UCD Writing Centre
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Scientific Writing: Introductions

What is an Introduction?

- ✓ Announces the **topic** and the **purpose** of the essay/dissertation.
- ✓ Includes any **background information** needed to engage with what is presented, i.e. paint a picture for your reader.
- ✓ Briefly outlines the **state of the field** and the wider significance of the essay/ dissertation/ thesis within the field more broadly (abbreviated literature review).
- ✓ Presents research **aims and objectives**.
- ✓ States the **key findings** of the essay/dissertation/thesis.
- ✓ Presents research **methodology**, materials, and the research structure, i.e. justify the choices you made in conducting the research (and the validity of your methodology).
- ✓ States the **key findings** of the essay/dissertation/thesis.
- ✓ Provides an opportunity to **teach the reader** about what they need to know to understand your work fully, i.e. *how* to read your work.
- ✓ Helps the reader understand the **significance** of your research by explaining the impact the research can have in relation to academic research, to society, to culture, or to a specific industry/ sector. In other words, your introduction can help to make your research more **meaningful** for the reader.

What are the differences between an Abstract and an Introduction?

Abstract	Introduction
Comes at the beginning of the work; this is the reader's **first impression** of the research.	Comes after the abstract; this is the reader's **second impression** of the research.
Provides an **overview of the project** itself, i.e. it is not directly talking about or engaging with the science yet.	Provides an **overview of the science and the specifics of the project**, i.e. sets the scene in terms of scholarship (analyses, background of the subject matter and contextual information, as well as research and science to date), and presents a detailed summary of each section.
Announces the hypothesis.	**Explains** the hypothesis.
Announces the validity of/ justification for the research.	**Explains** the validity of/ justification for the research.
Generates interest in the topic.	Maintains interest in the topic by **expanding** on major points.
	Literature review often included in the introduction, if not in a separate chapter.

Note: For more information about Abstracts, see the UCD Writing Centre's handout.

Example

Announces topic

Viral pathogens are major causes of morbidity and mortality among humans and animals. Efficient transmission of viruses between susceptible hosts is required in order for these agents to persist in nature and ultimately cause disease. Several mechanisms for this exist, and include direct contact, aerosol and sexual transmission, among others. A subset of viruses, termed arthropod-borne viruses (arboviruses) requires hematophagous arthropods, mainly mosquitoes and ticks, for transmission between vertebrates. In general, perpetuation of arboviruses requires vertebrate viremia so that arthropods acquire infectious virus along with nutrient-containing blood during feeding. Transmission of virus to a new host by an arthropod infected in this manner requires that this arthropod be a competent vector. In public health entomology, the term 'vector competence' refers to the inherent ability of a particular arthropod to transmit a particular virus. In competent vectors, virus is acquired during feeding, undergoes replication in gut tissue, disseminates to secondary sites of replication, including the salivary glands and is ultimately released into the arthropod's salivary secretions, where it may be inoculated into the skin and cutaneous vasculature of the host during subsequent feeding (Figure 1). Arboviruses, therefore, are those viruses that have evolved an intimate association with both a vertebrate and arthropod host in order to perpetuate in nature.

Provides background information

Significance of issue

[…] The global health burden of mosquito-borne viruses is immense. It is commonly estimated that between 50 and 100 million cases of infection by dengue virus (DENV) serotypes 1–4 occur per year. Recent estimates placed the burden of DENV at 1.14 million disability-adjusted life-years in 2013 [5]. Most of the individuals who are at risk of DENV infection are at risk of other arboviruses, including yellow fever virus (YFV), chikungunya virus (CHIKV), and Zika virus (ZIKV) which share the same mosquito vector, *Aedes aegypti* [6]. Additional arboviruses that burden the health of individuals living in, or traveling to, the tropics include Japanese encephalitis virus (JEV), Venezuelan equine encephalitis virus (VEEV), Mayaro virus (MAYV), o'nyong nyong virus (ONNV), and many others. Temperate regions also experience seasonal epidemics of arboviral disease caused by West Nile virus (WNV), La Crosse virus (LACV), eastern equine encephalitis virus (EEEV), Jamestown Canyon virus (JCV) and related viruses. Although quantitative estimates of the collective burden of mosquito-borne arboviruses on human health worldwide do not currently exist, it is clear that their burden is enormous, and increasing [5,7,8].

State of the field

The geographic distribution of many arboviruses has expanded in recent decades [6,9], resulting in infection of native populations and providing opportunities for new host–virus relationships to develop. **[*Continued on next page*]**

Rückert, Claudia and Ebel, Gregory D. "How Do Virus–Mosquito Interactions Lead to Viral Emergence?", *Trends in Parasitology*, vol. 34, no. 4, April 2018, pp. 310-321.

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Example

Provides background information + explains state of the field

[*Continued from previous page*]. For example, after incursions into Europe in the 1990s, WNV (genus Flavivirus) was introduced into the Americas in 1999 and rapidly spread from a small focus near New York City throughout the New World. Similarly, CHIKV (genus Alphavirus) spread from an African focus into Asia during the mid-2000s and was introduced into the Caribbean region in 2013 [10,11] CHIKV is now endemic in the Americas and has caused over one million infections, many of which result in debilitating arthralgia [10]. ZIKV (genus Flavivirus) has also emerged in recent years [12]. Following an expansion from an African focus into the Pacific islands, the virus was introduced into South America and has spread throughout most of the range of its *Ae. aegypti* vector [8]. ZIKV has caused notable disease among developing fetuses and unexpected neurological disease among adults [13]. WNV, CHIKV, and ZIKV, along with DENV and YFV, underscore the emergence of mosquito-borne viruses as truly global pathogens. The combination of increased travel and trade has resulted in frequent exchange of pathogens and vectors across continents, such that the notion of 'geographic diseases' is increasingly irrelevant. Coupled with the rapid growth of tropical megacities, these exchanges continue to result in explosive epidemics of pathogens transmitted by mosquito vectors that require the human footprint on the environment in order to survive – vectors such as *Ae. aegypti* and *Culex quinquefasciatus*. The ongoing emergence of mosquito-borne viruses is occurring on a scale (geographic, economic, and human) that is without precedent in human history [7,8,14].

Significance

Aims and objectives

How, then, do mosquito–virus relationships lead to the emergence of these global pathogens (Figure 2, Key Figure)? This review examines the ways that mosquitoes influence the emergence of mosquito-borne viruses in order to provide perspectives on the history and future of this phenomenon. The first section examines two central concepts in public health entomology – vector competence and vectorial capacity – which outline basic mosquito–virus interactions and are key in understanding how mosquitoes impact virus emergence. These concepts are also required for readers to develop a basic understanding of the biology and epidemiology of arboviruses. The second section deals with new knowledge of the evolutionary relationships between viruses and their arthropod hosts. This section illuminates the complexities of arthropod–host interactions and how these can influence virus population biology and phenotype, sometimes leading to emergence. The third section provides a historical perspective on how mosquitoes influence arbovirus emergence by examining the cases of WNV, CHIKV, and ZIKV. Finally, we provide perspectives on the future emergence of mosquito-borne viruses, highlighting emerging mosquito-borne viruses that have yet to capture the attention of the general population.

Methods + research structure

Key findings

Key findings + purpose/ significance

Rückert, Claudia and Ebel, Gregory D. "How Do Virus–Mosquito Interactions Lead to Viral Emergence?", *Trends in Parasitology*, vol. 34, no. 4, April 2018, pp. 310-321.