A review of *Lamyra* Loew (Diptera: Asilidae: Laphriinae)

T. Dikow[1] & J.G.H. Londt[2]

[1]*Mecklenburger Allee 6, 18109 Rostock, Germany. E-mail: torsten.dikow@stud.uni-rostock.de*
[2]*Natal Museum, Private Bag 9070, Pietermaritzburg, 3200 South Africa. E-mail: jlondt@nmsa.org.za*

The genus *Lamyra* Loew is reviewed. Four species are recognized, *L. greatheadi* Oldroyd, *L. gulo* (Loew), *L. rossi* Oldroyd, *L. vorax* Loew. A key for their identification and comments on their distribution and biology are provided. Redescriptions of *L. greatheadi* and *L. rossi* are given. *Laphria nobilis* Walker is confirmed as a synonym of *L. vorax.* The genus is widely distributed in the Afrotropical Region, but also occurs in Israel.

Key words: *Lamyra,* Asilidae, Laphriinae, Afrotropical Region.

INTRODUCTION

Species of *Lamyra* Loew are easily recognized by their large size, distinctive, almost entirely blackish appearance, elongate hind legs, and general similarity to wasps of the family Vespidae (Hymenoptera). The genus is widely distributed throughout the Afrotropical Region, while one species, *L. vorax* Loew, 1858a, has been recorded from Israel in the Palaearctic Region.

The taxonomic history of *Lamyra* may be summarized as follows:

- Loew (1851) – Established *Lamyra* as a subgenus of *Laphria* with his newly described *Laphria gulo* as type species (a unique female specimen from 'Port Natal' (= Durban, South Africa)).
- Loew (1858a) – Described the second species, *Lamyra vorax,* from 'Chartum' ('aus dem oberen Nilthale' = Khartoum), Sudan, elevating *Lamyra* to full generic status. He also redescribed *L. gulo* based on a female and a male collected by Wahlberg in 'Caffraria'.
- Loew (1858b) – Added the descriptions of two new species from Namibia, *Lamyra bipunctata* from 'Swakop' and *L. angularis* from 'T'kons fountain'.
- Loew (1860) – Repeated his previous descriptions of the four species, dividing the genus into two groups, (a) species with elongated legs (*L. gulo* and *L. vorax*) and (b) species with shorter legs (*L. bipunctata* and *L. angularis*). He provided illustrations of an entire male *L. gulo* and a wing of this species.
- Walker (1871) – Described *Laphria nobilis* from 'Tadjoura', Djibouti.
- Loew (1873) – Stated that *L. nobilis* was a synonym of *L. vorax.*
- Becker & Stein (1913) – Described *Lamyra pleskei* from 'Persisch-Beludshistan' (southeastern Iran).
- Ricardo (1925) – Described *Lamyra versicolor* from the Free State Province, South Africa.
- Curran (1927) – Published the description of *Lamyra apicalis* from 'Medje', Democratic Republic of Congo (DRC).
- Engel (1928) – Established the genus *Stiphrolamyra,* with *L. bipunctata* as type species, for Loew's group of short-legged species, and provided redescriptions of the genus and *L. pleskei* and *L. vorax.* Illustrations of the head and hypopygium of *L. vorax* were provided. In addition, he mentioned that *L. vorax* occurred in Egypt and Ethiopia.
- Bromley (1930) – Transferred *L. apicalis* to *Proagonistes* Loew, 1858a.
- Carpenter (1931) – Reported *L. gulo* from Ngamiland (northern Namibia and Botswana), and recorded observations on its behaviour in flight.
- Efflatoun (1934) – Failed to report *Lamyra* from Egypt, despite Engel's (1928) claim that *L. vorax* had been found there.
- Bromley (1935) – Described *L. rubra* from 'Elisabethville', DRC, saying it belonged to Loew's group of species in which the legs are short and stout (see Engel (1928)).
- Cuthbertson (1938) – Reported *L. gulo* from Mashonaland and from the Salisbury (= Harare) district in Zimbabwe during January to May.
- Jackson (1954) – Provided biological notes on *L. gulo* in northern Tanzania (adult activity period, mark and recapture experiments, adult resting positions, and prey records).
- Hull (1962) – Provided a key and description of the genus with illustrations of an entire female

L. gulo and detailed drawings of the antenna, wing, head, and terminalia. Four species were listed, *L. gulo, L. pleskei, L. versicolor* and *L. vorax* (with *L. nobilis* indicated as a probable synonym). A distribution map was also provided.

- Oldroyd (1970) – Included *Lamyra* in a key to the Laphriini of the DRC, but without verified records for the country.
- Oldroyd (1974) – Described *L. greatheadi* from 'El Rago', Ethiopia, and *L. rossi* from 'Santa Combe Dão', Angola. Five Afrotropical and one Palaearctic species were mentioned in the key, *L. greatheadi, L. gulo, L. nobilis, L. pleskei, L. rossi* and *L. vorax* and an illustration of an entire male *L. gulo* was given. He synonymized *L. rubra* and *L. versicolor* with *Stiphrolamyra angularis* (Loew).
- Theodor (1976) – A description of *Lamyra* genitalia was provided. An illustration of a spermatheca of *L. nobilis* was given under *L. vorax* without comment on the synonymy of these species.
- Oldroyd (1980) – Catalogued five species as occurring in the Afrotropical Region, *i.e. L. greatheadi, L. gulo, L. nobilis, L. rossi* and *L. vorax.*
- Theodor (1980) – Described both the male and female genitalia (epandrium, gonopod and spermatheca), and provided illustrations of an entire female and head of *L. vorax.* He mentioned four species from Tropical Africa, Arabia and Iran, plus one species from Israel of which the distribution was discussed. The distribution of *L. vorax* was given as Tropical Africa, Saudi Arabia and Israel (especially in the Dead Sea area from May to July). *Lamyra nobilis* was indicated as a synonym of *L. vorax* without any discussion of this status.
- Lehr (1988) – Catalogued two Palaearctic species, *L. pleskei* and *L. vorax.*
- Hradsky & Geller-Grimm (1997) – Transferred *L. pleskei* to *Stiphrolamyra,* leaving *L. vorax* as the only Palaearctic *Lamyra* species.

At the start of the present study there were five recognized species of *Lamyra, L. greatheadi, L. gulo, L. nobilis, L. rossi* and *L. vorax.* Loew's (1873) proposal that *L. nobilis* was a synonym of *L. vorax* had not received general support.

MATERIAL AND METHODS

Most specimens studied are in the Natal Museum (NMSA). Other institutions that provided material or data for this study are listed below, with the abbreviations used in the text, and the names of persons who assisted.

AMGS, Albany Museum, Grahamstown, South Africa (F.W. Gess); AUWN, Agricultural University Wageningen, The Netherlands (K. Zwart); BMNH, The Natural History Museum, London, UK (J. Chainey); CASC, California Academy of Sciences, U.S.A. (N. Penny); MRAC, Musée Royal de l'Afrique Centrale, Tervuren, Belgium (M. De Meyer); NMNW, National Museum of Namibia, Windhoek (E. Marais); PPRI, National Collection of Insects, Pretoria, South Africa (M.W. Mansell); SAMC, South African Museum, Cape Town, South Africa (M. Cochrane); TAUI, Insect Collection, Zoological Museum, Tel Aviv University, Israel (A. Freidberg); ZMHB, Zoologisches Museum, Humboldt Universität, Berlin, Germany (M. Kotrba); ZSMC, Zoologisches Staatsmuseum, München, Germany (W. Schacht).

A standard format is used in recording label data for type material, where information recorded on each label is demarcated by the use of single inverted commas, each line of data being separated by a slash (/). When recording data for other material, information is also given in a standard sequence (place name, grid reference or coordinates, altitude, date of collection with month indicated in roman numerals, collector, and additional information if provided). Square brackets are used to indicate relevant additional information not cited on labels. The repository is given in brackets after each entry except when material is housed in NMSA.

Specimens were dry-mounted on pins. Drawings were executed with the aid of a drawing tube, male terminalia being first excised and macerated in potassium hydroxide. Terminalia were stored temporarily in polyethylene vials, containing 70 % ethanol, until the completion of the study when they were sealed in genitalia vials containing a mixture of ethanol and glycerine, and attached to the specimen's pin. Wing length was measured from humeral crossvein to the tip. Morphological terminology follows mainly that of McAlpine (1981) while antennal terminology follows Stuckenberg (1999).

Key to the species of *Lamyra*

The pruinose pleural pattern is best viewed laterally without the aid of a microscope. A pair of distinct pruinose pleurites anterior to the wing base, an extensive patch on the posterodorsal

margin of the katepisternum, and a patch on the metapleura (above hind coxa) may be seen (provided the specimen is dry-mounted and not greasy). The anterior anepisternal patch of *L. gulo* and *L. rossi,* and the proepimeral patch (above forecoxa) of *L. greatheadi* and *L. vorax,* are sometimes not easily discernible from the greyish pruinescence of the thorax. The extensive dorsal grey pruinose patch on the anepisternum of *L. greatheadi* and *L. vorax* should be obvious if present. The pruinescence of the first three abdominal terga is best seen in dorsal view without the aid of a microscope.

1. Dorsal part of anepisternum extensively covered with distinct greyish pruinescence (Fig. 14); proepimeron (above forecoxa) with obvious patch of greyish pruinescence (Fig. 14); distal projection of gonocoxite slender and not hook-like distally (Figs 1, 10); aedeagus relatively slender, only two prongs visible in ventral view (Figs 3, 12) . . . 3
— Only a poorly developed anterior patch of distinct greyish pruinescence present on anepisternum (Fig. 13); proepimeron without distinct patch of greyish pruinescence (Fig. 13); distal projection of gonocoxite with a hook-like appearance distally (Figs 4, 7); aedeagus relatively better developed, three prongs visible in ventral view (Figs 6, 9). 2
2. Face, maxillary palps and vertex black; scape and pedicel black; postpedicel black or orange; mesonotum black; genitalia in both sexes black with only black setae; T6–8 with only black setae. Distribution: Angola, Botswana, Democratic Republic of Congo, Ethiopia, Kenya, Namibia, Malawi, Mozambique, South Africa, Sudan, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe. . . . . *L. gulo* Loew
— Face, maxillary palps, and vertex orange; antenna orange; mesonotum orange-red with black pattern; all tibiae and tarsi orange-red; genitalia in both sexes orange-red with white or yellow setae; T6–8 with white (male) or yellow (female) setae only. Distribution: Angola . . . . . *L. rossi* Oldroyd
3. Metapleura (above hind coxa) entirely greyish-pruinose (Fig. 14); T1–2 greyish-pruinose, T3 greyish-pruinose only on posterior half; postpedicel clavate, black or orange. Distribution: Ethiopia, Kenya, Somalia. . . . . *L. greatheadi* Oldroyd
— Metapleura with only posterior grey pruinose stripe (as in Fig. 13); T1 apruinose; T2–3 with pair of oblique, widely separated greyish-pruinose triangles; postpedicel widened in the middle, black. Distribution: Burkina Faso, Djibouti, Ethiopia, Ghana, Israel, ?Malawi, Mauritania, Saudi Arabia, Sudan, United Arab Emirates, Yemen . . *L. vorax* Loew

TAXONOMY

Genus *Lamyra* Loew

Lamyra Loew, 1851: 19 (as subgenus of *Laphria*); Type-species: *Laphria (Lamyra) gulo* Loew, 1851, by original designation.

Hull (1962: 365) provided a full description. This was generally good and described the condition found in the type species, without emphasis on the distribution of pruinescence or setal coloration. The following notes, based on material examined, supplement Hull's description.

Head. Postpedicel (= third antennal segment) somewhat cylindrical (*L. gulo*), widened in the middle (*L. vorax*), or clavate (*L. greatheadi*). Maxillary palpus unsegmented.

Thorax. Mesopleura distinctly patterned by greyish pruinescence (Figs 13, 14). Entire metapleura distinctly greyish-pruinose or with only a posterior stripe of obvious pruinescence. Proepimeron distinctly greyish-pruinose or apruinose.

Legs. Males with longer hind legs than females; first metatarsal segment more elongated in males than in females.

Abdomen. T1–3 with characteristic patterns of greyish to yellowish-gold pruinescence.

Comments

There is remarkable intraspecific variation in body size, (*e.g.* wing length in *L. gulo* ranges from 12.0–20.6 mm), even between specimens collected at the same locality. The reason for this is not known, but probably relates to larval nutrition.

The colour of the postpedicel (= third antennal segment) and katatergal setae, as used by Oldroyd (1974) to distinguish species, is subject to individual variation. For example, the postpedicel may be either black or orange in specimens of *L. greatheadi* and *L. gulo,* while katatergal setae may be either black or white. These characters are consequently unreliable for distinguishing species. While the

male genitalia of all species are similar, two groups can be recognized using the shape of the distal projection of the gonocoxite and the size and development of the aedeagus. *Lamyra gulo* and *L. rossi* appear to be sister-species, in that the distal projection of the gonocoxite is enlarged distally and has a more hook-like appearance (Figs 4, 7). This structure is more slender and less hook-like distally in *L. greatheadi* and *L. vorax* (Figs 1, 10) which together may constitute another species-pair. The aedeagus in *L. gulo* and *L. rossi* is well developed and all three distal prongs are visible in ventral view (Figs 4, 6, 7, 9), this organ is more slender in *L. greatheadi* and *L. vorax,* and only two of three prongs are visible in ventral view (Figs 1, 3, 10, 12).

Further support for the species-pairs recognized above is provided by the presence of diagnostically useful patterns of thoracic pruinescence. Two different patterns are evident; *L. gulo* and *L. rossi* having a more or less poorly developed antero-dorsal patch of greyish pruinescence on the anepisternum (Fig. 13), whereas this pruinose patch is far more extensive and obvious in the *L. greatheadi* and *L. vorax* pair (Fig. 14).

Lamyra greatheadi Oldroyd, Figs 1–3, 14–15

Lamyra greatheadi Oldroyd, 1974: 100.

Redescription

Based on a male and female from Kenya (specimens in NMSA), this brief redescription augments Oldroyd's original description which was limited to a few lines in a key.

Head. Black; scape and pedicel black; postpedicel clavate, black or orange; dorsal ridge of proboscis with black and white setae.

Thorax. Black; greyish-pruinose mesopleural pattern consists of extensive dorsal patch on anepisternum, two pruinose pleurites anterior to wing base, and an extensive patch on posterodorsal margin of katepisternum; metapleura entirely greyish-pruinose (Fig. 14). *Legs.* Black with black macrosetae and white setae.

Abdomen. T1–2 entirely greyish-pruinose; T3 grey-pruinose only on posterior half; T4 dull black-pruinose; T5 shiny black-apruinose; T6–8 steel-blue apruinose with white setae only; genitalia black with white setae and black macrosetae in males, brown setae in females. Male genitalia as in Figs 1–3.

Material examined: KENYA: 2♀, 1♂, Nguruman Kajiado dist Rift Valley, 01°50′S 36°56′E, 700 m, iv.1990, IMI Abu-Zinid, alluvial plains; 1♂, same data but v.1990; 1♂, Nairobi [01.17S 36.50E], 1994, Abu-Zinid (MRAC); 1♀, Magadi [01.54S 36.17E], 830 m, 23.xi.1957, Ross & Leech (CASC). SOMALIA: 1♀, Abrone [02.28N 41.35E], 24.v.1901, B v Erlanger (ZMHB); 3♀, 2♂, S. Somalia, 19–24.v.1901 19.vii.1902, B v Erlanger (ZMHB); 1♀, Sarigo, 8.v.1901, B v Erlanger (ZMHB); 1♀, Salatela, 9.v.1905, B v Erlanger (ZMHB).

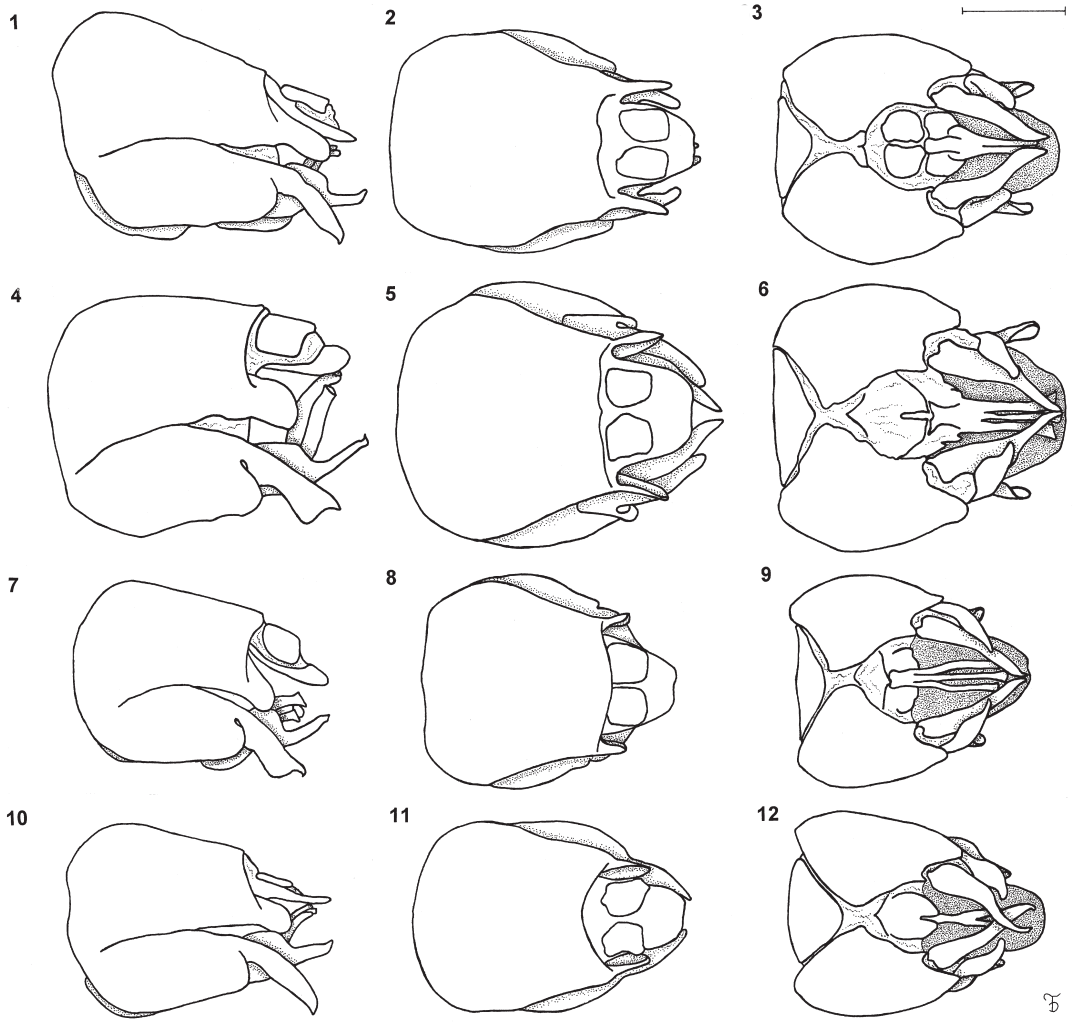
Material not examined (BMNH records supplied by J. Chainey): ETHIOPIA: holotype ♂, 2♀ paratypes 'Somaliland El Rago [06.38N 45.47E] / 8.12.53/Desert Locust Survey'. KENYA: 1?, Northern Frontier Dist. [01.00N 40.15E], Juba River, Neboi, 6.vi.1922, J. O'Beven; 2♀, 1♂, 00°32′N 37°38′E, 14.v.1975, I. Robertson; 1♀, Galole [01.29S 40.02E], 26.x.1972; 2♀, Tana River [02. 32S 40.31E], Garissa-Bura, xi.1948, van Someren; 1♂, Masai, Bissil-Namanga [02.33S 36.47E], iv.1951, van Someren; 1♂, Shimba Hills [04.13S 39.25E], 11.vi.1973, D.J. Greathead; 1♀, locality illegible iii.1958, B. Verdcourt; 2♂, Masai, near Orgasaille, 23.vi.1974, D.J. Greathead. SOMALIA: 1♀ paratype, 'al Mudugh Prov. [07.00′N 48.00E] / Somalia. 700 ft / 6.45 T. H. R. Jackson'; 3♀ 1♂ paratypes, 'Bohotle [08.15N 46.20E], Somaliland, 1903 / Vety-Major A.F. Appleton, 1907–89'; 1♀ paratype, 'Brit. Somaliland, 20 miles E. of Berbera [10.25N 45.02E] / coastal plain, vi.1949, K.M. Guichard / B.M. 1951-362'; 2♂ paratypes, 'Brit. Somaliland W.A. Macfayden / B.M. 1929-398'.

Lamyra gulo (Loew), Figs 4–6, 13, 15

Laphria (*Lamyra*) *gulo* Loew, 1851: 19.

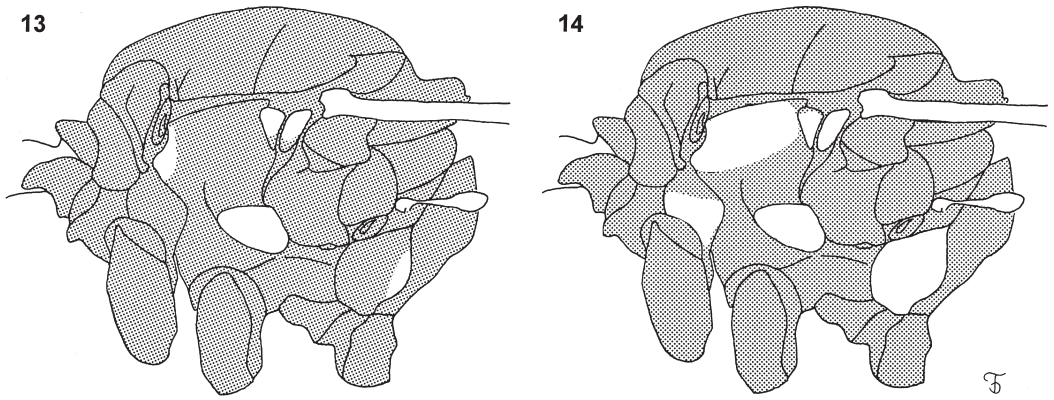
It is unnecessary to redescribe this species as Hull (1962) provided a detailed description.

Material examined: BOTSWANA: 2♀, 1♂, Farmer's Brigade, Serowe, 2226BD, i.1986 i.1987, P. Forchhammer, Malaise trap; 1♀, Serowe, 2226BD, 29.iv.1985, P. Forchhammer, forestry nursery; 1♂, Serowe, 6 km S., 2226BD, 1300 m, 19.v.1985, P. Forchhammer, forestry nursery, malaise trap. DEMOCRATIC REPUBLIC OF CONGO: 1♂, Pweto [07.23S 28.04E], 8 mi SW, 1080 m, 15.i.1958, Ross & Leech (CASC); 1♀, 2♂, Sampwe [09.20S 27.26E], 4 mi S, 980 m, 20.i.1958, Ross & Leech (CASC); 1♀, Lulua Luashi [10.56S 23.37E], 1936, F. Freyne (MRAC); 3♀, 3♂, Elisabethville [11.40S 27.28E], 9.xii.1929, Bequaert (MRAC); 1♂, Elisabethville [11.40S 27.28E], –.xi.1911, Miss.



Figs 1–12. Male terminalia of *Lamyra* species. **1–3**, *L. greatheadi*: **1**, lateral; **2**, dorsal; **3**, ventral. **4–6**, *L. gulo*: **4**, lateral; **5**, dorsal; **6**, ventral. **7–9**, *L. rossi*: **7**, lateral; **8**, dorsal; **9**, ventral. **10–12**, *L. vorax*: **10**, lateral; **11**, dorsal; **12**, ventral. Scale bar = 1 mm.

Agric. (MRAC); 2♀, Elisabethville, xii.1936, Ch. Seydel (MRAC); 1♀, Elisabethville Lubumbashi, 30.xii.1920, Bequaert (MRAC); 1♀, Katanga [10.00S 27.30E], 15.xii.1925, F. Overlaet (MRAC); 1♂, Katanga Kakanda/Mutaka, 15.xii.1953–4.i.1954, R. de Caters (MRAC); 1♂, Katanga Lubumbo, –.xii.1929, Ch. Seydel (MRAC). MALAWI: 1♂, Mzimba, 80 km S, 1233BC, 27.ii.1987, J. & A. Londt, long grass & trees; 2♂, Senga Bay, Salima, 1334DC, 7–8.iii.1987, J. & A. Londt, woodland on hill; 1♀, Blantyre [15.47S 35.00E], 53 mi N, 630 m, 25.ii.1958, Ross & Leech (CASC); 1♂, Bunda College, 5.i.1971 (NMNW). MOZAMBIQUE: 1♂, Cabora Bassa [12.47S 34.48E], i.1974, M. & G. Ferreira. NAMIBIA: 1♀, Caprivi, Muduma NP., Nkatwa, 18°10′S 23°26′E, 8–13.iii.1992, F. Koch, Kwandu Ufer *Phragmites* (ZMHB); 1♀, Okorosawe [18.10S 13.48E], iii.1926, Mus. Exp. (SAMC); 1♀, Etosha NP, Namutoni, 18°16′S 16°57′E, 22.ii.1994, Schumann (ZMHB); 1♀, 3♂, Kaoko Otavi [18.18S 13.42E],



Figs 13–14. Thorax of *Lamyra* species. **13**, *L. gulo*: lateral; **14**, *L. greatheadi*: lateral. Unshaded areas represent distinct greyish pruinescence.

iii.1926, Mus. Exp. (SAMC); 1♀, Etosha NP, 18°20′S 16°50′E, 16.ii.1994, Schumann (ZMHB); 1♀, Grootfontein, Etosha Pan NP, Namutomi, 18°46′S 16°57′E, 14.iii.1992, F. Koch (ZMHB); 1♀, Otjikoto [19.11S 17.33E], ii.1921, H.K. Barnard (SAMC); 1♂, Grootfontein, 15 km NE, 19°28′S 18°15′E, 21.iii.1984, Stuckenberg & Londt; 1♂, Grootfontein, 4 km N, 19°32′S 18°07′E, 13.iii.1987, R. Oberprieler; 1♂, Otavi, 13 km W, 19°38′S 17°14′E, 23.iii.1984, Stuckenberg & Londt, acacia thornveld with little grass; 1♀, 2♂, Grootfontein, 35 km SW, 19°43′S 17°48′E, 21.iii.1984, Stuckenberg & Londt, roadside vegetation; 1♂, Outjo, 18 km W, 20°10′S 15°59′E, 24.iii.1984, Stuckenberg & Londt, acacia scrub in open sandy area with grass; 1♀, Khorixas, 36 km S, 20°34′S 14°52′E, 26.iii.1984, Stuckenberg & Londt, roadside flowering shrub (purple); 1♀, 4♂, Otjiworongo, 87 km SE, 21°03′S 17°10′E, 19.iii.1984, Stuckenberg & Londt, acacia woodland with long grass in seed; 2♀, Omuramba Omatako River, Osire, 21°05′S 17°15′E, 19.iii.1984, Stuckenberg & Londt, grassy road verges; 1♀, Otjosondu, 35 km W, 21°12′S 17°31E, 19.iii.1984, Stuckenberg & Londt, mixed acacia woodland with grassy patches; 1♀, Omaruru, 21°15′S 16°0′E, 25.iii.1997, F.W. & S.K. Gess (AMGS); 2♀, Windhoek distr., 2118CA, 1600 m, 3.ii.1974, M.E. Irwin, sandy river bottom; 1♂, Omaruru commonage, 21°26′S 15°57′E, 27.iii.1984, Stuckenberg & Londt, acacia savanna; 2♀, 1♂, Omaruru, 21°32′S 15°58′E, 24.iii.1997, F.W. & S.K. Gess (AMGS); 2♂, Omaruru, 30 km S, 21°41′S 15°57′E, 27.iii.1984, Stuckenberg & Londt, sparse acacia scrub in cattle pasture; 1♀, Khan River, Karibib, 21°47′S 15°55′E, 27.iii.1984, Stuckenberg & Londt, acacia dry river bed; 1♂, Ameib Ranch, Usakos distr., 21°48′S 15°38′E, 22.xi.1988, M.W. Mansell (PPRI); 1♀, Windhoek, 2217CA, 16.iii.1974, R. Oberprieler; 1♂, Aris, 30 km S Windhoek, 2217CA, 18.iv.1983, Stuckenberg & Londt, thornveld; 1♀, Windhoek, 18 km E, 22°32′S 17°14′E, 16.iii.1984, Stuckenberg & Londt, damp river bed with acacia stony ground; 1♀, 1♂, Farm Valencia, Windhoek distr. [22.35S 17.05E], 14–24.iv.1972, Strydom & Jones; 1♂, Farm Portsmut, Windhoek distr. [22.35S 17.05E], 14.–24.iv.1972, Strydom & Jones; 1♂, Leonardville, 2316DD, 9.ii.1984, V.B. Whitehead (SAMC); 1♀, Quickborn, 19.v.1930, Bradfield (AMGS). SOUTH AFRICA: 1♀, Kruger Nat. Park, 22°26′S 31°12′E, 264 m, 20–24.i.1985, Prinsloo (PPRI); 1♀, Venda Nwanedi Resort, 22°38′S 30°24′E, 550 m, 5–9.ii.1994, R. Oberprieler (PPRI); 2♀, Kruger Nat. Park, Onder Sabie [23.50S 31.30E], 2.vi.1969 21.v.1969, Strydom (PPRI); 1♀, 1♂, Kruger Nat. Park, Crocodile Bridge [23.50S 31.30E], 20.v.1969, Strydom (PPRI); 1♀, 5♂, Waterberg distr. [24.00S 28.00E], 1898-1899, V. Jutrzencka; 1♂, Kruger National Park, vicinity of Skukuza, 2431DC, 9-12.iv.1983, J. Londt, bushveld; 1♂, Kruger National Park, Skukuza, 2431DC, 1-3.iii.1982, R. Miller & P. Stabbins, Malaise trap; 1♀, Kruger Nat. Park, Skukuza, 24°59′S 31°55′E, 26.v.1969, Strydom (PPRI); 2♀, Kruger Nat. Park, Skukuza, 24°59′S 31°55′E, 20.i.1984, M.W. Mansell (PPRI); 1♂, Loskopdam Nature Reserve, 25°25′S 29°20′E, 9-13.ii.1981, Van Tonder & Kok (PPRI); 1♂, Krokodil Drift, Brakkloof Swartruggens, 2526BD0, 20.iii.1984, E. Pinhey; 1♂, Pretoria, Transvaal, 2528CA0, 6.iii.1971, D.H. Jacobs; 2♂, Malelane, 2531CB0, ii.1915, Roberts; 1♂, Marico, Transvaal i.1907, Dr Brauns; 1♀, Saltpan Pta., 2528AC0,

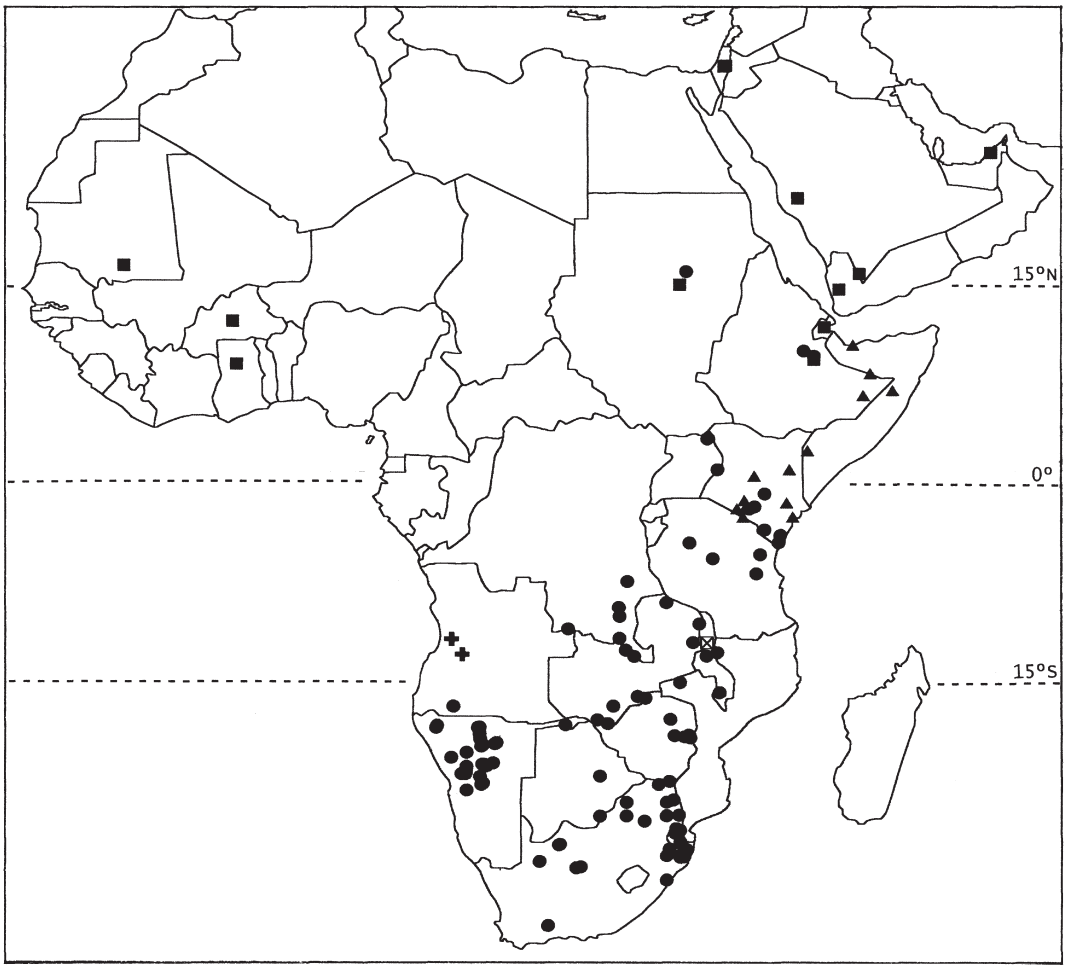


Fig. 15. The distribution of *Lamyra* species. *L. greatheadi* (▲); *L. gulo* (●); *L. rossi* (✚); *L. vorax* (■); crossed square indicates a record of *L. vorax* from Malawi which may be incorrect.

20.ix.1936, G. van Son; 2♀, Hotazel, 20 km N, 27°07′S 22°59′E, 1050 m, 14.iii.1991, Whittington & Londt, Kuruman river banks; 2♀, Hotazel, 27°10′S 22°55′E, 2.iii.1989, L. Schoeman; 4♀, Itala Game Reserve, 27°30′S 31°12′E, 690 m, 24&25.ii.1993, O. Bourquin; 1♀, 2♂, Mkuze Game Reserve [27.30S 32.30E], various dates, Weaving (AMGS); 2♂, Ingwavuma distr., 2732AC, 27.ii.1971, B. & P. Stuckenberg; 2♀, Itala Game Reserve, 27°34′31"S 31°13′45"E, 1120 m, 22.ii.1996, O. Bourquin, rocky grassland; 4♀, Kube Yeni Nature Reserve, 27°48′S 32°14′E, 360 m, 10–14.i.1994, Natal Museum Expedition; 1♀, Hluhluwe, 28°07′S 32°20′E, 16 m, 14.v.1992, P. Atkinson; 1♂, Hluhluwe/Umfolozi Reserve, 28°09′S 32°02′E, 160 m, 29.xii.–3.i.1995/1996, J. Londt & K. Craddock, Munyaweni camp area; 2♀, Upington, 26 km E, 28°23′S 21°29′E, 950 m, 16.iii.1991, Whittington & Londt, permanent dunes; 1♀, Kimberley, 22 km SW, 28°50′S 24°33′E, 1150 m, 19.iii.1991, Whittington & Londt, overgrazed acaciaveld; 1♀, Douglas, 45 km NE, 28°56′S 24°13′E, 1150 m, 19.iii.1991, Whittington & Londt; 1♀, 1♂, Umfolosi Game Reserve [28.09S 32.02E], 18–20.ii.1987, Weaving (AMGS); 1♀ holotype, 'Port Natal/Bohem S.' [Durban = 29.51S 31.01E] (ZMHB); 1♀, Oukloof, Beaufort West [33.15S 22.06E], i.1949, Zinn-Hesse (SAMC); 1♀, Nieuveld escarpment Rietvlei, i.1949, Zinn-Hesse

(SAMC); 1♀, 1♂, junction Crocodile & Marico River, ii.1918, R. Tucker (SAMC). SUDAN: 1♂, Chartum [15.35N 32.32E], Vierthaler (ZMHB). SWAZILAND: 1♂, Sand River Reservoir, 25°59′S 31°42′E, 300 m, 26.iv.1991, Londt & Schoeman, woodland; 2♀, Mbuluzi Nature Reserve, 26°08′S 32°00′E, 200 m, 25.iv.1991, Londt & Schoeman, mixed woodland; 1♀, Ngogolo, 13 km N, 26°19′S 31°38′E, 300 m, 22.–24.iv.1991, Londt & Schoeman, bushveld. TANZANIA: 6♀, 5♂ 1?, Itigi [05.42S 34.29E], 20 mi SW, 4300 ft, 28.i.1970, Irwin & Ross (CASC); 1♀, Linbi, xii.1896, Reimer (ZMHB); 1♀, Tanganjika, Bötem (ZMHB). UGANDA: 1♀, Koputh [03.22N 34.06E], 14.viii.1958, J. Bowden. ZAMBIA: 1♀, Kalambo Falls, Abercorn [09.00S 31.00E], 1200 m, 18.ii.1958, Ross & Leech (CASC); 3♂, Muyombe [10.36S 33.28E], 17 mi N, 1500 m, 20.ii.1958, Ross & Leech (CASC); 1♀, Chingola [12.32S 27.57E], 10 mi N, 1330 m, 8.ii.1958, Ross & Leech (CASC); 1♀, Ndola [13.00S 28.35E], 8 mi SW, 1310 m, 9.ii.1958, Ross & Leech (CASC); 1♀, Chirundu [16.02S 28.51E], 33 mi SE, 1170 m, 8.iii.1958, Ross & Leech (CASC); 2♀, Choma Nansai Farm, 16°45′S 27°00′E, 10.ii.1994, E. Bruce-Miller (AMGS); 1♀, Livingstone [17.45S 25.50E], 24 mi N, 1180 m, 5.iii.1958, Ross & Leech (CASC). ZIMBABWE: 1♂, Rekomitjie Res. Stat., 16°10′S 29°25′E, 500–600 m, 13.ii.–13.iii.1992, Groenendijk, malaise trap (MRAC); 3♂, Arcturus Salisbury [17.47S 31.19E], 1916, Dr Melle (SAMC); 1♂, Matelesi [18.03S 26.36E], iv.1934, R.H.P. Stevenson (SAMC); 1♀, 1♂, Nyachowa Falls, Umtali [18.58S 32.40E], 16.i.1955, B. R. S. P. G.; 2♂, Umtali Cross Kopie [18.58S 32.40E], 23.iii.1964, D. Cookson; 1♀, Rundi River, 19°01′S 31°35′E, 3.iii.1994, L. Schoeman; 1♂, Vumba, 19°05′S 32°45′E, 16.iii.1994, L. Schoeman; 1♂, Mapembi S.R. [19.05S 32.22E], 29.i.1964, D.M. Cookson; 1♂, Burma Valley, 19°11′S 32°47′E, 13.iii.1994, L. Schoeman; 1♀, Tsetse Fly Ops., 17.v.1956.

Material not examined (BMNH records supplied by J. Chainey): ANGOLA: 2♂, Rocadas [16.43S 15.01E], 30.iii.1972, B.M. Southern Africa Expedition; 1♂, 1 unsexed, Monteiro. DEMOCRATIC REPUBLIC OF CONGO: 1♂, S.E. Katanga [10.00S 27.30E], 10–11.xii.1907, S.A. Neave; 1♂, Katanga [10.00S 27.30E], Mpika, i.1908, S.A. Neave. ETHIOPIA: 2♀, 2♂, Riv. Errer [09.59N 41.19E], S. Kristensen. KENYA: 1♂, Karamoja [01.01N 34.52E], Mt. Labwor, iv.1950, van Someren; 1♀, 1♂, Garissa Road, Ukazzi hill [00.49S 38.22E], xii.1948, van Someren; 1♀, Makueni [01.48S 37.37E], Ukamba, v.1947, van Someren; 1♀, 1♂, Kima [01.57S 37.15E], v.1946, van Someren; 1♀, 1♂, Rabai [03.56S 39.34E], v.1928, van Someren; 1♀, 2♂, Shimba Hills [04.13S 39.25E], 11.vi.1973, D.J. Greathead; 1♂, Masai, near Orgisaille, 23.vi.1974, D.J. Greathead. TANZANIA: 1♀, 1♂ [in copula], 04°30′S 32°45′E, 8.i.1917, G.D.H. Carpenter; 1♀, Kilimandjaro [05.23S 38.03E]; 1♀, Morogoro [06.50S 37.45E], 15.v.1917, A. Loveridge.

Lamyra rossi Oldroyd, Figs 7–9, 15

Lamyra rossi Oldroyd, 1974: 100.

Redescription

Based on the female holotype and male paratype, both from Angola. This brief redescription supplements Oldroyd's original description that appeared in a key.

Head. Frons, face, maxillary palp, antenna and vertex orange; proboscis proximally orange-red, distally red-brown, with mixed black and white setae along dorsal ridge; two white divergent setae on ocellar tubercle.

Thorax. Mesonotum orange-red with black pattern, female with pair of black posterolateral spots, male with two black longitudinal stripes, not reaching hind margin, and two pairs of black marks laterally; mesopleura black, distinct greyish pruinescence consists of one anterior patch on anepisternum, two pruinose pleurites anterior to wing base, and an extensive patch on posterodorsal margin of katepisternum; metapleura with posterior stripe of distinct greyish pruinescence (as in *L. gulo,* Fig. 13). *Legs.* Tibiae and tarsi orange-red with black macrosetae; fore and mid femora orange with bluish-black dorsal stripe not reaching extremities; hind femora orange with bluish-black band in distal part, not reaching apex (female: half as long as femur; male: extended over most of femur).

Abdomen. T1–3 almost entirely greyish or yellow-gold pruinose, T4 black pruinose, T5–8 dull black with yellow setae in F, except for anterior half of T5 where setae are white, and white setae in males; genitalia of both sexes orange-red with yellow (female) or mostly white (male) setae. Male genitalia as in Figs 7–9.

Type material examined. Holotype ♀, ANGOLA: 'Angola 45 mi S. / Santa Combe Dão [11.38S 14.53E] / 3.iv.1970 / Edward S. Ross' (CASC); 1♂ paratype, 'Angola: 16 mi W. / Paiva Couceiro [12.45S 15.41E] / 1330 m, 9.xii.1966 / E.S. Ross & / K. Lorenzen' (CASC).

Lamyra vorax Loew, Figs 10–12, 15

Lamyra vorax Loew, 1858: 355 [1860: 186].

Laphria nobilis Walker, 1871: 258; Loew 1873.

It is unnecessary to redescribe this species as Loew (1860) and Theodor (1980) provided adequate descriptions.

Type material examined. Holotype ♂, SUDAN: 'Chartum / Vierthaler' [15.35N 32.32E] (ZMHB).

Material not examined. BURKINA FASO: 1♂, 290 km [locality not legible], Ouagadougou [12.22N 01.31W], 22.vii.1977 (BMNH). DJIBOUTI: holotype ♂, *Laphria nobilis* Walker, 1871, 'Tajura, [= Tadjoura 11.47N 42.53E] Straits Bab-el-Mendeb' (BMNH). ETHIOPIA: 1♂, Harrar Abyssinia [Harer = 09.19N 42.07E] (ZSMC); 1♀, Abyssinia (ZSMC). GHANA: 1♀, N. Territories, Yapi [09.10N 01.10W], ix.1915, J.J. Simpson (TAUI); 2♀, N. Territories, Yapi [09.10N 01.10W], xi.1915, J.J. Simpson (BMNH). ISRAEL: 1♀, Ein Gedi [31.27S 35.23E], 23.iii.1968, Margalit (TAUI); 1♂, Ghor Es Saliye [31.30S 35.30E], Wadi Araba, Dead Sea, 4.vii.1946 (TAUI); 1♂, Ein Feshka, 26.vi.1976, A. Freidberg (TAUI); 1♀, 3♂, South Dead-Sea, Ein es-saffish, v.1937, E. Rivnay (1♀ BMNH, 3♂ TAUI). MALAWI: 1♀, 3.iii.1913, S.A. Neave (TAUI). MAURITANIA: 2♂, Aounel Atrous [16.38N 09.37W], 10.ix.1961, G.B. Popov (BMNH). SAUDI ARABIA: 1♀, 1♂, in wadi nr. Thamud [21.30N 40.53E], 8.ix.1956, D.J. Greathead (BMNH). UNITED ARAB EMIRATES: 1♀, Sharjah [25.22N 55.23E], 1969, D. Burgin (BMNH). YEMEN: 1♀, Med. el. Abid [14.38N 43.58E], v.1980, T.L. (BMNH); 1♂, nr. Jauf [15.50N 45.30E], 25.vii. 1962, G. Popov (BMNH). COUNTRY UNKNOWN: 'ARABIA': 1♀, 1♂, Ktubu, G.W. Bury (BMNH).

Synonymy of *L. nobilis*

Walker's (1871) original description of *L. nobilis* accurately describes a specimen of *L. vorax*. Loew (1873) stated that *L. nobilis* Walker was a synonym of *L. vorax* ('*Laphria nobilis* Walker ist durchaus nichts anderes, als die von mir nach Exemplaren aus Chartum beschriebene *Lamyra vorax*.'). Oldroyd (1974) keyed *L. nobilis* with the distinguishing features – 'First four abdominal tergites with dull brown tomentum, greyish triangles at corners. Venter dull, without distinct bands.' These characters (especially T1–4 brown pruinose) do not describe *L. vorax* and suggest a distinct species. Theodor (1980) listed *L. nobilis* as a synonym of *L. vorax,* but did not discuss the synonymy. Although the present authors did not study the holotype, our key to species was sent to J. Chainey (BMNH), who kindly verified that the type of *L. nobilis* runs to *L. vorax.* We support Loew's opinion that *L. nobilis* is a synonym of *L. vorax,* at least until more material from the same locality is available for study.

BIOLOGY

Although species of *Lamyra* are easy to recognize in the field, little is known about their biology. Carpenter (1931) reported that the flight behaviour of *L. gulo* resembles that of *Belanogaster* (Vespidae) wasps (the flight of these wasps is sustained and the hind legs hang downward). Other observations of *L. gulo,* made by Jackson (1954) in northern Tanzania, revealed that it flies between January and May of the rainy season (November–May) near rivers and in rocky *Brachystegia* (Caesalpiniaceae) woodland. The species was observed perching on tall grass stems. Mark and recapture experiments indicated that individuals may live for at least 43 days and could range over hundreds of metres. The prey of *Lamyra* are mainly Aculeate Hymenoptera (Jackson 1954) and Diptera (Jackson 1954; Londt 1994) including robber flies (Londt 1995). Of the 12 NMSA prey records, 10 are Hymenoptera and two are species of Asilidae (*Stiphrolamyra bipunctata* (Loew, 1858b), a wasp-like species, and *Promachus* sp.). The Hymenoptera are species of the families Anthophoridae, Apidae, Halictidae, Ichneumonidae, Scoliidae, Vespidae and Xylocopidae.

Observations by one of us (J.G.H.L.) during field trips indicate that *L. gulo* is capable of sustained flight (up to about 50 m at a time) at heights of up to approximately 5 m. Individuals have been seen resting on bushes and in tall *Acacia* trees (Londt 1994), but also on low shrubs and even at ground level where they may rest on stones.

Theodor (1980) mentioned that *L. vorax* resembles *Sphex afer sordidus* Dahlbom (Sphecidae) (found sympatrically in southwest Arabia) in size, appearance and coloration. This observation is supported by the collection (in Namibia by J.G.H.L.) of a wasp of the genus *Sphex,* which was flying together with *L. gulo.* This wasp resembles *L. gulo* in size and general coloration, and even has a patch of whitish setae at the junction between thorax and abdomen that resembles the pruinose abdominal terga of *L. gulo.* It is not known if this is mimicry or merely convergence.

Table 1. Seasonality of *Lamyra* species.

Country	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
L. greatheadi												
N and S of Equator												
Ethiopia	–	–	–	–	–	–	–	–	–	–	–	•
Somalia	–	–	–	–	•	•	•	–	–	–	–	–
Kenya	–	–	•	•	•	•	–	–	–	•	•	–
L. gulo												
N of Equator												
Uganda	–	–	–	–	–	–	–	•	–	–	–	–
Kenya	–	–	–	•	–	–	–	–	–	–	–	–
S of Equator – 15°S												
Angola	–	–	•	–	–	–	–	–	–	–	–	–
Democratic Republic of Congo	•	–	–	–	–	–	–	–	–	–	•	•
Kenya	–	–	–	–	•	•	–	–	–	–	–	•
Malawi	–	•	•	–	–	–	–	–	–	–	–	–
Mozambique	•	–	–	–	–	–	–	–	–	–	–	–
Tanzania	•	–	–	–	•	–	–	–	–	–	–	•
Zambia	–	•	–	–	–	–	–	–	–	–	–	–
S of 15°S												
Botswana	•	–	–	•	•	–	–	–	–	–	–	–
Namibia	–	•	•	•	•	–	–	–	–	–	•	–
Malawi	–	•	–	–	–	–	–	–	–	–	–	–
South Africa	•	•	•	•	•	•	–	–	•	–	–	•
Swaziland	–	–	–	•	–	–	–	–	–	–	–	–
Zambia	–	•	•	–	–	–	–	–	–	–	–	–
Zimbabwe	•	•	•	•	•	–	–	–	–	–	–	–
L. rossi												
S of Equator – 15°S												
Angola	–	–	–	•	–	–	–	–	–	–	–	•
L. vorax												
N of Equator												
Burkina Faso	–	–	–	–	–	–	•	–	–	–	–	–
Ghana	–	–	–	–	–	–	–	–	•	–	•	–
Israel	–	–	•	–	•	•	•	–	–	–	–	–
Mauritania	–	–	–	–	–	–	–	–	•	–	–	–
Saudi Arabia	–	–	–	–	–	–	–	–	•	–	–	–
Yemen	–	–	–	–	•	–	•	–	–	–	–	–

Distribution

The distribution of all species, based on all listed material, is plotted in Fig. 15.

Lamyra gulo is widely distributed (perhaps the most widely ranging of all Afrotropical asilid species), occurring from Beaufort West in southern Africa to as far north as Khartoum in Sudan.

Lamyra vorax is also widely distributed, and probably occurs across the Afrotropical Region from Mauritania in the West to the Arabian Peninsula in the East. No central African records are available. The species is unusual in that it occurs in Saudi Arabia and the United Arab Emirates, countries on the Arabian Peninsula usually excluded from the Afrotropical Region, but shown by Larsen (1984) to have 'Afrotropical penetration', and in the Middle East, an area considered part of the Palaearctic Region. The single record of *L. vorax* from Malawi (plotted as a crossed square in Fig. 15) requires verification as this is the only record south of the equator and is considered doubtful.

Lamyra greatheadi appears to be more restricted in its range, being found only in northeastern Africa, while *L. rossi* has only been collected in Angola.

Seasonal incidence

The phenology of all species, based on listed material, is reflected in Table 1. Most of the species appear to be present for much of the year. *Lamyra greatheadi* has been collected during the Northern Hemisphere spring and summer months of March to July, and during the autumn and winter months of October to December. *Lamyra gulo,* whose distribution spans the equator, appears to be chiefly a summer flier, although there are records of the species in early spring as well as in autumn and early winter. *Lamyra vorax,* found only in the Northern Hemisphere, probably flies for much of the year, with the possible exception of the cooler and drier months of December, January and February. Although *L. rossi* has only been collected in April and December, the species probably flies for much of the Southern Hemisphere summer.

Species of *Lamyra* are inhabitants of open woodland savanna and like many invertebrates in this biome probably emerge in response to rainfall. Many East African countries have two annual peaks in rainfall and the data provided in Table 1 appears to support the suggestion that *Lamyra* is also influenced by rainfall.

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