito, is one of the premiere blood-feeding arthropods that has plagued humanity. It has been responsible for millions of human deaths. Its occurrence in Colombia dates from 1880 in Neiva, but it probably was introduced earlier to Cartagena with Spanish ships and then followed the Magdalena River deeper into the country (2).

The vector competency of *Aedes aegypti* for viral-borne diseases includes not only yellow fever, but also chikungunya, dengue, Zika, and others. The recent declaration by the World Health Organization (WHO) of a Public Health Emergency of International Concern over the explosion of Zika virus emphasizes the urgency of the threats from *Aedes aegypti* (3). The emergence of Zika virus and its possible health consequences, such as microcephaly in children, was not predicted by experts (4). The total number of cases in Colombia for January was nearly 21,000, with 0.6 million predicted for the country this year (5). The message is clear—threats to our health and economy from insects are part of the reality of sharing the planet with other living organisms.

Threats from diseases borne by arthropods, such as mosquitoes, continue to appear with alarming frequency. They arise unexpectedly and take new turns as environmental disturbances (e.g., habitat destruction, irrigation, reservoir construction) and global climate change create new opportunities for arthropods to interact with people. Aggravating the problem are the rapid evolution of resistance to insecticides and other control strategies, the exchange of genetic material between vector species (6), and the routine movement of humans and arthropods between any two points in the world within a few days.

Achievements in medical entomology have freed many parts of the world from vector-borne diseases. Colombia, in 2013, became the first country in the world to eliminate onchocerciasis from its borders (7). Solving problems in medical entomology, however,

is not an endgame. The solution to one problem typically creates another problem—the law of unintended consequences. The initial success of DDT in controlling vector-borne diseases such as malaria and louse-borne typhus, for example, resulted in a generation of untrained vector biologists, deemed no longer necessary because of the faith placed in DDT (8). The virtual disappearance of the bed bug *Cimex lectularius* in many parts of the world in the 1940s eventually left health professionals ignorant of these insects and unprepared to deal with resurgence of the bugs in much of the world 50 years later.

A sustained presence of medical entomologists is an essential frontline defense against vector-borne diseases and other public-health threats caused by arthropods. We suggest that a cost-effective strategy for establishing a bulwark against vector-borne diseases and other arthropod-related public-health problems would include a course in Medical-Veterinary Entomology required of students seeking degrees in medicine, veterinary medicine, and public health. The broader argument for including a veterinary component in a course stems from the relationship between individual diseases that affect humans and animals and that can involve transfer of the causal agents in either direction, as with Zika virus, previously known only in wild primates. Frequent interactions of health personnel with the public, directly or through the media, are now a routine consequence of every new arthropod-related health threat that appears. These interactions require medical personnel to be informed not only for professional credibility, but also to assist in designing timely solutions to the threats and reducing misinformation and associated distress among the public. Misidentifications of vectors, for instance, can misdirect control efforts, with life or death consequences (9). The history of successes in medical entomology bodes well for humanity, but the ability of medically important arthropods to adapt and threaten anew suggests that medical entomology must be a sustained effort.

Peter H. Adler. Department of Agricultural & Environmental Sciences. Clemson University. Clemson, SC 29634-0310 USA. padler@clemson.edu

Ligia I. Moncada-Álvarez. Departamento de Salud Pública. Facultad de Medicina, Universidad Nacional de Colombia. limoncadaa@unal.edu.co

1. Soriano-Lleras A, Osorno-Mesa E. Datos históricos de observaciones hechas en Colombia sobre artrópodos molestos y patógenos para el hombre. Revista de la Facultad de Medicina. 1963; S3: 3-27.
2. Gast Galvis A. Historia de la Fiebre Amarilla en Colombia. Bogotá: Instituto Nacional de Salud; 1982.
3. World Health Organization. WHO Director-General summarizes the outcome of the Emergency Committee on Zika. http://www.who.int/mediacentre/news/statements/2016/emergency-committee-zika-microcephaly/en/ [Consulted 1 February 2016].
4. Fauci AS, Morens DM. Zika virus in the Americas—yet another arbovirus threat. New England Journal of Medicine. 2016; pp. 1–3. Doi: 10.1056/NEJMp1600297.
5. Anonymous. 2,000 pregnant Colombian women have Zika virus. Tempo News in a Flash. Internet]. http://www.tempo.com.ph/2016/02/01/news/world/2000-pregnant-colombian-women-have-zika-virus/#gTjMiJdmT1oFherW.99. Consulted 31 January 2016.

6. Norris LC, Main BJ, Lee Y, Collier TC, Fofana A, Cornel AJ, Lanzaro GC. Adaptive introgression in an African malaria mosquito coincident with the increased usage of insecticide-treated bed nets. Proceedings of the National Academy of Sciences USA. 2015; 112: 815-820.
7. WHO. Onchocerciais. Fact Sheet 374. Internet]. http://www.who.int/mediacentre/factsheets/fs374/en/ Consulted 31 January 2016.
8. Adler PH. Biodiversity of biting flies: implications for humanity. Pp. 523-545. In R. G. Foottit & P. H. Adler (eds.) Insect Biodiversity: Science and Society. Chichester: Wiley-Blackwell Publishing; 2009.
9. Van Bortel, W., R. E. Harbach, H. D. Trung, P. Roelants, T. Backeljau and M. Coosemans. Confirmation of Anopheles varuna in Vietnam, previously misidentified and mistargeted as the malaria vector Anopheles minimus. American Journal of Tropical Medicine and Hygiene. 2001; 65: 729-732.