BRITISH AND EUROPEAN TRYPHONINI, EXENTERINI, ECTYTINI AND IDIOMERMATINI (HYM., ICHNEUMONIDAE: TRYPHONINAE) IN THE NATIONAL MUSEUMS OF SCOTLAND, INCLUDING 19 SPECIES NEW TO BRITAIN

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During visits by DRK to the National Museums of Scotland (NMS) in the autumns of 2001 and 2002, the collection of Western Palaearctic Tryphonini in the tribes Tryphonini, Exenterini, Ectytini and Idiogrammatini was reviewed, and as far as possible all material (over 2300 specimens) was identified to species (of which about 116 are present, 113 of them identified). Our rationales for presenting the results in this paper are essentially those given by Shaw & Kasparyan, 2003 (see also Schwarz & Shaw, 1989), and hinge on the fact that Ichneumonidae are so poorly known in Britain that these outline data on occurrence, abundance and phenology, taken from a large collection which is especially the result of relatively recent, widespread and large scale sampling, represent a worthwhile advance in knowledge. Nineteen species are recorded from Britain for the first time.

The four tribes treated in this paper are all believed to be parasitoids of sawfly larvae in the families Xyelidae, Argidae, Cimbicidae, Diprionidae and Tenthredinidae (Hymenoptera), except that in the genus Grypocentrus, which is primarily associated with leaf-mining Fenusini (Tenthredinidae), some species appear to have specialised on Eriocraniidae (Lepidoptera) making similar mines in tree leaves.

Kasparyan has provided keys to Palaearctic species of Tryphonini (Kasparyan, 1973; Kasparyan & Tolkanitz, 2000), Exenterini (Kasparyan, 1990), Ectytini (Kasparyan, 1977; Kasparyan & Tolkanitz, 2000) and Idiogrammatini (Kasparyan & Tolkanitz, 2000), on which the
identifications behind this paper are based. However, unless otherwise indicated we follow Yu & Horstmann (1997) for nomenclature and also dates of publication of species group and genus group names.

Tryphonini

Grypecentrus Ruthe, 1855

All the species in NMS of this medium-sized Holarctic genus have been identified.


Polyblastos Hartig, 1837

This is a moderately large Holarctic genus. All the species in NMS have been identified.

Polyblastos (Cophonchus) macrocentrus Thomson, 1888. 6♀, 4♂, Scotland (V.C. 82), England (V.C. 7, 17, 23, 28). Specimens collected in iv-vi(vii).

Polyblastos (Labrocentus) melanostigma Holmgren, 1857. 13♀, 6♂, Scotland (V.C. 84, 88, 92, 96, 99, 101, 102, 104, 105), England (V.C. 3, 7, 22), Isle of Man (V.C. 71). Specimens collected in v-ix; presumably plurivoltine. One was swept from Juniperus.


Polyblastos (Labrocentus) pallipes Thomson, 1888. 9♀, 1♂, England (V.C. 12, 22, 23, 29), Isle of Man (V.C. 71). Specimens collected in (v)-viii.

Polyblastos (Labrocentus) stenocentrus Holmgren, 1857. 1♀, Scotland, Aberdeenshire, Cawdell (V.C. 92), on Saxifraga aizoides at 2400ft. 19.viii.1985 (R. Knill-Jones); 1♂, Scotland, Dunbartonshire, Caldarvan, NS 450826 (V.C. 99), Malaise trap 8-27.vi.1983 (J.C. Christie).


*Polyblastos (Polyblastos) coturnicus* (Gravenhorst, 1829). 5♀, 1♂, Scotland (V.C. 99), England (V.C. 22, 28, 60). Specimens collected in vii and viii.viii. The male was reared from an unidentified sawfly larva coll. on Betula 4.viii.1988, em. 27.viii.1988 (M.R. Shaw). The rearing data suggest that it is plurivoltine.


*Polyblastos (Polyblastos) tener* Habermehl, 1909. 1♀, 9♂, Scotland (V.C. 77, 84, 86, 90), England (V.C. 7), Hungary (Vasi). Specimens collected in v–vii and ix(x); presumably plurivoltine.


*Polyblastos (Polyblastos) varians* (Gravenhorst, 1829). 77♀, 98♂, Scotland (V.C. 88, 92, 96, 97, 105, 106, 108, 110), England (V.C. 1, 7, 9, 12, 22, 23, 27, 29), Wales (V.C. 52), Isle of Man (V.C. 71), France (Aude). Specimens have been collected in v–ix, particularly in wet grassland. Presumably plurivoltine.

*Polyblastos (Polyblastos) wahlbergi* Holmgren, 1857. 20♀, 7♂, Scotland (V.C. 72, 75, 88, 96), England (V.C. 3, 6, 7, 12, 19, 22, 23, 29), Ireland (V.C. H.20). Specimens collected in (v)vi–ix; presumably plurivoltine.

**Clenochira** Forster, 1855

This is a large and predominantly Holarctic genus, in which some taxonomic problems remain. In addition to the species we list, we have recognised two further British species in the NMS collection that at present we are unable to identify. Both are near *gilvipes* and *pastoralis*.

*Clenochira* igezida Kasparian, 1973. New to Britain, but the British population has shorter punctuation on the hind claws than the form found on the Continent, and possibly represents a different species. 5♀, 24♂, Scotland, Aberdeenshire, Glen Tanar, NO 4892 (V.C. 92), 1990 (J. MacGowan); 2♀, 2♂, Scotland, Inverness-shire, Glen Strathfarrar, NH 330391 (V.C. 96) (J. MacGowan); 1♀, 1♀, 14♂, Scotland, Inverness-shire, Loch Garten (V.C. 96), 1981, 1982, 1983, 1984 (J.A. Owen); 1♀, Scotland, Perthshire, Rannoch, NO 5655 (V.C. 88), 1990 (J. MacGowan); 5♀, Scotland, Easter Ross, Amat, NH 4689 (V.C. 106), 1989 (J. MacGowan); 2♂, Scotland, Wester Ross, Rassall NNR, NO 485432 (V.C. 105), 1991 (P.R. Brown); 1♀, Scotland, Angus, Glen Clova, Craig Rennet (V.C. 90), 1985 (K.P. Blundell); 1♀, England, Oxfordshire, Tanington Fen (SP 233148) (V.C. 23), 1989 (K. Porter); 1♀, England, Oxfordshire, Yarnton Meadow, SP 471104 (V.C. 23), 1989 (K. Porter). The Scottish specimens are practically all from native pinewoods, which may suggest that the two English males from lowland fen should be regarded as doubtful. Specimens collected in v–viii, but the vast majority in vi; presumably univoltine.

presumably plurivoltine. This is evidently a fairly common species in England, as over much of mainland Europe, and it is surprising that it has not been recorded in Britain previously. The localities include both wetland and woodland sites.


_Cicera grossa_ (Brischke, 1871). This species was recorded from England by Kasparyn (2000). 1♂, Scotland, Perthshire, Glen Lochay, NN 538355 (V.C. 88), on Corylus 15.vi.1985 (M.R. Shaw).

_Cicera haemosterna_ (Haliday, 1839) (aberrans (Ruthe, 1885) = subula (Bridgman, 1889)). 6♀, 3♂, Scotland (V.C. 81, 83, 88), England (V.C. 7, 22, 23). One specimen emerged 10.v.1975 from a sawfly cocoon collected in leaf litter below Quercus, in which the external parasitoid was seen feeding on the sawfly larva [or pupae] in iv.1975 (K.P. Bland), and another is labelled as bred 25.ix.1954, with no host details. Specimens collected in vii-viii(ix) and ix-x(xii); presumably plurivoltine.

_Cicera marginata_ (Hohagen, 1857). 50♀, 30♂, Scotland (V.C. 92, 96, 97, 99, 101, 102, 105, 106, 107), England (V.C. 1, 7, 27, 29, 36, 58), Wales (V.C. 52). Specimens collected in (v)–viii(x) and ix(x); presumably plurivoltine.


_Cicera pastoralis_ (Gravenhorst, 1829). 1♀, Norway, Troms, Paras, 700-850m, 9.vii.1984 (K.P. Bland). The type of Tryphon pastoralis Gravenhorst is lost and a neotype has not been designated. This Norwegian specimen conforms with Kasparyn’s (1975) concept of the species.


_Cicera propinquata_ (Gravenhorst, 1829) (= obscura (Stephens, 1835)). 3♂, 7♀, Scotland (V.C. 88, 92, 95, 97, 104, 105, 108), England (V.C. 7, 12, 22, 23, 26, 27, 28, 58). Specimens collected only in v–vii (especially vi); clearly univoltine.


_Cicera rugipes_ (Gravenhorst, 1829). 1♂, labelled only “Beaul.” (= Scotland, Inverness-shire, Beauly (V.C. 96)) (P. Cameron); 1♂, England, Norfolk, Welborne (V.C. 27), ex green sawfly larva on Salix, coll.6.viii.1983, em. 22.vii.1983 (R.E. Evans); 1♂, England, Oxfordshire, Yarnsden Mead, SP 471104 (V.C. 25), Malaise trap 25.v–21.vi.1989 (K. Porter). The rearing data suggest that this is a plurivoltine species.


Ctenochira validicornis (Brischke, 1871). New to Britain. 1♀, Scotland, Perthshire, Tummel Bridge (V.C. 88), ex Nematus viridescens Cameron (Hym., Tenthredinidae) on Betula, coll. 3.vi.1989, em. 16.vi.1990 (M.R. Shaw); 1♂, England, Norfolk, Santon Downham, TL 818889 (V.C. 28), Malaise trap 16–25.vi.1983 (J. Field); 1♂, England, Kent, Hothfield NR (V.C. 15), 14.vi.1970 (P. Chandler). The rearing data suggest that this is a univoltine species, at least in Scotland.


**Erroneous Holmgren, 1857**

This is moderately large Holarctic genus. All the species in NMS have been identified.


Erroneus punctatus (Woldstedt, 1878). New to Britain. 1♀, Scotland, Wester Ross, Beinn Eighe NNR, NH 015634 (V.C. 105), 1992 (P.W. Brown); 1♀, 1♂, Scotland, Aberdeenshire, Glen Tanar, NO 4892 (V.C. 92), 1990 (I. MacGowan); 1♀, Scotland, Dumfartionshire, Cadairvan, NS 448838 (V.C. 99), 1983 (J.C. Christie); 1♀, Scotland, Aberdeenshire, Morone Birwood NNR (V.C. 92), 1984 (B.D. Batty); 2♂, Scotland, Inverness-shire, Glen Strathfarrar NH 330391 (V.C. 96), 1988 (I. MacGowan); 1♂, Scotland, Wester Ross, Shilding, NG 8252 (V.C. 105), 1991 (I. MacGowan); 1♂, Scotland, Beinn Dearg, NC 2766 (V.C. 108), 1983 (D. Horsfield); 1♂, Wales, Anglesey, Cnrs Goch (V.C. 52), 1981 (M.R. Shaw); 1♂, Wales, Ceredigion, Cnrs Ergair Maen, SN 652649 (V.C. 46), 1987 (P. Holmes); 1♀, Wales, Ceredigion, Cnrs Gwrsycu, SN 482504 (V.C. 46), 1987 (P. Holmes). Also 2♂, Norway, Troms, Reingjerdjellet, pollinating Listera, 11.vii.1984 (K.P. Bland). Specimens collected in (v–vi).
Entomologist's Monthly Magazine


Monoblastus Hartig, 1837

This is a moderately large Holarctic genus, though represented in Britain by only two species. All the species in NMS have been identified.


Otoblastus Foerster, 1869

This is a small genus, largely Holarctic but represented also in the Neotropical Region. Only one species is present in NMS. It was treated under Monoblastus by Fitton et al. (1978).

Otoblastus luteomarginatus (Gravenhorst, 1829). 11♀, 2♂, England (V.C. 7, 22, 23, 28), France (Dordogne, Lot-et-Garonne). Specimens collected in (v)vi–vii(viii), and also v in France.

Neleges Foerster, 1869

The only species in this genus is confined to Europe. It was treated under Monoblastus by Fitton et al. (1978).

Neleges productor (Gravenhorst, 1829). 2♀, 1♂, England, Norfolk, Santon Downham, TL 818883 (V.C. 28), Malaise trap (J. Field); 5♀, England, Cambridgeshire, Chippingham Fen NNR, TL 650693 (V.C. 29), Malaise trap (J. Field); 12♀, 17♂, France, Lot-et-Garonne, Béarn, Malaise trap (R.R. Askew). Specimens collected in vi–vii; evidently univoltine.

Dyspetes Foerster, 1869

We follow Yu & Horstmann (1997) for the nomenclature of what we believe to be a single European species of this small Holarctic and Oriental genus.

Dyspetes praegnator (Thomson, 1883) (= arrogator Heinrich, 1949). 57♀, 56♂, Scotland (V.C. 77, 83, 84, 86, 99, 105), England (V.C. 3, 7, 13, 16, 17, 21, 22, 23, 26, 27, 28, 29, 34, 35, 38, 39, 59, 69), Wales (V.C. 49, 52), France (Dordogne). Specimens have been collected in v–x; presumably plurivoltine. Hinz (1961) regarded male specimens with black hind femora flying in May as belonging to a different species (arrogator) from those with red hind femora flying in late summer. However, some of the late summer males in NMS have black hind femora.
Cosmoconus Foerster, 1869

All the species in NMS of this medium-sized Holarctic genus have been identified.


Tryphon Pallén, 1813

This is a large Holarctic genus. All the species in NMS have been identified.


Tryphon (Tryphon) auriculatus Thomson, 1883. 29♂, 46♂, Scotland (V.C. 91), England (V.C. 7, 22, 23, 28, 29), Wales (V.C. 52), France (Pas-de-Calais), Specimens collected in (vi) viii; evidently univoltine.

Tryphon (Tryphon) bidensculus Thomson, 1883. 3♂, 1♂, Scotland, Wester Ross, Hein Eighe NNR, NH 1064 (V.C. 105), Malaise trap 19.89 (I. MacGowan); 1♂, Scotland, Inverness-shire, Glen Strathfarrar, NH 330391 (V.C. 96), Malaise trap 19.88 (I. MacGowan); 1♂, England, Oxfordshire, Osmore Rifle Range, SP 757330 (V.C. 23), Malaise trap 20.vi.27.vii.1989 (K. Porter).

Tryphon (Tryphon) nigripes Holmgren, 1857. 22, England, Norfolk, Santon Downham, TL 818883 (V.C. 28), Malaise trap 7-18.vi.1984 (J. Field); 1♂, Belgium, Hainaut, Brain-Be-Fome, 27.vi.1919 (H.M. Vickers).

Tryphon (Tryphon) rutulator (Linnaeus, 1761). 15 7, 1 5, Scotland (V.C. 72, 83, 88), England (V.C. 8, 23, 29, 70), Wales (V.C. 52), France (Pas-de-Calais, Haut-de-Marne). Specimens collected in (v)vi-viii.

Tryphon (Tryphon) signator Gravenhorst, 1829. 48 7, 23 6, Scotland (V.C. 88, 96, 97, 101, 105, 111, 112), England (V.C. 7, 16, 23, 24, 37, 58), Wales (V.C. 51, 52), Isle of Man (V.C. 71), Belgium (Hainaut), Hungary (Sopron, Vas, Veszprémem). Specimens collected in vii-viii, but mainly in vi; evidently univoltine.

Tryphon (Tryphon) thompsoni Roman, 1929. 19 5, 10 5, Scotland (V.C. 96), England (V.C. 23, 27, 28, 29), Wales (V.C. 52). Specimens collected in (vii)vi-viii; evidently univoltine.

Tryphon (Tryphon) trochanteratus Holmgren, 1857. 21 5, 19 7, Scotland (V.C. 78, 87), England (V.C. 5, 6, 8, 12, 22, 23), France (Oise). Specimens collected in (v)vi-viii; evidently univoltine.


Tryphon (Tryphon) lentulus (Heinrich, 1860). 2 7, Scotland, Argyllshire, Kilmartin (V.C. 98), 19 5. Specimens collected in (v)vi-viii; evidently univoltine.


Tryphon (Tryphon) bistortae (Heinrich, 1893). Scotland, Argyllshire, Kilmartin (V.C. 98), 19 5. Specimens collected in (v)vi-viii; evidently univoltine.


Tryphon (Tryphon) bistortae (Heinrich, 1893). Scotland, Argyllshire, Kilmartin (V.C. 98), 19 5. Specimens collected in (v)vi-viii; evidently univoltine.

Tryphon (Tryphon) trochanteratus (Holmgren, 1857). This species was recorded from England by Kasparyan (1973), but it was not listed by Fitton et al. (1978). 19 5, Scotland, Dumfries and Galloway, Carlisle, NS 448838 (V.C. 99), Malaise trap 7-18.vii.1983 (1 5), 19.vii-1.viii.1983 (1 2) (J.C. Christie).

Exenterini

Kristotomus Mason, 1962

This is a rather large Holarctic and Oriental genus. All species in NMS have been identified.

Kristotomus laticeps (Gravenhorst, 1829). 1 5, 2 5, England, Norfolk, Cattfield
Cycasis Townes, 1965

There are only two species in this genus, one Eastern and one Western Palaeartic. Only the latter is present in NMS.

Cycasis rubiginosa (Gravenhorst, 1829). 1♀, 1♂, Scotland, Ayrshire, Taynish NNR, NR 720845 (V.C. 101), Malaise trap 1–10.vi.1984 (I.C. Christie); 2♂, Scotland, Inverness-shire, Loch Arkaig, NN 0291 (V.C. 97), Malaise trap vi.1992 (J. MacGowan); 1♀, Scotland, Perthshire, Coire Choille Chuil, NN 3328 (V.C. 88), Malaise trap vii.1985 (J. MacGowan); 2♀, France, Dordogne, St Marcel du Perigord, Malaise trap 1–19.v.1998 (R.B. Askew).

Exyston Schiödte, 1839

This is a medium-sized Holartic genus. All of the species in NMS have been identified.


*Acretomus* Holmgren, 1857

This is a small Palaeartic genus. All the species in NMS have been identified.


*Acretomus succinctus* (Gravenhorst, 1829). 41♀, 21♂. Scotland (V.C. 103, 110), England (V.C. 6, 7, 22, 23, 27, 28, 29, 58). France (Pas-de-Calais, Lot-et-Garonne, Dordogne). Specimens collected in v-ix(x), and one emerged v from an unidentified sawfly cocoon collected from sacking put round a Quercus trunk the previous autumn; evidently plurivoltine.

*Cteniscus* Haliday, 1832

This is a medium-sized Holarctic genus. All females in NMS have been identified, but not the males.

*Cteniscus pedatorius* (Panzer, 1809). 1♀, Scotland, Dunbartonshire, Caldercar, NS 44883 (V.C. 99), Malaise trap 19.vii-1.viii.1983 (J.C. Christie); 1♀, Scotland, Western Ross, Benn Eighe NNR, 22.vi.1988 (G.E. Rotheray); 1♂, England, Norfolk, Stanhoe (V.C. 28), ex *Croesus septentrionalis* (Linnaeus) (Hymn., Tenthredinidae), larvae coll. on *Betula* 1987, em. 1987 (K.A. Becker); 1♀, 1♂. England, Cheshire, Abbot Moss (V.C. 58), ex *Hemichroa crenata* Geoffroy (Hymn., Tenthredinidae), larvae coll. on *Betula* 3.x.1973, em. 6.viii.1974 (1♂) and 16.viii.1974 (1♀) (M.R. Shaw); 1♀, Ireland, Kilkenny, Mullinavat (V.C. H.11), 10.ix.1936 (R.C. Partis). While the reared series from Cheshire, which was treated under outdoor conditions of temperature and daylength, suggests that this is a univoltine species, the other data indicate that it can be at least partly plurivoltine.


Among the unidentified males of *Cteniscus* in the collection is one from England, Cumbria, Beckham (V.C. 69) reared from *Nematus leucotrichus* Hartig (Hymn., Tenthredinidae), larva coll. 25.vi.1991 on *Ribes uva-crispa*, em. 25.vi.1992 (M.R. Shaw).

*Exenterus* Hartig, 1837

This is a medium-sized and predominantly Holarctic genus. All the species in NMS have been identified.

*Exenterus abruptorius* (Thunberg, 1822). 22♀, 55♂. Scotland (V.C. 73, 83, 88, 94, 95, 96, 97, 105, 107, 109), England (V.C. 28). Specimens collected in vi-vii and occasionally viii. Thirty eight of the specimens were reared in vi from cocoons of *Neodiprion sertifer* (Geoffroy) (Hymn., Diprionidae) in which the parasitoid overwinters. This is an abundant univoltine parasitoid of *N. sertifer* in Scotland, occurring in both *Pinus contorta* and *Pinus sylvestris* plantations, as well as in native stands of the latter. Rearing
from 7 forests are represented in the collection, as well as specimens resulting from an outbreak of N. sorifer of 2-3 years’ duration in the mid 1980s on an isolated small Pinus sylvestris tree in an Edinburgh garden, which was extinguished soon after its discovery by E. abrahiopius und the ctenophleidame ichneumonid Lamaserus equis (Hartig).


Eridolius Foerster, 1869

This is a large and predominantly Holarctic genus, but represented also in the Oriental and Neotropical regions. The taxonomy of the genus remains difficult. In addition to the species we list at least one other may be present in the basalis group.

Eridolius alacer (Gravenhorst, 1829). 40, 10, Scotland (V.C. 77, 84, 96), England (V.C. 3, 7, 23, 58). Specimens collected in (ix) to (xi); evidently univoltine. It may be significant that 20, 10 were collected at light.


Eridolius basalis (Stephens, 1835) (= flavilabris (Holmgren, 1857) = hostillus (Holmgren, 1857) = limbatellus (Holmgren, 1857)). As some may turn out to be separate species, we are listing 4 colour forms separately as follows: form basesis (hind femur black with trochanter and trochantellus at least partly yellowish but often infuscate in northern specimens); form limbatellus (hind femur red with trochanter and trochantellus yellow); var.1 (hind femur black with black trochanter and trochantellus); var.2 (hind femur red, darkened at apex, with trochanter and trochantellus red). Form basesis 60, 70, Scotland


Eridolus dorsett (Thunberg, 1822) (= nitsigous (Gravenhorst, 1829) = lineola (Stephens, 1835)). 25 ♂, 45 ♀. England (V.C. 7, 12, 22, 27, 29). Specimens collected in (vii–viii.ix). There was a particular abundance of males in one Malaise trap sample from Wiltshire, Savernake Forest, SU 229656 in the period 13.vi–4.vii.1990 (K. Porter).


Eridolus ryfomontus (Holmgren, 1857). 3 ♂, Scotland, Inverness-shire, Glen Strathturrin, NNI 330394 (V.C. 96), Malaise trap viii.1988 (J. MacGowan); 1 ♂, Scotland, Easter Ross, Amat, NH 4689 (V.C. 100), Malaise trap viii.1989 (J. MacGowan). Both sites are native pine woods.


Ectylini

Ectylus Holmgren, 1857

This is a medium-sized Holarctic genus. We follow Kasparian & Tolkienitz (2000) for the subgeneric classification. All females of the
subgenus *Ectyus* in NMS have been dissected for identification, but six males remain unidentified and are not listed here. The dissected females had all previously been identified as *E. ornatus* Holmgren (cf. Fitton & Ficken, 1990), but this traditional identification of British material may turn out to be universally incorrect.


### Idiogrammatini

*Idiogramma* Foerster, 1869

This is a small Holarctic genus. Only one species is present in NMS.

*Idiogramma euryops* Schmiedeknecht, 1888, 5♀♀, 17♂♂, Scotland, Inverness-shire, Loch Garten (V.C. 96), Malaise trap (J.A. Owen); 2♀♀, 2♂♂, Scotland, Perthsire, Rannoch, NH 5655 (V.C. 88), Malaise trap (*I. MacGowan*); 1♀, Scotland, Easter Ross, Amat, NH 4689 (V.C. 106), Malaise trap (*I. MacGowan*). All sites are native pine woods. Specimens collected in v–vi.

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### REFERENCES


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REVIEW


The Monarch butterfly, Danaus plexippus (L.), or Milkweed Butterfly as it is perhaps better known by U.K. entomologists, is one of the most widely known and studied butterflies in the world. A total of 46 contributors are credited with the preparation of the book and all aspects of the butterfly's biology are covered in four main sections: Breeding, Migration, Overwintering and Integrated biology. The last section covers modelling the distribution and abundance, the transmission of the protozoan parasite Ophryocystis elektroscirrha in Monarch butterfly populations: implications for prevalence and population-level impacts. The book also contains the first publication of data assembled by two established citizen science projects, Journey North and the Monarch Larva Monitoring Project. There are also the first reports or two major events of long-term importance to the conservation and biology of the Monarch, i.e. the establishment of a larger protected area of over-wintering sites and a weather-related mortality event during the winter of 2002.

This splendid book provides an essential source of information for ecologists, entomologists, naturalists and teachers. — K.G.V. SMITH.