The genus *Macroglossum* Scopoli 1777 (Lepidoptera: Sphingidae, Macroglossinae) in Hong Kong

Roger C. Kendrick

C&R Wildlife, 129 San Tsuen Lam Tsuen, Tai Po, New Territories, Hong Kong
email: hkmoths@gmail.com

Abstract

A review of the status of species from the genus *Macroglossum* in Hong Kong is given, along with a key to adults to aid identification of similar species in the field. Currently there are 18 species recorded from Hong Kong, though several of these have occurred only once. The ecology of the species is given, where known. Many species are diurnal or crepuscular and attracted to nectar-rich flowers, especially *Duranta erecta* L. (Verbenaceae). Larval hosts in Hong Kong are primarily from Rubiaceae. A further two species are candidates to be found in Hong Kong, based upon their known regional distribution.

Key words: Lepidoptera, Sphingidae, *Macroglossum*, checklist, Hong Kong, field identification key.

Introduction

The humming-bird hawkmoths of the genus *Macroglossum* Scopoli 1777 are well represented in Hong Kong. Being both diurnal and nocturnal, they are one of the more conspicuous elements of the Hong Kong moth fauna, especially due to their habit of nectaring from flowers whilst still in flight, hovering close in front of a flower for a few moments to probe with their long haustellum (i.e. proboscis, or tongue), from which the genus name (from the Latin prefix “macro” = big, large; and the Greek “glossa” = tongue) is derived.

The genus is one of the best documented groups of moths in Hong Kong, but the main literature (Tennent 1992, Li 1992, Li 1998, Kendrick, 2002 [2003]) is not readily available to aid identification of species within the genus, and there have been additions to the list since these publications. This paper thus aims to update the Hong Kong list, provide the current taxonomic status for each species and summarize the known local ecology of each species; and gives a field identification key to all but the rarest *Macroglossum* species found in Hong Kong.

Methods

Records of *Macroglossum* species found in Hong Kong are based upon published information. Primary works are Tennent (1992); Li (1992); Waring et al. (1994); Kendrick (2002 [2003]); as well as Kendrick (1998); Li (1998); Kendrick & Barretto (2008); and field surveys (light trapping and nectaring) undertaken by the author and material submitted for identification to the author, either as voucher specimens or as identifiable photographs.

Collections checked for records are as follows: The Natural History Museum, London, England (material collected by W.J. Tennent & A.C.Galsworthy), Kadoorie Farm & Botanic Garden (KFBG), Tai Po (material collected by the author, J.J.Young, A.C.Galsworthy and K.H.K.Li), Hong Kong University of Science & Technology (Li’s material for Li, 1992), the private collection of A.J.Palmer (Bournemouth, England) and the private collection of M.J.Sterling (St. Albans, England). Ecological data on larval hosts are based on published information for Hong Kong, plus unpublished data held in the notebooks of the late Kent Li. Habitat data is summarised from collecting data for specimens, as recorded either in the published literature, or from the specimen collection labels.

Further records have been submitted electronically to the author from A. Hardacre (Sai Kung) and from members of HKWildlife.net (2007 – March 2010) (http://www.hkwildlife.net), Hong Kong Moths Yahoo! group (January 2005 – March 2010) (http://tech.groups.yahoo.com/group/Hkmoths/), and Hong Kong Moths Flickr group (August 2007 – March 2010) (http://www.flickr.com/groups/hongkongmoths/). Photographs depicting *Macroglossum* specimens not identifiable to species with total certainty have not been included in this work.

Global distributions of species are based upon Pittaway & Kitching (2000-2010) and Kiching *et al*. (2010). Species distributions in China (given to province only, province names abbreviated as per Table 1), are based on Chu & Wang (1997) except for the *insipida* / *neotroglodytus* / *peocilum* and *heliophila* / *pyrrhosticta* / *variegatum* complexes (where misidentifications are an issue), on Wang (1995) for Taiwan and Easton & Pun (1996) for Macau. Geographic entities are used in preference to administrative and political boundaries where possible, following Kendrick (2002 [2003]), especially in Malaysia and Indonesia, where Malaya refers to the Malay peninsula (West

Malaysia), the Greater Sundas and the Lesser Sundas refer to the islands on the Sunda shelf that comprise Indonesia (other than New Guinea), Brunei and east Malaysia. Distribution in Hong Kong is given as either: widespread (recorded from at least 11 sites throughout the Special Administrative Region), local (recorded from four to ten sites, usually localised to one or a few districts), or restricted (recorded from up to three sites).

Table 1. Abbreviations of Chinese provinces and metropolitan areas for species distributions

AH	Anhui	HN	Hainan	SaX	Shaanxi
BJ	Beijing	HuB	Hubei	SC	Sichuan
FJ	Fujian	HuN	Hunan	SD	Shandong
GD	Guangdong	IM	Inner Mongolia	SH	Shanghai
GS	Gansu	JN	Jilin	SX	Shanxi
GX	Guangxi	JS	Jiangsu	TJ	Tianjin
GZ	Guizhou	JX	Jiangxi	TW	Taiwan
HeB	Hebei	LN	Liaoning	XJ	Xinjiang
HeN	Henan	MC	Macau	XZ	Xizang
HLJ	Heilongjiang	NX	Ningxia	YN	Yunnan
HK	Hong Kong	QH	Qinghai	ZJ	Zhejiang

Species are presumed to be resident in Hong Kong, unless stated. The status is determined by the number of observations of each species: rare – 1 to 3 records; scarce – 4 to 10 records; uncommon – 11 to 30 records; frequent – 31 to 100 records; common – over 100 records.

Results

The 18 species of *Macroglossum* recorded in Hong Kong are listed in Table 2, together with a summary of the status of each species, which month(s) records were made and what method(s) of observation was successful in finding each species.

In the following key, please note (a) all features referred to are on the dorsal surface of the moth unless specified; f/w = forewing; h/w = hindwing. Note that features can fade or wear off in older individuals and may not always be so easily seen; (b) the *M. variegatum* / *M. pyrrhosticta* pair and the *M. neotroglodytus* / *M. insipida* / *M. poecilum* group are rather variable in patterning and this key is based on the most common forms of each species that occur in Hong Kong; genitalia dissection of the latter group is the only way to be 100% certain of a correct determination; and (c) *Macroglossum sylvia* and *M. glaucoptera* are not included (see species texts).

Table 2. The species of *Macroglossum* recorded in Hong Kong, with annotated status, months observed and observation methods

Species binomial Author(s)	status	adult phenology	method(s) of observation
Macroglossum stellatarum (Linnaeus, 1758)	rare, migrant	10, 11	nectaring
Macroglossum bombylans Boisduval, 1875	rare	4, 6, 8-10, 12	nectaring
Macroglossum belis (Linnaeus, 1758)	uncommon	5, 7-9, 11	nectaring
Macroglossum mediovitta Rothschild & Jordan, 1903	scarce	5, 7-10	nectaring; light trap
Macroglossum neotroglodytus Kitching & Cadiou, 2000	scarce	8, 10, 11	nectaring; light trap
Macroglossum insipida Butler, 1875	common	3, 5-11	nectaring; light trap
Macroglossum poecilum Rothschild & Jordan, 1903	scarce	6, 7, 9, 11, 12	nectaring
Macroglossum sitiene Walker, 1856	scarce	1-3, 8-12	nectaring
Macroglossum heliophila Boisduval, [1875]	common	3, 4, 6-12	nectaring; light trap
Macroglossum pyrrhosticta Butler, 1875	common	1, 3, 4, 7-11	nectaring; light trap
Macroglossum variegatum Rothschild & Jordan, 1903	uncommon	4, 6-11	nectaring; light trap
Macroglossum glaucoptera Butler, 1875	rare, one record	6	nectaring
Macroglossum saga Butler, 1878	scarce	1-3, 10	light trap
Macroglossum fritzei Rothschild & Jordan, 1903	common	all year	light trap
Macroglossum sylvia Boisduval, [1875]	rare, one record	10	nectaring
Macroglossum corythus Walker, 1856	common	2-11	nectaring, light trap
Macroglossum passalus (Drury, 1773)	scarce	3-5, 7-9, 11, 12	nectaring
Macroglossum mitchellii Boisduval, [1875]	rare	3-5, 10	light trap

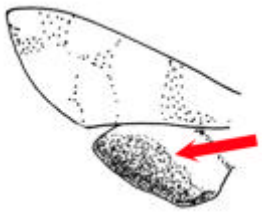
Key to months: 1 = January, 2 = February, .etc. to 12 = December.

Field Key to adults of *Macroglossum* species found in Hong Kong

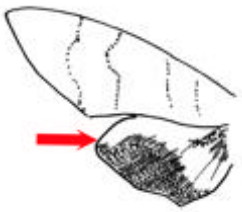
1. h/w orange all the way from the base to the termen . . . . . *M. stellatarum*
- h/w with dark brown or black basal patch and dark terminal zone, separated by an orange, yellow-orange or yellow band medially or sub-medially 2
2. f/w submedial band neither prominent nor contrasting strongly with the medial area 3
- f/w submedial band prominent and contrasting with the medial area 5
3 f/w sandy brown; h/w medial band orange with a diffuse border on the outer edge (Fig. 1) . . . *M. belis*
- f/w dark greenish brown with purple-lilac sheen; h/w yellow-orange or yellow, with little or no suffusion of the outer edge 4
4 f/w very uniform (Fig. 2), h/w medial band reaches the wing apex . . . . . *M. corythus*
- h/w band about one quarter the width of the wing, not reaching wing apex (Fig. 3) . . . . . *M. saga*
5. abdominal segments 4 onwards blackish-green dorsally, head and thorax bright white ventrally *M. bombylans*
- abdomen and thorax uniformly coloured 6
6 thoracic striping wide, one central and one patagial black stripe, V shaped post-medial fascia (Fig. 4) . . . . . *M. mitchellii*
- thin or flared thoracic stripe with a patagial triangle over the wing base 7
7. f/w submedial band has both edges straight . . . 8
- f/w submedial band with one or both edges curved, angled or sinuous 9
8. f/w basal area nearly as dark as the submedial band and significantly darker than the medial area (Fig. 5) . . . . . *M. passalus*
- f/w basal area similar in colour to the medial area; submedial band strongly oblique, antemedian line with a conspicuous narrow pale line along the basal edge . . . . . *M. fritzei*
9. f/w medial band white and straight (sometimes narrowing or broken centrally), bounded by blackish bands on both edges . . . . . *M. mediovitta*
- f/w medial band not bound by straight fasciae on both edges 10
10. h/w band yellow-orange, with long central straight distal edge (Fig. 6), f/w medial band pale and with a straight basal edge . . . . . *M. heliophila*
- h/w band curved centrally 11

Figures 1-12. Pointers to characters used in the identification key of *Macroglossum* species in Hong Kong.

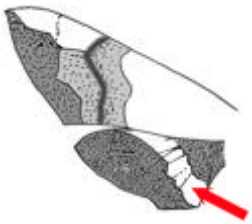
1. *M. belis*



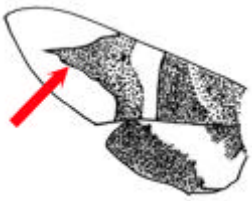
2. *M. corythus*



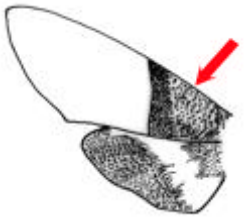
3. *M. saga*



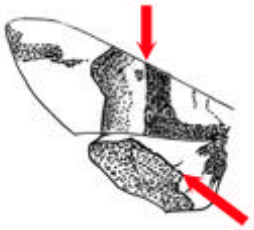
4. *M. mitchellii*



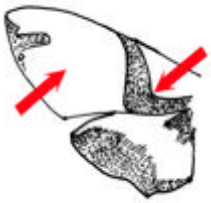
5. *M. passalus*



6. *M. heliophila*



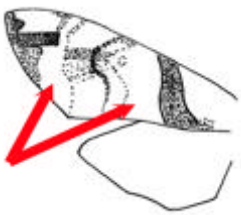
7. *M. sitiene*



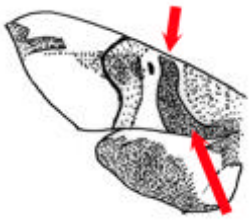
8. *M. neotroglodytus*

9. *M. poecilum*

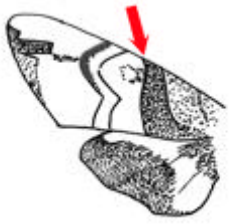
10. *M. insipida*



11. *M. variegatum*



12. *M. pyrrhosticta*



11. inner edge of the f/w submedial band turns in a right angle (90°) to the wing base (Fig. 7), no significant post-medial fascia, thorax pale green with a faint thin dorsal stripe . . . . . *M. sitiene*
- inner edge of the f/w submedial band curves towards the wing base, thoracic stripe and patagial triangles prominent 12
12. f/w submedial band meets the costa approximately at 90° (Fig. 8) . . . . . *M. neotroglodytus*
- f/w submedial band meets the costa obliquely . . 13
13. f/w submedial band with pale square (Fig. 9) filling the band near the costa . . . . . *M. poecilum*
- f/w submedial band without pale discal square . . 14
14. f/w medial band uniformly pale purplish brown, matching the subterminal area (Fig. 10) . . . . *M. insipida*
- f/w medial band greyish-green or grey-brown, paler than the subterminal area 15
15. f/w submedial band stops just short of the costa, and is much wider at the dorsum, curving in to the base (Fig. 11); abdomen uniformly pale grey-brown ventrally . . . . . *M. variegatum*
- f/w submedial band reaches costa, appears relatively straight and obliquely angled (Fig. 12); abdomen chestnut orange (with black patches when worn) ventrally . . . . . *M. pyrrhosticta*

Species accounts

Macroglossum stellatarum (Linnaeus 1758) (Tennent, 1992: 100, Plate 5, Figs. 7 & 8)
Global distribution: northern Africa, southern Europe, Arabia through to Japan, China (JL, LN, IM, GS, HuB, HeN, SD, SX, HuN, FJ, GD, HK, SC, GX). H.K. distribution & status: restricted (Victoria Peak), rare - possibly only stray migrants occur in Hong Kong.
H.K. ecology: two records; October, November.
Similar species: separated from other *Macroglossum* species found in Hong Kong by the almost completely orange hindwing bordered by a very narrow dark brown terminal band and no lateral orange banding on the abdomen.

Macroglossum bombylans Boisduval 1875 (Tennent, 1992: 100, Plate 3, Figs. 1 & 2)
Global distribution: northwestern India, Nepal, China (BJ, HuB, HuN, HK, HN, TW), Korea, Japan, northern Thailand, N.Vietnam, Philippines. H.K. distribution & status: widespread, scarce.
H.K. ecology: multivoltine, flying in April, June and August to mid-October; one record from early December. Adults recorded only nectaring, at *Barleria cristata* L., 1753 (Acanthaceae) and *Duranta erecta* L. (Verbenaceae) (Li, 1992); occurs up to 450m elevation in shrubland, parks, secondary forest, and grassland.
Similar species: separated from other *Macroglossum* species by the combination of very white head and thorax ventrally, dark dorsal colour, on the hindwing the dorsal sub-basal patches have a very small amount of yellow, and white bases ventrally.

Macroglossum belis (Linnaeus 1758) (Figs. 1 & 13k)
Global distribution: eastern Pakistan, India, Sri Lanka, Nepal, Thailand, China (south, HK, MC, TW), Ryukyu Is., Java. H.K. distribution & status: widespread, uncommon.
H.K. ecology: possibly trivoltine, adult records from May, July to September and November; occurring in parks, shrubland and secondary forest up to 550m elevation. Observed at light and nectaring at *D. erecta and Lantana camara* L. (Verbenaceae). Reared by K.Li (pers. comm.) on *Paederia scandens* (Lour.) Merr. (Rubiaceae) and N. Tong (Li, 1992) on *Strychnos angustiflora* Benth. (Loganiaceae), the life cycle taking one month.
Similar species: separated from other *Macroglossum* species by the orange, rather than yellow, hindwing medial band, which has a very diffuse outer edge.

Macroglossum mediovitta Rothschild & Jordan 1903 (Fig. 13d)
Global distribution: southern Japan, southern China, Thailand, Malaya, Sumatra, Mentawai, Borneo, Philippines. H.K. distribution & status: widespread, scarce.
H.K. ecology: recorded in May and July through October, occurring up to 700m elevation in secondary forest and grassland; taken at light and also nectaring on *D. erecta* at dawn, mid-morning and dusk.
Similar species: *M. heliophila* always has the forewing medial band grey and complete, bounded apically with a diffuse greenish postmedial fascia and is slenderer and smaller. *M. mitchellii* has a wide dorsal stripe from the labial palps to the junction of the thorax and abdomen.

Macroglossum neotroglodytus Kitching & Cadiou 2000 (Figs. 8 & 13l)
Global distribution: southern & eastern India, Sri Lanka, Thailand, Vietnam, southern China, southern Japan, Malaya, Sumatra, Java, Philippines. H.K. distribution & status: widespread, uncommon.
H.K. ecology: recorded in August, October & November in grassland, parks and secondary forest up to 100m elevation. Adults mostly recorded nectaring at *D. erecta,* at dusk or dawn. Larva reared by K. Li on *Hedyotis acutangula* Champ. ex Benth. (Rubiaceae) and *H. hedyotidea* (DC.) Merr. and by N. Tong on *H. tenelliflora* Blume (K. Li, pers. comm.).

Similar species: see *M. poecilum*.
Taxonomic note: previously known as *M. troglodytus* Boisduval, 1875.

Macroglossum insipida Butler 1875 (Fig. 10); (Tennent, 1992: 103, Plate 4, Figs. 3 & 4)
Global distribution: south & east India, Sri Lanka, Thailand, Malaya, Gtr. Sundas, Philippines; other subspecies – New Guinea to Australia (Queensland). H.K. distribution & status: widespread, uncommon.
H.K. ecology: Noted from March and May through November, more commonly recorded in October, occurring up to 350m elevation in shrubland, secondary forest and plantations. Adults have primarily been seen nectaring at *D. erecta*; they are crepuscular. Reared on *P. scandens*, the whole life cycle taking five weeks to complete (D. Mohn, pers. comm.)
Similar species: see *M. poecilum*

Macroglossum poecilum Rothschild & Jordan 1903 (Figs. 9 & 13f)
Global distribution: China (including TW), Japan, N Vietnam, N Philippines, N. Borneo. H.K. distribution & status: local (northwest New Territories, central New Territories); scarce.
H.K. ecology: adult records from June, July, September, November and December, occurring in secondary forest up to 100m elevation. Reared from *Lasianthus chinensis* (Champ. ex Benth.) Benth. (Rubiaceae), the life cycle taking five to six weeks (Li, 1998).
Similar species: *M. neotroglodytus*, *M. insipida* – *M. insipida* and *M. neotroglodytus* are virtually inseparable in the field; in fresh specimens both have a purple sheen. *M. insipida* has a larger loop in the forewing postmedial fascia below the costa. *M. poecilum* (originally described as a subspecies of *M. insipida*) has a dark orbicular stigma in the forewing discal spot, the medial and postmedial fasciae almost meet below this stigma and the dark band between the medial and submedial fascia has a small light rectangular patch near the costa.

Macroglossum sitiene Walker 1856 (Figs. 7 & 13n)
Global distribution: north-eastern India, Sri Lanka, Maldives, Thailand, Vietnam, China (south, HK, TW), south Japan, Malaya, Sumatra, Philippines. H.K. distribution & status: widespread, uncommon.
H.K. ecology: multivoltine, adults recorded from January through March and August through December, occurring up to 200m elevation in shrubland, parks and feng shui woods. Mostly seen nectaring at *D. erecta*. Reared on *P. scandens* (Li, 1992), ova laid in late December eclosing in early March.
Similar species: see *M. pyrrhosticta*

Macroglossum heliophila Boisduval (1875) (Figs. 6 & 13h)
Global distribution: India, Thailand, Vietnam, China (TW, GD, HK, MC, HN), south Japan, Sundaland, Philippines, New Guinea, Australia (Queensland). H.K. distribution & status: widespread, common.
H.K. ecology: multivoltine, with records in March, April and June through December; occurring up to 450m elevation in secondary forest, feng shui woods, shrubland, parks and plantations. Recorded nectaring on *Zanthoxylum avicennae* (Lam.) DC. (Rutaceae) (Kendrick & Barretto, 2008), *Bidens pilosa* L. and *Sphagneticola trilobata* (L.C. Rich.) Pruski (=*Wedelia triloba* (L.) Hitchc.) (both Asteraceae). Larvae have been reared on *Psychotria asiatica* L. (Rubiaceae) (Bascombe & Young, in Tennent 1992; Li, 1992).
Similar species: see *M. pyrrhosticta*

Taxonomic notes: this taxon should currently be treated as a subspecies of *M. divergens* Walker 1856 (Beck & Kitching, 2010), rather than the other way round as listed by Kitching & Cadiou (2000). However, DNA analysis work currently being undertaken suggests the situation may yet change further (Kitching, pers. comm.). *Macroglossum d. divergens* was listed as endemic to Sri Lanka by Kitching & Cadiou (2000). Listed in Chu & Wang (1997) under the synonym *M. fringilla* Boisduval (1875).

Macroglossum pyrrhosticta Butler 1875 (Figs. 12, 13i & 13j)
Global distribution: eastern India, Sri Lanka, Thailand, Vietnam, China (FJ, TW, HK, MC), Korea, Japan, Sundaland, Philippines. [introduced: Hawaii]. H.K. distribution & status: widespread and common.
H.K. ecology: multivoltine, recorded in January, March, April and July through November, from secondary forest, feng shui woods, shrubland and parks up to 500m elevation; primarily found feeding at *D. erecta* and also at *Z. avicennae*. Larvae reared on *P. scandens* (Bascombe and Young, in Tennent, 1992; Li, 1992).
Similar species: *M. variegatum*, *M. sitiene*, *M. heliophila*, *M. glaucoptera*. *Macroglossum sitiene* can be separated from the rest of this group by the sub-basal fascia on the forewing, which contains a 90° to 100° sharp angle, turning and continuing to the base of the wing, about three-quarters of the way from the costa to the dorsum. In the other species this angle is replaced by a curve. *Macroglossum variegatum* has a grey-brown ventral thoracic and abdominal surface, this is reddish chestnut in *M. pyrrhosticta*; with black patches in worn specimens. *Macroglossum heliophila* usually has its forewing medial band

pale grey edged with distinct dark bands (rather than fasciae, as in *M. glaucoptera*) on either side and is green in overall tinge. *Macroglossum glaucoptera* has the darkest overall appearance, with the medial and post medial fasciae black; its hindwing normally has two orange-yellow basal patches, though these may be fused to form a narrow band; the thorax has less contrasting markings. The ventral surfaces of the abdomen and fantail of *M. pyrrhosticta* are a reddish chestnut colour, which often appear with worn, white rimmed patches centrally along the abdomen.

Macroglossum variegatum Rothschild & Jordan 1903 (Figs. 11, 13p & 13q)
Global distribution: east India, Thailand, Vietnam, China (FJ, GD, HK, HN), Malaya, Gtr. Sundas, Philippines. H.K. distribution & status: widespread, uncommon.
H.K. ecology: multivoltine, records of adults from April, June, late July to November, occurring in secondary forest, shrubland, parks and plantations up to 200m elevation, mostly recorded nectaring at *D. erecta* and also at *Z. avicennae.*
Similar species: see *M. pyrrhosticta*.

Macroglossum glaucoptera (Butler 1875) (Fig. 13g)
Global distribution: Sri Lanka, Thailand, Vietnam, Malaya, Sumatra, Java, Philippines, Sulawesi. H.K. distribution & status: restricted (Tuen Mun); rare.
H.K. ecology: one adult reported nectaring at *D. erecta*, June (Li, 1998), specimen deposited in KFBG.
Similar species: see *M. pyrrhosticta*.

Macroglossum saga (Butler 1878) (Figs. 3 & 13b)
Global distribution: north India, Nepal, Thailand, Vietnam, Peninsular Malaysia, China (GD, HK, BJ, TW), Japan. H.K. distribution & status: local (central New Territories, northeast New Territories); scarce.
H.K. ecology: adult records from January to March and October; found in agricultural land and secondary forest up to 340m elevation.
Notes: originally reported from Hong Kong by Kendrick (1998), though an earlier unpublished series of five records from Tai Lung Farm, Fanling (1992-1995) and Ho Pui (1993) in the AFCD collection has subsequently been identified.

Macroglossum fritzei Rothschild & Jordan 1903 (Fig. 13m)
Global distribution: Nepal, Thailand, southern Japan, China (HN, HK, GD, HuN, HuB, TW), Peninsular Malaysia, Borneo. H.K. distribution & status: widespread, common.
H.K. ecology: recorded throughout the year and probably continuously brooded, though peaks in abundance occur in April and October-November; found from sea level to 690m elevation in or close to secondary forest, feng shui woods and shrubland. Reared on *Morinda umbellata* L. (Rubiaceae), taking five weeks to complete its cycle (D. Mohn, pers. comm.). This is the only species of *Macroglossum* commonly taken at light traps.

Macroglossum sylvia Boisduval (1875)
Global distribution: north India, Sri Lanka, Thailand, Vietnam, China (HK, TW), Malaya, Gtr. Sundas, Philippines, Sulawesi.
H.K. distribution & status: Lantau Island (Tung Chung); rare.
H.K. ecology: one adult reported nectaring at *D. erecta*, October (Tennent, 1992).
Similar species: see *M. corythus*.

Macroglossum corythus Walker 1856 (Figs. 2 & 13e)
Global distribution: northeast India, Andaman Is., Thailand, Vietnam, China (HLJ, JL, LN, BJ, SD, JS, HuB, HuN, JX, FJ, GD, HN, GX), Sundaland, Wallacea, Philippines: other subspecies – Japan, Ryukyu Is., south India, Sri Lanka, Moluccas, New Guinea, Australia (Queensland), Tanimbar, Solomon Is., Bismarck Arch., New Caledonia, Loyalty Is.. H.K. distribution & status: widespread, common.
H.K. ecology: multivoltine, recorded from late February to the end of November, commonest in October; found up to 690m elevation in secondary forest, feng shui woods, shrubland, mangrove and urban parks. Mostly seen nectaring at *D. erecta* and also on *L. camara* and and also at *Z. avicennae*. Larvae have been reared on *P. scandens* (M. Bascombe, in Tennent, 1992; K. Li, pers. comm.).
Similar species: *M. sylvia* has a dark brown “tail fan” and abdomen (chestnut brown in *corythus*) with white patches ventrally, though this is not clear in greasy or worn specimens (Tennent, 1992).

Macroglossum passalus (Drury 1773) (Figs. 5 & 13c)
Global distribution: India, Sri Lanka, Thailand, China (HK, TW, SC), Ryukyu Is., Sumatra, Java, Borneo, Philippines. H.K. distribution & status: widespread, uncommon.
H.K. ecology: at least trivoltine, with adult records from mid-March to mid-May, July to early September and mid-November to mid-December. Found from 60m to 550m elevation in secondary forest, mostly seen nectaring at *D. erecta* and also regularly seen nectaring at *Plumbago indica* L. (Plumbaginaceae) in August 2008 (Barretto & Kendrick, 2008). Larvae have been reared (Bascombe, in Tennent 1992, Li 1992) on *Daphniphyllum calycinum* Benth. (Daphniphyllaceae), taking 26 days from 1st instar larva to eclosion in June-July (D. Mohn,

pers. comm.) and the October life cycle taking 26 days (N. Tong, via K. Li, pers. comm.).
Similar species: *Macroglossum faro* (Cramer, 1780) (which could occur in Hong Kong) is almost identical in external appearance, but substantially larger than *M. passalus*.

Macroglossum mitchellii Boisduval (1875) ssp. *imperator* Butler 1875 (Figs. 4 & 13a)
Global distribution: south & east India, Sri Lanka, Thailand, Vietnam, China (HK, YN, TW), Malaya, Sumatra, Borneo, Sulawesi: nominotypical subspecies – Java. H.K. distribution & status: restricted (CNT), rare.
H.K. ecology: records from late March to late May and October; most on hill-tops at light.
Similar species: see *M. mediovitta*.

Species not yet recorded from Hong Kong, but which might occur

Macroglossum aquila Boisduval 1875
Global distribution: northeastern India, Bangladesh, Thailand, southern China (GD, GX, HN), Vietnam, Malaya, Sumatra, Java, Borneo, Philippines (Luzon).
A small species, dark basal area to the forewing, which is otherwise rather plain, the medial, post-medial and subterminal fasciae fairly faint; a small white oblique discal spot near the medial fascia and costa; the h/w is similar to *M. heliophila,* but has a diagnostic lobe on the ventral side of the hindwing costal edge, not found in other *Macroglossum* species (I.J.Kitching, pers. comm.)

Macroglossum faro (Cramer 1780)
Global distribution: southern India, Thailand, Vietnam, China (GD), Ryukyu Is., Malaya, Sumatra, Java, Borneo.
Similar to *M. passalus*, though substantially larger at around 75mm wingspan and with unicolorous green thoracic tegulae (in *M. passalus*, the posterior half of the tegulae is dark slate grey).

Discussion

The number of records from which the data are derived is still relatively small, 688 individuals recorded by Tennent (1992), plus a further 460 records of occurrence collated by the author, thus extensions to the elevational ranges and records from other habitats must be expected in future. Similarly, there remains much work to be done to elucidate and illustrate the life histories of most *Macroglossum* species in Hong Kong in order to assess whether these fascinating moths require any specific conservation measures. Some of the species are evidently rarely encountered in Hong Kong (e.g. *M. mitchellii*, *M. bombylans*) and these species are reported to be rare elsewhere in their ranges (Pittaway & Kitching, 2000-2010). Several other species have been encountered only once or twice, and only more intensive recording will reveal whether these species are resident in Hong Kong, or vagrants from elsewhere within their distribution, which may well be the case for *M. stellatarum*, a known and well-documented migrant, or whether they have gone undetected due to their similarity to other species. Further information on the taxonomy, identification and ecology of all these species is available on-line from Pittaway & Kitching (2000-2010).

Acknowledgements

There are many people who have contributed data to this work, especially the late Kent Li, who generously passed his notes to the author for incorporation therein. This paper is dedicated to his memory. His keen ability and enthusiasm for the Sphingidae will be greatly missed. I extend my thanks to all the other data contributors, from HKWildlife.net, David Mohn, Andrew Hardacre, Mark Sterling, Yiu Vor, Norman Tong and Paul Aston, as well as to Ruy and Karen Barretto for their hospitality as hosts for surveys at Tai Po Kau Headland. I am grateful to the Agriculture, Fisheries & Conservation Department of the Hong Kong SAR Government for granting permissions to run light traps and collect specimens, and to all the institutions and individuals listed in the method section whom I have visited to inspect material. I am grateful to Ian Kitching for reviewing several drafts of the key to species as well as thoroughly reviewing the manuscript (updating information on taxonomy and distribution where necessary) and, with Jan Beck, for providing assistance and much deliberation on the *Macroglossum* species from Hong Kong.

Figure 13

Facing page:
Figure 13. Adults of *Macroglossum* species
a – *M. mitchellii;* b – *M. saga*; c – *M. passalus*; d – *M. mediovitta*; e – *M. corythus*; f – *M. poecilum*; g – *M. glaucoptera*; h – *M. heliophila* ; i – *M. pyrrhosticta;* j – *M. pyrrhosticta* (ventral); k – *M. belis*; l – *M. neotroglodytus* ; m – *M. fritzei*; n – *M. sitiene*; p – *M. variegatum*; q – *M. variegatum* (ventral).

References

Kitching, I.J., Scoble, M.J., Smith, C., James, S., Young, R. & Blagoderov, V., 2010. CATE Sphingidae. CATE Sphingidae, CATE Sphingidae Team. Downloaded from http://www.cate-sphingidae.org?view=717c3847-e4d8-435a-bf9c-0f0b4e0dcfb1 on 25 March 2010.

Chu, H-F. & Wang, L-Y., 1997. *Fauna Sinica Insecta Vol. 11: Lepidoptera; Sphingidae*. Science Press, Beijing. 410 pp., 325 figs., 8 plates.

Beck, J. & Kitching, I.J., 2010. *Sphingidae of Southeast Asia (incl. New Guinea, Bismarck & Solomon Islands) Version 1.5 - Macroglossum divergens Walker, 1856*. Downloaded from http://www.sphin-sea.unibas.ch/SphinSEA/species_pages/Mac_divergens.htm on 3 March 2010

Easton, E.R. & Pun, W.W., 1996. New records of moths from Macau, Southeast China. *Tropical Lepidoptera* 7: 113-118.

Kendrick, R.C., 1998. *Macroglossum saga* (Butler, 1878) (Lepidoptera: Sphingidae) finally found in Hong Kong. *Porcupine!* 17: 15.

Kendrick, R.C., 2002 [2003]. *Moths (Insecta: Lepidoptera) of Hong Kong*. Ph.D. thesis, The Univesity of Hong Kong. xvi + 660pp, 47 plates, 40 figs. Downloaded from http://sunzi1.lib.hku.hk/hkuto/record/B30278831 on 1 August 2005.

Kendrick, R.C. & Barretto, R.O., 2008. *Observations of feeding adult Lepidoptera at Tai Po Kau Headland, Hong Kong: implications for butterfly gardening*. Poster presentation at the 2nd Asian Lepidoptera Conservation Symposium, Penang, November 2008. Downloaded from http://butterfly-insect.com/alcs2008/proceedings/tpkh-poster.pdf on 20 December 2009.

Kitching, I.J. & Cadiou, J.-M.,, 2000. *Hawkmoths of the World: an annotated and illustrated revisionary checklist (Lepidoptera: Sphingidae).* The Natural History Museum, London & Cornell University Press, New York. viii + 226 pp.

Li, K.H.K., 1992. Notes on a collection of *Macroglossum* and other species (Lepidoptera, Sphingidae) in Hong Kong. *Memoirs of the Hong Kong Natural History Society* 19: 1-5.

Li., K.H.K., 1998. Two new records of Hong Kong Sphingidae. *Porcupine!* 17: 12-13.

Pittaway, A.R. & Kitching, I.J., 2000-2010. *Sphingidae of the Eastern Palaearctic*. Downloaded from http://tpittaway.tripod.com/china/china.htm on 28 February 2010.

Tennent, J.W., 1992. The hawk moths (Lep.: Sphingidae) of Hong Kong and South-east China. *Entomologist's Record and Journal of Variation* 104: 88-112.

Wang, H.Y., 1995. *Guide book to insects in Taiwan: 9; Bombycidae, Thyatiridae, Limacodidae, Lasiocampidae, Sphingidae*. Chu Hai Publishing (Taiwan) Co., Taibei. 283 pp.

Waring, P., Thomas, R.C., & Li, K.H.K., 1994. Hawk-moths in Hong Kong, April 1993, with ecological notes. *British Journal of Entomology & Natural History* 7: 181-191.

