

### Special Issue Editorial

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The forensic sciences are comprised of diverse disciplines applied in legal investigations [1]. Due to innovative technology developed during the current industrial revolution (IR 4.0), the forensic sciences have progressed significantly in various fields [2]. In this special issue, we have 14 papers from across a number of disciplines including forensic pathology, radiology, anthropology, entomology, veterinary medicine, and fingerprints, available in the forms of original research articles and case reports. The authors of this special issue are coming from various countries across Asia, Europe, South and North America, such as Australia, Brazil, Canada, India, Malaysia, Singapore, Spain, Sri Lanka, and the United States of America.

The objective of this special issue is to highlight several novel findings in the forensic sciences especially forensic entomology. We aim to update readers regarding novel topics including, but not limited to, case management (e.g., Thennakoon et al.), analytic techniques (e.g., Shin et al.; Wong et al.; Chao et al.; Zuha), life-history and ecological data of forensically important species (e.g., Graham et al.; Correa et al.; Essarras et al.; Guareschi & Magni, Ivorra et al.). We anticipate these collective findings will provide a significant update on unique aspects of the forensic sciences.

Thennakoon et al. discussed the management of the dead and missing people in the Easter bombings in Colombo, Sri Lanka and highlighted the procedure adopted in the response to the disaster. They discussed the importance of advanced preparedness, interinstitutional cooperation, and an empathetic approach in caring for the grieving families.

Shin et al. proposed a three-dimensional (3D) geometric morphometric and conventional analysis of human fourth cervical vertebrae in the adult Malaysian population for the identification of race. The results were promising in identifying the race with a cross-validation value of 66.5%.

A case on postmortem radiography in Malaysia was reported by Wong et al. The main advantages of this process are the ability to characterize or exclude, violent traumatic bone fractures or abnormalities, locating foreign bodies, identifying medical devices as well as acting as secondary adjuncts to anthropologic assessment. However, limitations include lack of direct visualization of soft tissue as well as postmortem artefacts that obscure natural causes of death, which can be misinterpreted as antemortem pathology.

Chao et al investigated the performance of the nanobio-based reagent (NBR) for visualizing wet fingerprints exposed to different levels of water salinity. They found that the quality of the visualized fingerprints using NBR was comparable with that of small particle reagent (SPR) and may prove a promising relatively greener alternative for substituting SPR in the current practice.

In this special issue, not only human cases were reported. A review of forensic veterinary cases was also published herein. Chang & Magni reviewed animal-related complaints received by animal welfare organizations in Singapore during 2016. In summary, 831 cases committed by 839 perpetrators were reported. Out of these high numbers, only 11 cases were perpetrators fined and/or imprisoned. The type of crime, or complaint, committed against animals in Singapore

were diverse and ranged from abandonment to illegal sale. This paper aimed to facilitate the work of the organizations involved in investigating animal-related crime in Singapore.

In fact, nine papers out of the 14 published in the special issue were forensic entomology-related. Correa et al studied the effect of intraspecific larval aggregation and diet type on life-history traits of *Dermestes maculatus* and *Dermestes caninus* (Coleoptera: Dermestidae). Both are beetles of forensic importance in North America. They concluded that larval density and diet type had significantly impacted the development time for both species. Such factors could affect the accuracy and precision when estimating a time of colonization as related to a minimum postmortem interval with these species when present on decomposing human remains.

Graham et al. investigate the longevity of *Lucilia eximia* (Diptera: Calliphoridae) adults with and without, food or water. *Lucilia eximia* is known to oviposit on vertebrate remains and is found primarily in South America and the southeastern United States (primarily Texas and Florida, USA). They concluded that access to food and water impacted adult fly longevity and forensic entomologists could potentially estimate time since adult emergence based on mortality proportion of adults present in relation to environmental conditions and access to food in an enclosed environment (e.g., building).

Guareschi & Magni reported a multidisciplinary investigation of rafting spiders (*Dolomedes fimbriatus* (Clerck) (Araneae: Pisauridae)) colonizing a human corpse in a floodplain located in northern Italy. In this case, close collaboration between the forensic pathologist, anthropologist, entomologists and other ancillary experts, allowed all the essential questions to be answered in the judicial investigation thus highlighting the importance of multidisciplinary approach in a forensic investigation.

In forensic entomology, insect succession is one of the methods used when estimating the minimum post-mortem interval (mPMI) [3]. Essarras et al. conducted a preliminary investigation of insect succession patterns on decomposing swine carcasses on Rottneest Island (WA), located off the south-west coast of Perth, Australia. They collected a total of ten insect

taxa representing four families in association with the decomposing carrion and concluded that the composition of insect species and the patterns of succession in the island were similar with those occurring with carrion on mainland Western Australia.

Skopyk et al. documented the primary dipteran colonization and rates of decay of human donors with known causes of death placed in a forested area at the Australian Facility for Taphonomic Experimental Research (AFTER) in Sydney, Australia. No two donors followed the same rate of decomposition. Furthermore, there were events of delayed dipteran colonization that subsequently resulted in slower decomposition rates. Differences in rates of decay between donors could also have been influenced by intrinsic factors such as cause of death (COD) and perimortem treatments. This paper has again highlighted multiple external and internal factors (both biotic and abiotic) that could influence the process of human corpse decomposition, as suggested by recent literature [4-6].

In Spain, Ivorra et al. reported a forensic case in which two facultative dipteran predatory species were found together on a human corpse namely *Synthesiomyia nudiseta* (Diptera: Muscidae) and *Chrysomya albiceps* (Diptera: Calliphoridae). The authors highlighted that the intraguild competition between the two predatory species affected the mPMI estimation. They recommended that forensic entomologist should keep this interaction in mind when both species are present on human remains and developing a time of colonization estimate as related to the postmortem interval.

Bharti from India reviewed the role of cuticular hydrocarbons (CHCs) in forensic entomology. Due to the fact that CHC profiles are species-specific and change with each insect developmental stage (i.e., from egg to adult), hence it is possible to develop models to estimate the age of fly larvae and pupae.

In Malaysia, Maramat et al. recorded forensically important flies associated with decomposing rabbit carcass in a closed room in Kuching, Sarawak, Malaysian Borneo. The results showed that *S. nudiseta* and *Parasarcophaga ruficornis* (Diptera: Sarcophagidae) were able to reach decomposing rabbit carcasses located in a closed room

and concluded that the two species mentioned could be used as entomological evidence involving indoor cases in Kuching.

Zuha (2021) investigated the effects of preservative concentrations on larval cephalopharyngeal skeleton of *Chrysomya megacephala* (Diptera: Calliphoridae) as an alternative indicator to larval body length for mPMI estimation. The results demonstrated that in all four study replicates, larval body length was significantly affected by ethanol concentration ( $p < 0.001$ ) whilst two of the study replicates (50%) indicated the cephalopharyngeal skeleton maintained its size. The author suggested that the cephalopharyngeal skeleton should be considered as alternative growth parameter for mPMI estimation.

New findings and approaches in the forensic sciences have been presented through this Special Issue. Although a small contribution to the field of forensics, we are hopeful the readers enjoy reading the content. The guest editor would like to acknowledge all reviewers for their effort and input to referee the manuscripts submitted for publication in this special issue.

## REFERENCES

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