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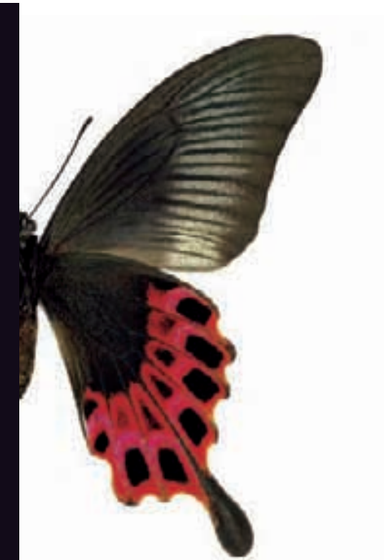
臺灣蝶類誌 第一卷
BUTTERFLY FAUNA OF TAIWAN VOL. I SECOND EDITION

鳳蝶科
PAPILIONIDAE

徐堉峰、黃嘉龍、梁家源

行政院農業委員會林務局



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臺灣蝶類誌

BUTTERFLY FAUNA OF TAIWAN

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COUNCIL OF AGRICULTURE EXECUTIVE YUAN
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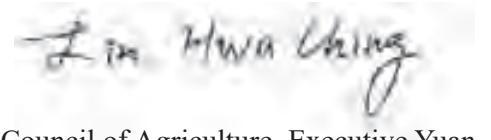
Foreword

The island of Taiwan is about 36,000 km^2, thus only representing 0.024% of the Earth's terrestrial surface, but butterflies proliferate across it. In the case of butterflies, the number of butterfly species in Taiwan, Japan (10 times of Taiwan in area) and Australia (213 times of Taiwan) are 380, 214 and 435 species, respectively, indicating that the diversity of butterflies in Taiwan far exceeds that of Japan and Australia; that is, the distinctiveness of Taiwan's butterfly habitat in the world. Whether from an academic research, ecological conservation, or education promotion perspective, butterfly resources research is of great importance.

"Biota" records the evolution of scientific names for species, the origin of type specimen, description, distribution, ecology, and references. In order to allow researchers to quickly consult the original documents of species as the basic data for follow-up research and development, and demonstrate the achievements of the national taxonomy, the Forestry Bureau is actively planning the publication of the "Biota". The Forestry Bureau has completed "Vascular Plant of Taiwan" and the second edition of "The Avifauna of Taiwan" while "Mammal Fauna of Taiwan" has also in preparations at present.

In terms of the research on butterfly classification, Professor Takashi Shirôzu published the original book " Butterflies of Formosa in Colour" in 1960 and three volumes entitled "Taiwan Butterfly Design Book" in 1999 were commissioned by Professor Yu-Feng Hsu of National Taiwan Normal University (NTNU). After nearly 20 years, breakthroughs in molecular biotechnology and the evolution of the concept of species have changed butterfly classification. However, there remains a lack of tools for their taxa to explain detail. Books on classification indicate the importance and urgency of a compilation of biota. The Forestry Bureau invited Professor Yu-Feng Hsu from NTNU to supplement and update butterfly specimens for the verification of taxonomic descriptions and illustrations, textual distribution, and habitats for a long time to complete the publication of the "Butterfly Fauna of Taiwan" study, which is an important milestone in history. For the first time, a complete series of monographs on the island and the associated islands butterfly resources have been collected and reviewed with the latest data on the current status; written in both English and Chinese, for five volumes in total, with the hope to complete in six or seven years. This year, the first two collections of the monographs on Papilionidae and Pieridae have been published in the hope of providing research and application to readers both at home and abroad. It is also hoped that compatriots in Taiwan can learn more about the diversity and preciousness of Taiwan's butterflies to protect their rich natural habitat.

Direct General



Forestry Bureau, Council of Agriculture, Executive Yuan

推薦序

臺灣全島面積約 36000 平方公里，僅占世界陸域面積的萬分之二點四，卻擁有豐富的動植物資源；以蝴蝶種數為例，臺灣、日本 (面積為臺灣 10 倍) 與澳洲 (面積為臺灣 213 倍) 蝴蝶種數分別為 380 種、214 種與 435 種，可知臺灣蝶類的多樣性遠超過日本與澳洲，顯現臺灣在全球蝴蝶棲地之特殊性，深具學術研究、生態保育及教育推廣價值。

「生物誌」記載物種學名演變、模式產地、分類特徵描述、分布、生態及參考文獻。林務局為了讓研究人員快速查閱種類命名的原始文獻，做為後續研究發展的基礎資料，更為了展現國家分類學研究成果，因此，積極籌劃生物誌，目前已完成《台灣維管束植物簡誌》與《臺灣鳥類誌》第二版，而《陸域哺乳動物誌》也正籌備中。

就蝴蝶分類研究而言，自日藉學者白水隆教授 1960 年出版《原色臺灣蝶類大圖鑑》與 1999 年國立鳳凰谷鳥園委託國立臺灣師範大學徐堉峰教授出版《臺灣蝶圖鑑》三卷後，近 20 年間，分子生物技術突破以及物種概念的演變，造成蝶類分類階層異動，然而，尚缺乏一部分類論述詳盡的專著，顯見生物誌編撰的重要性與急迫性。本局邀請臺灣師範大學徐堉峰教授團隊，長期間補充與更新蝴蝶標本，查證分類特徵描述與圖示、考證分布、棲地環境等資料，完成《臺灣蝶類誌》發行，可說是臺灣蝶類分類研究史的重要里程碑。該書為國內首部完整論述本島與離島蝶類資源之專著，分年逐步編纂，中英文對照，共計五卷，期於六、七年間出版完成。本 (2018) 年首期出版、付梓鳳蝶與粉蝶科兩卷，冀望提供國內外讀者研究應用，也讓國人更了解臺灣蝴蝶資源的多樣性與珍貴性，進而保護臺灣豐富的自然生態。

行政院農業委員會林務局 局長

謹識

2017 年 12 月

愛蝶人的臺灣蝴蝶圖鑑

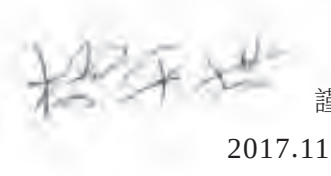
三十多年前，日本九州大學已故名譽教授白水隆的「原色台灣蝶類大圖鑑」，幾乎是研究台灣蝶類的聖經；而就在這個時間點，從小就熱衷蝴蝶研究的徐堉峰早已把這本日文圖鑑「讀」得滾瓜爛熟，當然為了蝴蝶，他的日文竟然是無師自通。所以，在他進入台大，到我研究室後，我們的蝴蝶研究如虎添翼，研究室也同時展開了長時間的全台蝴蝶資源調查和保育生物學的研究。畢業後他前往美國加州大學深造，但每一次返國，便會回到研究室持續協助指導學弟妹們，如今台灣蝴蝶研究之能有現在的成果，徐教授長年以來的耕耘和努力，的確功不可沒！

返國之後，徐教授除致力於研究、教學之外，已出版多套蝴蝶圖鑑，但這系列以科為別的「台灣蝶類誌」則是一套大書！非常敬佩林務局能延請徐堉峰和他的兩位高足共同執筆，相信這套大書應是繼白水隆之後，最令人期待的台灣蝴蝶圖鑑。就以即將出版的第一卷鳳蝶科來說，均依正統分類學方式製作，按科屬種方式進行編撰；每一個蝶種的介紹，包括有中名、異名表列、標本檢查、成蟲形態、世界分佈、台灣分佈、幼蟲寄主植物、種之生物學及註記等；而且每一個種類都有雄雌背、腹面標本彩圖，雌雄蟲生殖節及外性器解剖圖，當然也包括脈翅圖；全書以中、英文並列，是一本國際化的蝶類分類圖誌。「台灣蝶類誌」首先發行兩冊。以第一冊鳳蝶科來說，介紹了台灣 32 種固定出現的種類，和 1 種偶產種及其他 6 種非固定出現的蝶種，第二冊粉蝶科則介紹了台灣 37 種固定出現的種類及常見偶產種及其他 4 種非固定出現的蝶種，是目前蝶類圖誌中介紹最完整，也最詳盡的好書。

為了便於後學者研究及查閱方便，書末均附有往昔研究的文獻，以及中英文索引；恭喜林務局找到最適合的人選，持續出版系列蝶類誌，相信這也是越來越多蝶類愛好者所衷心期待的。

堉峰任職於國立台灣師範大學生命科學系，年近中年依然上山下海，執著蝶類研究，而每年也帶著學生認真出席國內外各種研討會，是極具國際化的傑出學者；身為他的老師，「青出於藍勝於藍」，的確與有榮焉，也期待後學者能以堉峰為楷模，持續讓台灣的蝶類研究及蝴蝶生態保育和環境教育工作，而且都能在國際上發光發熱！

國立臺灣大學 名譽教授



謹記

2017.11.22

Preface

The idea of writing the book series entitled “Butterfly Fauna of Taiwan” dates back to a few years ago in a conversation with my good friend Mr. Shou-Ming Wang. Mr. Wang was a senior staff serving in the Conservation Section of Forestry Department, Council of Agriculture (COA), Taiwan. By that time, we collaboratively worked on a project to organize an international symposium on butterfly research and conservation for East Asia. We both had the same impression that although the diversity of butterfly fauna in Taiwan is famous, a formal faunistic work is still lacking. Butterflies have symbolic meaning to Taiwan, thus many nature lovers take efforts to observe, study, and record them. Many guide books and handbooks on Taiwanese butterflies have been published, but they are mainly produced for use of the general public interested in butterflies, leaving out information on taxonomy and nomenclature. The most important textbook on taxonomy of Taiwanese butterflies is a classical book entitled “Butterflies of Formosa in Colour” by Takashi Shirôzu published in 1960. With splendid illustration of specimens and drawings of male genitalia, the book remains a “must have” for those who interested in studying butterflies of Taiwan. However, the book was published more than half a century ago, thus taxonomic assignments of many species included have changed, and quite a few new taxa have been added to the inventory of Taiwanese butterflies. The book series “Butterfly Fauna of Taiwan” aim to provide update information on all known species of butterflies occurring in Taiwan, including “accidentals”. The text of the series will be in both English and Chinese, so information will be available to international and local users of the book series. I invited two ex-PhD students graduated from my laboratory, Dr. Chia-Lung Huang and Dr. Jia-Yuan Liang, as co-authors. Dr. Huang chiefly deals with translation of the English text into Chinese, whereas Dr. Liang performed dissections of genitalia. The contents of the book series include the follows: Information for each family, subfamily, genus and species is provided. For each species, Sections of synonymic list, specimen examined, description, distribution, hostplants, biology, and remarks (if applicable) are given. Specimens were primarily examined from the collection housed in the Department of Life Science, National Taiwan Normal University, Taipei (NTNU), except those otherwise indicated. The condition of specimens for some accidental species is poor, and replaced using specimens from their possible source area whenever possible. Rearing codes refer to a rearing database (HSU) maintained in NTNU.

National Taiwan Normal University, Taipei

作者序

「臺灣蝶類誌」撰寫的濫觴源自我多年前和當時任職於林務局保育組的好友王守民先生間的對話，其時我們正努力催生一場關於亞洲蝴蝶研究與保育的國際研討會。守民兄和我都對一件事有同感，那便是雖然臺灣蝴蝶資源聞名遐邇，卻缺少一本較專業的專著。由於蝴蝶被視為臺灣的象徵之一，許多人興趣濃厚地觀察、研究、記錄這些可愛的小生物。如今已有許多介紹臺灣蝶類的書籍出版，但內容主要是針對大眾的科普讀物，鮮少對分類及學名等資料作說明。以臺灣的蝴蝶分類研究而言，最具有里程碑意義的著作是日籍學者白水 隆博士於 1960 發表的「原色台灣蝶類大図鑑」。該書圖片印刷精美，伴以精細的生殖器解剖手繪圖，至今仍是研究臺灣蝴蝶研究不可或缺的經典參考文獻。然而，該書的發行距今已經過半世紀以上的時光，書中介紹的蝶種許多經過諸多分類處理的變更，亟須整理，而在該書問世後，有許多新蝶種被發現，亦須補充，分布、生態等資料也因後來的研究進展使內容大不相同，這些情形均使得撰寫包含此等新資料的專書有其必要。「臺灣蝶類誌」編撰的緣由因此產生。這套專書的內容希望可以涵蓋迄今已知的臺灣所有的蝶種，包括偶產種。為了服務國內外所有對臺灣蝴蝶感興趣的朋友，內文以中英文對照呈現。撰寫期間我邀請從我研究室畢業的兩位出色的學生黃嘉龍博士及梁家源博士協助。黃博士主要致力於將英文內容中譯，梁博士則戮力進行生殖器解剖工作。本書內容包括科、亞科、屬及種的基本介紹。每一種則依序說明異名、標本檢視、形態、分布、寄主植物或食餌、生物學及註記 (若有必要)。所檢標本除了特別標示者以外，基本上使用師大生科系蝴蝶研究室的收藏。少數偶產種標本品質不佳，本書儘量以其可能起源地的標本代替作為圖示。飼養編號則來自師大生科系蝴蝶研究室使用的 HSU 飼養資料庫。

2017. 11. 9. 夜於師大分部

Acknowledgments

Many friends and students provide assistance to this book series, on assistance of chores, giving helpful comments, or providing materials and literature. Overseas colleagues and friends include Dr. Dick Vane-Wright (UK), Mr. Adam Cotton (UK, now in Thailand), Dr. Michael Braby (Australia), Dr. Alexander Monastyrskiy (Russia, now in Vietnam)，Dr. Tomoo Fujioka (Japan), Prof. Osamu Yata (Japan), Prof. Masaya Yago (Japan), Dr. Hideyuki Chiba (Japan), Mr. Hiroshi Tsukiyama (Japan), Mr. Motoki Saito (Japan), Mr. Gian Cristoforo Bozano (Italy), Mr. James Young (Hong Kong), Mr. Philip Yik-Fui Lo (Hong Kong), Dr. Chin-sheng Wu (mainland China), Prof. Gou-fang Jiang (mainland China), Prof. Shan-yi Zhou (mainland China), Mr. He-li Deng (mainland China), Mr. Ai-min Li (mainland China), Mr. Jian-qin Zhu (mainland China), Mr. Zhen-jun Wu (mainland China), Mr. Jia-lin Chen (mainland China), Mr. Hao Huang (mainland China), Mr. Shao-ji Hu (mainland China). Local colleagues and friends include Prof. Ping-Shu Yang, Prof. Shen-Horn Yen, Mr. Shou-Ming Wang, Ms. Shu-Chi Hsieh, Dr. Kuang-Liang Chen, Mr. Hang-Chi Huang, Mr. Cheng-Chih Lu, Mr. Chang-Ching Chen, Mr. Hui-Yung Li, Mr. Hsing Hang Li, Mr. Yu-Jung Hung, and Mr. Yung-Jen Chang. Members and ex-members of my laboratory include Mr. Li-Hao Wang, Mr. Yu-Chi Lin, Mr. Jung-Chun Lin, Mr. Chih-Wei Huang, Mr. Cheng-Jui Chang, Mr. Wen-Jie Lin, Mr. Li Huang, Ms. Ke-Yi Ho, Mr. Yu-Ming Hsu, Ms. Hsin-Yun Chen, Dr. Chih-Chien Lu, and Dr. Li-Wei Wu. Prof. Kazunori Yoshizawa of Hokkaido University kindly allowed us to examine the specimen of *Luehdorfia japonica formosana* in Matsumura collection under his care. I am here to express my cordial thanks to all of them. Conservation Section of Forestry Department, Council of Agriculture (COA) generously provides financial aid to the production of the book series. Without their support, the publication of the book series cannot be accomplished. Finally, I hope the readers of the book series may find them useful, and comments from anyone will be heartily welcomed.

National Taiwan Normal University, Taipei

致謝

除了黃嘉龍博士及梁家源博士以外，許多朋友及國立臺灣師範大學生科系的同學或協助工作進行、或作學術討論、或提供樣本與文獻，均讓本書撰寫獲益良多。海外學者包括英國的 Dick Vane-Wright 博士及 Adam Cotton 先生 (現居泰國)、澳洲的 Michael Braby 博士，俄羅斯的 Alexander Monastyrskiy 博士 (現居越南)，日本的藤岡知夫博士、矢田 脩教授、矢後勝也教授、千葉秀幸博士、築山 洋先生、齊藤基樹先生，義大利的 Gian Cristoforo Bozano 先生，香港的楊建業先生與羅益奎先生，中國大陸的武春生博士、蔣國芳教授、周善益教授、鄧合黎先生、李愛民先生、朱建青先生、吳振軍先生、陳嘉霖先生、黃灝博士、胡邵驥博士。臺灣本地的師長與朋友包括楊平世教授、顏聖紘教授、王守民先生、謝書綺小姐、陳光亮醫師、黃行七先生、呂晟智先生、陳常卿先生、李惠永先生、李興漢先生、洪裕榮先生及張永仁先生。臺灣師範大學研究團隊的成員則有王立豪先生、林育綺小姐、林容諄小姐、黃智偉先生、張宸睿先生、林文傑先生、黃黎先生、何可薏小姐、許育銘先生、陳歆芸小姐、呂至堅博士及吳立偉博士。北海道大學吉澤和德教授慨允檢視他負責管理的松村收藏中珍貴的臺灣記錄之虎鳳蝶標本。對以上諸君在此致上我萬分謝忱。此外，若無林務局保育組的大力支持，「臺灣蝶類誌」無法問世，在此表達最高的敬意。最後，我誠摯希冀這套書的讀者會覺得它有參考價值，並歡迎賢達批評指教。

2017. 11. 9. 夜於師大分部

Preface and acknowledgments for second edition

The volume one and two of “Butterfly Fauna of Taiwan” were published in the spring of 2018. It was a surprise when both volumes went out of print by the end of the summer of the same year. The publisher decided to produce a second edition last winter upon request from readers missing the first edition. We thus took this as a nice opportunity to correct some errors in the first edition. Special thanks are expressed here for helpful comments by Mr. Jun-ichi Asahi of the Butterfly Science Society of Japan and Mr. Hsing-Han Li, the author of “the Etymology of Scientific Names of Formosa Butterflies”.

National Taiwan Normal University, Taipei

本誌第一及第二冊於2018年春發行，令人意外的是，初版在同年夏便已告絕版，於是出版本誌的林務局基於大眾需求及教育推廣的目標，決定製作第二版。我等覺得這會是修正本誌初版中一些疏漏與謬誤的好機會，因此從善如流配合。在第二版發行之際，特藉機向提供寶貴意見的兩位賢達表達謝忱，他們分別是日本蝶類科學學會的朝日純一先生及「臺灣蝴蝶拉丁學名考釋」的作者李興漢先生。

2019. 1. 24.

Contents

目錄

Family PAPILIONIDAE Latreille, [1802]

Compared to other families of butterflies, the species diversity of Papilionidae, swallowtails, is low. It is estimated there are about 550 to 600 species known (Ackery *et al.*, 1999; Racheli & Cotton, 2010), with a worldwide distribution. In spite of this low species richness, this family draws the most attention of researchers and general public because many of its members are spectacular, possessing showy wing patterns and large in size. They also serve as popular research targets as many groups display intriguing biological phenomena, such as mimicry. Ackery *et al.* (1999) stated that the phylogeny of Papilionidae is probably the best documented of any lepidopteran family.

The monophyly of Papilionidae is well supported by both morphological evidence (e. g. Ackery *et al.*, 1999) and molecular data (e. g. Walberg *et al.*, 2005; Heikkilä, M. *et al.*, 2011). Unique synapomorphies of this family at least include two characters: 1) vein 2A of forewing runs freely to, or almost to dorsum; 2) larva possesses osmeterium on prothorax. Other diagnostic characters include: 1) Only one anal vein is present in hindwing, except presumed basal taxon genus *Baronia*, which possesses two anal veins; 2) epiphysis is present on fore-tibia, but this characters is shared with other families, such as Hesperiidae; 3) pretarsal aroliar pads and pulvilli are reduced, but this character is at least shared with some pierids and nymphalids; 4) cubitus quadrifid, which is shared by Dismorphiinae in Pieridae within Papilionoidea; 5) cervical sclerites joined ventromedially, a feature also found in some primitive moths.

Although monophyly of Papilionodae has long widely accepted by researchers around the world, systematics below the family level had been extensively disputed. The scheme of three subfamilies by Ehrlich (1958) has been accepted worldwide (Vane-Wright, 2003). One of the subfamilies, the Baroniinae, contains only one species inhabiting Mexico, and is widely accepted as the stem lineage of the family. The subfamily Parnassiinae includes up to 80 species in 8 genera (Racheli & Cotton, 2010). Members of this subfamily are restricted to Holarctics (Europe, Asia, and North America). Although the montane, higher elevation habitats of Taiwan seem to be suitable for survival of members of Parnassiinae, no member of this subfamily has been found from Taiwan except doubtful records of *Luehdorfia*. Consequently all swallowtails known to occur in Taiwan belong

to Papilioninae, which is the largest subfamily in terms of species richness within Papilionidae. With regard to systematics for generic level, there was a tendency to divide large genera into multiple smaller genera in the second half of the twenty centuries. However, with modern phylogenetic researches based on cladistics and availability of molecular data, now we see a trend to favor reunion of small genera into larger, "sensu lato" genera.

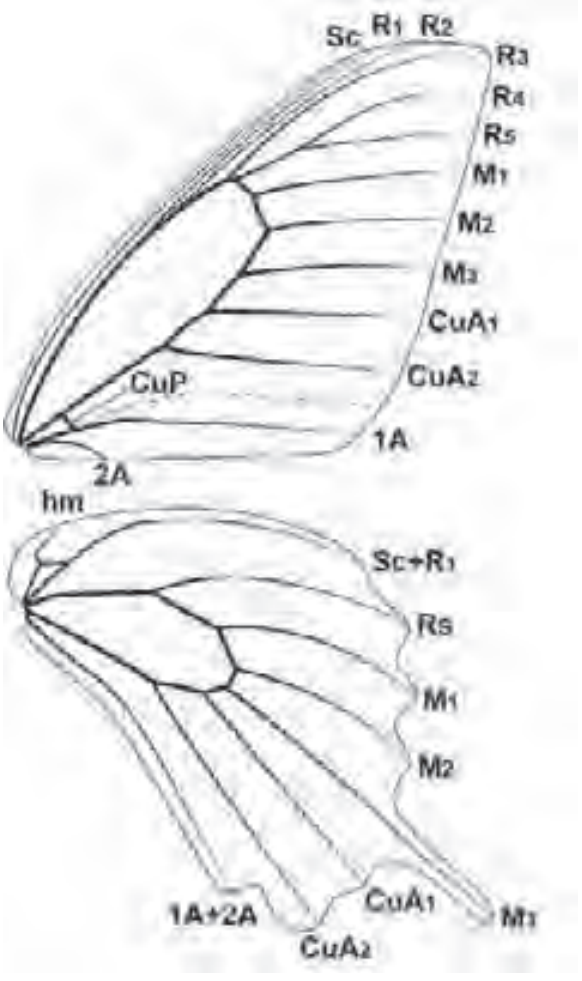
鳳蝶科

鳳蝶科的物種多樣性相較於其他蝴蝶的科群來說是較低的，根據一些研究文獻估算，目前已知的鳳蝶科種類大約在 550 種至 600 種之間 (Ackery *et al.*, 1999; Racheli & Cotton, 2010)，且廣泛分布在世界各地。雖然鳳蝶科的物種多樣性不高，但由於許多成員體型大、外觀引人注目並且具有豔麗的翅紋，因此最能吸引研究學者及普羅大眾的關注。同時，許多鳳蝶類群呈現了諸多有趣的生物現象 (例如擬態)，可以說是非常熱門的研究對象。Ackery 曾經提到鳳蝶科的系統發育關係很可能是任何一個鱗翅目科群當中，研究最為詳盡且記錄最為完整的科。

鳳蝶科做為一個單系群 (monophyly) 而言，無論是從形態証據 (例如 Ackery *et al.*, 1999)，或是從分子生物學証據來說 (例如 Walberg *et al.*, 2005; Heikkilä, M. *et al.*, 2011)，都得到良好的支持。這個科的成員至少包含了兩個獨特的共有衍徵：1) 前翅第 2 臀脈 (2A 脈) 與後緣游離至或接近達後緣；2) 幼蟲在前胸具一可外翻的叉狀器官，稱為「臭角」(osmeterium)。其他形態特徵尚包括：1) 後翅僅一條臀脈，但其中被認為是鳳蝶科基群 (basal taxon) 的寶鳳蝶屬 (*Baronia*) 例外，其後翅具有兩條臀脈；2) 前足脛節具有前脛突 (epiphysis)，但此一特徵在其他科也出現，例如弄蝶科；3) 前跗節爪間盤墊 (pretarsal aroliar pads) 及褥盤 (pulvilli) 退化，但至少一些粉蝶和蛺蝶也具有此一特徵；4) 肘脈 (Cubitus) 成四分叉，但此一特徵在鳳蝶總科當中也出現在粉蝶科的袖粉蝶亞科；5) 頸片 (cervical sclerites) 於腹面中央相連，此一特徵也出現在某些較原始的蛾類。

鳳蝶科是單系起源類群的概念廣為全世界研究者所認同，然科層級以下的分類系統卻仍有許多爭論。Vane-Wright (2003) 指出由 Ehrlich 於 1958 年提出的三個亞科架構是廣被全世界所接受的，其中寶鳳蝶亞科 (Baroniinae) 底下僅包含一種棲息在墨西哥的種類，是目前公認的鳳蝶科基群 (stem lineage, basal lineage)。絹蝶亞科 (Parnassiinae) 則包括 8 個屬至少 80 個種 (Racheli & Cotton, 2010)，此一亞科

的成員主要分布在全北區 (歐洲、亞洲及北美洲)，臺灣具有多山地及高海拔的棲地，似乎適合絹蝶亞科的成員生存，但除了存疑的虎鳳蝶屬 (*Leuhdorfia*) 以外，目前為止該亞科成員在臺灣並無可靠記錄，從而臺灣已知的鳳蝶均屬於鳳蝶科中物種多樣性最高的鳳蝶亞科。在亞科階級以下的屬級系統分類方面，二十世紀後半葉傾向細分成許多小屬，然而現代的親緣關係研究，基於支序系統學的發展及分子生物學資料的取得，多傾向將一些小屬重新整合為較大、較廣義的屬。



Text-fig. 1. Wing venation of Papilionidae (*Papilio machaon*).

鳳蝶科翅脈脈相圖 (黃鳳蝶為例)

Subfamily PAPILIONINAE, Latreille, [1802]

Ackery *et al.* (1999) points out that only one character convincingly supports monophyly of this subfamily: Metathorax with a distinct meral suture, including internal lamella. In Taiwan, all swallowtail butterflies belong to this subfamily.

A total of 32 species of swallowtails thrive in Taiwan and its associated islands, with 7 additional species of uncertain sources or accidental stray from areas outside of Taiwan. Full accounts are given to these 32 resident species plus an accidental species frequently found in southern Taiwan in this work, with supplementary notes given to the 6 non-resident species.

鳳蝶亞科

Ackery *et al.* (1999) 指出真正支持鳳蝶亞科的特徵僅有一項，即後胸具有明顯的基節側片縫線。棲息在臺灣的所有鳳蝶科物種均屬於本亞科。

臺灣本島及週邊離島地區共計有 32 種鳳蝶棲息，另有 7 種來源不確定或偶然意外地從臺灣以外的地區進入此區的偶產種、迷蝶。本蝶類誌提供此 32 種固有種及 1 種較常發現的偶產種之完整敘述記載，並補充提供 6 種非固有種相關資料。

Tribe TROIDINI Talbot, 1939

Type genus: *Troides* Hübner, [1819]

Miller (1987) listed a few synapmorphies he considered as supports for monophyly of Troidini: 1) tibia and tarsi scaleless; 2) pleuron of female 8th abdominal segment sclerotized; 3) female with a row of closely spaced spines running the length of tibia; 4) anal margin of the male hindwing rolled dorsally; 5) first anal vein with a prominent groove; 6) medial surface of papillae anales with four to seven long hooks per lobe; 7) larvae with fleshy tubercles on thoracic and abdominal segments; 8) pupae with protuberances on abdominal segments 4–7.

The members of this tribe is pantropical in distribution, but some species may be adapted to cool, temperate climatic zones. The host plants of all species are restricted to Aristolochiaceae. The records of Menispermaceae in old literature may involve misidentification of plants in Aristolochiaceae.

The boundaries of genera within this tribe remain lack of consensus among researchers, especially on taxonomic placement of those medium-sized species with dark ground color. In the present work, we tentatively follow the treatments by Häuser *et al.* (2005) and Racheli & Cotton (2010).

In Taiwan, a total of 7 species in 4 genera are included in this work, with an additional of 2 straying species briefly discussed in the supplementary section.

裳鳳蝶族

Miller (1987) 曾列出一些他認為可以做為支持裳鳳蝶族為一單系群的共衍徵，包括：1) 脛節與跗節無鱗片覆蓋；2) 雌蟲第 8 腹節側板 (pleuron) 骨化；3) 雌蟲脛節具一列排列緊密的刺；4) 雄蟲後翅內緣向背側反摺；5) 第 1 臀脈形成明顯凹溝；6) 肛突 (產卵瓣) 表面中央具四至七個長鉤；7) 幼蟲胸部及腹部體節具有肉棘；8) 蛹體腹部第 4 至 7 節具突起。

本族成員主要呈泛熱帶性分布，但某些種類可以適應寒冷的溫帶氣候區，族內所有種類的寄主植物都侷限於馬兜鈴科 (Aristolochiaceae) 植物。

本族族內不同屬之間的界線在不同學者間仍缺乏共識，特別是一些體型中型且翅面底色黑色的種類的分類位置仍頗有爭議。本誌撰寫上暫依循 Häuser *et al.* (2005) 及 Racheli & Cotton (2010) 的分類處理。

在臺灣地區，本族有 4 屬 7 種，另於補充註記部份提及 2 種偶產 / 疑問種。

Genus *TROIDES* Hübner, [1819]

Type species: *Papilio helena* Linnaeus, 1758

Miller (1987) considered a few characters synapomorphic for his "subgenus *Troides*", but the taxon he recognized contains *Ornithoptera,* not generally accepted by most recent literature (e. g. Haugum & Low, 1982–1985; Condamine *et al.*, 2015). Racheli & Cotton (2010) listed the few diagnostic characters for this genus: Large butterflies with prominent sexual dimorphism usually with black forewing and yellow black-spotted hindwing; males with androconial anal wing folds and other androconial structures on abdomen. Further evaluation of characters for monophyly of this genus is necessary.

The boundary of the genus *Troides* varies in views of different researchers. It sometime contains all "birdwing butterflies" (e. g. Miller, 1987). Other authors excluded *Trogonoptera* but still included other "birdwing" genera in it (e. g. Hancock, 1980, 1983). Most recent literature prefer a less inclusive, "sensu stricto" *Troides* (e. g. Braby *et al.*, 2005; Simonsen *et al.*, 2011; Condamine *et al.*, 2015).

The genus contains about 18 species distributed in the Oriental, Palearctic, and Australian Region.

In Taiwan, two species occur, with one inhabiting main island and Ludao, and the other restricted to Lanyu.

裳鳳蝶屬

Miller (1987) 針對其認為的"裳鳳蝶亞屬"提出一些共衍徵，然而其認定的類群中包括了鳥翼蝶屬成員，該處理未獲普遍接受 (例如 Haugum & Low, 1982–1985; Condamine *et al.*, 2015)。Racheli & Cotton (2010) 列出了一些裳鳳蝶屬的形態特徵：大型蝴蝶且具有明顯的雌雄二型性、前翅通常呈黑色、後翅具有黃色及黑色斑、雄蝶後翅具有發香內緣摺及腹部有其他發香構造。進一步評估支持本屬為單系群的特徵實屬必須。

裳鳳蝶屬範圍的界定依不同研究者而有不同觀點，有些研究者，如 Miller (1987) 認為應該包含所謂的“鳥翼蝶”；其他研究者如 Hancock (1980, 1983) 則認為裳鳳蝶屬不應該包括紅頸鳳蝶屬 (*Trogonoptera*)，但其他的鳥翼蝶則應包括在裳鳳蝶內，而大多數近期文獻則多採用狹義的裳鳳蝶屬用法 (例如 Braby *et al.*, 2005; Simonsen *et al.*, 2011; Condamine *et al.*, 2015)。

本屬共計有 18 種，分布在東洋區、古北區及澳洲區。

在臺灣地區有 2 種，一種分布於臺灣本島及綠島，另一種侷限分布於蘭嶼。

Troides aeacus **(Felder & Felder, 1860) (黃裳鳳蝶 / 金裳鳳蝶)**

Ornithoptera aeacus Felder & Felder, 1860: Wiener entomologische monatschrift 4: 225. (Type locality: Not stated [“Bangalen”])

Ornithoptera rhadamanthus var. *thomsonii* Bates, 1857: Thomson, Straits of Malaca: 546. (Type locality: “Siam” [Cambodia according to Haugum & Low, 1985)

Ornithoptera aeacus f. *praecox* Fruhstofer, 1913: Deutsche entomologische Zeitschrift, Iris 27: 134. (Type locality: “Siam, Bankok; Muok Lek, Angkor”)

Troides minos szechwanus M. Okano & T. Okano, 1983: Artes Liberales 32: 190. (Type locality: “Xinxing, Sichuan; Kanding”)

Ssp. *kaguya* Nakahara & Esaki, 1930

PLATE 1, figs. 1-2; PLATE 21, fig. 93; PLATE 31, fig. 133

Troides aeacus formosanus Rothchild, 1899: Novitates Zoologicae 6: 67. (Type locality: “South Cape, Formosa”)

Papilio (Ornithoptera) aeacus kaguya Nakahara & Esaki, 1930: Zephyrus 2: 209. [replacement name].

Troides aeacus kaguya f. *kurobashi* Normura, 1937: Zephyrus 7: 43.

Troides aeacus kaguya f. *maeboshi* Normura, 1941: Mushi no Sekai 4(7/8): 119.

Specimens examined:

XINZHU [= HSINCHU] Co.: 1♀, Zhudong, emgd. II. 2005; 1♂, same locality, 20. II. 2009; 1♀, Baoshan, Shanhu, 30. XI. 2008, reared from *Aristolochia shimadai*, emgd. 5. III. 2009, HSU 08L33. **HUALIAN [= HUALIEN] Co.:** 1♂, Yuli, Yuancheng, emgd. 19. VII. 2012; 1♂, same locality, 23. VII. 2012 (genitalia preparation JYL102); 1♂, same locality, 1. XII. 2013; 1♀, same locality, 2. XII. 2013; 1♀, Fuyuan Forest Recreation Area, 24. VII. 2015 (genitalia preparation JYL132). **TAIDONG [= TAITUNG] Co.:** 1♂, Ludao, 25/27. IX. 2004. **TAINAN CITY [= TAINAN Co.]:** 1♂, Xinhua, 200m, 21. I. 2008, reared from *A. shimadai*, emgd. 3. III. 2008, HSU 08A17. **PINGDONG [= PINGTUNG] Co.:** 1♂, Liuqiu, Liuqiuyu, 7. III . 2010.

Description. Adult – Forewing length 55-82 mm. Sexual dimorphism prominent. Male (PLATE 1, fig. 1): Head hairy, dark brown with red hairs sparsely present on vertex. Antennae dark brown tinged with gray. Proboscis dark brown. Labial palpus short, bearing brown hairs. Thorax dark brown, bearing red hairs laterally. Abdomen with ground color yellow, banded with a series of transverse markings dorsally, bearing red hairs around cephalic end; a longitudinal row of black dots present laterally. Pale brown androconial patches present on A3-5 dorsally. Valvae with outer surface covered by white scalings. Legs dark brown. Patagia dark brown edged with red anteriorly; tegula dark brown. Forewing apex somewhat acute, termen nearly straight. Hingwing termen slightly wavy. A fold present along dorsum of hindwing, containing fine, wool-like, creamy white androconia. Stiff, brush-like scales present along hindwing dorsum. Forewing uppersides black brown, with prominent gray stripes along veins. Forewing undersides similar to uppersides, with stripes along veins further prominent. Hindwing uppersides with ground color semi-transparent yellow; black, wedge-shape spots at distal ends of cells, usually with black shade at inner margin of spots in posterior ones. Veins black. Hindwing undersides as uppersides, black shades by wedge-shape spots all absent. Female (PLATE 1, fig. 2): Head and thorax as those of male. Abdomen uniformly dark brown dorsally, a series of black brown, transverse spots present ventrally. No fold on hindwing. Forewing with stripes along veins more prominent than those of males. Hindwing with large, black, wedge-shaped spots and deeply incised, black marginal borders.

Male gentalia (PLATE 21, fig. 94) – Pseuduncus tapering toward caudal end, bearing a small, strongly down-curved hook at distal tip. Socii setose, as a pair of processes with dorsal bumps. Vinculum slightly bent. Saccus enlarged, short. Valva lobe-like, bearing a prominent digitate process caudad; harpe represented as heavily sclerotized, elongate, boot-shaped piece, with dorsal margin smoth, distal and posterior half of ventral margin serrate. Phallus stout, down-curved, somewhat flatten dorso-ventrally.

Female genitalia (PLATE 31, fig. 134) – Corpus bursae oval, with many longitudinal folds. Ductus bursae thick, membranous. Signum highly modified; lamella antevaginalis forming a large moderately sclerotized pouch containing a pair of heavily sclerotized dome-like structures; lamella postvaginalis as a pair of sclerotized depressions with a medial, horseshoe-shaped sclerite. Anal papillae broad, semi-circular. Posterior

apophyses approximately equal to anal papillae in length, with cephalad end blade-like.

Global distribution. East Pakistan, Himalayas, Indochina, Sumatra, West, South to East China, and Taiwan (Racheli & Cotton, 2010).

Distribution in Taiwan. Ssp. *kaguya* occurs in Taiwan. This species mainly inhabit lowlands in Taiwan, including Ludao (Green Island) (Hsu, 2013).

Larval Host plant(s). *Aristolochia zollingeriana* (as *A. tagala kankauensis*, Hamano, 1987), *A. shimadai* (Igarashi & Fukuda, 1997; Lee & Chang, 1988), *A. foveolata* (Ho & Chang, 1998), and *A. cucurbitifolia* (Igarashi & Fukuda, 1997)(all Aristolochiaceae).

Biology. This species is known to be multivoltine in occurrence (Hsu, 2013), on the wing throughout the year, but may overwinter as pupae in areas cold in winter (Hsu, 1999).

Remarks. There have been confusion over whether *formosanus* Rothchild, 1899 or *kaguya* Nakahara & Esaki, 1930 should be the valid name for the subspecies of *Troides aeacus* in Taiwan. Nakahara & Esaki (1930) proposed the name *kaguya* to replace *formosanus* Rothchild, 1899 based on the situation that *Troides* was considered a subspecies of *Papilio,* thus becoming a homonym with *Papilio castor formosana* Rothchild, 1896. Haugum & Low (1985) pointed out that the treatment is unnecessary because it involves secondary homonym, thus *formosanus* Rothchild, 1899 should not be replaced. However, the article 59.3 of ICZN has ruled that all homonyms replaced before 1961 are treated as permanently unavailable, consequently *kaguya* Nakahara & Esaki, 1930 ought to be regarded as the valid subspecific name for *T. aeacus* in Taiwan.

Ssp. *kaguya* is long considered endemic to Taiwan, but individuals identified as this subspecies have been frequently found from Hateruma-jima of Yaeyama islands of Japan in recent years, suggesting that it may be temporarily established on this island.

Troides aeacus is regarded as a species in the category III “Other Conservation-

Deserving Wildlife" listed by the Council of Agriculture, Taiwan, ROC (http://conservation.forest.gov.tw/File.aspx?fno=67075).

形態特徵：成蝶前翅長 55–82mm。雌雄二型性明顯。雄蝶 (圖 1)：頭被毛、黑褐色，頭頂疏被紅色毛。觸角黑褐色略帶灰色。口吻黑褐色。下唇鬚短，具有褐色毛。胸部黑褐色，側面具有紅色毛。腹部底色黃色，背部具有一系列橫條紋，前端生有紅色毛；側面有一列黑色縱走斑列。腹部第 3 到 5 節背面具有淺褐色發香鱗區。抱器外表面覆有白色鱗片。足呈黑褐色。領片黑褐色，前緣紅色；翅基片黑褐色。前翅先端銳尖，外緣近平直。後翅外緣略波狀。後翅內緣具褶，內含細的綿毛狀米黃色發香鱗。沿著後翅外緣具有硬毛刷狀淺褐色鱗片。前翅背面黑褐色，沿翅脈有灰色條紋。前翅腹面與背面相似，沿翅脈之條紋更鮮明。後翅背面底色為半透明之黃色；翅室末端具有黑色楔狀斑，後端黑色楔狀斑靠內緣處常模糊。翅脈黑色。後翅腹面與背面相同，楔狀斑界限明顯。雌蝶 (圖 2)：頭部、胸部特徵同雄蝶，腹部背面單一黑褐色，腹面有一列黑褐色橫斑。後翅無褶。相較於雄蝶，雌蝶前翅沿翅脈分布之條紋更為鮮明。後翅有大型黑色楔狀斑向內插入，黑色外緣較寬闊。

雄交尾器 (圖 94)：偽鉤突朝末端漸尖並形成一個強烈下彎小鉤。背兜側突似一對向背側隆起小丘，具剛毛。基腹弧略彎曲。囊突膨大且短。抱器葉狀，末端明顯形成一指狀突。抱握鋏高度骨化，形成延長的靴狀骨板，背緣平滑，末端及腹緣後半部鋸齒狀。陽莖膨大向下彎曲，背腹略扁平。

雌交尾器 (圖 134)：交尾囊卵狀，具許多縱皺褶。交尾囊管細、膜質。花壁高度特化；前交尾孔板形成一大型中度骨化凹袋，並具有一對高度骨化圓頂狀構造；後交尾孔板為一對骨化凹陷，中央具有一馬蹄形骨片。肛突寬闊、半圓形。後內骨突長度與肛突略等長，前端葉狀。

世界分布：東巴基斯坦、喜馬拉雅地區、中南半島、蘇門答臘、華西、華南、華東及臺灣 (Racheli & Cotton, 2010)。

臺灣分布：亞種 ssp. *kaguya* 分布於臺灣。本種主要棲息於臺灣低地，包括綠島 (Hsu, 2013)。

幼蟲寄主植物：馬兜鈴科港口馬兜鈴、臺灣馬兜鈴、蜂窠馬兜鈴、瓜葉馬兜鈴。

生物學：本種目前已知為一年多世代性物種 (Hsu, 2013)，終年可見成蝶活動，但冬季在較為寒冷的地區可能以蛹態過冬 (Hsu, 1999)。

註記：黃裳鳳蝶臺灣亞種學名應使用 *formosanus* Rothchild, 1899 還是 *kaguya* Nakahara & Esaki, 1930 近年頗多爭議。Nakahara & Esaki (1930) 以裳鳳蝶屬在當時被視為鳳蝶屬的亞屬為由，認為 *formosanus* Rothchild, 1899 成為無尾白紋鳳蝶臺灣亞種 *Papilio castor formosana* Rothchild, 1896 的異物同名，因此提出替代名 *kaguya* 取代，Haugum & Low (1985) 指出此一情形實際上涉及的是次異物同名，不應取代，因此主張維持使用 *formosanus* Rothchild, 1899。然而，依據國際動物命名法規 59.3 條規定，1961 年以前被取代的異物同名均視為非適用名，從而黃裳鳳蝶臺灣亞種學名仍應使用 *kaguya* Nakahara & Esaki, 1930。

亞種 ssp. *kaguya* 長久以來被認為是臺灣特有亞種，但近年來在日本八重山群島的波照間島所發現的個體，經鑑定屬於此亞種，推測本亞種可能在該島上建立暫行性的族群。

根據臺灣行政院農委會公告，黃裳鳳蝶目前列為保育類三級的「其他應予保護之野生動物」(http://conservation.forest.gov.tw/File.aspx?fno=67075) 。

Troides magellanus (C. & R. Felder, 1862) (珠光裳鳳蝶 / 珠光鳳蝶 / 蘭嶼黃裳鳳蝶 / 螢光裳鳳蝶)

Ornithopus magellanus C. & R. Felder, 1862: Wiener entomologische monatschrift 6 (9): 282. (Type locality: “Babuyanae (Camiguin); Luzon”.)

Troides magellanus apoensis Okano & Ohkura, 1978: Artes Liberales 23: 174. (Type locality: “Mt. Apo, Southern Mindanao”, [Philippines])

Troides magellanus leyteanus Okano & Ohkura, 1983: Artes Liberales 32: 189. (Type locality: “Leyte, Philippines”)

Ssp. *sonani* Matsumura, 1932

PLATE 1, fig. 3; PLATE 2, fig. 4; PLATE 21, fig. 94; PLATE 31, figs. 134

Troides magellanus f. *sonani* Matsumura, 1931: 6000 Illustrated Insects Japan-Empire: 459. (Type locality: “Taiwan, Kotosho”)[nomen nudum]

Troides magellanus f. *sonani* Matsumura, 1932: Insecta Matsumurana 6: 199.

Specimens examined:

TAIDONG [= TAITUNG] Co.: 1♀, Lanyu, 10. X. 1999; 1♂, same locality, 10. X. 2000; 1♀, same locality, emgd. 12. X. 2004; 1♀, same locality, 19. III. 2006; 1♂, same

locality, 10. IV. 2006; 2♂, 2♀, same locality, 23. VIII. 2012, reared from *Aristolochia zollingeriana*, emgd. 27. X. 2012/28. II. 2013; 1♂, same locality, 27. V. 2013 (genitalia preparation JYL099); 1♀, Lanyu, Sidaogou, 18. IV. 2006 (genitalia preparation JYL096).

Description. Adult – Forewing length 70-95 mm. Sexual dimorphism prominent. Male (PLATE 1, fig. 3): Head hairy, dark brown. Antennae dark brown. Proboscis dark brown. Labial palpus short, bearing brown hairs. Body dark brown, bearing red hairs laterally. Abdomen with ground color yellow, with black scaling laterally, more extensive toward caudal end; T1 bearing long, brown and red hairs dorsally and laterally; a longitudinal row of black dots present laterally. Pale brown androconial patches present on A3-5 dorsally. Valvae with outer surface covered by creamy white scaling, covered with some dark scaling. Legs dark brown. Patagia dark brown edged with bright red anteriorly; tegula dark brown. Forewing apex somewhat acute, termen nearly straight, slightly wavy in some individuals. Hingwing termen slightly wavy. A fold present along dorsum of hindwing, containing fine, wool-like, creamy yellow androconia. Stiff, brush-like, pale brown scales present along hindwing dorsum. Forewing uppersides black brown, with prominent yellowish white stripes along veins. Forewing undersides similar to uppersides, with stripes along veins further prominent. Hindwing uppersides with ground color semi-transparent yellow, opalescent at certain angle; a black band with wedge-shaped indentation along termen. Veins black. Hindwing undersides as uppersides. Female (PLATE 2, fig. 4): Head and thorax as those of male. Abdomen light gray to creamy yellow, sometimes covered by extensive black scaling, a series of black brown, transverse spots present ventrally. No fold on hindwing. Forewing with stripes along veins more prominent than those of males. Hindwing with yellow patch confined to a proximal position, with a series of yellow lunules submarginally; no opalescence in yellow markings.

Male gentalia (PLATE 21, fig. 95) – Pseuduncus strongly down-curved, beak-like, pointed at distal end. Socii setose, as a pair of processes with dorsal bumps. Vinculum slightly bent. Saccus enlarged, short. Valva lobe-like, bearing a weakly produced process caudad; harpe represented as heavily sclerotized, broad, elongate piece, with dorsal margin nearly straight, distal and ventral margin serrate. Phallus stout, short, down-curved.

Female genitalia (PLATE 31, fig. 135) – Corpus bursae oval, with many longitudinal folds. Ductus bursae thick, membranous. Signum highly modified; lamella antevaginalis forming a large moderately sclerotized pouch containing a pair of heavily sclerotized dome-like structures; lamella postvaginalis as a patch of weakly sclerotized wall with a medial, horseshoe-shaped sclerite. Anal papillae broad, semi-circular. Posterior apophyses shorter than length of anal papillae, slightly enlarged cephalad.

Global distribution. Philippines and Lanyu of Taiwan (Racheli & Cotton, 2010).

Distribution in Taiwan. Ssp. *sonani*, if recognized, occurs in Lanyu, Taiwan (Hsu, 2013).

Larval Host plant(s). Aristolochiaceae: *Aristolochia zollingeriana* (as *A. kankoensis*, Sonan, 1939).

Biology. This species is known to be multivoltine in occurrence, on the wing throughout the year (Hsu, 2006).

Remarks. Infraspecific taxonomy of this famous swallowtail still lacks consensus among researchers. For instance, Tsukada & Nishiyama (1982) recognized three subspecies: ssp. *magellanus* of northern Philippines, ssp. *apoensis* of southern Philippines, and ssp. *sonani* from Lanyu. Haugum & Low (1985) distinguished only two geographical races, ssp. *magellanus* for all Phlippines and ssp. *sonani* for Lanyu. D'Aberea (1982) considered all populations belong to the nominotypical subspecies, and speculated the population found in Taiwan [Lanyu] may be introduced for commercial reason. However, as Haugum & Low (1985) pointed out, no commercial enterprise was operating in 1930s when Matsumura's type series were collected from Lanyu.

Troides magellanus is regarded as a species in the category category I "Endangered Species" listed by the Council of Agriculture, Taiwan, ROC (http://conservation.forest.gov.tw/File.aspx?fno=67075).

形態特徵：成蟲前翅長 70–95mm。雌雄二型性明顯。雄蝶 (圖 3)：頭具毛、黑褐色，觸角黑褐色。口器黑褐色，下唇鬚短，具褐色毛。體黑褐色，體側具紅毛。腹部底色黃色，側面有黑色鱗片並向末端延伸。前胸背面及側面具有褐色及紅色長毛，側面沿體軸方向有一列黑點。腹部第 3 到 5 腹節背面具有淺褐色發香鱗區塊。抱器外側具有米白色鱗片，並覆蓋一些黑色鱗片。足黑褐色。領片黑褐色，前端具鮮紅色緣，翅基片黑褐色。前翅翅端尖銳，外緣近直線，部分個體略呈波狀。後翅外緣略為波狀。後翅沿內緣具內緣褶，內含細綿毛狀米黃色發香鱗。沿後翅前緣具有硬毛刷狀淺褐色鱗片。前翅背面黑褐色，沿翅脈有黃白色條紋。前翅腹面與背面相似，沿翅脈之條紋更鮮明。後翅背面底色為半透明之黃色，在某些角度則呈乳白色；沿翅外緣有一條黑色且具楔形的鋸齒狀條帶。翅脈黑色。後翅腹面與背面相同。雌蝶 (圖 4)：頭部、胸部特徵同雄蝶，腹部淺灰色至米黃色，有時泛佈著黑色鱗片。腹面有一列列黑褐色橫斑。後翅無翅褶。相較於雄蝶，雌蝶前翅沿翅脈分布之條紋更為鮮明。後翅黃色斑塊侷限於翅基部區域，亞外緣有一排黃色月形紋；雌蝶的黃色斑紋缺乏螢光。

雄交尾器 (圖 95)：假鉤突明顯下彎、喙狀、末端尖銳。背兜側突具剛毛，具一對背面隆起突出。基腹弧略彎曲。囊突膨大且短。抱器葉狀，略向末端延伸突出；抱握鋏寬闊長骨片，高度骨化，背緣近平直，末端及腹面邊緣鋸齒狀。陽莖粗壯且短，向下彎曲。

雌交尾器 (圖 135)：交尾囊卵狀，具多縱皺褶。交尾囊管細、膜質。花壁高度特化；前交尾孔板形成一大型中度骨化凹袋，並具有一對高度骨化之圓頂狀構造；後交尾孔板輕微骨化，中間具有一馬蹄狀骨片。肛突寬闊、半圓形。後內骨突長度較肛突短，前端略膨大。

世界分布：菲律賓及臺灣蘭嶼 (Racheli & Cotton, 2010)。

臺灣地區分布狀況：亞種 ssp. *sonani* 分布於臺東蘭嶼島 (Hsu, 2013)。

幼蟲寄主植物：馬兜鈴科之港口馬兜鈴。

生物學：本種目前已知為多世代性物種，終年可見成蝶活動 (Hsu, 2006)。

註記：珠光裳鳳蝶此一著名物種的種內分類處理在不同學者仍缺乏一致的共識。例

如 Tsukada & Nishiyama (1982) 認定有三個亞種：菲律賓北部的 ssp. *magellanus*、菲律賓南部的 ssp. *apoensis* 及蘭嶼的 ssp. *sonani*。Haugum & Low (1985) 認為只有兩個亞種，即菲律賓全域為 ssp. *magellanus* 以及蘭嶼的 ssp. *sonani*。D'Aberea (1982) 則認為所有族群都屬於承名亞種，並認為臺灣 (蘭嶼) 的族群是因為商業用途而引進。然而，如同 Haugum & Low (1985) 指出，在 1930 年代松村松年的模式標本系列採自蘭嶼的那個時期，尚未有任何關於蝴蝶的商業組織存在，因此珠光裳鳳蝶不可能是藉由人為方式引入蘭嶼的。

根據臺灣行政院農業委員會公告，珠光裳鳳蝶目前列為保育類一級的瀕危物種 (http://conservation.forest.gov.tw/File.aspx?fno=67075)。

Genus *PACHLIOPTA* Reakirt, [1865]

Type species: *Papilio diphilus* Esper, 1793

Racheli & Cotton (2010) listed the following diagnostic characters for this genus: 1) valva much reduced except for sacculus and clasper [harpe]; 2) uncus hypertrophied; 3) male 8th tergite and tegumen widely separated; 4) two portions of uncus [socii] separated medially; 5) vein 1A+2A [of hindwing] short; 6) no deciduous androconial scales. Some additional characters are shared with *Losaria* Moore, [1902], which is sometimes considered as subgenus of *Pachliopta* (e. g. Miller, 1987): pseuduncus small; transverse suture of pseuduncus absent; aedeagus [phallus] thin and heavily sclerotized; saccus elongate.

This taxon is sometimes considered as a subgenus (e. g. Hancock, 1980, 1983) or a synonym (e. g. Hancock, 1988) of *Atrophaneura*. It remains a distinct genus in some recent treatments (e. g. Miller, 1987; Braby *et al.*, 2005; Racheli & Cotton, 2009), and followed in the present work.

The genus contains about 16 species in Oriental and Australian Regions (Häuser, 2005).

In Taiwan, only one species is known.

珠鳳蝶屬

Racheli & Cotton (2010) 列出本屬的形態特徵如下：1) 抱器瓣除了抱器腹及抱握鋏以外明顯退化；2) 鉤突肥大；3) 雄性第 8 腹節背板與背兜分離；4) 鉤突 [背兜側突] 從中央分離成兩部分；5) 後翅 1A+2A 臀脈短；6) 不具有脫落性發香鱗。另有些特徵與錘尾鳳蝶屬 (*Losaria* Moore, [1902]) 共有，此屬在某些學者的分類處理上被視為珠鳳蝶屬的 1 個亞屬 (例如 Miller, 1987)，這些特徵為：偽鉤突小；偽鉤突無橫向縫線；陽莖器細且高度骨化；囊突長。

此分類群有時被一些分類學者認為是曙鳳蝶屬 *Atrophaneura* 的 1 個亞屬 (例如 Hancock, 1980, 1983) 或者同物異名 (Hancock, 1988)。現今有些文獻的分類處理上仍保留其為 1 獨立屬，本誌依循此處理。

本屬大約有 16 種，分布在東洋區及澳洲區 (Häuser, 2005)。

在臺灣已知僅有 1 種。

Pachliopta aristolochiae **(Fabricius, 1775) (紅珠鳳蝶 / 紅紋鳳蝶)**

Papilio aristolochiae Fabricius, 1775: Systema Entomologiae: 443. (Type locality: “Indiae orientalis”)

Papilio diphilus Esper, 1793: Die ausländischen Schmetterlinge: 156. (Type locality: not stated)

Ssp. *interposita* Fruhstorfer, 1904

PLATE 2, figs. 5-6; PLATE 21, fig. 95; PLATE 31, fig. 135

Papilio aristolochiae interpositus Fruhstorfer, 1904: Berliner entomologische Zeitschrift 49: 197. (Type locality: “Formosa”)

Papilio aristolochiae formosensis Rebel, 1906: Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien 56: 222. (Type locality: “Formosa”)

Papilio aristolochiae rhodopis Rothschild, 1908: Novitates Zoologicae 15(1): 167. (Type locality: “Loo Choo Islands”)

Specimens examined:

TAIPEI CITY: 2♂, Wenshan, Gongguan campus, NTNU, 21. IX. 2014, reared from *Aristolochia* sp., emgd. 23. IX. 2014, HSU 14J45 (L. H. Wang); 1♀, same locality, 11. X. 2014 (L. Huang); 1♂, same locality, 15. X. 2014 (L. Huang); 1♂, same locality, 1. XII. 2014 (L. Huang) (genitalia preparation JYL095); 1♀, same locality, 5. XII. 2014

(L. Huang); 1♂, same locality, 29. IV. 2015, reared from *A. shimadai*, emgd. 27. V. 2015 (L. Huang); 2♀, same locality, 2. VI. 2015 (L. Huang) (genitalia preparation JYL081, JYL052). **TAIZHONG CITY [= TAICHUNG CITY/ TAICHUNG Co.]:** 1♀, 12. III. 2005 (L. H. Wang). **ZHANGHUA [= CHUNGHUA] Co.:** 1♀, Baguashan, 7. III. 2005, (L. H. Wang). **TAIDING [= TAITUNG] Co.:** 1♂, Lanyu, 30. V. 2004; 1♂, Lanyu, Sidaogou, 16/18. III. 2012 (Y. F. Hsu & H. C. Huang); 1♂, same locality, 14. XI. 2013, reared from *A. zollingeriana* (C. L. Huang); 1♂, 1♀, Lanyu, Shuangshiyan, reared from *A. zollingeriana*, emgd. 4/14. VI. 2014, HSU 14E14 (L. H. Wang & Y. M. Hsu).

Description. Adult – Forewing length 35-41 mm. Sexual dimorphism not recognizable except a fold present along hindwing dorsum in male. Male (PLATE 2, fig. 5): Head hairy, red in color. Antennae dark brown. Proboscis dark brown. Labial palpus short, bearing red hairs. Body dark brown dorsally, red ventrally, with a prominent brown patch in thorax; a longitudinal row of black dots present laterally and a row of black bars ventrally on abdomen. Legs dark brown. Patagia dark brown edged with red; tegula dark brown, bearing some red hairs basad. Forewing apex rounded, termen nearly straight. Hingwing termen wavy, with a prominent, lobe-like project at M_3 distad. A narrow fold present along dorsum of hindwing, containing long, bristle-like, gray androconia. Forewing uppersides ground color pale brown, frequently darker proximally; prominent dark stripes present between veins. Four dark brown stripes in discoidal cell. Forewing undersides similar to uppersides but ground color of outer half paler, gray in color. Hindwing uppersides with ground color dark brown, somewhat glossy. A series of faint, pink spots dusted by dark brown scalings present submarginally. Prominent, white spot in cell M_1, M_2, M_3 and CuA_1, forming a white band. Additional white spot in CuA_2 distad, usually dusted with red scalings. Hindwing undersides with pattern similar to uppersides, but pink spots not dusted by brown scalings. Female (PLATE 2, fig. 6): Head and body as those of male. No fold on hindwing. Ground color of wings paler than that of male. Pink spots on hindwing uppersides usually paler than those in male.

Male gentalia (PLATE 21, fig. 96) – Pseuduncus represented as a short extension with caudal margin wavy. Socii forming large, sclerotized stricture with bump-like processes bearing stiff, short spines. Vinculum large, curved. Tegumen membranous dorsad. Saccus as a prominent flap. Valva highly modified, as a setose flap with obtuse distal margin;

sacculus forming a large, flat ventral piece; harpe forming a prominent, conical, horn-like structure. Phallus elongate, straight, with a ventral keel caudad.

Female genitalia (PLATE 31, fig. 136) – Corpus bursae oval, with bee-hive network on wall. Ductus bursae membranous, with caudal end forming a sclerotized tube surrounding ostium bursae. Signum weakly sclerotized, granular, forming concentric folds surrounding a small sclerotized band. Sterigma as a sclerotized dome surrounding ostium bursae. Anal papillae broad, semi-circular. Posterior apophyses sigmoid, slightly longer than length of anal papillae.

Global distribution. Southeast Afghanistan, East Pakistan, North and South India, Southeast Myanmar, Sri Lanka, Thailand, Laos, Vietnam, Nicobar islands, Andaman islands, Malay Peninsula, Indonesia, Japan (Yaeyama islands), Philippines (Batan islands), West and Southwest to East China, and Taiwan (Page & Treadaway, 2003; Racheli & Cotton, 2010; Hsu, 2013).

Distribution in Taiwan. Populations in Taiwan belongs to ssp. *interpositus*, which is also distributed in Yaeyama islands of Japan and Batan islands of the Philippines. In Taiwan, this species is mostly found from lowlands to hills below 500 m in elevation, but sometimes up to 1000 m (Hsu, 2013).

Larval Host plant(s). Aristolochiaceae: *Aristolochia zollingeriana* (Aristolochiaceae) (as *A. tagala kankauensis*, Chang 1964) and *A. shimadai* (Lee, 1990; Lee & Wang, 1997). *A. cucurbitifolia*, *A. foveolata* [as *A. kaoi*], and cultivated *A. elegans* in captivity (Lee, 1990).

Biology. This species is known to be multivoltine in occurrence (Hsu, 2013), on the wing throughout the year, but may overwinter as pupae in areas cold in winter (Hsu, 1999).

形態特徵：成蝶前翅長 35–41mm。除了雄性後翅內緣具褶之外，雌雄二型性不明顯。雄蝶 (圖 5)：頭被毛、紅色。觸角黑褐色。口吻黑褐色。下唇鬚短，具紅色毛。身體背部黑褐色，腹面紅色，胸部具明顯褐色區塊；腹部側面具一縱列黑斑，腹面則有黑色條帶。足呈黑褐色。領片黑褐色，邊緣紅色；翅基片黑褐色，基部具些許紅

色毛。前翅先端圓鈍，外緣近平直。後翅外緣波狀，於 M_3 脈末端具一明顯葉狀突。後翅內緣具一狹窄翅褶，內有灰色長刺毛狀之發香鱗。前翅背面底色淺褐色，靠近身體處顏色較深。翅脈之間有明顯黑色條紋。中室內具四條黑褐色條紋。前翅腹面與背面相似，但底色於外半部呈較淺的灰色。後翅背面底色黑褐色，有時有光澤。亞外緣具有一列不鮮明的桃紅色斑，其內散佈黑褐色鱗片。M_1、M_2、M_3 及 CuA_1 室各具有一明顯白斑，形成一白色帶。CuA_2 室末端亦有白斑，其內通常散佈紅色鱗片。後翅腹面與背面翅紋相似，但桃紅色斑內無褐色鱗片散佈。雌蝶 (圖 6)：頭部與身體與雄蝶相同。後翅無翅褶。翅底色較雄蝶淺。後翅背面的桃紅色斑通常較雄蝶淺。

雄交尾器 (圖 96)：偽鉤突短，末端波狀。背兜側突形成一大型骨化隆起構造，具短硬刺。基腹弧大且彎曲。背兜背部膜質。囊突片狀。抱器高度特化，板狀、多毛，末端圓鈍；抱器腹形成一大而平整腹片；抱握鋏形成一圓錐形角狀構造。陽莖長且直，腹面末端呈龍脊狀。

雌交尾器 (圖 136)：交尾囊卵狀，壁上具有蜂窩狀網絡。交尾囊管膜質，末端形成一骨化管圍繞交尾孔。花壁輕度骨化、顆粒狀，形成同心圓褶紋圍繞一小骨化帶。交尾孔板呈骨化半球狀包圍交尾孔。肛突寬闊半圓形。後內骨突呈 S 形，略長於肛突。

世界分布：阿富汗東南、東巴基斯坦、印度北部及南部、緬甸東南、斯里蘭卡、泰國、寮國、越南、尼科巴群島、安達曼群島、馬來半島、印尼、日本 (八重山群島)、菲律賓 (巴丹島)、華西南至東部及臺灣 (Page & Treadaway, 2003; Racheli & Cotton, 2010; Hsu, 2013)。

臺灣分布：臺灣的族群屬於亞種 ssp. *interpositus*，也分布在日本八重山群島、菲律賓的巴丹島。臺灣地區本種大多分布在海拔 500 公尺以下的低地山區，但有時候也出現在海拔 1000 公尺以上的地方 (Hsu, 2013)。

幼蟲寄主植物：馬兜鈴科的港口馬兜鈴、臺灣馬兜鈴、瓜葉馬兜鈴、蜂窩馬兜鈴，亦可利用栽培的彩花馬兜鈴 (Lee, 1990)。

生物學：本種為一年多世代種類，終年可見成蝶活動 (Hsu, 2013)，但在較寒冷的地區冬季以蛹態過冬 (Hsu, 1999)。

Genus *BYASA* Reakirt, [1865]

Type species: *Papilio philoxenus* Gray, 1831

Racheli & Cotton (2010) listed the following diagnostic characters for this genus: Adults from small to medium size; anteena curved; sexes similar or females buffish brown; forewing black; hindwing long, scalloped, with spatulate tail sometimes tipped with red; upperside hindwing discal whitish spots and/or red/yellow submarginal crescents; underside hindwing like upperside hindwing but red/yellow submarginal spots larger and brighter; male with white, grey or blackish wooly scent organ; valvae broadly rounded; invagination dorsal to ostium fused to membrane; ostium fluted. Most of these characters are clearly not synapomorphies for the genus, requiring further evaluation.

Byasa is sometimes considered as a subgenus within *Parides* Hübner, 1819 (e. g. Miller, 1987; Fujioka, 1997), but this viewpoint is not supported by recent molecular works (e. g. Braby *et al.*, 2005). It is also included in the genus *Atrophaneura* in some literature (e. g. Braby *et al.*, 2005). Häuser *et al.* (2005) and Racheli & Cotton (2010) still recognize *Byasa* as a distinct genus, and this viewpoint is tentatively accepted in the present work.

麝鳳蝶屬

Racheli & Cotton (2010) 列出本屬的形態特徵如下：成蝶小至中型；觸角彎曲；雌雄相似或雌蝶暗黃褐色；前翅黑色；後翅長，邊緣波狀扇形，具匙狀尾突，末端有時有紅斑；後翅背面中央具有白斑與 (或) 紅色 (或黃色) 亞外緣新月紋；後翅腹面與背面相似但紅色 (或黃色) 亞外緣斑較大且鮮明；雄蝶具有白色、灰色或黑色毛狀發香器；抱器闊而圓；交尾孔背面的內褶癒合入膜質部內；交尾孔具凹槽。這些特徵很明顯地大多不是本屬的共衍徵，因此需要進一步評估。

麝鳳蝶屬 *Byasa* 有時被視為番鳳蝶屬 *Parides* Hübner, 1819 的 1 個亞屬 (例如 Miller, 1987；Fujioka, 1997)，但此一觀點並不受晚近分子証據所支持 (例如 Braby *et al.*, 2005)。在某些研究中本屬也被包含在曙鳳蝶屬 *Atrophaneura* 內 (例如 Braby *et al.*, 2005)。Häuser *et al.* (2005) 及 Racheli & Cotton (2010) 仍認為麝鳳蝶屬為 1 個獨立屬，本誌暫時採用此觀點。

Byasa confusus (Rothschild, 1895)(麝鳳蝶 / 南麝鳳蝶 / 麝香鳳蝶 / 麝馨鳳蝶)

Papilio alcinous mencius form *confusus* Rothschild, 1895: Novitates Zoologicae 2:269. (Type locality: "China", fixed as "Wa-ssu-Kow, Sichuan" by Racheli & Cotton, 2010)

Papilio confusus var. *decora* Oberthür, 1907: Bulletin de la Société entomologique de France 1907: 138. (Type locality: "Taho; Tatsienlou" [Sichuan, China])

Papilio confusus var. *parvummaculatus* Draeseke, 1923: Deutsche entomologische Zeitschrift, Iris 37: 56. (Type locality: "Wassekou")

Ssp. *mansonensis* Fruhstorfer, 1901

PLATE 2, figs. 7-8; PLATE 21, fig. 96; PLATE 31, fig. 136

Papilio alcinous mansonensis Fruhstorfer, 1901: Soc. Ent. 16(15): 113. (Type locality: "Tonkin, Than-Moi…Nord Tokin und Man Son Gebirge" [Vietnam])

Papilio alcinous mausonensis Fruhstorfer, 1902: Berliner Entomologische Zeitschrift 47: 171. (invalid emendation)

Specimens examined:

XINZHU [= HSINCHU] Co.: 1♂, 1♀, Zhudong, 17. IX. 2004, reared from *Aristolochia shimadai*, emgd. 27. X. 2004, HSU 04J17.3 (L. H. Wang); 1♂, Zhudong, 11. VI. 2006 (Y. F. Hsu); 1♀, same locality, 7. VIII. 2006 (Y. F. Hsu); 1♀, same locality, 1. II. 2007, reared from *A. shimadai*, emgd. 5. III. 2007, HSU 07B1 (L. H. Wang); 1♀, same locality, 22. I. 2007, reared from *A. shimadai*, emgd. 22. II. 2007, HSU 07A49 (Y. F. Hsu); 1♀, same locality, 26. VII. 2008, reared from *A. shimadai*, emgd. 7. VIII. 2008, HSU 08G23 (Y. F. Hsu); 1♂, Guanxi, 18. VI. 2008, (Y. F. Hsu); 1♂, Baoshan, Shanhu, 27. XII. 2008, reared from *A. shimadai*, emgd. 5. III. 2009, HSU 08M28 (Y. F. Hsu & C. C. Lu). **ZHANGHUA [= CHUNGHUA] Co.:** 1♂, Baguashan, 28. V. 2006, reared from *A. shimadai*, emgd. 3. VII. 2006, 06E35 (L. H. Wang& L. W. Wu). **TAINAN CITY [= TAINAN Co.]:** 1♀, Xinhua, 26. VII. 2007, reared from *A. shimadai*, emgd. 5. VIII. 2007, HSU 07G25 (Y. F. Hsu). **JINMEN [= KINMEN] Co.:** 1♂, Kinmen Botanical Garden, 13. V. 2013 (C. L. Huang); 1♂, same locality, 7. VI. 2014 (C. L. Huang & H. C. Huang); 1♂, same locality, 7. VI. 2014 (C. L. Huang) (genitalia preparation JYL142); 1♂, same locality, same collected date, reared from *A. mollis*, emgd. 23. VI. 2014, HSU 14F23 (C. L. Huang & H. C. Huang); 2♀, same locality, 14. VIII. 2015 (C. L. Huang) (genitalia preparation JYL128, JYL129).

Description. Adult – Forewing length 45-50 mm. Sexual dimorphism prominent. Male (PLATE 2, fig. 7): Head hairy, pink mixed with brown. Antennae dark brown. Proboscis dark brown. Labial palpus short, bearing pink hairs. Body dark brown dorsally, pink

ventrally, with a prominent brown patch in thorax; a longitudinal row of black dots present laterally and a row of black bars ventrally on abdomen. Legs dark brown. Patagia and tegula dark brown with some pink hairs. Forewing termen nearly straight. Hingwing termen wavy, with a prominent tail-like project at M_3. A fold present along dorsum of hindwing, containing fine, pale brown, androconia. Forewing uppersides dark brown, slightly tinged with indigo. Forewing undersides pale brown with dark brown stripes between veins. Four dark brown, fine stripes in discoidal cell, with 2nd and 3rd ones fused proximally, 3rd joining 4th one mesad. Hindwing uppersides dark brown, slightly tinged with indigo, with area near fold brown. A fold present along dorsum of hindwing, containing fine, dark brown androconia. A series of obscure, pink lunules present along termen. Hindwing undersides dark brown, with prominent pink lunules present distally in each cell. A series of 4 inner and 3 outer dark brown spots in this pink patch. Female (PLATE 2, fig. 8): Head and body as those of male. No fold on hindwing. Wing uppersides mostly yellowish grey, with prominent dark brown stripes on forewing; outer half dark brown, forming serrate edge on hindwing. Lunules along termen prominent, pink tinged with gray. Wing undersides similar to those of male, but with lunules more prominent.

Male gentalia (PLATE 21, fig. 97) – Pseuduncus narrow, elongate, pointed at distal end. Socii short, densely setose. Vinculum narrow, slightly bent anteriad. Saccus enlarged. Valva lobe-like, rounded; harpe represented as elongate, blade-like sclerite with prominent, pointed, distal tooth. Phallus stout, down-curved, flattened dorso-ventrally.

Female genitalia (PLATE 31, fig. 137) – Corpus bursae oval. Ductus bursae thick, membranous. Signum as an elongate band, lanceolate, wrinkled, granular, well over 1/2X of length of corpus bursae. Sterigma well-developed, forming sclerotized dome, with ostium bursae surrounded by sclerotized wall. Anal papillae broad, semi-circular. Posterior apophyses slender, bent near base.

Global distribution. North Vietnam, West, Central and East China and Taiwan (Racheli & Cotton, 2010). Ssp. *mansonensis* occurs in eastern part of its range.

Distribution in Taiwan. Mostly found in low land and hills in northern and western Taiwan west of the Central Mountain Range below 500 m (Hsu, 2013). Also found in Kinmen islands.

Larval Host plant(s). *Aristolochia shimadai* (Aristolochiaceae)(as *A. heterophylla*, Lee & Wang 1997)(Hsu, 2013) under natural condition. In captivity, *A. zollingeriana* (Chang , 1964) and *A. elegans* (Lee, 1990) may be accepted. Populations in Kinmen Islands utilize *A. mollis* (Chang, 2012).

Biology. This species is known to be multivoltine in occurrence, on the wing throughout the year, but overwinters as pupae in areas cold in winter (Hsu, 1999).

Remarks. *B. confusus* is usually regarded as a subspecies or a synonym of of *Byasa alcinous* Klug, 1836, but comparison of genitalia and molecular data by Kato & Yagi (2004) suggests these two taxa probably represent two distinct species. Racheli & Cotton (2010) accept this viewpoint and considered *Byasa alcinous* a species confined to areas surrounding the Sea of Japan.

The author and publication date for the name *confusus* was given as Jordan, 1896 by Racheli & Cotton (2010) based on the concept that Rothchild (1985) described the name as an aberration and unavailable. However, Rothchild (1985) indeed described the name as a “form”, and according to article 45.6.4 of ICZN, a form described before 1961 is recognized as subspecific and available.

形態特徵：成蝶 (圖 7) 前翅長 45–50 mm。雌雄二型性明顯。雄蝶頭部被毛、桃紅色混雜褐色。觸角黑褐色。口器黑褐色，下唇鬚短，具有桃紅色毛。身體背面黑褐色，腹面桃紅色，胸部具有一明顯褐色毛叢。腹部沿體軸側面具一列黑色斑點，腹面具有一列黑色紋。足呈黑褐色，領片及翅基片黑褐色並具有些許桃紅色毛。前翅外緣近筆直。後翅外緣波狀，於 M_3 脈具一明顯延伸的尾突。後翅內緣具有內緣褶，內有細小淺褐色發香鱗。前翅背面黑褐色，略帶有靛藍色調。前翅腹面淺褐色，翅脈間具有黑褐色條紋。中室具有四條黑褐色細條紋，第二及第三條於基部癒合，第三條連接至第四條中間。後翅背面黑褐色，略帶靛藍色調，接近翅褶處褐色。後翅沿內

緣具一褶，內含黑褐色細小發香鱗，外緣具一排鮮明的桃紅色弧形紋。後翅腹面黑褐色，各翅室末端有桃紅色弧形紋。桃紅色文中有一列四只褐色紋組成之內側斑列及三只褐色紋組成之外側斑列。雌蝶 (圖 8)：頭部與身體與雄蝶相似。後翅內緣無褶。翅背面幾乎呈黃灰色，前翅具明顯黑褐色條紋；後翅外半部黑褐色形成鋸齒狀。弧形紋沿外側排列，桃紅色帶有灰色調。翅腹面與雄蝶相似，但弧形紋較鮮明。

雄交尾器 (圖 97)：偽鉤突窄，延長至末端呈尖銳。背兜側突短，密生剛毛。基腹弧狹長，前端略彎曲。囊突膨大。抱器葉狀，圓鈍；抱握鋏為一延長葉狀骨板，末端具明顯尖銳鋸齒。陽莖膨大下彎，背腹扁平。

雌交尾器 (圖 137)：交尾囊卵狀。交尾囊管細，膜質，花壁為一披針狀長帶，具皺紋及顆粒狀，長度超過交尾囊二分之一倍。交尾孔板發達，形成骨化半球，於交尾孔周圍呈骨化壁。肛突寬闊、半圓形。後內骨突細長，基部彎曲。

世界分布：越南北部、華西、華中、華東及臺灣。亞種 *mansonensis* 見於在分布範圍東部。

臺灣分布：本種大多分布於臺灣北部及西部低地山區，主要在中央山脈以西 500 公尺以下區域，亦見於金門島。

寄主植物：幼蟲在自然狀況下取食馬兜鈴科的臺灣馬兜鈴。在飼育環境下可能取食港口馬兜鈴及彩花馬兜鈴，金門的族群則利用柔毛馬兜鈴。

生物學：本種是一年多世代種類，終年可見成蝶活動，在冬季較寒冷的地區以蛹越冬 (Hsu, 1999)。

註 記：*B. confusus* 常被視為 *B. alcinous* Klug, 1836 的 1 個亞種或同物異名，但 Kato & Yagi (2004) 比較交尾器及分子生物學資料，認為兩者為 2 個獨立種。Racheli & Cotton (2010) 接受此觀點，並認為 *B. alcinous* 僅侷限分布在日本海週邊地區。

Racheli & Cotton (2010) 認為 Rothchild (1985) 發表學名 *confusus* 時將之視為異常型 (abrration)，並認為不適用，而將 *confusus* 的作者及發表年代歸於 Jordan, 1896。Rothchild (1985) 其實發表時是將 *confusus* 視為一型 (form)，而根據國際動

物命名規約 45.6.4 條，發表於 1961 年的 form 可視為亞種，因而為適用名。

Byasa impediens (Rothscild, 1895) (長尾麝鳳蝶 / 臺灣麝香鳳蝶)

Papilio alcinous mencius form *impediens* Rothschild, 1895: Novitates Zoologicae 2: 269. (Type locality: "Ta-tsien-lu" [Kangding, Sichuan, China])

Papilio alcinous impediens Seitz, 1907: Die Gross-Schmetterlinge der Erde 1: 9. (Type locality: "Ta-tsien-lu" [Sichuan, China], fixed as "Washan" by Racheli & Cotton, 201. Holotype in NHM))

Papilio imperius Fruhstofer, 1901: Societas Entomologica 16(15): 113. (incorrect subsequent spelling)

Ssp. *febanus* Fruhstorfer, 1908

PLATE 3, figs. 9-10; PLATE 22, fig. 97; PLATE 32, fig. 137

Pap. alcinous febanus Fruhstorfer, 1908: Entomologische Zeitschrift 22(11): 46. (Type locality: "Formosa, Suishasee")

Papilio jonasi Rothschild, 1908: Novitates Zoologicae 15: 168. (Type locality: "Northern Formosa")

Papilio (Pharmacophagus) koannania Matsumura, [1908]: Transaction of Sapporo Natural History Society 2: 67. (Type locality: "Formosa (Shinsha, Kanshirei (Koannania))")

Specimens examined:

TAOYUAN CITY [= TAOYUAN Co.]: 1♂, 1♀, Fuxing, Xuanyuan, Northern Cross-Island Way 53K, 30. V. 2015 (W. J. Lin, C. J. Chang & C. W. Huang) (genitalia preparation JYL098). **XINZHU [= HSINCHU] Co.:** 1♀, Baoshan, Shanhu, 27. XII. 2008, reared from *Aristolochia shimadai*, emgd. 12. II. 2009, HSU 08M28.2 (Y. F. Hsu & C. C. Lu). **NANTOU Co.:** 1♀, Lugu, Fonghuanggu Bird Park, 2. XII. 2013 (W. J. Lin); 1♂, same locality, 15. VI. 2015 (Y. C. Lin) (genitalia preparation JYL074); 1♀, Xinyi, Dongpu, 1500m, 16. V. 2011 (L. W. Wu). **ZHANGHUA [= CHUNGHUA] Co.:** 1♀, Baguashan, 11. III. 1998, emgd. 12. IV. 1998 (S. C. Chen); 1♂, same locality, 29. IV. 2001, emgd. 2. V. 2001 (L. W. Wu); 1♂, NCUE campus, 7. IV. 2001, emgd. 9. V. 2001 (J. M. Wu).

Description. Adult – Forewing length 39-48 mm. Sexual dimorphism weakly recognizable. Male (PLATE 3, fig. 9): Head hairy, pink mixed with brown. Antennae dark brown. Proboscis dark brown. Labial palpus short, bearing pink hairs. Body dark brown dorsally, pink ventrally, with a prominent brown patch in thorax; a longitudinal row of black dots present laterally and a row of black bars ventrally on abdomen. Legs

dark brown. Patagia and tegula dark brown with some pink hairs. Forewing termen nearly straight or slightly convex. Hingwing termen wavy, with a prominent, long, tail-like project at M_3. A fold present along dorsum of hindwing, containing fine, grayish white androconia. Forewing uppersides pale dark brown, with dark stripes between veins. Four dark brown stripes in discoidal cell, with 3rd joining 4th one proximally. Forewing undersides as uppersides except paler in ground color. Hindwing uppersides dark brown, somewhat glossy. A series of prominent, pink or pinkish yellow lunules present along termen. Hindwing undersides as uppersides but lunules further enlarged, with additional small pink spot usually in cell M_3 proximally. Female (PLATE 3, fig. 10): Head and body as those of male. No fold on hindwing. Hindwing uppersides with basal half paler. Lunules along termen usually larger than those in males. Wing undersides as uppersides but basal half not paler.

Male gentalia (PLATE 22, fig. 98) – Pseuduncus narrow, elongate,down-curved, beak-like, pointed at distal end. Socii short, setose. Vinculum narrow, bent caudad. Saccus enlarged. Valva lobe-like, rounded; harpe represented as elongate, serrate blade-like sclerite with prominent triangular ventral projection. Phallus stout, straight, flattened dorso-ventrally.

Female genitalia (PLATE 32, fig. 138) – Corpus bursae oval. Ductus bursae thick, membranous. Signum as an elongate band, rod-shaped, wrinkled, granular, approximate 1/2X of length of corpus bursae. Sterigma well-developed, forming sclerotized dome, with ostium bursae surrounded by sclerotized wall. Anal papillae broad, semi-circular. Posterior apophyses slender, bent.

Global distribution. West, Central and East China and Taiwan (Racheli & Cotton, 2010). Ssp. *febanus* is considered endemic to Taiwan. Records of *febanus* in eastern China (e. g. Lee & Wang, 1995) requires further verification.

Distribution in Taiwan. Found from low to middle elevations in Taiwan up to 2500 m (Hsu, 2013).

Larval Host plant(s). Aristolochiaceae: *Aristolochia shimadai* (Chang, 1972), *A. cucurbitifolia* (Hsu, 2013), *A. zollingeriana*, and *A. foveolata* (Lee & Wang, 1995).

Biology. This species is known to be multivoltine in occurrence (Hsu, 2013), on the wing throughout the year, but overwinters as pupae in areas cold in winter (Hsu, 1999).

Remarks. Ssp. *febanus* was long considered as a distinct species endemic to Taiwan (e. g. Shirôzu, 1960), but Jordan (1920) pointed out that no difference may be recognized between male genitalia of *febanus* and *impediens*.

The author and publication date for the name *impediens* was given as Seitz, 1907 by Fujioka (1997) and Racheli & Cotton (2010) based on the concept that Rothchild (1985) described the name as an aberration and unavailable. However, Rothchild (1985) actually described the name as a "form", and according to article 45.6.4 of ICZN, a form described before 1961 is recognized as subspecific and available.

形態特徵：成蝶前翅長 39–48 mm。雌雄二型性略有之。雄蝶 (圖 9)：頭部具毛叢、桃紅色混雜褐色。觸角黑褐色。口器黑褐色，下唇鬚短，具有桃紅色毛。身體背面黑褐色，腹面桃紅色，胸部具有一明顯褐色毛叢。腹部沿體軸側面具一列黑色斑點，腹面具有一列黑色紋。胸足黑褐色，領片及翅基片黑褐色並具有些許桃紅色毛。前翅外緣近筆直或略圓凸。後翅外緣波狀，於 M_3 脈具一明顯延伸的長尾突。後翅內緣具有內緣褶，內有細小的灰白色發香鱗。前翅背面淺黑褐色，翅脈間具有深色帶。中室具有四條黑褐色帶 , 第三及第四條一端相連。前翅腹面與背面類似，惟底色較淺。後翅背面黑褐色，有時具光澤，沿外緣有一排明顯桃紅色或略帶桃紅的黃色弧形紋。後翅腹面如同背面，但弧形紋變大，且鄰近 M_3 室端處通常有一額外的桃紅色小斑點。雌蝶 (圖 10)：頭部與身體與雄蝶相似。後翅內緣無褶。後翅背面靠基半部顏色較淺，外緣的弧形紋通常較雄蝶大。翅腹面同背面，翅面色彩均勻。

雄交尾器 (圖 98)：偽鉤突狹窄，長而向下彎曲，呈喙狀指向後端。背兜側突短，具許多剛毛。基腹弧狹長，尾部彎曲。囊突膨大。抱器瓣狀、圓形；抱握鋏長、鋸齒狀，形成刀刃狀之骨板，腹面具有三角狀突出。陽莖粗壯、筆直，背腹扁平。

雌交尾器 (圖 138)：交尾囊卵狀，交尾囊管細，膜質。花壁如同一膨大條棒狀，具皺褶及顆粒狀，長度約莫為交尾囊二分之一倍。交尾孔板高度骨化，形成一骨化圓頂，於交尾孔周圍呈骨化壁。 肛突寬，半圓形，後內骨突細長，彎曲。

世界分布：分布包括華西、華中至華東及臺灣 (Racheli & Cotton, 2010)。亞種

febanus 被視為臺灣特有亞種。亦有文獻記載 *febanus* 分布於中國東部 (例如 Lee & Wang, 1995)，此記錄有待進一步確定。

臺灣分布：自低海拔到中海拔皆可發現，最高分布至海拔 2500 公尺。

寄主植物：馬兜鈴科之臺灣馬兜鈴、瓜葉馬兜鈴、港口馬兜鈴及蜂窩馬兜鈴。

生物學：本種發生期為一年多世代 (Hsu, 2013)，終年可見成蟲，冬季於寒冷地區以蛹態越冬 (Hsu, 1999)。

註記：Ssp. *febanus* 長久以來被視為是臺灣特有種 (例如 Shirôzu, 1960)。然而 Jordan (1920) 早已指出 *febanus* 及 *impediens* 2 亞種的雄蟲交尾器彼此之間並無可辨識確認的差異。

Fujioka (1997) 及 Racheli & Cotton (2010) 認為 Rothchild (1985) 發表學名 *impediens* 時將之視為異常型 (abrration)，並認為不適用，而將 *impediens* 的作者及發表年代歸於 Seitz, 1907。Rothchild (1985) 其實發表時是將 *impediens* 視為一型 (form)，而根據國際動物命名規約 45.6.4 條，發表於 1961 年的 form 可視為亞種，因而為適用名。

Byasa polyeuctes (Doubleday, 1842) (多姿麝鳳蝶 / 大紅紋鳳蝶)

Papilio polyeuctes Doubleday, 1842: The zoological miscellany 2: 74. (Type locality: “Silhet” [Sylhet, Bangladesh])

Papilio philoxenus hostilius Fruhstofer, 1908: Entomologische Zeitschrift 22: 72. (Type locality: ”S.-Annam, Plateau von Lang-Bian”) (Homonym of *Papilio hostilius* Felder & Felder, 1861)

Papilio philoxenus var. *polymitis* Tytler, 1912: Journal of the Bombay Natural History Society 21: 589. (Type locality: “Naga Hills”) (nomen nudum)

Papilio nepenthes Ehrmann, 1920: Bulletin of the Brooklyn Entomological Society 15: 21. (Type locality: “South East Assam”.)

Ssp. *termessus* Fruhstorfer, 1908

PLATE 3, fig. 11; PLATE 4, fig. 12; PLATE 22, fig. 98; PLATE 32, fig. 138

Papilio philoxenus termessus Fruhstorfer, 1908: Entomologische Zeitschrift 22(11): 46. (Type locality: “Formosa, Kagi”)

Specimens examined:

TAIZHONG CITY [= TAICHUNG CITY/ TAIZHONG Co.]: 1♀, Heping,

Basianshan, 17. VIII. 2015 (H. C. Huang) (genitalia preparation JYL127). **HUALIAN [= HUALIEN] Co.:** 1♂, Xiulin, Shikongzai trail, 25. IV. 2008, emgd. 18. V. 2008, HSU 08D17 (L. H. Wang); 1♂, Xiulin, Asia Cement Garden, 17. III. 2015, emgd. 20. IV. 2015, HSU 15C20 (L. H. Wang); 1♀, Fuyuan Forest Recreation Area, 17. X. 2015 (genitalia preparation JYL134). **NANTOU Co.:** 1♀, Xinyi, Dongpu, 1500m, 16. V. 2011 (L. W. Wu); 1♂, Renai, Tunyuan, 26. X. 2015 (L. H. Wang) (genitalia preparation JYL135). **ZHANGHUA [= CHUNGHUA] Co.:** 1♀, Baguashan, 4. IV. 2004, HSU 04D59 (C. M. Wu). **TAINAN CITY [= TAINAN Co.]:** 2♀, Xinhua, 200m, 20. I. 2007, reared from *Aristolochia shimadai*, emgd. 8/10. II. 2007, HSU 07A27 (Y. F. Hsu); 4♂, 3♀, same locality, 21. I. 2008, reared from *A. shimadai*, emgd. 4. II/3. III. 2008, HSU 08A16 (Y. F. Hsu); 1♀, same locality, 17. II. 2008, reared from *A. shimadai,* emgd. 3. III. 2008, HSU 08B17 (Y. F. Hsu); 1♂, same locality, 12. III. 2013, reared from *A. shimadai,* emgd. 18. III. 2013, HSU 13C17 (Y. F. Hsu); 1♀, same locality, 4. III. 2014, reared from *A. shimadai*, emgd. 28. IV. 2014, HSU 14C11 (Y. F. Hsu); 1♀, Xinhua, Dakeng, 1. I. 2007, reared from *A. shimadai*, emgd. 23. I. 2007, HSU 07A1 (Y. F. Hsu).

Description. Adult – Forewing length 39-48 mm. Sexual dimorphism weakly recognizable. Male (PLATE 3, fig. 11): Head hairy, red in color. Antennae dark brown. Proboscis dark brown. Labial palpus short, bearing red hairs. Body dark brown dorsally, red ventrally, with a prominent brown patch in thorax; a longitudinal row of black dots present laterally and a row of black bars ventrally on abdomen. Legs dark brown. Patagia dark brown edged with red; tegula dark brown, bearing some red hairs basad. Forewing apex rounded, termen nearly straight. Hingwing termen wavy, with a prominent, long, lobe-like project at M_3. A fold present along dorsum of hindwing, containing fine, gray androconia. Forewing uppersides pale brown, with dark stripes between veins. Four dark brown stripes in discoidal cell. Forewing undersides as uppersides. Hindwing uppersides with ground color dark brown, somewhat glossy. Wavy, red markings present submarginally in cell M_2, M_3, CuA_1. A large, proximal, white spot in cell M_1, a small, proximal, white spot in cell M_2. Both spot sometimes tinged with pink. A prominent red spot in “tail”-like projection. Hindwing undersides as uppersides, with red markings slightly larger. An additional red band extending from white spots toward dorsum. Female (PLATE 4, fig. 12): Head and body as those of male. No fold on hindwing. Hindwing uppersides with basal half slightly paler. Additional white or pink markings

extending from white spots toward dorsum.

Male gentalia (PLATE 22, fig. 99) – Pseuduncus narrow, elongate, down-curved, beak-like, pointed at distal end. Socii short, setose. Vinculum narrow, slightly bent anteriad. Saccus enlarged. Valva lobe-like, rounded; harpe represented as elongate, blade-like sclerite with prominent triangular, ventral projection, which bears small teeth along dorsal ridge. Phallus stout, down-curved, flattened dorso-ventrally.

Female genitalia (PLATE 32, figs. 139) – Corpus bursae oval. Ductus bursae thick, membranous. Signum as an elongate band, lanceolate, wrinkled, granular, approximate 1/2X of length of corpus bursae. Sterigma well-developed, forming sclerotized dome, with ostium bursae surrounded by sclerotized wall. Anal papillae broad, semi-circular. Posterior apophyses slender, bent near base.

Global distribution. East Pakistan, Northwest to Northeast India, Nepal, Bhutan, Myanmar, Thailand, Laos, Vietnam, West and Southwest China (Sichuan, Yunnan, Guizhou), and Taiwan (Racheli & Cotton, 2010).

Distribution in Taiwan. Ssp. *termessus* is considered endemic to Taiwan. This species is found from lowlands to middle elevations up to 2700 m in Taiwan (Igarashi & Fukuda, 1997).

Larval Host plant(s). Aristolochiaceae: *Aristolochia shimadai* (Chang, 1972); *A. zollingeriana* (Hamano, 1987); *A. cucurbitifolia*, and *A. foveolata* (Lee & Chang, 1988).

Biology. This species is known to be multivoltine in occurrence (Hsu, 2013), on the wing throughout the year, but may overwinter as pupae in areas cold in winter (Hsu, 1999).

Remarks. In Taiwan, this species is the only swallowtail species possessing a prominent red spot in “tail”-like projection of hindwing.

形態特徵：成蝶前翅長 39–48mm。雌雄二型性略有之。雄蝶 (圖 11)：頭被毛、紅色。觸角黑褐色。口吻黑褐色。下唇鬚短，具紅色毛。身體背部黑褐色，腹部紅色，胸部具有一明顯褐色區塊；腹部側面有縱向黑色斑，腹面有一列黑色條帶。足呈黑褐色。領片黑褐色，邊緣紅色；翅基片黑褐色，基部具有一些紅色毛。前翅先端圓鈍，外緣近平直。後翅外緣波狀，於 M_3 脈具一明顯長的葉狀突。後翅沿內緣具一褶，內具細小灰色發香鱗。前翅背面淺褐色，翅脈間具深色條紋。中室具有四條黑褐色條紋。前翅腹面與背面相同。後翅背面底色黑褐色，有時有光澤，在 M_2、M_3、CuA_1 室亞外緣具紅色波狀斑紋。M_1 室近基部有一大型白色斑，M_2 室近基部則有一小型白色斑。兩個斑有時帶有桃紅色調。尾狀延伸有一明顯的紅斑。後翅腹面與背面相同，紅斑較背面者略大，另有一紅色條帶自白斑延伸至內緣。雌蝶 (圖 12)：頭部與軀體同雄蝶。後翅無內緣褶。後翅背面基部半部略淺色，另有白色或桃紅色斑紋自白斑延伸至內緣。

雄交尾器 (圖 99)：偽鉤突狹長下彎，鳥喙狀，末端尖銳。背兜側突短，具剛毛。基腹弧狹窄，前端微彎曲。囊突膨大。抱器葉狀，圓鈍；抱握鋏長葉片狀骨板，腹面具明顯三角狀延長，背脊具小齒。陽莖粗，下彎，背腹扁平。

雌交尾器 (圖 139)：交尾囊卵狀。交尾囊管細，膜質。花壁為披針狀長帶，具皺紋及顆粒狀，長度約交尾囊二分之一。交尾孔板發達，形成骨化半球，於交尾孔周圍呈骨化壁。肛突寬闊半圓形。後內骨突細長，基部彎曲。

世界分布：巴基斯坦東部、印度西北部及東北部、尼泊爾、不丹、緬甸、泰國、寮國、越南、華西、華西南 (四川、雲南、貴州)，以及臺灣。

臺灣分布：亞種 *termessus* 被視為臺灣特有亞種。本種從臺灣低地至中海拔乃至 2700 公尺皆可見。

寄主植物：馬兜鈴科的臺灣馬兜鈴、港口馬兜鈴、瓜葉馬兜鈴及蜂窩馬兜鈴。

生物學：本種已知為一年多世代種類，終年可見成蝶活動，在冬季較冷的地區可能以蛹態越冬 (Hsu, 1999)。

註記：在臺灣，本種是後翅具尾突的鳳蝶當中唯一尾突上有紅斑的種類。

Genus *ATROPHANEURA* Reakirt, [1865]

Type species: *Papilio erythrosoma* Reakirt, [1865] by monotypy

Racheli & Cotton (2010) listed the following diagnostic characters for this genus: Strong sexual dimorphism; patagia and abdomen pink or red; hindwing tailless, or in one species with a short projection at vein 4 [M_2], with or without white, cream or red spots; male blackish, often with a blue sheen; hindwing scent-fold of the male very broad and rolled up, when fully expanded with or without long hairs at the edge of tornus; hindwing outer margin of space 1a and 1b [CuA_1 and CuA_2] straight and much longer than in *Byasa*; valva distally emarginated or flat; small spiny processes along the edge of valva; female larger with blackish white striped forewings and hindwings with different coloration. Most of these characters are clearly not synapomorphies for the genus, requiring further evaluation.

The status of *Atrophaneura* varies tremendously in the views of different authors. Some authors placed it under *Parides* Hübner, 1819 (e. g. Monroe, 1961; Fujioka, 1997). Some authors recognize it a distinct genus, but others prefer a more inclusive, "sensu lato" *Atrophaneura*, containing most smaller *Aristolochia*-feeding swallowtails excluding those "birdwing" genera (e. g. Braby *et al.*, 2005). Häuser *et al.* (2005) and Racheli & Cotton (2010) retain *Atrophaneura* as a distinct genus but prefer a "sensu stricto" treatment, containing 12 species. This view is provisionally followed herein.

The genus *Atrophaneura sensu* Häuser *et al.* (2005) and Racheli & Cotton (2010) ranges in in the Oriental and Palearctic Region.

In Taiwan, only one endemic species is known.

曙鳳蝶屬

Racheli & Cotton (2010) 列出本屬以下形態特徵：具明顯雌雄二型性；領片和腹部桃紅色或紅色；後翅通常無尾突，惟有一個種類在第 4 條脈 [M_2] 有短突出，有

或無乳白色或紅色斑；雄蝶黑色，常具有一種藍色光澤；雄蝶後翅發香褶很寬且上捲，完全展開後後緣具有或不具有長毛；後翅 1a 及 1b 室 [CuA_1 and CuA_2] 外緣筆直，比麝鳳蝶屬長；抱器後端微凹或扁平；沿抱器邊緣有小針狀突起；雌蝶體型較大，黑色，前翅具有白色條紋，後翅色彩不同。這些特徵大部分明顯並非這個屬的共衍徵，因此屬的共衍徵須進一步評估。

曙鳳蝶屬的分類地位在不同學者的觀點變化很大。有些學者將它置於番鳳蝶屬 *Parides* Hübner, 1819 內 (例如 Monroe, 1961; Fujioka, 1997) ; 有些研究者認為它是一個獨立的屬，有的研究者則偏好使用較有包含性的「廣義曙鳳蝶屬」，包含了許多較小型且幼蟲取食馬兜領屬植物的鳳蝶，但不包括與「鳥翼蝶類」相關的屬 (例如 Braby *et al.*, 2005)。Häuser *et al.* (2005) 及 Racheli & Cotton (2010) 保留曙鳳蝶為 1 獨立的屬但偏向狹義屬之分類處理，底下包含了 12 個種，目前本誌採用此一觀點。

根據 Häuser *et al.* (2005) and Racheli & Cotton (2010) 所界定的曙鳳蝶屬，本屬分布在東洋區和舊北區。

在臺灣已知僅有 1 種特有種。

Atrophaneura horishana (Matsumura, 1910) (曙鳳蝶)

PLATE 4, figs. 13-14; PLATE 22, fig. 99; PLATE 32, fig. 139

Papilio horishanus Matsumura, 1910: Entomologische Zeitschrift, Stuttgart 23: 209. (Type locality: "Horisha, Formosa")

Papilio sauteri Heyne, 1913: Supplementa entomologica 2: 68. (Type locality: "Suisharyo and Hoozan, Formosa")

Specimens examined:

HUALIAN [= HUALIEN] Co.: 1♂, Bilu, 2200m, 15. VIII. 1987; 1♀, Xiulin, Shikongzai, 14. XII. 2008. **NANTOU Co.:** 1♀, Renai, Songgang, 21. III . 2000; 1♂, Renai, Songgang, collecting date missing, emgd. 5. XI. 2005; 1♂, Renai, Biluxi, emgd. 1. IV. 2006; 1♂, Renai, Tunyuan, 22. IX. 2015 (genitalia preparation JYL133); 1♀, Renai, Biluxi, collecting date missing (genitalia preparation JYL86).

Description. Adult – Forewing length 65-70 mm. Sexual dimorphism prominent. Male (PLATE 4, fig. 13): Head hairy, pink but with dark brown dorsally. Antennae dark brown.

Proboscis dark brown. Labial palpus short, bearing pink hairs. Body dark brown dorsally, pink ventrally, with a prominent brown patch in thorax; a longitudinal row of black dots present laterally and a row of black bars ventrally on abdomen. Legs dark brown. Patagia and tegula dark brown. Forewing termen nearly straight. Hingwing termen wavy. A fold present along dorsum of hindwing, containing fine, white, androconia. Forewing uppersides dark brown, slightly tinged with indigo. Forewing undersides pale brown with dark brown stripes along veins. Four dark brown, fine stripes in discoidal cell, with 2nd and 3rd ones fused proximally, fork-like. Hindwing uppersides dark brown, slightly tinged with indigo, with area near fold gray. Hindwing undersides dark brown, with a prominent pink patch present distally. A series of 4 inner and 3 outer dark brown spots in this pink patch. Female (PLATE 4, fig. 14): Head and body as those of male. No fold on hindwing. Wing uppersides mostly yellowish grey, with dark brown stripes on forewing; two series of dark brown spots on hindwing. Wing undersides similar to those of male, but with paler ground color on forewing.

Male gentalia (PLATE 22, fig. 100) – Pseuduncus narrow, elongate, strongly down-curved, hook-like, pointed at distal end. Socii short, setose. Vinculum narrow. Saccus enlarged. Valva lobe-like, bearing two processes; dorsal one smaller, pointed; caudal one larger, blunt; harpe represented as elongate, curved rib bearing two large teeth dorsally, a small tooth mesad, a serrate lobe ventrally. Phallus stout, short, down-curved, flattened dorso-ventrally.

Female genitalia (PLATE 32, fig. 140) –Corpus bursae oval. Ductus bursae thick, membranous. Signum as an elongate band, rod-like, wrinkled, granular, approximate 1/2X of length of corpus bursae. Sterigma well-developed, forming sclerotized dome, with ostium bursae surrounded by sclerotized wall. Anal papillae broad, semi-circular. Posterior apophyses slender, straight.

Global distribution. Endemic to Taiwan.

Distribution in Taiwan. Montane areas of higher elevations mostly between 1000 to 2500 m. Sometimes at lower elevations down to 300 m in spring and autumn (Hsu, 2013).

Larval Host plant(s). Aristolochiaeae: *Aristolochia shimadai* (Chang, 1972).

Biology. This species is known to be univoltine in occurrence, on the wing from April to December. It overwinters as non-diapausing larva (Hsu, 1999).

Remarks. This swallowtail is one of the symbolic butterflies to Taiwan because it is a conspicuous, large-sized, pretty species endemic to Taiwan. The wing pattern of this species is unique, with no species resembling to it. Shirôzu (1985) considered *Atrophaneura sycorax* (Grose-Smith, 1885) of Indochina and Sundaland as its putative sister species.

Atrophaneura horishana is regarded as a species in the category III "Other Conservation-Deserving Wildlife" listed by the Council of Agriculture, Taiwan, ROC (http://conservation.forest.gov.tw/File.aspx?fno=67075).

形態特徵：成蝶前翅長 65–70 mm。具明顯雌雄二型性。雄蟲 (圖 13)：頭部被黑褐色夾雜桃紅色毛。 觸角黑褐色。口器黑褐色，下唇鬚短且被桃紅毛。身體背面黑褐色，腹面桃紅色，胸部具明顯的褐色斑塊。腹部體側具一縱列黑點，腹面則有一列黑色條紋。足部黑褐色。領片、肩板黑褐色。前翅外緣近筆直；後翅外緣波狀，內緣摺內密生白色細小發香鱗。前翅背面黑褐色，帶有靛藍色；前翅腹面淺褐色沿翅脈具黑褐色條狀斑，中室內有四條黑褐色細條斑，其中第二及第三條近翅基處聚合成叉狀。後翅背面黑褐色泛些微靛藍色光澤，近內緣摺處呈灰色。後翅腹面黑褐色，末端有明顯桃紅色區塊並鑲嵌兩列黑褐色斑點，靠內側列四枚，外側三枚。雌蟲 (圖 14)：頭部及身體與雄蟲相似，後翅無內緣摺。翅背面近黃灰色，前翅具黑褐色條斑；後翅有兩列黑褐色斑點，翅腹面與雄蝶相似但前翅底色較雄蝶淺。

雄蟲生殖器 (圖 100)：偽鉤突狹窄長，向下彎曲而末端呈鉤狀。背兜側突短，具剛毛。基腹弧狹窄。囊突膨大。抱器葉狀，具一對突起，背側突起較小且尖銳；近後端突起較大且鈍。抱握鋏長而彎曲，背脊有兩個大型齒突，中間有小齒突，腹面呈鋸齒狀葉。陽莖粗短，向下彎曲且背腹扁平。

雌蟲生殖器 (圖 140)：交尾囊卵狀。交尾囊管厚膜質。花壁長，桿狀，具皺褶及顆粒，約為交尾囊的一半長。交尾孔板發達，形成一骨化圓頂，於交尾孔周圍呈骨化壁。

肛突寬，半圓形。後內骨突細，直。

世界分布：本種為臺灣特有種。

臺灣分布：分布在島內山區海拔 1000 至 2500 公尺之間。有時春季和秋季能在海拔低至 300 公尺處發現。

寄主植物：馬兜鈴科的臺灣馬兜鈴。

生物學：本種已知為一年一世代，成蝶發生期自四月至十二月，以非休眠滯育之幼蟲越冬 (Hsu, 1999)。

註記：本種鳳蝶大型、顯眼且美麗，又為臺灣特有種，可說是臺灣的代表性蝴蝶之一，而其翅紋獨特，也沒有與其相似的物種。Shirôzu (1985) 認為分布於中南半島及巽他陸塊的巫曙鳳蝶 *Atrophaneura sycorax* (Grose-Smith, 1885) 可能是本種的姐妹種。

根據臺灣行政院農業委員會公告，曙鳳蝶目前列為保育類三級的「其他應予保護之野生動物」(http://conservation.forest.gov.tw/File.aspx?fno=67075)。

Tribe LEPTOCIRCINI Kirby, 1896

Type genus: *Leptocircus* [Swaison]

Miller (1987) states that Leptocircini (called Graphiini) was the most strongly supported of any tribe in Papilionidae, and listed a few putative synapmorphies that render support for monophyly of the tribe: 1) antennae scaled; 2) tentorial crests high; 3) cross-vein between Rs and M_1 of hindwing sinuate; 4) aedeagus bell-shaped at base: 5) dorsolateral sclerite of valve articulated; 6) dorsal bristlelike scales present basally on ventral anal margin of male hind wing; 7) first instar larvae with bifid setae on thoracic and abdominal segments; 8) pupa with lateral ridges extending from cremaster to head; 9) papillae anales with peglike setae.

The members of this tribe has a worldwide distribution, mostly in the tropical and subtropical zones. There are more than 140 species known. The host plants of this tribe include plants in the family Lauraceae, Magnoliaceae, Annonaceae, Hemandiaceae, etc.

The boundary of the tribe vary depending on different authors, with *Meandrusa* and *Teinopalpus* sometimes included, a treatment not supported by recent work based on molecular data (e. g. Simonsen *et al.*, 2011). Boundaries of genera within this tribe also vary in literature, with many taxa included in *Graphium* in recent works assigned to a few different genera. In the present work, we tentatively follow the treatments by Häuser *et al.* (2005).

In Taiwan, a total of 6 species in 1 genera (2 in many literature) are included in this work.

燕鳳蝶族

Miller (1987) 指出燕鳳蝶族 (又稱青鳳蝶族) 比鳳蝶科其他個族有更多支持其單系性的證據，並列出一些可能的共衍徵為其單系群依據，包括：1) 觸角具鱗片；2) 幕狀骨高位；3) 後翅 Rs 和 M_1 脈之間的交叉脈呈波狀；4) 陽莖基呈鐘狀；5) 抱器

背側方骨片具關節；6) 雄蝶後翅臀緣腹面具剛毛狀鱗片；7) 一齡幼蟲胸部及腹部具二分叉剛毛；8) 蛹體具側脊自垂懸器延伸至頭部；9) 肛突具栓狀剛毛。

本族成員廣佈世界各地，大多分布在熱帶及亞熱帶地區，已知超過 140 種。本族幼蟲寄主植物包括樟科、木蘭科、番荔枝科、蓮葉桐科等。

不同學者對本族的界限看法不一，有些人將 *Meandrusa* 和 *Teinopalpus* 置於本族，但此一處理並未受到分子証據所支持 (例如 Simonsen *et al.*, 2011)。本族內各屬的界限也因不同文獻而異，包含在青鳳蝶屬 *Graphium* 的種類在晚近的研究常被置於一些不同的屬。本誌目前暫時依據 Häuser *et al.* (2005) 的分類處理。

本誌記載描述臺灣地區本族共 1 屬 6 種 (許多文獻分為 2 屬)。

Genus *GRAPHIUM* Scopoli, 1777

Type species: *Papilio sarpedon* Linnaeus, 1758

Miller (1987) listed nine synapomorphies to support monophyly of the genus: 1) vein R_1 of forewing anastomosed with Sc; 2) juxta with setae; 3) clasper [harpe] composed of three parts; 4) tegumen with lateral horns. 5) distal opening of aedeagus dorsal in position; 6) female genitalia with cuplike process; 7) ostium with ventral central structure and paired lateral lobes; 8) short tubercles present on 2nd and 3rd thoracic segments and 10th abdominal segment of final instar larvae; 9) valve with teeth on distal margin.

The taxon *Pazala* Moore, 1888 (Type species: *Papilio glycerion* Gray, 1831), regarded as a distinct genus in many literature (e. g. Igarashi, 1979; Hsu, 2013), was considered a subgenus by Miller (1987) and followed by Racheli & Cotton (2010), and adopted in the present work.

In Taiwan, 6 species in two subgenus (4 in *Graphium*, 2 in *Pazala*) are recognized.

青鳳蝶屬

Miller (1987) 列出 9 項共衍徵作為本屬為一單系群的支持証據：1) 前翅 R_1 脈與 Sc 脈接合；2) 陽基軛片具毛；3) 抱握鋏由三個部分組成；4) 背兜具側角；5) 陽莖器末端開口位於背側；6) 雌交尾器具有杯狀延伸；7) 交尾孔具有腹面中央結構及一對側葉；8) 終齡幼蟲胸部第 2、第 3 節及腹部第 10 節具短肉棘；9) 抱器在末端邊緣具齒。

劍鳳蝶屬 *Pazala* Moore, 1888 (模式種 : *Papilio glycerion* Gray, 1831) 在許多文獻中被視為 1 獨立屬 (例如 Igarashi, 1979; Hsu, 2013)，然而 Miller (1987) 視其為青鳳蝶的 1 個亞屬，Racheli & Cotton (2010) 亦依此處理，本誌採用此一處理。

臺灣地區目前確認青鳳蝶屬有 2 亞屬共 6 種 (青鳳蝶亞屬 4 種，劍鳳蝶亞屬 2 種)。

Graphium (Graphium) sarpedon (Linnaeus, 1758) (青鳳蝶 / 青帶鳳蝶 / 青條鳳蝶)

Papilio (Eques) sarpedon Linnaeus, 1758: Systema Naturae (Edn 10) 1: 461. (Type locality: "Asia" [Canton, China].)

Papilio sarpedon var. *semifasciatus* Honrath, 1888: Entomologische Nachrichten 14 (11): 161. (Type locality: "Kiukiang (China)")

Papilio sarpedon luctatius Fruhstorfer, 1907: Entomologische Zeitschrift 21 (30): 183. (Type locality: "Natuna")

Papilio sarpedon melas Fruhstorfer, 1907: Entomologische Zeitschrift 21 (30): 183. (Type locality: "Tonkin")

Papilio sarpedon pagus Fruhstorfer, 1907: Entomologische Zeitschrift 21 (30): 183. (Type locality: "Mindoro")

Papilio sarpedon colus Fruhstorfer, 1907: Entomologische Zeitschrift 21 (30): 183. (Type locality: "Palawan")

Ssp. *connectens* Fruhstorfer, 1906

PLATE 5, figs. 15-16; PLATE 22, fig. 100; PLATE 32, fig. 140

Papilio sarpedon connectens Fruhstorfer, 1906: Societas Entomologica 21 (10): 73. (Type locality: "Formosa")

Ssp. *sarpedon* Linnaeus, 1758

PLATE 5, figs. 17-20; PLATE 23, fig. 101; PLATE 33, fig. 141

Specimens examined:

Ssp. *connectens*: **TAIPEI CITY:** 1♂, Wenshan, NTNU Gongguan campus, 24. I. 2009, reared from *Cinnamomum camphora*, emgd. 25. II. 2009, HSU 09A29 (Y. F. Hsu); 1♀, same locality, 8. I. 2012 (L. Huang); 1♀, same locality, 1. VIII. 2011 (Y. F. Hsu); 1♂, same locality, 4. V. 2012 (Y. F. Hsu); 1♂, same locality, 21. IV. 2014 (W. J. Lin); 1♂, Beitou, Qilianshan, 4. III. 2008 (Y. F. Hsu); 1♀, Nangang, Academia Sinica, 15. IV. 2015 (L. Huang) (genitalia preparation JYL053). **XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]:** 1♀, Bali, Guangyishan, 500m, 27. VII. 2001 (Z. H. Yen); 1♀, Shiding, Ergeshan, 25. V. 2004 (Y. F. Hsu); 1♂, Wulai, Tonghou, 13. II. 2005 (H. C. Huang); 1♂, Wulai, Fushan Research Station, ca 700m, 4/5. VII. 2006 (Y. F. Hsu & H. C. Huang); 1♂, Wulai, 2. III. 2007 (Y. F. Hsu); 1♂, Danshui, Erziping, ca 700m, 28. VI. 2012 (Y. F. Hsu). **YILAN Co.:** 1♂, Toucheng, Guishan Is. [= Guishandao], 4/5. III. 2006 (H. C. Huang & C. L. Huang). **TAOYUAN CITY [= TAOYUAN Co.]:** 1♂, Fuxing, Sule, 600m, 23. II. 2010 (Y. F. Hsu). **XINZHU [= HSINCHU] Co.:** 1♀, Baoshan, Shanhu, 27. XII. 2008, reared from *C. burmannii*, emgd. II. 17. 2009, HSU 08M32 (Y. F. Hsu & C. C. Lu). **MIAOLI Co.:** 1♂, Sanyi, 14. VI. 2001 (Y. T. Lo); 2♂, same locality, 7. VI. 2015

(L. Huang) (genitalia preparation JYL075). **TAIZHONG CITY [= TAICHUNG CITY/ TAICHUNG Co.]:** 1♀, Heping, Lileng, 8. X. 2000 (C. Y. Hung); 1♂, Qingshui, 21. V. 2011 (Y. F. Hsu). **NANTOU Co.:** 1♂, 1♀, Kuantaushan [= Guandaoshan], 500m, 30. IX. 2000, reared from *C. camphora*, emgd. X. 13/14. 2000 (C. Y. Hung); 1♀, Xinyi, Renlun Forest Trail, 25. IX. 2010, reared from *C. kanehirae*, emgd. 5. X. 2010 (N. Y. Tsai). **JIAYI [= CHIAYI] Co.:** 1♀, Fanlu, Chuko, ca 350m, 1 V. 2006 (Y. F. Hsu). **TAINAN CITY [= TAINAN Co.]:** 1♂, Xinhua, 27. VII. 2008, reared from *Machilus thunbergii*, emgd. 22. VIII. 2008, HSU 08A32 (Y. F. Hsu).

Ssp. *sarpedon*: **LIANJIANG [= LIENCHIANG] Co.:** Beigan, Bishan, 15. VI. 2000 (Y. F. Hsu); 1♂, Nangan, Jinsha, 26. VI. 2013, reared from *C. comphora*, emgd. 24. VII. 2013, HSU 13F60 (C. L. Huang & H. Y. Lee); 1♂, same locality, 20. VII. 2013 (C. L. Huang & H. Y. Lee); 1♀, same locality, 12. X. 2014 (H. Y. Lee & C. W. Huang); 1♀, Nangan, Shengtian Park, 27. VI. 2013 (C. L. Huang & H. Y. Lee) (genitalia preparation JYL114); 1♀, same locality, 21. VII. 2013 (C. L. Huang & H. Y. Lee); 1♀, Beigan, Wusha, 19. VII. 2013 (C. L. Huang & H. Y. Lee). **JINMEN [= KINMEN] Co.:** 2♂, 2♀, Wuhushan, 6/7. VII. 2001, emgd. 30. VIII/6. IX. 2001; 7♂, 3♀, Jinhu, Shenshiqiao, 27/28. V. 2011 (Y. F. Hsu & H. C. Huang); 1♂, same locality, 28/29. VII. 2011 (Y. F. Hsu & H. C. Huang); 1♂, same locality, 12. V. 2013 (C. L. Huang); 1♂, Zhongshanlin, 7. VI. 2014 (C. L. Huang & H. C. Huang) (genitalia preparation JYL113).

Description. Adult – Forewing length 35–41 mm. Male (PLATE 5, figs. 15, 17, 18): Head hairy, white mixed with long, brown hairs on frons, brown dorsally. Antennae dark brown, clavate distad. Proboscis dark brown. Labial palpus white, sparsely mixed with few brown hairs. Thorax covered by brown tinged with gray hairs dorally, white ventrally. Abdomen ground color brown tinged with gray; several narrow, longitudinal bands present: two subdorsal, white; two lateral, yellow; three ventral, white. Areas between ventral bands scattered with white scalings. Valvae with outer surface hairy, brown mixed with white. Legs bearing white hairs. Patagia, tegula brown. Forewing elongate, with costa convex, apex slightly produced. Hingwing termen wavy. A fold present along dorsum of hindwing, containing creamy yellow wools and long, white hairs. Forewing uppersides ground color brown. A series of semi-transparent, light blue discal spots present. Forewing undersides similar to uppersides, ground color paler, with

additional, faint, submarginal line. Hindwing uppersides ground color brown. Discal spots paler anteriorly. A series of semi-transparent, light blue, submarginal lunules present. Hindwing undersides with pattern similar to that of uppersides, but ground color paler, with medial area darkened. Short, red bars present near base, at distal end of discoidal cell, in cell M_2, M_3, CuA_1, CuA_2. Female (PLATE 5, figs. 16, 19, 20): Color patterns of body and wings similar to that of male. No fold on hindwing.

Two subspecies recognized: the nominotypical subspecies (PLATE 5, figs. 17-20) occurs in Jinmen and Matzu Islands, whereas ssp. *connectens* (PLATE 5, figs. 15-16) inhabits main island of Taiwan. The discal band of the former is usually wider than the latter, and frequently reduced in hindwing, a feature not seen in ssp. *connectens* except in very rare abnormal form. Besides, the size of the nominotypical race is usually larger than that of ssp. *connectens*.

Male gentalia (PLATE 22, fig. 101; PLATE 23, fig. 102) – Pseuduncus a short extension with caudal end truncated. Socii setose, triangular with blunt distal ends. Tegumen largely membranous. Vinculum slender, curved. Saccus considerably enlarged. Valva lobe-like with prominent indentation distad, bearing a row of small teeth along distal edge; two prominent processes on inner surface, one dorsal, one ventral; dorsal process longer, serrate, arm-like with a ventral fin; ventral process shorter, digitate or papillary; sacculus enlarged basad, moderately sclerotized. Phallus straight, aedeagus with dorsal portion largely membranous.

Female genitalia (PLATE 32, fig. 141; PLATE 33, fig. 142) – Corpus bursae oval. Ductus bursae with caudal end forming a sclerotized ring. Lamella antevaginalis a transverse, sclerotized piece. Signum as a prominent invaginated process densely covered by fine spines. Anal papillae broad, semi-circular, with basal portion thickened. Posterior apophyses longer than length of anal papillae, pole-like, clavate distad.

Variation. Much variation on extent of discal band exists in the nominotypical subspecies, with individuals showing prominent reduction in hindwing frequently called form *semifasciatus* Honrath. Reduction of discal band is rarely seen in ssp. *connectens*.

Global distribution. Eastern Himalayas, South India, Malay Peninsula, Indochina, Philippines, New Guinea, New Britain, Solomon Islands, Northeast Australia, West, South to East China, and Taiwan (Tsukada & Nishiyama, 1982).

Distribution in Taiwan. The nominotypical subspecies occurs in Jinmen Islands (Chen, 1974; Lee & Wang, 1995; Chang, 2011) and Mazu Islands (Lin *et al.*, 2003). Ssp. *connectens* occurs in main island of Taiwan (Hsu, 2013).

Larval Host plant(s). Lauraceae: *Cinnamomum camphora* (Hamano, 1987); *C. kanehirae* [or *C. micranthum*], *C. osmophloeum*, *C. osmophloeum* [as *C. japonicum*], *Machilus thunbergii* [as *Persea thunbergii*], *M. zuihoensis* [as *P. zuihoensis*], *M. japonica* [as *P. japonica*], *Litsea hypophaea* [as *Lit. kostermansii*], *Lindera glauca* (Lee & Chang, 1988); *C. verum* (Ho & Chang, 1998); *C. subavenium* (Hsu, 1999); *Lit. rotundifolia* (Lee, 2000); *Lit. akoensis* (Jan, 2012), and *C. burmannii* (Hsu, 2013). In Jinmen Islands: *C. comphora*, *Lit. glutinosa*, and *Lit. rotundifolia* are utilized (Hsu *et al.*, 2004).

Biology. This species is known to be multivoltine in occurrence (Hsu, 1999), on the wing in all months except winter (Hsu, 1999).

形態特徵：成蝶前翅長 35–41 mm。雄蝶 (圖 15、17、18) 頭部具白色毛叢，額區混褐色長毛，背面褐色。觸角黑褐色，末端棍棒狀。口器黑褐色。下唇鬚白色，稀疏被覆少量褐色毛。胸部背面褐色並具有灰色毛，腹面白色。腹部底色褐色，背部略帶灰色調，腹面白色，具數條細窄縱貫體側的條帶，兩條位於亞背線，白色；兩條位於側面，黃色；三條在腹面，白色，腹面條帶間具有白色鱗片。抱器瓣外側表面具毛，褐色混雜白色。步足具有白色毛。領片及翅基片褐色。前翅拉長，前緣凸，翅端輕微延長。後翅外緣波狀，沿後翅內緣具有褶，內有乳黃色絨毛及長白毛。前翅背面底色褐色，具一系列半透明亮藍色中央斑帶。前翅腹面與背面相似，底色較淡，額外具有一微弱模糊的亞外緣線。後翅背面底色褐色，中室斑前端較淺白，並具有一列半透明亮藍色亞外緣弧狀斑。後翅腹面翅紋與背面相似，但底色較淺，中央區顏色較深。翅基具短且紅色的條帶，位於中室外端、M_2 室、M_3 室、CuA_1 室及 CuA_2 室。雌蝶 (圖 16、19、20) 身軀及翅紋與雄蝶相似。後翅內緣無褶。

臺灣地區確認有兩亞種：承名亞種 (圖 17–20) 分布於金門和馬祖，另 1 亞種 ssp.

connectens (圖 15–16) 分布於臺灣本島。前者的中央斑帶通常較後者寬，且常於後翅有減退的現象，此一特性未見於臺灣亞種 (除了非常少數的異常型)。此外，承名亞種的體型通常較大。

雄交尾器 (圖 101–102)：偽鉤突短，末端呈截狀。背兜側突具毛，三角形，末端截平。背兜大部分膜質。基腹弧細而彎曲。囊突甚膨大。抱器葉狀，末端具有一明顯的凹陷，沿末端邊緣具一列細齒；內面背、腹側各具明顯突起，背側突起較長，具鋸齒，如臂狀突出且腹側具鰭狀突起；腹側突起較短，指狀或乳突狀；抱器腹基部膨大，骨化。陽莖筆直，陽莖器背部大部分膜質。

雌交尾器 (圖 141–142)：交尾囊卵狀，交尾囊管於尾端形成骨化環。前交尾孔板橫向骨化片。花壁明顯內伸且密佈棘刺。肛突寬闊，半圓形，基部增厚。後內骨突較肛突長，柱狀，後端棒狀。

變異：承名亞種的中央斑帶長度多變異，有些個體後翅有不同程度的減退，稱為「半帶型」(form *semifasciatus* Honrath)，此一條帶減退的情況一般不見於臺灣亞種。

世界分布：東喜馬拉雅、南印度、馬來半島、中南半島、菲律賓、新幾內亞、新不列顛、所羅門群島、澳洲北部、華西、華南、華東以及臺灣。

臺灣分布：承名亞種分布於金門及馬祖。亞種 ssp. *connectens* 分布於臺灣本島。

寄主植物：樟科：樟樹、牛樟、土肉桂、天竺桂、紅楠、香楠、日本槙楠、黃肉樹、白葉釣樟、錫蘭肉桂、香桂、橢圓葉木薑子、屏東木薑子、陰香。金門地區則利用樟樹、潺稿樹、橢圓葉木薑子等。

生物學：本種已知為多世代性，除了冬季以外終年可見成蝶 (Hsu, 2013)。

Graphium (Graphium) cloanthus (Westwood) (寬帶青鳳蝶 / 寬青帶鳳蝶)

Papilio cloanthus Westwood, 1841: Arcana entomologica, 1: pl. 11, f. 2, 42. (Type locality: “Northern India”)

Ssp. *kuge* Fruhstorfer, 1908

PLATE 6, figs. 21-22; PLATE 23, fig. 102; PLATE 33, fig. 142

Papilio cloanthus kuge Fruhstorfer, 1908: Entomologische Zeitschrift 22 (29): 118-119. (Type lo-

cality: “Chip-Chip”.)

Specimens examined:

XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]: 1♂, Wulai, Fushan, 30. III. 1986 (Y. F. Hsu); 1♂, same locality, 3. IV. 2002 (Y. F Hsu); 2♂, same locality, 22. IV. 2003; 1♂, same locality, 19. III. 2010 (Y. F. Hsu); 1♂, same locality, 18. III. 2015 (C. W. Huang) (genitalia preparation JYL107); 1♂, Wulai, Fushan, 400m, 2. IX. 2011 (L. H. Wang). **TAIZHONG CITY [= TAICHUNG CITY]:** 1♂, CHU campus, 23. IX. 2011 (W. J. Lin). **HUALIAN Co.:** 1♂, Zhuoxi, Zhongping Forest Trail, 14. IX. 2010 (Z. H. Yen). **PINGDONG [= PINGTUNG] Co.:** 1♂, 1♀, Wutai, Wutoushan, 1100m, 6. IV. 2010 (L. H. Wang); 1♀, Wutai, Ali, 4. IV. 2011 (genitalia preparation JYL140).

Description. Adult – Forewing length 36–47 mm. Male (PLATE 6, fig. 21): Head hairy, creamy yellow mixed with long, brown, hairs on frons, mostly brown dorsally. Antennae dark brown, clavate distad. Proboscis dark brown. Labial palpus creamy yellow, sparsely mixed with few brown hairs. Thorax covered by brown tinged with gray hairs dorsally, creamy yellow ventrally. Abdomen ground color brown tinged with gray; several longitudinal, white bands present: two subdorsal, thin; two lateral, thicker; three ventral, prominent, thick. Areas between ventral bands scattered with white scalings. Valvae with outer surface hairy, brown mixed with white. Legs bearing white hairs. Patagia, tegula brown. Forewing elongate, with costa convex concave, termen nearly straight. Hingwing termen wavy, with a prominent, digitate tail-like projection at distal end of vein M_3. A fold present along dorsum of hindwing, containing creamy yellow wools and long hairs. Forewing uppersides ground color brown. A series of prominent, semi-transparent, light bluish green discal spots present, arranged longitudinally, with posterior one largest in size. Forewing undersides similar to uppersides, ground color paler, with additional, glossy, grayish silvery, submarginal band. Hindwing uppersides ground color brown. Discal spots combining into a large patch. A series of semi-transparent, light bluish green, submarginal lunules present. Hindwing undersides with pattern similar to that of uppersides, but ground color paler, with medial area darkened. Short, red bars present near base, at distal end of discoidal cell, in cell M_1, M_2, M_3, CuA_1, CuA_2. Female (PLATE 6, fig. 22): Color patterns of body and wings similar to that of male. No fold on hindwing.

Male gentalia (PLATE 23, fig. 103) – Pseuduncus a short extension with caudal end rounded. Socii setose, slender, elongate. Vinculum slender, slightly curved. Saccus considerably enlarged. Valva lobe-like with prominent indentation distad, bearing prominent teeth along distal edge; two prominent processes on inner surface, one proximal, one distal; proximal process a flattened, elongate spine; distal process fin-like with several spines along edge; sacculus with outer margin thickened. Phallus straight, aedeagus with dorsal portion largely membranous.

Female genitalia (PLATE 33, fig. 143) – Corpus bursae oval. Ductus bursae with caudal end forming a sclerotized tube. Lamella antevaginalis a transverse, sclerotized piece with a medial, rectangular extension. Signum as a prominent, invaginated, digitate process densely covered by fine spines. Anal papillae broad, semi-circular, with basal portion thickened. Posterior apophyses longer than length of anal papillae, pole-like, clavate distad.

Variation. Size tends to be smaller with broader discal bands in spring.

Global distribution. Eastern Himalayas, North India, Sumatra, Northern Indochina, West, South to East China, and Taiwan (Tsukada & Nishiyama, 1982).

Distribution in Taiwan. Lowland up to montane areas up to 2000 m in elevation (Hsu, 2013).

Larval Host plant(s). Lauraceae: *Cinnamomum camphora*, *Machilus japonica*, *M. zuihoensis*, *M. thunbergii* (Lee & Wang, 1995); *C. insulari-montanum* (Lee & Wang, 1997); *C. subavenium*, *Lindera megaphylla* (Igarashi & Fukuda, 2000).

Biology. This species is known to be multivoltine in occurrence, on the wing in all months except winter (Hsu, 2013).

形態特徵：成蝶前翅長 36–47 mm。雄蝶 (圖 21)：頭部具乳黃色毛叢，額區混褐色

長毛，背側大多褐色。觸角黑褐色，末端棒狀。口器黑褐色。下唇鬚乳黃色，稀疏被覆少量褐色毛。胸部背面褐色並具有灰色毛，腹面乳黃色。腹部底色褐色略帶灰色調，具數條縱貫身體的白色帶，兩條位於亞背線纖細；兩條位於側面，較粗；三條在腹面，顯著且粗，腹面條帶間具有白色鱗片。抱器瓣外側表面具毛，褐色混雜白色。步足具有白色毛。領片及翅基片褐色。前翅拉長，前緣凸，外緣近筆直。後翅外緣波狀，在 M_3 脈末端具一明顯指狀低延伸之尾突。沿後翅內緣具有褶，內有乳黃色絨毛及長毛。前翅背面底色褐色，具一系列明顯半透明亮藍綠色中央斑帶，沿體軸縱向排列，前端斑較大。前翅腹面與背面相似，底色較淡，額外具有光澤銀灰色亞外緣帶。後翅背面底色褐色，中室斑合併成一大塊，並具有一列半透明亮藍綠色亞外緣弧狀斑。後翅腹面翅紋與背面相似，但底色較淺，中央區較深，翅基具短且紅色的條帶，位於中室外端、M_1 室、M_2 室、M_3 室、CuA_1 室及 CuA_2 室。雌蝶 (圖 22)：軀體及翅紋顏色與雄蝶相似。後翅內緣無翅褶。

雄交尾器 (圖 103)：偽鉤突短，延伸至末端圓鈍。背兜側突具毛，細長。基腹弧細且微彎。囊突膨大。抱器葉狀，末端具一明顯內凹，沿末端邊緣明顯具齒。內面近基部與近末端具明顯突起，近基突起扁平，具長刺；近末端突起呈鰭狀，沿邊緣有數個刺。抱器腹外緣增厚。陽莖筆直，陽莖器背部大部分膜狀。

雌交尾器 (圖 143)：交尾囊卵狀，交尾囊管末端形成一骨化管。前陰道片為一橫向骨化片，中間具矩形延伸。花壁明顯內陷呈指狀且密佈細刺。肛突寬闊，半圓形，基部增厚。後內骨突較肛突長，柱狀，後端棒狀。

變異：春季體型通常較小且中央斑帶較寬。

世界分布：東喜馬拉雅、北印度、蘇門答臘、中南半島北部、華西、華南、華東以及臺灣。

臺灣分布：分布自低地到海拔 2000 公尺山區。

寄主植物：樟科樟樹、日本楨楠、香楠、紅楠、臺灣肉桂、香桂、大葉釣樟。

生物學：本種已知為多世代性，除了冬季以外終年可見成蝶 (Hsu, 2013)。

Graphium (Graphium) doson (C. & R. Felder, 1864) (木蘭青鳳蝶 / 青斑鳳蝶)

Papilio doson C. & R. Felder, 1864: Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien. 14(3): 305, no. 222. (Type locality: ?)

Papilio telephus C. & R. Felder, 1864: Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien. 14 (3) : 305, no. 221. (Type locality: "Ceylon" [Sri Lanka])(Nomen Nudum)

Ssp. *postianus* Fruhstorfer, 1902

PLATE 6, figs. 23-24; PLATE 23, fig. 103; PLATE 33, fig. 143

Papilio jason postianus Fruhstorfer, 1902: Societas entomologica 17 (10): 73. (Type locality: "Formosa aus Tamsui". Type in: NHM)

Papilio jason jostianus Fruhstorfer, 1903: Berliner entomologische Zeitschrift 47 (3/4): 212. (Incorrect Subsequent Spelling)

Specimens examined:

TAIPEI CITY: 1♂, Wenshan, Gongguan, VI. 9. 2009 (Y. F. Hsu); 1♀, Songshan, Hushan, X. 13. 2010 (Y. T. Lin); 1♀, same locality, V. 5. 2009 (C. K. Wang); 1♀, Beitou, Junjianyan, 18. IV. 2015, emgd. 5. V. 2015 (L. Huang) (genitalia preparation JYL055); 1♂, Beitou, Shipai, 11. V. 2015, emgd. 31. V. 2015 (L. Huang); 1♂, Yangmingshan, 12. X. 2015 (C. J. Peng) (genitalia preparation JYL056). **XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]:** 2♂, Wulai, Fushan, 6. IV. 2004 (Y. F. Hsu); 1♂, same locality, 17. IV. 2004, (J. H. Lin), 1♂, same locality, 22. III. 2010 (Z. H. Yen); 1♀, same locality, 28. V. 2013; 1♂, same locality, 29. III. 2015 (L. Huang) (genitalia preparation JYL119); 1♂, Wulai, Fushan, 400m, 19. III. 2010 (Y. F Hsu); 1♂, Xindian, Shitoushan, 1. III. 2012, emgd. 8. III. 2012, HSU 12C1 (L. H. Wang, C. Y. Lin & T. L. Chen); 1♂, Wulai, Xinxian Trail, 20. III. 2013 (Y. F. Hsu). **TAOYUAN CITY:** 1♂, Fuxing, Baling, 9. V. 2015 (L. Huang) (genitalia preparation JYL054). **TAIZHONG CITY [= TAICHUNG CITY/ TAIZHONG Co.]:** 1♂, Heping, Guguan, 2. IV, 2015 (W. J. Lin, C. J. Chang, M. F. Ciou & Y. H. Lin). **NANTOU Co.:** 2♀, Xinyi, Dongpu, 1100m, 31. VIII. 2008, reared from *Michelia alba*, emgd. 22/23. IX. 2008, HSU 08H28 (L. H. Wang); 1♀, same locality, 31. VIII. 2008 (L. H. Wang).

Description. Adult – Forewing length 40–46 mm. Male (PLATE 6, fig. 23): Head hairy, white with prominent brown medial band. Antennae dark brown, clavate distad. Proboscis dark brown. Labial palpus white, sparsely mixed with few brown hairs. Thorax covered by brown tinged with gray hairs dorsally, white ventrally. Abdomen ground

color brown tinged with gray dorsally, white ventrally; two thin, longitudinal line present laterally. Valvae with outer surface hairy, brown, with ventral edge white. Legs bearing white hairs. Patagia, tegula brown. Forewing elongate, with costa convex, apex slightly produced. Hingwing termen wavy. A fold present along dorsum of hindwing, containing light brown wools and long hairs. Forewing uppersides ground color brown. A series of prominent, light blue (rarely yellow) discal spots and submarginal spots present, arranged longitudinally. Five bars of same color in discoidal cell. Forewing undersides ground color paler, with markings as on uppersides in position but replaced by silver markings. Hindwing uppersides ground color brown. Discal spots more or less connecting into a band tapering posteriad. A series of light blue (rarely yellow), submarginal lunules present. Hindwing undersides with blue (rarely yellow) markings replaced by silver markings, ground color paler. Short, red bars present near wing base, in discoidal cell distally, in cell M_3, CuA_1, CuA_2. A prominent, straight, brown band from costa near base to tornus. Additional "tooth"-like bar from costa to vein Rs, interrupted by a short red spot, separated from brown band. Female (PLATE 6, fig. 24): Color patterns of body and wings similar to that of male. No fold on hindwing but with a white stripe along dorsum.

Male gentalia (PLATE 23, fig. 104) – Pseuduncus absent. Socii setose, triangular with blunt distal ends. Vinculum slender, straight. Saccus considerably enlarged. Valva lobe-like, semicircular. A prominent, sclerotized piece on inner surface, with four processes along edge; two outer prominent spines and two inner fins with small spines; sacculus triangular, moderately sclerotized. Phallus straight, aedeagus with dorsal portion largely membranous.

Female genitalia (PLATE 33, fig. 144) – Corpus bursae oval. Ductus bursae with caudal half forming a sclerotized tube. Signum as a prominent invaginated process densely covered by fine spines, significantly enlarged basad. Lamella antevaginalis elaborately modified, forming a trapezoid process sandwiched by a pair of fin-like sclerotized process. Anal papillae broad, semi-circular, with basal portion thickened. Posterior apophyses approximately 2X length of anal papillae, pole-like, clavate distad.

Variation. Blue markings on wing uppersides occasionally replaced by yellow markings.

Global distribution. Eastern Himalayas, North and South India, Sri Lanka, Sundaland, Indochina, southern Japan, West, South to East China, and Taiwan (Tsukada & Nishiyama, 1982).

Distribution in Taiwan. Lowland up to montane areas up to 2000 m in elevation (Hsu, 2013).

Larval Host plant(s). Magnoliaceae: *Michelia alba* (Iinuma, 1938), *Mic. fuscata* (Fukuda & Sakane, 1975); *Magnolia grandiflora*, *Mic. compressa* (Lee & Chang, 1988); *Mic. pilifera* (Hsu, 2002). Also *Annona squamosa* (Announaceae) according to Lee and Chang (1988).

Biology. This species is known to be multivoltine in occurrence, on the wing in all months except winter (Hsu, 2013).

形態特徵：成蝶前翅長 40–46 mm。雄蝶 (圖 23)：頭具白色毛叢，中央有褐色帶。觸角黑褐色，末端棒狀。口器黑褐色。下唇鬚白色，稀疏被覆少量褐色毛。胸部背面褐色並具有灰色毛，腹面白色。腹部底色褐色，背部略帶灰色調，腹面白色，側面具有兩條細線縱貫體側。抱器瓣外側表面具褐色毛，腹面邊緣白色。步足具有白色毛。領片及翅基片褐色。前翅拉長，前緣凸，翅端輕微延長。後翅外緣波狀，沿後翅內緣具有褶，內有絨毛及長毛。前翅背面底色褐色，一系列明顯的亮藍色 (少數黃色) 中央斑帶及亞外緣斑縱向排列，中室具五條同顏色的斑帶。前翅腹面底色較淡，翅紋和位置與背面相同，但翅紋為銀白色。後翅背面底色褐色，翅室斑或多或少連成一帶狀並向後端延伸，並具有一列淺藍色 (少數黃色) 亞外緣弧狀斑。後翅腹面具藍色 (少數為黃色翅紋) 被銀白色紋取代，底色較淡。翅基具短且紅色的條帶，位於中室端、M_3 室、CuA_1 室及 CuA_2 室，有一明顯且筆直的褐色帶從前緣近基部至臀區。此外有一齒狀帶從前緣至 Rs 脈，並被一短紅斑截斷區隔開來的褐色帶。雌蝶 (圖 24)：軀體及翅紋與雄蝶相似。後翅內緣無翅褶，但沿內緣具有一白色條帶。

雄交尾器 (圖 104)：偽鉤突缺失。背兜側突具毛，三角形，末端截平。基腹弧細且直。囊突大。抱器葉狀，半圓形。內面具一明顯骨化片，沿邊緣具有四個突起，外側具兩明顯刺，內側兩個鰭狀而具細刺。抱器腹三角形，骨化。陽莖筆直，陽莖器背部大部份膜質。

雌交尾器 (圖 144)：交尾囊卵狀，交尾囊管靠末端一半形成骨化管。花壁明顯內陷延伸且密佈細刺，基部顯著膨大。前交尾孔板複雜，呈梯形突出並夾有一對鰭狀骨化延伸。肛突寬闊，半圓形，基部增厚。後內骨突長度為肛突兩倍長，柱狀，後端棒狀。

變異：翅背面之藍色斑紋偶有被黃色斑紋取代的現象。

世界分布：東喜馬拉雅、北印度至南印度、斯里蘭卡、巽他陸塊、中南半島、日本南部、中國西部南部至東部以及臺灣。

臺灣分布：分布自低地到海拔 2000 公尺山區。

寄主植物：木蘭科白玉蘭、含笑、洋玉蘭、烏心石、南洋含笑。有取食番荔枝科釋迦的記錄。

生物學：本種已知為多世代性，除了冬季以外終年可見成蝶 (Hsu, 2013)。

Graphium (Graphium) agamemnon (Linnaeus, 1758) (翠斑青鳳蝶 / 綠斑鳳蝶)

PLATE 6, figs. 25-26; PLATE 23, fig. 104; PLATE 33, fig. 144

Papilio (Eques) agamemnon Linnaeus, 1758: Systema Naturae (Edn 10) 1: 462. (Type locality: "Asia. Osbeck"" [Canton]).

Papilio (Eques) aegisthus Linnaeus, 1763: Amoenitates academicae 6: 401. (Type locality: "China")

Papilio dorylas Sulzer, 1776: Dr. Sulzers Abgekürzte geschichte der Insecten: Nach dem Linaeischen System: 142, pl. 13 f. 58. (Type locality: "China")

Papilio agamemnon var. *anoura* Oberthür, 1879: Études d'entomologie 4: 58. (Type locality: "Borneo")

Papilio agamemnon var. *rufescens* Oberthür, 1879: Études d'entomologie 4: 58. (Type locality: "China")

Specimens examined:

TAIZHONG CITY [= TAICHUNG CITY/ TAICHUNG Co.]: 1♂, Dakeng, 3. XII. 2010 (W. J. Lin); 1♀, Fengyuan, Zhongzheng park, 6. IV. 2013 (L. Huang). **ZHANGHUA [= CHUNGHUA] Co.:** 1♂, Baguashan, emgd. V. 2. 2003. **JIAYI [= CHIAYI] Co.:** 1♂, 1♀, Chiayi Botanical Garden, 8. V. 2015 (J. R. Peng) (genitalia preparation JYL092, JYL093). **TAIDONG [= TAITUNG] Co.:** 1♂, Lanyu, Sidaogou, 18. IV. 2006 (Y. F. Hsu); 1♂, Lanyu, Langdao, II. 17. 2013, reared from *Michelia*

compressa var. *lanyuensis*, emgd. 25. III. 2013, HSU 13B12 (W. Y. Wang & L. H. Wang). **[= TAIANA Co.]:** 1♂, Baihe, Guanziling, 30. VIII. 2008, reared from *M. alba*, emgd. 21. IX. 2008, YFH 08H25 (Y. F. Hsu); 1♀, Xinhua, 17. II. 2008, reared from *Annona montana*, emgd. 4. III. 2008, HSU 08B8 (Y. F. Hsu); 1♂, 1♀, same locality, 27. VII. 27. 2008, reared from *M. alba*, emgd. 10. VIII. 2008, HSU 08G30 (Y. F. Hsu); 1♀, same locality, 8 XII. 2009, reared from *A. montana*, emgd. XII. 31. 2009, HSU 09M2 (Y. F. Hsu); **PINGDONG [= PINGTUNG] Co.:** 1♂, 1♀, Fangshan, 26. VIII. 2007, reared from *Polyalthia longifolia*, emgd. 16/20. IX. 2007, HSU 07H40 (Y. F. Hsu).

Description. Adult – Forewing length 42–50 mm. Male (PLATE 6, fig. 25): Head hairy, white with prominent brown medial band, which tapering downwards. Antennae dark brown, clavate distad. Proboscis dark brown. Labial palpus white, brown mesad. Thorax covered by brown hairs dorsally, with white tinged with greenish yellow, subdorsal bands, white ventrally; some white hairs tinged with pink. Abdomen ground color brown dorsally and laterally, white ventrally; white tinged with greenish yellow, subdorsal bands following those of thorax, but replaced by scalings. A series of black dots present along the boundary of brown and white areas. Valvae with outer surface hairy, brown, with ventral edge white. Legs bearing white hairs. Patagia, tegula brown but white tinged with greenish yellow where connecting with subdorsal bands of thorax. Forewing elongate, with costa convex, apex produced. Hingwing termen wavy, with a short, digitate projection at distal end of vein M_3. A fold present along dorsum of hindwing, containing gray wools posteriorly and light brown wools anteriorly; long, creamy white hairs also present. Forewing uppersides ground color dark brown. A series of prominent, yellowish green discal spots and submarginal spots present, from dorsum toward apex. Two tilted bands of same color near base. Seven spots of same color in discoidal cell; 4 anteriorly, 3 posteriorly. Forewing undersides ground color paler, with markings as on uppersides in position but some dusted by dark scalings. Ground color partially overlaid with pinkish scalings to variable extent, forming mosaic pattern. Hindwing uppersides ground color dark brown. Discal spots arranged into an arc, with anterior spot white. A series of submarginal lunules present. A band consisting of two yellowish green bars with one anterior white spot present proximally. Hindwing undersides with markings as on uppersides in position but mostly dusted by dark scalings. Ground color partially overlaid with dark or pinkish scalings to variable extent, forming mosaic pattern. Female

(PLATE 6, fig. 26): Color patterns of body and wings similar to that of male. No fold on hindwing but with a yellowish green stripe along dorsum.

Male gentalia (PLATE 23, fig. 105) – Pseuduncus a short extension with truncate distal end. Socii setose, small, bump-like. Vinculum slender, straight. Saccus considerably enlarged. Valva lobe-like, semicircular, bearing a row of teeth distad. A prominent, sclerotized piece on inner surface, with a large, dorsal, heavily sclerotized, thumb-like processes; sacculus triangular, moderately sclerotized. Phallus elongate, down-curved, caudal end pointed.

Female genitalia (PLATE 33, fig. 145) – Corpus bursae oval, with concentric folds around signum. Ductus bursae membranous. Signum invaginated into a heavily scerotized sac bearing small short spines. Anal papillae broad, semi-circular. Posterior apophyses longer than length of anal papillae, pole-like, clavate distad.

Variation. Prominence of the projection of hindwing varies; those of females are usually longer than those of males.

Global distribution. Eastern Himalayas, North and South India, Sri Lanka, Andamans, Sundaland, Lesser Sunda Islandsm Indochina, Philippines, Sulawesi, New Guinea, Solomons, Northeast Australia, Southwest, South to East China, and Taiwan (Tsukada & Nishiyama, 1982).

Distribution in Taiwan. Used to be considered a tropical species inhabiting southern Taiwan, but now may be found from lowland up to montane areas up to 1000 m in elevation in central Taiwan. It is also found on Lanyu Island (Hsu, 2013).

Larval Host plant(s). Magnoliaceae: *Michelia alba* [as *Michelia fuscata*], *Mic. compressa* (Hamano, 1987); *Magnolia grandiflora* (Lee & Chang, 1988); Announaceae: *Annona reticulata*, *Artabotrys uncinatus* (Hamano, 1987); *A. montana, A. squamosa* (Lee & Chang, 1988); *Goniothalamus amuyon* (Lee & Wang, 1997); *A. reticulata* (Igarashi & Fukuda, 2000); *Polyalthia longifolia* (Hsu, 1999). Piperaceae: *Piper betle* (Ho & Chang,

1998); *P. arborescens* (Hsu, 2013). Malvaceae: *Durio zibethinus* (Igarashi & Fukuda, 2000).

Biology. This species is known to be multivoltine in occurrence, on the wing in all months (Hsu, 2013).

形態特徵：成蝶前翅長 42–50 mm。雄蝶 (圖 25)：頭部具白色毛叢，中央有明顯褐色帶。觸角黑褐色，末端棒狀。口器黑褐色。下唇鬚白色，中央褐色。胸部背面覆有褐色毛，亞背部線白色略帶黃綠色，腹面白色，些許白色毛略帶桃紅色。腹部底色背面及側面為褐色，腹面白色略帶黃綠色，亞背線自胸部延續至腹部，一列黑斑沿褐色及白色區域的界線分布。抱器瓣外側具毛、褐色，腹面邊緣白色。足具有白色毛。領片及翅基片褐色，但與胸部的亞背帶相連處呈白色略帶黃綠色。前翅修長，前緣凸，翅端突出。後翅外緣波狀，在 M_3 脈末端具一短指狀延伸，沿後翅內緣具有褶，內部後端具灰色絨毛，前端具亮褐色絨毛及乳白色長毛。前翅背面底色黑褐色，具一系列明顯黃綠色中室斑及亞外緣斑，自後緣向翅端分布。翅基具兩個同色斜帶。中室具有七枚同色斑，四枚在前，三枚在後。前翅腹面底色較淺，翅紋與背面位置相同，但散佈黑色鱗片。底色覆蓋不同程度之桃紅色鱗片而形成鑲嵌狀。後翅背面底色黑褐色，中央斑帶排成弧，前端白色，亞外緣具一列弧狀紋。後翅腹面翅紋位置與背面相同，但大多散佈黑色鱗片，底色覆蓋不同程度之暗桃紅色鱗片而形成鑲嵌狀。雌蝶 (圖 26)：軀體及翅紋與雄蝶相似。後翅內緣無翅褶，但沿後緣有黃綠色條帶。

雄交尾器 (圖 105)：偽鉤突短，末端截狀。背兜側突小且具毛，丘狀。基腹弧細且直。囊突膨大。抱器葉狀，半圓形，末端具一列齒，內表面具一明顯骨板，背側具一大型高度骨化指狀突。抱器腹三角形，骨化。陽莖長且下彎，末端尖銳。

雌交尾器 (圖 145)：交尾囊卵狀，花壁週圍具同心圓褶痕，交尾囊管膜質。花壁內陷成一高度骨化囊袋並具有小短刺。肛突寬闊、半圓形。後內骨突較肛突長、柱狀，末端呈棒狀。

變異：後翅尾突凸起富變異，通常雌蝶較雄蝶為長。

世界分布：東喜馬拉雅、北印度及南印度、斯里蘭卡、安達曼群島、巽他陸塊、小巽他群島、中南半島、菲律賓、蘇拉威西、新幾內亞、所羅門群島、澳洲東北部、

華西南、華南、華東以及臺灣。

臺灣分布：過去曾被認為是棲息於臺灣南部的熱帶種類，但現今在臺灣中部從低海拔平地至海拔 1000 公尺山區也可能發現，本種亦見於蘭嶼。

寄主植物：木蘭科含笑、烏心石、洋玉蘭；番荔枝科牛心番荔枝、鷹爪花、山刺番荔枝、釋迦、垂枝長葉暗羅；胡椒科荖葉、蘭嶼胡椒；錦葵科榴槤等。

生物學：本種已知為多世代性，終年可見成蝶 (Hsu, 2013)。

Graphium (Pazala) eurous (Leech, 1893) (劍鳳蝶 / 昇天鳳蝶 / 升天劍鳳蝶)

Papilio eurous Leech, 1893: Butterflies from China, Japan, and Corea (2): 521, pl. XXXII, fig. 3. (Type locality: "Chang-yang, central China; Moupin")

Pazala euroa Chou, 1994: Monographia Rhopalocerorum Sinensium 1: 55. (Unjustified emendation)

Ssp. *asakurae* Matsumura, 1908

PLATE 7, figs. 27-28; PLATE 24, fig. 105; PLATE 34, fig. 145

Papilio asakurae Matsumura, 1907: Transactions of the Sapporo Natural History Society 2: 75, pl. 1, fig. 4. (Type locality: "Formosa (Horisha)")

Papilio eurous var. *formosanus* Oberthür, 1908: Bulletin de la Société entomologique de France 1908: 330. (Type locality: "mont Morrison…10,000 pieds" [Yushan, Taiwan])

Papilio eurous var. *koxinga* Wileman, 1909: Annotationes Zoologicae Japonenses 7: 97. (Type locality: "Arisan, 7300 feet; Gahōzan, Lake Suisha, 400 feet?" [Taiwan])

Specimens examined:

XINBEI CITY [= NEW TAIPEI CITY/TAIPEI Co.]: 1♀, Wulai, Fushan, 10. IV. 1994 (genitalia preparation JYL141); 1♂, same locality, 3. IV. 2002 (Y. F. Hsu); 5♂, same locality, 6. IV. 2004 (Y. F. Hsu); 1♂, same locality, ca 500m, 17. III. 2009 (C. K. Wang); 3♂, same locality, 21. III. 2009 (C. H. Yen & C. H. Lin); 2♂, same locality, 22. III. 2010 (Z. H. Yen); 1♂, Sanxia, Beichatianshan, 1700-1727m, 20. V. 1996 (Y. F. Hsu). **TAOYUAN CITY [= TAOYUAN Co.]:** 1♂, Lalashan, 1700-2000m, 8. V. 2000 (Y. T. Lo & Y. J. Chen); 3♂, same locality, 12. IV. 2000 (Y. T. Lo); 3♂, Daman, 8. IV. 2000 (Y. T. Lo & C. Y. Hong); 2♂, Fuxing, Baling, Dahanqiao, 19. III. 2015 (C. L. Huang & M. X. Lo); 1♂, Fuxing, Zhongbaling, 2. IV. 2015 (C. W. Huang & T. Y. Liu) (genitalia preparation JYL051). **XINZHU [= HSINCHU] Co.:** 1♂, Jianshi, Zhenxibao, ca 1600m, 6. V . 2004, reared from *Cinnamomum osmophloeum*, emgd. V. 2005, HSU 04E9 (Y. F.

Hsu); 1♀, Jianshi, Lidongshen, IV. 29. 2005 (genitalia preparation JYL138); 1♂, Jianshi, Yulao, ca 1500m, 25. II. 2009 (C. K. Wang). **TAIZHONG CITY [= TAICHUNG CITY/ TAIZHONG Co.]:** 1♂, Heping, Xueshan Rd, 2. IV. 2015 (J. Y. Liang). **NANTOU Co.:** 2♂, Renai, Aowanda National Forest Recreation Area, 24. III. 2001 (C. C. Lu); 1♀, Renai, Beidongyanshan, 20. III. 2005 (Y. F. Hsu); 1♂, Renai, Yunhai, 9. IV. 2009 (L. H. Wang); 1♂, Renai, Tunyuan, 13. IV. 2012 (L. H. Wang).

Description. Adult – Forewing length 37–40 mm. Sexual dimorphism absent except a gray androconial patch on hindwing uppersides in male. Male (PLATE 7, fig. 27): Head bearing long hairs, white but with a dark patch on vertex and a dark transverse band on frons. Antennae dark brown, club-like at distal end. Proboscis dark brown. Labial palpus short, bearing whit hairs. Thorax covered by white hairs, with prominent, dark band laterally. Abdomen with ground color dark brown dorsally, white ventrally, bearing three dark, longitudinal bands, two laterally, one ventrally. Valvae with outer surface covered by scalings as abdominal segments. Legs pale olive, glossy, with brown setae; femur bearing white hairs. Patagia dark brown; tegula bearing white hairs. Forewing costa slightly convex concave, termen nearly straight. Hingwing termen straight or slightly wavy, tornus extending into three-lobed configuration, with elongate, slender process at vein M_3 distad. Forewing uppersides white, somewhat transparent, with prominent brown stripes along veins. Three brown longitudinal bands present distad, with marginal band broadest; inner band bi-furcate anteriorly. Area between medial and inner band gray. Six brown bands present in discoidal cell, with the proximal two extending to dorsum. Forewing undersides similar to uppersides. Hindwing uppersides with ground color white. Three brown longitudinal bands also present; a straight discal band from costa to tornus. Additional straight, brown band present proximally, joining discal band at tornu. Tornus dark brown, with faint, blue bars in cell M_2, M_3, CuA_1 distad. Small orange spot in cell CuA_1 and CuA_2 distad, separated by darkened vein of CuA_1. M_3 process dark brown with white or yellow tip. Gray androconial patch present along A1+A2 proximally. Hindwing undersides with double, parallel, discal bands, with outer band edged with yellow band proximally. Female (PLATE 7, fig. 28): Color patterns of body and wings similar to that of male. No androconial patch on hindwing.

Male gentalia (PLATE 24, fig. 106) – Pseuduncus broad, short. Socii setose, short,

digitate. Tegumen with prominent, lateral, triangular processes with acute tip. Vinculum slender, curved. Saccus short, small. Valva lobe-like, largely membranous, with heavily sclerotized processes on inner surface: a small serrate fin present distally, a large serrate fin near ventral margin, and a prominent, heavily sclerotized, proximal piece with two serrate extensions. Sacculus large, sclerotized. Phallus slender, down-curved, with acute distal end.

Female genitalia (PLATE 34, fig. 146) – Corpus bursae oval. Ductus bursae membranous. Lamella antevaginalis a transverse, sclerotized piece with a pair of widely separated, elongate processes with pointed distal end; Lamella postvaginalis forming a pair of rounded, thin, sclerotized lobes. Signum as a prominent, elongate band, slightly invaginated, granular. Anal papillae broad, semi-circular. Posterior apophyses longer than length of anal papillae, pole-like.

Global distribution. Kashmir, Himalayas, northern Indochina, West, South to East China, and Taiwan (Racheli & Cotton, 2010).

Distribution in Taiwan. This species mainly inhabit montane areas from 200 m to about 2500 m in elevation in Taiwan (Hsu, 2013).

Larval Host plant(s). Lauraceae: *Machilus zuihoensis, Cinnamomum camphora, C. subavenium* (Lee & Wang, 1997); *M. thunbergii* [as *M. arisanensis*], *M. odoratissima, C. insulari-montanum* (Igarashi & Fukuda, 2000); *C. osmophloeum* (Hsu, 2006).

Biology. This species is known to be univoltine in occurrence (Hsu, 2013), on the wing in spring months, and overwinters as pupae (Hsu, 2006).

形態特徵：成蝶前翅長 37–40 mm。不具有雌雄二型性，惟雄蝶在後翅背面具有灰色發香鱗區塊。雄蝶 (圖 27)：頭部具白色長毛，頂端有深色區塊，額區有深色橫帶。觸角黑褐色，末端棍棒狀。口器黑褐色。下唇鬚短，有白色毛。胸部被覆白色毛，背面有明顯黑色條帶。腹部背面底色黑褐色，腹面白色，具三條黑色縱貫身體的條帶，兩條在側面，一條在腹面。抱器瓣外側表面如同腹部體節般披覆鱗片。足淺橄

欖色，光滑具褐色剛毛，腿節有白色毛。領片深褐色，翅基片有白色毛。前翅前緣微凸，外緣近筆直，後翅外緣筆直或輕微波狀，臀區延展呈三瓣葉狀，在 M_3 脈向末端形成細長延長狀。前翅腹面白色，有時透明，沿翅脈具有明顯褐色條帶，內側帶在前端二分叉。中央及內側帶之間的區域灰色。中室具有六條褐色帶。前翅腹面翅紋與背面相似。後翅背面底色白色，具三條褐色縱走帶，一條筆直由中央帶自前緣到臀區。另一筆直褐色帶大約在臀區與中央帶會合。臀區黑褐色，在 M_2，M_3 及 CuA_1 外端具微弱藍色帶。CuA_1 及 CuA_2 室外端具有橙色小斑，此斑被深色 CuA_1 脈區隔開。M_3 脈延伸為黑褐色，末端白色或黃色。灰色發香鱗區塊約略沿著 A1+A2 脈。後翅腹面具兩條平行中央帶，其位於外側帶者邊緣緊鄰黃色帶。雌蝶 (圖 28)：軀體及翅紋顏色與雄蝶相似。後翅無發香鱗區塊。

雄交尾器 (圖 106)：偽鉤突寬闊、短。背兜側突短、具毛、指狀。背兜具明顯側向三角形突，末端尖銳。基腹弧細且彎曲。囊突短小。抱器葉狀，大部分膜質，內表面具一高度骨化突出，末端鋸齒狀小鰭，近腹面邊緣鋸齒狀大鰭，基部具一骨化片，並具有兩個鋸齒突。抱器腹大、骨化。陽莖纖細、下彎，末端銳尖。

雌交尾器 (圖 146)：交尾囊卵狀。交尾囊管膜質。前交尾孔板為橫向骨化片，具有一對 V 形深裂之長突起，末端銳尖；後交尾孔板形成一對圓且細的骨化裂片。花壁為一明顯長條帶，略內陷，具顆粒。肛突寬闊、半圓形。後內骨突較肛突長、柱狀。

世界分布：喀什米爾、喜馬拉雅、中南半島北部、華西、華南、華東及臺灣。

臺灣分布：本種主要棲息於臺灣海拔 200 至 2500 公尺山區。

寄主植物：樟科香楠、樟樹、香桂、紅楠、臺灣肉桂、土肉桂等。

生物學：本種已知為一年一世代 (Hsu, 2013)，成蟲春季活動，以蛹期越冬 (Hsu, 2006)。

Graphium (Pazala) mullah (Alphéraky, 1897) (黑尾劍鳳蝶 / 高嶺昇天鳳蝶 / 木生鳳蝶 / 鐵木劍鳳蝶)

Papilio alebion var. *mullah* Alpheraky, 1897: Mémoires sur les lépidoptères 9: 84. (Type locality: "Sé-Tchouen, Ja-djoou, Lutine" [Luding, Sichuan])

Papilio tamerlanus var. *timur* Ney, 1911: Entomologische Zeitschrift. 24: 252. (Type locality: "Ta-tsien-lu" [Kangding, Sichuan])

P[apilio] tamerlanus v. *timor* Dreseke, 1923: Deutsche entomologische Zeitscrift, Iris 37: 59. (Incorrect Subsequent Spelling)

Ssp. *chungianus* Murayama, 1961

PLATE 7, figs. 29-30; PLATE 24, fig. 106

Iphiclides chungianus Murayama, 1961: Kontyû Kagaku (Insect Science) 12: 7–8. (Type locality: "Gōkan, Zentral-formosa" [error])

Iphiclides alebion tayal Shirôzu, 1961: Tyô to Ga 12(2): 23–29, pl. 2, figs. 1–6, male. (Type locality: "N. Taiwan (Vicinity of Urai)")

Iphiclides alebion chungiyanus, D'Abrera, 1982: Butterflies of the Oriental Region 1: 108–109. (Incorrect Subsequent Spelling)

Pazala chengkon Lee & Zhu, 1992: Atlas of Chinese Butterflies: p. 37, fig. 3; p. 38, fig. 3. (Nomen nudum)

Ssp. *mullah* Alphéraky, 1897

PLATE 7, figs. 31-32; PLATE 24, fig. 107; PLATE 34, fig. 146

Specimens examined:

Ssp. *chungianus*: **XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]:** 1♂, Wulai, Fushan, 30. III. 1986 (Y. F. Hsu); 1♂, same locality, ca 350m, 6. IV. 2004 (Y. F. Hsu); 1♀, same locality, 5. IV. 2005; 1♂, same locality, 400m, 19. III. 2010 (Y. F. Hsu); 1♂, same locality, 400m, 15. IV. 2011 (J. H. Lin). **YILAN Co.:** 1♀, Yuanshan, Shuanglianpi, 1. IV. 1987 (M. H. Lee). **TAOYUAN CITY [= TAOYUAN Co.]**: 1♂, Mingchi, 23. IV. 2004 (L. W. Wu); 1♂, Fuxing, Sileng, 2. IV. 2015 (C. W. Huang & T. Y. Liu) (genitalia preparation JYL057).

Ssp. *mullah*: **LIANJIANG [= LIENCHIANG] Co.:** 2♂, 1♀, Nangan, 14. IV. 2014, reared from *Litsea rotundifolia* [= *L. rotundifolia var. oblongifolia*], emgd. 2/28. III. 2015, HSU 14D15 (Y. F. Hsu, H. C. Huang & C. L. Huang); 1♂, 1♀, Nangan, Shengtian Park, 17. IV. 2014, emgd. 5. III. 2015, HSU 14D66 (Y. F. Hsu, H. C. Huang & C. L. Huang) (genitalia preparation JYL120, JYL136).

Description. Adult – Forewing length 35–40 mm. Sexual dimorphism absent except a gray androconial patch on hindwing uppersides in male. Male (PLATE 7, figs. 29, 31): Head bearing long hairs, white mixed with dark brown, with a dark medial patch on vertex. Antennae dark brown, club-like at distal end. Proboscis dark brown. Labial palpus short, bearing whit hairs. Thorax covered by white hairs, with prominent, dark band

mesad. Abdomen with ground color dark brown dorsally, white ventrally, bearing three dark, longitudinal bands, two laterally, one ventrally. Valvae with outer surface covered by scalings as abdominal segments. Legs pale olive, glossy, with brown setae; femur bearing white hairs. Patagia dark brown mesad, white or orange laterally; tegula bearing white hairs. Forewing costa slightly convex, termen nearly straight. Hingwing termen straight or slightly wavy, tornus extending into three-lobed configuration, with elongate, slender process at vein M_3 distad. Forewing uppersides white, somewhat transparent, with prominent brown stripes along veins. Three brown longitudinal bands present distad, with marginal band broadest; inner band bi-furcate anteriorly. Area between medial and inner band white or slightly tinged with gray. Six brown bands present in discoidal cell, with the proximal two extending to dorsum. Forewing undersides similar to uppersides. Hindwing uppersides with ground color creamy white. Three brown longitudinal bands also present; a straight discal band from costa to tornus, with prominent, dark streak at vein M_3. Additional straight, brown band present proximally, joining discal band at tornu. Tornus with extensive dark brown area, with faint, blue bars in cell M_2, M_3, CuA_1 distad. An orange patch in cell CuA_1 and CuA_2 distad. M_3 process dark brown with white or yellow tip. Gray androconial patch present along A_1+A_2 proximally. Hindwing undersides tinged with yellow sheen. No dark scalings around discoidal veins. Female (PLATE 7, figs. 30, 32): Color patterns of body and wings similar to that of male. No androconial patch on hindwing.

Two subspecies are present. Ssp. *chungianus* (PLATE 7, figs. 29-30) occurs in main island of Taiwan, whereas ssp. *mullah* (PLATE 7, figs. 31-32) are found in Mazu (Matsu) and Jinmen (Kingmen). Ssp. *chungianus* may be distinguishable from ssp. *mullah* by the two distal dark discoidal bands on forewing thicker, and distinctly larger orange tornal patch on hindwing. Male genitalia of these two subspecies are similar to each other, but the lateral projection of tegumen is slender and tooth-like in ssp. *chungianus* (PLATE 24, fig. 107), whereas it is triangular in ssp. *mullah* (PLATE 24, fig. 108).

Male gentalia (PLATE 24, figs. 107-108) – Pseuduncus broad, short. Socii setose, short, digitate. Tegumen with prominent, lateral tooth with acute end. Vinculum slender, curved. Saccus short, small. Valva lobe-like, largely membranous, with heavily sclerotized, bifurcated serrate ridge distad. Additional sclerotized processes on inner surface: a large

serrate fin near ventral margin, and a prominent, heavily sclerotized, proximal piece with two serrate extensions; dorsal one triangular, ventral one rectangular. Sacculus large, sclerotized. Phallus slender, straight, with acute distal end.

Female genitalia (PLATE 34, fig. 147) – Corpus bursae oval. Ductus bursae membranous. Lamella antevaginalis a transverse, sclerotized piece with a pair of elongate processes separated by a V-shaped notch. Lamella postvaginalis forming a pair of rounded, thin, sclerotized lobes. Signum as a prominent, elongate band, slightly invaginated, granular. Anal papillae broad, semi-circular. Posterior apophyses longer than length of anal papillae, pole-like.

Global distribution. Laos, Vietnam, West, South to East China, and Taiwan (Racheli & Cotton, 2010).

Distribution in Taiwan. Ssp. *chungianus* occurs in main island of Taiwan, restricted to montane areas from 200 m to about 1500 m in northern Taiwan. Ssp. *mullah* are found in Mazu (Matsu) and Jinmen (Kingmen), where it is found in broad-leaved forests of lowlands (Hsu, 2013).

Larval Host plant(s). Ssp. *chungianus*: Lauraceae: *Machilus zuihoensis*, *Cinnamomum camphora*, and *C. subavenium* (Lee & Wang, 1997); and *M. japonica* (Igarashi & Fukuda, 2000). Ssp. *mullah*: Lauraceae: *Litsea rotundifolia* (NTNU specimens).

Biology. This species is known to be univoltine in occurrence, on the wing in spring months, and overwinters as pupae (Hsu, 2013).

Remarks. The type locality of ssp. *chungianus* appears to be erroneous. It was addressed as the site called “Hehuanshan”, a high mountain over 3000 m in elevation in central Taiwan, far outside of confirmed range of this taxon in Taiwan. The name of ssp. *chungianus* refers to a famous pioneer butterfly investigator Weso Chen (陳 維 壽). The name *tayal* Shirôzu, 1961, recognized as a synonym of ssp. *chungianus* refers to the aboriginal people Atayal living in the vicinity of the type locality Wulai, northern

Taiwan, for this name.

形態特徵：成蝶前翅長 35–40 mm。不具有雌雄二型性，惟雄蝶在後翅背面具有灰色發香鱗區塊。雄蝶 (圖 29、31)：頭部具白色長毛混雜深褐色，頂端中央有深色區塊。觸角黑褐色、棍棒狀。口器黑褐色。下唇鬚短，有白色毛。胸部被覆白色毛，中間有黑色條帶。腹部背面底色黑褐色，腹面白色，具三條黑色縱貫身體的條帶，兩條在側面，一條在腹面。抱器瓣外側表面如同腹部體節般披覆鱗片。步足淺橄欖色，光滑具褐色剛毛，腿節有白色毛。領片中間深褐色，側邊白色或橙色，翅基片有白色毛。前翅前緣微凸，外緣近筆直，後翅外緣筆直或輕微波狀，臀區延展呈三瓣葉狀，在 M_3 脈向末端形成細長延長狀。沿翅脈具有明顯褐色條帶，三條褐色縱帶，外緣帶最寬，內側帶在前端二分叉。中央及內側帶之間的區域白色或略帶灰色。中室具有六個褐色帶。前翅腹面翅紋與背面相似。後翅背面底色乳白色，具三條褐色縱走帶，一條筆直的中央帶自前緣到臀區，在 M_3 脈有明顯黑色帶。另一筆直褐色帶大約在臀區與中央帶會合。臀區有廣大的黑褐色區，在 M_2、M_3 及 CuA_1 外端具微弱藍色帶。CuA_1 及 CuA_2 室外端具有小橘斑。M_3 脈延伸為黑褐色，末端白色或黃色。灰色發香鱗區塊約略沿著 A_1+A_2 脈。後翅腹面略帶黃色光澤，中室脈無黑色鱗片。雌蝶 (圖 30、32) 軀體及翅紋與雄蝶相似。後翅無發香鱗區塊。

臺灣亞種 ssp. *chungianus* (圖 29–30) 分布於臺灣本島，承名亞種 (圖 31–32) 則見於馬祖及金門。臺灣亞種可藉由一些特徵與承名亞種區別，前翅中室靠末端兩條帶較細，後翅臀區的橙色斑明顯較大。兩亞種的雄交尾器相似，但臺灣亞種 (圖 107) 背兜側向凸出、較纖細且呈齒狀，而在承名亞種側突 (圖 108) 則呈三角形。

雄交尾器 (圖 107–108)：偽鉤突寬闊且短。背兜側突短，具毛，指狀。背兜具明顯側齒，末端尖銳。基腹弧細且彎曲。囊突短小。抱器葉狀，大部分膜質，末端具高度骨化二叉鋸齒緣。內表面具一骨化突起，近腹側邊緣具鋸齒狀大鰭，基部具高度骨化片，並具兩個鋸齒突，靠背側為三角形，靠腹側為矩形。抱器腹大，骨化。陽莖纖細，筆直，末端銳尖。

雌交尾器 (圖 147)：交尾囊卵狀。交尾囊管膜質。前交尾孔板為橫向骨化片，具有一對 V 形深裂長突起。後交尾孔板為一對圓且細之骨化裂片。花壁為突出長帶狀，略內陷、顆粒狀。肛突寬闊，半圓形。後內骨突較肛突長，柱狀。

世界分布：寮國、越南、華西、華南、華東及臺灣。

臺灣分布：臺灣亞種 ssp. *chungianus* 分布於臺灣本島，見於臺灣北部海拔 200 至 1500 公尺左右山區。承名亞種 ssp. *mullah* 見於馬祖及金門，棲息在低地闊葉林中。

寄主植物：亞種 *chungianus* 幼蟲取食樟科香楠、樟樹、香桂及日本槙楠；亞種 *mullah* 幼蟲取食樟科橢圓葉木薑子。

生物學：本種已知為一年一世代，成蟲春季活動，以蛹期越冬 (Hsu, 2013)。

註記：亞種 ssp. *chungianus* 的模式產地記載似乎有誤，其模式產地地點「合歡山」位於臺灣中部，海拔高度超過 3000 公尺，遠超出此分類群已被確定的分布範圍。亞種小名 *chungianus* 係獻名給知名的臺灣蝶類研究者陳維壽。而由 Shirôzu (1961) 命名的同物異名 *tayal*，指的是居住在其模式產地烏來 (北臺灣) 附近的泰雅族原住民族。

Tribe PAPILIONINI Latreille, [1802]

Miller (1987) recognized only three synapomorphies for this very speciose tribe, and pointed out all these characters are homoplasious. These characters are : 1) ductus bursae elbow-shaped; 2) fourth instar larvae glossy; 3) "basal fleck" of labial palpus forming a large medial flap.

The members of this tribe has a worldwide distribution, with more than 200 species known. The host plants of this tribe include plants in the family Lauraceae, Rutaceae, Apiacae, Asteraceae, etc.

Although a few genera had been proposed and included in this tribe, recent works favor to include members previously assigned to different genera into a collective genus *Papilio* (e. g. Simonsen *et al.*, 2011), and this view is adopted in the present work.

In Taiwan, a total of 19 resident species in 2 genera (3 or more in most literature) are included in this work. One species, *Papilio (Menelaides) rumanzovia* is added as it is a species frequently straying to Taiwan.

鳳蝶族

Miller (1987) 確認鳳蝶族這個種類繁多的族只有三個共衍徵，並認為這些特徵都具同塑性。這些特徵如下：1) 交尾囊彎肘狀；2) 4 齡幼蟲平滑有光澤；3) 下唇鬚基部斑紋形成一大形內側蓋。

本族成員廣佈於全世界，已知超過 200 種。寄主植物包括樟科、芸香科、繖形科、菊科等。

雖然鳳蝶族常包含多屬，近期研究較支持將一些原本放在不同屬的成員納入包含性較大的鳳蝶屬 *Papilio* 中 (例如 Simonsen *et al.*, 2011)，本誌目前採用此一觀點。

本誌介紹臺灣種類共計 2 個屬 19 個固有種 (許多文獻分為 3 屬或更多屬)，其

中包括紅斑大鳳蝶 *Papilio (Menelaides) rumanzovia*，因為經常被發現從其他地區進入臺灣。

Genus *PAPILIO* Linnaeus, 1758

Type species: *Papilio machaon* Linnaeus, 1758

Miller (1987) considered four synapomorphic characters to support monophyly of the genus: 1) tibiae and tarsi lacking scales; 2) female with prominent ostial armature; 3) vesica with a lateral process; 4) signum zipperlike.

This genus was a speciose taxon containing many species later included in several smaller genera recognized by a few authors (Shirôzu, 1960; Miller & Brown, 1981; Hancock, 1983; Igarashi, 1979, 1984). Miller (1987) argued such treatments were based on poor ground, lacking supportive characters. Recent studies based on morphological data and molecular data are mostly in favor of a large, collective genus (Miller, 1987; Aubert *et al.*, 1999; Simonsen *et al.*, 2011; Wu *et al.*, 2015)

The genus *Papilio* under current concept is the most speciose genus, containing more than 220 species distributed worldwide.

In Taiwan, 19 resident species are known, one is restricted to small islands close to Fujian Province of continental China. A few additional species were recorded but representing rare strays from other areas or doubtful sources.

鳳蝶屬

Miller (1987) 認為有下列四個共衍徵可以支持鳳蝶屬為一單系群：1) 脛節及跗節無鱗片覆蓋；2) 雌蝶具明顯骨化之交尾孔；3) 陽莖端膜具側突；4) 花壁拉鍊狀。

本屬是物種豐富的類群，包含許多後來被部分學者放到一些小屬的種類 (Shirôzu, 1960; Miller & Brown, 1981; Hancock, 1983; Igarashi, 1979, 1984)。Miller (1987) 認為此等處理根據不足且缺乏有力的支持特徵。最新的研究依據形態及分子資料，大部份較支持使用大且包含性廣的鳳蝶屬 (Miller, 1987; Aubert *et al.*, 1999; Simonsen *et al.*, 2011; Wu *et al.*, 2015)。

依據最新的鳳蝶屬概念，本屬是鳳蝶科中種類最多的屬，全世界共計超過 220 種。

臺灣地區目前已知有 19 種固有種，其中一種侷限分布於靠近中國大陸福建省的一個小島。另有一些種類是從其他地區進入臺灣的迷蝶或疑問種。

Papilio (Chilasa) agestor (Gray, 1831) (斑鳳蝶 / 褐斑鳳蝶)

Papilio agestor Gray, 1831: The Zoological Miscellany 1: 32. (Type locality: "Sumatra" [error])
Papilio agestor agestorides Fruhstorfer, 1909: Entomologische Zeitschrift, Stuttgart 22 (45): 190. (Type locality: "Tibet(?), W. China, Lou-Tse-Kiang")

Ssp. *matsumurae* Fruhstorfer, 1909

PLATE 8, figs. 33-34; PLATE 24, fig. 108; PLATE 34, fig. 147

Papilio agestor matsumurae Fruhstorfer, 1909: Internatinale Entomologische Zeitschrift 2(25): 282. (Type locality: “Formosa, Horisha”)

Specimens examined:

XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]: 1♂, same locality, 350m, 6. IV. 2004 (Y. F. Hsu); 1♂, same locality, 8. IV. 2008, (C. H. Yen); 1♂, same locality, 22. III. 2010 (Z. H. Yen); 1♂, Wulai, Fushan, 20. III. 2015 (C. W. Huang); 1♂, Shiding, Ergeshan, 10. III. 2002, (L. W. Wu); 1♂, same locality, 28. III. 2015 (W. J. Lin & C. J. Chang); 1♀, Sanzhi, Datunshan, 21. IV. 2010 (N. Y. Tsai); 1♂, Tamsui, Erzhiping, 19. IV. 2011 (C. L. Huang). **YILAN Co.:** 1♂, 1♀, Dabaishan, 14. IV. 2015 (L. Huang) (genitalia preparation JYL058, JYL059). **XINZHU [= HSINCHU] Co.:** 1♂, Jianshi, Yulao, 1500m, 25. II. 2009 (C. K. Wang). **TAIZHONG CITY [= TAICHUNG CITY/ TAIZHONG Co.]:** 1♂, Heping, Malunshan, 2. IV. 2015 (W. J. Lin, C. J. Chang, Y. H. Lin & M. F. Chou). **PINGDONG [= PINGTUNG] Co.:** 1♂, Chunri, Dahanshan, 1400m, 4. IV. 2000 (Y. F. Hsu); 1♂, Wutai, Ailiaobeixi-Bayouxi, 500-900m (Y. F. Hsu & H. C. Huang).

Description. Adult – Forewing length 46–49 mm. Male (PLATE 8, fig. 33): Head bearing long hairs, dark brown but with white hairs laterally. Antennae dark brown, thicker distad. Proboscis dark brown. Labial palpus short, bearing white hairs proximally, brown hairs distally. Thorax covered by dark brown hairs, ornamented with white spots. Abdomen ground color dark brown, two series of white bars present dorsally,

three series of white dots present ventrally. Valvae with outer surface covered by brown scalings with a white patch. Legs bearing brown hairs mixed with some white hairs. Patagia dark brown with white dots laterally; tegula dark brown with a prominent white spot. Forewing costa convex, termen slightly convex, apex obtuse. Hingwing termen slightly concave. Forewing uppersides ground color dark brown. A series of pale blue submarginal spots along termen, deviated inwards near apex. A series of pale blue discal spots deviated inwards anteriorly. A large pale blue patch covering proximal portions of cell M_2 to 1A and much of discoidal cell. Two or three additional pale blue spots in distal end of discoidal cell. Forewing undersides similar to uppersides, but area around apex and along termen pale brown. Hindwing uppersides ground color brown to dark brown. Pale blue patch covering space in discoidal cell and proximal areas in cells, with additional small spot distal to this patch in cell $Sc+R_1$, Rs, and M_1. Two dark stripes in discoidal cell. A series of faint white dots at distal end of each cell; a series of faint submarginal lunules present. Hindwing undersides with pattern similar to that of uppersides, but ground color paler, with pale blue patch reduced. Marginal and submarginal markings more prominent. Female (PLATE 8, fig. 34): Color patterns of body and wings similar to that of male, but hindwing uppersides ground color paler, with marginal and submarginal markings more prominent than those of males.

Male gentalia (PLATE 24, fig. 109) – Pseuduncus forming short extension, beak-like. Socii as a pair of elongate, sclerotized sac, bearing several short spines caudad. Vinculum stout, curved. Tegumen membranous dorsally. Saccus short. Valva lobe-like; sacculus thick, heavily sclerotized, triangular in ventral view; harpe represented as sclerotized, arch-shaped piece, edge thickened, serrate, bearing a prominent, triangular tooth ventrad, and a triangular extension caudad. Phallus cylindrical, strongly up-curved.

Female genitalia (PLATE 34, fig. 148) – Corpus bursae oval. Ductus bursae thick, membranous, tapering toward caudal end. Signum as an elongate, wrinkled, granular, sclerotized band. Sterigma as moderately sclerotized hood. Anal papillae broad, semi-circular. Posterior apophyses longer than length of anal papillae, straight, pole-like with cephalic end slightly enlarged, flattened.

Global distribution. Himalayas, northern Indochina, West, South to East China, and

Taiwan (Hsu, 2013).

Distribution in Taiwan. This species mainly inhabit montane areas from 200 m to about 2500 m in elevation in Taiwan (Hsu, 2013).

Larval Host plant(s). Lauraceae: *Cinnamomum camphora* (Chang, 1972); *C. kanehirae* [or *C. micranthum*], *Machilus japonica* [as *Persea japonica*], *M. thunbergii* [as *P. thunbergii*], *M. zuihoensis* [as *P. zuihoensis*] (Lee, 1990); *C. osmophloeum*,and *C. insulari-montanum* (Lee & Wang, 1997).

Biology. This species is known to be univoltine in occurrence (Hsu, 2013), on the wing in spring months, and overwinters as pupae (Hsu, 2006).

形態特徵：成蝶前翅長 46–49mm。雄蝶 (圖 33)：頭被長毛、黑褐色，側面具白毛。觸角黑褐色，末端較厚。口器黑褐色，小顎鬚短，近部有白毛，末端褐色毛。胸部覆有黑褐色毛，具白斑。腹部底色黑褐色，背側兩列白帶，腹側三列白斑。抱器外表面覆有褐色鱗片，綴有白色區塊。足具褐色毛混雜一些白色毛。領片黑褐色，側面具白點；翅基片黑褐色具明顯白點。前翅前緣圓凸，外緣微凸，先端圓鈍。後翅外緣略凸。前翅背面底色黑褐色，沿外緣有一列淺藍色亞外緣斑，近先端向內偏，另一列淺藍色中央斑帶於先端內偏，一大片淺藍色區塊覆蓋 M_2 室至 1A 室靠基部及大部分中室。中室近末端另有二至三個淺藍色斑。前翅腹面與背面相似，但沿先端及外緣的區域淺褐色。後翅腹面底色褐色至黑褐色。中室及各翅室近基部覆蓋淺藍色區塊，$Sc+R_1$、Rs 及 M_1 室在這些區塊末端具小斑。中室具有兩條暗色條帶。各室外緣具模糊白點排呈一列，亞外緣具一列模糊弦月紋。後翅腹面與背面翅紋相似，但底色較淺，淺藍色區塊退化，外緣及亞外緣斑紋較明顯。雌蝶 (圖 34)：軀體及翅紋與雄蝶相似，但後翅背面底色較淺，外緣及亞外緣斑紋較雄蝶明顯。

雄交尾器 (圖 109)：偽鉤突延伸呈短喙狀。背兜側突呈一對長骨化囊，末端具些許短刺。基腹弧肥碩彎曲。背兜背部膜狀。囊突短。抱器葉狀；抱器腹厚，高度骨化，腹面呈三角形；抱握鋏拱狀骨板，邊緣厚，鋸齒狀，腹面具三角形突出，末端延伸成三角形。陽莖圓柱狀，顯著下彎。

雌交尾器 (圖 148)：交尾囊卵狀。交尾囊管寬，膜質，向末端隘縮。花壁為長骨化帶，

具皺紋及顆粒。交尾孔板呈兜帽狀，中度骨化。肛突寬闊，半圓形。後內骨突較肛突長，筆直，柱狀，前端略膨大，扁平。

世界分布：喜馬拉雅地區、中南半島北部、華西、華南、華東及臺灣。

臺灣分布：主要分布於臺灣海拔 200 至 2500 公尺的山區。

寄主植物：樟科樟樹、牛樟、日本楨楠、紅楠、香楠、土肉桂、臺灣肉桂。

生物學：本種已知為一年一世代物種 (Hsu, 2013)，成蝶出現於春季月份，以蛹期越冬 (Hsu, 2006)。

Papilio (Chilasa) epycides Hewitson, 1864 (黃星斑鳳蝶 / 黃星鳳蝶 / 小黑斑鳳蝶)

Papilio epycides Hewitson, 1864: Illustrations of New Species of Exotic Butterflies 1: Papilio VI: f. 16. (Type locality: “N. India”)

Ssp. *melanoleucus* Ney, 1911

PLATE 8, figs. 35-36; PLATE 25, fig. 109; PLATE 34, fig. 148

Papilio epycides melanoleucus Ney, 1911: Deutsche Entomologische. Zeitschrift Iris 25: 5. (Type locality: “Formosa”)

Papilio epycides f. *uwakurona* Matsumura, 1929: Insecta Matsumurana 3 (2/3): 89, pl. 4, f. 6. (Type locality: “Formosa, Hori”)

Papilio epycides f. *shitakurona* Matsumura, 1929: Insecta Matsumurana 3 (2/3): 89. (Type locality: “Formosa, Hori”)

Specimens examined:

JILONG [= KEELUNG] CITY: 1♂, Haimentianxian, V. 6. 2002 (M. H. Lin); 1♂, Longgang Trail, 50m, 25. II. 2010 (C. H. Lin & W. H. Chien). **XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]:** 2♂, 2♀, Beitou, Zhongqingque, V. 2004, reared from *Lindera megaphylla*, emgd. 2/23. III. 2005 (Y. C. Yang); 1♂, same locality, V. 2004, reared from *Cinnamomum comphora*, emgd. 17. III. 2005 (Y. C. Yang); Bali, Guangyinshan, 400-450m, 15. III. 2011 (Z. H. Yen); 1♀, Wulai, Fushan, 18. III. 2015 (C. W. Huang). **YILAN Co.:** 1♀, Dabaishan, 14. IV. 2015 (L. Huang) (genitalia preparation JYL061). **TAOYUAN CITY:** 1♂, Fuxing, Sileng, 1. IV. 2015 (L. Huang) (genitalia preparation JYL060). **PINGDONG [= PINGTUNG Co.]:** 1♂, 1♀, Wutai, Wutoushan, 1200m, 4. IV. 2002 (Y. F Hsu, C. C. Lu & C. L. Huang); 1♂, Wutai, Ali, 1200m, 5. III.

2011 (Y. F. Hsu).

Description. Adult – Forewing length 22–36 mm. Male (PLATE 8, fig. 35): Head bearing long hairs, dark brown but with white hairs laterally. Antennae dark brown, thicker distad. Proboscis dark brown. Labial palpus short, bearing white hairs proximally, brown hairs distally. Thorax covered by dark brown hairs, ornamented with white spots. Abdomen ground color dark brown; two series of white dots present dorsally; two series of white dots present laterally; three series of white dots present ventrally, with medial series small, obscure. Valvae with outer surface covered by brown scalings with a white bar. Legs bearing brown hairs mixed with some white hairs. Patagia dark brown with white dots laterally; tegula dark brown with a prominent white spot. Forewing costa convex, termen slightly convex, apex obtuse. Hingwing termen rounded. Forewing uppersides ground color dark brown. A series of creamy yellow discal spots deviated inwards anteriorly. Creamy yellow stripes at basal portion of cell M_2 to CuA_2. Discoidal cell covered with creamy yellow scalings, with three narrow, brown stripes running from base to distal end, anterior two usually joined anteriorly. A patch of faint creamy yellow scalings frequently present near apex. Forewing undersides similar to uppersides, but markings more prominent, ground color around apex paler. Hindwing uppersides ground color brown. Creamy yellow scalings covering space in discoidal cell and proximal areas in cells. Three narrow, brown stripes running from base to distal end, anterior two joined anteriorly. A series of creamy yellow discal dots present, arranged into a curve. A series of creamy yellow dots at distal end of each cell. An oval, orange spot at tornus. Hindwing undersides with pattern similar to that of uppersides, with markings more prominent. Female (PLATE 8, fig. 36): Color patterns of body and wings similar to that of male, with forewing broader.

Male gentalia (PLATE 25, fig. 110) – Pseuduncus forming short extension, beak-like. Socii as a pair of sclerotized sac with distal half narrowed, inner side bearing several short spines caudad . Vinculum slender, curved. Saccus short. Valva long, lobe-like; sacculus thick, heavily sclerotized; harpe represented as sclerotized, lobe-like piece, with ventral edge thickened, caudal end with a dorsal depression, bearing multiple rows of small spines on inner surface. Phallus cylindrical, strongly up-curved.

Female genitalia (PLATE 34, fig. 149) – Corpus bursae oval. Ductus bursae thick, short, with ostium bursae surrounded by funnel-shaped, heavily sclerotized sterigma. Signum as an elongate, wrinkled, granular, sclerotized, slightly invaginated band. Anal papillae broad, heavily sclerotized, semi-circular but with basal portion thickened, shield-like. Posterior apophyses slightly longer than length of anal papillae, pole-like, slightly curved basad.

Global distribution. Himalayas, northern Indochina, West, South to East China, and Taiwan (Hsu, 2013).

Distribution in Taiwan. Ssp. *melanoleucus* occurs in Taiwan. This species mainly inhabit broad-leaf forests from sea level to 1500 m in northern Taiwan, but confined to montane habitats in southern Taiwan (Hsu, 2013).

Larval Host plant(s). Lauraceae: *Cinnamomum camphora* (Sonan, 1922); *Lindera megaphylla, Litsea cubeba, C. kanehirae* [or *C. micranthum*] (Lee & Chang, 1988), and *Machilus thunbergii* (Igarashi & Fukuda, 1997).

Biology. This species is known to be univoltine in occurrence (Hsu, 2013), on the wing in spring months, and overwinters as pupae (Hsu, 1999).

形態特徵：成蝶前翅長 22–36mm。雄蝶 (圖 35)：頭被長毛、黑褐色，側面具白毛。觸角黑褐色，末端較厚。口器黑褐色，小顎鬚短，近部有白毛，末端褐色毛。胸部覆有黑褐色毛，具白斑。腹部底色黑褐色，背面兩列白斑，側面兩列白斑，腹面三列白斑且中列較小且不明顯。抱器外表面覆有褐色鱗片，綴有一白帶。足具褐色毛混雜一些白色毛。領片黑褐色，側面具白點；翅基片黑褐色具明顯白點。前翅前緣圓凸，外緣微凸，先端圓鈍。後翅外緣圓。前翅背面底色黑褐色，一列乳黃色中央斑在先端向內偏。M_2 室至 CuA_2 室基部有乳黃色條帶。中室覆有乳黃色鱗片，並有三條褐色窄帶自基部延伸至中室端，前端兩條於先端連結，近先端常有模糊乳黃色鱗片區塊出現。前翅腹面與背面相似，唯翅紋較明顯，底色近翅先端較淺。後翅背面底色褐色，乳黃色鱗片覆蓋中室及各室近基部區域，三條褐色條帶自基部延伸至端部，前兩條於前端相連。一列乳黃色中央斑點排列呈彎曲狀，各室靠外側端具乳

黃色點，排成一列。臀角具有一卵狀橘色斑。後翅腹面與背面相似，翅紋較明顯。雌蝶 (圖 36)：軀體及翅紋與雄蝶相似，前翅較寬大。

雄交尾器 (圖 110)：偽鉤突延伸呈短喙狀。背兜側突呈一對骨化囊，後半部狹窄，內側靠末端具多短刺。基腹弧纖細彎曲。囊突短。抱器長葉狀；抱器腹厚，高度骨化，抱握鋏為葉狀骨板，腹面邊緣厚，靠末端背面扁平，內面具數列小刺。陽莖圓柱狀，強上彎。

雌交尾器 (圖 149)：交尾囊卵狀，交尾囊管寬短，交尾孔板於交尾囊孔處呈高度骨化之漏斗狀。花壁骨化長條帶，略內陷，具皺褶及顆粒。肛突寬闊、高度骨化，半圓形，基部增厚呈盾狀。後內骨突略長於肛突，柱狀，基部略彎曲。

世界分布：喜馬拉雅地區、中南半島北部、華西、華南、華東以及臺灣。

臺灣分布：亞種 ssp. *melanoleucus* 分布於臺灣，主要棲息在臺灣北部海平面至海拔 1500 公尺的闊葉林，在臺灣南部則侷限分布於山區。

寄主植物：樟科樟樹、大葉釣樟、山胡椒、牛樟、紅楠。

生物學：本種已知為一年一世代物種 (Hsu, 2013)，成蝶出現於春季月份，以蛹期越冬 (Hsu, 1999)。

Papilio (Chilasa) clytia Linnaeus, 1758 (大斑鳳蝶 / 黃邊鳳蝶 / 斑鳳蝶)

PLATE 9, figs. 37-39; PLATE 25, fig. 110; PLATE 35, fig. 149

Papilio (Nymphalis) clytia Linnaeus, 1758: Systema Naturae (Ed 10) 1: 479, no. 125. (Type locality: "Indiis" [India])

Papilio (Nymphalis) dissimilis Linnaeus, 1758: Systema Naturae (Ed 10) 1: 479, no. 130. (Type locality: "Asia")

Papilio (Nymphalis) panope Linnaeus, 1758: Systema Naturae (Ed 10) 1: 479, no. 131. (Type locality: "Asia")

Papilio similis Grote, 1899: Proceedings of American Philosophical Society 38: 30, pl. 4, f. 11. (Type locality: Not available)

Papilio casyapa Moore, 1879: Proceedings of Zoological Society of London 1879 (1): 143. (Type locality: "Calcultta")

Papilio papone Westwood, 1872: Transaction of Entomological Soiety of London 1872 (2): 94, pl. 3, f. 2. (Type locality: "India Orientali")

Papilio onpape Moore, 1878: Proceedings of Zoological Society of London 1878 (4): 840. (Type locality: "Houngduran source; Naththoung, Upper Tenasserim" [Myanmar])

Papilio saturata Moore, 1878: Proceedings of Zoological Society of London 1878 (3) : 697. (Type localit: Hainan)

Specimens examined:

JINMEN [= KINMEN] Co.: 1♂, Jinhu, Taiwushan, XII. 14. 1997, reared from *Litsea glutinosa*, emgd. 15. I. 2000, HSU 99M16 (Y. F. Hsu); 1♂, site not specified,VII. 2008 (W. T. Chen); 1♀, Wuhushan, 50m, 30. X. 2000 (Y. T. Lo, C. C. Lu & B. C. Chou); 1♂, same locality, 7. VIII. 2001, emgd. IX. 2. 2001; 1♀, Jinhu, Shenshiqiao, 27/28. V. 2011 (Y. F. Hsu & H. C. Huang); 2♂, 1♀, same locality, 12. V. 2013, reared from *L. glutinosa*, emgd. 29/31. V. 2013, HSU 13E24 (C. L. Huang, L. H. Wang & H. C. Huang); 2♂, same locality, 10/13. VI. 2015 (L. Huang); 1♂, 1♀, Shishan, 6. VI. 2014, reared from *L. glutinosa*, emgd. 1/2. VII. 2014, HSU 14F25 (C. L. Huang & H. C. Huang) (genitalia preparation JYL115, JYL116).

Description. Adult – Forewing length 41–50 mm. Male (PLATE 9, figs. 37-38): Head hairy, dark brown but with a pair of white bars on frons. Antennae dark brown, thicker distad. Proboscis dark brown. Labial palpus white mixed with few brown scalings. Thorax covered by dark brown hairs, ornamented with white spots. Abdomen ground color dark brown; two narrow, creamy white, longitudinal stripes present dorsally; two prominent, creamy white, longitudinal stripes present laterally; three series of white dots present ventrally. Valvae with outer surface covered by brown scalings with a white bar laterally and ventrally. Legs bearing brown hairs mixed with some white hairs. Patagia dark brown with white dots laterally; tegula dark brown with a prominent white spot. Forewing costa convex, termen nearly straight. Hingwing termen wavy. Forewing uppersides ground color dark brown or brown. A series of creamy white, discal spots present. A series of creamy white marginal dots present at distal ends of cells. Extensive creamy yellow markings present in discoidal cell and cells in form *dissimilis* (PLATE. 9, figs. 37, 39). Forewing undersides similar to uppersides. Hindwing uppersides ground color dark brown or brown. A series of creamy white, discal lunules present, arranged into a curve. Additional lunules present proximal to discal spots. A series of orange or yellow bars present at distal ends of cells. Two orange spots present at tornus. Extensive creamy yellow markings present in discoidal cell and cells in form *dissimilis* (PLATE 9, figs. 37, 39). Hindwing undersides with pattern similar to that of uppersides, but

marginal orange markings more extensive. Female (PLATE 9, fig. 39): Color patterns of body and wings similar to that of male.

Male gentalia (PLATE 25, fig. 111) – Pseuduncus forming an extension with a blunt distal end. Socii as a pair of elongate, sclerotized sac. Vinculum stout. Saccus short. Valva lobe-like; saccus thick, heavily sclerotized; harpe represented as sclerotized, flame-shaped piece, edge thickened, serrate, bearing a prominent fin-like tooth ventrad, and a triangular extension caudad. Phallus cylindrical, up-curved.

Female genitalia (PLATE 35, fig. 150) – Corpus bursae oval. Ductus bursae thick, membranous, leading to a heavily sclerotized hood with prominent, medial extension surrounding ostium bursae. Signum as an elongate, weakly sclerotized band. Sterigma as moderately sclerotized hood. Anal papillae broad, semi-circular. Posterior apophyses longer than length of anal papillae, pole-like.

Variation. Many forms of this species exist and given names. Two forms commonly found in nominotypical subspecies are form *clytia* (PLATE 9, fig. 38) and form *dissimilis* (Figs. 37, 39). The former has much reduced markings on wings and body compared to the latter.

Global distribution. Himalayas, India, Andaman, Malay Peninsula, eastern Indochina, Philippines, West, South to East China, and Taiwan (Tsukada & Nishiyama, 1982).

Distribution in Taiwan. This species inhabits Jinmen Islands (Chen, 1974; Lee & Wang, 1995; Hsu *et al.*, 2004; Chang, 2011), and introduced to Penghu Islands via anthropogenic pathway (Huang, 2008).

Larval Host plant(s). Lauraceae: *Litsea glutinosa* (Lee & Wang, 1995).

Biology. This species is known to be multivoltine in occurrence (Lee & Wang, 1995; Hsu *et al.*, 2004), on the wing in all months except winter (Lee & Wang, 1995; Hsu *et al.*,

2004).

形態特徵：成蝶前翅長 41–50mm。雄蝶 (圖 37–38)：頭被毛、黑褐色，前額具一對白條。觸角黑褐色，末端較厚。口器黑褐色，下唇鬚白色雜有一些褐色鱗片。胸部覆有黑褐色毛，綴有白點。腹部底色黑褐色，背面有兩條乳白色縱向窄帶，側面有兩條乳白色縱向窄帶，腹面有三列白點。抱器外表面覆有褐色鱗片，側面及腹面具白條。足有褐色毛，混有一些白毛。領片黑褐色側面具白點；翅基片黑褐色具明顯白點。前翅前緣圓凸，外緣近筆直。後翅外緣波狀。前翅背面底色黑褐色或褐色，具一列乳白色中央斑，一列乳白色外緣斑點在各翅室外端，多紋型 *dissimilis* (圖 37、39) 則在中室及各翅室廣佈乳黃色斑紋。前翅腹面與背面相似。後翅背面底色黑褐色或褐色，一列乳白色中央斑呈弦月紋排列呈彎曲狀，另一列橙色或黃色條帶排列於各翅室端部。臀區有兩枚橙色斑。多紋型 *dissimilis* (圖 37、39) 型在中室及各翅室有廣佈乳黃色斑紋。後翅腹面與背面相似，但邊緣橙色翅紋較廣。雌蝶 (圖 39)：軀體及翅紋與雄蝶相似。

雄交尾器 (圖 111)：偽鉤突向後延伸，末端鈍。背兜側突為一對長骨化囊。基腹弧粗壯。抱器葉狀。囊突厚、高度骨化。抱握鋏為一焰狀骨片，邊緣增厚，具鋸齒，腹面具一明顯鰭狀齒，後端延伸呈三角形。陽莖圓柱狀、上彎。

雌交尾器 (圖 150)：交尾囊卵狀，交尾囊管厚，膜質，延伸成高度骨化兜帽狀構造，中間明顯延伸包圍交尾囊孔。花壁長帶狀、略骨化。交尾孔板為中度骨化兜帽構造。肛突寬闊、半圓形。後內骨突長於肛突、柱狀。

變異：本種存在許多不同變異型並被給予命名。在承名亞種中常發現兩型，分別為寡紋型 *clytia* 和多紋型 *dissimilis*，相較於後者，前者身體及翅膀上斑紋大多減退。

世界分布：喜馬拉雅地區、印度、安達曼、馬來半島、中南半島東側、菲律賓、華西、華南、華東以及臺灣。

臺灣分布：本種分布於金門島，亦經由人為途徑引入澎湖群島。

寄主植物：樟科潺稿樹。

生物學：本種已知為一年多世代種類，除了冬季終年可見成蝶活動。

Papilio (Pterourus) maraho Shiraki & Sonan, 1934 (臺灣寬尾鳳蝶 / 寬尾鳳蝶 / 闊尾鳳蝶)

PLATE 10, figs. 40-41; PLATE 25, fig. 111; PLATE 35, fig. 150

Papilio maraho Shiraki & Sonan, 1934: Zephyrus 5: 177–181, tab. 15, figs 1–2. (Type locality: "Eboshi, Rato-Precture")

Specimens examined:

YILAN Co.: 2♂, Datong, Mingchi, 1200m, 3. VI. 2002, reared from *Sassafras randaiense*, emgd. 26. II. 2003, HSU 02F4 (C. C. Lu); 1♀, same locality, 1200m, 28. V. 2002, reared from *S. randaiense*, emgd. 27. II. 2003, HSU 02E78 (C. C. Lu); 1♀, same locality, 7. VIII. 2002, reared from *S. randaiense*, emgd. 28. III. 2003, HSU 02H26 (C. C. Lu& L. H. Wang); 1♀, same locality, 1200m, 2. VI. 2006, reared from *S. randaiense*, emgd. 21. VII. 2006, HSU 06F4.3 (L. H. Wang & C. C. Lu); 1♂, same locality, 23. V. 2008, reared from *S. randaiense*, emgd. 7. VII. 2008, HSU 08E31.2 (L. H. Wang); 1♂, same locality, 23. VII. 2008 (L. H. Wang) (genitalia preparation JYL084); 1♂, Datong, Tuleng, 2. II. 2009, reared from *S. randaiense*, emgd. 28. II. 2009, HSU09B02 (L.H. Wang); 1♀, 2. VII. 2015 (L. Huang); 1♀, Datong, Taipingshan, 14. VII. 2005, reared from *S. randaiense*, emgd. 24. VIII. 2005, 05G14 (L. H. Wang) (genitalia preparation JYL085); 1♀, Datong, Cuifenghu, 4. VII. 2006, reared from *S. randaiense*, emgd. 3. VIII. 2006, HSU 06G1.1 (L. H. Wang); 1♂, 5. VII. 2006, reared from *S. randaiense*, emgd. 3. VIII. 2006, HSU 06G1.3 (L. H. Wang).

Description. Adult – Forewing length 48–65 mm. Sexual dimorphism absent. Male (PLATE 10, fig. 40): Head bearing short, dark brown hairs. Antennae dark brown, thicker distad. Proboscis dark brown. Labial palpus short, bearing dark brown hairs. Thorax and abdomen covered by dark brown hairs. Legs dark brown. Patagia and tegula dark brown. Forewing elongate, with costa concave, termen nearly straight, apex obtuse. Hingwing termen wavy, forming prominent lobe-like "tail" in which veins M_3 and CuA_1 penetrate. Forewing uppersides ground color brown, with veins darkened. Dark stripes in each cell, with 4 narrow, dark brown stripes in discoidal cell. Forewing undersides similar to uppersides. Hindwing uppersides ground color brown, with outer half darkened. A white patch present in discoidal cell and adjacent areas in proximal portion of cells, notable in M_1, M_2, M_3 and CuA_1. A series of prominent red lunules along termen. Faint, blue scalings in dark area between red markings and white patch. Hindwing undersides

similar to uppersides. Female (PLATE 10, fig. 41): Color patterns of body and wings similar to that of male.

Male gentalia (PLATE 25, fig. 112) – Pseuduncus forming short extension with blunt distal end. Socii with distal ends pea-like, bearing short hairs. Vinculum stout, curved. Tegumen membranous dorsally. Saccus short. Valva lobe-like; sacculus thick, heavily sclerotized; harpe represented as sclerotized fin, bearing a row of small teeth dorsally, a large tooth with acute distal end ventrally. Phallus cylindrical, strongly curved.

Female genitalia (PLATE 35, fig. 151) – Corpus bursae oval, with concentric folds. Ductus bursae membranous, thick cephalically, narrow caudally, with ostium bursae surrounded by a sclerotized dome. Signum as an elongate, wrinkled, granular, sclerotized band. Sterigma as moderately sclerotized U-shaped band bearing two rounded distal patches with a fold. Anal papillae broad, semi-circular, setose distad. Posterior apophyses slightly longer than length of anal papillae, nearly straight, pole-like.

Global distribution. Endemic to Taiwan.

Distribution in Taiwan. Found in montane habitats from 500 to 2000 m in elevation.

Larval Host plant(s). Lauraceae: *Sassafras randaiense* (Liao, 1967).

Biology. The pupa of this species is known to perform prolonged diapause in some individuals, thus no fixed voltinism exists (Wang *et al.*, 2007). Adult butterfly are mostly found in spring and summer (Yamanaka, 1971).

Remarks. Along with continental *P. elwesi* Leech, 1889, is often placed in the genus *Agehana* Matsumura, [1936], which was established with *P. maraho* designated as the type species. However, Wu *et al.* (2015) has demonstrated these two species are derived from *Pterourus*, a species-rich group of American swallowtails, and synonymized *Agehana* with *Pterourus*.

P. maraho is assessed as a species in the category of "nearly threatened" (LR/nt) in 1996 by the IUCN Red List (Gimenez Dixon, 1996), and in the category I "Endangered Species" listed by the Council of Agriculture, Taiwan, ROC (http://conservation.forest.gov.tw/File.aspx?fno=67075).

形態特徵：成蝶前翅長 48–65mm，無雌雄二型性。雄蝶 (圖 40)：頭被黑褐色短毛。觸角黑褐色，末端較粗。口器黑褐色，下唇鬚短，具有黑褐色毛。胸部及腹部覆有黑褐色毛。足呈黑褐色。領片和翅基片黑褐色。前翅長，前緣圓凸，外緣近筆直，先端圓。後翅外緣波狀，具一明顯突起之尾狀突，並且 M_3 脈及 CuA_1 脈貫穿該尾突。前翅背面底色褐色，翅脈顏色深，各室有深色帶，中室有四條狹窄的黑褐色條帶。前翅腹面與背面相似。後翅背面底色褐色，外半部顏色較深。一白色區域覆於中室及相鄰區域翅室基部，M_1、M_2、M_3 及 CuA_1 者特別明顯，沿後翅外緣有一列明顯的紅色弦月紋。紅色紋及白色區塊間的暗色區有模糊的藍色鱗片。後翅腹面與背面相似。雌蝶 (圖 41)：軀體顏色及翅紋與雄蝶相似。

雄交尾器 (圖 112)：偽鉤突短、後端鈍。背兜側突後端豆狀，具短毛。基腹弧粗大彎曲。背兜背部膜質，囊突短。抱器葉狀；抱器腹厚，高度骨化；抱握鋏呈一骨化鰭，背部具一列小齒，腹面近末端銳尖，具一大齒。陽莖圓柱狀，顯著彎曲。

雌交尾器 (圖 151)：交尾囊卵狀，具有同心圓褶。交尾囊管膜質，頭端粗，末端狹窄，於交尾孔周圍呈半圓狀骨化。花壁骨化長帶狀，具皺紋及顆粒。交尾孔板中度骨化，呈 U 形帶狀，後端具兩圓形區塊並具一褶。肛突寬闊、半圓形，後端具毛。後內骨突略長於肛突，近筆直、柱狀。

世界分布：本種為臺灣特有種。

臺灣分布：分布於海拔 500 至 2000 公尺的山區。

寄主植物：樟科臺灣檫樹。

生物學：本種的蛹已知在部分個體有延長滯育的現象，因此沒有固定的世代性 (Wang *et al.*, 2007)。成蝶主要在春、夏季出現 (Yamanaka, 1971)。

註記：中華寬尾鳳蝶 *P. elwesi* Leech, 1889 和臺灣寬尾鳳蝶 *P. maraho* 過去都被放在

寬尾鳳蝶屬 *Agehana* Matsumura, [1936] 中，其中臺灣寬尾鳳蝶 *P. maraho* 為該屬的模式物種。然而，根據 Wu *et al.* (2015) 研究証實此兩種是從美洲的一群物種多樣性很高的美洲鳳蝶亞屬 *Pterourus* 演化而來，因此寬尾鳳蝶屬為該亞屬的同物異名。

根據國際自然保護聯盟紅色名錄(紅皮書)，臺灣寬尾鳳蝶被評估為「瀕危等級」(LR/nt)，而臺灣行政院農業委員會公告，臺灣寬尾鳳蝶目前列為保育類一級的「瀕危物種」。

***Papilio (Papilio) machaon* Linnaeus, 1758 (黃鳳蝶 / 金鳳蝶)**

Papilio (Eques) machaon Linnaeus, 1758: Systema Naturae (Edition 10) 1: 462. (Type locality: "Europae" [Sweden])

Papilio machaon var. *marginalis* Robbe, 1891: Annales de la Société Entomoloique de Belgique 35: CCCXCV [395]. (Type locality: "Belgium")

Papilio machaon var. *aurantiaca* de Selys-Longchamps, 1857: Annales de la Société Entomoloique de Belge 1: 4. (Type locality: "Belgium")

Ssp. *sylvina* Hemming, 1933

PLATE 10, fig. 44; PLATE 11, fig. 45; PLATE 25, fig. 112

Papilio machaon sylvina Hemming, 1933: Entomologist 66: 279. (replacement for *sylvia* Esaki & Kano, 1930)

Papilio machaon sylvia Esaki & Kano, 1930: Zephyrus 2: 201. (Type locality: Formosa)(preoccupied by *Papilio sylvia* Fabricius, 1775)

Ssp. *schantungensis* Eller, 1936

PLATE 11, figs. 46-47; PLATE 26, fig. 113

Papilio machaon sphyrus f. *chinensis* Verity, 1907: Rhopalocera Palaearctica 1: 16, 108, 297, pl. 11, f. 2. (Type locality: "Venchuan et Taraku, Sze-chuan")(preoccupied by *Papilio paris chinensis* Rothschild, 1895)

Papilio machaon chinensis Eller, 1936: Die Rassen von *P. machaon* L.: 38. (preoccupied by *Papilio paris chinensis* Rothschild, 1895)

Papilio machaon schantungensis Eller, 1936: Die Rassen von *P. machaon* L.: 41. (Type locality: Tsingtau, Schantung)

Papilio machaon venchuanus Moonen, 1984: Papilio International 1(3): 47. (Replacement for *chinensis* Verity, 1907)

Specimens examined:

Ssp. *sylvina*: **TAIZHONG CITY [= TAICHUNG CITY/ TAICHUNG Co.]:** 1♀, Heping, Lishan, VII. 31. 1988 (E. Teshirogi); 1♂, Heping, Deji, VI. 16. 1990 (H. Y. Lee) (genitalia preparation JYL150); 1♀, Heping, Guguang, 24. VII. 1993 (S. Miyazaki).

NANTOU Co.: 1♂, Shuili, Danda Forest Trail, VII. 3. 1992 (W. I. Chou).

Ssp. *schantungensis*: **LIANJIANG [= LIENCHIANG] Co.:** 4♂, 1♀, Nangan, Bajiaoting, V. 21. 2012, reared from *Foeniculum vulgare*, emgd. VI. 7/8. 2012, HSU 12E23 (J. F. Tasi) (genitalia preparation JYL151).

Description. Adult – Forewing length 42–46 mm. Male (PLATE 10, fig. 44;PLATE 11, fig. 46): Head hairy, creamy yellow with a prominent, dark brown, medial band. Antennae dark brown, clavate distad. Proboscis dark brown. Labial palpus creamy yellow. Thorax brown dorsally, creamy yellow with two chevrons from wing base to coxae of meso- and meta-legs. Abdomen dark brown dorsally, ground color creamy yellow ventrally, with two longitudinal, thin, brown bands laterally and two ventrally. Valvae with outer surface creamy yellow with some dark brown scalings, most extensive along dorsal margin. Legs dark brown with yellow bands on femurs externally. Patagia, tegula brown with creamy yellow band. Forewing with costa concave, termen nearly straight. Hingwing termen wavy, with a prominent, digitate projection at distal end of vein M_3. Forewing uppersides ground color dark brown. A series of prominent yellow spots forming discal band; a series of narrow, yellow, marginal streaks along termen; a series of prominent, yellow, submarginal spots arranged in a line roughly along termen. Two yellow spots at distal end of discoidal cell. Dark area near wing base dusted with yellow scalings. Forewing undersides mostly yellow, with dark areas represented only by a narrow stripe along termen, a relatively broad band between discal band and submarginal band, and along veins. Hindwing uppersides ground color brown. Discal spots forming a large yellow patch proximally. Submarginal and marginal spots prominent. Markings consisted of blue scalings present in each cell of dark band between proximal yellow patch and submarginal band. A short, dark brown bar at distal end of discoidal cell. A prominent, red, round spot crowned with metallic blue lunule at tornus. Dark shade present along dorsum proximally. Hindwing undersides mostly yellow, with dark areas represented only by a narrow band running along termen, a relatively broad band between discal band and submarginal band, and along veins. Prominent, blue markings in each cell of this dark band. A few orange markings sometimes present. Female (PLATE 11, figs. 45, 47): Color patterns of body and wings indistinguishable to those of male.

Two subspecies are present. Individuals of ssp. *sylvina* (PLATE 10, fig. 44; PLATE 11, fig. 45) is usually smaller than those of ssp. *schantungensis* (PLATE 11, figs. 46-47) in size. Moreover, a few distinctions on wing patter may be recognized between them: Compared to ssp. *schantungensis*, dark area between discal band and submarginal band is narrower, submarginal spots are larger.

Male gentalia (PLATE 25, fig. 113; PLATE 26, fig. 114) – Pseuduncus forming medial extension, tapering into narrow, blunt distal end. Socii with dorsal bump, setose. Vinculum slender, curved. Tegumen with dorsal side membranous mesad. Saccus short. Valva lobe-like, with angled distal end; sacculus thick, heavily sclerotized; harpe represented as elongate sclerotized rib with distal half serrate. Juxa as an elongate, flat sclerite. Phallus cylindrical, curved.

Female genitalia – Corpus bursae oval. Ductus bursae membranous, thick. Signum forming an elongate, wrinkled, granular, invaginated, sclerotized band, with medial ridge. Sterigma with lamella postvaginalis forming a pair of sclerotized serrate extensions. Anal papillae broad, semi-circular, setose distad. Posterior apophyses approximately 2X length of anal papillae, straight, pole-like.

Global distribution. Widely distributed in the Holarctic region, covering nearly entire Palearctic region and northwestern portion of Nearctic region, extending to northern margins of the Oriental region. (Fujioka, 1997).

Distribution in Taiwan. Ssp. *sylvina* is endemic to main island of Taiwan, confined to montane zone from 1000 up to approximately 2500 m in elevation of central and southern Taiwan (Hsu, 2013). Ssp. *schantungensis* has been found from Mazu Islands (Hsu, 2013).

Larval Host plant(s). Apiaceae: *Angelica dehurica* [*decursiva*], *A. hirsutiflora*, *Apium graveoleus* [*graveolens*], *Coriandrum sativum*, *Cryptotaenia canadeusis* [*canadensis*], *Daucus carota*, *Peucedanum formosanum* (Lee & Chang, 1988); *Angelica tarokensis* (Lee & Wang, 1997).

Biology. This species is multivoltine in occurrence in Taiwan, and in diapause as pupa in winter (Hsu, 2013).

Remarks. Although a few plants in the Parsley family (Apiaceae) have been recorded as hostplants for *P. machaon*, the race in Taiwan, ssp. *sylvina*, seems to depend on *Peucedanum formosanum* for larval host under natural condition (e. g. Lin, 1994).

Ssp. *sylvina* of *P. machaon* has been considered a rare butterfly, and no confirmed record of it after the devastating earthquake of 21 September 1999 (Jiji earthquake). Concerns on its survival has been a subject of evaluation and discussion.

形態特徵：成蝶前翅長 42–46mm。雄蝶 (圖 44、46)：頭具毛、乳黃色，具一明顯黑褐色中央帶。觸角黑褐色，末端呈棍棒狀。口器黑褐色。下唇鬚乳黃色。胸部背面褐色，胸部整體乳黃色自翅基至中、後足基節有兩枚箭形紋。腹部背面黑褐色，腹面底色乳黃色，側面及腹面具兩條縱向細褐色帶。抱器外表面乳黃色，具一些黑褐色鱗片，大部分沿背緣延伸。足呈黑褐色，腿節外側具黃色帶。領片及翅基片具乳黃色帶。前翅前緣圓凸，外緣近筆直。後翅外緣波狀，M_3 脈末端具一明顯指狀突。前翅背面底色黑褐色。一列明顯黃色斑形成中央斑帶；一列窄黃色緣條沿外緣分布；一列明顯黃色亞外緣斑沿外緣略排成線狀。中室後端有兩黃色斑。近翅基暗區撒佈黃色鱗片。前翅腹面幾乎黃色，暗色區沿外緣呈窄帶，在中央斑帶及亞外緣斑帶之間則呈一相對寬闊斑帶，以及沿脈分布。後翅背面底色褐色。中央斑形成一近基部的大型黃色區。亞外緣及外緣斑明顯。近基部黃色區及亞外緣帶之間的各翅室暗帶出現由藍色鱗片組成的斑紋。中室末端有一短黑褐色條帶。臀角有一明顯紅色圓點冠上金藍色弦月紋。近基部沿內緣有暗影。後翅腹面幾乎黃色，黑色區則沿外緣呈窄帶，及一相對較寬的斑帶界於中央斑帶和亞外緣帶之間，以及沿脈分布。此暗帶在各翅室內有明顯藍色斑。有時會有一些橙色斑出現。雌蝶 (圖 45、47)：軀體及翅紋與雄蝶難以區別。

臺灣亞種 ssp. *sylvina* (圖 44–45) 個體通常較大陸亞種 ssp. *schantungensis* (圖 46–47) 來得小。此外，其中央斑帶與亞外緣帶之間的暗色區也較窄，亞外緣斑則較大。

雄交尾器 (圖 113–114)：偽鉤突中央突出，向後端漸縮而末端鈍。背兜側突背面隆起，具毛。基腹弧纖細彎曲。背兜背面中央膜質。囊突短。抱器葉狀，末端角狀。抱器

腹厚高度骨化；抱握鋏呈長骨化脊，後半部鋸齒。陽基軛片長，扁平骨片。陽莖圓柱狀、彎曲。

雌交尾器：交尾囊卵狀，交尾囊管膜質且厚。花壁形成一內陷長骨化帶，具皺褶及顆粒，中央具脊。後交尾孔板形成一對骨化鋸齒延伸，肛突寬闊、半圓形，後端具毛。後內骨突約肛突的兩倍長、筆直、柱狀。

世界分布：廣分布於全北區，涵括幾乎整個舊北區和新北區西北部，並延伸至東洋區的北界。

臺灣分布：臺灣亞種 ssp. *sylvina* 為臺灣本島特有，侷限分布於臺灣中南部海拔 1000 至 2500 公尺山區。大陸亞種 ssp. *schantungensis* 見於馬祖。

寄主植物：有記錄者包括繖形科：野當歸、濱當歸、旱芹菜、芫荽、加拿大芹、野胡蘿蔔、臺灣前胡、太魯閣當歸。

生物學：本種在臺灣一年多世代，冬季以蛹態滯育 (Hsu, 2013)。

註記：雖然有些文獻記載其他繖形科植物為的寄主植物，但臺灣亞種 ssp. *sylvina* 在自然情況下似乎主要倚賴臺灣前胡為主要幼蟲寄主植物。

臺灣亞種 ssp. *sylvina* 被視為稀有蝶種，自從 1999 年 9 月 21 日發生大規模破壞性的地震 (集集地震) 後便不再有可靠記錄，此一特有亞種族群是否健在是值得關注的議題。

Papilio (Sinoprinceps) xuthus Linnaeus, 1767 (柑橘鳳蝶 / 花椒鳳蝶 / 柑桔鳳蝶 / 準鳳蝶)

PLATE 11, figs. 48-49; PLATE 26, fig. 114; PLATE 35, fig. 151

Papilio (Eques) xuthus Linnaeus, 1767: Systema Naturae (Edn 12) 1 (2): corrigenda [correct spelling]. (Type locality: “India orientali”, probably Canton, China according to Honey & Scoble, 2001)

Papilio (Eques) xanthus Linnaeus, 1767: Systema Naturae (Edn 12) 1 (2): 751, no. 34. [incorrect original spelling]

Papilio xuthulus Bremer, 1861: Bulletin de l’Académie impériale des sciences de St.-Pétersbourg 3: 463. (Type locality: “Ussuri”)

Papilio xuthulinus Murray, 1874: The Entomologist's monthly magazine11: 166. (Type locality:

"Yokohama, Japan")

Papilio xanthus neoxuthus Fruhstorfer, 1908: Entomologische Zeitschrift, Stuttgart 22 (11): 46. (Type locality: "Ta-chien-lu" [Kangding, China])

Papilio xanthus neoxuthus f. *hondoensis* Fruhstorfer, 1908: Entomologische Zeitschrift, Stuttgart 22 (11): 47. (Type locality: "Hondo" [Japan])

Papilio xanthus neoxuthus f. *xuthina* Fruhstorfer, 1908: Entomologische Zeitschrift, Stuttgart 22 (11): 47. (Type locality: "Siao-Lou" [China])

Specimens examined:

XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]: 1♂,1♀, Wanli, Daping, 15. V. 2008, reared from *Zanthoxylum ailanthoides*, emgd. 12. VI. 2008, HSU 08E19, (L. H. Wang); 1♀, Ruifang, Nanya, 17. V. 2015 (Y. C. Lin) (genitalia preparation JYL062). **TAIZHONG CITY [= TAICHUNG CITY]:** 1♂, 1♀, Fengyuan Dist., Zhongzhen Park, 5. V. 2012, reared from *Z. beecheyanum*, emgd. 10. V. 2012 (L. Huang); 2♂1♀, 1. VIII. 2015 reared from *Z. beecheyanum*, emgd. 27. VIII. 2015 (L. Huang). **TAIDONG [= TAITUNG] Co.:** 2♂, Lanyu, Light house, 17. IX. 20. 2013. **LIANJIANG [= LIENCHIANG] Co.:** 1♂, Nangan, Yuntaishan, 28. VI. 2013; 2♂, 1♀, Beigan, Nigushan, 19. VII. 2013 (C. L. Huang & H. Y. Lee); 1♂, 1♀, Beigan, 7. IV. 2014, reared from *Citrus grandis*, 13. IV. 2014, HSU 14D61 (H. Y. Lee); 1♂, same locality, 10. X . 2014 (C. W. Huang & H. Y. Lee) (genitalia preparation JYL118).

Description. Adult – Forewing length 40–50 mm. Male (PLATE 11, fig. 48): Head hairy, creamy yellow with a prominent, dark brown, medial band. Antennae dark brown, swollen distad. Proboscis dark brown. Labial palpus creamy yellow. Thorax hairy, brown dorsally, creamy yellow with two chevrons from wing base to coxae of meso- and meta-legs. Abdomen creamy yellow with a prominent, dark brown band dorsally; narrow, dark brown line laterally; double, dark brown bands ventrally. Valvae with outer surface creamy yellow with some dark brown scalings, most extensive along dorsal margin. Legs dark brown with yellow bands on femurs externally. Patagia, tegula brown with creamy yellow bands. Forewing with costa concave, termen nearly straight. Hingwing termen wavy, with a prominent, digitate projection at distal end of vein M_3. Forewing uppersides ground color dark brown. A series of prominent yellow spots forming discal band; a series of prominent, yellow, submarginal spots arranged in a line roughly along termen, deviated inwards at apex. Two yellow spots at distal end of discoidal cell. Four broken narrow, yellow lines in discoidal cell proximally. Forewing undersides mostly

yellow, with dark areas represented by a narrow stripe along termen, a relatively broad band between discal band and submarginal band, along veins, and two prominent bars in discoidal cell distad and some streaks basad. Hindwing uppersides ground color brown. Discal spots forming a large yellow patch proximally. Submarginal spots prominent. Markings consisted of blue scalings in each cell of dark band between proximal yellow patch and submarginal band. A prominent, orange, round spot crowned with metallic blue lunule usually at tornus. Hindwing undersides mostly yellow, with dark areas represented only by a narrow band running along termen, a band between discal band and submarginal band, and along veins. Prominent, blue markings in each cell of this dark band. Orange markings sometimes present distally. Female (PLATE 11, fig. 49): Color patterns of body and wings indistinguishable to those of male.

Male gentalia (PLATE 26, fig. 115) – Pseuduncus forming medial extension with blunt distal end. Socii with dorsal bump, tapering to serrate distal end. Vinculum slender, curved. Tegumen with dorsal membranous area. Saccus short. Valva lobe-like, rounded distad, thickened along edge; sacculus thick, heavily sclerotized; harpe represented as elongate sclerotized rib with serrate, comb-like distal end. Juxa as a broad, flat, triangular sclerite. Phallus cylindrical, short, distal end truncated.

Female genitalia (PLATE 35, fig. 152) – Corpus bursae oval. Ductus bursae membranous, thick. Signum less than 1/4X length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band, with medial ridge. Sterigma elaborately modified; lamella antevaginalis forming a sclerotized arc with lateral conical process bearing small warts apically; lamella postvaginalis a broad sclerotized area with rounded, medial depression. Anal papillae broad, semi-circular, setose distad. Posterior apophyses approximately 2X length of anal papillae, straight, pole-like.

Variation. Wet season form is larger in size, with broader dark brown bands on both fore and hind wings. An additional prominent black spot appears in cell Sc + R_1.

Global distribution. Widely distributed in East Asia, reaching eastern Siberia to the north, reaching Luzon of the Philippines to the south. Introduced to a few Pacific island

groups, such as Hawaii, Ogasawara, and Guam (already extinct) (Fujioka, 1997).

Distribution in Taiwan. Mostly found in lowland habitats, including associated islands. (Hsu, 2013).

Larval Host plant(s). Rutaceae: *Citrus* spp. (Nitobe, 1914); *Poncirus trifolia*, *Zanthoxylum ailanthoides, Toddalia asiatica, Tetradium glabrifolium* (Hamano, 1987); *Z. nitidum* and *Z. simulans* (Lee & Chang, 1988); *Z. scandens* (Lee & Wang, 1997); *Z. nitidum, Z. scinifolium* (Lee, 2000); *Severinia buxifolia* (Lin, 2008); *Z. piperitum* (Jan, 2012).

Biology. This species is multivoltine in occurrence in Taiwan, and in diapause as pupa in winter (Hsu, 2013).

Remarks. In Taiwan, *P. xuthus* was considered a “common species” (e. g. Shirôzu, 1960), and a pest of *Citrus* plants. However, its number has been decreased considerably in recent years.

形態特徵：成蝶前翅長 40–50 mm。雄蝶 (圖 48)：頭被毛、乳黃色，具一明顯黑褐色中央帶。觸角黑褐色，末端腫大。口器黑褐色。下唇鬚乳黃色。胸部具毛，背面褐色，整體乳黃色，自翅基至中、後足基節有兩枚箭形紋。腹部乳黃色，背面具一明顯黑褐色帶，側面具窄黑褐色線條；腹面具黑褐色雙線。抱器外表面乳黃色，具一些黑褐色鱗片，大多沿背緣延伸。足呈黑褐色，腿節外側具黃色帶。領片及翅基片褐色具乳黃色帶。前翅前緣圓凸，外緣近筆直。後翅外緣波狀，M_3 脈末端具一明顯指狀突。前翅背面底色黑褐色，具一列明顯黃色斑形成中央斑帶；一列明顯黃色亞外緣斑約沿外緣排成線狀，並在先端內偏。中室靠外端有兩黃色點，中室近基部有四條斷裂黃色窄線。前翅腹面幾乎黃色，黑色區沿外緣呈窄帶，界於中央斑帶及亞外緣帶之間者相對較寬，以及沿脈，及兩條明顯的帶位於中室末端及一些條帶位於基部。後翅背面底色褐色，中央斑帶於靠基部形成一大型黃色區。亞外緣斑明顯。近基部黃色區及亞外緣帶之間的各翅室暗帶出現由藍色鱗片組成的斑紋。臀角有一明顯橘色圓點冠上藍色金屬弦月紋。後翅腹面幾乎黃色，黑色區則沿外緣呈窄帶，及一條斑帶界於中央斑帶和亞外緣帶之間，以及沿脈分布。此暗帶在各翅室內有明

顯藍色斑，末端有時會有一些橙色斑出現。雌蝶 (圖 49)：驅體及翅紋與雄蝶難以區別。

雄交尾器 (圖 115)：偽鉤突中央突出，末端鈍。背兜側突背面隆起，末端漸細、鋸齒狀。基腹弧纖細彎曲。背兜背面膜質。囊突短。抱器葉狀，末端圓鈍，邊緣厚，抱器腹厚、高度骨化；抱握鋏為長並具鋸齒之骨化脊，後端梳狀。陽基軛片寬闊扁平三角形骨片。陽莖圓柱狀、短小，末端截形。

雌交尾器 (圖 152)：交尾囊卵狀，交尾囊管膜質，厚。花壁短於交尾囊長度四分之一，形成一內陷長骨化帶，具皺褶及顆粒，中央具脊。交尾孔板複雜；前板骨化弧狀，並具圓錐狀側突，先端具疣；後板呈寬闊骨化板，中間具圓形凹陷。肛突寬、半圓形，末端具毛。後表皮突約為肛突兩倍長、筆直、柱狀。

變異：雨季型個體較大，前後翅有較寬的黑褐色帶。Sc+R_1 室具一明顯黑色斑。

世界分布：廣分布於東亞，直達東西伯利亞北部，向南到菲律賓呂宋島南端，被引入一些太平洋島群，例如夏威夷、小笠原群島、關島 (已滅絕)。

臺灣分布：大多出現在低地，包括離、外島地區。

寄主植物：芸香科：柑橘屬之枸橘、食茱萸、飛龍掌血、賊仔樹、雙面刺、刺花椒、烏柑仔、胡椒木等。

生物學：本種在臺灣為一年多世代，冬季以蛹態滯育 (Hsu, 2013)。

註記：柑橘鳳蝶 *P. xuthus* 在臺灣被認為是「常見種」 (例如 Shirôzu, 1960)，並且是柑橘屬植物的害蟲，然而近年來其數量有相當程度減少。

Papilio (Princeps) demoleus Linnaeus, 1758 (花鳳蝶 / 無尾鳳蝶 / 達摩鳳蝶)

PLATE 10, figs. 42-43; PLATE 26, fig. 115; PLATE 35, fig. 152

Papilio (Eques) demoleus Linnaeus, 1758: Systema Naturae (Edn 10) 1: 464. (Type locality: “Asia” [Canton, China])

Papilio demoleus pictus Fruhstorfer, 1898: Entomologische Zeitschrift 11 (24): 189. (Type locality: “Sumba”)

Papilio erithonius f. *malayanus* Wallace, 1865: Transactions of the Linnean Society of London 25

(1): 59. (Type locality: “Singapore, Flores, Manilla”)

Papilio demoleus annamiticus Fruhstorfer, 1902: Deutsche entomologische Zeitscriftm “Iris” 14 (2): 271. (Type locality: “Xom-Gom, S.Annam; Insula Bai-Miu, nahe Nha-Trang, S. Annam” [S. Vietnam])

Papilio demoleus sthenelinus Rothschild, 1895: Novitates Zoologicae 2 (3): 281. (Type locality: “Alor”)

Papilio erithonius Cramer, [1779]: De Uitlandsche Kapellen 3 (17-21): 67, pl. 232, f. A, B. (Type locality: “China, Java, Coromandel [New Zealand]”)

Papilio epius Fabricius 1793: Entomoloia Systematica 3, p 1: 35. (Type locality: “China”)

Papilio demoleinus Oberthür, 1879: Etudes d'Entomologie 4: 57-58. (Type locality: “China”)

Papilio demoleus libanius Fruhstorfer, 1908: EntomologischeZeitschrift (Stuttgart) 22(35): 141. (Type locality: “Takaw, Formosa [Kaohsiung, Taiwan]”)

Papilio demoleus var. *flavosignatus* Heidemann, 1954: Zeitschrift der Wiener Entomoloischen Gesellschaft 39: 388. (Type locality: “Afganistan”)

Specimens examined:

TAIPEI CITY: 1♀, 8. XI. 2010, Daan Dist., NTNU Main campus, reared from *Citrus grandis*, emged. 29. XI. 2010 (L. Huang); 1♀, Beitou, Shipai, 22. IV. 2012, reared from *C. sinensis*, emgd. 8. V. 2015 (L. Huang); 1♀, same locality, 11. V. 2015, reared from *C. sinensis*, emgd. 27. V. 2015 (L. Huang) (genitalia preparation JYL104); 1♀, same locality, 17.V. 2015 (L. Huang); 1♂, 1♀, same locality, 29.V. 2015, reared from *C. sinensis*, emgd. 8. VI. 2015 (L. Huang); 1♂, same locality, 7. VI. 2015, reared from *C. sinensis*, emgd. 24. VI. 2015 (L. Huang) (genitalia preparation JYL078); 1♂, Wenshan Dist., NTNU Gongguan campus, 24. IV. 2015, reared from *C. grandis*, emgd. 20. V. 2015 (L. Huang); 1♀, same locality, 12. V. 2015, (L. Huang); 1♀, Wenshan Dist., NTU campus, 21. VI. 2012, reared from *C. limetta*, emgd. 8. VII. 2015 (L. Huang). **XINBEI CITY [= NEW TAIPEI CITY/TAIPEI Co.]:** 1♀, Zhonghe, 21. IX. 2004, reared from *C. grandis*, emgd. 18. X. 2004, HSU 04J36 (L. H. Wang). **MIAOLI Co.:** 1♀, Sanyi, 7.VI. 2015. **PENGHU Co.:** 1♂, Magong, 11. VII. 2014 (C. L. Huang & H. Y. Lee); 1♂, same locality, 14. VII. 2014 (C. L. Huang & H. Y. Lee).

Description. Adult – Forewing length 42–46 mm. Male (PLATE 10, fig. 42): Head hairy, creamy yellow with a prominent, dark brown, medial band. Antennae dark brown, slightly enlarged distad. Proboscis dark brown. Labial palpus creamy yellow. Thorax brown dusted with creamy yellow scalings dorsally, creamy yellow with two chevrons from wing base to coxae of meso- and meta-legs. Abdomen dark brown dusted with creamy yellow scalings dorsally, ground color creamy yellow ventrally, with two

longitudinal brown bands laterally and two ventrally. Valvae with outer surface creamy yellow with some dark brown scalings, most extensive along dorsal margin. Legs dark brown with yellow bands on femurs externally. Patagia, tegula brown with creamy yellow band. Forewing with costa concave, termen nearly straight. Hingwing termen wavy, with distal end of vein M_3 slightly more produced than the other veins. Forewing uppersides ground color dark brown. Three series of creamy yellow spots present, marginal spots small; submarginal prominent, arranged roughly along termen; discal spots with size and shape more vaiable, arranged into an arc. Three creamy yellow spots in discoidal cell. Minute creamy yellow dots and markings present near wing base, in four lines in discoidal cell, wavy posterior to discoidal cell. Forewing undersides with markings similar to uppersides, ground color paler, with additional, orange patch subapically. Creamy yellow stripes present near wing base. Hindwing uppersides ground color brown. Discal spots forming a large creamy yellow patch near wing base. Submarginal and marginal spots prominent. In cell $Sc+R_1$, space between discal spot and submarginal spot forming a circle, containing a metallic blue lunule. Much of hind wing dusted with creamy yellow scalings. A prominent red spot crowned with metallic blue lunule at tornus. Hindwing undersides mostly creamy yellow, with prominent orange spots edged by blue between discal and submarginal spots. Prominent brown stripes near wing base, forming an anterior Y-shaped band and a posterior curved band. Female (PLATE 10, fig. 43): Color patterns of body and wings similar to those of male, but hindwing undersides usually duller, tinged with orange. Red spot at tornus on hindwing uppersides usually not as extensive as that of males.

Male gentalia (PLATE 26, fig. 116) – Pseuduncus forming rhombic extension with blunt distal end. Socii reniform, setose. Vinculum stout, curved. Tegumen with dorsal membranous area. Saccus short. Valva lobe-like, truncate dorsad, with a caudal extension; sacculus thick, heavily sclerotized; harpe represented as sclerotized fin, bearing a row of small teeth dorsally. Juxa as a flat sclerite, broad dorsad, narrowed ventrad. Phallus cylindrical, slightly curved.

Female genitalia (PLATE 35, fig. 153) – Corpus bursae an elongate sac. Ductus bursae membranous, thick cephalically, narrow caudally. Signum over half of length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band, with

medial ridge. Sterigma elaborately modified; lamella antevaginalis forming sclerotized walls by side of ductus bursae; lamella postvaginalis a broad sclerotized dome. Anal papillae broad, semi-circular, setose distad. Posterior apophyses longer than length of anal papillae, straight, pole-like.

Global distribution. Arabia, Iran, Himalayas, India, Malay Peninsula, Sumatra, Indochina, Philippines, southern China, Taiwan, Flores, Alor, Sumba, Southeastern New Guinea, and Australia (Tsukada & Nishiyama, 1982).

Distribution in Taiwan. From lowland up to 1000 m in elevation (Hsu, 2013). Most common in lowland areas, and well-adapted to urban environments (Hsu, 1999).

Larval Host plant(s). Rutaceae: *Citrus* spp. (Nitobe, 1914); *Glycosmis citrifolia*, *Zanthoxylum nitidum*, *Z. ailanthoides* and *Clausena excavata* (Lee & Chang, 1988); *Z. scandens* (Lee & Wang, 1997); *Severinia buxifolia*, *Fortunella japonica* (Hsu, 1999); *Toddalia asiatica* (Igarashi & Fukuda, 2000).

Biology. This species is known to be multivoltine in occurrence, on the wing in all months except winter (Hsu, 1999).

Remarks. Populations in Taiwan and the Philippines are sometimes treated as a distinct subspecies (e. g. Shirôzu, 1960; Tsukada & Nishiyama, 1982), ssp. *libanius* Fruhstorfer, but Fujioka (1997) pointed out that no distinction is found between *libanius* and the nominotypical subspecies.

形態特徵：成蝶前翅長 42–46 mm。雄蝶 (圖 42)：頭被毛、乳黃色，具一明顯黑褐色中央帶。觸角黑褐色，末端略膨大。口器黑褐色。下唇鬚乳黃色。胸部褐色，背面佈有乳黃色鱗片，整體乳黃色並且沿翅基至中、後足基節有兩枚箭形紋。腹部黑褐色背面佈有乳黃色鰻鱗片。抱器外表面乳黃色具一些黑褐色鱗片，多沿背緣分布。足呈黑褐色，腿節外側具黃色帶。領片、翅基片褐色具乳黃帶帶。前翅前緣圓凸，外緣近筆直。後翅外緣波狀，M_3 脈末端較其他脈略微突。前翅背面底色黑褐色，具三列乳黃色斑點，外緣斑點小，亞外緣明顯約沿外緣排列，中央斑點大小和形狀較

具變化，排列呈一弧形。中室有三枚乳黃色斑。細乳黃色點及斑紋出現於近翅基處並於中室呈四條線，在中室前端呈波狀。前翅腹面斑紋與背面相似，底色較淺，在亞端區具額外橘色區。近翅基有乳黃色條帶。後翅背面底色褐色。中央斑於近翅基形成一大型乳黃色區，亞外緣及外緣斑明顯，$Sc+R_1$ 室、中央斑及亞外緣斑之間的區域形成一環狀，包括一藍色金屬弦月紋。後翅大部分布有乳黃色鱗片。臀角具一冠有金藍色弦月紋的明顯紅色斑。後翅腹面幾乎乳黃色，中央斑及亞外緣斑間具有明顯橘色斑，邊緣伴有藍色。近翅基有明顯褐色條帶，於前端成 Y 形帶，後方形成彎曲帶。雌蝶 (圖 43)：軀體及翅紋與雄蝶相似，但後翅腹面通常無光澤，略帶橙色。後翅背面臀角的紅色斑通常不如雄蝶來的廣佈。

雄交尾器 (圖 116)：偽鉤突形成菱形突出，末端鈍。背兜側突腎形、具毛。基腹弧粗壯、彎曲。背兜具背面膜質區。囊突短。抱器葉狀、後端截狀，具一突起，抱器腹厚，高度骨化；抱握鋏骨化鰭狀，背部具一列小齒。陽基軛片為扁平骨片，背面寬闊，腹面窄。陽莖圓柱狀、略彎曲。

雌交尾器 (圖 153)：交尾囊卵狀，交尾囊管膜質，頭端厚，尾端窄。花壁長於交尾囊長度一半，形成一內陷長骨化帶，具皺褶及顆粒，中央具脊。交尾孔板複雜；前板於交尾囊管旁形成骨化壁;後板呈一寬闊骨化圓頂。肛突寬闊、半圓形，末端具毛。後內骨突長於肛突、筆直、柱狀。

世界分布：阿拉伯、伊朗、喜馬拉雅地區、印度、馬來半島、蘇門答臘、中南半島、菲律賓、華南、臺灣、弗洛勒斯、阿洛、松巴、新幾內亞東南部、澳洲。

臺灣分布：分布自低地到海拔 1000 公尺，在低地非常常見，也頗能適應都市環境。

寄主植物：芸香科：柑橘屬之石苓舅、雙面刺、食茱萸、過山香、藤花椒、烏柑仔、金桔、飛龍掌血。

生物學：本種為一年多世代物種，除冬季以外終年可見成蝶活動 (Hsu, 1999)。

註記：臺灣及菲律賓的族群有時被處理為 1 獨立亞種，稱為 ssp. *libanius* Fruhstorfer (例如 Shirôzu, 1960; Tsukada & Nishiyama, 1982)，但 Fujioka (1997) 指出 *libanius* 與承名亞種並沒有區別。

Papilio (Menelaides) thaiwanus Rothschild, 1898 (臺灣鳳蝶 / 渡邊鳳蝶)

PLATE 15, figs. 69-70; PLATE 26, fig. 116; PLATE 36, fig. 153

Papilio protenor thaiwanus Rothschild, 1898: Novitates Zoologicae 5 (3): 602. (Type Locality: "Formosa")

Papilio rhetenor annaeus Fruhstorfer, 1908: Entomologische Rundschau 25 (9): 38. (Type Locality: "Lake Candidius" [Sun Moon Lake])

Papilio thaiwanus ab. *watanabei* Matsumura, 1927: Insecta. Matsumurana 2 (2): 115, pl. 3, f. 2. (Type Locality: "Mt. Gakoki, Formosa" [鵝公髻山 , Egongjishan, Xinzhu, Taiwan])

Specimens examined:

TAOYUAN CITY: 3♂, Fuxing, Gaoyi, 26. V. 2015 (L. Huang) (genitalia preparation JYL090); 1♀, Fuxing, Xuanyuan, 14. VII. 2015 (L. Huang) (genitalia preparation JYL125). **NANTOU Co.:** 1♀, Renai, Bilu, 20. XI. 2007, emgd. 3. I. 2008 (L. H. Wang); 1♀, Renai, Aowanda National Forest Recreation Area, 22. II. 2012 (W. J. Lin).

Description. Adult – Forewing length 52–57 mm. Prominent sexual dimorphism present. Male (PLATE 15, fig. 70): Head hairy, dark brown with narrow, white band laterally. Antennae dark brown, swollen distad. Proboscis dark brown. Labial palpus brown mixed with white. Thorax hairy, dark brown dorsally, dark brown with two obscure, white chevrons from wing base to coxae of meso- and meta-legs. Abdomen dark brown. Valvae with outer surface dark brown. Legs dark brown with white bands on femurs externally. Patagia, tegula brown with white bands. Forewing with costa concave, apex rounded, termen nearly straight. Hingwing somewhat rectangular in shape; termen wavy. Forewing uppersides ground color dark brown, with indigo sheen, dark stripes in cells. Several dark stripes in discoidal cell proximally. Forewing undersides ground color paler, covered by pale gray scalings. Red markings present near wing base. Hindwing uppersides ground color brown with indigo sheen. A small red ring or lucule at tornus. Hindwing undersides mostly ground color dark brown. Extensive red markings present, forming reticulate pattern, sometimes partially whitened. Female (PLATE 15, fig. 71): Ground color of wings brown to dark brown without indigo sheen. A red patch present in discoidal cell of forewing. Prominent white discal spots on hindwing uppersides plus red circles in distal end of cells in posterior part of wing. Prominent white markings in addition to red markings on hindwing undersides.

Male gentalia (PLATE 26, fig. 117) – Pseuduncus forming medial extension, beak-like.

Socii setose basad, bearing a pair of claw-like distal process with acute end. Vinculum slender, curved. Saccus short and small. Valva lobe-like, obtuse distad; sacculus thick, heavily sclerotized; harpe represented as elongate sclerotized rib, enlarged into a fin with minute teeth distad. Juxa as a broad, flat, oblong sclerite. Phallus cylindrical, curved, distal end truncate.

Female genitalia (PLATE 36, fig. 154) – Corpus bursae oval. Ductus bursae membranous, thick. Signum longer than 1/2X length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band, with medial ridge. Sterigma elaborately modified; lamella antevaginalis forming a sclerotized arc with lateral, serrate process; lamella postvaginalis a broad sclerotized area with rounded, medial, thickened area. Anal papillae broad, semi-circular, setose distad. Posterior apophyses approximately 2X length of anal papillae, slightly bent, pole-like.

Variation. Dry season/spring form is smaller in size, with markings more prominent.

Global distribution. A species endemic to Taiwan.

Distribution in Taiwan. Found in montane habitats in lowland to moderate elevations (Hsu, 2013).

Larval Host plant(s). Rutaceae: *Toddalia asiatica* (Ae & Ootsuka, 1967), *Zanthoxylum nitidum* (Hamano, 1987), *Z. ailanthoides* (Lee, 1990). Lauraceae: *Cinnamomum camphora* (Nakamura, 1983), *C. kanehirae* (Lu & Chen, 2014).

Biology. This species is multivoltine in occurrence in Taiwan, and in diapause as pupa in winter (Hsu, 2013).

Remarks. This species appears closely related to *Papilio alcmenor* Felder, [1864] of Himalayas to western and southern China.

形態特徵：成蝶前翅長 52–57 mm。具明顯雌雄二型性。雄蝶 (圖 70)：頭被毛、黑褐色，側面具窄白帶。觸角黑褐色，末端腫大。口器黑褐色。下唇鬚褐色混白色。胸部具毛，背面黑褐色，整體黑褐色沿翅基至中、後足基節有兩個模糊白色箭紋。腹部黑褐色，抱器外表面黑褐色。足呈黑褐色，腿節外側具白帶。領片及翅基片褐色具白帶。前翅前緣圓凸，先端圓鈍，外緣近筆直。後翅形狀稍呈四邊形；外緣波狀。後翅背面底色黑褐色，具靛藍色光澤，翅室具暗帶。中室近基部有數條暗帶。前翅腹面底色較淺，覆有淺灰色鱗片。近翅基有紅斑。後翅背面底色褐色具靛藍光澤。臀角具一小紅色環或弦月紋。後翅腹面底色幾乎黑褐色。廣佈紅斑並形成網狀紋，有時部份變白。雌蝶 (圖 71)：翅底色褐色至黑褐色，不具有靛藍光澤。前翅中室有一紅色區。後翅腹面有一明顯白色中央斑，以及翅後方各翅室末端有紅色環紋。後翅腹面除紅色斑紋之外有明顯的白色斑紋。

雄交尾器 (圖 117)：偽鉤突中央延伸呈喙狀。背兜側突基部具毛，後端具一對爪狀突起，末端銳尖。基腹弧纖細彎曲。囊突短且小。抱器葉狀，末端圓鈍；抱器腹厚，高度骨化；抱握鋏呈長骨化脊，末端膨大具細齒鰭狀。陽基軛片為寬闊、扁平之橢圓形骨片。陽莖圓柱狀、彎曲，末端截狀。

雌交尾器 (圖 154)：交尾囊卵狀，交尾囊管膜質、粗大，花壁長於交尾囊二分之一長度，形成一內陷長骨化帶，具皺褶及顆粒，中央具脊。交尾孔板複雜；前板形成骨化弧狀，具側向鋸齒突;後陰道片呈一寬闊骨化區，具圓形中央增厚區。肛突寬闊、半圓形，末端具毛。後內骨突約兩倍肛突長度、略彎、柱狀。

變異：乾季型 / 春型個體較小，斑紋較明顯。

世界分布：本種為臺灣特有種。

臺灣分布：分布於山區，自低地到中海拔均可見。

寄主植物：芸香科：飛龍掌血、雙面刺、食茱萸。樟科：樟樹、牛樟。

生物學：本種在臺灣為一年多世代，冬季以蛹態滯育 (Hsu, 2013)。

註記：本種與產自於喜馬拉雅地區至華西及華南的紅基美鳳蝶 *Papilio alcmenor* Felder, [1864] 很近緣。

Papilio (Menelaides) polytes Linnaeus, 1758 (玉帶鳳蝶)

Papilio (Eques) polytes Linnaeus, 1758: Systema naturae (Edn 10) 1: 460, no. 7. (Type Locality: "Asia" [southern China])

Papilio cyrus Fabricius, 1793: Entomologia Systemetica 3 (1): 7, no. 19. (Type locality: not given)

Papilio astyanax Fabricius, 1793: Entomologia Systemetica 3 (1): 13, no. 37. (Type locality: India) (preoccupied by *Papilio astyanax* Fabricius, 1775, Systema Entomologiae: 447, no. 20.)

Papilio hector de Haan, 1840: Verhandelingen over de Naturlijke Geschiedenis der Nederlandsche Overzeesche Bezittingen (Zoologie): 39. (preoccupied by *Papilio hector* Linnaeus, 1758: Systema naturae (Edn 10) 1: 459, no. 2)

Papilio pammon var. *borealis* C. & R. Felder, 1862: Wiener entomologische monatschrift 6 (1): 22. (Type Locality: "Ning-Po")

Papilio polytes polycles Fruhstorfer, 1902: Deutsche entomologische Zeitscrift, "Iris" 15: 309. (Type Locality: "Okinawa")

Papilio polytes pasikrates Fruhstorfer, 1908: Entomologische Rundschau 25 (9): 38. (Type Locality: "Formosa")

Papilio polytes pasikrates f. *ocha* Fruhstorfer, 1908: Entomologische Rundschau 25 (9): 38. (Type Locality: "Formosa")

Papilio polytes pasikrates f. *depicta* Fruhstorfer, 1908: Entomologische Rundschau 25 (9): 38. (Type Locality: "Ishigaki") Fruhstorfer, 1908

Papilio polytes pammon (?) f. *cyroides* Fruhstorfer, 1909: Entomologische Zeitschrift, Stuttgart 22(43): 178. (Type Locality: "Sikkim")

Papilio polytes neomelanides Fruhstorfer, 1909: Entomologische Zeitschrift, Stuttgart 22(43): 178. (Type Locality: "Perak; Singapore")

Papilio richardi Fernandez, 1912: Boletín de la Sociedad Española de Historia Natural 12: 302. (Type Locality: "Ya-lan, hunan" [Yala, Yueyang, Hunan, China])

Papilio polytes var. *kuroiwai* Matsumura 1919: Thousand Insects of Japan, Additamenta 3: 720. (Type Locality: "Liukiu (Okinawa)")

Papilio polytes var. *okinawaensis* Matsumura 1919: Thousand Insects of Japan, Additamenta 3: 720. (Type Locality: "Liukiu")

Papilio chalcas Fabricius (in Bryk), 1938: Systema Glossatorum Secundum Ordines, Genera, Species Adiectis Synonymi Locis, Observationibus, Descriptionibus in Bryk: 24. (preoccupied by *Papilio chalcas* Fabricius, 1775, Systema Entomologiae: 453.)

Papilio polytes flavolineatus Chou, Yuan & Wang, 2000: Entomotaxonomia 22(4): 267. (Type Locality: "Nantong, Jiangsu, China")

Papilio obscuras Chou, Yuan & Wang, 2000: Entomotaxonomia 22(4): 267. (Type Locality: "Lushan, Sichuan, China")

Ssp. *polytes* Linnaeus, 1758

PLATE 11, figs. 50-52; PLATE 12, fig. 52-55; PLATE 27, fig. 117; PLATE 36, fig. 154

Ssp. *ledebouria* Eschscholtz, 1821

PLATE 12, figs. 56-59; PLATE 27, fig. 118; PLATE 36, fig. 155

Papilio ledebouria Eschscholtz, 1821: In Kotzebue, Entdeckungs-Reise in die Süd-See und nach der Berings-Strasse 3: 206, pl. 3, f. 7. (Type Locality: "Manila")

Papilio elyros Gray, 1856: List of Lepidopterous Insects in the Collection of the British Museum. Part I. Papilionidae 1: 26. (Type Locality: "Philippine Island) (nom. nud.)

Papilio horsfieldii Reakirt, [1865]: Proceedings of the Entomological Society of Philadelphia 3: 476. (Type Locality: "Philippine")

Specimens examined:

Ssp. *polytes*: **JILONG [= KEELUNG] CITY:** 1♂, Pengjiayu, 15. VII. 2010 (Y. F. Hsu). **HUALIAN Co.:** 1♂, 1♀, Nanan, 22. IV. 2015 (J. Y. Liang) (genitalia preparation JYL076, JYL077). **TAIDONG [= TAITUNG] Co.:** 1♀, Lanyu, Sidaogou, 18/20. III. 2006 (Y. F. Hsu & H. C. Huang); 2♂, Lanyu, Qiwei, 28/29. III. 2010, reared from *Toddalia asiatica*, emgd. 4/5. V. 2010, HSU 10C48.1 (Y. F. Hsu, J. H. Lin & C. H. Li); 1♀, same locality, 28/29. III. 2010, reared from *T. asiatica*, emgd. 5. V. 2010, HSU 10C48.1 (Y. F. Hsu, J. H. Lin & C. H. Li); 1♂, same locality, 25. IV. 2010, reared from *T. asiatica*, emgd. 10. V. 2010, HSU 10D49 (J. H. Lin). **KAOHSIUNG CITY [= KAOHSIUNG Co.]:** 2♀, Liugui, 22. I. 2007, reared from *Citrus* sp., emgd. 9. III. 2008, HSU 08A30 (Y. F. Hsu); 1♀, Taoyuan, Shenshan, 17. X. 2016 (L. Huang). **LIANJIANG [= LIENCHIANG] Co.:** 1♂, Nangan, Jinsha, 20. VII. 2013 (C. L. Huang & H. Y. Lee), 1♀, same locality, 24. VII. 2013 (C. L. Huang & H. Y. Lee); 1♀, same locality, 9. IV. 2014, reared from *Citrus* sp., HSU 14D09 (H. Y. Lee); 1♀, Beigan, Wusha, 19. VII. 2013 (C. L. Huang& H. Y. Lee); 1♀, Nagan, Shengtian Park, 17. IV. 2014, reared from *Zanthoxylum schinifiolium*, HSU 14D67.2 (Y. F. Hsu, C. L. Huang & H. C. Huang). **JINMEN [= KINMEN] Co.:** 1♂, Jinsha, 13. V. 2013, reared from *Zanthoxylum nitidum*, emgd. 16. VII. 2013, HSU 13E28 (L. H. Wang, C. L. Huang & H. C. Huang); 1♂, 1♀, Zhongshanlin, 5. XI. 2013, reared from *Clausena excavata*, emgd. 20. XII. 2013, HSU 13L01 (H. C. Huang & C. L. Huang); 1♀, HSU 11H52.

Ssp. *ledebouria*: **TAIDONG [= TAITUNG] Co.:** 1♂, Lanyu, 6. IV. 1998 (K. L. Chen); 2♂, Lanyu, Qiwei, 27/29. III. 2010 (J. H. Lin & Y. F. Hsu).

Description. Adult – Forewing length 44–52 mm. A polytypic species with sexual dimorphism. Male (PLATE 11, figs. 50-51; PLATE 12, fig. 56): Head hairy, dark brown with narrow, white band laterally. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus white mixed with brown. Thorax hairy, dark brown

dorsally, dark brown with two faint, broken, white, chevrons from wing base to coxae of meso- and meta-legs. Abdomen dark brown, with narrow, white, longitudinal, lateral lines, two dorsal and two ventral to spiracles; one white band present ventrally. White dots present by spiracles. Valvae with outer surface dark brown. Legs dark brown with white bands on femurs externally. Patagia, tegula brown. Forewing with costa convex, apex obtuse, termen nearly straight. Hingwing with termen wavy, usually bearing a lobe-like process at distal end of vein M_3. Forewing uppersides ground color dark brown, overlaid with grayish yellow stripes. Four narrow, grayish yellow stripes in discoidal cell. Creamy yellow spot present at distal margin of cells. Forewing undersides ground color paler, with stripes of posterior portion of wings reduced. Hindwing uppersides ground color brown. A series of creamy yellow discal spots present. Red markings present at tornus, with blue scalings present nearby. Short, narrow, creamy yellow streaks at distal end of cells. Hindwing undersides ground color brown, with prominent, creamy yellow, discal band present. Grayish yellow scalings near wing base, forming several lines in discoidal cell. A series of orange or red lunules present submarginally. Marginal spots more prominent. Female (PLATE 11, fig. 52; PLATE 12, figs. 52-55): In form *mandane* (PLATE 11, fig. 52; PLATE 12, fig. 52), wing patterns similar to those of males. In form *polytes* (PLATE 12, figs. 54-55), distal portion of both surface of forewing paler; marginal spots reduced to short dashes. discal patch replaced by a few white spots, sometimes entirely absent; red, submarginal lunules (spots) usually present.

Descriptions given above referring to the nominotypical subspecies. For ssp. *ledebouria* (PLATE 12, figs. 56-59), shape of hindwings more elongate. In male (PLATE 12, figs. 56-57), no lobe-like process at distal end of hindwings (with rare exception); discal bands of hind wing prominent; markings on wing undersides creamy white, with a series of short, creamy white, submarginal bars. In female (PLATE 12, figs. 58-59), distal half of forewing with streaks bright; red markings of hindwings more prominent; veins in discal patch of hindwing covered by white scaling if present.

Male gentalia (PLATE 27, figs. 117-118) – Pseuduncus forming medial, relatively long, extension, beak-like. Socii setose basad, bearing a pair of elongate distal process tapering to obtuse end. Vinculum slender, curved. Saccus short. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized; harpe represented as large, heavily sclerotized,

axe-shaped piece with dorsal edge serrate. Juxa as a broad, sclerotized patch. Phallus cylindrical, slightly curved.

Female genitalia (PLATE 36, figs. 154-155) – Corpus bursae ovate. Ductus bursae membranous, thick, short. Signum approximately 1/2X length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band with medial ridge. Sterigma elaborately modified; lamella antevaginalis forming a medial, elongate, ventral flap and sclerotized wall with two prominent, lateral processes; anterior one larger than posterior one; lamella postvaginalis a broad sclerotized area with rounded, medial, swollen area bearing minute spines. Anal papillae broad, semi-circular, setose distad. Posterior apophyses less than 2X length of anal papillae, slightly curved, pole-like.

Global distribution. Nearly entire Oriental region.

Distribution in Taiwan. From lowland up to about 2000 m in elevation, including associated islands (Hsu, 2013).

Larval Host plant(s). Rutaceae: *Citrus* spp. (Nitobe, 1914); *Tetradium glabrifolium*, *Toddalia asiatica* (Hamano, 1987); *Zanthoxylum nitidum*, *Clausena excavata* (Lee & Chang, 1988); *Severinia buxifolia* (Lee & Wang, 1997); *Zanthoxylum ailanthoides* (Hsu, 2002); *Glycosmis citrifolia* (Lin & Lin, 2008). Lauraceae: *Cinnamomum camphora* (Lin & Lin, 2008).

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

Remarks. Individuals evidently belonging to ssp. *ledebouria* have been found from southern Taiwan, especially Lanyu Island of Taidong. There is no evidence that this subspecies has established persisting populations in Taiwan, but multiple individuals were found at the same time in some occasions, suggesting temporary reproduction for more than one generation had occurred. Moreover, individuals with features of both ssp. *ledebouria* and nominotypical subspecies were sometimes found after presence of typical

ledebouria, suggesting natural hybridization of these two races may have occurred.

The tailess subspecies, including ssp. *ledebouria*, has been regarded as a distinct species under *P. alphenor* Cramer, 1776 (Type locality: "China" [error]) of the Philippines and Maluku Islands (Moluccas) (e. g. Tsukada & Nishiyama, 1982), but recent literature still recognize them as races of *P. polytes* (e. g. Fujioka, 1997; Page & Treadaway, 2003).

The form *polytes* is often considered a mimic of *Pachliopta* species (e. g. Eliot, 1992).

形態特徵：成蝶前翅長 44–52 mm。為多型性種類且具雌雄二型性。雄蝶 (圖 50–51、56)：頭被毛、黑褐色，側面具白色細帶。觸角黑褐色，末端略膨大。口器黑褐色。下唇鬚白色雜褐色。胸部被毛，背面黑褐色，從翅基向中、後足基節具有兩條模糊且斷續之白色箭型紋。腹部黑褐色，側面具有縱向窄白條，氣門背側及腹側各二兩，腹部腹面一條白色帶。氣門旁有白點。抱器外表面黑褐色。足呈黑褐色，於腿節外側有白色帶。領片及翅基片褐色。前翅前緣圓凸，先端圓鈍，外緣近乎筆直。後翅外緣波浪狀，M_3 脈末端部有葉狀突出。前翅背面底色黑褐色，覆有灰黃色的條狀斑。中室內有四條狹長的灰黃色條狀斑。各翅室末端有淺黃色斑。前翅腹面底色較淺，翅後端的條狀斑消退。後翅背面底色褐色，有一列乳黃色中央斑紋。臀角處有一紅色斑，周圍具藍色鱗片。各翅室末端有短而窄的乳黃色斑紋。後翅腹面底色褐色，具一列明顯乳黃色的中央帶。翅基有灰黃色鱗片，於中室形成數條線狀斑。亞外緣有一列橙色或紅色弦月紋，外緣斑較明顯。雌蝶 (圖 52–55、57–59)：白帶型雌蝶 (form *mandane*) (圖 52) 翅紋與雄蝶相似。紅斑型雌蝶 (form *polytes*) (圖 53–55) 於前翅兩面外側顏色較淺；邊緣斑紋消退呈點狀。中央區由數只白斑取代，有時完全消退；亞外緣常有紅色弦月紋。

前述的特徵描述為承名亞種。菲律賓亞種 (ssp. *ledebouria*) (圖 56–59) 後翅形狀較長，雄蝶 (圖 56) 後翅不具有葉狀突出 (有少數例外)；後翅中央帶的斑紋較明顯；翅腹面斑紋乳白色，亞外緣有一列短的乳白色條狀斑。雌蝶 (圖 57–59) 前翅後半部有亮色條狀斑，後翅的紅色斑紋較明顯；後翅中央區脈上覆有白色鱗片。

雄交尾器 (圖 117–118)：偽鉤突中央突出長，喙狀。背兜側突基部具毛，具一對向後長突起，向後漸細而末端圓鈍。基腹弧纖細彎曲。囊突短。抱器葉狀、末端圓；抱器腹厚，高度骨化；抱握鋏呈大型高度骨化之斧狀片，背部邊緣具鋸齒。陽基軛

片為寬闊骨化片。陽莖圓柱狀、略彎曲。

雌交尾器 (圖 154–155)：交尾囊卵狀，交尾囊管膜質，粗短。花壁約交尾囊二分之一長度，形成一內陷長骨化帶，具皺褶及顆粒，中央具脊。交尾孔板複雜；前板中間為長骨化壁，兩側具突起，前突起較後突起大；後板呈一寬闊骨化區，中央呈圓形膨大骨片，具細刺。肛突寬闊、半圓形，末端具毛。後內骨突短於兩倍肛突長度、略彎、柱狀。

世界分布：本種幾乎分布於整個東洋區。

臺灣分布：分布自低地到海拔 2000 公尺，包括離、外島地區。

寄主植物：芸香科：柑橘屬植物、賊仔樹、飛龍掌血、雙面刺、過山香、烏柑仔、食茱萸、石苓舅。樟科：樟樹。

生物學：本種為一年多世代，冬季以蛹態滯育 (Hsu, 2013)。

註記：有証據顯示屬於菲律賓亞種 ssp. *ledebouria* 的個體曾在南臺灣被發現過，特別是在台東蘭嶼。目前尚沒有任何証據顯示該亞種在臺灣已建立常駐族群，但是有些時候可同時發現該亞種複數個體，因此推測短暫性超過一個世代的繁殖現象有可能發生。有時候在典型的菲律賓亞種出現之後，發現有些個體同時具有該亞種與承名亞種的特徵，因此推測兩個亞種曾發生過自然雜交的現象。

分布於菲律賓及摩洛加島的無尾突亞種，包括亞種 ssp. *ledebouria* 在內，有時被視為 1 獨立種，稱為 *P. alphenor* Cramer, 1776 (Tsukada & Nishiyama, 1982)，但有些文獻仍認為只是 *P. polytes* 的 1 個亞種 (Fujioka, 1997; Page & Treadaway, 2003)。

紅斑型雌蝶常被認為擬態珠鳳蝶屬蝴蝶。

Papilio (Menelaides) protenor Cramer, [1775] (黑鳳蝶 / 藍鳳蝶)

Papilio protenor Cramer, [1775]: De uitlandsche kapellen 1 (1-7): 77, pl. 49, f. A, B. (Type Locality: “China”)

Papilio protenor euprotenor Fruhstorfer, 1908: Entomologische Zeitschrift, Stuttgart 22 (11): 46. (Type Locality: “Sikkim”)

Papilio protenus euanthes Fruhstorfer, 1908: Entomologische Zeitschrift, Stuttgart 22 (11): 46. (Type Locality: "Hainan")

Papilio protenor sulpitius Fruhstorfer, 1909: Entomologische Zeitschrift, Stuttgart 22 (42): 175. (Type Locality: "Tonkin; Annam")

Papilio protenor amaura Jordan, 1909: In Seitz, Die Gross-Schmetterlinge der Erde 9: 75. (Type Locality: "Formosa")

Ssp. *protenor* Cramer, [1775]

PLATE 13, figs. 60-61; PLATE 27, fig. 119; PLATE 36, fig. 156

Ssp. *liukiuensis* Fruhstorfer, 1899

Papilio demetrius liukiuensis Fruhstorfer, 1899: Entomologische Zeitung 59 (10-12): 407. (Type Locality: "Loo-Choo, Formosa (?)" [Ishigaki])

Papilio demetrius sitalkes Fruhstorfer, 1908: Entomologische Zeitschrift, Stuttgart 22 (11): 46. (Type Locality: "Okinawa")

Specimens examined:

Ssp. *protenor*: **TAIPEI CITY:** 1♀, Zhongzheng Dist., Taipei Botanical Garden, 3. II. 2012 (L. Huang); 1♂, Nangang, Academia Sinica, 20. X. 2014 (L. Huang); 1♂, same locality, 15. IV. 2015 (L. Huang) (genitalia preparation JYL064); 1♀, Wenshan Dist., NTNU Gongguan campus, 11. III. 2015, reared from *Citrus grandis*, emgd. 2. IV. 2015 (L. Huang) (genitalia preparation JYL065). **XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]:** 1♂, Shiding, Ergeshan, 14. IV. 2015 (W. J. Lin & C. J. Chang). **LIANJIANG [= LIENCHIANG] Co.:** 1♂, 1♀, Beigan, Nigushan, 19. VII. 2013 (C. L. Huang & H. Y. Lee); 1♀, Beigan, Qinbi, 8. IV. 2014 (H. Y. Lee); 1♂, Nangan, Shengtian Park, 17. IV. 2014, reared from *Zanthoxylum schinifolium*, HSU 14D67.1 (Y. F. Hsu, C. L. Huang & H. C. Huang). **JINMEN [= KINMEN] Co.:** 1♀, 19. XI. 2013 (Y. F. Hsu & H. C. Huang).

Ssp. *liukiuensis*: **YILAN Co.:** 1♂, Toucheng, Guishan Island, 28. VI. 2004 (C. C. Hsieh).

Description. Adult – Forewing length 54–60 mm. Sexual dimorphism present. Male (PLATE 13, fig. 60): Head hairy, dark brown with narrow, white band laterally. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus white mixed with brown. Thorax hairy, dark brown dorsally, dark brown with two obscure, white chevrons from wing base to coxae of meso- and meta-legs. Abdomen dark brown. Valvae with outer surface dark brown. Legs dark brown with white bands on femurs externally.

Patagia, tegula brown with white bands. Forewing with costa convex, apex rounded, termen slightly concave. Hingwing with termen wavy. Forewing uppersides ground color dark brown, with indigo sheen, dark stripes in cells. Five dark stripes in discoidal cell. Forewing undersides ground color paler, covered by grayish white scalings. Hindwing uppersides ground color brown with indigo sheen. A prominent creamy yellow streak present in anterior portion of cell $Sc+R_1$. Hindwing undersides ground color dark brown. Red markings present near tornus and distal anterior cells, more or less with blue scalings. Female (PLATE 13, fig. 61): Ground color of wings brown to dark brown without indigo sheen. Red markings present on both surfaces of hindwings, more extensive on undersides. Blue and creamy yellow scalings sometimes scattered on uppersides of hindwings. No creamy yellow stripe on hindwing.

Male gentalia (PLATE 27, fig. 119) – Pseuduncus forming medial extension, beak-like. Socii setose basad, bearing a pair of elongate distal process with obtuse end. Vinculum slender, curved. Saccus short. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized; harpe represented as large, heavily sclerotized flap with dorsal edge serrate. Juxa as a broad, sclerotized patch. Phallus cylindrical, elongate.

Female genitalia (PLATE 36, fig. 156) – Corpus bursae oblong. Ductus bursae membranous, thick, enlarged caudad. Signum longer than 1/2X length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band with medial ridge, tapering toward both ends. Sterigma elaborately modified; lamella antevaginalis forming a medial, ventral flap and sclerotized wall with two prominent, lateral processes; anterior one as a single tooth, posterior one as a flat piece bearing small teeth; lamella postvaginalis a broad sclerotized area with rounded, medial, swollen area bearing minute spines. Anal papillae broad, semi-circular, setose distad. Posterior apophyses less than 2X length of anal papillae, slightly curved, pole-like with rounded distal end.

Variation. Blue and creamy yellow scalings are more extensive in individuals of female on the wing in seasons of low temperature.

Global distribution. Kashmir, Himalayas, Northeastern India, Northern Indochina,

Japan, West to East China, Taiwan (Fujiuka, 1997).

Distribution in Taiwan. From lowlands to about 1500 m in elevation, including most associated islands (Hsu, 2013).

Larval Host plant(s). Rutaceae: *Citrus* spp. (Nitobe, 1914); *Zanthoxylum nitidum* (Takechi, 1923); *Z. ailanthoides* (Ae, 1968); *Z. piperitum, Z. simulans* (Lee & Chang, 1988), *Tetradium glabrifolius, Toddalia asiatica, Severinia buxifolia, Phellodendron amurense, Glycosmis citrifolia* (Lee & Wang, 1997); *Skimmia arisanensis, Murraya euchrestifolia* (Hsu, 1999); *Zanthoxylum scinifolium* (Lee, 2000); *Z. armatum* (Lee, 2000); *Z. scandens* (Jhan, 2012)

Biology. This species is multivoltine in occurrence in Taiwan, and in diapause as pupa in winter (Hsu, 2013).

Remarks. An individual with features similar to ssp. *liukiuensis*, which possess prominent tail-like process on hindwing, was collected once from Guishan Island of Yilan on June 28th, 2004 (Hsu, 2013: p.259). Such tail-like process is rarely found in the nominotypical subspecies.

形態特徵：成蝶前翅長 54–60 mm。具雌雄二型性。雄蝶 (圖 60)：頭部被毛、黑褐色，側面具有狹長狀白色帶。觸角黑褐色，末端略為膨大。口器黑褐色，下唇鬚白色混雜褐色。胸部具毛，背部黑褐色，由翅基部延伸至中、後足基節有兩道模糊的白色箭型紋路。腹部黑褐色。抱器外表面黑褐色。足呈黑褐色，腿節外側有白色帶。領片、翅基本褐色具白色帶狀紋。前翅前緣圓凸，先端圓，外緣略圓凸。後翅外緣呈波浪狀。前翅背面底色黑褐色，具有靛藍色光澤，翅室內有深色條狀斑，中室內有五條暗條狀斑。前翅腹面底色較淺，覆蓋灰白色鱗片。後翅背面底色褐色有靛藍色金屬光澤，Sc+R_1 室前端有一明顯乳黃色條紋。後翅腹面底色黑褐色，臀角附近及外側靠前端翅室有紅色斑及多少有些藍色鱗片。雌蝶 (圖 61)：翅底色為褐色至黑褐色，無靛藍色光澤。後翅兩面皆具有紅色斑紋，腹面較背面發達，後翅背面有時散佈藍色及乳黃色鱗片，不具有乳黃色條狀斑。

雄交尾器 (圖 119)：偽鉤突喙狀、中央突出。背兜側突基部具毛，具一對向後長突起，末端圓鈍。基腹弧纖細彎曲。囊突短。抱器葉狀，末端圓；抱器腹厚，高度骨化；抱握鋏為大型高度骨化片，背部邊緣具鋸齒。陽基軛片為一寬闊骨化區。陽莖長圓柱狀。

雌交尾器 (圖 156)：交尾囊橢圓形，交尾囊管膜質、粗、末端膨大。花壁長於交尾囊二分之一，形成一內陷長骨化帶，具皺褶及顆粒，中央具脊，向兩端漸細。交尾孔板複雜；前板中間形成腹翼及具兩明顯側突，前者具單一齒，後者為一具有小齒之扁片；後板呈一寬闊骨化區，中央膨大區圓且具細刺。肛突寬闊、半圓形，末端具毛。後內骨突短於肛突兩倍，略彎曲、柱狀，末端圓。

變異：低溫型的某些雌蟲個體前翅具有發達的藍色及黃白色鱗片。

世界分布：喀什米爾、喜馬拉雅、印度東北部、中南半島北部、日本、華西至華東、臺灣等地。

臺灣分布：本島平地至海拔 1500 公尺地區，離島亦有分布。

寄主植物：芸香科：柑橘屬植物、雙面刺、食茱萸、胡椒木、刺花椒、賊仔樹、飛龍掌血、烏柑仔、臺灣黃蘗、石苓舅、阿里山茵芋、山黃皮、翼柄花椒、秦椒、藤花椒等。

生物學：本種在臺灣為一年多世代，冬季以蛹態滯育 (Hsu, 2013)。

註記：2004 年 6 月 28 日日於宜蘭龜山島採獲一隻特徵與沖繩、八重山亞種 ssp. *liukiuensis* 相似的個體，其後翅具有明顯尾突 (Hsu, 2013: p.259)。此一具有尾突的情況在承名亞種當中相當少見。

Papilio (Menelaides) helenus Linnaeus, 1758 (白紋鳳蝶 / 玉斑鳳蝶)

Papilio (Eques) helenus Linnaeus, 1758: Systema Naturae (Edition 10) 1: 459, no. 4. (Type locality: “Asia” [Canton, China]; Lectotype in MLU)

Papilio helenus aspadantus Fruhstorfer, 1915: Archiv für Naturgeschichte 81 A (11) : 75. (Type locality: “Malayaische Habinsel” [Malay Peninsula])

Papilio helenus aulus Fruhstorfer, 1915: Entomologische Wochenblatt 25 (9): 38. (Type locality: “Hainan”)

Ssp. *fortunius* Fruhstorfer, 1908

PLATE 13, figs. 62-63; PLATE 27, fig. 120; PLATE 37, fig. 157

Papilio helenus fortunius Fruhstorfer, 1908: Entomologische Wochenblatt 25 (9): 38. (Type locality: "Lake Candidius" [Sun Moon Lake])

Ssp. *helenus* Linnaeus, 1758

PLATE 13, fig. 64

Specimens examined:

Ssp. *fortunius*: **TAOYUAN CITY [= TAOYUAN Co.]:** 1♀, Fuxing, Xuanyuan, 14. VII. 2015 (L. Huang) (genitalia preparation JYL126). **XINZHU [= HSINCHU] Co.:** 1♂, Jianshi, Zhenxibao, 15. V. 2015 (L. H. Wang) (genitalia preparation JYL066).

Ssp. *helenus*: **LIANJIANG [= LIENCHIANG] Co.:** 1♀, Nangan, Shengtian Park, 27. VI. 2013, (genitalia preparation JYL109);1♂, same locality, 28. VI. 2013; 2♂, same locality, 17. IV. 2014 (Y. F. Hsu, C. L. Huang & H. C. Huang); 1♂, Beigan, Nigushan, 19. VII. 2013 (C. L. Huang & H. Y. Lee). **JINMEN [= KINMEN] Co.:** 1♂, Zhongshanlin, 5. XI. 2013 (C. L. Huang & H. C. Huang); 1♂, same locality, 28. X. 2014, reared from *Zanthoxylum ailanthoides*, emgd. 16. XI. 2014, HSU 14K59 (C. L. Huang & H. C. Huang) (genitalia preparation JYL108).

Description. Adult – Forewing length 53–56 mm. Male (PLATE 13, figs. 62, 64): Head hairy, dark brown with narrow, white band laterally. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus white mixed with brown. Thorax hairy, dark brown dorsally, dark brown with two faint, white chevrons from wing base to coxae of meso- and meta-legs. Abdomen dark brown, with white, longitudinal, lateral lines, two dorsal and two ventral to spiracles. White dots present by spiracles. Valvae with outer surface dark brown. Legs dark brown with white bands on femurs and tibiae externally. Patagia, tegula brown with white bands. Forewing with costa convex, apex obtuse, termen slightly concave. Hingwing with termen wavy, bearing a lobe-like process at distal end of vein M_3. Forewing uppersides ground color dark brown, with outer half overlaid with grayish yellow stripes. Four narrow, grayish yellow stripes in discoidal cell. Forewing undersides ground color paler, with stripes grayish white. Hindwing uppersides ground color brown. A creamy white discal patch present in anterior half

of hindwing. Red markings sometimes near tornus. Hindwing undersides ground color brown. Discal patch also present. Grayish white scalings near wing base, forming several lines in discoidal cell. Red lunules present submarginally. Female (PLATE 13, fig. 63): Ground color of wings paler than that of male. Red markings more extensive, usually conspicuous on hindwing uppersides.

The nominotypical subspecies (found in Jinmen and Matzu Islands; PLATE 13, fig. 64) possess larger white discal patch on hindwings, and considerable larger in size than ssp. *fortunius* (PLATE 13, figs. 62-63) inhabiting main island of Taiwan.

Male gentalia (PLATE 27, fig. 120) – Pseuduncus forming medial, thick extension with acute distal end. Socii setose basad, bearing a pair of elongate distal process tapering to acute end. Vinculum slender, curved. Saccus short. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized; harpe represented as heavily sclerotized, fin-shaped piece with edge bearing minute teeth. Juxa as a broad, sclerotized patch enlarged ventrad. Phallus cylindrical, curved.

Female genitalia (PLATE 37, fig. 157) – Corpus bursae ovate. Ductus bursae membranous, thick. Signum approximately 1/2X length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band with medial ridge. Sterigma elaborately modified; lamella antevaginalis forming a medial, elongate, ventral flap and sclerotized wall with two prominent, lateral processes; anterior one as elongate arm with slightly serrate margin, posterior one as flat piece enlarged distad with two apical spines; lamella postvaginalis a broad sclerotized area with medial, swollen area bearing minute spines. Anal papillae broad, semi-circular, setose distad. Posterior apophyses less than 2X length of anal papillae, straight, pole-like.

Global distribution. Himalayas, Southern India, Sri Lanka, Indochina, Japan, Indonesia, Philiipines, West to East China, Taiwan.

Distribution in Taiwan. The nominotypical subspecies occurs in Jinmen Islands and Mazu Islands (Lee & Wang, 1995; Hsu, 2013). Ssp. *fortunius* occurs in main island of

Taiwan, from lowlands to about 2000 m in elevation (Hsu, 2013).

Larval Host plant(s). In main island of Taiwan: Rutaceae: *Zanthoxylum ailanthoides, Euodia meliaefolia* [as *Tetradium glabrifolium*] (Ae, 1968); Citrus spp., *Z. nitidum* (Lee, 1990); *Toddalia asiatica* (Lee & Wang, 1995) and *Tetradium ruticarpum* (Lu & Chen, 2014). In Jinmen: *Z. nitidum* (Chang, 2011). Some of the recorded hostplants may require clarification whether they are utilized in the wild.

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

形態特徵：成蝶前翅長 53–56 mm。雄蝶 (圖 62、64)：頭被毛、黑褐色，側面具窄白帶。觸角黑褐色，末端略膨大。口器黑褐色。下唇鬚白色雜褐色。胸部具毛，背側黑褐色，整體黑褐色，從翅基到中足及後足基節有兩個模糊破碎之白色箭狀紋。腹部黑褐色，具白色縱向側線，氣門背側及腹側各兩條。氣門旁有白點。抱器外表面黑褐色。足呈黑褐色，在腿節及脛節外側具白帶。領片及翅基片褐色具白帶。前翅前緣圓凸，先端圓鈍，外緣略圓凸。後翅外緣波狀，M_3 脈末端具有葉狀突。前翅背面底色黑褐色，外半部覆有灰黃色條帶，中室具四條灰黃色窄條帶。前翅腹面底色較淡，具灰白色條帶。後翅背面底色褐色，後翅前半部有一乳白色中央區。臀角有時有紅色斑紋。後翅腹面底色褐色，具有中央區，近翅基有灰白色鱗片，在中室形成數條線。亞外緣有紅色弦月紋。雌蝶 (圖 63)：翅底色較雄蝶暗淡，紅色斑紋較廣，後翅背面通常較明顯。

承名亞種 (發現於金門及馬祖；圖 64) 的後翅中央斑紋較大型，且體型較棲息於臺灣本島的臺灣亞種 ssp. *fortunius*(圖 62–63) 來得大。

雄交尾器 (圖 120)：偽鉤突中央粗而向後延伸，末端銳尖。背兜側突基部具毛，向後形成一對長突起，向後漸細、末端尖。基腹弧纖細、彎曲。囊突短，抱器葉狀、末端圓；抱器腹粗，高度骨化；抱握鋏呈高度骨化鰭狀，邊緣具細齒。陽基軛片寬闊，骨化區腹側膨大。陽莖圓柱狀、彎曲。

雌交尾器 (圖 157)：交尾囊卵狀。交尾囊管膜質且厚。花壁約為交尾囊二分之一長度，並形成一內陷具皺紋及顆粒的長骨化帶，中央具脊。交尾孔板複雜；前板形成長中

央腹翼及具有兩顯著側突之骨壁；前者呈長臂狀邊緣略鋸齒，後者為一扁平片狀、末端膨大且頂端具兩刺；後板為一寬骨化區，中央膨大區具細刺。肛突寬闊、半圓形，末端具毛。後內骨突短於肛突兩倍長、筆直、柱狀。

世界分布：喜馬拉雅地區、南印度、斯里蘭卡、中南半島、日本、印尼、菲律賓、華西至華東、臺灣。

臺灣分布：承名亞種分布於金門及馬祖。臺灣亞種則分布於臺灣本島低地至海拔2000 公尺。

寄主植物：臺灣本島：芸香科食茱萸、賊仔樹、柑橘屬、雙面刺、飛龍掌血、吳茱萸。金門：雙面刺。某些寄主植物在野外是否被利用可能需要確認。

生物學：本種為一年多世代，冬季以蛹期滯育 (Hsu, 2013)。

Papilio (Menelaides) nephelus Boisduval, 1836 (大白紋鳳蝶 / 臺灣白紋鳳蝶 / 寬帶鳳蝶)

Papilio nephelus Boisduval, 1836: Histoire naturelle des insects, spécies général des lépidoptères 1: 210. (Type locality: “Célébes” [Java])

Ssp. *chaonulus* Fruhstorfer, 1902

PLATE 14, figs. 65-66; PLATE 28, fig. 121; PLATE 37, fig. 158

Papilio chaon chaonulus Fruhstorfer, 1902: Societas entomologica 17 (10): 73. (Type locality: “Hainan, Five Finger Mts”)

Papilio nephelus f. *ukon* Matsumura, 1939: Insecta Matsumurana, 13 (4):113, Fig. 1, g. (Type locality: “Formosa, Hori”)

Specimens examined:

TAOYUAN CITY [= TAOYUAN Co.]:: 2♂, 2♀, Fuxing, Xuanyuan, 29. VIII. 2008, emgd. 8/17. X. 2008, HSU 08H31 (L. H. Wang); 1♂, same locality, 19. VI. 2015 (W. J. Lin) (genitalia preparation JYL080); 1♀, same locality, 14. VII. 2015 (L. Huang) (genitalia preparation JYL123); 2♂, Fuxing, Sileng, 1. IV. 2015 (L. Huang).

Description. Adult – Forewing length 50–60 mm. Male (PLATE 14, fig. 65): Head hairy, dark brown with narrow, white band laterally. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus white mixed with brown. Thorax hairy, dark

brown dorsally, dark brown with two faint, broken, white, chevrons from wing base to coxae of meso- and meta-legs. Abdomen dark brown, with white, longitudinal, lateral lines, two dorsal and two ventral to spiracles; one white band present ventrally. White dots present by spiracles. Valvae with outer surface dark brown. Legs dark brown with white bands on femurs externally. Patagia, tegula brown with white bands. Forewing with costa convex, apex obtuse, termen slightly concave. Hingwing with termen wavy, bearing a lobe-like process at distal end of vein M_3. Forewing uppersides ground color dark brown, overlaid with grayish yellow stripes. Four narrow, grayish yellow stripes in discoidal cell. Small creamy white dot present in distal margin of cells. Forewing undersides ground color paler, with stripes grayish white. A small white discal patch present distad near dorsum. Hindwing uppersides ground color brown. A creamy white discal patch present in anterior half of hindwing, consisted of 4-5 spots. Small white dots or short streaks present at distal margin of cells. Hindwing undersides ground color brown. Prominent, white, discal band present. A series of yellowish white or yellow lunules present submarginally. Female (PLATE 14, fig. 66): Ground color of wings paler than that of male, with markings more conspicuous; addition white, tilted band present near apex of forewing.

Male gentalia (PLATE 28, fig. 121) – Pseuduncus forming medial, thick extension with acute distal end, beak-like. Socii setose basad, bearing a pair of conical distal process with acute apical end. Vinculum slender, curved. Saccus short. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized; harpe represented as elongate, sclerotized stripe thickened ventrad, with distal end enlarged, club-like, serrate. Juxa as a broad, elongate, sclerotized patch. Phallus cylindrical, curved.

Female genitalia (PLATE 37, fig. 158) – Corpus bursae ovate. Ductus bursae membranous, thick. Signum longer than 1/2X length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band with medial ridge. Sterigma elaborately modified; lamella antevaginalis forming a medial, elongate, ventral flap and sclerotized wall with two prominent, lateral processes; both represented as thin sclerites with serrate edges; lamella postvaginalis a broad sclerotized area with medial, swollen area bearing minute spines. Anal papillae broad, semi-circular, setose distad. Posterior apophyses approximately 2X length of anal papillae, straight, pole-like.

Global distribution. Eastern Himalayas, Indochina, Sundaland, West to East China, Taiwan.

Distribution in Taiwan. From lowland to montane areas up to about 2000 m in elevation (Hsu, 2013).

Larval Host plant(s). Rutaceae: *Citrus* spp., *Toddalia asiatica*, *Tetradium glabrifolium* (Lee, 1990); *Zanthoxylum ailanthoides*, *Clausena excavata* (Lee & Wang, 1997).

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

形態特徵：成蝶前翅長 50–60 mm。雄蝶 (圖 65)：頭被毛、黑褐色，側面具窄白帶。觸角黑褐色，末端略膨大。口器黑褐色。下唇鬚白色混褐色。胸部具毛，背側黑褐色，整體黑褐色，從翅基到中足及後足基節有兩個模糊破碎之白色箭狀紋。腹部黑褐色，具白色縱向側線，氣門背側及腹側各兩條，腹面一條白帶。氣門旁有白點。抱器外表面黑褐色。足呈黑褐色，在腿節外側具白帶。領片及翅基片褐色具白帶。前翅前緣圓凸，先端圓鈍，外緣略圓凸。後翅外緣波狀，M_3 脈末端具有葉狀突。前翅背面底色黑褐色，覆有灰黃色條帶，中室具有四條灰黃色窄條帶。翅室後緣有乳白色小點。前翅腹面底色較淡，具灰白色條帶，中央區下緣靠外側具有一小白點。後翅背面底色褐色，後翅前半部有一乳白色中央區，由四至五個斑點組成，翅室靠外緣有白色小點或短條帶。後翅腹面底色褐色，有明顯的白色中央帶，亞外緣有一列黃白色或黃色的弦月紋。雌蝶 (圖 66)：翅底色較雄蝶暗淡，斑紋較鮮明，前翅近翅端有白色斜帶。

雄交尾器 (圖 121)：偽鉤突喙狀，中央粗而向後延伸，末端銳尖。背兜側突基部具毛，後端形成一對圓錐狀突起，向後漸細、末端尖。基腹弧纖細彎曲。囊突短，抱器葉狀、末端圓；抱器腹粗，高度骨化；抱握鋏呈骨化長帶狀，腹面厚，後端膨大、棒狀，具細齒。陽基軛片為一寬闊長骨化區。陽莖圓柱狀、彎曲。

雌交尾器 (圖 158)：交尾囊卵狀。交尾囊管膜質且厚。花壁長於交尾囊二分之一，形成一具皺紋及顆粒的內陷長骨化帶，具中央脊。交尾孔板複雜；前板形成一中央長腹翼及具有兩個明顯側突之骨壁；兩者均為邊緣有鋸齒之細骨片；後板為一寬骨

化區，中央膨大區具細刺。肛突寬闊、半圓形、末端具毛。後內骨突約肛突兩倍長度、筆直、柱狀。

世界分布：東喜馬拉雅地區、中南半島、巽他陸塊、華西至華東、臺灣。

臺灣分布：分布自低地到海拔 2000 公尺山區。

寄主植物：芸香科：柑橘屬植物、飛龍掌血、賊仔樹、食茱萸、過山香。

生物學：本種為一年多世代，冬季以蛹態滯育 (Hsu, 2013)。

Papilio (Menelaides) castor Westwood, 1842 (無尾白紋鳳蝶 / 玉牙鳳蝶)

Papilio castor Westwood, 1842: Annals and magazine of natural history 9: 37. (Type locality: “Sylhet”)

Papilio pollux Westwood, 1842: Annals and magazine of natural history 9: 37. (Type locality: “Sylhet”)

Ssp. *formosanus* Rothschild, 1896

PLATE 15, figs. 67-68; PLATE 28, fig. 122; PLATE 37, fig. 159

Papilio castor formosanus Rothschild, 1896: Novitates Zoologicae 3 (4): 423. (Type locality: “N. Formosa, hills near Kelung, 500 – 1500 feet”)

Papilio gotonis Matsumura, 1908: Entomologische Zeitschrift, Stuttgart: 22 (13): 54. (Type locality: “Formosa (Hoppo, Kanshirei, Horisha, Koshun)”)

Specimens examined:

TAIPEI CITY: 1♀, Neihu, Jinmianshan, 12. I. 2015 (Y. M. Hsu); 1♀, Songshan, Zhongqiang Park, 50/100m, 26. IX. 2000, reared from *Acronychia pedunculata*, emgd. 26. X. 2000 (J. M. Wu). **XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]:** 1♂, Wulai, 20. V. 1999 (R. P. Tsai, J. C. Tasi & Q. H. Wu); 1♀, Ruifang, Nanya, 23. IV. 2000; 1♂, same locality, 3. IX. 2010 (S. H. Yen); 1♂, Wulai, Fushan Research Station, ca 700m, 4/5. VIII. 2006 (Y. F. Hsu & H. C. Huang). **TAOYUAN CITY:** 1♀, Fuxing, Sanmin, Bianfudong, 350m, 8. IX. 2008 (Y. F. Hsu); 1♂, Fuxing, Gaoyi, 9. V. 2015 (L. Huang)(genitalia preparation JYL067); 1♂, same locality, 26. V. 2015 (L. Huang); 1♀, Fuxing, Sileng, 1. IV. 2015 (L. Huang) (genitalia preparation JYL068). **TAINAN CITY [= TAINAN Co.]:** 1♂, Dongshan, Kantoushan, 600/800m, 8. III. 2010, reared from *Glycosmis citrifolia*, emgd. 29. III. 2010, HSU 10C7 (Y. F. Hsu).

Description. Adult – Forewing length 42–50 mm. Sexual dimorphism recognized. Male (PLATE 15, figs. 67): Head hairy, dark brown with narrow, white band laterally on frons; two pairs of white dots dorsally; a patch of white behind compound eyes. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus white mixed with brown. Thorax hairy, dark brown dorsally, with a few white dots anteriad; dark brown with two faint, broken, white, chevrons from wing base to coxae of meso- and meta-legs. Abdomen dark brown, with series of paired, white dots longitudinally: one subdorally, one above spiracles, one below spiracles, and one ventrally. White dots present by spiracles. Valvae with outer surface dark brown, with a white dot mesad at anterior margin. Legs dark brown with white bands on femurs externally. Patagia, tegula brown mixed with some white hairs. Forewing with costa convex, apex obtuse, termen nearly straight. Hingwing with termen wavy. Forewing uppersides ground color dark brown. Four narrow, grayish yellow stripes in discoidal cell. White spot present at distal margin of cells. Forewing undersides ground color paler. Hindwing uppersides ground color brown. Discal spots consisted of four creamy yellow spots in Sc+R_1, Rs, M_1, M_2. Hindwing undersides ground color paler, covered by grayish yellow scalings. Discal spots white. A series of small, white, submarginal dots sometimes present. Female (PLATE 15, fig. 68): Ground color of wings paler. On forewing: series of marginal and submarginal spots present; a white dot at distal end of discoidal cell. On hind wing: submarginal spots represented as a series of lunules; marginal spots represented as white dashes.

Male gentalia (PLATE 28, fig. 122) – Pseuduncus forming medial extension with obtuse distal end. Socii setose basad, bearing a pair of conical distal process with acute apical end. Vinculum slender, curved. Saccus short. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized; harpe represented as elongate, sclerotized stripe thickened ventrad, with distal end enlarged, flap-like, serrate. Juxa as a broad, elongate, sclerotized patch. Phallus cylindrical, curved.

Female genitalia (PLATE 37, fig. 159) – Corpus bursae ovate. Ductus bursae membranous, thick. Signum longer than 1/2X length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band with medial ridge. Sterigma elaborately modified; lamella antevaginalis forming a medial, elongate, triangula, ventral

flap and sclerotized wall with two prominent, lateral processes; both represented as thin sclerites with serrate edges; lamella postvaginalis a broad sclerotized area with medial, swollen area bearing minute spines. Anal papillae broad, semi-circular, setose distad. Posterior apophyses less than 2X length of anal papillae, straight, pole-like.

Global distribution. Himalayas, Indochina, West, South to East China, Taiwan.

Distribution in Taiwan. From lowland up to about 1500 m in elevation (Hsu, 2013).

Larval Host plant(s). Rutaceae: *Toddalia asiatica*, *Murraya paniculata*, *M. crenulata*, *Glycosmis citrifolia* (Lee, 1990). Although a few species in citrus family has been recorded as larval hostplants in Taiwan, it seems *P. castor* chiefly depends on *Glycosmis* species as hostplant under natural condition.

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

形態特徵：成蝶前翅長 42–50mm。具雌雄二型性。雄蝶 (圖 67)：頭被毛、黑褐色，前額側面具窄的白色帶；背部兩對白點；複眼後方具一白色區。觸角黑褐色，末端略膨大。口器黑褐色，下唇鬚白色混雜有褐色毛。胸部具毛，背部黑褐色，前端有一些白點；整體黑褐色，從翅基到中足及後足基節有兩個模糊破碎之白色箭狀紋。腹部黑褐色，沿縱軸有成對白色點排成數列：一列位於亞背側，一列在氣門上方，一列在氣門下方，一列位於腹側。氣門週邊有白點。抱器外表面黑褐色，中間靠前端邊緣有白點。足呈黑褐色並在腿節外側具白色帶。領片及翅基片褐色雜有一些白色毛。前翅前緣圓凸，先端圓鈍，外緣近筆直。後翅外緣波狀。前翅背面底色黑褐色，中室內有四條灰黃色窄條帶。各翅室末端邊緣有白點。前翅腹面底色較暗淡，後翅背面底色褐色，中央斑由四個乳黃色斑組成，位於 $Sc+R_1$、Rs、M_1 及 M_2 室。後翅腹面底色較暗淡，覆有灰黃色鱗片。中央斑帶白色，有時在亞外緣出現一列小的白色斑點。雌蝶 (圖 68)：翅底色較暗淡，前翅：外緣及亞外緣有斑；中室靠外側具一白色斑點。後翅：亞外緣斑點呈一列弦月紋；外緣斑呈白色斷線狀。

雄交尾器 (圖 122)：偽鉤突中間突出，後端圓鈍。背兜側突基部具毛，末端具一對

圓錐狀突起，頂端銳尖。基腹弧纖細彎曲。囊突短。抱器葉狀，末端圓鈍。抱器腹厚，高度骨化；抱握鋏呈骨化長帶狀，腹面厚，後半部膨大呈板狀，具鋸齒。陽基軛片寬闊，長骨化帶。陽莖圓柱狀、彎曲。

雌交尾器 (圖 159)：交尾囊卵狀，交尾囊管膜質且厚。交尾囊管膜質且厚。花壁長於交尾囊二分之一長度，形成一內陷長骨化帶並具皺褶及顆粒，中央具脊。交尾孔板複雜，前板在中央腹面呈長三角形，骨化壁具兩明顯側突，兩者皆為邊緣有鋸齒之細骨片；後板為寬闊骨化區，中央膨大區具細刺。肛突寬闊，半圓形，後端具毛。後內骨突短於肛突的兩倍長、筆直、柱狀。

世界分布：喜馬拉雅地、中南半島、中國華西、華南至華東、臺灣。

臺灣分布：分布從低地至海拔 1500 公尺。

寄主植物：芸香科：飛龍掌血、月橘、蘭嶼月橘、石苓舅。臺灣地區雖然有些芸香科植物被記載為幼蟲寄主植物，但無尾白紋鳳蝶主要是以石苓舅屬植物為天然環境下的寄主。

生物學：本種為一年多世代，冬季以蛹態滯育 (Hsu, 2013)。

Papilio (Menelaides) memnon **Linnaeus, 1758 (大鳳蝶 / 美鳳蝶 / 長崎鳳蝶)**

Papilio (Eques) memnon Linnaeus, 1758: Systema Naturae: (Edition 10) 1: 460, no. 12. (Type locality: “Asia” [probably Java]; Lectotype in MLU)

Papilio achates Sulzer, 1776.: Dr. Sulzers Abgekürtze Geschichte der Insecten: nach dem Linaeischen System: 141, pl. 12, f. 2 (Type locality: “Asien” [Asia])

Papilio laomedon Cramer, [1776]: De uitlandsche kapellen 1 (1-7): 78, pl. 50, f. A, B (Type locality: “Coromandel”)

Papilio atrovenatus Goeze, 1779: Entomologische Beyträge 3 (1): 44 (Type locality: “Amboinische” [Ambon])

Papilio achatiades Esper, 1790: Die ausländischen Schmetterlinge: 118, pl. 28, f. 2, pl. 29, f. 1 (Type locality: “Asien” [Asia])

Papilio arbates Zinken, 1831: Nova Acta physico-med. [Leop. Carol.] 15 (1): 151. (Type locality: “Java”)

Papilio memnon var. *javanus* Haase, 1893: Untersuchungen über die Mimicry auf Grundlage eines natürlichen Systems der Papilioniden: 57. (Type locality: “Java”)

Papilio memnon var. *erebinus* Haase, 1893: Untersuchungen über die Mimicry auf Grundlage eines natürlichen Systems der Papilioniden: 87. (Type locality: “Borneo”)

Papilio memnon memnoides Fruhstorfer, 1903: Deutsche entomologische Zeitscrift “Iris” 15 (2) : 308. (Type locality: “N.- und Süd-Borneo”)

Papilio memnon imperiosus Fruhstorfer, 1907: Entomologische Zeitschrift, Stuttgart 21 (33) : 204. (Type locality: “Banka”)

Papilio memnon f. *taihokuana* Matsumura, 1929: Insecta Matsumurana 3 (2/3): 87. (Type locality: “Formosa (Taihoku; Puli)”)

Ssp. *heronus* Fruhstorfer, 1902

PLATE 15, figs. 71-72; PLATE 16, fig. 73; PLATE 28, fig. 123; PLATE 37, fig. 160

Papilio memnon heronus Fruhstorfer, 1902: Societas entomologica 17 (10): 73. (Type locality: “Formosa”)

Ssp. *agenor* Linnaeus, 1768

PLATE 16, figs. 74-76

Papilio (Eques) agenor Linnaeus, 1758: Systema Naturae: (Edition 10) 1: 460, no. 13. (Type locality: “Asia” [China, Canton]; Lectotype in LSL)

Papilio androgeos Cramer, [1776]: De uitlandsche kapellen 1 (8): 142, pl. 91, f. A, B. (Type locality: “ China”)

Papilio alcanor Cramer, [1777]: De uitlandsche kapellen 2 (9-16): 107, pl. 166, f. A. (Type locality: “ China”)

Papilio protenor Esper, 1792: Die ausländischen Schmetterlinge: 120, pl. 29, f. 2. (Type locality: “ Surinami”[error]) (preoccupied by *Papilio protenor* Cramer, [1775])

Iliades mestor Hübner, 1816: Verzeichniss bekannter Schmettlinge (6): 89. (Type locality: ?)

Papilio esperi Butler, 1879: Transactions of the Linnean Society of London (2) 1 (8): 553, pl. 68, f. 7. (Type locality: “Malacca; Penang”)

Papilio androgeus de Nicéville, 1882: The journal of the Asiatic Society of Bengal 50(4)(1881): 64. [Subsequent Incorrect Spelling].

Papilio phoenix Distant, 1885: Rhopalocera Malayana : 340, pl. 27, f. 7. (Type locality: “Malay Peninsula, Province Wellesley [Seberang Perai]”)

Papilio cilix Distant, 1885: Rhopalocera Malayana : 340, pl. 29, f. 4, 5 (preocc.). (Type locality: “Malay Peninsula, Malacca”)(preoccupied by *Papilio cilix* Godman & Salvin, 1879)

Papilio androgeos depelchini Robbe, 1892: Annales de la Société entomologique de Belgique 36: 125. (Type locality: “Kurseong, Sikkim”)

Iliades polymnestoroides Moore, 1902: Lepidoptera Indica 5 : 202, pl. 451, f. 1-2, TL. (Type locality: “N. E. India”)

Papilio memnon agenor f. *rhetenorina* Jordan, 1909: in Seitz, Die Gross-Schmetterlinge der Erde 9: 72. (Type locality: “North India”)

Papilio memnon agenor f. *ityla* Jordan, 1909: in Seitz, Die Gross-Schmetterlinge der Erde 9: 73. (Type locality: “Nias”)

Papilio memnon f. *phoeniciana* Strand, 1916: Lepidoptera Niepeltiana 2 : 25, pl. 13, f. 8. (Type locality: “Sikkim”)

Papilio memnon f. *aphrodite* Röber, 1927: Internationale Entomologische Zeitschrift 21 (13): 97. (Type locality: “Naga Hills”)

Papilio memnon-agenor ♀ *alcanor* f. *ensifer* Rousseau-Decelle, 1932: Bulletin de la Société entomologique de France 37 : 301. (Type locality: "Khasia Hills, Assam")

Papilio f. *subvenusia* Dufrane, 1946: Annales de la Société entomologique de Belgique 82 : 116

Papilio aurantiaca Rousseau-Decelle, 1933: Bulletin de la Société entomologique de France 38 (17): 273. (Type locality: "Tonkin?")(preoccupied by *Papilio machaon* var. *aurantiaca* Speyer, 1858)

Specimens examined:

Ssp. *heronus*: **TAIPEI CITY:** 1♂, Xinyi Dist., Xiangshan, 20. I. 2014 (Y. C. Liao); 1♀, Wenshan Dist., NTNU Gongguan campus, 13. VI. 2015 (L. Huang) (genitalia preparation JYL079); 1♂, Nangang, Academia Sinica, 15. IV. 2015 (L. Huang) (genitalia preparation JYL063). **TAIDONG [= TAITUNG] Co.:** 2♂, Lanyu, Langdao, 29. III. 2014, HSU 14C51 (L. H. Wang, H. Y. Lee& Y. M. Hsu).

Ssp. *agenor*: **JINMEN [= KINMEN] Co.:** 1♀, Jinhu, Haiyinsi, 13. V . 2013, emgd. 16. VI. 2013, HSU 13E27 (L. H. Wang, C. L. Huang & H. C. Huang). **LIANJIANG [= LIENCHIANG] Co.:** 1♀, Beigan, 20. XI. 2013 (genitalia preparation JYL117); 2♂, 4♀, Nangan, Jinsha, 23. V. 2014, HSU 14E60.1 (C. L. Huang & H. Y. Lee)(genitalia preparation JYL103, JYL105); 1♂, Nangan, Shengtian Park, 17. IV. 2014 (Y. F. Hsu, C. L. Huang & H. C. Huang) (genitalia preparation JYL137).

Description. Adult – Forewing length 60–75 mm. Sexual dimorphism and polymorphism very prominent. Male (PLATE 15, fig. 71; PLATE 16, fig. 74): Head hairy, dark brown; two pairs of white dots dorsally; a patch of white behind compound eyes. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus brown with some white scalings. Thorax hairy, dark brown dorsally, with a few white dots anteriad; dark brown ventrally. Abdomen dark brown, with faint, white, longitudinal line below spiracles. White dots present by spiracles. Valvae with outer surface dark brown. Legs dark brown. Patagia, tegula brown with some white hairs. Forewing with costa convex, apex obtuse, termen nearly straight. Hingwing with termen wavy. Forewing uppersides glossy, ground color dark brown tinged with indigo. Four obscure dark stripes in discoidal cell. Blue scalings forming stripes along both sides of veins. A red marking in discoidal cell basad. Forewing undersides ground color dark brown. Grayish white stripes along veins and in discoidal cell. Red marking in discoidal cell prominent. Hindwing uppersides glossy, ground color brown tinged with indigo. Blue stripes further

prominent. Hindwing undersides ground color dark brown, with prominent red markings at tornus, forming a ring at distal end of CuA_2, a double ring in CuA_1. Similar double rings, white or obscure, present at distal end of other cells. Prominent red markings basad. Blue scalings scattered to variable extant. Female (PLATE 15, fig. 72; PLATE 16, figs. 73, 75-76): Head with faint, white stripes laterally. Labial palpus dark brown banded with white. Abdomen sometimes with prominent orange-yellow patches dorso-laterally. Forewing with ground color paler except near base. Prominent grayish white or grayish yellow stripes along veins and in discoidal cell. Hindwing with prominent white markings distad, with a black spot at distal end of each cell. A tail-like projection sometimes present at distal end of vein M_3.

Many forms of the females are known, and many names have been given. They are recognized as tailed form *achates* (PLATE 16, figs. 73, 76) and tailless form *agenor* (PLATE 15, fig. 72; PLATE 16, fig. 75) only for convenience. The tailed form *achates* usually possess more extensive dark areas and markings, but tailless form *agenor* may be mostly dark brown in some occasions.

Populations found in Taiwan has conventionally recognized as a distinct ssp. *heronus* (PLATE 15, figs. 71-72; PLATE 16, fig. 73), whereas those from Jinmen and Mazu islands have been considered belong to ssp. *agenor* (PLATE 16, figs. 74-76). These two taxa are barely distinguishable, with ssp. *agenor* tends to bear more extensive orange scalings in females.

Male gentalia (PLATE 28, fig. 123) – Pseuduncus forming thick, medial extension with obtuse distal end. Socii setose basad, bearing a pair of uplifted, conical distal processes with acute apical end. Vinculum slender, strongly curved. Saccus short. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized; harpe represented as elongate, sclerotized stripe thickened ventrad, with distal end half heavily sclerotized, serrate. Juxa as a broad, sclerotized piece enlarged caudad. Phallus cylindrical, stout, curved.

Female genitalia (PLATE 37, fig. 160) – Corpus bursae ovate. Ductus bursae membranous, thick. Signum longer than 1/2X length of corpus bursae, forming an

elongate, wrinkled, granular, invaginated, sclerotized band with medial ridge. Sterigma elaborately modified; lamella antevaginalis forming a medial, elongate, broad, ventral flap and sclerotized wall with prominent, lateral process, represented as thin piece with serrate edges; lamella postvaginalis a broad sclerotized area with medial, swollen area bearing minute spines. Anal papillae broad, semi-circular, setose distad. Posterior apophyses approximately 2X length of anal papillae, curved, pole-like.

Global distribution. Himalayas, Indochina, Sundaland, Lesser Sunda Islands, southern Japan, West, South to East China, Taiwan.

Distribution in Taiwan. From lowland up to about 1500 m in elevation (Hsu, 2013), with records in Lanyu and Guishan Island. Individuals from Jinmen and Mazu Island have been regarded as ssp. *agenor*.

Larval Host plant(s). Rutaceae: *Citrus* spp. (Nitobe 1914); *Zanthoxylum nitidum*, *Z. ailanthoides* (Lee & Chang, 1988); *Poncirus trifoliata* (Lee & Chang, 1988); *Severinia buxifolia*, *Tetradium glabrifolium* (Lee & Wang, 1997); *C. grandis* (Hsu, 1999); *Zanthoxylum schinifolium* (Lee, 2000).

Although a few plants in the citrus family have been recorded as larval hostplants for *P. memnon*, it seems this swallowtail butterfly chiefly utilizes *Citrus* spp., especially *C. grandis*, as hostplants under natural condition.

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

Remarks. The geographical variation of this polytypic species is difficult to classify, with boundaries between subspecies poorly defined. The two subspecies recognized in the present work, ssp. *heronus* and ssp. *agenor*, are barely distinguishable. Fujioka (1997) actually states he fails to find any obvious difference between these two subspecies, although both names were still retained in his work.

形態特徵：成蝶前翅長 60–75 mm。雌雄二型性及多型性非常明顯。雄蝶 (圖 71、74)：頭被毛、黑褐色，背部具有二對白點；複眼後方有一白色區。觸角黑褐色，末端略膨大。口器黑褐色。下唇鬚褐色，有白色鱗片。胸部具毛，背部黑褐色，前端具有一些白點；腹面黑褐色。腹部黑褐色，氣門下具有白色模糊縱線，氣門下具有白點。抱器外表面黑褐色。足呈黑褐色。領片及翅基片褐色具一些白毛。前翅前緣圓凸，先端圓鈍，外緣近筆直。後翅外緣波狀。前翅背面具光澤，底色黑褐色帶有靛藍色。中室具有四條模糊暗帶，沿翅脈兩邊有藍色鱗片呈條帶。中室基部有紅色斑。前翅腹面底色黑褐色，灰白色帶沿各及中室分布，中室紅斑明顯。後翅背面具光澤，底色褐色帶有靛藍色，藍色條更明顯。後翅腹面底色黑褐色，臀角具明顯紅色斑，在 CuA_2 末端形成一環，在 CuA_1 呈雙環，其他室末端具有類似的白色或模糊的雙環，基部有明顯紅斑，藍色鱗片有變化地散佈延展。雌蝶 (圖 72–73、75–76)：頭側面具模糊白色條帶。下唇鬚黑褐色具白帶。腹部背側方有時具有明顯橘黃色區。前翅除近基部以外底色較淺，沿脈及中室有明顯灰白色或灰黃色條帶。後翅末端具有明顯白色斑，各室末端具黑色斑。M_3 脈末端有時有尾狀突。

雌蝶已知有許多型，為方便起見這些型有時被給予名稱，例如有尾型 form *achates* (圖 73、76) 及無尾型 form *agenor* (圖 72、75)。有尾型通常具有較廣泛的暗色區和斑紋，但無尾型有時也呈黑褐色。

發現於臺灣地區的族群一般被認為屬於亞種 ssp. *heronus* (圖 71–73)，而金門和馬祖的族群則被視為屬於亞種 ssp. *agenor* (圖 74–76)。這兩個亞種幾乎無法區分，惟亞種 ssp. *agenor* 的雌蝶傾向有較廣泛的橙色鱗片分布。

雄交尾器 (圖 123)：偽鉤突中央粗而向後突出，末端圓鈍。背兜側突基部具毛，具一對上舉並向末端延伸的圓錐狀突起，先端銳尖。基腹弧纖細、強彎曲。囊突短。抱器葉狀、末端圓鈍。抱器腹粗，高度骨化；抱握鋏為骨化長帶狀，腹面增厚，末端半部高度骨化，具鋸齒。陽基軛片為寬闊骨片，末端膨大。陽莖圓柱狀，粗大且彎曲。

雌交尾器 (圖 160)：交尾囊卵狀，交尾囊管膜質且厚。花壁長於交尾囊二分之一長度，形成一內陷長骨化帶並具皺褶及顆粒，中央具脊。交尾孔板複雜；前板形成長且寬闊之中央腹翼，兩側具突起骨化壁，邊緣具鋸齒。後板為寬骨化帶，中央膨大區具細刺。肛突寬闊、半圓形，後端具毛。後內骨突約肛突的兩倍長、彎曲、柱狀。

世界分布：喜馬拉雅地區、中南半島、巽他陸塊、小巽他群島、日本南部、華西、華南至華東、臺灣。

臺灣分布：分布自低地至海拔 1500 公尺，蘭嶼及龜山島亦有記錄。金門和馬祖的個體被認為屬於另 1 亞種 ssp. *agenor*。

寄主植物：芸香科：柑橘屬植物、雙面刺、食茱萸、枸橘、烏柑、賊仔樹、柚子、翼柄花椒。雖然有些芸香科植物被記載為幼蟲寄主植物，但本種似乎主要利用柑橘屬植物，尤其柚子是自然狀況下的主要寄主植物。

生物學：本種為一年多世代，冬季以蛹態滯育。

註記：本種的多型性在地理變異上很難區別，不同亞種間的界限定義不清。目前本誌所列的 2 個亞種，亞種 ssp. *heronus* 和亞種 ssp. *agenor*，幾乎無法區別。Fujioka(1997) 亦指出無法找出這兩個亞種有任何明顯的差別，即便兩個亞種名在他的研究中仍保留使用。

Papilio (Menelaides) rumanzovia Eschscholtz, 1821 (紅斑大鳳蝶 / 紅斑美鳳蝶 / 基紅鳳蝶)

PLATE 17, figs. 77-78; PLATE 28, fig. 124; PLATE 38, fig. 161

Papilio rumanzovia Eschscholtz, 1821: in Kotzebue, Entdeckungs-Reise in die Süd-See und nach der Berings-Strasse 3: 204, pl. 2, f. 4a-b. (Type locality: “Manila”)

Papilio krusensternia Eschscholtz, 1821: in Kotzebue, Entdeckungs-Reise in die Süd-See und nach der Berings-Strasse 3: 205, pl. 3, f. 5a-b. (Type locality: “Manila”)

Iliades emalthion Hübner, [1821]: Sammlung exotischer Schmetterlinge 2: pl. 117. (nomen nudum)

Papilio descombii Roger, 1826: Bulletin d'histoire naturelle de la Société Linnéenne de Bordeau-Bull. Soc. Linn. Bordeaux 1: 158. (Type locality: “Philippines”)

Papilio emalthion var. *semperinus* Haase, 1893: Untersuchungen über die Mimicry: 55. (Type locality: “Philippinen”)

Papilio rumanzowius[sic] ciris Fruhstorfer, 1909: Entomologische Zeitschrift, Stuttgart 22 (43): 178. (Type locality: “Bazilan; Mindoro”)

Papilio rumanzowius[sic] spinturnix Fruhstorfer, 1909: Entomologische Zeitschrift, Stuttgart 22 (43): 178. (Type locality: “Talaut (Jolo?)”)

Papilio rumanzovia honorius Fruhstorfer, 1911: Ent. Rundschau 28 (23) : 178. (Type locality: “Sangir”)

Papilio rumanzovia ♀ f. *paya* Fruhstorfer, 1911: Ent. Rundschau 28 (23) : 178. (Type locality: “Sangir”)

Papilio rumanzovia ♀ f. *risena* Fruhstorfer, 1911: Ent. Rundschau 28 (23) : 178. (Type locality:

"Sangir")

Papilio rumanzovia ♀ f. *carnia* Fruhstorfer, 1911: Ent. Rundschau 28 (23) : 178. (Type locality: "Sangir")

Papilio memnon agenor f. *rhetenorina* Jordan, 1909: in Seitz, Die Gross-Schmetterlinge der Erde 9: 72. (Type locality: "North India")

Papilio memnon agenor f. *ityla* Jordan, 1909: in Seitz, Die Gross-Schmetterlinge der Erde 9: 73. (Type locality: "Nias")

Papilio memnon f. *phoeniciana* Strand, 1916: Lepidoptera Niepeltiana 2 : 25, pl. 13, f. 8. (Type locality: "Sikkim")

Specimens examined:

PINGDONG Co.: 1♀, Hengchun, Kuraru [Guijiao], V. 29. 1934 (Taiwan Agriculture Research Institute [TARI]).

Description. Adult – Forewing length 60–75 mm. Sexual dimorphism and polymorphism very prominent. Male (PLATE 17, fig. 77): Head hairy, dark brown; two pairs of white dots dorsally; a patch of white behind compound eyes. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus brown banded with white. Thorax hairy, dark brown dorsally, with a few white dots anteriad; dark brown ventrally. Abdomen dark brown, with faint, white, longitudinal line below spiracles. White dots present by spiracles. Valvae with outer surface dark brown. Legs dark brown. Patagia, tegula brown with some white hairs. Forewing with costa convex, apex obtuse, termen nearly straight or slightly concave. Hingwing with termen wavy. Forewing uppersides ground color dark brown. Four obscure dark stripes in discoidal cell. Blue scalings forming stripes along both sides of veins distad. Forewing undersides ground color dark brown. Grayish white stripes along veins distad. A prominent, red marking in discoidal cell basad. Hindwing uppersides ground color brown. Blue stripes present on outer half. A small red ring sometimes present at tornus. Hindwing undersides ground color dark brown, with a series of bright red rings or lunules usually present at distal end of cells. Such red markings sometimes extending toward wing base along dorsum. Prominent red patch present basally. Female (PLATE 17, fig. 78): Head with faint, white stripes laterally. Labial palpus dark brown banded with white. Blue scalings merely represented by scattered scales. Red markings prominent. Additional white markings sometimes present. Forewing with ground color paler except near base. Prominent grayish white or grayish yellow stripes along veins and in discoidal cell. Hindwing with prominent white markings distad, with a black spot at distal end of each cell. A tail-like projection

sometimes present at distal end of vein M_3.

Many forms of the females are known. The individuals with prominent red markings and without white patches are usually collectively termed form *semperinus*, whereas those individuals with a prominent white, central patches on hindwing with less extensive red markings are termed form *rumanzovia*.

So far only form *semperinus* has been recorded from Taiwan.

Male gentalia (PLATE 28, fig. 124) – Pseuduncus forming sclerotized medial extension, thick proximally, narrowed distally with obtuse distal end. Socii setose sclerotized, bean-like, armed with prominent saw ventrad near distal end. Vinculum slender, strongly curved. Saccus short. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized; harpe as a narrow sclerotized rib with distal end heavily sclerotized, fin-like, serrate. Juxa as a broad, sclerotized piece enlarged caudad. Phallus cylindrical, stout, curved.

Female genitalia (PLATE 38, fig. 161) – Corpus bursae ovate. Ductus bursae membranous, thick. Signum longer than 1/2X length of corpus bursae, forming an elongate, wrinkled, granular, invaginated, sclerotized band with medial ridge. Sterigma elaborately modified; lamella antevaginalis forming a medial, elongate, broad, ventral flap and sclerotized wall with prominent, lateral process, represented as thin piece with serrate edges; lamella postvaginalis a broad, wrinkled, sclerotized area, with multiple thicker, transverse folds mesad and thin, longitudinal folds laterally. Anal papillae broad, semi-circular, setose distad. Posterior apophyses approximately 2X length of anal papillae, straight, pole-like.

Global distribution. Philippines.

Distribution in Taiwan. An “occidental” species to Taiwan, mostly recorded from southern Taiwan, including Lanyu (Yamanaka, 1975). Although it may form intermittent colonies, there is no evidence that this species has successfully established in Taiwan.

Larval Host plant(s). Not recorded in Taiwan.

Biology. This species is multivoltine in the Philippines.

Remarks. *Papilio rumanzovia* is considered a subspecies of *Papilio deiphobus* Linnaeus of Moluccas by some authors (e. g. Page & Treadaway, 2003).

形態特徵：成蟲前翅長 60–75mm，具有顯著的斑紋變異型與雌雄二型性。雄蝶 (圖 77)：頭部被黑褐色毛，背面具有兩個白點，複眼後方具有一條白色斑紋。觸角黑褐色，在末端稍微膨大。口器黑褐色。下唇鬚褐色參雜白色條紋。胸部被毛，背面呈黑褐色並具有幾對對稱的白點，腹面黑褐色。腹部黑褐色，在氣孔下方具有白點與不明顯之縱向白線。抱器表面黑褐色。足呈黑褐色。領片、翅基片褐色參雜白色毛。前翅前緣圓凸，先端圓鈍，外緣微凸或近直線。後翅外緣呈波浪狀。前翅背面底色為黑褐色，中室具有四條不明顯之黑色帶狀斑，沿翅脈兩側具藍色鱗片形成向外延伸之條狀斑。前翅腹面底色黑褐色，灰白色條狀斑沿著翅脈向外延伸，中室基部具有一顯眼紅色斑紋。後翅背面底色褐色，外側沿翅脈有藍色條狀斑，常有紅色環狀斑出現於臀角。後翅腹面底色黑褐色，翅室末端有一列亮紅色環狀或弦月紋出現，部分紅斑常沿下緣擴散至翅基，基部具有醒目的紅色斑紋。雌蝶 (圖 78)：頭部側面具有不明顯之條狀斑，下唇鬚黑褐色具白色條紋。前翅翅基底色較淺，中室與翅面具明顯灰白色或淡黃色沿翅脈的條狀斑，後翅具醒目之白色斑紋向外延伸，並有一黑點位於各翅室末端，有時具一尾狀突出現於 M_3 脈末端。

已知雌蝶具有許多型。具醒目紅色斑紋而缺少白斑之個體統稱為紅斑型 form *semperinus*，在後翅中央具明顯白斑而紅色斑紋較少之個體稱為白紋型 form *rumanzovia*。

目前為止在臺灣僅有紅斑型之記錄。

雄交尾器 (圖 124)：偽鉤突形成中央突起，基部厚，後端窄且末端圓鈍。背兜側突具毛、骨化、豆狀，腹面近後端具顯著鋸齒。基腹弧纖細、強彎曲。囊突短。抱器葉狀，末端圓鈍。抱器腹厚，高度骨化；抱握鋏呈狹窄骨化脊，末端高度骨化，鰭狀，具鋸齒。陽基軛片為寬骨化片，末端膨大。陽莖圓柱狀、彎曲。

雌交尾器 (圖 161)：交尾囊卵狀。交尾囊管膜質且厚。花壁長於交尾囊二分之一，形成一具皺紋及顆粒之內陷長骨化帶，具中央脊。交尾孔板複雜；前板形成長且寬之中央腹翼及兩側有突起之骨化壁，突起邊緣具鋸齒。後板為寬闊具皺褶骨化區，中央具多厚橫褶，側面具細縱褶。肛突寬闊，半圓形，後端具毛。後內骨突約肛突兩倍長、筆直、柱狀。

世界分布：菲律賓。

臺灣分布：本種在臺灣為一偶產種，大多在臺灣南部被記錄，包括蘭嶼 (Yamanaka, 1975)。雖然在臺灣有可能形成一時性的族群，但沒有證據顯示已成功在臺灣建立族群。

寄主植物：在臺灣未曾被記載。

生物學：本種在菲律賓為一年多世代種類。

註記：部分研究者將紅斑大鳳蝶 *Papilio rumanzovia* 視為摩洛加群島 *Papilio deiphobus* Linnaeus 的 1 個亞種 (例如 Page & Treadaway, 2003)。

Papilio (Achillides) bianor Cramer, 1777 (翠鳳蝶 / 碧鳳蝶 / 烏鴉鳳蝶)

Papilio bianor Cramer, 1777: De uitlandsche kapellen 2 (9-16): 10. (Type locality: “China”)

Papilio polyctor Boisduval, 1836: Histoire naturelle des insectes; spécies général des lépidoptères 1: 205. (Type locality: “Cachemire” [Kashmir])

Ssp. *thrasymedes* Fruhstorfer, 1909

PLATE 17, figs. 79-80; PLATE 29, fig. 125; PLATE 38, fig. 162

Papilio bianor formosanus Rebel, 1906: Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien 56: 222. (Type locality: “Nordformosa, Tam-sui”) (Subjective junior homonym of *Papilio castor formosanus* Rothschild, 1896)

Papilio bianor thrasymedes Fruhstorfer, 1909: Societas Entomologica 24(16): 121. (Type locality: “Formosa”)

Papilio bianor takasago Nakahara & Esaki, 1930: Zephyrus 2 (4): 210. (replacement name for *Papilio bianor formosanus* Rebel, 1906)

Papilio chengkon Chen, 1974: Butterflies of Taiwan in Colour: 83. (Type locality: “Mt. Mengtan”. Presumed type in Chenkon Insect Museum)

Ssp. *bianor* Cramer, 1777

PLATE 18, fig. 81; PLATE 29, fig. 126; PLATE 38, fig. 163

Papilio bianor v. *superans* Draeseke, 1923: Deutsche entomologische Zeitscrift, "Iris" 37: 58. (Type locality: "Tatsienlu", Holotype in SMTD, Dresden)

Papilio polyctor connectens Mell, 1938: Deutsche entomologische Zeitscrift. (Type locality: "Westyunnan: Tali; Chaochow")

Papilio polyctor kingtungensis Lee, 1962: Acta Entomologica Sinica 11(2): 139. (Type locality: "Yunnan, [Jingdong, 1170 m]. Holotype in IOZ")

Papilio polyctor xiei Chou, 1994: Monographia Rhopalocerorum Sinensium: 751. (Type locality: "Mengla, Yunnan". Holotype in NAU [Northwest Agricultural University])

Ssp. *kotoensis* Sonan, 1927 (翠鳳蝶蘭嶼亞種 / 琉璃帶鳳蝶)

PLATE 18, figs. 82-83; PLATE 29, fig. 127; PLATE 38, fig. 164

Papilio Polyctor kotoensis Sonan, 1927: Transactions of the natural history society of Formosa 17(92): 308. (Type locality: "Kotosho, Kwashoto")

Specimens examined:

Ssp. *thrasymedes*: **TAIPEI CITY:** 1♂, Nangang, Academia Sinica, 20. X. 2014 (L. Huang); 1♂, same locality, 15. IV. 2015 (L. Huang) (genitalia preparation JYL070). **XINBEI CITY [= NEW TAIPEI CITY]:** 1♂, 1♀, Xindain, Ergeshan, 14. IV. 2015 (W. J. Lin & C. J. Chang). **TAOYUAN CITY:** 1♀, Fuxing, Daman, 9. V. 2015 (L. Huang) (genitalia preparation JYL069).

Ssp. *bianor*: **LIANJIANG [= LIENCHIANG] Co.:** 1♀, Beigan, Nigushan, 19. VII. 2013 (genitalia preparation JYL111); 1♂, same locality, 19. VII. 2013 (C. L. Huang & H. Y. Lee); 1♂, Nangan, Shengtain Park, 26. VI. 2013; 1♂, Beigan, Qiaozai, 13. X. 2014 (C. W. Huang& H. Y. Lee) (genitalia preparation JYL110). **JINMEN [= KINMEN] Co.:** 1♂, 1♀, Jincheng, Shuitou, 14.V. 2013, *Zanthoxylum simulans*, emgd. 17/19. VI. 2013, HSU 13E36 (C. L. Huang, L. H.Wang & H. C. Huang).

Ssp. *kotoensis*: **TAIDONG [= TAITUNG] Co.:** 2♀, Lanyu, 19. IV. 2006, reared from *Toddalia asiatica*, emgd. 12. XI. 2006, HSU 06D61 (L. H. Wang)(genitalia preparation JYL139); 1♂, same locality, 12. I. 2014 (J. Y. Liang); 1♂, same locality, 4. IV. 2015, (C. L. Huang) (genitalia preparation JYL071); 1♂, Ludao, 26. VI. 2008, reared from *Z. ailanthoides*, emgd. 29. VII. 2008, HSU 08F23 (H. C. Huang); 1♀, same locality, reared from *Z. ailanthoides*, emgd. 19. VII. 2008, HSU 08F23.1 (H. C. Huang); 2♂, 1♀, Lanyu, Entrance of Tianchi, 20. X. 2012, reared from *T. asiatica*, emgd. 8/20. V. 2013, HSU

12K16 (L. H. Wang).

Description. Adult – Forewing length 52–60 mm. Sexual dimorphism recognized. Male (PLATE 17, fig. 79; PLATE 18, figs. 81-82): Head hairy, dark brown, scattered with metallic green scalings; two bands of faint, white on frons; a patch of white behind compound eyes. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus brown mixed with white scalings. Thorax hairy, dark brown, scattered with metallic green scalings dorsally, with a few white dots anteriad; dark brown ventrally. Abdomen dark brown, scattered with metallic green scalings. Valvae with outer surface dark brown. Legs dark brown, with white, linear bands on external surfaces of femurs and tibiae. Patagia, tegula brown with some metallic green scalings. Forewing with costa convex, apex obtuse, termen slightly wavy. Hingwing with termen wavy, bearing a prominent tail-like process at distal end of vein M_3. Forewing uppersides ground color dark brown, overlaid with metallic green scalings. Four faint, dark stripes in discoidal cell. A patch of sexual brand consisted of hair-like scales present along M_2, CuA_1, CuA_2, 1A+2A, and cell CuA_2. Fringe white. Forewing undersides ground color dark brown. Grayish white stripes in distal half of wing surface. Yellowish white scales scattered in anterior half of wing. Hindwing uppersides ground color brown, scattered with metallic blue scalings anteriad, green scalings posteriad. Lunules consisted of metallic scalings, perhaps also purplish red markings present submarinally. Metallic scalings extending into tail-like process along vein M_3. Fringe brown banded with white. Hindwing undersides ground color dark brown, with yellowish white scales scattered proximally. Purplish red lunules present submarginally. Female (PLATE 17, fig. 80; PLATE 18, fig. 83): No sexual brand on forewing uppersides. Metallic scalings less extensive on hindwing uppersides, but blue scalings denser, forming a prominent metallic patch. Red markings in submarginal lunules more prominent.

Three subspecies recognized: the nominotypical subspecies occurs in Jinmen and Matzu Islands (PLATE 18, fig. 81). Ssp. *thrasymedes* (PLATE 17, figs. 79-80) inhabits main island of Taiwan. Ssp. *kotoensis* (PLATE 18, figs. 82-83) is endemic to Lanyu and Ludao Island. Ssp. *thrasymedes* is not significantly different from the nominotypical subspecies in wing patterns. By contrast, ssp. *kotoensis* is characteristic by very bright metallic scaling on wing uppersides, forming prominent, showing bands. Besides, harpe of ssp.

kotoensis is thicker proximally and bearing more prominent serrate distal blade compared to ssp. *thrasymedes* and the nominotypical subspecies.

Male gentalia (PLATE 29, figs. 125-127) – Pseuduncus as narrow, medial extension with obtuse distal end, hook-like. Socii setose basad, bearing a pair of uplifted spines with acute apical end. Vinculum slender, curved. Saccus as a short rod. Valva lobe-like, slightly produced dorsad, rounded distad; sacculus thick, heavily sclerotized, rectangular or boot-shaped; harpe represented as elongate, sclerotized stripe with distal part enlarged into an elongate, serrate blade. Juxa broad with a medial notch dorsad. Phallus cylindrical, elongate, slightly curved.

Female genitalia (PLATE 38, figs. 162-164) – Corpus bursae ovate. Ductus bursae membranous, with portion surrounding ostium bursae sclerotized. Signum prominent, longer than 1/2X length of corpus bursae, forming an elongate, granular, invaginated, sclerotized band with medial ridge and fine transverse folds. Sterigma elaborately modified; lamella antevaginalis forming a bell-shaped dome; lamella postvaginalis as oblong or rectangular sclerotized patch, slightly thickened at anterior end. Anal papillae broad, semi-circular, setose distad. Posterior apophyses approximately 1.5X length of anal papillae or slightly longer, straight, pole-like, swollen at distal end.

Variation. Individuals occurring in seasons of lower temperature tend to be smaller in size, but with stronger metallic sheen.

Global distribution. Pakistan, northern and northeastern India, Himalayas, Indochina, Korea, Japan, southeast part of mainland China, Taiwan.

Distribution in Taiwan. From lowland up to about 2000 m in elevation (Hsu, 2013), with records also in associated islands, such as Guishan Island, Penghu Islands. Populations in Jinmen and Mazu Island have been regarded belonging to the nominotypical subspecies. Populations in Lanyu and Ludao Islands are considered as ssp. *kotoensis* endemic there.

Larval Host plant(s). In main island of Taiwan: Rutaceae: *Citrus* spp. (Nitobe, 1914)

; *Tetradium glabrifolium, Zanthoxylum ailanthoides* (Ae, 1968); *Z. nitidum* (Lee & Chang, 1988); *Z. simulans* (Lee & Wang, 1995); *Toddalia asiatica* (Lee & Wang, 1997); *Z. schinifolium* (Lee, 2000); *Tetradium ruticarpum* (Lu & Chen, 2014). In Lanyu and Ludao, *Toddalia asiatica*, *Zanthoxylum ailanthoides* (Hsu, 2013). In Jinmen: *Z. simulans* (NTNU specimens).

Biology. This species is multivoltine in occurrence, but may be in diapause as pupa in winter or dry season (Hsu, 2013).

Remarks. The geographical and seasonal variation of this species is so remarkable that recognition of species boundary between it and related species is a difficult task. A few populations previously assigned to this species endemic to some islands and areas have been considered as distinct species by some authors, while a few taxa formerly recognized as distinct species have been considered as geographical races of this species by recent researchers. For instance, Shirôzu (2006) recognized populations of most Japanese islands as a distinct species *P. dehaanii* C. & R. Felder, 1864, and those from Okinawa islands and Amami islands as another species *P. okinawensis* Fruhstorfer, 1898. On the other hand, the forms with bright metallic scalings in Indian subcontinent and southwestern China had long considered a distinct species *P. polyctor,* but recent works such as Zhu *et al.* (2009) and Condamine *et al.* (2013) support the view to lump *P. polyctor* with *P. bianor*.

形態特徵：成蟲前翅長 52–60mm。具有雌雄二型性。雄蝶 (圖 79、81–82)：頭被毛、黑褐色，散佈綠色金屬光澤鱗片；前額具有兩條白色模糊帶；複眼後方有一片白色。觸角黑褐色，末端略膨大。口器黑褐色。下唇鬚褐色混有白色鱗片。胸部具毛，黑褐色，背部散佈金綠色鱗片，前端有一些白色點；腹面黑褐色。腹部黑褐色，散佈綠色金屬光澤鱗片。抱器外表面黑褐色。足呈黑褐色，腿節及脛節外側表面具白色線條。領片、翅基片褐色具有一些金綠色鱗片。前翅前緣圓凸，先端圓鈍，外緣略波狀。後翅外緣波狀，M_3 脈末端具一明顯尾狀突。前翅背面底色黑褐色，覆蓋金綠色鱗片。中室內具四條模糊暗色帶。沿著 M_2、CuA_1、CuA_2、1A+2A、及 CuA_2 室有由毛狀鱗片構成的性標區。緣毛白色。前翅腹面底色黑褐色，翅表面後半有灰白色條帶。翅前半部散佈黃白色鱗片。後翅背面底色褐色，前端散佈藍色金屬光澤鱗片，後端散佈綠色鱗片。亞外緣有包含紫紅色金屬光澤的弦月紋。金屬光澤鱗片沿

M_3 脈沿伸進入尾狀突。緣毛褐色具有白色條帶。後翅背面底色黑褐色，基部散部黃白色鱗片。亞外緣有紫紅色弦月紋。雌蝶 (圖 80、83)：前翅背面無性標，後翅背面金屬光澤鱗片分布較不廣泛，但藍色鱗片較密集，形成一明顯金屬光澤區域，亞外緣紅色弦月紋較明顯。

臺灣地區確認有三個亞種：承名亞種 ssp. *bianor* 分布於外島金門及馬祖 (圖 82)，臺灣亞種 ssp. *thrasymedes* (圖 79–80) 分布於臺灣本島，蘭嶼亞種 ssp. *kotoensis* (圖 82–83) 為蘭嶼及綠島特有。其中臺灣亞種 (圖 79–80) 與承名亞種在翅紋特徵上並無明顯差異，相對的，蘭嶼亞種 (圖 82–83) 於翅背面金屬鱗片非常鮮明，形成一條顯著的亮帶，有「琉璃帶鳳蝶」的別稱。此外，相較於承名亞種與臺灣亞種 (圖 79–80)，蘭嶼亞種的抱握鉗基部較厚，末端片狀構造上具較多鋸齒。

雄交尾器 (圖 125–127)：偽鉤突窄，鉤狀，中央突出部位末端圓鈍。背兜側突基部具毛，具一對上舉之刺，刺先端銳尖。基腹弧纖細彎曲。囊突呈短棒狀。抱器葉狀，背部略伸長，後端圓鈍；抱器腹厚，高度骨化，矩形或靴狀；抱握鉗呈骨化長條帶狀，後端膨大成具鋸齒之長葉。陽基軛片寬闊，背部中央凹陷。陽莖長圓柱狀，略彎曲。

雌交尾器 (圖 162–164)：交尾囊卵狀，交尾囊管膜質，於交尾囊孔週圍骨化。花壁顯著，長度長於交尾囊二分之一，形成內陷而具顆粒的長骨化帶，並具有中央脊和橫向細褶。交尾孔板複雜；前板呈鐘狀半球形；後板呈橢圓形或矩形骨化區，前端略增厚。肛突寬闊，半圓形，後端具毛。後內骨突長度較肛突長、筆直、柱狀，末端膨大。

變異：出現在溫度較低的季節個體體型較小，常具有較強烈金屬光澤。

世界分布：巴基斯坦、印度北部及東北部、喜馬拉雅地區、中南半島、韓國、日本、中國大陸南半部及臺灣。

臺灣分布：分布從低地至海拔 2000 公尺，離島地區亦有記錄，例如龜山島、澎湖群島。分布在金門及馬祖的族群被認為屬於承名亞種。分布在蘭嶼及綠島的族群屬於蘭嶼亞種 ssp. *kotoensis* 且為這些地區所特有。

寄主植物：臺灣本島：芸香科柑橘屬、賊仔樹、食茱萸、雙面刺、刺花椒、飛龍掌血、翼柄花椒、吳茱萸。蘭嶼和綠島：飛龍掌血、食茱萸。金門：刺花椒。

生物學：本種為一年多世代，冬季及乾季可能以蛹態進行滯育休眠 (Hsu, 2013)。

註記：本種的地理及季節性變異非常顯著，因此本種與其相關種類的種界限在辨識上是件非常困難的工作。一些特產於某些島和地區的族群先前被置於本種內，但有些學者則認為應屬於不同的種；而另一些類群先前被某些學者認為是不同種，卻被晚近的研究者視為本種的地理性族群。例如 Shirôzu (2006) 將分布在日本大部分島嶼的族群視為 1 獨立種 *P. dehaanii* C. & R. Felder, 1864，而沖繩島和奄美島的族群則屬於另一種 *P. okinawensis* Fruhstorfer, 1898。另一方面，產於印度次大陸及中國西南地區具有鮮明金屬鱗片的型，長久以來被認為是 1 個獨立種，稱為孔雀鳳蝶 *P. polyctor*，但近期由 Zhu *et al.* (2009) 和 Condamine *et al.* (2013) 的研究則認為 *P. polyctor* 應與 *P. bianor* 合併。

Papilio (Achillides) dialis Leech, 1893 (穹翠鳳蝶 / 臺灣烏鴉鳳蝶)

Papilio dialis Leech, 1893: Entomologist 26 (Supplement): 104. (Type locality: “Chia-ting-fu” [Jiadingfu, Sichuan])

Ssp. *tatsuta* Murayama, 1970

PLATE 18, fig. 84; PLATE 19, fig. 85; PLATE 29, fig. 128; PLATE 39, fig. 165

Papilio andronicus Fruhstorfer, 1908: Entomologische Zeitschrift, Stuttgart 22: 167. (Type locality: “Formosa, Chip Chip”) (Subjective junior homonym of *Papilio andronicus* Ward, 1871)

Papilio dialis tatsuta Murayama, 1970: New Entomologist 19(4): 2. (Replacement for *Papilio andronicus* Fruhstorfer, 1908)

Specimens examined:

XINBEI CITY [= NEW TAIPEI CITY]: 1♂, Wanli, Daping, 21. V. 2012 (L. H. Wang) (genitalia preparation JYL089). **TAOYUAN CITY [= TAOYUAN Co.]:** 1♂, Fuxing, Xuanyuan, 10. VII. 2005, reared from *Zanthoxylum ailanthoides*, emgd. 14. VIII. 2005, HSU 05G07 (L. H. Wang). **NANTOU Co.:** 2♀, Renai, Huisun Forest Recreation Area, 22. III. 2013, emgd. 5. V. 2013 (W. J. Lin, J. R. Chen & C. Y. Wan) (genitalia preparation JYL088).

Description. Adult – Forewing length 52–60 mm. Male (PLATE 18, fig. 84): Head hairy, dark brown, scattered with metallic green scalings; a patch of white behind compound eyes. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus brown mixed with white scalings. Thorax hairy, dark brown, scattered with metallic green scalings dorsally, with a few white dots anteriad; dark brown ventrally. Abdomen

dark brown, scattered with metallic green scalings. Valvae with outer surface dark brown. Legs dark brown, with white, linear bands on external surfaces of femurs and tibiae. Patagia, tegula brown with some metallic green scalings. Forewing with costa convex, apex obtuse, termen slightly wavy. Hingwing with termen wavy, bearing a process at distal end of vein M_3, short, triangular to long, spatulate. Forewing uppersides ground color dark brown, overlaid with metallic green scalings. Four faint, dark stripes in discoidal cell. A patch of sexual brand consisted of hair-like scales present along M_2, CuA_1, CuA_2, 1A+2A, and cell CuA_2. Fringe white interrupted with brown. Forewing undersides ground color dark brown. Grayish white stripes in distal half of wing surface. Hindwing uppersides ground color brown, scattered with metallic blue scalings anteriad, green scalings posteriad. Lunules consisted of metallic scalings, perhaps also purplish red markings, present submarginally. Metallic scalings extending into process at distal end of vein M_3. Fringe brown banded with white. Hindwing undersides ground color dark brown, with metallic green and yellow scales scattered along dorsum. Purplish red lunules present submarginally. Female (PLATE 19, fig. 85): No sexual brand on forewing uppersides.

Male gentalia (PLATE 29, fig. 128) – Pseuduncus as narrow, medial extension with obtuse distal end, hook-like. Socii setose, forming a pair of conical processes with acute apical end. Vinculum slender, curved. Saccus short. Valva lobe-like, slightly produced dorsad, rounded distad; sacculus thick, heavily sclerotized, rectangular; harpe represented as elongate, sclerotized stripe with distal part enlarged into an elongate, serrate blade. Juxa broad with a medial notch dorsad. Phallus cylindrical, elongate, slightly curved.

Female genitalia (PLATE 39, fig. 165) – Corpus bursae ovate. Ductus bursae membranous. Signum prominent, longer than 1/2X length of corpus bursae, forming an elongate, granular, invaginated, sclerotized band with medial ridge and fine transverse folds, tapering toward cephalic end. Sterigma elaborately modified; lamella antevaginalis forming a bell-shaped dome; lamella postvaginalis as a shield-like sclerotized patch, slightly thickened at anterior end. Anal papillae broad, semi-circular, setose distad. Posterior apophyses approximately 2X length of anal papillae or slightly longer, straight, pole-like, swollen at distal end.

Global distribution. Northern Indochina, West, South to East China, Hainan, Taiwan.

Distribution in Taiwan. From lowland up to about 1500 m in elevation (Hsu, 2013).

Larval Host plant(s). Rutaceae: *Tetradium glabrifolium* (Chang, 1972); *Toddalia asiatica* (Lee, 1990); *Zanthoxylum ailanthoides* (Ho & Chang, 1998); *Tetradium ruticarpum* (Hsu, 2006).

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

Remarks. A short tailed form *doddsi* Janet, 1896 described from northern Vietnam is sometimes considered as a distinct species (e. g. Wu, 2001) or a subspecies of *P. dialis* (e. g. Shimogori, 1997; Ek-Amnuay, 2012). Both long-tailed and short-tailed forms occur in Hainan, and regarded merely as forms of the same species by some authors (e. g. Chou, 1992; Osada *et al.*, 1999). The latter viewpoint is tentatively accepted in the present work.

形態特徵：成蟲前翅長 52–60 mm。雄蟲 (圖 84)：頭被黑褐色毛，散佈綠色金屬鱗片；複眼後方有一白色區塊。觸角黑褐色，末端略膨大。口器黑褐色。下唇鬚褐色混雜白色鱗片。胸部被黑褐色毛，背面散佈綠色金屬鱗片，前端有些許白色斑點；腹面黑褐色。腹部黑褐色，散佈金屬綠鱗片。抱器外表面深褐色。足深褐色，於腿節及脛節外側有白色線條。領片及翅基片褐色帶有一些綠色金屬鱗片。中室具四條模糊之暗條狀斑。沿著 M_2、CuA_1、CuA_2、1A+2A 及 CuA_2 室有毛狀性標區域。緣毛白色具褐色間隔。前翅腹面底色黑褐色，表面後半部有灰白色條狀斑。後翅背面底色褐色，前端散佈藍色金屬鱗片，後端則散佈綠色金屬鱗片。亞外緣的弦月紋由金屬光澤的鱗片及紫紅色斑紋組成。金屬光澤鱗片延伸到 M_3 脈突起的末端，緣毛褐色與白色分段交替。後翅腹面底色黑褐色，具綠色及黃色金屬鱗片沿內緣散佈。亞外緣具紫紅色弦月紋。雌蟲 (圖 85)：前翅背面不具性標。

雄交尾器 (圖 128)：偽鉤突窄、鉤狀，中央突出部位的末端圓鈍。背兜側突具毛，具一對圓錐狀延伸且先端銳尖。基腹弧纖細彎曲。囊突短。抱器葉狀，背部略長，

後端圓鈍；抱器腹厚，高度骨化、矩形；抱握鋏呈骨化長條帶，後端膨大成長鋸齒片。陽基軛片寬闊，背部中央凹缺。陽莖長圓柱狀、略彎曲。

雌交尾器 (圖 165)：交尾囊卵狀，交尾囊管膜質。花壁長於交尾囊二分之一倍，形成內陷具顆粒之長骨化帶，中央具有脊和細橫褶，向頭端漸縮。交尾孔板複雜，前板為鐘狀圓蓋，後板呈盾狀骨化片，前端略增厚。肛突寬闊、半圓形，末端具毛。後內骨突約為肛突的兩倍長或略長，筆直、柱狀、末端腫大。

世界分布：中南半島北部、華西、華南至華東、海南島及臺灣。

臺灣分布：分布從低地至海拔 1500 公尺。

寄主植物：芸香科：賊仔樹、飛龍掌血、食茱萸、吳茱萸。

生物學：本種為一年多世代種類，冬季以蛹態滯育過冬 (Hsu, 2013)。

註記：產於越南北部的短尾型 form *doddsi* Janet, 1896 有時被認為是 1 獨立種 (例如 Wu, 2001) 或是 *P. dialis* 的 1 個亞種 (例如 Shimogori, 1997; Ek-Amnuay, 2012)。在海南島長尾突型和短尾突型的個體都有，有些學者認為只是同一種的不同型 (例如 Chou, 1992; Osada *et al.*, 1999)，本誌暫採用後者的觀點。

Papilio (Achillides) hopponis Matsumura, 1907 (雙環翠鳳蝶 / 雙環鳳蝶 / 北埔鳳蝶 / 重幃翠鳳蝶)

PLATE 19, figs. 86-87; PLATE 30, fig. 129; PLATE 39, fig. 166

Papilio hopponis Matsumura, 1907: Insect World 11: 6. (Type locality: “Shinchukuteu, Neihokupo” [Xinzhu, Beipu, Taiwan])

Papilio hoppo Matsumura, 1908: Transactions of the Sapporo Natural History Society 2: 72. (Type locality: Formosa: Arisan, Hoppo)

Papilio hoppo Matsumura, 1908: Entomologische Zeitschrift, 22: 54. (Type locality: “Formosa”)

Specimens examined:

XINZHU [= HSINCHU] Co.: 1♀, Jianshi, Lidongshan, 9. VII. 2008, reared from *Toddalia asiatica*, emgd. 28. VIII. 2008, HSU 08G05 (L. H. Wang); 1♀, Jianshi, Zhenxibao, 4. IV. 2010, reared from *T. asiatica*, 23. V. 2010, HSU 10D03 (L. H. Wang); 1♂, same locality, 13. IV. 2011 (L. H. Wang). **HUALIAN [= HUALIEN] Co.:** 1♂,

Northern Cross-Island Highway, 3. IX. 2015, (L. H. Wang) (genitalia preparation JYL131). **JIAYI [= CHIAYI] Co.:** 1♀, Alishan, Dinghu, 24. VIII. 2015 (J. Y. Liang) (genitalia preparation JYL094).

Description. Adult – Forewing length 36–56 mm. Sexual dimorphism present. Male (PLATE 19, fig. 86): Head hairy, dark brown mixed with white; a patch of white behind compound eyes. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus brown, white laterally. Thorax hairy, dark brown, overlaid with metallic green scalings dorsally; dark brown ventrally. Abdomen dark brown, scattered with metallic green scalings. Valvae with outer surface dark brown. Legs dark brown, with obscure, white, linear bands on external surfaces of femurs and tibiae. Patagia, tegula brown with some metallic green scalings. Forewing with costa convex, apex obtuse, termen slightly wavy. Hingwing with termen wavy, bearing a spatulate process at distal end of vein M_3. Forewing uppersides ground color dark brown, overlaid with metallic green scalings. Dark stripes in each cell. Four obscure, dark stripes in discoidal cell. Fringe white interrupted with brown. Forewing undersides ground color dark brown. Grayish white stripes in distal half of wing surface. Hindwing uppersides ground color brown, densely overlaid by metallic blue scalings anteriad, scattered with green scalings posteriad. Purplish red lunules in accompany with metallic green scales present submarginally. Metallic scalings extending into process at distal end of vein M_3. Fringe brown banded with white. Hindwing undersides ground color dark brown, overlaid with yellowish white scales proximally and along vein M_3 into tail-like process. Purplish red markings consisted of double rings present submarginally. Female (PLATE 19, fig. 87): On hindwing uppersides, blue patch less extensive and red lunules more prominent.

Male gentalia (PLATE 30, fig. 129) – Pseuduncus as narrow, medial extension with acute distal end, beak-like. Socii bearing long setae basad, with a pair of uplifted conical processes with acute apical end. Vinculum slender, curved. Saccus as a short rod. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized, roughly rectangular; harpe represented as elongate, sclerotized stripe with distal part slightly enlarged into a serrate blade. Juxa a moderately sclerotized plate. Phallus cylindrical, elongate, slightly curved.

Female genitalia (PLATE 39, fig. 166) – Corpus bursae ovate. Ductus bursae

membranous, narrowed posteriad. Signum prominent, longer than 1/2X length of corpus bursae, forming an elongate, granular, invaginated, sclerotized band with medial ridge and fine transverse folds. Sterigma elaborately modified; lamella antevaginalis forming a bell-shaped dome; lamella postvaginalis as broad sclerotized patch with elongate, lateral band. Anal papillae broad, semi-circular, setose distad. Posterior apophyses less than 2X length of anal papillae, slightly curved, pole-like, swollen at distal end.

Global distribution. Endemic to Taiwan (Shirôzu, 1960; Hsu, 2013).

Distribution in Taiwan. From 500 m up to about 3000 m in elevation (Hsu, 2013).

Larval Host plant(s). Rutaceae: *Tetradium glabrifolium*, *Phellodendron amurense* (Ae, 1968); *Zanthoxylum ailanthoides* (Lee & Wang, 1997); *Toddalia asiatica* (Lin & Lin, 2008).

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

Remarks. This species appears to be closed related to *Papilio arcturus* Westwood, 1842, which is ranged from Himalayas to southern China.

形態特徵：成蟲前翅長 36–56 mm。具雌雄二型性。雄蝶 (圖 86)：頭部被黑褐色毛摻雜白色毛；複眼後方有一塊白色斑紋。觸角黑褐色末端微膨大。口器黑褐色，下唇鬚褐色，側面白色。胸部被黑褐色毛，背面覆蓋金綠色鱗片，腹面黑褐色。腹部深褐色散佈金綠色鱗片，抱器外表面黑褐色。足呈黑褐色，在腿節與脛節外側表面有不明顯之白線或帶。領片、翅基片褐色並散佈一些金綠色鱗片。前翅前緣脈突起，先端圓鈍，外緣呈微波浪狀。後翅外緣波浪狀，在 M_3 脈末端具有一尾狀突起。前翅背面底色黑褐色，覆蓋金綠色鱗片。各翅室具暗色條狀斑，中室具有四條不明顯之暗色條斑。緣毛白色有褐色間隔。前翅腹面底色黑褐色，翅面後半具灰白色條狀斑。後翅背面底色褐色，前端密布金藍色鱗片，後端散佈的金綠色鱗片，亞外緣紫紅色弦月紋伴隨著金綠色鱗片，金屬色鱗片沿著 M_3 脈分布至末端，緣毛褐色摻白色帶。後翅腹面底色黑褐色，基部覆蓋黃白色鱗片並沿著 M_3 脈分布進尾狀突起，亞外緣具

紫紅色斑紋組成的雙環狀紋。雌蝶 (圖 87)：後翅背面藍色範圍較小而紅色弦月紋較明顯。

雄交尾器 (圖 129)：偽鉤突窄、喙狀，中央突出部位末端銳尖。背兜側突基部具長毛，有一對上舉圓錐狀延伸且先端銳尖。基腹弧纖細彎曲。囊突短棒狀。抱器葉狀，後端圓鈍；抱器腹厚，高度骨化，略呈矩形；抱握鋏成骨化長條帶，後端略膨大呈鋸齒片。陽基軛片呈中度骨化片。陽莖長圓柱狀、略彎曲。

雌交尾器 (圖 166)：交尾囊卵狀，交尾囊管膜質，後端狹窄。花壁顯著，長於交尾囊二分之一倍，形成一內陷具顆粒長骨化帶，中央具脊和細橫褶。交尾孔板複雜，前板形成鐘狀圓蓋，後板成寬闊骨片並具長側帶。肛突寬闊、半圓形，末端具毛。後內骨突長度不及肛突的兩倍長、略彎曲、柱狀，末端膨大。

世界分布：本種為臺灣特有種。

臺灣分布：分布自海拔 500 至 3000 公尺。

寄主植物：芸香科的賊仔樹、臺灣黃蘗、食茱萸、飛龍掌血。

生物學：本種為一年多世代，冬季以蛹態滯育過冬 (Hsu, 2013)。

註記：本種與分布自喜馬拉雅至華南地區窄斑翠鳳蝶 *Papilio arcturus* Westwood, 1842 之近緣。

Papilio (Achillides) hermosanus Rebel, 1906 (臺灣琉璃翠鳳蝶 / 琉璃紋鳳蝶)

PLATE 19, fig. 88; PLATE 20, fig. 89; PLATE 30, fig. 130; PLATE 39, fig. 167

Papilio polyctor hermosanus Rebel, 1906: Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien 56 : 223. (Type locality: “Formosa”)

Specimens examined:

TAOYUAN CITY [= TAOYUAN Co.]: 1♀, Fuxing, Xuanyuan, 7. VIII, 2007, reared from *Toddalia asiatica*, emgd. 15. IX. 2007, HSU 07H30 (L. H. Wang); 1♀, Fuxing, Xuanyuan, 29. VI. 2015 (L. Huang) (genitalia preparation JYL124). **TAIZHONG CITY [= TAICHUNG CITY]:** 1♂, Fengyuan, Zhongzheng Park, 5.X. 2013 (L. Huang). **HUALIAN [= HUALIEN] Co.:** 1♂, Yuli, Yuancheng, 2. XII. 2014 (J. Y. Liang) (genitalia

preparation JYL082). **NANTOU Co.:** 1♂, Renai, Huisun Forest Recreation Area, reared from *T. asiatica*, 26. VIII. 2007, emgd. 12. X. 2007, HSU 07J13 (C. K. Wang); 1♂, 1♀, same locality, 2. VIII. 2007, reared from *T. asiatica*, emgd. 17/20. IX. 2007, HSU 07H5 (L.H. Wang).

Description. Adult – Forewing length 39–50 mm. Male (PLATE 19, fig. 88): Head hairy, dark brown mixed with metallic green scales; a patch of white behind compound eyes. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus brown, white laterally. Thorax hairy, dark brown, densely overlaid with metallic green scalings dorsally; dark brown, sparsely scattered with metallic green scalings ventrally. Abdomen dark brown, scattered with dull, ochreous scalings dorsally, creamy white scalings laterally. Legs dark brown, with obscure, white, linear bands on external surfaces of femurs and tibiae. Patagia, tegula brown with some metallic green scalings. Forewing with costa convex, apex obtuse, termen slightly wavy. Hingwing with termen wavy, bearing a spatulate process at distal end of vein M_3. Forewing uppersides ground color dark brown, overlaid with metallic green scalings. Sexual brand represented as gray, shinning streaks along vein M_3 and CuA_1. Fringe brown interrupted with white. Forewing undersides ground color dark brown. Grayish white stripes in distal half of wing surface. Hindwing uppersides ground color brown, densely overlaid by metallic green and bluish green scalings, with a prominent, metallic, greenish blue patch in outer half anteriorly. A narrow, curved, metallic green band connecting greenish blue patch with dorsum. A purplish red ring present at tornus. Hindwing undersides ground color dark brown, overlaid with yellowish white scales proximally and along vein M_3 into tail-like process. Purplish red lunues at distal end of each cell. Female (PLATE 20, fig. 89): Wing patterns similar to those of male. Sexual brand absent.

Male gentalia (PLATE 30, fig. 130) – Pseuduncus as narrow, medial extension with obtuse distal end, beak-like. Socii setae, enlarged basad, with a pair of uplifted conical processes with acute apical end. Vinculum slender, curved. Saccus as a short rod. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized, boot-like; harpe represented as elongate, sclerotized stripe gradually enlarged toward distal end into a blade with very fine teeth. Juxa a sclerotized plate with a dorsal notch. Phallus cylindrical, elongate, straight, with distal end slightly enlarged.

Female genitalia (PLATE 39, fig. 167) – Corpus bursae ovate. Ductus bursae membranous. Signum prominent, over 3/4X length of corpus bursae, forming an elongate, granular, invaginated, sclerotized band with medial ridge and fine transverse folds. Sterigma with lamella antevaginalis forming a bell-shaped dome; lamella postvaginalis as rounded sclerotized patch with two lateral processes anteriad. Anal papillae broad, semi-circular, setose distad. Posterior apophyses slightly longer than length of anal papillae, straight, pole-like, swollen at distal end.

Global distribution. Endemic to Taiwan (Shirôzu, 1992; Hsu, 2013).

Distribution in Taiwan. Lowlands to approximately 1200 m elevation througout the island excluding areas surrounding Taipei Basin (Hsu, 2013).

Larval Host plant(s). The following plants in Rutaceae were recorded: *Melicope pteleifolia* (Lee, 1990); *Toddalia asiatica* and *Zanthoxylum nitidum* (Lee & Chang, 1988); *Z. armatum* (Lee & Wang, 1997). Although several species in the citrus family have been recorded as larval host plants of this species in literature, later tests showed its larvae rejected most of them, and accepted only *T. asiatica*, thus past records probably involve mis-identification of *P. paris* as this species.

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

Remarks. This species is long considered as a subspecies of *Papilio paris*. Shirôzu (1992) first recognized it as a distinct species endemic to Taiwan.

形態特徵：成蝶前翅長 39–50 mm。雄蝶 (圖 88)：頭被毛、黑褐色混雜綠色金屬光澤鱗片，複眼後方具一白色區。觸角黑褐色，末端略膨大。口器黑褐色。下唇鬚褐色，側面白色。胸部具毛，黑褐色，背面密佈綠色有金屬光澤之鱗片，腹面黑褐色，稀疏散佈綠色有金屬光澤之鱗片。腹部黑褐色，背面散佈土黃色無光澤鱗片，側面具乳白色鱗片。足呈黑褐色，腿節及脛節外側表面具模糊白色線條斑。領片及翅基片褐色具一些金綠色鱗片。前翅前緣脈圓凸，先端圓鈍，外緣微波浪狀。後翅外緣波

浪狀，在 M_3 脈末端有一明顯匙狀尾凸。前翅背面底色黑褐色並覆蓋金綠色鱗片，性標沿 M_3 及 CuA_1 脈呈亮灰色帶，緣毛褐色與白色相間隔。前翅腹面底色黑褐色，翅表面後半部具灰白色條狀斑。後翅背面底色褐色密布綠色及藍色金屬鱗片，前端靠外半部有一個明顯的金藍綠色斑塊，一條狹窄彎曲的金綠色帶與內緣藍綠色區塊相連，臀角具一紫紅色的環狀斑。後翅腹面底色黑褐色，基部覆有黃白色鱗片並沿著 M_3 脈進入尾突，紫紅色弦月紋出現在每個翅室末端。雌蝶 (圖 89) : 翅紋與雄蝶相似，無性標。

雄交尾器 (圖 130)：偽鉤突窄、喙狀，中央突出部位的末端圓鈍。背兜側突具毛，基部膨大，具一對上舉圓錐狀延伸且先端銳尖。基腹弧纖細彎曲。囊突呈短棒。抱器葉狀，後端圓鈍；抱器腹厚、高度骨化，呈靴狀；抱握鋏呈長骨化帶，末端逐漸膨大呈片狀並具細齒。陽基軛片骨片狀，背側凹陷。陽莖長圓柱狀、筆直，後端略膨大。

雌交尾器 (圖 167) : 交尾囊卵狀，交尾囊管膜質。花壁顯著，長於交尾囊四分之三倍，形成內陷具顆粒長骨化帶，中央具脊和細橫褶。交尾孔板複雜，前板形成鐘狀圓蓋，後板呈寬闊骨片並具長側帶。肛突寬闊、半圓形，末端具毛。後內骨突長度不及肛突的兩倍長，略彎曲、柱狀，末端膨大。

世界分布：本種為臺灣特有種。

臺灣分布：除了臺北盆地週邊，分布於全島低地至海拔約 1200 公尺。

寄主植物：文獻中雖然記載數種芸香科的種類為寄主植物，但後續的飼育測試發現本種幼蟲拒絕取食大部份的種類，僅取食飛龍掌血，因此過去的記錄可能是將琉璃翠鳳蝶誤認為本種。

生物學：本種為一年多世代種類，冬季以蛹態滯育過冬 (Hsu, 2013)。

註記：本種長期以來被認為是琉璃翠鳳蝶 *Papilio paris* 的 1 個亞種。Shirôzu (1992) 首次主張應為 1 獨立種，並視為臺灣特有種。

Papilio (Achillides) paris Linnaeus, 1758 (琉璃翠鳳蝶 / 大琉璃紋鳳蝶 / 寶鏡鳳蝶 / 巴黎翠鳳蝶)

Papilio (Eques) paris Linnaeus, 1758: Systema Naturae (Edn 10) 1: 459, no. 3. (Type locality: "Asia" [Canton, China]. Type in: The Linnean Society of London)

Papilio paris paris f. *decorosa* Fruhstorfer, 1909: Entomologische Zeitschrift 22 (41): 171. (Type locality: "Sikkim")

Papilio paris majestatis Fruhstorfer, 1909: Entomologische Zeitschrift 22 (41): 171. (Type locality: "Tonkin; Annam; Tenasserim")

Papilio paris splendorifer Fruhstorfer, 1909: Entomologische Zeitschrift 22 (41): 171. (Type locality: "Siam")

Papilio angelicae Bryk, 1939: Entomologisk Tidskrift 60: 262. (Type locality: Sikkim)

Papilio reductomaculata Bryk, 1939: Entomologisk Tidskrift 60: 263. (Type locality: Sikkim)

Papilio sumbingensis Toxopeus, 1937: Entomologiske Mededeelingen van Nederlandsch-Indië 3: 46. (Type locality: "Soemburg")

Ssp. *nakaharai* Shirôzu, 1960

PLATE 20, figs. 90-91; PLATE 30, fig. 131; PLATE 39, fig. 168

Papilio paris nakaharai Shirôzu, 1960: Butterflies of Formosa in Colour: 54. (Type locality: "Showa, Taikoku Pref., N. Formosa")

Ssp. *paris* Linnaeus, 1758

PLATE 30, fig. 132

Specimens examined:

Ssp. *nakaharai*: **TAIPEI CITY:** 1♀, Wenshan Dist., Taipei City Zoo, 18. X. 2013, reared from *Melicope semecarpifolia*, emgd. 24. XI. 2013 (W. J. Lin); 1♂, 1♀, Nangang, Academia Sinica, 25. II. 2015, reared from *M. semecarpifolia*, emgd. 10. IV. 2015 (W. J. Lin & C. W. Huang); 3♂, same locality, 15. IV. 2015 (L. Huang) (genitalia preparation JYL072, JYL073). **XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.]:** 1♀, Wulai, Sikanshui, 17. VIII. 2015 (Y. H. Lin) (genitalia preparation JYL130).

Ssp. *paris*: **JINMEN [= KINMEN] Co.:** 1♂, 1♀, Shishan, 4. XI. 2013 (C. L. Huang & H. C. Huang) (genitalia preparation JYL 101); 1♂, Jincheng, Gugang, 5. XI. 2013 (C. L. Huang & H. C. Huang).

Description. Adult – Forewing length 47–55 mm. Male (PLATE 20, fig. 90): Head hairy, dark brown mixed with metallic green scales; a patch of white behind compound eyes. Antennae dark brown, slightly swollen distad. Proboscis dark brown. Labial palpus

brown, white laterally. Thorax hairy, dark brown, densely overlaid with metallic green scalings dorsally; dark brown, sparsely scattered with metallic green scalings ventrally. Abdomen dark brown, scattered with dull, ochreous scalings dorsally, creamy white scalings laterally. Valvae with outer surface dark brown. Legs dark brown, with obscure, white, linear bands on external surfaces of femurs and tibiae. Patagia, tegula brown with some metallic green scalings. Forewing with costa convex, apex obtuse, termen slightly wavy. Hingwing with termen wavy, bearing a spatulate process at distal end of vein M_3. Forewing uppersides ground color dark brown, overlaid with metallic green scalings. Sexual brand poorly represented, barely visible, forming narrow stripe on vein CuA_1 if present. Fringe brown interrupted with white. Forewing undersides ground color dark brown. Grayish white stripes in distal half of wing surface. Hindwing uppersides ground color brown, densely overlaid by metallic green and bluish green scalings, with a prominent, metallic, greenish blue patch in outer half anteriorly. A narrow, curved, metallic green band connecting greenish blue patch with dorsum. A purplish red ring present at tornus. Hindwing undersides ground color dark brown, overlaid with yellowish white scales proximally and along vein M_3 into tail-like process. Purplish red lunues at distal end of each cell. Female (PLATE 20, fig. 91): Sexual brand absent. Narrow metallic green band on hindwing uppersides absent or barely recognizable.

Male gentalia (PLATE 30, fig. 131-132) – Pseuduncus as narrow, medial extension with obtuse distal end, beak-like. Socii setae, enlarged basad, with a pair of uplifted conical processes with acute apical end. Vinculum slender, curved. Saccus as a short rod. Valva lobe-like, rounded distad; sacculus thick, heavily sclerotized, boot-like; harpe represented as elongate, sclerotized stripe gradually enlarged toward distal end into a blade with small teeth. Juxa a sclerotized plate with a dorsal notch. Phallus cylindrical, elongate, straight, with distal end slightly enlarged.

Female genitalia (PLATE 39, fig. 168) – Corpus bursae ovate. Ductus bursae membranous. Signum prominent, over 3/4X length of corpus bursae, forming an elongate, granular, invaginated, sclerotized band with medial ridge and fine transverse folds. Sterigma with lamella antevaginalis forming a bell-shaped dome; lamella postvaginalis as oblong sclerotized patch with two lateral processes. Anal papillae broad, semi-circular, setose distad. Posterior apophyses slightly longer than length of anal

papillae, straight, pole-like, swollen at distal end.

Global distribution. Himalayas, India, Indochina, Sumatra, Java, West, South to East China, Taiwan (Shimogori, 1997).

Distribution in Taiwan. Confined to hills of low elevations of northern Taiwan and Guishan Island. Recent observations from Taizhong area of central Taiwan may be anthropogenic (Hsu, 2013).

Larval Host plant(s). In main island of Taiwan: Rutaceae: *Melicope semecarpifolia* (Chang, 1974); *M. pteleifolia* (Lee & Chang, 1988); *Toddalia asiatica* (Lee & Wang, 1995); *Tetradium glabrifolium* and *Zanthoxylum ailanthoides* in captivity (Lee & Wang, 1997). In Mazu Islands: *Z. nitidum*, *Z. armatum* (Lee, 2000).

Biology. This species is multivoltine in occurrence, in diapause as pupa in winter (Hsu, 2013).

形態特徵：成蟲前翅長 47–55 mm。雄蝶 (圖 90)：頭被黑褐色毛並摻雜金綠色鱗片，複眼後方有一白斑。觸角黑褐色，前端稍膨大。口器黑褐色，下唇鬚褐色，側面白色。胸部被黑褐色毛，背面密佈金綠色鱗片，腹面黑褐色稀疏散佈金綠色鱗片。腹部黑褐色，背面散佈著無光澤的土黃色鱗片，側面則散佈乳白色鱗片。抱器外表面呈黑褐色，足呈黑褐色，在腿節與脛節表面外側具有不明顯白線。領片和翅基片褐色並具一些金綠色鱗片。前翅前緣脈圓凸，先端圓鈍，外緣微波浪狀。後翅外緣波浪狀，在 M_3 脈末端有一明顯匙狀尾凸。前翅背面底色黑褐色並覆蓋金綠色鱗片，性標不明顯，若出現則隱約可見於 CuA_1 脈上呈狹窄條狀，緣毛褐色與白色相間。前翅腹面底色黑褐色，翅表面後半部具灰白色條狀斑。後翅背面底色褐色密布綠色及金藍色鱗片，前端靠外半部有一個明顯的金藍綠色斑塊，一條彎曲金綠色細帶與內緣藍綠色區塊相連，臀角有一紫紅色的環狀斑。後翅腹面底色黑褐色，基部覆有黃白色鱗片並沿著 M_3 脈進入尾突，紫紅色弦月紋出現在每個翅室末端。雌蝶 (圖 91)：缺乏性標，後翅背面金綠色細帶消失或不明顯。

雄交尾器 (圖 131–132)：偽鉤突窄、喙狀，中央突出部末端圓鈍。背兜側突具毛，

基部膨大，具一對上舉圓錐狀延伸且先端銳尖。基腹弧纖細彎曲。囊突短棒。抱器葉狀，後端圓鈍；抱器腹厚，高度骨化，靴狀；抱握鋏長骨化帶，末端逐漸膨大呈片狀並具細齒。陽基軛片骨片狀，背側凹陷。陽莖長圓柱狀、筆直，後端略膨大。

雌交尾器 (圖 168)：交尾囊卵狀，交尾囊管膜質。花壁顯著，長於交尾囊四分之三倍，形成內陷具顆粒之長骨化帶，中央具脊和細橫褶。交尾孔前板形成鐘狀圓蓋，後板具橢圓狀骨化區並具兩個側突起。肛突寬闊、半圓形，末端具毛。後內骨突略長於肛突、筆直、柱狀、末端膨大。

世界分布：喜馬拉雅地區、印度、中南半島、蘇門答臘、爪哇、華西、華南及華東、以及臺灣。

臺灣分布：侷限分布在臺灣北部及龜山島低海拔山丘，近期在臺灣中部的臺中地區的觀察記錄可能是人為引進。

寄主植物：臺灣本島：取食芸香科三刈葉、三腳虌、飛龍掌血；飼育時可取食賊仔樹、食茱萸。馬祖：取食芸香科雙面刺、秦椒。

生物學：本種為一年多世代，冬季以蛹態進行滯育 (Hsu, 2013)。

Supplementary Notes

A few swallowtail species were recorded from Taiwan in literature, but probably involving mis-labelling, doubtful sources of specimens, or rare straying species. They are discussed as the followings:

Luehdorfia japonica formosana Rothschild, 1918 (日本虎鳳蝶)

Luehdorfia japonica formosana Rothschild, 1918: Novitates Zoologicae 25: 65. (Type locality: "Formosa". Syntypes in NHM.)

PLATE 20, Fig. 92

This taxon was described based on two males purchased by Ernest Swinhoe (Rothschild, 1918), and Matsumura (1929) states that two additional male specimens were collected at Bokusekkaku (PLATE 20, fig. 92), in the Prov. Daito by K. Asakura. Watanabe (1996) has pointed out that all these specimens evidently were from unreliable sources, and *Luehdorfia japonica* is to date recognized as a species endemic to Japan.

Troides rhadamantus plateni Staudinger, 1888 (菲律賓裳鳳蝶)

The sole record of this species in Taiwan was a male collected from Lanyu Island on August 21th, 1951 (Hamano, 1987), under the name *T. plateni*. This taxon is treated as a distinct species endemic to Palawan and Balabac of the Philippines by some authors. There is no doubt the sole record of this taxon represents an accidental stray to Taiwan.

Atrophaneura semperi (C. & R. Felder, 1861) (菲律賓曙鳳蝶)

The sole record of this species in Taiwan is found in Chen (1974), without further data on sex, date, or locality of collecting. It is well known that *A. semperi* is a swallowtail endemic to the Philippines. There is no doubt that the specimen showa in Chen (1974) represents an accidental occurrence of this species in Taiwan.

Papilio maackii Ménétriés, 1859 (綠帶翠鳳蝶)

The sole record of this species was reported by Shirôzu (1944) based on a male collected from Shinten, Taihoku on September 8th, 1935, and the specimen was illustrated in

Shirôzu (1960). *Papilio maackii* is widespread in East Asia, but as no additional observation of this species anywhere in Taiwan after this specimen, this record evidently represents an accidental occurrence.

***Papilio aegus* Donovan, 1805 (果園美鳳蝶)**

Papilio aegus is a swallowtail species of Australian Region. Lee and Wang (2002) reported that it has been introduced to Taiwan, and may be found in urban parks and suburban orchards. However, no additional observation or record of this species is available after this work, and there seems no evidence that this species has successfully established in Taiwan.

"*Papilio polydorus* Linne" [*Pachliopta polydorus* Linnaeus, 1763] (紅身珠鳳蝶)

The record of this taxon appeared only once in an early literature (Matsumura, 1905), with merely a name in a catalogue without additional data or figure. This taxon is currently placed in the genus *Pachliopta*, and is a species distributed in the Australian Region, thus unlikely to occur in Taiwan. Judging from the morphological features of *P. polydorus*, Matsumura's record perhaps refers to an individual of *P. aristolochiae* with tails of hindwing missing.

補充註記

在文獻中有些鳳蝶種類在臺灣曾有記錄，但可能是標纖錯誤、標本來源有問題或稀有的偶發性迷蝶，這些種類概述如下：

日本虎鳳蝶

本種在臺灣的記錄是根據 Ernest Swinhoe (Rothschild, 1918) 所購得的兩隻雄蝶標本而被描述，Matsumura (1929) 另提及 K. Asakura. 在 Daito 的 Bokusekkaku 璞石閣 (當今花蓮縣玉里一帶) 採到另外兩隻雄蝶 (圖 92)。Watanabe (1996) 指出這些標本顯然來源都不可靠，日本虎鳳蝶目前仍被認為是日本特有種。

菲律賓裳鳳蝶

本種在臺灣僅有的記錄是 1951 年 8 月 21 日採集自蘭嶼的一隻雄蝶，當時以 *T. plateni* 為學名，有些學者將本種處理為菲律賓巴拉望及巴拉巴克島特有種。毫無疑問地該筆唯一記錄是偶發性進入臺灣的個體。

菲律賓曙鳳蝶

本種在臺灣的唯一記錄見於 Chen (1974)，沒有進一步關於性別、採集日期及地點的資料。本種是菲律賓著名的特有種鳳蝶。毫無疑問地 Chen (1974) 提及的樣本是一筆偶產性記錄。

綠帶翠鳳蝶

本種唯一記錄是由 Shirôzu (1944) 報導一隻 1935 年 9 月 8 日採集自台北新店的雄蝶標本，該標本在 Shirôzu (1960) 有圖示。本種廣分布於東亞，但自從這隻標本發現之後，本種在臺灣任何地區不再有額外的觀察記錄，本筆記錄顯然是偶產性個體。

果園美鳳蝶

果園美鳳蝶是屬於澳洲區的鳳蝶種類。Lee and Wang (2002) 報導已被引入臺灣，可在都會公園郊區果園發現。然而，從該報導後再也沒有本種額外的觀察記錄，似乎沒有任何証據支持本種在臺灣已成功建立族群。

紅身珠鳳蝶

此分類群的記錄僅在一筆早期文獻出現過一次 (Matsumura, 1905)，並且僅為名錄中的一個名稱且沒有任何額外的資料和圖片。本種後來被置於珠鳳蝶屬，而且是分布於澳洲區的種類，因此不太可能出現在臺灣。從紅身珠鳳蝶的形態特徵來判斷，Matsumura 的記錄可能指的是紅珠鳳蝶 *P. aristolochiae* 後翅尾突缺損的個體。

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COLOUR PLATES

Note. Scale bars represent 1 cm.

: **Uppersides**

: **Undersides**

1. *Troides aeacus kaguya* Nakahara & Esaki, 1930 黃裳鳳蝶
♂. HUALIAN Co., Yuli, Yuancheng, 1. XII. 2013.

2. *Troides aeacus kaguya* Nakahara & Esaki, 1930 黃裳鳳蝶
♀. HUALIAN Co., Yuli, Yuancheng, 2. XII. 2013.

3. *Troides magellanus sonani* Matsumura, 1932 珠光裳鳳蝶
♂. TAIDONG Co., Lanyu, 23. VIII. 2012, reared from *Aristolochia zollingeriana*, emgd. 10. I. 2013.

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4. *Troides magellanus sonani* Matsumura, 1932 珠光裳鳳蝶
♀. TAIDONG Co., Lanyu, 23. VIII. 2012, reared from *Aristolochia zollingeriana*, emgd. 28. II. 2013.

5. *Pachliopta aristolochiae interposita* (Fruhstorfer, 1904) 紅珠鳳蝶
♂. TAIDONG Co., Lanyu, Shuangshiyan, reared from *Aristolochia zollingeriana*, emgd. 4/14. VI. 2014, HSU 14E14 (L. H. Wang & Y. M. Hsu).

6. *Pachliopta aristolochiae interposita* (Fruhstorfer, 1904) 紅珠鳳蝶
♀. TAIPEI CITY, Wenshan, Gongguan campus, NTNU, 5. XII. 2014 (L. Huang).

7. *Byasa confusus mansonensis* (Fruhstorfer, 1901) 麝鳳蝶
♂. JINMEN Co., Jinmen Botanical Garden, 7. VI. 2014 (C. L. Huang & H. C. Huang).

8. *Byasa confusus mansonensis* (Fruhstorfer, 1901) 麝鳳蝶
♀. XINZHU Co., Zhudong, 17. IX. 2004, reared from *Aristolochia shimadai*, emgd. 27. X. 2004, HSU 04J17.3 (L. H. Wang).

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9. *Byasa impediens febanus* (Fruhstorfer, 1908) 長尾麝鳳蝶
♂. ZHANGHUA Co., NCUE campus, 7. IV. 2001, emgd. 9. V. 2001 (J. M. Wu).

10. *Byasa impediens febanus* (Fruhstorfer, 1908) 長尾麝鳳蝶
♀. NANTOU Co., Lugu, Fonghuanggu Bird Park, 2. XII. 2013 (W. J. Lin).

11. *Byasa polyeuctes termessus* (Fruhstorfer, 1908) 多姿麝鳳蝶
♂. HUALIAN Co., Xiulin, Asia Cement Garden, 17. III. 2015, emgd. 20. IV. 2015, HSU 15C20 (L. H. Wang).


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12. *Byasa polyeuctes termessus* (Fruhstorfer, 1908) 多姿麝鳳蝶
♀. NANTOU Co., Xinyi, Dongpu, 1500m, 16. V. 2011 (L. W. Wu).

13. *Atrophaneura horishana* (Matsumura, 1910) 曙鳳蝶
♂. NANTOU Co., Renai, Songgang, collecting date missing, emgd. 5. XI. 2005.

14. *Atrophaneura horishana* (Matsumura, 1910) 曙鳳蝶
♀. NANTOU Co., Renai, Biluxi, collecting date missing, emgd. 1. IV. 2006.

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15. *Graphium (Graphium) sarpedon connectens* (Fruhstorfer, 1906) 青鳳蝶
♂. MIAOLI Co., Sanyi, 7. VI. 2015 (L. Huang).

16. *Graphium (Graphium) sarpedon connectens* (Fruhstorfer, 1906) 青鳳蝶
♀. TAIPEI CITY , Nangang, Academia Sinica, 15. IV. 2015 (L. Huang).

17. *Graphium (Graphium) sarpedon sarpedon* Linnaeus, 1758 青鳳蝶
♂. JINMEN Co., Zhongshanlin, 7. VI. 2014 (C. L. Huang & H. C. Huang).

18. *Graphium (Graphium) sarpedon sarpedon* Linnaeus, 1758 青鳳蝶
♂. LIANJIANG Co., Nangan, Jinsha, 26. VI. 2013, reared from *Cinnamomum comphora*, emgd. 24. VII. 2013, HSU 13F60 (C. L. Huang & H. Y. Lee).

19. *Graphium (Graphium) sarpedon sarpedon* Linnaeus, 1758 青鳳蝶
♀. LIANJIANG Co., Nangan, Jinsha, 12. X. 2014 (H. Y. Lee & C. W. Huang).

20. *Graphium (Graphium) sarpedon sarpedon* Linnaeus, 1758 青鳳蝶
♀. LIANJIANG Co., Nangan, Shengtian park, 27. VI. 2013 (C. L. Huang & H. Y. Lee).


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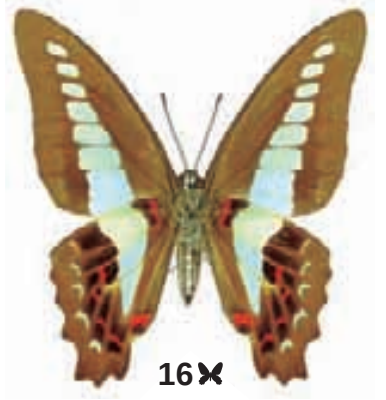
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21. *Graphium (Graphium) cloanthus kuge* (Fruhstorfer, 1908) 寬帶青鳳蝶
♂. XINBEI CITY [= NEW TAIPEI CITY], Wulai, Fushan, 18. III. 2015 (C. W. Huang).

22. *Graphium (Graphium) cloanthus kuge* (Fruhstorfer, 1908) 寬帶青鳳蝶
♀. PINGDONG Co., Wutai, Ali, 4. IV. 2011 (L. H. Wing).

23. *Graphium (Graphium) doson postianus* (Fruhstorfer, 1902) 木蘭青鳳蝶
♂. TAIZHONG CITY, Heping, Guguan, 2. IV, 2015 (W. J. Lin, C. J. Chang, M. F. Ciou & Y. H. Lin).

24. *Graphium (Graphium) doson postianus* (Fruhstorfer, 1902) 木蘭青鳳蝶
♀. TAIPEI CITY, Beitou, Junjianyan, 18. IV. 2015, emgd. 5. V. 2015 (L. Huang).

25. *Graphium (Graphium) agamemnon* (Linnaeus, 1758) 翠斑青鳳蝶
♂. TAIZHONG CITY, Dakeng, 3. XII. 2010 (W. J. Lin).

26. *Graphium (Graphium) agamemnon* (Linnaeus, 1758) 翠斑青鳳蝶
♀. TAIZHONG CITY, Fengyuan, Zhongzheng park, 6. IV. 2013 (L. Huang).


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27. *Graphium (Pazala) eurous asakurae* (Matsumura, 1908) 劍鳳蝶
♂. TAIZHONG CITY, Heping, Xueshan Rd, 2. IV. 2015 (J. Y. Liang).

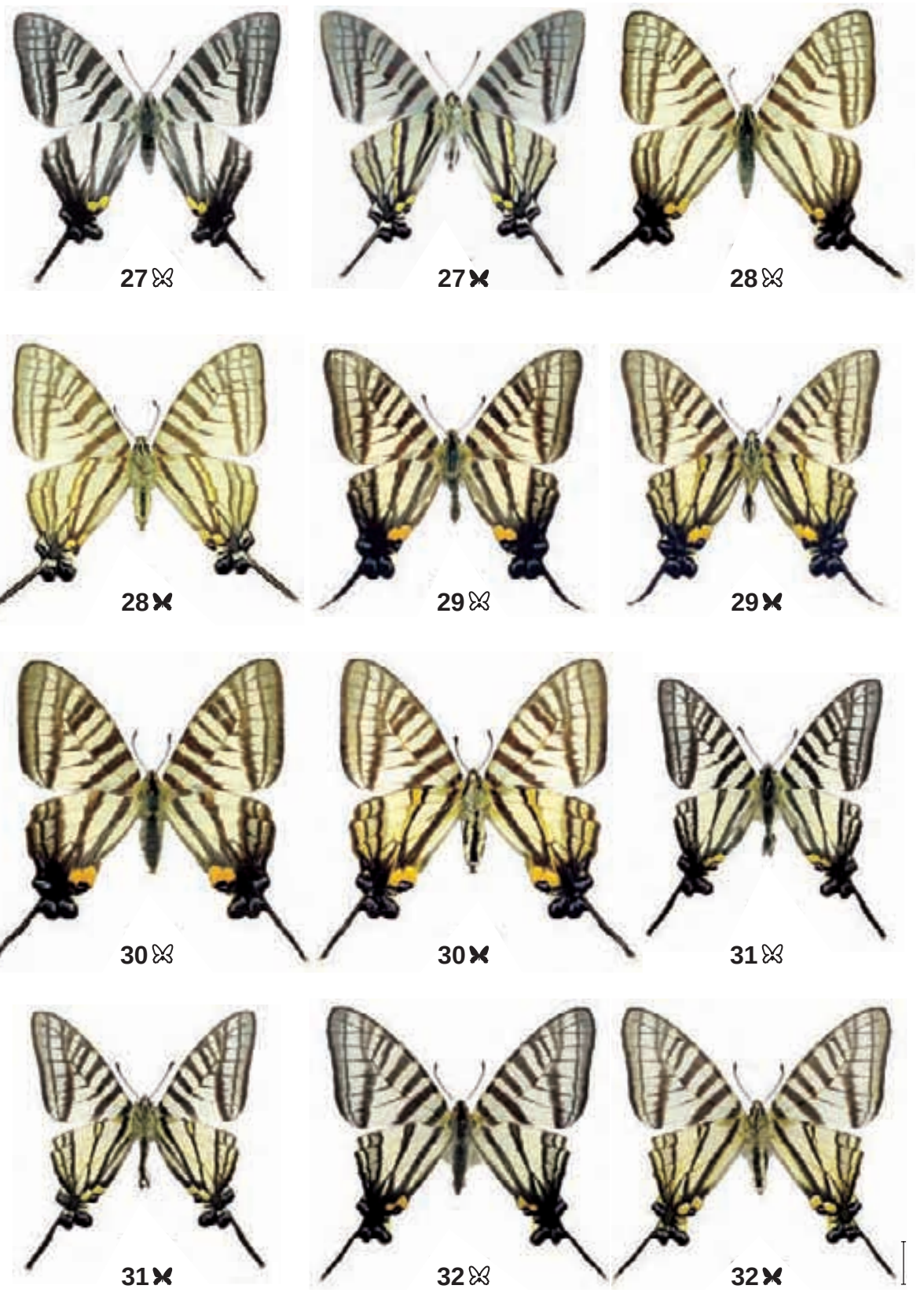
28. *Graphium (Pazala) eurous asakurae* (Matsumura, 1908) 劍鳳蝶
♀. NANTOU Co., Renai, Beidongyanshan, 20. III. 2005 (Y. F. Hsu).

29. *Graphium (Pazala) mullah chungianus* (Murayama, 1961) 黑尾劍鳳蝶
♂. XINBEI CITY [= NEW TAIPEI CITY], Wulai, Fushan, 15. IV. 2011 (J. H. Lin).

30. *Graphium (Pazala) mullah chungianus* (Murayama, 1961) 黑尾劍鳳蝶
♀. XINBEI CITY [= NEW TAIPEI CITY], Wulai, Fushan, 4. V. 2005.

31. *Graphium (Pazala) mullah mullah* (Alphéraky, 1897) 黑尾劍鳳蝶
♂. LIANJIANG Co., Nangan, 14. IV. 2014, reared from *Litsea rotundifolia* [= *Litsea rotundifolia* var. *oblongifolia*], emgd. 2/28. III. 2015, HSU 14D15 (Y. F. Hsu, H. C. Huang & C. L. Huang).

32. *Graphium (Pazala) mullah mullah* (Alphéraky, 1897) 黑尾劍鳳蝶
♀. LIANJIANG Co., Nangan, 14. IV. 2014, reared from *Litsea rotundifolia* [= *Litsea rotundifolia* var. *oblongifolia*], emgd. 2/28. III. 2015, HSU 14D15 (Y. F. Hsu, H. C. Huang & C. L. Huang).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33. *Papilio (Chilasa) agestor matsumurae* Fruhstorfer, 1909 斑鳳蝶
♂. TAIZHONG CITY, Heping, Malunshan, 2. IV. 2015 (W. J. Lin, C. J. Chang, Y. H. Lin & M. F. Chou).

34. *Papilio (Chilasa) agestor matsumurae* Fruhstorfer, 1909 斑鳳蝶
♀. YILAN Co., Dabaishan, 14. IV. 2015 (L. Huang).

35. *Papilio (Chilasa) epycides melanoleucus* Ney, 1911 黃星斑鳳蝶
♂. TAOYUAN CITY, Fuxing, Sileng, 1. IV. 2015 (L. Huang).

36. *Papilio (Chilasa) epycides melanoleucus* Ney, 1911 黃星斑鳳蝶
♀. XINBEI CITY [= NEW TAIPEI CITY], Wulai, Fushan, 18. III. 2015 (C. W. Huang).

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37. *Papilio (Chilasa) clytia* Linnaeus, 1758 (f. *dissimilis*) 大斑鳳蝶（多紋型）
♂. JINMEN Co., Jinhu, Shenshiqiao, 12. V. 2013, reared from *Litsea glutinosa*, emgd. 29/31. V. 2013, HSU 13E24 (C. L. Huang, L. H. Wang & H. C. Huang).

38. *Papilio (Chilasa) clytia* Linnaeus, 1758 (f. *clytia*) 大斑鳳蝶（寡紋型）
♂. JINMEN Co., VIII. 2008 (W. T. Chen).

39. *Papilio (Chilasa) clytia* Linnaeus, 1758 (f. *dissimilis*) 大斑鳳蝶（多紋型）
♀. JINMEN Co., Jinhu, Shenshiqiao, 12. V. 2013, reared from *Litsea glutinosa*, emgd. 29/31. V. 2013, HSU 13E24 (C. L. Huang, L. H. Wang & H. C. Huang).

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40. *Papilio (Pterourus) maraho* Shiraki & Sonan, 1934 臺灣寬尾鳳蝶
♂. YILAN Co., Datong, Tuleng, 2. II. 2009, reared from *S. randaiense,* emgd. 28. II. 2009, HSU 09B02 (L.H. Wang).

41. *Papilio (Pterourus) maraho* Shiraki & Sonan, 1934 臺灣寬尾鳳蝶
♀. YILAN Co., Datong, Cuifenghu 4. VII. 2006, reared from *S. randaiense,* emgd. 3. VIII. 2006, HSU 06G1.1 (L. H. Wang).

42. *Papilio (Princeps) demoleus* Linnaeus, 1758 花鳳蝶
♂. TAIPEI CITY, Wenshan Dist, NTNU Gongguan campus, 24. IV. 2015, reared from *C. grandis*, emgd. 20. V. 2015 (L. Huang).

43. *Papilio (Princeps) demoleus* Linnaeus, 1758 花鳳蝶
♀. XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.], Zhonghe, 21. IX. 2004, reared from *C. grandis*, emgd. 18. X. 2004, HSU 04J36 (L. H. Wang).

44. *Papilio (Papilio) machaon sylvina* Hemming, 1933 黃鳳蝶
♂. TAIZHONG CITY [= TAICHUNG Co.], Heping, Deji, VI. 16. 1990 (H. Y. Lee).


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45. *Papilio (Papilio) machaon sylvina* Hemming, 1933 黃鳳蝶
♀. TAIZHONG CITY [= TAICHUNG Co.], Heping, Lishan, VII. 31. 1988 (E. Teshirogi).

46. *Papilio (Papilio) machaon schantungensis* Eller, 1936 黃鳳蝶
♂. LIANJIANG Co., Nangan, Bajiaoting, V. 21. 2012, reared from *Foeniculum vulgare*, emgd. VI. 7/8. 2012, HSU 12E23 (J. F. Tsai).

47. *Papilio (Papilio) machaon schantungensis* Eller, 1936 黃鳳蝶
♀. LIANJIANG Co., angan, Bajiaoting, V. 21. 2012, reared from *Foeniculum vulgare*, emgd. VI. 7/8. 2012, HSU 12E23 (J. F. Tsai).

48. *Papilio (Sinoprinceps) xuthus* Linnaeus, 1767 柑橘鳳蝶
♂. XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.], Wanli, Daping, 15. V. 2008, reared from *Zanthoxylum ailanthoides*, emgd. 12. VI. 2008, HSU 08E19 (L. H. Wang).

49. *Papilio (Sinoprinceps) xuthus* Linnaeus, 1767 柑橘鳳蝶
♀. XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.], Wanli, Daping, 15. V. 2008, reared from *Zanthoxylum ailanthoides*, emgd. 12. VI. 2008, HSU 08E19 (L. H. Wang).

50. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 玉帶鳳蝶
♂. HUALIAN Co., Nanan, 22. IV. 2015 (J. Y. Liang).

51. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 玉帶鳳蝶
♂.JINMEN Co., Zhongshanlin, 5. XI. 2013, reared from *Clausena excavata*, emgd. 20. XII. 2013, HSU 13L01 (H. C. Huang & C. L. Huang).

52. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 (f. *mandane*) 玉帶鳳蝶（白帶型）
♀. KAOHSIUNG CITY [= KAOHSIUNG Co.], Liugui, 22. I. 2008 (Y. F. Hsu).


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52. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 (f. *mandane*) 玉帶鳳蝶（白帶型）
♀. KAOHSIUNG CITY [= KAOHSIUNG Co.], Liugui, 22. I. 2008 (Y. F. Hsu).

53. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 (f. *polytes*) 玉帶鳳蝶（紅斑型）
♀. JINMEN Co., Zhongshanlin, 5. XI. 2013, reared from *Clausena excavata*, emgd. 20. XII. 2013 (H. C. Huang & C. L. Huang).

54. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 (f. *polytes*) 玉帶鳳蝶（紅斑型）
♀. LIANJIANG Co., Nangan, Jinsha, 9. IV. 2014, reared from *Citrus* sp., HSU 14D09 (H. Y. Lee).

55. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 (f. *polytes*) 玉帶鳳蝶（紅斑型）
♀. LIANJIANG Co., Nagan, Shengtian Park, 17. IV. 2014, reared from *Zanthoxylum schinifiolium*, HSU 14D67.2 (Y. F. Hsu, C. L. Huang & H. C. Huang).

56. *Papilio (Menelaides) polytes ledebouria* Eschscholtz, 1821 玉帶鳳蝶菲律賓亞種
♂. PHILIPPINES: Camigun Is., IV. 19. 2012 (M. L. Chan).

57. *Papilio (Menelaides) polytes ledebouria* Eschscholtz, 1821 玉帶鳳蝶菲律賓亞種
♂. PHILIPPINES: Camigun Is., IV. 19. 2012 (M. L. Chan).

58. *Papilio (Menelaides) polytes ledebouria* Eschscholtz, 1821 玉帶鳳蝶菲律賓亞種
♀. PHILIPPINES: BATANES PROV., Batan Is., Basco, Mt. Iraja, III. 21/23. 2014, reared from *Citrus* sp., emgd. 22. IV. 2014, HSU 14C34 (Y. F. Hsu, C. L. Huang, H. C. Huang).

59. *Papilio (Menelaides) polytes ledebouria* Eschscholtz, 1821 玉帶鳳蝶菲律賓亞種
♀. PHILIPPINES: BATANES PROV., Batan Is., Basco, Mt. Iraja, III. 21/23. 2014, reared from *Citrus* sp., emgd. 22. IV. 2014, HSU 14C34 (Y. F. Hsu, C. L. Huang, H. C. Huang).


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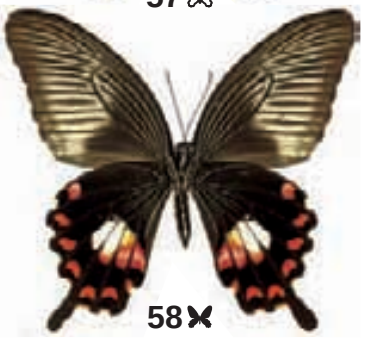
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60. *Papilio (Menelaides) protenor protenor* Cramer, [1775] 黑鳳蝶
♂. XINBEI CITY [= NEW TAIPEI CITY], Xindian, Ergeshan, 14. IV. 2015 (W. J. Lin & C. J. Chang).

61. *Papilio (Menelaides) protenor protenor* Cramer, [1775] 黑鳳蝶
♀. LIANJIANG Co., Beigan, Qinbi, 8. IV. 2014 (H. Y. Lee).

62. *Papilio (Menelaides) helenus fortunius* Fruhstorfer, 1908 白紋鳳蝶
♂. XINZHU Co., Jianshi, Zhenxibao, 15. V. 2015 (L. H. Wang).

63. *Papilio (Menelaides) helenus fortunius* Fruhstorfer, 1908 白紋鳳蝶
♀. XINZHU Co., Jianshi, Zhenxibao, 1600m, 4. V. 2011 (L. H. Wang).

64. *Papilio (Menelaides) helenus helenus* Fruhstorfer, 1758 白紋鳳蝶
♂. JINMEN Co., Zhongshanlin, 17. IV. 2014 (Y. F. Hsu, C. L. Huang & H. C. Huang).


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65. *Papilio (Menelaides) nephelus chaonulus* Fruhstorfer, 1902 大白紋鳳蝶
♂. TAOYUAN CITY [= TAOYUAN Co.], Fuxing, Xuanyuan, 29. VIII. 2008, emgd. 8/17. X. 2008, HSU 08H31 (L. H. Wang).

66. *Papilio (Menelaides) nephelus chaonulus* Fruhstorfer, 1902 大白紋鳳蝶
♀. TAOYUAN CITY [= TAOYUAN Co.], Fuxing, Xuanyuan, 29. VIII. 2008, emgd. 8/17. X. 2008, HSU 08H31 (L. H. Wang).

67. *Papilio (Menelaides) castor formosanus* Rothschild, 1896 無尾白紋鳳蝶
♂. TAOYUAN CITY, Fuxing, Gaoyi, 26. V. 2015 (L. Huang).

68. *Papilio (Menelaides) castor formosanus* Rothschild, 1896 無尾白紋鳳蝶
♀. TAIPEI CITY, Neihu, Jinmianshan, 12. IV. 2015 (Y. M. Hsu).

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69. *Papilio (Menelaides) thaiwanus* Rothschild, 1898 臺灣鳳蝶
♂. TAOYUAN CITY, Fuxing, Gaoyi, 26. V. 2015 (L. Huang).

70. *Papilio (Menelaides) thaiwanus* Rothschild, 1898 臺灣鳳蝶
♀. NANTOU Co., Renai, Bilu, 20. XI. 2007, emgd. 3. I. 2008 (L. H. Wang).

71. *Papilio (Menelaides) memnon heronus* Fruhstorfer, 1902 大鳳蝶
♂. TAIDONG Co., Lanyu, Langdao, 29. III. 2014, HSU 14C51 (L. H. Wang, H. Y. Lee& Y. M. Hsu).

72. *Papilio (Menelaides) memnon heronus* Fruhstorfer, 1902 (f. *achates*) 大鳳蝶（無尾型）
♀. MIAOLI Co., Touwu, Puguang Tample, ca 300 m, II. 24. 2008, reared from *Citrus reticulata*, emgd. III. 23. 2008, HSU 08B14 (Y. F. Hsu).


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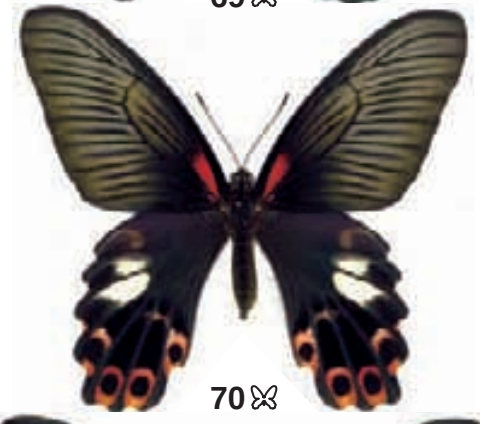
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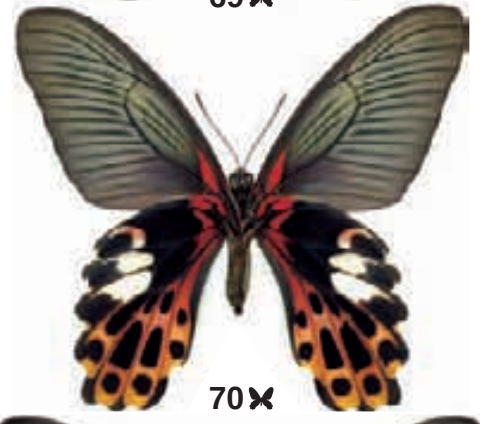
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73. *Papilio (Menelaides) memnon heronus* Fruhstorfer, 1902 (f. *agenor*) 大鳳蝶（有尾型）
♀. XINBEI CITY [= NEW TAIPEI CITY/ TAIPEI Co.], Neihu, Bishanyan, V. 2. 2015 (W. J. Lin).

74. *Papilio (Menelaides) memnon agenor* Linnaeus, 1768 大鳳蝶
♂. LIANJIANG Co., Nangan, Jinsha, 23. V. 2014, HSU 14E60.1 (C. L. Huang & H. Y. Lee).

75. *Papilio (Menelaides) memnon agenor* Linnaeus, 1768 (f. *achates*) 大鳳蝶（無尾型）
♀. JINMEN Co., Jinhu, Haiyinsi, 13. V. 2013, emgd. 16. VI. 2013, HSU 13E27 (L. H. Wang, C. L. Huang & H. C. Huang).

76. *Papilio (Menelaides) memnon agenor* Linnaeus, 1768 (f. *agenor*) 大鳳蝶（有尾型）
♀. LIANJIANG Co., Nangan, Jinsha, 23. V. 2014, HSU 14E60.1 (C. L. Huang & H. Y. Lee).


73♂


73♀


74♂


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76♂


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77. *Papilio (Menelaides) rumanzovia* Eschscholtz, 1821 紅斑大鳳蝶
♂. PHILIPPINES: BATANES PROV., Batan Is., Ivana, San Bioente, Mt. Matarem, IV. 16. 2013, reared from undetermined Rutaceae, emgd. 30. V. 2013, HSU 14D25 (Y. F. Hsu).

78. *Papilio (Menelaides) rumanzovia* Eschscholtz, 1821 紅斑大鳳蝶
♀. PHILIPPINES: BATANES PROV., Batan Is., Ivana, San Bioente, Mt. Matarem, IV. 17. 2013 (Y. F. Hsu).

79. *Papilio (Achillides) bianor thrasymedes* Fruhstorfer, 1909 翠鳳蝶
♂. TAIPEI CITY, Nangang, Academia Sinica, 20. X. 2014 (L. Huang).

80. *Papilio (Achillides) bianor thrasymedes* Fruhstorfer, 1909 翠鳳蝶
♀. XINBEI CITY [= NEW TAIPEI CITY], Xindain, Ergeshan, 14. IV. 2015 (W. J. Lin & C. J. Chang).


77♂


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78♂


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80♂


80♀

81. *Papilio (Achillides) bianor bianor* Cramer, 1777 翠鳳蝶
♂. JINMEN Co., Jincheng, Shuitou, 14.V. 2013, reared from *Zanthoxylum simulans,* emgd. 17/19. VI. 2013, HSU 13E36 (C. L. Huang, L. H.Wang & H. C. Huang).

82. *Papilio (Achillides) bianor kotoensis* Sonan, 1927 翠鳳蝶蘭嶼亞種
♂. TAIDONG Co., Lanyu, Entrance of Tianchi, 20. X. 2012, reared from *Toddalia asiatica*, emgd. 8/20. V. 2013, HSU 12K16 (L. H. Wang).

83. *Papilio (Achillides) bianor kotoensis* Sonan, 1927 翠鳳蝶蘭嶼亞種
♀. TAIDONG Co., Lanyu, 19. IV. 2006, reared from *Toddalia asiatica,* emgd. 12. XI. 2006, HSU 06D61 (L. H. Wang).

84. *Papilio (Achillides) dialis tatsuta* Murayama, 1970 穹翠鳳蝶
♂. TAOYUAN CITY [= TAOYUAN Co.], Fuxing, Xuanyuan, 10. VII. 2005, reared from *Zanthoxylum ailanthoides*, emgd. 14. VIII. 2005, HSU 05G07 (L. H. Wang).

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85. *Papilio (Achillides) dialis tatsuta* Murayama, 1970 穹翠鳳蝶
♀. NANTOU Co., Renai, Huisun Forest Recreation Area, 22. III. 2013, emgd. 5. V. 2013 (W. J. Lin, J. R. Chen & C. Y. Wan).

86. *Papilio (Achillides) hopponis* Matsumura, 1907 雙環翠鳳蝶
♂. XINZHU Co., Jianshi, Zhenxibao, 13. IV. 2011 (L. H. Wang).

87. *Papilio (Achillides) hopponis* Matsumura, 1907 雙環翠鳳蝶
♀. XINZHU Co., Jianshi, Zhenxibao, 4. IV. 2010, reared from *Toddalia asiatica*, 23. V. 2010, HSU 10D03 (L. H. Wang).

88. *Papilio (Achillides) hermosanus* Rebel, 1906 臺灣琉璃翠鳳蝶
♂. NANTOU Co., Renai, Huisun Forest Recreation Area, 2. VIII. 2007, reared from *Toddalia asiatica*, emgd. 17/20. IX. 2007, HSU 07H5 (L. H. Wang).

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89. *Papilio (Achillides) hermosanus* Rebel, 1906 臺灣琉璃翠鳳蝶
♀. TAOYUAN CITY [= TAOYUAN Co.], Fuxing, Xuanyuan, 7. VIII, 2007, reared from *Toddalia asiatica*, emgd. 15. IX. 2007, HSU 07H30 (L. H. Wang).

90. *Papilio (Achillides) paris nakaharai* Shirôzu, 1960 琉璃翠鳳蝶
♂. TAIPEI CITY, Nangang, Academia Sinica, 25. II. 2015, reared from *Melicope semecarpifolia*, emgd. 10. IV. 2015 (W. J. Lin & C. W. Huang).

91. *Papilio (Achillides) paris nakaharai* Shirôzu, 1960 琉璃翠鳳蝶
♀. TAIPEI CITY, Nangang, Academia Sinica, 25. II. 2015, reared from *Melicope semecarpifolia*, emgd. 10. IV. 2015 (W. J. Lin & C. W. Huang).

92. *Luehdorfia japonica formosana* Rothschild, 1918 日本虎鳳蝶
♂. " 台東廳 璞石角 [=TAIDONG Co., Pushige]/Type Matsumura (Red label) [error]/ *Leudorfia jap*. *formosana* n. det. Matsumura" (SEHU).

89♂

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MALE GENITALIA

Note. Scale bars represent 1 mm.

93. *Troides aeacus kaguya* Nakahara & Esaki, 1930 黃裳鳳蝶

♂. HUALIAN Co., Yuli, Yuancheng, 23. VII. 2012 (genitalia preparation JYL102).

94. *Troides magellanus sonani* Matsumura, 1932 珠光裳鳳蝶

♂. TAIDONG Co., Lanyu , 27. V. 2013 (genitalia preparation JYL099).

95. *Pachliopta aristolochiae interposita* (Fruhstorfer, 1904) 紅珠鳳蝶

♂. TAIPEI CITY, Wenshan, Gongguan campus, NTNU, 1. XII. 2014 (L. Huang) (genitalia preparation JYL095).

96. *Byasa confusus mansonensis* (Fruhstorfer, 1901) 麝鳳蝶

♂. JINMEN Co., Kinmen Botanical Garden, 7. VI. 2014 (C. L. Huang & H. C. Huang) (genitalia preparation JYL142).

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97. *Byasa impediens febanus* (Fruhstorfer, 1908) 長尾麝鳳蝶

♂. NANTOU Co., Lugu, Fonghuanggu Bird Park, 15. VI. 2015 (Y. C. Lin) (genitalia preparation JYL074).

98. *Byasa polyeuctes termessus* (Fruhstorfer, 1908) 多姿麝鳳蝶

♂. NANTOU Co., Renai, Tunyuan, 26. X. 2015 (L. H. Wang) (genitalia preparation JYL135).

99. *Atrophaneura horishana* (Matsumura, 1910) 曙鳳蝶

♂. NANTOU Co., Renai, Tunyuan, 22. IX. 2015 (genitalia preparation JYL133).

100. *Graphium (Graphium) sarpedon connectens* (Fruhstorfer, 1906) 青鳳蝶

♂. MIAOLI Co., Sanyi, 7. VI. 2015 (L. Huang) (genitalia preparation JYL075).

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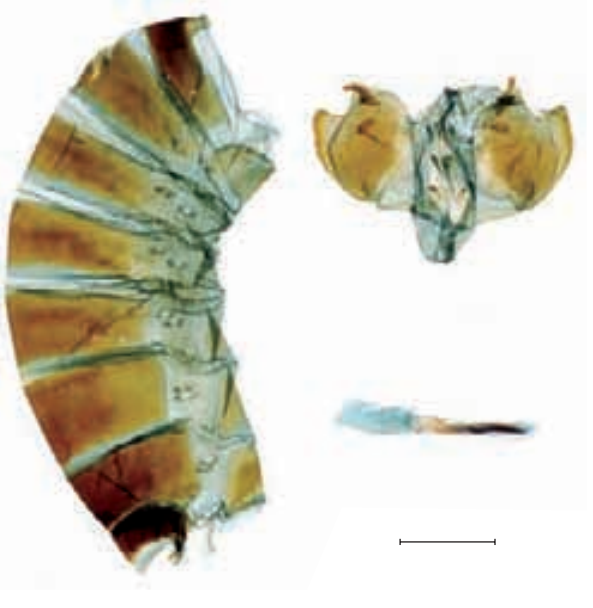

100

101. *Graphium (Graphium) sarpedon sarpedon* (Linnaeus, 1758) 青鳳蝶
♂. JINMEN Co., Jhongshanlin, 7. VI. 2014 (C. L. Huang& H. C. Huang) (genitalia preparation JYL113).

102. *Graphium (Graphium) cloanthus kuge* (Fruhstorfer, 1908) 寬帶青鳳蝶
♂. XINBEI CITY [= NEW TAIPEI CITY], Wulai, Fushan, 18. III. 2015 (genitalia preparation JYL107).

103. *Graphium (Graphium) doson postianus* (Fruhstorfer, 1902) 木蘭青鳳蝶
♂. TAIPEI CITY, Yangmingshan, 12. X. 2015 (C. J. Peng) (genitalia preparation JYL056).

104. *Graphium (Graphium) agamemnon* (Linnaeus, 1758) 翠斑青鳳蝶
♂. JIAYI CITY, Chiayi Botanical Garden, 8. V. 2015 (C. J. Peng) (genitalia preparation JYL092).

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105. *Graphium (Pazala) eurous asakurae* (Matsumura, 1908) 劍鳳蝶
♂. TAOYUAN CITY, Fuxing, Zhongbaling, 2. IV. 2015 (C. W. Huang & T. Y. Liu) (genitalia preparation JYL051).

106. *Graphium (Pazala) mullah chungianus* (Murayama, 1961) 黑尾劍鳳蝶
♂. TAOYUAN CITY, Fuxing, Sileng, 2. IV. 2015 (C. W. Huang) (genitalia preparation JYL057).

107. *Graphium (Pazala) mullah mullah* (Alphéraky, 1897) 黑尾劍鳳蝶
♂. LIANJIANG Co., Nangan, Shengtian Park, 17. IV. 2014, emgd. 5. III. 2015, HSU 14D66 (Y. F. Hsu, H. C. Huang & C. L. Huang) (genitalia preparation JYL136).

108. *Papilio (Chilasa) agestor matsumurae* Fruhstorfer, 1909 斑鳳蝶
♂. YILAN Co., Dabaishan, 14. IV. 2015 (L. Huang) (genitalia preparation JYL058).

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109. *Papilio (Chilasa) epycides melanoleucus* Ney, 1911 黃星斑鳳蝶
♂. TAOYUAN CITY, Fuxing, Sileng, 1. IV. 2015 (L. Huang) (genitalia preparation JYL060).

110. *Papilio (Chilasa) clytia* Linnaeus, 1758 大斑鳳蝶
♂. JINMEN Co., Shishan, 6. VI. 2014, reared from *L. glutinosa*, emgd. 1/2. VII. 2014, HSU 14F25 (C. L. Huang & H. C. Huang) (genitalia preparation JYL115).

111. *Papilio (Pterourus) maraho* Shiraki & Sonan, 1934 臺灣寬尾鳳蝶
♂. YILAN Co., Datong, Mingchi, 23. VII. 2008 (L. H. Wang) (genitalia preparation JYL084).

112. *Papilio (Papilio) machaon sylvina* Hemming, 1933 黃鳳蝶
♂. TAIZHONG CITY [= TAICHUNG Co.], Heping, Deji, VI. 16. 1990 (H. Y. Lee) (genitalia preparation JYL150).

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113. *Papilio (Papilio) machaon schantungensis* Eller, 1936 黃鳳蝶

♂. LIANJIANG Co., Nangan, Bajiaoting, V. 21. 2012, reared from *Foeniculum vulgare*, emgd. VI. 7/8. 2012, HSU 12E23 (J. F. Tsai) (genitalia preparation JYL151).

114. *Papilio (Sinoprinceps) xuthus* Linnaeus, 1767 柑橘鳳蝶

♂. LIANJIANG Co., Beigan, 7. IV. 2014, reared from *Citrus grandi*s, 10. X. 2014 (C. W. Huang & H. Y. Lee) (genitalia preparation JYL118).

115. *Papilio (Princeps) demoleus* Linnaeus, 1758 花鳳蝶

♂. TAIPEI CITY, Beitou, Shipai, 7. VI. 2015, reared from *C. sinensis*, emgd. 24. VI. 2015 (L. Huang) (genitalia preparation JYL078).

116. *Papilio (Menelaides) thaiwanus* Rothschild, 1898 臺灣鳳蝶

♂. TAOYUAN CITY, Fuxing, Gaoyi, 26. V. 2015 (L. Huang) (genitalia preparation JYL090).

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117. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 玉帶鳳蝶
♂. HUALIAN Co., Nanan, 22. IV. 2015 (J. Y. Liang) (genitalia preparation JYL076).

118. *Papilio (Menelaides) polytes ledebouria* Eschscholtz, 1821 玉帶鳳蝶菲律賓亞種
♂. PHILIPPINES: Camigun Is., IV. 19. 2012 (M. L. Chan) (genitalia preparation JYL122).

119. *Papilio (Menelaides) protenor protenor* Cramer, [1775] 黑鳳蝶
♂. TAIPEI CITY, Nangang, Academia Sinica, 15. IV. 2015 (L. Huang) (genitalia preparation JYL064).

120. *Papilio (Menelaides) helenus fortunius* Fruhstorfer, 1908 白紋鳳蝶
♂. XINZHU Co., Jianshi, Zhenxibao, 15. V. 2015 (L. H. Wang) (genitalia preparation JYL066).

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121. *Papilio (Menelaides) nephelus chaonulus* Fruhstorfer, 1902 大白紋鳳蝶
♂. TAOYUAN CITY, Fuxing, Xuanyuan, 19. VI. 2015 (W. J. Lin) (genitalia preparation JYL080).

122. *Papilio (Menelaides) castor formosanus* Rothschild, 1896 無尾白紋鳳蝶
♂. TAOYUAN CITY, Fuxing, Gaoyi, 9. V. 2015 (L. Huang) (genitalia preparation JYL067).

123. *Papilio (Menelaides) memnon heronus* Fruhstorfer, 1902 大鳳蝶
♂. TAIPEI CITY, Nangang, Academia Sinica, 15. IV. 2015 (L. Huang) (genitalia preparation JYL063).

124. *Papilio (Menelaides) rumanzovia* Eschscholtz, 1821 紅斑大鳳蝶
♂. PHILIPPINES: BATANES Prov., Mahato,12. V. 2015 (C. L. Huang) (genitalia preparation JYL121).

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125. *Papilio (Achillides) bianor thrasymedes* Fruhstorfer, 1909 翠鳳蝶
♂. TAIPEI CITY, Nangang, Academia Sinica, 15. IV. 2015 (L. Huang) (genitalia preparation JYL070).

126. *Papilio (Achillides) bianor bianor* Cramer, 1777 翠鳳蝶
♂. LIANJIANG Co., Beigan, Qiaozai, 13. X. 2014 (C. W. Huang& H. Y. Lee) (genitalia preparation JYL110).

127. *Papilio (Achillides) bianor kotoensis* Sonan, 1927 翠鳳蝶蘭嶼亞種
♂. TAIDONG Co., Lanyu,, 4. IV. 2015 (C. L. Huang) (genitalia preparation JYL071).

128. *Papilio (Achillides) dialis tatsuta* Murayama, 1970 穹翠鳳蝶
♂. XINBEI CITY [= NEW TAIPEI CITY], Wanli, Daping, 21. V. 2012 (L. H. Wang) (genitalia preparation JYL089).

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129. *Papilio (Achillides) hopponis* Matsumura, 1907 雙環翠鳳蝶
♂. TAOYUAN CITY, Northern Cross-Island Highway, 3. IX. 2015 (L. H. Wang) (genitalia preparation JYL131).

130. *Papilio (Achillides) hermosanus* Rebel, 1906 臺灣琉璃翠鳳蝶
♂. HUALIAN Co., Yuli, Yuancheng, 2. XII. 2014 (J. Y. Liang) (genitalia preparation JYL082).

131. *Papilio (Achillides) paris nakaharai* Shirôzu, 1960 琉璃翠鳳蝶
♂. TAIPEI CITY, Nangang, Academia Sinica, 15. IV. 2015 (L. Huang) (genitalia preparation JYL073).

132. *Papilio (Achillides) paris paris* Linnaeus, 1758 琉璃翠鳳蝶
♂. JINMEN Co., Shishan, 4. XI. 2013 (C. L. Huang& H. C. Huang) (genitalia preparation JYL 101).

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FEMALE GENITALIA

Note. Scale bars represent 1 mm.

133. *Troides aeacus kaguya* Nakahara & Esaki, 1930 黃裳鳳蝶

♀. HUALIAN Co., Fuyuan Forest Recreation Area, 24. VII. 2015 (genitalia preparation JYL132).

134. *Troides magellanus sonani* Matsumura, 1932 珠光裳鳳蝶

♀. TAIDONG Co., Lanyu, Sidaogou, 18. IV. 2006 (genitalia preparation JYL096).

135. *Pachliopta aristolochiae interposita* (Fruhstorfer, 1904) 紅珠鳳蝶

♀. TAIPEI CITY, Wenshan, Gongguan campus, NTNU, 2. VI. 2015 (L. Huang) (genitalia preparation JYL081).

136. *Byasa confusus mansonensis* (Fruhstorfer, 1901) 麝鳳蝶

♀. JINMEN Co., Kinmen Botanical Garden, 14.VI. 2015 (L. Huang) (genitalia preparation JYL128).

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137. *Byasa impediens febanus* (Fruhstorfer, 1908) 長尾麝鳳蝶
♀. TAOYUAN CITY, Fuxing, Xuanyuan, Northern Cross-Island Highway 53K, 30. V. 2015 (W. J. Lin, C. J. Chang & C. W. Huang) (genitalia preparation JYL098).

138. *Byasa polyeuctes termessus* (Fruhstorfer, 1908) 多姿麝鳳蝶
♀. HUALIAN Co., Fuyuan Forest Recreation Area, 17. X. 2015 (L. H. Wang & J. Y. Liang) (genitalia preparation JYL134).

139. *Atrophaneura horishana* (Matsumura, 1910) 曙鳳蝶
♀. NANTOU Co., Renai, Biluxi, collecting date unknown (genitalia preparation JYL86).

140. *Graphium (Graphium) sarpedon connectens* (Fruhstorfer, 1906) 青鳳蝶
♀. TAIPEI CITY, Nangang, Academia Sinica, 15. IV. 2015 (L. Huang) (genitalia preparation JYL053).

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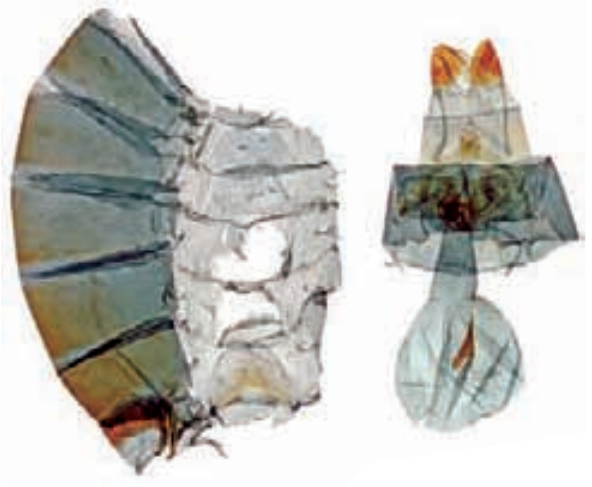
141. *Graphium (Graphium) sarpedon sarpedon* (Linnaeus, 1758) 青鳳蝶
♀. LIANJIANG Co., Nangan, Shengtian park, 27. VI. 2013 (C. L. Huang& H. Y. Lee) (genitalia preparation JYL114).

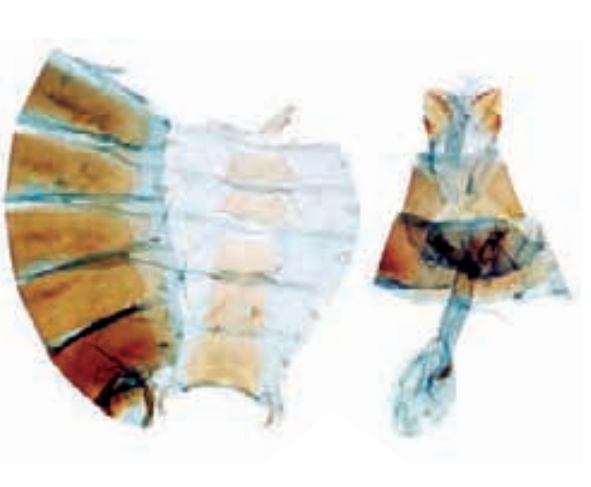
142. *Graphium (Graphium) cloanthus kuge* (Fruhstorfer, 1908) 寬帶青鳳蝶
♀. PINGDONG Co., Wutai, Ali, 4. IV. 2011 (genitalia preparation JYL140).

143. *Graphium (Graphium) doson postianus* (Fruhstorfer, 1902) 木蘭青鳳蝶
♀. TAIPEI CITY, Beitou, Junjianyan, 18. IV. 2015, emgd. 5. V. 2015 (L. Huang) (genitalia preparation JYL055).

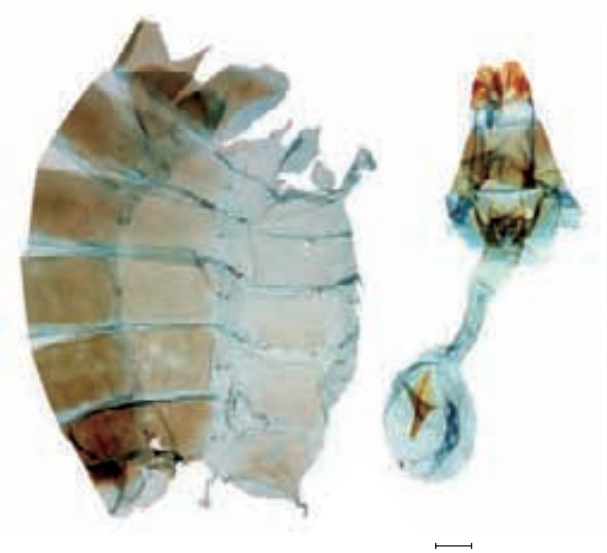
144. *Graphium (Graphium) agamemnon* (Linnaeus, 1758) 翠斑青鳳蝶
♀. JIAYI CITY, Chiayi Botanical Garden, 8. V. 2015 (C. J. Peng) (genitalia preparation JYL093).



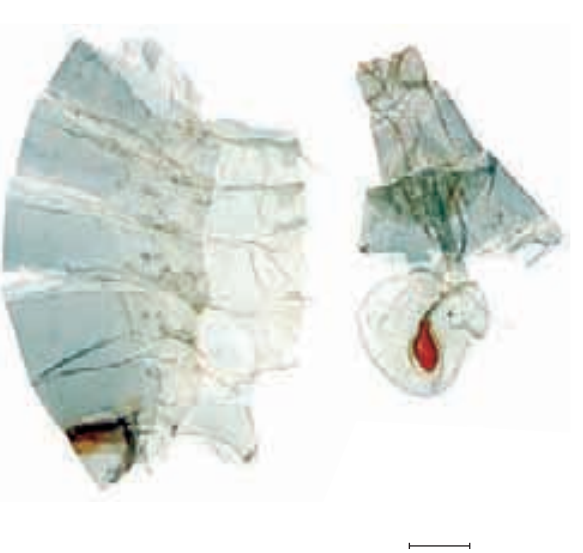
141



142



143



144

145. *Graphium (Pazala) eurous asakurae* (Matsumura, 1908) 劍鳳蝶
♀. XINZHU Co., Jianshi, Lidongshen, IV. 29. 2005 (genitalia preparation JYL138).

146. *Graphium (Pazala) mullah mullah* (Alphéraky, 1897) 黑尾劍鳳蝶
♀. LIANJIANG Co., Nangan, Shengtian Park, 17. IV. 2014, emgd. 5. III. 2015, HSU 14D66 (Y. F. Hsu, H. C. Huang & C. L. Huang) (genitalia preparation JYL120).

147. *Papilio (Chilasa) agestor matsumurae* Fruhstorfer, 1909 斑鳳蝶
♀. YILAN Co., Dabaishan, 14. IV. 2015 (L. Huang) (genitalia preparation JYL059).

148. *Papilio (Chilasa) epycides melanoleucus* Ney, 1911 黃星斑鳳蝶
♀. YILAN Co., Dabaishan, 14. IV. 2015 (L. Huang) (genitalia preparation JYL061).

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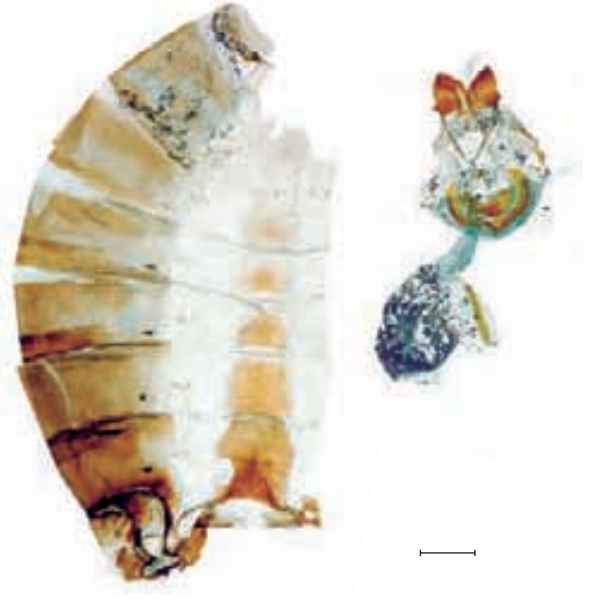

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149. *Papilio (Chilasa) clytia* Linnaeus, 1758 大斑鳳蝶

♀. JINMEN Co., Shishan, 6. VI. 2014, reared from *L. glutinosa*, emgd. 1/2. VII. 2014, HSU 14F25 (C. L. Huang & H. C. Huang) (genitalia preparation JYL116).

150. *Papilio (Pterourus) maraho* Shiraki & Sonan, 1934 臺灣寬尾鳳蝶

♀. YILAN Co., Datong, Taipingshan, 14. VII. 2005, reared from *S. randaiense*, emgd. 24. VIII. 2005, HSU 05G14.E (L. H. Wang) (genitalia preparation JYL085).

151. *Papilio (Sinoprinceps) xuthus* Linnaeus, 1767 柑橘鳳蝶

♀. XINBEI CITY [= NEW TAIPEI CITY], Ruifang, Nanya, 17. V. 2015 (Y. C. Lin) (genitalia preparation JYL062).

152. *Papilio (Princeps) demoleus* Linnaeus, 1758 花鳳蝶

♀. TAIPEI CITY, Beitou, Shipai, 11. V. 2015, reared from *C. sinensis*, emgd. 27. V. 2015 (L. Huang) (genitalia preparation JYL104).

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153. *Papilio (Menelaides) thaiwanus* Rothschild, 1898 臺灣鳳蝶
♀. TAOYUAN CITY, Fuxing, Xuanyuan, 14. VII. 2015 (L. Huang) (genitalia preparation JYL125).

154. *Papilio (Menelaides) polytes polytes* Linnaeus, 1758 玉帶鳳蝶
♀. HUALIAN Co., Nanan, 22. IV. 2015 (J. Y. Liang) (genitalia preparation JYL077).

155. *Papilio (Menelaides) polytes ledebouria* Eschscholtz, 1821 玉帶鳳蝶菲律賓亞種
♀. PHILIPPINES: Camigun Is., IV. 19. 2012 (M. L. Chan) (genitalia preparation JYL144).

156. *Papilio (Menelaides) protenor protenor* Cramer, [1775] 黑鳳蝶
♀. TAIPEI CITY, Wenshan Dist., NTNU Gongguan campus, 11. III. 2015, reared from *Citrus grandis*, emgd. 2. IV. 2015 (L. Huang) (genitalia preparation JYL065).

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157. *Papilio (Menelaides) helenus fortunius* Fruhstorfer, 1908 白紋鳳蝶
♀. TAOYUAN CITY, Fuxing, Xuanyuan, 14. VII. 2015 (L. Huang) (genitalia preparation JYL126).

158. *Papilio (Menelaides) nephelus chaonulus* Fruhstorfer, 1902 大白紋鳳蝶
♀. TAOYUAN CITY, Fuxing, Xuanyuan, 14. VII. 2015 (L. Huang) (genitalia preparation JYL123).

159. *Papilio (Menelaides) castor formosanus* Rothschild, 1896 無尾白紋鳳蝶
♀. TAOYUAN CITY, Fuxing, Sileng, 1.IV. 2015 (L. Huang) (genitalia preparation JYL068).

160. *Papilio (Menelaides) memnon heronus* Fruhstorfer, 1902 大鳳蝶
♀. TAIPEI CITY, Wenshan Dist., NTNU Gongguan campus, 13. VI. 2015 (L. Huang) (genitalia preparation JYL079).

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161. *Papilio (Menelaides) rumanzovia* Eschscholtz, 1821 紅斑大鳳蝶
♀. PHILIPPINES: BATANES Prov., Basco, Mt. Iraja, 17. IV. 2013 (genitalia preparation JYL143).

162. *Papilio (Achillides) bianor thrasymedes* Fruhstorfer, 1909 翠鳳蝶
♀. TAOYUAN CITY, Fuxing, Daman, 9. V. 2015 (L. Huang) (genitalia preparation JYL069).

163. *Papilio (Achillides) bianor bianor* Cramer, 1777 翠鳳蝶
♀. LIANJIANG Co., Beigan, Nigushan, 19. VII. 2013 (genitalia preparation JYL111)

164. *Papilio (Achillides) bianor kotoensis* Sonan, 1927 翠鳳蝶蘭嶼亞種
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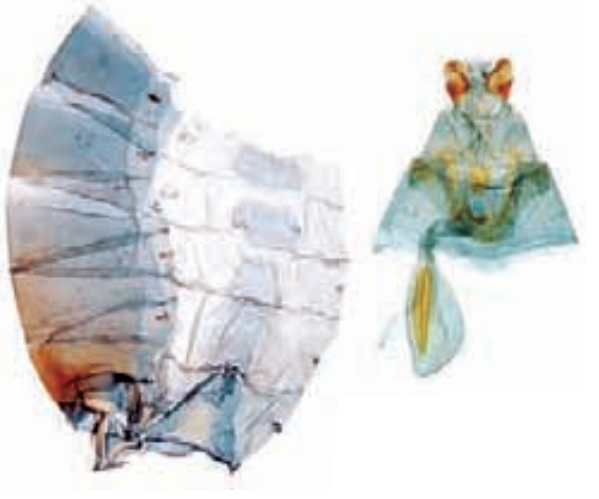

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