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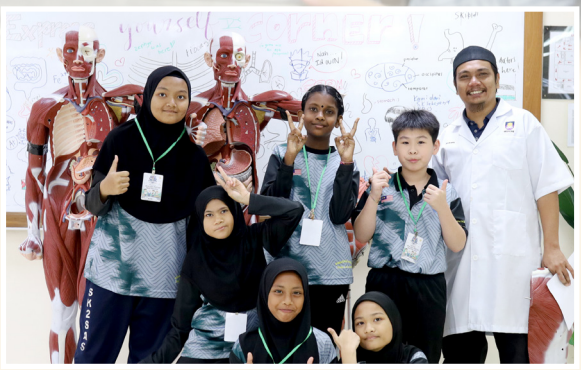
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INSPIRING CURIOSITY THROUGH ANATOMY









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Advancing forensic entomology from Malaysia To London

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ADVANCING FORENSIC ENTOMOLOGY FROM MALAYSIA TO LONDON

Professor Dr. Heo Chong Chin

From November 2025 to July 2026, I spent nine months on a research sabbatical hosted jointly by University College London (UCL) and the Natural History Museum (NHM) in London. Working alongside Prof. Ruth Morgan (Professor of Crime and Forensic Science in the Department of Security and Crime Science and Director of the UCL Centre for the Forensic Sciences) and Olga Sivell, Diptera Curator at the NHM, my project focused on combining traditional taxonomy with artificial intelligence, geometric morphometrics, and legal decision-making to advance forensic entomology.



THE iconic book corridors inside the UCL Main Library.

My core work centred on five objectives: **(1) Assessing Legal and Cognitive Factors:** I conducted a global survey investigating the reasoning processes,



UNIVERSITY College London (UCL). The Wilkins Building, which houses the UCL Main Library under its central Octagon dome.



THE UCL Department of Security & Crime Science is located at 35 Tavistock Square, London.



THE main specimen storage cabinets inside the Diptera Collection at the Natural History Museum, located at the Darwin Centre. These wooden entomological drawers contain pinned fly specimens from the UK and all over the world.



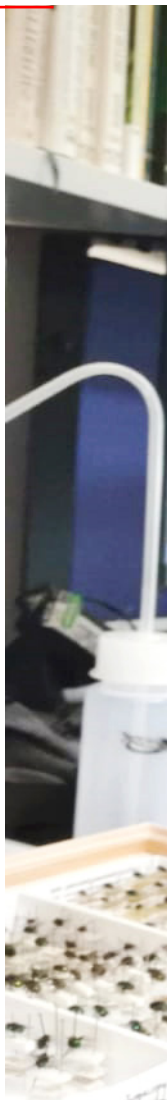


THE Natural History Museum, London, in South Kensington. The bronze Diplodocus skeleton (Fern) stands in the outdoor Evolution Garden.

legal limitations, and cognitive biases that forensic entomologists face when providing expert testimony. This drew responses from 32 experts across 19 countries. **(2) Developing UK Puparial Keys:** I built taxonomic keys for forensically relevant UK fly puparia (Calliphorinae and Luciliinae). **(3) Updating Malaysian Taxonomy:** I created an updated, illustrated identification key for 18 forensically important adult Diptera species found in Malaysia. **(4) Building AI Identification Models:** I compiled and curated a dataset of 283 female



EXAMPLES of the adult fly specimens I worked on, including species of medical and forensic importance in Malaysia and Southeast Asia. A unit tray of pinned blowfly specimens (*Chrysomya villeneuvi*) from the Natural History Museum collection.





A lateral view of a pinned adult blowfly *Chrysomya megacephala* (Diptera: Calliphoridae) mounted for morphological study.



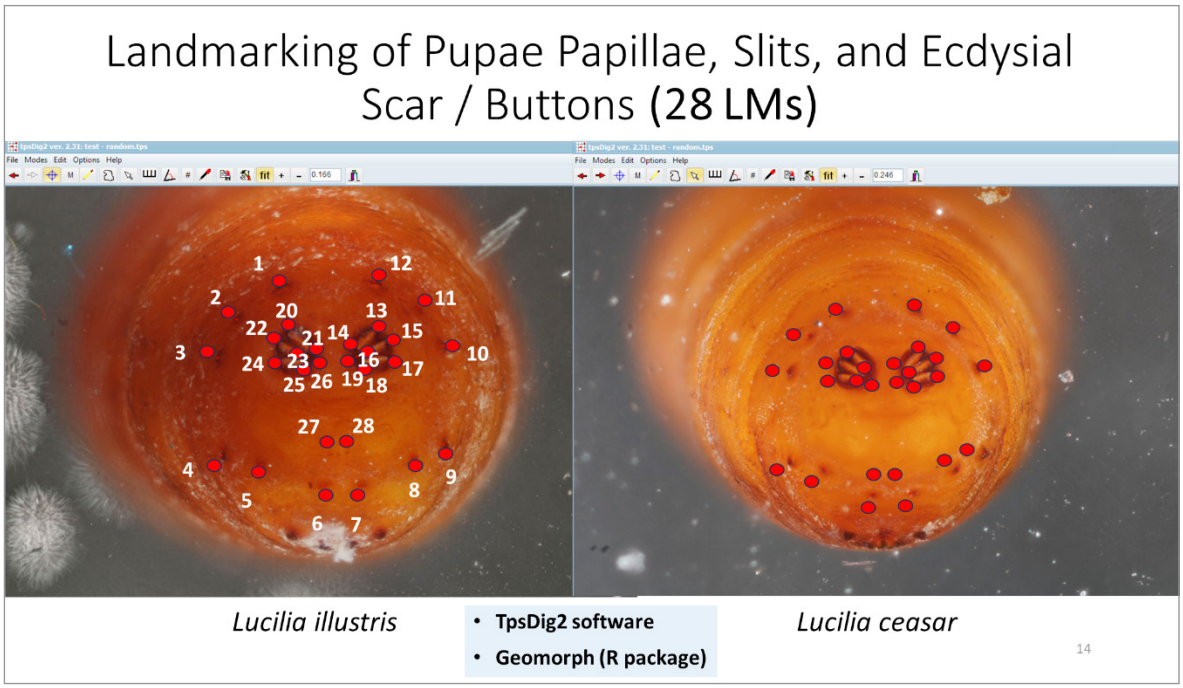
A male fly showing holoptic compound eyes (eyes touching)



A female fly showing dichoptic compound eyes (eyes separated).



MICROSCOPY and imaging facility at the Angela Marmont Centre for UK Biodiversity (AMC) inside the Natural History Museum. This is where I spent most of my time.



GEOMETRIC morphometric landmarking on the posterior spiracular region of fly puparia. A total of 28 landmarks were placed on each specimen (e.g., comparing *Lucilia illustris* and *Lucilia caesar*) to detect interspecific shape variation for automated species identification.

Lucilia adult specimens (*L. caesar, L. ampullacea, and L. illustris*) sourced from over 20 countries to train automated AI identification tools. (5) Applying Geometric Morphometrics: Using tpsDig2 and the Geomorph R



DELIVERING a presentation at Entomology 2025 (Portland, Oregon, USA), where I shared our team's research on environmental forensics and pathogen detection in Malaysia.

package, I mapped 28 landmarks across 126 puparia to test geometric morphometrics as a reliable method for identifying UK blowfly pupae.

Taxonomy and imaging work involved extensive specimen photo-stacking within the NHM Diptera collection and the Angela Marmont Centre for UK Biodiversity. Beyond the laboratory, the sabbatical provided opportunities to engage with the wider scientific community. I presented at Entomology 2025 in Portland, Oregon, on fly vectors and pathogen detection in environmental forensics, and attended Dipterists Day 2025 at the David Attenborough Building, University of Cambridge.

The sabbatical also opened doors to share my work with diverse international audiences. I delivered invited online talks for the University of Surrey, discussing forensic entomology case studies, and for the European COST Action GIN-TONIC network, hosted by Germany, exploring the dynamics of Black Soldier Fly Larvae in circular economies. I later brought my global survey findings to the European Association for Forensic Entomology (EAFE) Annual Meeting 2026 at Keele University, UK, providing an opportunity to exchange ideas with fellow researchers in the field.

Networking and future planning were equally important. At UCL, I attended postgraduate classes on human cognitive biases, case studies, and forensic databases. I joined the UCL Policing Academic Centre of Excellence (P-ACE) sandpit on Identification and Tracing, collaborating with forensic scientists, researchers, and officers from the Metropolitan and Norwegian Police to map out critical research needs. To support future projects, I submitted grant applications to





WITH my host supervisors during the sabbatical, Prof. Ruth Morgan at UCL (left) and Olga Sivell at the NHM (right).

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DELIVERING an oral presentation at EAFE 2026 (Keele University, UK), highlighting environmental data challenges and cognitive factors in forensic entomology testimony.

major funding schemes, including the Dipterist Society (US) and the Wellcome Trust (UK). Meanwhile, the datasets and identification keys developed during the sabbatical are being prepared for submission to scientific journals.

Above all, this sabbatical reinforced how vital museum collections remain as living, physical databases that make modern AI tools, morphometric precision, and robust forensic science possible—continuing to uphold justice and contributing to the advancement of medicolegal entomology.