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## EXPLORING THE BUTTERFLIES (ORDER LEPIDOPTERA: FAMILY PAPILIONIDAE): A COMPREHENSIVE STUDY OF THE SARAWAK MUSEUM DEPARTMENT COLLECTION

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### ABSTRACT

The family Papilionidae of butterflies, known for their striking colours and graceful flight, constitutes a significant component of tropical biodiversity. Widely distributed across various habitats, these butterflies are aesthetically pleasing and serve as important biological indicators. The natural history collection owned by the Sarawak Museum Department has been gradually expanding since the 1980s, with the samples constituting a growing archive of documented butterflies for future analyses. This study aims to document the taxonomic diversity of Papilionidae butterflies in Sarawak over the years. The study overall documented a total of 40 species of Papilionidae from the natural history collection and an extended sampling session. *Chilasa paradoxa* was the most abundant species recorded, while *Graphium aristeus* was the least abundant species recorded from the collection. The sampling session identified *Pachliopta aristolochiae* as the most dominant species, with twelve other species documented only once throughout the sampling period. This study provides valuable insights into the diversity and conservation significance of Papilionidae butterflies in Sarawak, underscoring the importance of museum collections as repositories of biological knowledge.

**Keywords:** Papilionidae, voucher specimen, biodiversity, Natural History Museum



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## INTRODUCTION

Butterflies, classified under the order Lepidoptera, are insects known for their delicate wings adorned with scales (Yong, 1983; Abang, 2006). The order can be further divided into six distinct families, namely Papilionidae, Nymphalidae, Riodinidae, Pieridae, Lycaenidae, and Hesperiiidae, each with unique characteristics and ecological roles (Abang, 2006; Corbert and Pendlebury, 2020). Malaysia has over 1000 documented species of butterflies, with approximately 950 species found in Borneo alone (Yong, 1983). Remarkably, around 200 species are believed to be endemic to Borneo (Otsuka, 2001). Butterflies undergo complete metamorphosis, encompassing four distinct developmental stages including the egg, larva, pupa and adult (Abang, 2006).

The family Papilionidae, known as swallowtail butterflies, is globally diverse (He *et al.*, 2022). Comprising three subfamilies and 32 genera, Papilionidae includes around 573 species with a worldwide distribution (Van Nieukerken *et al.*, 2011). These butterflies are recognised for their distinct wing patterns, size, and vibrant colours (Collins and Morris, 1985). Papilioninae, the largest subfamily, comprises the most species, particularly in tropical regions (Zakharov *et al.*, 2004). The common name “Swallowtail” refers to the split appearance on their hindwings observed when at rest (Krenn *et al.*, 2010).

The family Papilionidae has a wide distribution worldwide, with the subfamily Papilioninae particularly abundant in the Borneo region (Yong, 1983). While most species within this family are sexually monomorphic, some exhibit sexual dimorphism, and certain species even exhibit polymorphic in females (Yong, 1983). In Sarawak alone, researchers have documented a total of 38 swallowtail species, among them is the renowned Rajah Brooke’s Birdwing, *Trigonoptera brookiana*, which stands as one of the regions few protected species (Abang, 2006).

Papilionidae are widely distributed and can be found in various habitats, including gardens, roadsides, forest paths, clearing, streams, and mountain and hill tops, as noted by Yong in 1983. A study conducted by Häuser *et al.* in 1997 identified 35 species of Papilionidae within the vicinity of Kinabalu Park in Sabah, among a total of 625 species of Lepidoptera captured. Conversely, a study by Hilo *et al.* in 2022 at Libiki Bamboo Resort in Bau only recorded two species out of 97 species captured within the study site. Additionally, Itioka *et al.* in 2009 conducted a study in Lambir Hills National Park, documenting 22 species of Papilionidae out of the total 341 species recorded.

Museum collections plays a pivotal role in documenting and preserving biodiversity, serving as invaluable resources for taxonomic research, conservation