I. INTRODUCTION

1.1 Research Background

Indonesia is home to at least 46 species of stingless bees belonging to 10 genera, distributed widely across the archipelago and showing a high degree of endemicity. The western islands host the greatest diversity, with 23 species recorded in Sumatra, 7 in Java, and 29 in Borneo. Further east, 3 species are found in Sulawesi, 2 in Ambon, 1 in Timor, and 9 in Papua (Salatnaya et al., 2023). Traditionally, stingless bee identification has relied on morphological and morphometric traits, such as body size and coloration, hair distribution on specific body parts, and leg structures (Sakagami et al., 1990; Azizi et al., 2020).

More recently, additional diagnostic features have been incorporated, including nest entrance architecture, brood and food storage structures, as well as genetic markers, thereby revealing a more complex species diversity (Trianto & Purwanto, 2022). Key morphological traits used in identification include the hind tibia, hind basitarsus, malar space, mandibles, clypeus, propodeum, mesoscutum, mesoscutellum, antennae, eyes, forewings, wing venation, hamuli, and body coloration (Sakagami et al., 1990; Azizi et al., 2020). Wing venation, in particular, has been widely applied in morphometric studies to assess interspecific relationships (Laksono et al., 2020).

Phylogenetic studies focusing on Old World stingless bees (Rasmussen & Cameron, 2007; Rasmussen, 2008) emphasized the need for taxonomic revision beyond the traditional classification, aligning more closely with Moure's (1961)

evolutionary framework. Within this context, Trigona (*Geniotrigona) incisa* Sakagami & Inoue, originally described from Sulawesi (Sakagami & Inoue, 1989), was shown to render the genus *Geniotrigona* polyphyletic. Subsequent analyses placed *G. incisa* as the sister group to *Lepidotrigona*, indicating that it should not be accommodated within *Geniotrigona* (Rasmussen & Cameron, 2007). Morphologically, *G. incisa* differs from other *Geniotrigona* species despite superficial similarities, most notably in characters of the inner tibia (Rasmussen, 2007). As a result, Engel and Rasmussen (2010) established a new genus, *Wallacetrigona*, to accommodate *W. incisa*.

Members of *Geniotrigona* are generally large-bodied and distinct from other Asian stingless bees by their elongate malar area (more than twice the diameter of the third flagellomere), short mesoscutellum and propodeum, a raised ridge on the vertex, and dense plumose setae that obscure much of the mesosoma (Schwarz, 1939; Sakagami & Michener, 1987; Rasmussen, 2007). In contrast, *Wallacetrigona incisa*, endemic to Sulawesi, is recognized as a golden stingless bee with black legs and translucent wings (Engel et al., 2018). Meanwhile, *Geniotrigona thoracica* is more widely distributed across Thailand, Cambodia, Singapore, Malaysia, and Indonesia. The distribution of *Wallacetrigona* east of the Wallace Line contrasts with *Geniotrigona*, which is restricted to Sundaland. This biogeographical separation, supported by phylogenetic and morphological evidence, highlights the importance of revising Meliponini taxonomy in Indonesia and provides new insights into the evolutionary history of stingless bees in the region.

1.2 Research Problem

The research questions in this study are as follows:

1. What are the differences in morphometric characteristics between *Geniotrigona thoracica* and *Wallacetrigona incisa*?
2. What extent do *Geniotrigona thoracica* and *Wallacetrigona incisa* differ morphologically, andwhich morphological character shows the highest degree of similarity between the two species?

1.3 Research Objective

1. To determine differences in morphological size between *Geniotrigona thoracica* and *Wallacetrigona incisa*.
2. To analyze the degree of morphological differentiation between the two species and identify the morphological character that shows the greatest similarity.

1.4 Research Significant

The Significance of the Research This study provides morphometric data on *Geniotrigona thoracica* and *Wallacetrigona incisa*, which can serve as comparative references for research in other regions beyond serving as baseline data, the findings contribute to the refinement of stingless bee taxonomy, improve understanding of species-level morphological differentiation, and support ecological and biogeographical studies in Indonesia and Southeast Asia. Furthermore, by highlighting diagnostic traits that distinguish closely related species, this research offers valuable insights for biodiversity monitoring.