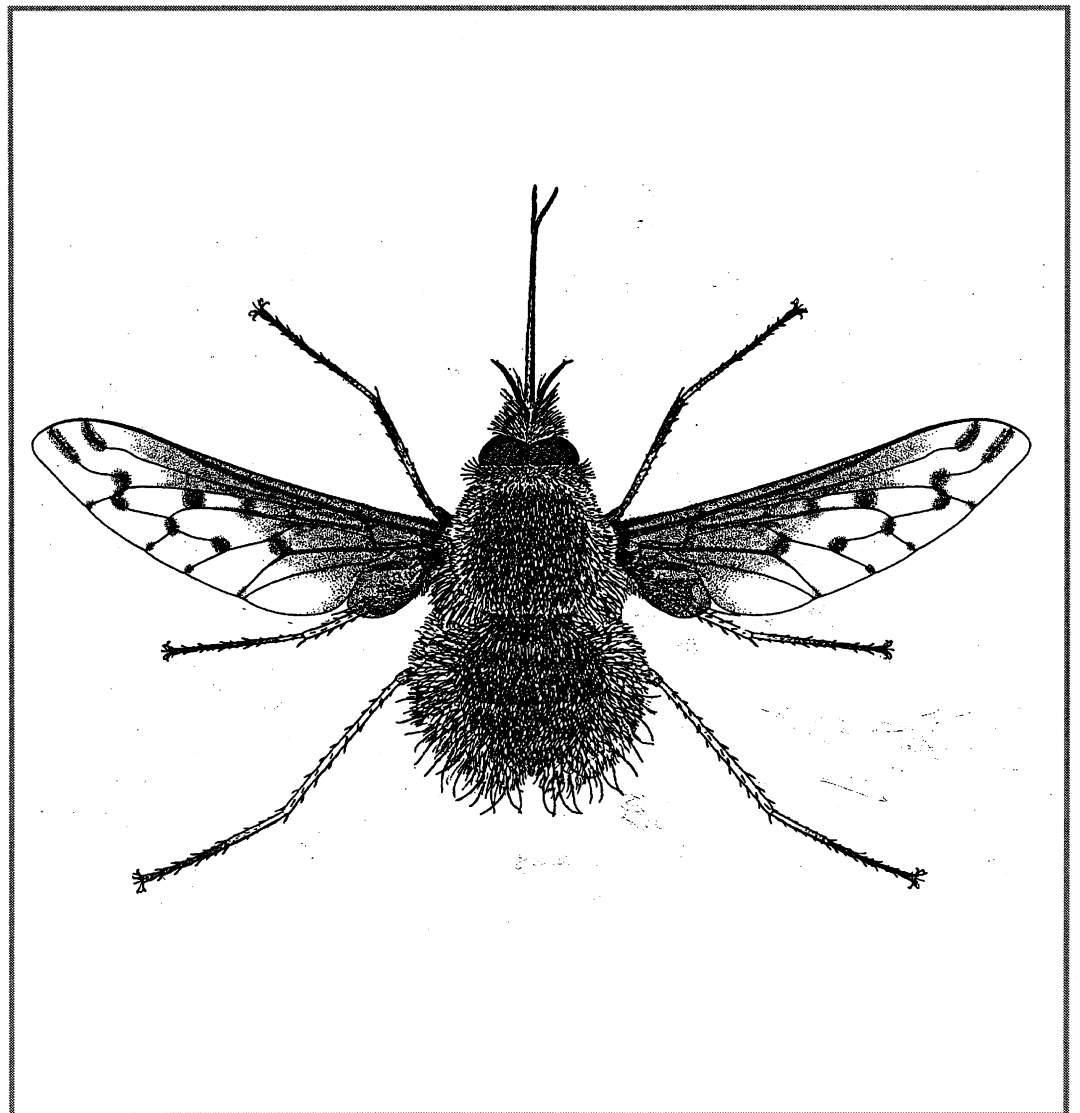


A review of the ecology and
distribution of *Bombylius discolor*
Mikan (Diptera, Bombyliidae)

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Number 309

**A review of the ecology and distribution of *Bombylius discolor* Mikan
(Diptera, Bombyliidae)**

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1. Introduction

1.1 Reason for the report

Bombylius discolor is a distinctive species of bee-fly that has decreased in numbers in recent years. In the most recent review of scarce and threatened flies it is accorded notable status (Falk, 1991). This report is intended to collate existing information and suggest ways in which further data can be obtained for active conservation proposals. Drake (1991) summarised the British distribution of the species. Records for this species can be accepted without voucher specimens from most recorders, since it is highly distinctive. The wing has numerous brown spots and the end of the abdomen has black hairs; the closely related European *B. medius* Linnaeus has tawny to yellow pubescence around the abdomen and the commoner British *Bombylius major* has no spots on the wing.

2. Results

2.1 Life history

2.1.1 Rearing records and host associations

The life histories of Bombyliidae are summarised by Du Merle (1975) and Yeates & Greathead (1997). There is only one confirmed rearing record for this species, from *Andrena vaga* Panzer (Müller, 1944). The larva is probably ectoparasitic on larvae of solitary bees nesting in the ground.

Recent work has indicated two further candidate species of bees in Britain. In the Cotswolds a possible association with *Andrena cineraria* (Linnaeus) has been made by M. Oates, while on the south coast M. Edwards has suggested that *discolor* occurs where *Andrena flavipes* Panzer is nesting. Blair (1920) writing about the hosts of *Bombylius minor* Linnaeus reported that 'Empty pupa-cases of another species, *B. discolor* Mik. were so found in another part of the same pit (host not ascertained).' The record in the list below from SP308607 was from a record card of *Andrena clarkella* Kirby and on the reverse was a note 'Burrows were in a vertical cliff about 6ft high, 60 yds long and facing SE, about 2 ft from level grass tops where *Andrena fulva* had burrows. Also present but in fewer numbers was *A. albicans* (*A. haemorrhoida*). The cliff was a major breeding site for *Bombylius discolor* - not *B. major*, which also bombed level top with eggs. Collected many protruding empty pupal cases of *B. discolor*'.

The distributions of *Andrena flavipes* and *A. cineraria* fit with that of *B. discolor*, both being widespread in southern England. However *A. vaga* is extremely unlikely to be the sole host of *B. discolor* since there are only three fairly recent records, from East Kent and West Sussex and the species has RDB1 status.

2.1.2 Oviposition behaviour

Chapman (1878) made early observations on the oviposition behaviour of *B. major*. Perkins (1919) notes that 'Chapman observed the oviposition of *Bombylius major* at the burrows of *Andrena labialis* and, as mentioned hereafter, I have seen the same fly at pure colonies of *A. flavipes*, but it is not at all confined to these two species.' Blair (1920) examined the specimens referred to by Perkins and reidentified them as *B. discolor*. Scott (1952) records *B. major* or *B.*

discolor ovipositing into the bare sand of a flowerbed. There is an early note by Gilbert White (edition seen 1876, but first published in 1836 according to Scott (1952)) that the female of *B. discolor* (recorded as *B. medius*) 'seems to lay its eggs as it poises on its wings, by striking its tail on the ground, and against the grass that stands in its way, in a quick manner, for several times together.'

2.1.3 Hypothetical life history

Since there is little direct evidence for the life history of *B. discolor* it is useful to extrapolate what is known about other *Bombylius* in order to plan research. The females of *Bombylius* have a sand chamber used for storing sand. During oviposition the egg is coated in sand and flicked onto the ground. On hatching the larva is probably of the triungulin type, actively seeking out a host burrow and descending into it. When the host larva is mature the *Bombylius* larva moults and becomes an ectoparasite on the bee larva. The *Bombylius* larva pupates and may remain in the host cell, or may migrate through the soil to emerge some distance from the host cell and burrow. This last fact may be crucial in identifying the host bee - the pupa could emerge close to the nest of a non-host species.

2.1.4 Phenology

The records of adult flight dates range from 23rd March to 13th August. Two records from 8th June and 13th August are discounted because they lie well without the remaining records, which are from late March to early May. The records in Appendix 1 were divided into date classes and counted with the following result. The figures in the body of the table are numbers of records.

March	1.iv - 10.iv.	11.iv. - 20.iv.	21.iv. - 30.iv.	1.v. - 10.v.	11.v. - 21.v.
5	18	33	22	4	4

This indicates that middle to late April is the peak period for adult activity, but weather must play an important role so early in the season.

2.2 Pupae of *B. discolor* and *B. major*

In the Hope Entomological Collections, University of Oxford there is a male specimen labelled 'Bred pupa Madingley [Cambridgeshire] em. 2/iv/32' collected by G.C. Varley, with the associated pupal skin but without any further data. There are two further hatched pupae in the Verrall-Collin collection in the Hope Entomological Collections labelled 'Ranscombe [or Rauscombe]14.4.88', one also labelled 'JSH' and again without any further data. There do not appear to be good published descriptions of the pupae of the two species. The larva and pupa of *B. major* are described and figured by Dufour (1858) and Vimmer (1925) and there are figures of the pupa in Imhoff (1834) and Westwood (1840). Specimens in the Hope Entomological Collections were examined for characters to separate the species. One pupa of *B. major* labelled 'Bombyl. major bred fm this pupa April 1 1835 .. by C. Pickering' but without associated adult was examined. Zaitzev (1993) illustrated the pupa of *B. minor*. The figure indicated that there is no central spine at the tip of the abdomen. In both *B. discolor* and *B. major* there is a bifurcate central spine at the tip of the abdomen. The tips of the processes of this spine are rounded in *B. major* but smaller and pointed in *B. discolor*. The lateral spine at the tip of the abdomen is also different; in *B. major* it has a distinct lateral basal process, absent in *B. discolor*. The most

posterior of the cephalic spines is differently shaped in the two species. Recent unpublished work by A.E. Stubbs and M. Drake also provides characters for separating the species, but more material is needed. These characters are not covered in the accounts of the early stages of *B. major* noted above and as part of the ecological studies pupae of *B. major* and *B. discolor* should be collected and the differences checked.

2.3 Flower preferences

Knight (1967) gave lists of flowers visited by *Bombylius major* and *B. discolor* but did not record the species' preferences separately. Woodcock (1946) reported *B. discolor* feeding from primroses, sometimes with the anterior legs resting on the flower while the insect hovered but also with the whole insect resting on the flower. Very few recorders have noted flower associations but the records in appendix 1 add forget-me-not and purple *Aubretia* to the list. Greathead (pers. comm.) has seen *B. discolor* on oxlip in Switzerland. The list for *Bombylius major* is much longer and it is to be expected that *B. discolor* will prove to have a wider range of flower associations.

2.4 Habitat

Verrall (1909) records the species from 'all large woods and even open roadsides' (in Sussex) and 'in my garden' (in Suffolk). Very few recorders have noted the habitat in which the species has been found. The data available was summarised by counting the number of records for each habitat type and in the list below some records are entered twice, for example chalk woodland would be entered under chalk and woodland.

Gardens	7
Calcareous habitats	7
Woodland	6
Dunes	2
Coastal cliffs	1

It is likely that *B. discolor* has at least two major habitat requirements - one for the larval development in bees' burrows and another for the adult feeding on flowers, necessary for flight and egg production. Unless both of these are available together the species will not thrive. The records from gardens are possibly adults which are seeking an abundance of flowers but are breeding in another habitat. Similarly woodland in April is rich in flowers and may be used by adults but may not necessarily be the habitat used for breeding. The key to improving populations of this species is probably supporting the host aculeate while providing sufficient flower diversity and abundance for the adult.

2.5 Current distribution

Zaitzev (1989) gives the world distribution as 'Europe from Greece to Yugoslavia and Spain to Poland; USSR: south of Northern European Territory, Central European Territory, Southern European Territory, Transcaucasus, Soviet Middle Asia (mountains of Turkmenistan); North Africa, Algeria'. It does not appear to occur in Scandinavia, Israel (Zaitzev, 1995; Austen, 1937) or Egypt (Efflatoun, 1945). Greathead (pers. comm.) has provided the following more detailed list from a 'World Catalog' in preparation: Algeria, Armenia, Austria, Azerbaijan, Belarus, Belgium, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Italy (including Sicily), Latvia, Libya, Lithuania, Moldava, Poland, Portugal,

Romania, Russia, Slovakia, Spain, Switzerland, Turkey, UK (England), Ukraine, Yugoslavia. The records from Algeria and Libya may be misidentifications (Greathead, *pers. comm.*).

Verrall (1909) states that it 'is not uncommon in early spring in the southern half of England'.

The British distribution maps attached have been divided into three date classes;

- **Map 1:**
Pre-1970
1970-1980
Post-1980

and

- **Map 2:**
Pre-1970
1970-1989
Post-1990

They both show a wide distribution in southern England and Wales but recent records are concentrated in a few areas, indicating a serious decline since the last century. There are only 16 post-1989 squares, although these are widely distributed. There are 40 post-1979 squares. This lack of records is unlikely to be due to lack of recording, since the group is popular among dipterists and is also well recorded by aculeate hymenopterists.

3. Discussion of research requirements

3.1 Research requirements for *B. discolor*

A Species Recovery Programme needs to be fitted to the autecological studies of the species and the best way to ensure this is to pose questions such as the following -

What is the present distribution of *B. discolor*?

What are the common features of the sites which currently have strong populations of *B. discolor*?

Can any factors be identified which would explain the loss of *B. discolor* from sites where it was formerly recorded (eg low numbers of host bees)?

What are the preferred hosts of *B. discolor* and how may they be conserved?

What are the flower-feeding requirements of *B. discolor* and how species specific is it?

Are there any secondary factors, such as aspect or abundance of flowers for adult feeding, which need to be considered?

3.2 Suggested research programme

The programme should have two major components - survey of distribution and in-depth studies on the ecology of the fly. The distribution needs to be studied first to provide sites for the ecological work. One avenue is to publish the attached map in the Larger Brachycera Recording Group Newsletter and ask recorders for further records and information. It is suggested that a limited number of areas are examined in detail to record the presence of adults and detail the habitat preferences, which are unclear. From the distribution map the target areas are:

- Somerset
- Dorset
- Isle of Wight
- The Gower
- North Kent

The peak time for survey is probably late April, depending on the season, but at this time of year the weather is critical and a cool wet spring may make surveys unprofitable. It is also probable that *B. discolor* is a species that can exist in low population densities. Insect populations, especially those of parasitic and predatory species, can survive at low densities and the density of maintenance may be lower than that which can be detected by sampling methods. It is also a strong flier which probably searches widely for flowers and hosts. Thus the species may be more easily or accurately recorded from the breeding site by searching for hatched pupae. During the survey work the habitat characteristics of the sites should be recorded in detail and where the species is found a list of aculeates, particularly *Andrena* species, made. This will require collaboration with an aculeate specialist. The flower species visited should be listed and possibly identification of pollen (if any) from on flies or in their crops considered (pollen can be commercially identified, but the process is expensive).

The second part of the programme is the ecological research which would probably need to be commenced later than the distribution survey. There would need to be a strong colony available to provide sufficient numbers of specimens and to allow destructive sampling of host nests. A colony where females have been observed ovipositing would be ideal. At the appropriate time of year, depending on the host species, cells would need to be uncovered and examined for larvae of *B. discolor* on the mature host larva. Both the fly larva and associated bee larvae would be reared to prove the host association. This would again need the services of an aculeate specialist identify host colonies and to advise when the host larvae are mature. Both the bee and the bombyliid may undergo diapause.

4. Conclusions

B. discolor has been recorded from southern England and Wales and is known from gardens, calcareous habitats and woodlands. There has been a contraction in the range of the species in recent years. The host range of the species is not adequately known. Future research should concentrate on the distribution, host aculeates, flower preferences and habitat requirements of the species.

Acknowledgements

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Appendix 1. Distribution records of *Bombylius discolor* Mikan in Britain

Grid ref.	V-C	Locality	Collector	Date	Notes
SO2914	35	Abergavenney	A.Chapman [Ver. col.]	[pre 1960]	
SO6140	36	Tarrington	J.H.Wood	1897	
SO745760	37	Wyre Forest	C.J.Wainwright	1909	
SO745760	37	Wyre Forest	N.Jones	1986	
SO77	37	Wyre Forest	C.J.Wainwright	1909	
SO764733	37	Wyre Forest, Rock Coppice	N.P.Jones	1986	
SO8501	34	Minchinghampton Common SSSI	Ricardo	1900	
SO8503	34	Rodborough Common SSSI	B.Fletcher	1943	
SO8503	34	Rodborough Common SSSI		1890	
SO8900	34	Devil's Churchyard nr Minchinghampton	C.O.Hammond	1949	
SO8900	34	Devil's Churchyard, nr Minchinhampton	K.N.A.Alexander	1986	
SP0511	34	Chedworth	G.H.Knight	1960	
SP209501	38	nr village of Combrook	G.Knight	28.v.1977	
- associated with colony of <i>Andrena labialis</i> in north side of E/W cutting of disused railway.					
Both <i>B. discolor</i> and <i>B. major</i> abundant.					
SP3747	38	Ratley Quarry	S.Falk	25.iv.1996	
- limestone quarry					
SP3457	38	Chesterton Wood	G.H.Knight	1960	
SP385598	38	Harbury Spoilbank	S.J.Falk	10.iv.1992	
- old limestone spoilheap					
SP3858	38	Harbury Spoilbank		1988	
SP308607	38	Ufton Fields Nature Reserve	G.Knight	1967/1968	
- disused Lias Lst. quarry					
SP3862	38	Ufton Wood	G.H.Knight	1960	
SP3861	38	Ufton Fields	Anon.	1969	
SP3862	38	Ufton Fields		1969	
SP40	22	Appleton Com. nr Oxford	W.Holland	13.iv.1902	
SP40	22	Boars Hill	A.H.Hamm	30.iv.1899	
SP50	22	Bagley Wood	W.J.Lucas	16.iv.1900	
SP5102	23	Bagley Wood	K.G.V.Smith	1955	
SP50	23	Marston Lane	A.H.Hamm	11.v.1919	
SP50	23	Shotover	A.H.Hamm	2.v.1909	
SS4785	41	Horton	S.J.Falk	1993	
SS4885	41	Overton Bay	S.Falk	23.iv.1993	
- cliff top					
SS4885	41	Port-Eynon Bay	S.J.Falk	1993	
SS51		Bradford Abbas	B.Dean	26.iv.1986	
SS510850	41	Oxwich	P.M.Pavett	22.iv.1985	
- south facing ash wood edge on Carboniferous limestone					
SS501851	41	Oxwich	P.M.Pavett	22.iv.1985	
- coastal cliffs					
SS5087	41	Oxwich Burrows NNR	S.J.Falk	24.iv.1993	dunes
SS5087	41	Oxwich Bay	P.M.Pavett	1992	
SS5287	41	Nicholaston Dunes	S.Falk	25.iv.1993	dunes
SS530880	41	Penmaen Burrows	S.J.Falk	1993	
SS8176	41	Porthcawl	G.H.Verrall	11.v.1902	
ST057427	5	Cleeve Hill SSSI	A.J.Prince	2.iv.1989	
- calcareous mixed wood, scrub and fringe					
ST3002	3	Alston	G.H.Verrall	6.iv.1893	
ST3839	6	Edington	J.Cowley	1942	
ST3936	6	Moorlinch	S.P.Roberts	10.v.1998	
- roadside verge, clay soil					
ST4907	9	Chedington Woods	E.T.Levy	1984	
ST4907	9	Chedington Woods	E.T.Levy	1985	
ST4907	9	Chedington Woods	E.T.Levy	1986	
ST439101	5	Milwater Meadow	A.J.Parsons	1978	
ST494171	5	St Michael's Hill	E.T.Levy	1984	
ST405376	6	Loxley Wood	J.Cowley	1942	
ST405376	6	Loxley Wood	E.T.Levy	1984	
ST405376	6	Loxley Wood	E.T.Levy	1986	
ST4140	6	Shapwick Heath SSSI, non NNR		1923	
ST449553	6	Cheddar Wood	R.S.Cropper	1984	
ST4963	6	Redhill	A.C.Pont	1960	
ST535104	5	Coker Wood	D.A.Levy	1985	
ST5713	9	Clifton Maybank	E.T.Levy	1984	
ST5814	9	Bradford Abbas	W.F.Dean	1986	
ST588147	9	Bradford Abbas	W.F.Dean	20.iv.1988	garden

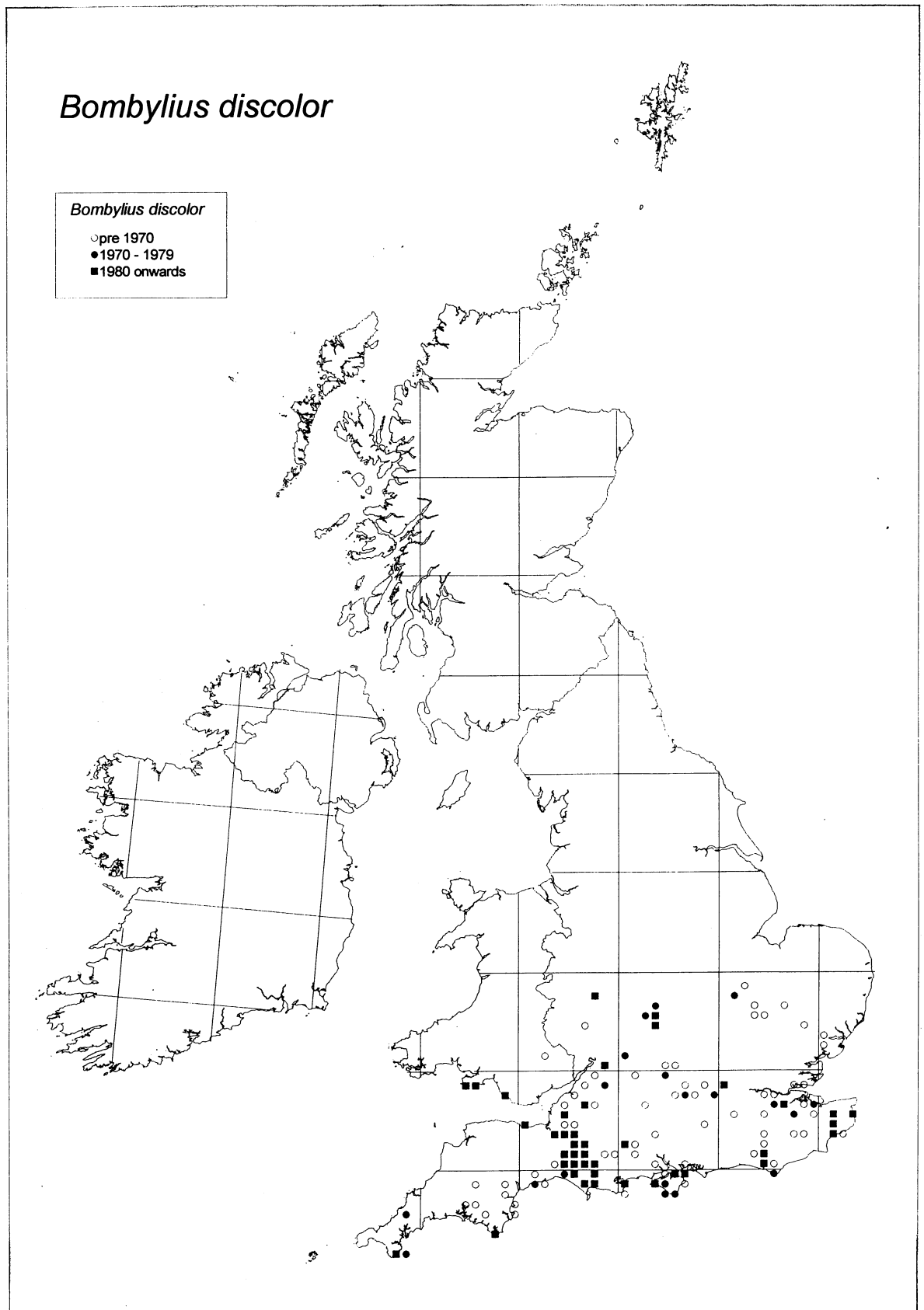
ST542223	5	Yeovilton Weir	E.T.Levy	17.v.1992	
ST502315	6	Great Breach Wood	A.J. Prince	4.iv.1990	
- mixed woodland rides and clearings					
ST5445	6	Wells	C.G.Lamb	1904	
ST5445	6	Wells	C.G.Lamb	1904	
ST5573	6	Leigh Woods	E.E.Lowe	1945	
ST644004	9	Hog Hill Wood, Ceme	E.T.Levy	19.iv.1989	
ST6718	5	Milbourne Port	W.F.Dean	1980	
ST6718	5	Milbourne Port	E.T.Levy	1984	
	5	Milbourne Port	B.Dean	9.iv.1981	
ST61	5	Milbourne Port	B.Dean	12.iv.1988	
ST6327	5	North Cadbury	W.F.Dean	1980	
ST6327	5	North Cadbury	E.T.Levy	1984	
ST62	5	North Cadbury	B.Dean	20.iv.1980	
ST62	5	North Cadbury	B.Dean	21.iv.1980	
ST62	5	Sparkford	B.Dean	12.iv.1988	
ST6127	5	Sparkford Wood	E.T.Levy	1984	
ST613275	5	Sparkford Wood	W.F.Dean	12.iv.1988	
- mature deciduous wood					
ST62	5	Galhampton	B.Dean	19.iv.1980	
ST6329	5	Galhampton	W.F.Dean	1980	
ST645645	6	Compton Dando, Stable House	M.W.J.Paskin	13.iv.1984	garden
ST645645	6	Compton Dando, Stable House	M.W.J.Paskin	21.iv.1984	
- garden at flower of forget-me-not					
ST645645	6	Compton Dando, Stable House	M.W.J.Paskin	8.vi.1984	
- garden at flower of purple Aubretia					
ST645645	6	Compton Dando, Stable House	M.W.J.Paskin	14.v.1984	
- garden at flower of purple Aubretia					
ST645645	6	Compton Dando, Stable House	M.W.J.Paskin	9.v.1984	
- garden at flower of purple Aubretia					
ST645646	6	Compton Dando	M.W.J.Paskin	1984	
ST68	34	Olveston	M.J.C. [Ver. col.]	v.1918	
ST7805	9	Delcombe Wood	M.Parker	13.iv.1997	
ST7805	9	Delcombe Wood	M.Parker	30.iii.1997	
ST76	6	Limpley Stoke	R.B.Robertson	11.iv.1906	
ST7864	6	Claverton	J.R.	1914	
ST7694	34	Coombe Hill, Wotton	E.E.Lowe	1944	
ST8312	9	Child Okeford	C.D.Day	1928	
ST8089	34	Midger SSSI	n.d.	1979	
ST91	9	Crichel	P.Harwood	19.iv.1942	
ST98	7	Milbourne Port	B.Dean	24.iv.1980	
SU0325	8	Broade Chalke	S.P.Roberts	v.1994	
- grazed chalk downland on SW facing unimproved bank					
SU1118	11	Rockbourne	C.H.Andrewes	1958	
SU1024	8	Coombe Bissett Down	C.H.Andrewes	1964	
SU19	7	Redlands nr Highworth	W.J.Arkell	iv.1918	
SU2166	7	Savernake Forest		1924	
SU30	11	New Forest s.l.	H.W.Andrewes	1904	
SU3737	12	Leckford	Lewis & McCarthy	1947	
SU3738	12	Leckford Abbas Estate		1947	
SU49	22	Dry Sandford Pit	C.O'Toole	9.v.1978	
SU49	22	Cothill	L.H.Woolatt	15.iv.1949	
SU49	22	Tubney	A.H.Hamm	14.vi.1906	
SU49	22	Tubney	A.H.Hamm	14.iv.1906	
SU49	22	Tubney	J.Collins	13.v.1906	
SU49	22	Tubney	J.Collins	14.iv.1906	
SU4398	22	Tubney area		1906	
SU4499	22	Tubney Wood s.s.	O.W.Richards	1924	
SU589029	11	Gosport	I.R.Hudson	1984	
SU57	22	Yattendon		iv.1962	
SU57	22	Yattendon	n.d.	iv.1962	
SU6406	11	Portsdown SSSI	D.J.Clark	1948	
SU6678	23	Gutteridge's Wood, Nuney Green		1969	
SU6181	23	Coneyberry Hill & Wroxhills Wd	J.H.Cole	1958	
SU77	22	Reading, Hardwick	E.Burt	16.v.1930	
SU8540	17	Frensham Common	J.W.Yerbury	1903	
SU879817	22	Maidenhead	R.Besch	1955	
SU97	22	Windsor Forest SSSI	A.E.Stubbs	1974	
SU97	22	Windsor forest SSSI	C.N.Colyer	1951	
SW7316	1	Kennack Sands	A.P.Foster	1985	
SW8019	1	Lowland Point	G.M.Spooner	1977	
SW8051	1	Chyverton Woods	S.B.Cull	1974	
SW803513	1	Cheverton Wood, Zelah	S.Cull	14.iv.1974	
SX46	3	Walkham Valley	J.W.Yerbury	1893	
SX46	3	Walkham Valley	J.W.Yerbury	1895	
SX46	3	Walkham Valley	G.H.Verrall	1.v.1890	
SX56	3	Yelverton 'Fiveoaks'	G.M.Spooner	15.iv.1954	

SX58	3	Tavy Valley	G.H.Verrall	9.iv.1893
SX6353	3	Ermington	C.R.Billups	1907
SX7136	3	Bolt Head to Bolt Tail	G.M.Spooner	1976
SX7936	3	Prawle Point	A.E.Stubbs	1978
SX7936	3	Prawle Point & Start Point	J.D.Coldwell	1986
SX7681	3	Lustleigh	J.E.Collin	17.iv.1935
SX8377	3	Chudleigh Knighton Heath	A.P.G.Michelmore	1924
SX8671	3	Newton Abbot	L.Parmenter	1931
SX8688	3	Northwood	A.P.G.Michelmore	1924
SX95	3	Brixham	P.Harwood	30.iv.1928
SX96	3	Torquay	P.Harwood	19.iv.1929
SY1988	3	Sidmouth to Beer Coast		1978
SY1988	3	Branscombe	M.Edwards	1973
SY1095	3	Ottery St Mary	A.W.Pearcy	1960
SY28	3	Beer Aston	J.W.Yerbury	1893
SY415919	9	Chideock	M.Edwards	1978
SY5396	9	Powerstock Common SSSI	E.T.Levy	1895
SY6285	9	Coryates	M.Parker	20.iv.1994
SY6282	9	Tattan Wood	M.Parker	27.iv.1985
SY6382	9	Tattan Wood	M.Parker	29.iii.1997
SY6680	9	Chaffies Lake	A.Wass	23.iii.1990
SY668800	9	Chafey's lake	E.T.Levy	1984
SY695856	9	Came Wood	D.A.Levy	1985
SY705845	9	Sutton Poyntz	E.T.Levy	29.iii.1991
SY7084	9	Sutton Poyntz	M.Parker	26.iv.1987
SY79	9	Yellowham	B.Dean	11.iv.1988
SZ07	9	Swanage	C.O.Hammond	1949
SZ07	9	Swanage (vague)	C.O.Hammond	1949
SZ08	9	Twelve Acre Wood, Studland	E.T.Levy	1986
SZ38	10	Freshwater IOW	K.G.Blair	1947
SZ38	10	Isle of Wight	M.Oates	1985
SZ47	10	Hanover Point to St Catherines	G.Else	1972
SZ429857	10	Calbourne Down	J.W.Saunt	1946
SZ49	10	Cowes, West	J.W.Saunt	1939
SZ5376	10	Niton, Ventnor Undercliff	G.Else	1976
SZ5076	10	Niton	C.H.Andrewes	1921
SZ5678	10	Ventnor Downs SSSI	P.M.Ellis	1923
SZ5879	10	Luccombe Bay pSSSI	S.W.Wakely	1947
SZ5095	10	East Cowes	J.W.Saunt	1945
SZ553907	10	Firestone Copse	I.R.Hudson	28.iv.1987
- mixed woodland with open rides				
SZ68	10	nr Bembridge	E.B.Poulton	24.iv.1900
SZ68	10	St Helens	E.B.Poulton	12.iv.1902
- St Helens Cottage, in garden				
SZ68	10	St Helens	E.B.Poulton	13.viii.1902
SZ68	10	St Helens	E.B.Poulton	4.iv.1902
- St Helens Cottage				
TL180702	31	Brampton Wood	J.H.Cole	1966
TL180702	31	Brampton Wood	J.H.Cole	1966
TL200800	31	Monks Wood NNR	N.C.Rothschild	1905
TL345532	29	Eversden Wood	Cam. Nat. Soc.	1930
TL36		Madingley	G.C.Varley	2.iv.1932
TL4557	29	Cambridge area	F.Jenkinson	1900
TL4557	29	Cambridge area	F.Jenkinson	1902
TL455573	29	Cambridge Botanic Gardens	Cam. Nat. Soc.	1942
TL6463	26	Newmarket	G.H.Verrall	1898
TL6469	29	Chippenham	G.H.Verrall	21.iv.1898
TL84	26	Sudbury	P.Harwood	24.iv.1928
TM0024	19	Colchester	J.E.Chainey	1962
TM02	19	Colchester	P.Harwood	1911
TM0533	18	Dedham	L.Saunders	1911
TQ08	21	Harefield	C.R.Vardy	1980
TQ1356	17	Bookham Common	G.Nixon	1930
TQ3814	14	Warrengore	G.H.Verrall	8.iv.1894
TQ3814	14	Warrengore, Lewes	G.H.Verrall	9.iv.1872
TQ3814	14	Warrengore	G.H.Verrall	11.iv.1884
TQ4401	14	Newhaven	M.Edwards	1984
TQ4701	14	Bishopstone	G.H.Verrall	1902
TQ41	14	nr Isfield	J.E.Collin	10.iv.1939
TQ41	14	nr Ridgewood	G.H.Verrall	1865
TQ4210	14	Malling Down, Lewes	P.J.Hodge	1988
TQ4210	14	The Coombe, Lewes	P.J.Hodge	24.iv.1988
- chalk grassland				
TQ4615	14	Lewes, Plashett	G.H.Verrall	25.iii.1868
TQ4615	14	Plashett	G.H.Verrall	7.iv.1870
TQ42	14	nr Maresfield	J.E.Collin	10.iv.1939
TQ4136	14	Ashhurstwood	C.R.Billups	1904

TQ4152	17	Limpsfield Common	L.Parmenter	1939
TQ4170	16	Sundridge Park	J.F.Burton	13.iv.1948
TQ5408	14	Cuckmere	J.E.Collin	9.iv.1939
TQ5465	16	Eynsford	H.W.Andrews	1937
TQ5465	16	Eynsford	A.Low	1939
TQ5763	16	West Kingsdown	G.H.L.Dicker	1976
TQ5671	16	Darenth	G.H.Verrall	8.iv.1870
TQ65	16	Frith Woods		1900
TQ6361	16	Trottscliffe Downs	G.Dicker	1980
TQ6561	16	Trosley Country Park	G.H.L.Dicker	1980
TQ7237	15	Goudhurst	O.W.Richards	1933
TQ7359	15	Aylesford	E.Philp	1974
TQ7655	15	Maidstone	J.W.Yerbury	1894
TQ7655	15	Maidstone	W.R.O.Grant	1896
TQ796894	18	Thundersley Great Common SSSI	D.G.Davis	1962
TQ8235	15	Hemsted Forest	H.W.Andrews	1900
TQ8061	15	Bredhurst Hurst	K.C.Durrant	1946
TQ8486	18	Leigh-on-Sea	M.G.Smith	1948
TQ9060	15	Cromer's Wood	J.C.Felton	1962
TQ9262	15	Bapchild	L.Clemons	1976
TQ921639	15	Sittingbourne, 76 Tonge Road	L.Clemons	10.iv.1976
TQ921639	15	Murston	L.Clemons	10.iv.1976
TQ95		Dodington	Chitty	1894
TR184364	15	Seabrook Stream SSSI	E.Philp	1986
TR1245	15	Dowles Farm	L.Clemons	22.v.1983
TR159417	15	Sibton Park	L.Clemons	27.iv.1996
TR168459	15	Park Gate Down	L.Clemons	16.iv.1996
TR106528	15	Denge Wood	L.Clemons	16.iv.1996
TR2135	15	Folkstone	E.B.Ashly	1925
TR2135	15	Folkstone	E.B.Ashly	1924
TR2336	15	Folkstone	G.H.Verrall	17.iv.1870
TR3355	15	Ham Fen	L.Clemons	18.iv.1996
TV5607	14	Abbott's Wood	G.H.Verrall	24.iv.1870
TV5399	14	Friston Forest	R.A.Jones	1970
TV5399	14	Friston Forest	R.D.Dumbrell	3.iv.1976
- beech/pine plantation on chalk		Ranscombe (or Rauscombe)	G.H.Verrall	14.iv.1888
- bred pupa				

Maps

Map 1



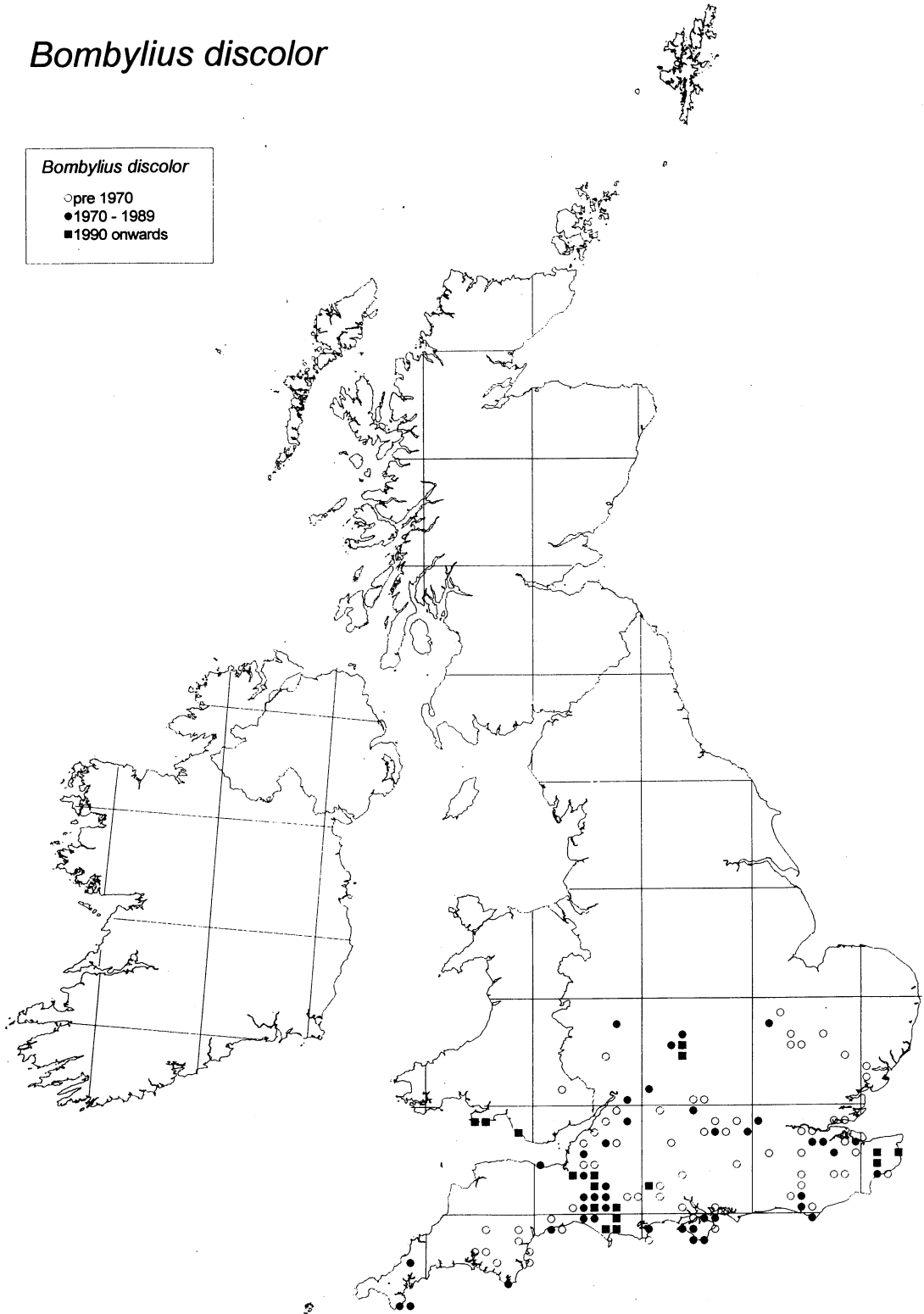
Distribution of *Bombylius discolor* - dotted bee-fly in Britain, by 10km square.
Source: J. Ismay, Hope Entomological Collections - University Museum of Natural History Oxford, and C.M. Drake, Larger Brachycera Recording Scheme and English Nature - Invertebrate Site Register.

Map 2

Bombylius discolor

Bombylius discolor

- pre 1970
- 1970 - 1989
- 1990 onwards



Distribution of *Bombylius discolor* - dotted bee-fly in Britain, by 10km square.

Source: J. Ismay, Hope Entomological Collections - University Museum of Natural History Oxford, C.M. Drake - Larger Brachycera Recording Scheme and English Nature - Invertebrate Site Register.