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A PRELIMINARY LIST OF THE IRISH TEPHRITIDAE(DIPTERA), WITH NOTES ON THE SPECIES

Peter J.Chandler and Martin C.D.Speight

Introduction

In the last 15 years significant advances have been made towards compiling a list of Irish Diptera(flies). But there still remains great scope for adding to knowledge of the Irish Diptera fauna among the families of the Schizophora, only a few groups of which have yet been treated systematically. One of the Schizophoran groups most familiar to the general entomologist is the Tephritidae (also referred to in literature as Trypetidae or Trupanaeidae), a family of flies all of which are phytophagous as larvae. In this text we have set out to provide a list of the known Irish tephritids, together with a summary of available life history information and Irish distribution records. In all cases, the records cited are based on specimens whose identity has been checked by either one or both of us.

Adult tephritids - black, brown or yellow in colour - are relatively small but with conspicuously marked wings, the patterns on which are frequently highly specific. The adult flies may be seen running about wing-waving on or near their larval food-plants (usually herbs), in more or less open habitats. A few species habitually occur on tree foliage. Many tephritids can be collected by sweeping, but a better method is searching their host plants. Some are only readily obtained by rearing.

Larval tephritids feed internally on plant tissues, mainly in the flower-heads of Compositae but stems, roots, leaves and fleshy fruits all have tephritid associations. Most species are specific to a particular plant genus or tribe, while others attack all members of some plant family indiscriminately. In the period 1930-1960 much work was done in Britain on the life histories of W.European species. A list of known food-plants was provided by Niblett(1939) and many of the then gaps in knowledge were subsequently filled by Niblett and others, enabling Uffen(1978) to produce a comprehensive food-plant list for the British species. The food-plant associations mentioned in the present text are based upon Uffen(l.c.).



Because most of their food-plants occur in open situations, tephritids are most frequently found in grasslands (especially on chalk or limestone), in ruderal habitats (waste ground, gardens, etc.) or in littoral sites (sand-dunes, cliffs, salt-marsh). The fruit feeders occur in hedges or at woodland edge. However, the species with leaf-mining larvae, although developing in herbaceous plants, occur mainly in wooded locations and mines are more frequent in shaded than open situations.

From examination of many collections and extensive field-work in Ireland we have been able to muster Irish records of only 24 tephritid species. In contrast, 76 species are known from Great Britain (all of the known Irish species also occur in Great Britain), as listed in Kloet and Hincks(1976), 72 of which are certainly resident there. The depauperate nature of the Irish tephritid fauna cannot reasonably be regarded as due to non-availability of appropriate food-plants in Ireland since the host-plants of fully 39 of the species known in Great Britain but absent from Ireland do occur in Ireland. It is undoubtedly true that insect groups which favour open habitats with a high degree of insolation are poorly represented in Ireland. Among Diptera, the larger Brachycera and Tachinidae may be cited as examples, as argued by Chandler(1975). The Tephritidae is a mainly tropical group with, in Europe, its greatest diversity in the Mediterranean basin.

Of the remaining 13 tephritids known in Great Britain but unrecorded from Ireland, 2(*Tephritis dioscurea*(Lw.) and *Heringina guttata*(Fal.)) are probably wrongly recorded from Great Britain, 2 are occasionally introduced "Fruit Flies" of Mediterranean origin(*Ceratitis capitata* (Wied.) and *Rhagoletis cerasi*(L.)) and 5 have unknown food-plants (*Acinia corniculata*(Zett.), *Chaetostoma curvinervis* Rond., *Rhacochlaena toxoneura*(Lw.), *Tephritis separata* Rond. and *Trypeta wiedemanni*(Hend.)). This leaves but 4 species whose known food-plants occur in Great Britain but not in Ireland, namely *Gonioglossum wiedemanni*(Mg.)(larvae in fruits of *Bryonia dioica* Jacq.), *Paroxyna praecox*(Lw.)(larvae in flower heads of *Filago gallica* L.), *Platyparella discoidea*(Fab.)(larvae in stems of *Campanula latifolia* L.) and *Terellia longicauda*(Mg.)(larvae in flower heads of *Cirsium*

*eriophorum* Roth.).

It is difficult to argue forcefully that the 39 tephritids present in Britain but unrecorded from Ireland despite the presence there of appropriate food-plants are all really absent from Ireland, because collecting effort has been sporadic and largely incidental. To date the most widely distributed Irish species (*Tephritis vespertina*(Lw.)) is known from only 17 counties. There are a few Irish counties (e.g. Roscommon) from which there are so far no tephritid records at all. Further collecting can, then, be expected to reveal the presence in Ireland of some so-far unrecorded species in this family, even though the character of the physical environment is such as to probably exclude most European species from the island. Comparing the Irish fauna with local lists for various parts of Great Britain gives the following results:

<u>local list</u>	no.spp.in <u>local list</u>	no.Irish spp. <u>represented</u>
1. Scilly Isles (Smith,1963)	5	5
2. Kent (pers. comm.H.Britten)	58	21
3. London area (Niblett,1956)	49	21
4. Bristol area (Audcent,1950)	37	20
5. Cambridgeshire (Collin,1938)	27	15
6. Monks Wood, Hunts. (Cole & Willis,1973)	8	6
7. Yorkshire (Hincks,1946)	28	16
8. Northumberland & Durham(Fordham,1946)	23	11
9. Is.of Rhum (Steele & Woodroffe, 1969)	8	8

From an examination of the species held in common by these lists and the Irish list it is apparent that most of the Irish species tend to be widely distributed in Great Britain. In particular, species which have reached Northern England and Scotland are more likely to also

have reached Ireland than are those tephritids found today in Great Britain only in Southern England.

Tephritids can be distinguished from members of related families by use of the keys provided by Colyer and Hammond(1968), McAlpine(1981), Oldroyd(1970) and Unwin(1981). The constitution of the family, as recognised here, follows Kloet and Hincks(1976), as does the species nomenclature used. Some authors, notably Griffiths(1972), employ a broader concept of the Tephritidae, embracing the flies consigned in Kloet and Hincks(l.c.) to Otitidae, Pallopteridae and Platystomatidae. The Irish representative of these other "tephritoid" groups have been dealt with elsewhere (see Speight,1979; Speight and Chandler, in press). There is no English-language key from which all British and Irish Tephritidae can be identified to species. Collin(1947) provided a key to the genera recognised by him, which also permits identification of the 22 species belonging to genera (*sensu* Collin,l.c.) monospecific in the British Isles. The European keys are largely unsatisfactory and in particular frequently place too much reliance on small differences in wing pattern without taking into account the full range of intra-specific variation. Nevertheless, the illustrations of wing pattern given by, for example, Séguy(1934), enable many species to be correctly named. Papers by Collin(1937, 1943, 1946, 1950) and Andrews(1940, 1941) deal with taxonomic and nomenclatural problems concerning a limited number of species, and thereby assist in identification of some difficult species groups.

Abbreviations used in text

AHH	A.H.Halliday, NMD
AWS	A.W.Stelfox, NMD & SIW
BMNH	in the collection of the British Museum(Natural History), London
BPB	B.P.Beirne
CM	C.Morley
DND	D.N.Dowling
ECPC	E.C.Pelham-Clinton, RSM
HWA	H.W.Andrews, collection of British Entomological & Natural History Society (London)
JJFXK	J.J.F.X.King
JNH	J.N.Halbert, NMD

JWY	J.W.Yerbury
MCDS	M.C.D.Speight
MdeCW	M.de Courcy Williams
NMD	National Museum, Dublin
PJC	P.J.Chandler
RCF	R.C.Faris, RSM
RSM	Royal Scottish Museum (Edinburgh)
SIW	in the collections of the Smithsonian Institution(Washington, D.C.)
UM	in the collections of the Ulster Museum(Belfast)

Annotated species list

In the following list, the Irish distribution is summarised for the seven species frequently collected and already known to be widespread in Ireland. Full data is given for all other species, for which there are ten or fewer records.

*Myoleja caesio*(Harris)

Although once thought scarce, *M.caesio* has been found commonly in shady woodland in southern England in recent years, and is usually in numbers when found. It was long thought to be a leaf miner in *Silene dioica*(L.) Clairv. (a synonym of *caesio* is *lychnidis* Fabricius, taking its name from *Lychnis* in which *dioica* was formerly included). Mr H.Britten informed one of us (PJC)(*in litt.*,1968) that A.H.Hamm reared it near Oxford from a leaf mine in that plant, on which Britten had himself taken it plentifully at Miller's Dale,Derbyshire; Hamm's record has not, however, been confirmed. Shaw(1953) found *caesio* on *Aesculus* foliage above *Petasites* and Britten found it on *Petasites* at Chee Dale, Derbyshire. Allen(1963) suggested *Tussilago* (and possibly *Petasites*) as food-plants. Fonseca(1964) found the species in numbers amongst *Urtica dioica* L. but the flies were presumably using the nettle stand only as shelter. They are usually found either among low plants or tree foliage in woodland.

The related species *M.lucida* Fallén develops in the fruit of *Lonicera xylosteum* L. and the possibility that *caesio* is a fruit feeder has been considered. Uffen(1964) suggested *L.periclymenum* L. and if this is the food-plant, its sporadic fruiting in shade may account for the local occurrence of the fly. Other Caprifoliaceae might be

possible. Mr A.A.Allen (pers.comm.) has suggested that *Sambucus nigra* L. might be the host. When one of us (PJC) collected *caesio* settled under a *Tussilago* leaf at Bromley, Kent, 3 Sept.1966,*Sambucus* but not *Lonicera* was present in the vicinity. *Sambucus* is also probably common to all the known localities for *caesio* and was present where *caesio* occurred at Portmarnock. *S.dioica* is scarce in Ireland and was probably not present at Portmarnock.

DOWN: Clifden, J 37 (AHH, NMD, 3 under *lychnidis*, one labelled *caesio* by J.E.Collin). DUBLIN: Portmarnock, O 2443, 17 July 1971, sycamore copse behind dunes, 2 ♀ (PJC).

*Euleia cognata*(Wiedemann)

A leaf miner in *Tussilago* and *Petasites* in wooded sites. Mines are conspicuous in autumn; larvae pupate in the soil. Flies emerge in the following year and are often found settled under the foliage of trees in early summer.

DOWN: Holywood, J 37 (3 labelled 'Ireland' and one labelled *cognata*, AHH, NMD)(Haliday,1833). ARMAGH: Poyntzpass, J 03, 17 August 1921, house (W.F.Johnson, RSM). DUBLIN: Portmarnock, O 24, 11 August 1893 (JNH, NMD); Seapoint, O 22, 14 August 1937 (BPB, NMD). WICKLOW: Glen of the Downs, O 2512, 11 October 1970, numerous larvae in *Petasites* (PJC).

*Euleia heraclei*(Linnaeus)

A leaf miner in Umbelliferae (*Apium*, *Heracleum*, *Sium*, *Angelica*, *Pastinaca*, *Smyrnum*, *Aegopodium*, *Pimpinella*), frequent in woodland edge and hedges. Most known food-plants are common in Ireland. Mines occur from July onwards; larvae pupate in soil and emergence may be in the same year to produce a second brood. It has been recorded as a pest of celery (*Apium graveolens* L.) in Dublin gardens (Carpenter,1905) and larvae were found in *Heracleum* at Glen of the Downs, Co.Wicklow, 11 October 1970 (PJC). Haliday(1833) recorded it under the synonyms *onopordinis* and *centaureae* but it was unrepresented in his collection.

DOWN. LOUTH. DUBLIN. WICKLOW. KILDARE. WEXFORD. KERRY. CLARE. MAYO. CAVAN.

*Cryptaciura rotundiventris*(Fallén)

Another leaf miner of Umbelliferae, recorded in Europe from *Angelica*, *Aegopodium* and *Pimpinella*. In Britain it has been reared from *Heracleum* (Collin,1947, who cast doubt on a reputed record from *Arctium*). It is apparently scarce in Britain and usually found singly, but extends at least as far north as the Scottish Lowlands.

WEXFORD: Boley Fen, S 7817, 8 September 1979, poor fen(DND, MCDS collection).

*Trypeta immaculata*(Macquart)

A leaf miner in Compositae, most often associated with *Taraxacum*, which it has been found mining in Ireland. European records include other common composite genera (*Crepis*, *Hieracium*, *Hypochoeris*, *Lapsana*, *Leontodon*, *Mycelis*, *Sonchus*). More recent records are known to us from Ireland than from Britain.

KILDARE: N 7715, 13 July 1979, ♀s beaten from *Salix* by ditch in conifer plantation on drained fen (MCDS). DUBLIN: garden, O 1627, malaise trap, 10 August 1981, ♀ (MCDS). WICKLOW: Glen of the Downs, O 2512, 11 October 1970, eight larval mines in *Taraxacum*, one larva in each mine, ♀ emerged 7 May 1971 (PJC).

*Trypeta zoe*(Meigen)

A leaf miner in Compositae in open situations. Common in Britain; probably under recorded in Ireland but evidently widespread. Known hosts are *Artemisia*, *Chrysanthemum*, *Eupatorium*, *Senecio*, *Petasites*, *Tussilago* and garden species of *Aster* and *Chrysanthemum*. Mines appear in early summer, larvae pupate in the soil, flies emerging in June-July of the same year and then hibernating as adults.

DOWN: Stormont, J 3974, 10 July 1975, ♂ (A.G.Irwin, UM); Holywood, J 37 (Haliday,1833; 2 ♂ labelled 'Ireland', AHH, NMD). DUBLIN: Rathmines, O 02, 16 September 1908 (Stephens, NMD); Dublin, garden, O 1627, malaise trap, 11 June 1978, ♂ (MCDS); Harold's Cross, O 13, 30 May/26 August/5 September 1934, ♀s (AWS, RSM). WICKLOW: Devil's Glen, T 29, 23 May 1920, ♀ (JNH, NMD). WEXFORD: Kilmun, 31 July 1925, ♀ (NMD). KERRY: Kenmare Demesne, V 97, 1905 (JNH, NMD).

*Phagocarpus purmundus*(Harris)

The paucity of Irish records is probably not significant. The adults

are infrequently collected in Britain, but larvae are found more readily. They develop in the fruit of *Crataegus* and have also been reared from other Rosaceae (*Cotoneaster* and *Pyracantha* spp.) and from *Berberis*. Pupation is in the ground and adults emerge in the following year.

ANTRIM: Belfast, J 3268, 6 June 1972, ♂ (R.Nash, UM). DUBLIN: Loughlinstown Common, O 2423, 20 July 1978, swept from grassy bank sloping down to stream (MdeCW, MCDS collection).

*Chaetostomella onotrophes*(Loew)

A common species, developing in flower heads of Compositae (*Cirsium*, *Centaurea*, *Serratula*, *Arctium*, *Carduus*) in open situations. Larvae pupate in the flower heads. Adults may emerge in the same year to produce a second brood. Most records are from the south but R.C.Faris found it commonly in Cavan and reared it several times from *Centaurea nigra* L. Adult captures 26 May - 18 July.

DUBLIN. WICKLOW. KILDARE. LAOIS. CORK. CLARE. CAVAN.

*Terellia serratulae*(Linnaeus)

This may be one of the sunloving species which only reach the south-east corner of Ireland. It is frequent in the south in Britain, developing in flower heads of *Cirsium vulgare*(Savi) Ten. and of *Carduus* species (*nutans* L. and *acanthoides* L. are recorded hosts but are local in Ireland and not recorded from Wexford; *C.tenuiflorus* Curt., however, which is not a known host, does occur there). The larva forms a cocoon of pappus hairs and adults emerge in the following year.

WEXFORD: Wexford, T 02, 12 July 1902 (JJFK, BMNH); Saltee Island, X 95-96, 11 July 1978, bracken on rough grassland (MdeCW, MCDS collection).

*Orellia ruficauda*(Fabricius)

A frequent and widespread species; larvae occur in flower heads of *Cirsium* species - *arvense*(L.) Scop., *palustre*(L.) Scop. and *dissectum* (L.) Hill. Pupation is in a cocoon of pappus hairs in the flower heads and adults emerge in the following year.

WICKLOW: Vale of Clara, T 19 (Haliday,1833); July 1919 (JNH, NMD);

Bellevue, O 21, 11 July 1945 (AWS, SIW). KILDARE: Newbridge Fen, N 7715, 21 June 1978, *Cladium fen* (MCDS), 20 June 1979, 13 July 1979 (MdeCW). WEXFORD: Great Saltee Island, X 9596, 13 July 1978 (DND). WATERFORD: Tramore, S 50, 1901 (JNH, NMD), July-August 1918 (Scharff, NMD). LAOIS: N 0652, 3 July 1975, boggy mixed wood (MCDS). CORK: Glengarriff, V 95, 20 June 1901 (JWY, BMNH) (Yerbury, 1902, as *Trypeta florescentiae* L.), 20 June 1924 (JNH, NMD). GALWAY: Clonbrock, M 73, 1896 (JNH, NMD). CAVAN: Annagh Lake, Belturbet, H 31, 5 July 1934 (RCF, HWA collection and RSM); Farrinseer, Binney's Bog, 20 June 1935, 20 October 1941 (RCF, RSM).

*Xyphosia millaria* (Schrank)

Common and widespread in Ireland. It develops in the flower heads of *Cirsium* and *Arctium* species in fields and adults may emerge in the same year to produce a second brood. There are numerous Irish records. Haliday (1833) recorded it as *Tephritis arnicae* and specimens in his collection were under both that name and *Spilographa abrotani*. Grimshaw (1912) recorded it under the name *Oxyphora flava* Geoffroy. It has been observed on *Cirsium arvense* at Powerscourt, Co. Wicklow and on *C. palustre* at Marl Bog, Co. Tipperary (PJC). Adult captures 12 June-4 August.

DOWN. CAVAN. MEATH. DUBLIN. WICKLOW. WEXFORD. WATERFORD. KILDARE. LAOIS. TIPPERARY. CORK. KERRY. LEITRIM. CLARE. GALWAY. MAYO.

*Urophora stylata* (Fabricius)

Evidently widespread and probably common in open grassland and marsh in Ireland. The larvae form hard woody galls in the flower heads of *Cirsium vulgare*, *C. arvense* and *Carduus nutans*. They pupate in the gall and emerge in the following year.

WEXFORD: S 7424, 11 July 1978, swept in dry grassland, ♂ (MCDS). CLARE: Dromore, R 3487, 20 June 1977, ♀, lakeside fen (MCDS). LEITRIM: N 0195, 15 July 1978, ♀ (MCDS). MAYO: Louisburgh, L 88, ♂ (CM; Grimshaw, 1912).

*Urophora jaceana* (Hering)

Common at least in the south, records extending north to Cavan. Occurs in open grassland, where the larva forms a woody gall in the flower heads of *Centaurea nigra*; in Europe it develops in the non-



British *C.jacea* L. The life cycle resembles that of *U.stylata*. It was reared from *C.nigra* in Cavan by R.C.Faris. Adult captures 19 May-5 August.

CAVAN. LOUTH. MEATH. DUBLIN. WICKLOW. KILDARE. WATERFORD. LAOIS. KERRY. CLARE. MAYO.

*Ensina sonchi* (Linnaeus)

A small easily overlooked species which develops in flower heads of many Compositae in open situations. The Irish record is based on a rearing from *Aster tripolium* L.; it is also recorded in Britain from *Hypochoeris*, *Leontodon*, *Picris*, *Sonchus*, *Tragopogon* and in Europe also from *Carduus nutans*, *Crepis* and *Senecio*. It pupates in flower heads; emergence may occur in the same year and it is probably double brooded.

DOWN: Holywood, J 37 (Haliday, 1833; 1 labelled 'Ireland', AHH, NMD) (Haliday, 1839, described *Tephritis asteris*, bred from puparia among seeds of *Aster tripolium*, considered a possible variety of *sonchi* with more yellow colouration; now considered a synonym of *sonchi*).

*Sphenella marginata* (Fallén)

Only older records for the east coast are available for Ireland. In Britain, it is common in open habitats, developing in flower heads of *Senecio* species (*jacobaea* L., *vulgaris* L., *aquaticus* Hill, *erucifolius* L., *sylvaticus* L., *viscosus* L.). They cause the flower heads to swell and remain closed. Pupation is in the heads and emergence is in the same year.

DOWN: Holywood, J 37 (Haliday, 1833; 3 labelled 'Ireland', AHH, NMD). DUBLIN: North Bull, O 23, 7 August 1898 (NMD). WICKLOW: Ballymoyle, Arklow, T 27, 13 August 1945 (BPB, HWA collection).

*Paroxyna plantaginis* (Haliday)

Haliday (1833) described this species from specimens taken at Holywood, Co. Down and called it *plantaginis* because *Plantago maritima* L. was abundant in its habitat. It is now known to be a specific feeder in *Aster tripolium* and is common in saltmarshes. Its food plant is widespread around the Irish coasts but the fly has only been found on the east coast. It pupates in the heads and the adults emerge in the following year. Adult captures 28 June-19 September.

DOWN: Holywood, J 37. LOUTH: Blackrock, J 0703. MEATH: Laytown, O 1671. DUBLIN: Blackrock, O 2129; Bull Island, O 2538. WEXFORD: Wexford, T 02; marshes south of Wexford, T 01; North Slob, main channel, T 0723.

*Paroxyna bidentis*(Robineau-Desvoidy)

The provenance of Haliday's examples is unknown. More recent specimens are from southern coastal localities. The larvae develop and pupate in the flower heads of both *Bidens* species, emerging in the same year and hibernating as adults. According to Britten(*in litt.* to PJC, 1968) it occurs in Britain as far north as Lancashire and he had records of its rearing from the aliens *Galinsoga parviflora* Cav. and *Tagetes* species. The usual food-plants are both local in Ireland and are not especially coastal or southern.

Ireland (Walker, 1853; 7 examples, AHH, NMD, det. by J.E. Collin as *Oxya elongatula* Loew). WEXFORD: Kilmore, S 90, 13 August 1898 (J. Beaumont, BMNH; Yerbury, 1902, as *Tephritis elongatula* Loew).

KERRY: Glenbeigh, V 69, 20 June 1902 (H.St.J. Donisthorpe, det. by E. E. Austen as *absinthii*).

*Paroxyna loewiana* Hendel

This fly is probably localised in Ireland by the distribution of its food-plant *Solidago virgaurea* L., which is most frequent in the west and has its main centre in Wicklow in the eastern counties. It develops in the flower heads, in which pupation occurs and adults emerge in the following year.

WICKLOW: Athdown, 22 August 1948, ♂ (AWS, SIW). KERRY: Cahernane, V 98, 17 July 1943 (BPB, HWA collection). CLARE: Lisdoonvarna, R 19, July 1964, 4 reared from seed heads of *Solidago* (ECPC, RSM); Slieve Elva, M 10, 22 June 1977, ♂ ♀, on limestone (MCDS).

*Tephritis conjuncta*(Loew)

This common species develops in flower heads of *Chrysanthemum leucanthemum* L. and of the garden species *C. maximum*. Pupation is in the heads and emergence is in the same year; the adults hibernate and may be swept from heather, *Vaccinium*, etc. during the winter months. Many records from the southern counties north to Cavan. Adult captures January-June, August-September.

CAVAN. DUBLIN. WICKLOW. KILDARE. TIPPERARY. KERRY. MAYO.

*Tephritis vespertina*(Loew)

Common throughout Ireland in many habitats from boggy woods to dune-slacks and it is the most frequently collected Irish tephritid. The larvae develop and pupate in the flower heads of *Hypochoeris radicata* L.; it is double brooded and adults hibernate in similar situations to *conjuncta*. Adult captures 1 April-18 October.

ANTRIM. DERRY. FERMANAGH. DONEGAL. CAVAN. LOUTH. DUBLIN. WICKLOW. WEXFORD. KILDARE. LAOIS. TIPPERARY. CORK. KERRY. CLARE. MAYO.

*Tephritis conura*(Loew)

A northern species in Britain but apparently frequent throughout Ireland. It forms a hard gall in flower heads of *Cirsium* species (*vulgare*, *palustre*, *heterophyllum*(L.) Hill). The life cycle resembles that of the previous species. The record of *leontodontis* (as *leucodontis*) by Beirne(1943a) was later corrected to *conura* (Beirne, 1943b). Localities are either open pasture or woodland rides. Adult captures 1 May-17 August.

ANTRIM. TYRONE. CAVAN. DUBLIN. WICKLOW. OFFALY. CORK. KERRY. MAYO.

*Tephritis leontodontis*(Degeer)

Early records (Haliday,1833; Walker,1853; Carpenter,1895) probably refer at least in part to *conura*, which closely resembles *leontodontis*. There are, however, definite records from a few Irish localities. This species develops in flower heads of *Chrysanthemum leucanthemum* and *Leontodon* species (*autumnale* L. and *hispidus* L.). The Beirne specimens had been labelled as *praecox* Loew now placed in *Paroxyna*); there are sometimes only two white spots in cell R1 (on at least one wing) so that they would run in Séguy's key to *praecox*.

LONGFORD: N 0882, 16 July 1978, ♀, swept in open pasture (MCDS).

WICKLOW: Arklow, Ballymoyle, T 27, 13 August 1943, 2 ♂ (BPB, HWA collection). KERRY: Cahernane, V 98, 19 July 1943, ♂ (BPB, HWA collection).

*Tephritis bardanae*(Schrank)

There is only one Irish record of this species, which is common in Britain; it has possibly been overlooked but it might occur only near the east coast in Ireland. It develops in flower heads of *Arctium*

species and is usually closely associated with its food plant on which flies are found at rest or running about wing waving. The larvae develop in the seeds, pupating in the flower head and emergence of adults is in the same year. Another tephritid, *Orellia tussilaginis* (Fabricius) is common on *Arctium* in Britain but has not yet been found in Ireland.

DUBLIN: Dublin, garden, malaise trap, O 1627, 7 June 1976, ♀ (MCDS).

*Trypanea stellata* (Fuessly)

Only a few older records from the east coast in Ireland. British records are from flower heads of *Hieracium* and *Senecio* species, in which the larvae pupate and adults emerge in the same year. There are European records from many other Compositae (*Inula*, *Serratula*, *Artemisia*, *Crepis*, *Anthemis*, *Picris*, *Sonchus*, *Aster* and *Centaurea*).

DOWN: Holywood, J 37 (Haliday, 1833, as *Tephritis radiata* Schrank; Walker, 1853, cited Ireland under *stellata*; 1 example labelled *radiata* by Haliday and *amoena* by Collin, AHH, NMD). WICKLOW: Arklow, T 27, August 1940 (BPB, BMNH); Mizen Head sandhills, T 27, 17 August 1942 (BPB, HWA collection).

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NOTES ON THE IRISH DISTRIBUTION OF THE FRESHWATER CRAYFISH

Julian D. Reynolds

Introduction :

As its generic name suggests, the crayfish *Austropotamobius (Atlantostacus) Pallipes* (Lereboullet) has a western European distribution, occurring in Portugal, Spain, France, the Dalmatian hills of Jugoslavia, and the British Isles (Ingle, 1977). In mainland Europe, where other native and introduced crayfish species occur, it is apparently restricted to hill streams. In Ireland and England, where it is the only crayfish species, it is, however, widespread (Reynolds, 1979; Jay and Holdich, 1981) and occurs in streams, rivers and lakes, a wider range of habitats than elsewhere.

Some notes on the regional distribution of crayfish in Ireland have already been published. Thompson (1843) summarised available information, and interest was stimulated through the Irish Naturalist some 75 years later, resulting in several reports from correspondents (e.g. Delap, 1909). More recently, Inland Fisheries Trust records from stocked lakes were listed in a letter from the Director, Dr Kennedy, to the late Dr A.E.J. Went (pers. comm.). Moriarty published information from a number of Irish waters in 1973. A recent water quality survey by An Foras Forbartha of some Irish rivers is yielding much detailed crayfish distribution information (J. Lucey, pers. comm.).

I have collected crayfish distribution records from 1977 to 1982. Some of which were summarised in a paper on crayfish ecology (Reynolds, 1978). As this survey is now terminated, the present note aims to document all my distributional data, and to use them to describe the distribution of the species over the whole of Ireland.

I am indebted to many correspondents, who have kindly provided me with specimens or with positive or negative distributional information, much of which I have subsequently checked, and believe to be reliable. These correspondents (identified in the text by their initials) are:- John Aldrich, Charmian Arbuckle, Evelyn M. Booth, Kevin Bradley, Erica Brandt, John Breen, Kevin Clabbey, Brendan Connolly, Pat Dolan, Martin Donohoe, Paddy FitzMaurice, Brendan Glass, Roger Goodwillie, J.N.R. Grainger, G.D.F. Hadoke, Rory Harkin, Dick Hollinshead, Mark Holmes, Chris Janssen, Brendan Kavanagh, G. Kennedy, Daphne Levinge, Desmond McCarthy, Careen Mhic Daeid, Dan Minchin, Christopher



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Records from Rivers and Streams : (data collected 1977-1982 only).

Most recent records come from smaller streams and headwaters, since these are most readily investigated. However, where larger rivers are studied, crayfish are frequently found (e.g. R.Boyne). Physical obstacles such as weirs do not appear to hinder crayfish dispersal (Dorrity,1945), and a crayfish record from a river may thus be assumed to indicate the potential presence of the species throughout that river system, provided suitable habitats are available, and the water chemistry does not vary greatly along its length due to the underlying geology (Reynolds,1979). In this section I list only positive records; negative records were used to formulate the discussion.

In the East, crayfish have recently been found in the Glyde-Dee, N 89 (MD), and the Boyne, (DMC), including its tributaries the Blackwater N 8272 (TOF), Athboy, N 7262 (BC), Riverstown, N 55, N 5388, and Knightsbridge, N 8357 (EB). In the Liffey, records come from the Rye Water, N 9837 (NO), Straffan, N 9330, and the Morello River, N 9329 (MD), and upstream of Poulaphouca Reservoir at O 01 and O 0318 (COK). There are records from the Dodder river at O 1530 and O 1630 (MD,RH,ROH), the Camac, O 0630 (CMD), and the Slaney, S 8963 (PW). In addition, crayfish enter the Grand Canal from a feeder stream, N 9931, near Lucan (DW).

In the South, crayfish are reported from the Slate River at Rathangan, S 6820 (BG), and another Barrow tributary, S 7282 (MH). They occur at Abbyleix, S 4184, on the Nore (BK) and in the Suir above Thurles, S 1632, and in the Drish, S 1458, S 1860, and Aherlow, R 93, tributaries (KB,DR,AS). K.Clabbey (pers.comm.) has found them in the Awbeg tributary of the Munster Blackwater, although they have not been found in the rest of that system (JB).

Crayfish are widespread in Shannon tributaries (DL,JNRG,PFM),

including streams in Clare north of Limerick city at R 5655. In addition to older published records, they are found in the Camlin, N 1175 (JB), the Inny, N 16 (DM), and Tynagh Stream, M 7413 (SOB), and occur in the main river at Carrick, M 9396, M 9399 (BBW). They are also found in the Corrib system, the Clare at M 4254 (BBW) and the Robe at M 1904, M 17 (BS, BBW), in the Moy-Deel at G 1620 and M 2292 (BG) and (unverified) in the Owenmore. In the Erne, my records come from near Belturbet, H 3517 (CJ) and neighbouring areas (MD, PSW). Crayfish are reported from the Ballinderry, H 8174, in the Bann catchment (PSW), but there are no other recent records from Northern Irish rivers apart from the Erne (PSW, GDFH).

Records from Irish Lakes : (data collected 1977-1982 only).

In England, lake populations number under 15% of the records of Jay and Holdich(1981), and then occur in rather small water bodies, often artificial, but in Ireland lakes seem to be relatively more important, often holding large crayfish stocks (COK, CM, CJ, PW). Also, crayfish occur in some of the larger Irish lakes, although Moriarty(1973) emphasises that crayfish rarely occur in lakes larger than 1000 ha. Many small lakes in the Cavan-Fermanagh area have been reported to contain crayfish (Kennedy, MS 1969; Watson, 1971). I have received recent reports of crayfish from Whitewood Lake, N 7988, and other lakes near Kingscourt, Co.Cavan (MD), Poulaphouca Reservoir, N 91 (MD, COK), and the Brittas Lakes, O 0322 (FW). Crayfish are abundant in Loughs Bane, N 5571 (MP, ABW), and Lene, N 5167 (ABW), in the Boyne headwaters, and frequent or abundant in adjacent Inny and Brosna lakes - White Lake, N 5172 (COK, CM), L.Owel, N 4058 (RH, PFM, CM), and L.Glore, N 4971 (CM). They are reported from Carrigaport Lake, H 00 (CA, RG), and from Lough Ree (PW) and in particular from a bay near Killinure, N 0746 (DL, CM). In the West, they occur in L.Carra, M 27 (BS), and parts of L.Corrib (CM), while the most westerly population reported occurs in a lake at Carraroe, L 2495 (DM). They are prevalent in many smaller lakes of the Erne and Annalee (PSW, MD), and L.Gowna, N 38 (DT, WAW), and there is one unsubstantiated report from Lough Neagh.

Older Records :

Freshwater crayfish are rarely mentioned in the older literature, and

the few reports which exist (e.g., Ruddy,1772; Thompson,1843) generally attribute their presence to an introduction from somewhere else! Over the last hundred years, however, records are more frequent, and may indicate some restriction in range. Two correspondents recall crayfish in the Slaney or tributaries near Bunclody, S 9157 (EMB) and Enniscorthy (HW), but say that they disappeared in the early years of this century; I have only one current record, from some miles above Bunclody (PW). In the Dublin area, crayfish were once frequent in the lower Liffey, but apparently are no longer seen there. Specimens in the National Museum come from Chapelizod, O 0935 (1890) and from Collinstown Ponds, ? O 1743 (1894), and also from the Tongue Fields Quarry, Kimmage (R.Poddle ? in 1928), while Ruddy(1772) reports them from 'near Finglass', probably in the Tolka. They occurred until recently throughout the Dodder system (MD) before it was polluted by seepage from an urban tip-head. They were recorded by R.Ball from the Royal Canal, about 12 miles west of Dublin (Thompson,1843).

Delap(1909) reported crayfish from Waterford and Tipperary tributaries of the Suir, and there are several INM specimens from this area and date, but I have only one unverified recent report from Ballydine, S 3524, near Carrick, although crayfish are still plentiful further upstream. In the Shannon system, crayfish were caught early this century in L.Derg, but have not been seen there recently (PW). They were caught in the shallows of L.Sheelin until about 1940 (DH) and still occur in tributaries of L.Ennell, N 3646, N 3949, and perhaps in the lake itself (PFM,JNRG). Moriarty(1973) records the disappearance of crayfish from Pallas Lake, N 2619, near Tullamore, in 1954. Faris(1936) reports that crayfish were once abundant in the Upper Erne River, but absent from it in the early years of this century although still present in nearby lakes. They returned to the river in the 1930s. In the Pullins River (Donegal) they were most recently reported by Crawford(1909). Delap(1909) stated that crayfish occurred in the Foyle near Strabane, but none have been taken there recently (GDFH), while in the Bann system, Thompson(1843) noted the presence of crayfish in the Six Mile Water in Antrim, but I have no later reports.

#### Discussion :

The records summarised here, plus many negative results from trapping and surveys, indicate that crayfish are commonly found in alkaline

lowland drainages, but apparently are absent from the North-West, western Connemara and Clare, the south-west and Wicklow, and are only occasionally reported from north-eastern Ireland.

This pattern may result from the interplay of several factors. It may reflect local geology; acid waters are inimical to most crustaceans which have to construct a robust limy exoskeleton, and crayfish cannot long survive a pH as low as 6.0 (Jay and Holdich,1981). This is substantiated by the evidence from the (limestone) Awbeg tributary of the Munster Blackwater, and from English lake district streams (Jay and Holdich,1981). Summer temperatures (lower at higher elevations) may also limit their distribution, since Pratten(1980) reports that growth of *Austropotamobius* in the R.Ouse and in laboratory experiments was limited to water temperatures above 10°C. Dorrity(1945) quotes Mr Stelford as saying that crayfish are rare above 500' altitude. The species does not occur naturally in Scotland, but an introduced population grew and reproduced in the alkaline Central Lowlands, suggesting that low winter temperatures were not the excluding factor (Jay and Holdich,1981).

Moriarty(1973) has suggested that eel predation may significantly limit Irish crayfish, and finally, urbanisation, pollution and disease have been implicated in the decreasing ranges of European crayfish (c.f. Kossakowski,1973 ;Chaisemartin,et al.,1976). In Ireland, disease is at most a local factor (O'Keeffe and Reynolds,1982) but agricultural practices and associated industry may be responsible for crayfish absence from the River Suir below Thurles, and elsewhere, while the growth of Dublin has eradicated some former habitats. The present distribution pattern thus seems to represent an amalgam of the effects of localised introductions and extinctions on a species widespread in alkaline rivers and the smaller lakes of Ireland (which are still large compared with most English lakes). Lake populations may grow relatively fast (Reynolds,1979), and it is hoped that further work may establish why crayfish populations are not often found in large Irish lakes. The crayfish literature has many references to the harmful effects of organic and industrial pollution on these crustaceans, but little precise data. Information on this may be forthcoming from the detailed surveys of biota and water quality of Irish river systems, now being analysed.

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Note:-

The recent crayfish distribution records from rivers and streams, and from lakes, relate only to reports or personal findings during the period 1977-1982, unless specific reference is made to earlier published work (e.g., that of Watson for the Erne system), which is usually not again reported in detail here. J.D.R.

AN ANNOTATED LIST OF THE IRISH GROUND BEETLES (COL., CARABIDAE +  
CICINDELIDAE)

Martin C.D. Speight, Roy Anderson and Martin L. Luff

Introduction

In 1902, Johnson and Halbert's Catalogue of Irish Coleoptera (see Johnson and Halbert, 1902) was published, into which were incorporated records of the 195 ground beetle species (Carabidae) which the authors believed to be present in the island. Since then, although local lists including carabid records have not infrequently appeared in print, as have occasional notes adding one or two species to the known fauna, no comprehensive revision of the island's carabid list has been published. This lack of an up-to-date check list has prompted the production of the present text.

Johnson and Halbert (1902) is mentioned so frequently in the following pages that from this point on it is referred to in an abbreviated form, as J & H.

Between 1902 and today, major taxonomic works covering the carabid faunas of both Ireland and Great Britain have been produced. The most important of these are Joy (1932) and Lindroth (1974). Both volumes mention "en passant" whether each species they deal with is believed to occur in Ireland. But the authors neither checked the Irish records nor claimed to have done so. Similarly, the distributional work published by Moore (1957) purports to cover Ireland but the author evidently did not check the Irish records he used. These three publications thus rely upon J & H and the writings of subsequent authors who added species to the Irish ground beetle fauna. If all the species records available from these various sources were accepted at face value, the Irish carabid fauna would today comprise some 232 species. Or, if one were to follow Turin (1981), who lumps Ireland and Great Britain as a single subregional unit of Europe, one might presume the Irish carabid fauna to stand at c. 360 species, the total for Great Britain.

In the following text, 198 Carabidae are listed as occurring in Ireland. All of the listed species are known to occur also in Great Britain. In the Appendix a number of the J & H species are, along

with others, removed from the list: 35 of the species recorded either by J & H or subsequent authors are involved. Among the species removed is *Bembidion argenteolum*, the only carabid known from Ireland but absent from Great Britain. *B. argenteolum* is apparently now extinct in Ireland (see Appendix).

For the purposes of the present text, the only species accepted as validly recorded for Ireland are those of which we have been able to locate Irish specimens whose identity we have been able to check. Species of which only one or two 19th ct. Irish specimens exist are removed from the list on grounds either of probable extinction or doubtful locality data (see Appendix). For instance, at least four species were reported as Irish in J & H based on 19th ct. specimens collected by Hardy and or Standen from one or the other (or both) of two localities (Rathlin Is. in Antrim and Pt. Salon in Donegal) at the northern extreme of the island. The species concerned are as follows:

*Carabus violaceus*

*Harpalus neglectus*

*Leistus spinibarbis*

*Leistus ferrugineus*

Few or no additional 19th ct. records are given for these species by J & H. Two of them have not been recorded subsequently and the 20th ct. records of the other two are doubtful in that the relevant specimens cannot be traced. Recent attempts to relocate these species on Rathlin have been entirely unsuccessful. It is feasible that Hardy (who was the curator of the Manchester Museum in England) inadvertently confused English and Irish specimens when labelling. There are no Irish specimens of any of these species in the present Manchester Museum collections. It is also possible that these species inhabit Rathlin today, even if the available habitats there seem singularly inappropriate for some of them. Other potential explanations for the lack of recent Irish records of these insects could equally forcefully be promoted. The only certain thing is that, for these beetles, recent, verifiable, Irish records are lacking. Species such as these would be relegated to a "doubtfully Irish" category, if such a category were employed in the present text. We have deliberately not employed a "doubtfully Irish" category. All of the "doubtful" species have been relegated to the Appendix, as species for removal from the Irish list. It is our hope that in



this way we can provide a firm base for further work on the Carabidae of Ireland.

In compiling the present list we have surveyed the carabid collections of the National Museum of Ireland in Dublin, the Ulster Museum in Belfast and the British Museum(Natural History) in London. In this survey we have attempted to at least trace specimens of all "doubtful" species, of all rare species, of all species added to the Irish list since J & H and of all species about which there has been taxonomic confusion which could involve name-changes for Irish specimens. Voucher specimens of the rest of the species listed as Irish have been checked as well. But we have not attempted to examine every specimen of every species of carabid collected in Ireland and at present preserved in the collections of the above-mentioned institutions. Neither have we had access to important collections of Irish Coleoptera retained elsewhere, notably the O'Mahony collection (now in the Hope Dept., Oxford, England), the Faris collection (now in the Royal Scottish Museum, Edinburgh, Scotland) and the bulk of the collections made by Stelfox while he was employed as Entomologist at the National Museum in Dublin. Stelfox subsequently sent those collections to the Smithsonian Institution(Washington, U.S.A.). Whether these untapped sources contain Irish specimens of any carabid species not listed as Irish in the present account is a question for other workers to decide!

In the Notes and Records section of the present text we include the available (published and unpublished) Irish records of rare Irish carabids and note which Museums contain Irish specimens of them. We also note which of us checked the identity of the specimens concerned. Similar information is provided about each of the species added to the Irish list since publication of J & H and for certain of the commoner Irish species where there has been (or still is) confusion as to their correct names.

Apart from where explicitly stated otherwise the names used for the carabids referred to in this text are employed *sensu* Pope *et al*(1977) with corrections as published in Hammond(1977) and Pope and Marshall (1980). The names are thus used *sensu auct.Brit.* based on Lindroth (1974) for the identity of the species to which the names are applied.

The tiger beetles, treated as a subfamily (Cicindelinae) of the Carabidae by Pope *et al*(1977) are included in the present list but, following Crowson(1981), are given family status as the Cicindelidae.

Format of the check list

Generic names are presented in alphabetical, rather than phylogenetic, order. The species names are arranged alphabetically under each genus. Generic names no longer in use, but which appear in J & H, are given in brackets following the names currently in use. Species names used in J & H but which are either not today in use or are today applied to different species, are shown indented below the species name now used. Symbols used in the check list are as follows:

- + = a species not recorded as Irish by J & H,
- + = a species not recorded as Irish by Lindroth(1974),
- ++ = a species added to the Irish list in the present text,
- \* = a species on which notes are provided in the Notes and Records section of the present text.

Check list of Irish Carabidae and Cicindelidae

<i>Abax</i> ( <i>Pterostichus</i> )	<i>Agonum</i> (continued)
<i>A.parallelepipedus</i> (P.& M.)	++ <i>A.livens</i> (Gyll.)*
<i>A.striola</i> (Fab.)	<i>A.marginatum</i> (L.)
<i>Acupalpus</i>	<i>A.micans</i> Nic.
++ <i>A.consputus</i> (Duft.)*	<i>A.moestrum</i> (Duft.)
<i>A.dorsalis</i> (Fab.)	<i>A.viduus</i> var. <i>moestus</i> Duft.
<i>A.dubius</i> Schilsky	<i>A.muelleri</i> (Herbst)
<i>A.exiguus</i> v. <i>luridus</i> Dej.	<i>A.parumpunctatus</i> Fab.
<i>Aepus</i>	<i>A.nigrum</i> Dej.
<i>A.marinus</i> (Strom)	<i>A.obscurum</i> (Herbst)
<i>A.robini</i> (Laboulbene)	<i>A.oblongum</i> (Fab.)
<i>Agonum</i>	<i>A.piceum</i> (L.)
<i>A.albipes</i> (Fab.)A	+ <i>A.scitulum</i> Dej.*
<i>A.assimile</i> (Payk.)	<i>A.thoreyi</i> Dej.
<i>A.angusticollis</i> Fab.	<i>A.puellum</i> Dej.
<i>A.dorsale</i> (Pont.)	<i>A.versutum</i> Sturm*
<i>A.fuliginosum</i> (Panz.)	<i>A.viduum</i> (Panz.)
<i>A.gracile</i> Sturm	<i>Amara</i>
	<i>A.aenea</i> (DeG.)

- Amara* (continued)
- A.trivialis* (Gyll.)
- A.apricaria* (Payk.)
- A.aulica* (Panz.)
- A.spinipes sensu* Schiodte
- A.bifrons* (Gyll.)
- A.communis* (Panz.)
- A.consularis* (Duft.)
- A.eurynota* (Panz.)
- A.acuminata* (Payk.)
- A.familiaris* (Duft.)
- A.fulva* (Mull.)
- A.lucida* (Duft.)
- A.lunicollis* Schiodte
- ++ *A.montivaga* Sturm\*
- A.ovata* (Fab.)
- A.plebeja* (Gyll.)
- A.praetermisssa* (C.R.Sahl.)
- A.rufocincta* Dej.
- A.similata* (Gyll.)
- A.tibialis* (Payk.)
- Anisodactylus*
- A.binotatus* (Fab.)
- Asaphidion*
- A.flavipes* (L.)
- A.pallipes* (Duft.)\*
- Badister*
- B.bipustulatus* (Fab.)
- + *B.dilatatus* Chaud.\*
- ++ *B.meridionalis* Puel.\*
- ++ *B.peltatus* (Panz.)\*
- B.sodalis* (Duft.)
- B.unipustulatus* Bonnelli\*
- Bembidion*
- B.aeneum* Germ.
- B.andreae* (Fab.)\*
- B.anglicanum* Sharp
- Bembidion* (continued)
- B.assimile* Gyll.
- B.atrocoeruleum* Steph.
- B.bipunctatum* (L.)
- B.bruxellense* Wesm.
- B.clarki* (Daws.)
- B.decorum* (Zenk. in Panz.)
- B.dentellum* (Thun.)
- B.flammulatum* Clairv.
- B.doris* (Panz.)
- B.femoratum* Sturm
- ++ *B.fumigatum* (Duft.)\*
- + *B.genei* Kust.\*
- B.quadrigruttatum* Ill.nec Fab.
- ++ *B.geniculatum* Heer
- B.gilvipes* Sturm
- B.guttula* Fab.\*
- B.harpaloides* Serv.
- B.rufescens* (G.-M.)
- B.lampros* (Herbst.)
- B.laterale* (Sam.)
- Cillenus lateralis* Sam.
- B.lunatum* (Duft.)
- ++ *B.lunulatum* (Fourc.)\*
- B.mannerheimi* Sahlb.
- B.unicolor* Chaud.
- B.maritimum* Steph.
- B.concinnum sensu auct.* not Steph.
- B.minimum* (Fab.)
- + *B.monticola* Sturm\*
- B.nitidulum* (Marsh.)
- B.normannum* Dej.
- B.obtusum* Serv.
- B.pallidipenne* Ill.
- B.punctulatum* Drap.
- B.quinquestriatum* Gyll.

- Bembidion* (continued)  
*B.saxatile* Gyll.  
*B.stephensi* Crotch  
*B.affinis* Steph. nec Say.  
*B.tetracolum* Say.  
*B.littorale* sensu auct. not(Oliv.)  
*B.tibiale* (Duft.)  
*B.varium* (Oliv.)
- Blethisa*  
*B.multipunctata* (L.)
- Bradycellus*  
*B.collaris* (Payk.)  
*B.harpalinus* (Serv.)  
*B.ruficollis* (Steph.)  
*B.similis* (Dej.)  
+ *B.sharpi* Joy\*  
*B.distinctus* (Dej.) sensu auct.  
*B.verbasci* (Duft.)
- Broscus*  
*B.cephalotes* (L.)
- Calathus*  
*C.erratus* (Sahl.)\*  
*C.flavipes* (Duft.)  
*C.fuscipes* (Goeze)  
*C.cisteloides* (Panz.)  
*C.melanocephalus* (L.)  
*C.micropterus* (Duft.)  
*C.mollis* (Marsh.)  
*C.piceus* (Marsh.)
- Carabus*  
*C.arvensis* Herbst  
*C.clatratus* L.  
*C.clathratus* auct. (misspelling)  
*C.glabratus* Payk.  
*C.granulatus* L.
- Carabus* (continued)  
*C.nemoralis* Mull.  
*C.nitens* L.  
*C.problematicus* Herbst  
*C.catenulatus* sensu auct. not Scop  
*Chlaenius*  
*C.nigricornis* (Fab.)  
*C.tristis* (Sch.)\*  
*C.holosericeus* (Fab.)  
*C.vestitus* (Payk.)
- Clivina*  
*C.collaris* (Herbst)  
*C.fossor* (L.)
- Cychrus*  
*C.caraboides* (L.)
- Cymindis*  
*C.vaporariorum* (L.)
- Demetrias*  
*D.atricapillus* (L.)
- Dicheirotichus*  
*D.gustavi* Crotch  
*D.pubescens* (Payk.) nec (Mull.)
- Dromius*  
*D.linearis* (Oliv.)  
*D.melanocephalus* Dej.  
*D.meridionalis* Dej.  
*D.notatus* Steph.  
*D.quadrinotatus* (Zenk. in Panz.)
- Dyschirius*  
*D.globosus* (Herbst)  
*D.impunctipennis* Daws.  
++ *D.luedersi* Wag.  
*D.aeneus* sensu auct. not(Dej.)

- Dyschirius* (continued)  
*D.obscurus* (Gyll.)  
*D.politus* (Dej.)  
*D.salinus* Schaum.  
*D.thoracicus* (Rossi)
- Elaphrus*  
*E.cupreus* Duft.  
*E.riparius* (L.)  
*E.uliginosus* Fab.\*
- Harpalus*  
*H.affinis* (Sch.)  
*H.aeneus* (Fab.) nec (Dej.)  
*H.anxius* (Duft.)  
*H.latus* (L.)  
+ *H.puncticeps* (Steph.)\*  
*H.quadripunctatus* Dej.\*  
*H.rubripes* (Duft.)\*  
*H.rufibarbis* (Fab.)\*  
*H.rufipes* (DeG.)  
*H.ruficornis* (Fab.)  
*H.rufitarsis* (Duft.)\*  
*H.ignavus sensu auct.not* (Duft.)  
*H.tardus* (Panz.)  
*Laemostenus* (*Pristonychus*)  
+ *L.complanatus* (Dej.)\*  
*L.terricola* (Herbst)
- Lebia*  
*L.chlorocephala* (Hoff.)  
+ *L.crux-minor* (L.)\*
- Leistus*  
*L.fulvibarbis* Dej.  
*L.montanus* Steph.  
*L.rufescens* (Fab.)
- Loricera*  
*L.pillicornis* (Fab.)
- Metabletus*  
*M.foveatus* (Fourc.)  
*M.foveola* Gyll.  
*M.truncatellus* L.\*
- Nebria*  
*N.brevicollis* (Fab.)  
*N.complanata* (L.)\*  
*N.gyllenhali* (Schoen.)\*  
+ *N.salina* Fair. & Lab.\*
- Notiophilus*  
*N.aquaticus* (L.)  
*N.biguttatus* (Fab.)  
+ *N.germinyi* Fauv.\*  
*N.hypocrita sensu auct.not* Putzey  
*N.palustris* (Duft.)  
*N.substriatus* Waterh.
- Olisthopus*  
*O.rotundatus* (Payk.)
- Panagaeus*  
*P.crux-major* (L.)\*
- Patrobus*  
*P.assimilis* Chaud.  
*P.atrorufus* (Strom.)\*  
*P.excavatus* (Payk.)  
+ *P.septentrionis* Dej.\*
- Pelophila*  
*P.borealis* (Payk.)
- Perileptus*  
+ *P.areolatus* (Creutz.)\*
- Platyderus*  
+ *P.ruficollis* (Marsh.)\*
- Pogonus*  
*P.chalceus* (Marsh.)  
*P.littoralis* (Duft.)

<i>Pterostichus</i>	<i>Stenolophus</i>
<i>P.adstrictus</i> Eschscholtz	<i>S.mixtus</i> (Herbst)
<i>P.vitreus</i> (Dej.)	<i>S.vespertinus</i> (Panz.)
<i>P.anthracinus</i> (Panz.)*	<i>Stomis</i>
<i>P.aterrimus</i> (Herbst)*	<i>S.pumicatus</i> (Panz.)
<i>P.cupreus</i> (L.)	<i>Synuchus</i> ( <i>Taphria</i> )
<i>P.diligens</i> (Sturm)	<i>S.nivalis</i> (Panz.)
<i>P.gracilis</i> (Dej.)*	<i>Trechus</i>
<i>P.madidus</i> (Fab.)	<i>T.discus</i> (Fab.)*
<i>P.melanarius</i> (Ill.)	<i>T.fulvus</i> Dej.*
<i>P.vulgaris sensu auct.not</i> (L.)	<i>T.lapidus</i> Daws.
<i>P.minor</i> (Gyll.)	<i>T.micros</i> (Herbst)*
<i>P.niger</i> (Schal.)	+ <i>T.obtusus</i> Erich.*
<i>P.nigrita</i> (Payk.)*	<i>T.quadristriatus</i> (Sch.)
<i>P.oblongopunctatus</i> (Fab.)*	<i>T.rubens</i> (Fab.)
<i>P.strenuus</i> (Panz.)	+ <i>T.subnotatus</i> Dej.*
<i>P.vernalis</i> (Panz.)	<i>Trichocellus</i>
<i>P.versicolor</i> (Sturm)	<i>T.cognatus</i> (Gyll.)
<i>Sphodrus</i>	<i>T.placidus</i> (Gyll.)
<i>S.leucophthalmus</i> (L.)	CICINDELIDAE
	<i>Cicindela</i>
	<i>C.campestris</i> L.

Conventions adopted in following sections

At the end of each record the name of the collector is referred to by initials (see abbreviations used) preceded by "col." Where the specimens upon which a record is based have been both collected and identified by the same individual, only one set of initials is given. If specimens were collected by one person but identified by another, the initials of the identifier are given in brackets, after the initials of the collector. In cases where the location of specimens in a particular museum is noted, the museum is referred to by initials (see abbreviations used) inserted between collector's and identifier's initials. Thus the sequence "col.LW, BM(ML)" at the end of a record would signify that the record is based on specimens

collected by L.H.Bonaparte-Wyse which are now in the collections of the British Museum(Natural History) in London and that the identity of these specimens has been checked by M.L.Luff. Most of the localities mentioned in the records are referred to by County (given first) and place name. But where Irish National Grid references are available they are also quoted, in brackets, following the place names. In a few cases only County plus Irish Grid reference is given.

Abbreviations used

1. category of record:

AR = additional unpublished Irish record(s),

FR = first published Irish record(s),

PR = Irish records published subsequent to J & H.

2. museum containing Irish specimens:

BM = British Museum(Natural History), London,

NMI = National Museum of Ireland, Dublin,

UM = Ulster Museum, Belfast.

3. collectors and identifiers:

AHH = A.H.Haliday

AI = A.J.Irwin

CR = C.Reid

CT = C.Tottenham

DD = D.Doogue

DDo = D.Dowling

EB = E.F.Bullock

EO = E.O'Mahony

IM = I.McClenaghan

J & H = Johnson & Halbert

JF = J.Farrandene

JH = J.N.Halbert

LW = L.H.Bonaparte-Wyse

ML = M.L.Luff

MS = M.C.D.Speight

MW = M.de Courcy Williams

NS = N.Stork

PB = P.Bolger

PH = P.M.Hammond

PL = P.N.Lawrence

RA = R.Anderson

RM = R.Moore

RP = R.A.Philips

TB = T.Bolger

Notes on and records of selected species

*Acupalpus consputus*(Duft.)

FR: Galway - Garryland Wood(M 4203), Anderson(1981).

So far, this is the only Irish record of this species.

*Agonum livens*(Gyll.)

FR: Galway - Garryland Wd.(M 4103), Speight(1976a).

So far, this is the only known Irish locality for this species.

*Agonum micans* Nic.

J & H stated they had seen no Irish specimens of this species.

PR: Antrim - L.Neagh, Halbert(1910), Janson(1924); Limerick - Shannon, Bullock(1914); Kerry - Glencar, Janson and Wyse(1924); Killarney, Bullock(1914); Muckcross, Speight(1972).

*A.scitulum* Dej.

FR: Antrim - L.Neagh, Janson(1924), BM(ML). AR: Antrim - L.Neagh(J 1485). 7 Feb.1981, under bark, *Alnus* carr, RA.

*A.versutum* Sturm

J & H: Clare - Killaloe.

FR: Kerry - Killarney, Janson(1920b), BM(ML).

No specimens of this species in NMI.

*Amara montivaga* Sturm

FR: Kerry - Muckcross, Speight(1972). PR: Kerry - Killarney valley, Speight(1976c).

The presence of this species in Ireland is discussed in Hammond(1974) and Speight(1976c).

*Asaphidion pallipes*(Duft.)

J & H: Donegal - Coolmore.

PR: Sligo - Rosses Pt., Johnson(1905), UM(RA). AR: Donegal - Coolmore, CT, BM(ML).

*Badister dilatatus* Chaud.

FR: Kerry - Killarney, Janson(1920b). PR: Kerry - Muckcross, Speight (1972), NMI(MS). AR: Clare - L.Bunny(R 3696), 19 April 1976, ♂, swept, *Schoenus*, edge limestone lake, hot, sunny afternoon, MS. Cork - Sherkin Is.(W 8819), 1981, ♂, *Phragmites* swamp, col.RM(ML). Waterford - Tramore, 1927, col.LW, BM(ML). Roscommon - Hodson's Bay(N 04), ♂, 1980, col.CR(ML).

*B.meridionalis* Puel

FR: Galway - Garryland Wd.(M 4103), Speight(1976b), NMI(MS).

So far, Garryland Wood is the only known Irish locality for this species.

*B.peltatus*(Panz.)

FR: Galway - Garryland Wd., Speight(1977a). PR: Clare - Dromore, Anderson(1981). AR: Roscommon - Hodson's Bay(N 04), ♂, 4 June 1980, col.CR(ML).



Speight(1977a) relates the confused history of this species in Ireland.

*B.unipustulatus* Bonelli

J & H: "Waterford".

PR: Kerry - Killarney, Bonaparte-Wyse(1920); Killarney, Speight(1972), NMI(MS). AR: Kerry - Muckcross, 8 June 1915, ♂, col.LW, NMI(MS).

*Bembidion andreae*(Fab.)

J & H: Dublin - banks of R.Dodder, UM(RA).

PR: Dublin - Oldbawn, O'Mahony(1931); Down - Newtonards, Crawford (1936a, 1936b).

*B.fumigatum*(Duft.)

FR: Clare - L.Bunny, Anderson(1981).

So far, L.Bunny is the only known Irish locality for this species.

*B.genei* Kust.

AR: "Ireland", AHH, NMI(MS); Wexford - (T 1510), April 1980, seepage run on sea-cliff, col.DD(MS). No previous Irish locality records have been published for *B.genei*.

*B.geniculatum* Heer

AR: Antrim - Inver R., Glenariff (D 211191), 26 July 1982, ♂, among fine basalt gravel, streamside, c.250m., RA.

Added to the Irish list by Speight(1972), based on specimens so named in the Bullock collection(NMI). On re-examination(MS), the Bullock specimens proved to belong to *B.atrocoeruleum*, so the Glenariff record represents the only definite occurrence of *B.geniculatum* in Ireland. Identity of the Glenariff specimens has been checked by two of us(RA,ML).

*B.guttula* Fab.

AR: Clare - (R 3696), 20 April 1975, stoney lake shore, MS; Dublin - Kilbarrack, 1927, col.EO, BM(ML); Kerry - Muckcross, 1919, col.LW, BM(ML); Glencar, 1924, col.LW, BM(ML); Kildare - (N 7715), 7 May 1980, fen, MS; Meath - (N 9757), 13 April 1975, arable field on clay, MS. Common in North(RA) with records from Antrim, Armagh, Derry, Donegal, Fermanagh and Tyrone. J & H were unable to trace Irish specimens.

*B.lunatum*(Duft.)

J & H: Antrim - Rathlin Is., col.Hardy, NMI(MS); Derry - Magilligan. RA has searched for *B.lunatum* on Rathlin Is., but without success.

AR: Derry - R.Roe (C 6629), 31 May 1982, 12 July 1982, abundant in

The confused history of this species in Ireland is related in Speight (1977a).

*B. unipustulatus* Bonelli

J & H: "Waterford".

PR: Kerry - Killarney, Bonaparte-Wyse(1920); Killarney, Speight(1972), NMI(MS). AR: Kerry - Muckross, 8 June 1915, ♂, col.LW, NMI(MS).

*Bembidion andreae*(Fab.)

J & H: Dublin - banks of R.Dodder, UM(RA).

PR: Dublin - Oldbawn, O'Mahony(1931); Down - Newtonards, Crawford (1936a, 1936b).

*B.fumigatum*(Duft.)

FR: Clare - L.Bunny, Anderson(1981).

So far, L.Bunny is the only known Irish locality for this species.

*B.genei* Kust.

So far as we know, no Irish locality records have been published for this species. It seems that both Moore(1957) and Lindroth(1974) assumed that the Johnson and Halbert(1902) records of "*B.quadriguttatum*" referred to *B.genei*.

AR: "Ireland", AHH, NMI(MS); Wexford - (T 1510), April 1980, seepage run on sea-cliff, col.DD(MS).

*B.guttula* Fab.

J & H: state they had been unable to trace any Irish specimens of this species.

AR: Clare - (R 3696), 20 April 1975, stoney lake shore, MS; Dublin - Kilbarrack, 1927, col.EO, BM(ML); Kerry - Muckross, 1919, col.LW, BM(ML); Glencar, 1924, col.LW, BM(ML); Kildare - (N 7715), 7 May 1980, fen, MS; Meath - (N 9757), 13 April 1975, arable field on clay, MS. Common in the North (RA) with records from Antrim, Armagh, Derry, Donegal, Fermanagh and Tyrone.

*B.lunatum*(Duft.)

J & H: Antrim - Rathlin Is., col.Hardy, NMI(MS); Derry - Magilligan. For discussion of Hardy Rathlin Is. records see Introduction. One of us (RA) has searched for *B.lunatum* on Rathlin Is., but without success.

AR: Derry - R.Roe(C 6629), 31 May 1982, 12 July 1982, abundant in

cracks in soil surface, at roots of sparse vegetation, etc., sandy/muddy banks of tidal river, RA.

*B.lunulatum*(Fourc.)

J & H: mention an unconfirmed record from the vicinity of Dublin.

AR: Dublin - St.Catherine's Farm(O 0236), 1976, in pit-fall traps placed in sugar-beet crop, col.TB, (ML).

*B.monticola* Sturm

J & H: Donegal - Foyle district; Dublin - Rathfarnham, by R.Dodder; Limerick.

PR: Antrim - L.Neagh, Anderson(1979); Dublin - banks of R.Dodder, O'Mahony(1931); Kerry - Killarney, Bullock(1914); Kenmare, Bonaparte-Wyse(1920); Killarney, Speight(1972), NMI(MS). AR: Dublin - Rathfarnham, 1925, R.Dodder, col.LW, BM(ML); Kerry - Kenmare, LW, BM(ML); L.Leane, LW, BM(ML).

This beetle was erroneously omitted from the Irish list by Moore(1957) and Lindroth(1974). One of us (RA), has found *B.monticola* to be not uncommon in the North of the island, with records from Antrim, Derry and Fermanagh.

*Bradycellus sharpi* Joy

FR: Kerry - Killarney, Bullock(1928). PR: Kerry - Killarney, Muckross peninsula, Speight(1972), NMI(MS). AR: Dublin - (O 2738), rotten log, deciduous woods, MS; Kerry - Glencar, 1924, LW, BM(ML); Muckross, 1928, LW, BM(ML); Killarney(V 9.8), col.PL, BM(ML).

This species was separated from *B.distinctus* subsequent to publication of Johnson and Halbert(1902). Most specimens standing under *B.distinctus* in NMI belong to *B.sharpi* and there is little doubt that the latter is reasonably common and widely distributed in Ireland, perhaps particularly so in the North, where one of us (RA) has found it in Antrim, Derry, Donegal, Down, Fermanagh and Tyrone.

*Carabus nitens* L.

AR: Down - L.Shannagh(J 2626), Mourne Mountains, 14 April 1974, on gravel lake-shore, col.AI, UM(RA).

*Calathus erratus*(Sahl.)

J & H: most of Johnson and Halbert's(1902) records of this species probably refer to *C.mollis*, since all the Johnson specimens in UM

belong to *C.mollis* (RA).

AR: Down - Slieve Bearnagh(J 3128), 24 May 1980, RA.

*Chlaenius tristis*(Sch.)

AR: Kerry - Muckcross peninsula, L.Leane, 1928, LW, BM(ML).

A review of the occurrence of this species in Ireland is provided by Speight(1977a).

*Clivina collaris*(Herbst)

J & H: Antrim - Rathlin Is., col.Hardy, NMI(ML); Donegal - Pt.Salon, col.Stranden, NMI(ML).

Female specimens, belonging to *C.collaris* and collected in the 19th century, exist (ML) in the collections of NMI. One of us (RA) has searched for *C.collaris* on Rathlin Is., but with no success. There are no 20th ct. records of *C.collaris* from Ireland.

*Dyschirius luedersi* Wagner

FR: Clare - Dromore, Speight(1977a). AR: Wexford - (T 0723), 27 June 1978, edge of freshwater lagoon, polder, col.DDo., MS.

All Irish specimens in museum collections and labelled as *D.aeneus* appear to belong to *D.luedersi*. "*D.aeneus*" was recorded by J & H from Derry, Down, Dublin, Galway and Kerry.

*D.obscurus* Gyll.

This species is still only known in Ireland from the shores of L.Neagh, where it was recently present in numbers, Anderson(1979).

*Elaphrus uliginosus* Fab.

J & H: Cork - Glengarriff.

PR: Kerry - Gap of Dunloe, Bullock(1914); Flesk, Killarney, Speight (1972), NMI(MS).

A number of Irish specimens of *E.uliginosus* are present in the collections of both NMI(MS) and BM(ML). All of these specimens are from either the Killarney valley or the Gap of Dunloe(Kerry), and collected by either EB or LW.

*Harpalus puncticeps*(Steph.)

FR: Kerry - Killarney, Bullock(1930). PR: Dublin - Bull Is., Luff (1977); Kerry - Flesk, Killarney, Speight(1972), NMI(MS).

See under *H.puncticollis* in the Appendix.

*H. quadripunctatus* Dej.

J & H: Wicklow - Sugarloaf.

PR: Clare - Black Hd., Morris(1967); Wicklow - Sugarloaf, Janson(1920a); Bray, O'Mahony(1931).

*H. rubripes* (Duft.)

J & H: "Cork" and "Kerry".

PR: Kerry - Sneem, Janson(1920b); Killarney, Speight(1972), NMI(MS); Waterford - Tramore, Janson and Wyse(1923); Wexford - Curraclloe, Halbert(1937). AR: Cork - Sherkin Is.(W 8819), 1981, col.RM(MS).

*H. rufibarbis* (Fab.)

This species was regarded as common and widespread by J & H. All Irish specimens of "*H. brevicollis*" and "*H. melleti*" in the Bullock collection in NMI belong to *H. rufibarbis*, as do many Irish Bullock specimens of "*H. puncticollis*".

*H. rufitarsis* (Duft.)

J & H: Dublin - Portmarnock.

AR: Cork - Sherkin Is.(W 8819), 1981, col.RM(MS).

*Laemostenus complanatus* (Dej.)

FR: Dublin - Bull Is., Kemp(1902). PR: O'Mahony(1929) brings together a number of additional records. *L. complanatus* is now evidently reasonably well distributed in Ireland.

*Lebia crux-minor* (L.)

FR: Kerry - Killarney, Bullock(1914). PR: Clare - Killaloe, Mackechnie-Jarvis(1972).

*Metabletus truncatellus* L.

J & H: Dublin - Portmarnock.

FR: Dublin - Portmarnock, Sharp(1910). AR: Dublin - Malahide Pt. (O 2346), 6 April 1980, under stone on beach, col.DD(MS).

*Nebria complanata* (L.)

The Irish distribution of this groundbeetle is reviewed by Harding(1973).

*N. gyllenhali* (Schoen.)

J & H record this beetle from 11 different Irish counties, but there are few Irish specimens in NMI. No specimens of *N. nivalis* (Payk.) are mixed among the Irish *N. gyllenhali* in either NMI(MS) or UM(RA).

There are few recent records of *N.gyllenhali* from anywhere but the northern counties, where one of us (RA) has found the species widespread but local, by mountain streams.

*N.salina* Fair.& Lab.

FR: Galway - "Connemara", Donisthorpe(1922). PR: Kerry - Flesk, Speight(1972), NMI(MS); Wicklow - Ballymore Eustace(N 9208), Luff(1977).

AR: Galway - (L 8349), 27 March 1975, under stone, trackside, conifer plantation, MS; (L 7781), 4 July 1979, moorland at 1,000 ft., MW(MS); Wicklow - (T 1096), 20 October 1970, under stones, trackside, spruce plantation, MS; (O 1616), 21 February 1971, under heather on boulder, rough pasture, MS.

One of us (RA) has found this species commonly in montane biotopes in the North of the island.

*Notiophilus germinyi* Fauv.

FR: Donegal - Salt Lough Mtn.; Kerry - Croagh Patrick; Mayo - Achill Is., all in Halbert(1915). AR: Cork - Mizen Hd., 1964, BM(ML); Galway - (L 7761), 4 July 1979, moorland at 1,000 ft., col.DDo(MS); Kerry - Mangerton Mtn., 1928, LW, BM(ML); Castlegregory, 1952, col. and det.L.Frewin; Wicklow - (O 2314), heather moor/scree, 1,500 ft., MS. Also found (RA) on montane heaths in Antrim, Donegal and Down.

*Panagaeus crux-major*(L.)

J & H: Clare - Finlough.

AR: Clare - Inchiquin Lake, Corofin, Feb.1909, col.RP, NMI(MS); Galway - Nr.Menlough, 19 January 1909, col.RP, NMI(MS); Portumna, 28 February 1926, col.RP, NMI(MS); (M 3753), 7 October 1978, under stone by turlough, col.DD(MS).

*Patrobus atrorufus*(Strom)

J & H: Antrim - Collinward Hill; Donegal - Horn Hd.; Down - Rostrevor Mtn.; Dublin - Stepside; Kerry - Conor Hill & Brandon. One Irish specimen in NMI(MS).

AR: Antrim - Barnetts Pk.(J 3168), 15 April 1981, rotting log in *Alnus carr*, RA.

*P.septentrionis* Dej.

FR: Kerry - Carrantuohill, Janson and Wyse(1924), BM(ML).

Apparently no further records to date.

*Perileptus areolatus*(Creutz)

FR: Kerry - Kenmare, Donisthorpe(1903). PR: Cork - Glengarriff, Halbert(1937). AR: Kerry - Killarney, 1922, CT, BM(ML); R.Flesk at Killarney, 1931 & 1938, EB, BM(ML).

*Platyderus ruficollis*(Marsh.)

FR: Dublin - Howth, Halbert(1924), NMI(MS).

Apparently no further records to date.

*Pterostichus anthracinus*(Panz.)

Irish specimens standing under this name in NMI(MS) have proved to include a number of *P.nigrita*, so records of *P.anthracinus* given in J & H should be treated with caution. All Irish "*P.anthracinus*" in the Bullock collection in NMI(MS) are also *P.nigrita*.

AR: Cavan - ?, ♀, NMI(MS); Galway - L.Oughter, ♀♂, col.JH, NMI(MS); Woodfrod, ♂, NMI(MS); Garryland Wd.(M 4103), ♀, 28 March 1975, under stone, edge of turlough, col.MS, BM(NS); Roscommon - Hodson's Bay (N 04), 4 June 1980, CR. One of us (RA) has found this beetle commonly on limestone lake shores in S.Donegal and S.Fermanagh and also on the shores of L.Neagh(Shane's Castle, Co.Antrim) and L.Shark (Armagh).

*P.aterrimus*(Herbst).

J & H: Cork - Cork.

PR: Cavan - Cloverhill, Nicholson(1914, 1920); Clare - W.shore L.Derg, 6ml.N.of Killaloe, Mackechnie-Jarvis(1972); Kerry - Killarney, EB, Mackechnie-Jarvis(1972), NMI(MS). AR: Kerry - Ardagh, 1934, EB, NMI(MS); Armagh, 1924, EO, NMI(MS).

*P.gracilis*(Dej.)

J & H: Cavan - L.Oughter, NMI(MS); Down - Belfast; Waterford - Ballyscanlon Lough.

PR: Kerry - Killarney, Bullock(1914), NMI(MS). AR: Kerry - Kenmare, 1917, LW, BM(ML); Bunroe, ♂, March 1935, EB, NMI(MS); Waterford - ?, 1903, LW, BM(ML); Roscommon - Hodson's Bay(N 04), 4 June 1980, CR.

*P.nigrita*(Payk.)

Koch and Thiele(1980) have demonstrated that *P.nigrita* is a complex of biological species indistinguishable morphologically. It would seem very unlikely that "*P.nigrita*" is the only example of this phenomenon among Irish Carabidae. Indeed, many so-called species

currently recognised could prove to be complexes. This possibility requires to be born in mind in distribution-recording work, especially when species occupying more than one distinct biotope are involved. A form of *P.nigrita* with yellow basal leg segments occurs in Ireland, as recorded from Co.Dublin by Luff(1977). This is probably the "*Omaseus rufifemoratus* Steph." of Stephens(1839) described from Belfast. This form is not known in Great Britain.

*P.oblongopunctatus*(Fab.)

J & H: Antrim - Ballycastle, NMI(MS); Murlough Bay, NMI(MS) and Whitepark Bay; Cork - Cork.

PR: Waterford - Curraghmore, Bonaparte-Wyse(1916). AR: Antrim - Murlough(D 1914), 1 November 1976, RA; Glenariff(D 2120), 11 November 1978, limestone woodland, RA.

There are surprisingly few Irish records of this deciduous woodland insect.

*Trechus discus*(Fab.)

J & H: Galway - R.Suck at Ahascragh.

AR: Antrim - R.Quaile(J 477455), 26 September 1973, RA; Wexford - (T 0723), 28 June 1978, under stones along shore of brackish coastal lagoon, col.DDo & MW(MS).

*T.fulvus* Dej.

J & H: Donegal - Coolmore; Down - Holywood; Louth - Bellurgan; Dublin - Howth; Wicklow - Bray.

PR: Wexford - R.Slaney estuary, Halbert(1937). AR: Cork - Roscarberry, 1964, col.PH, BM(ML); Dublin - Howth(O 2738), 20 November 1975, under stones, boulder beach at cliff-base, above h.t.m., MS; Kerry - Killorglin & Ballycashun, 1932, col.LW, BM(ML).

*T.micros*(Herbst)

J & H: Derry - Magilligan; "Armagh"; Tipperary - Mitchelstown Cave.

PR: Dublin - R.Tolka at Finglas, Halbert(1924); Waterford - Ballinamintra, O'Mahony(1938). AR: Antrim - Massereene(J 1485), 29 December 1975, RA; Agivey-Bann Bridge(C 9023), 12 March 1977, RA; Down - R.Quaile (J 4834), 4 October 1976, RA.

*T.obtusus* Erich.

FR: Waterford - Glen of the Gap, Janson and Wyse(1923).



This species was confused with *T.quadristriatus* in earlier literature. It is probably common and widespread in Ireland in general and is certainly so in the North. Records are at present available from Antrim, Armagh, Cork, Derry, Donegal, Down, Dublin, Fermanagh, Galway, Kerry, Kilkenny, Sligo, Tyrone, Waterford, Westmeath, Wexford and Wicklow.

*T.subnotatus* Dej.

FR: Dublin - St.Annes, Clontarf, O'Mahony(1940), NMI(MS), also BM(ML). No subsequent records.

*Trichocellus placidus*(Gyll.)

J & H: Antrim - Ballycastle; Armagh - Loughgilly.

PR: Leitrim - Dromahair, Halbert(1937); Limerick - bank of R.Shannon, Bullock(1914). AR: Down - Newcastle(J 33), 1958, col.IM, (ML); Galway - Inchiquin Is., 1977, col.DD(ML); Kildare - (N 7715), 8 March 1978, fen, among grass roots, ditch bank, MS; Westmeath - (N 4157), 1971, col.JF, BM(ML).

APPENDIX: Carabids to be deleted from the Irish list

*Acupalpus exiguus* Dej.

The *A.exiguus* of J & H is *A.dubius*, known then as *A.exiguus v.dubius*. *A.exiguus* was also mistakenly recorded as Irish by Speight(1972), based on specimens of *A.dubius* named as *A.exiguus* by E.Bullock, and in the collections of NMI(MS).

+ *Agonum gracilipes* Duft.

Included as Irish by Moore(1957), but the Irish record was evidently based on a misdetermination - see Allen(1977).

++ *Amara anthobia* Villa

Mistakenly added to the Irish list by Speight(1972), based on specimens determined as *A.anthobia* in the Bullock collection, in NMI. These specimens have been checked by M.Brendell(BM) and belong to *A.familiaris*.

+ *A.convexior* Steph.

Although this beetle is included as Irish by both Moore(1957) and Lindroth(1974) we have been unable to trace either published Irish records or Irish specimens of it.

*A.convexiuscula*(Marsh)

J & H: Cork - nr.Cork; Kerry - Castlemaine

J & H do not say whether they had seen Irish specimens of this species. We have been unable to trace any Irish specimens and there are no Irish records since the middle of the 19th century.

+ *A.curta* Dej.

Added to the Irish list from Waterford - Tramore, Janson and Wyse(1923). We have been unable to trace the specimen(s) concerned. There are no other Irish records.

++ *A.spretta* Dej.

Mistakenly added to the Irish list by Speight(1972), based on specimens determined as *A.spretta* in the Bullock collection in NMI. These specimens belong to *A.aenea* (MS).

*Bembidion argenteolum* Ahrens

Found repeatedly earlier this century at 2 sites, Shane's Castle (Antrim) and Ardmore Pt.(Armagh) on the shores of Lough Neagh. Johnson(1902) also refers to its capture at Glenavy(Antrim), a point between the other two known localities. The beetle is no longer present at its known localities and cannot be found at any other apparently suitable sites on the shores of L.Neagh (Anderson,1979). It is thus presumed to be extinct in Ireland. Irish specimens of *B.argenteolum* exist in the collections of BM(ML), NMI(MS) and UM(RA).

*B.biguttatum*(Fab.)

J & H: Antrim - Rathlin Is.; Waterford - Monovollough Mtns.

We have been unable to trace any Irish specimens of this beetle. There are no further published Irish records.

+ *B.littorale*(Oliv.)

There is great confusion in the literature between *B.paludosum*(Panz.) and *B.tetracolum* Say, because the *B.littorale*(Oliv.) of most early authors (including J & H) is *B.tetracolum* but not the true *B.littorale* (Oliv.) which, like *B.paludosum* is a synonym of a different species,

*B.litorale*(Oliv.). Of the two species *B.litorale*(Oliv.) and *B.tetracolum* Say only the second is known in Ireland so far, though both Moore(1957) and Lindroth(1974) also include *B.litorale* as an Irish species (*B.litorale* is recorded in Great Britain).

+ *B.nigricorne* Gyll.

Added to the Irish list by Donisthorpe(1903), based on specimens he had collected in Kerry - Kenmare. We have been unable to trace these specimens. There are no subsequent Irish records of the species.

+ *B.properans*(Steph.)

Added to the Irish list by Bullock(1928), based on specimens from Kerry - Killarney. The Irish specimens of "*B.properans*" in the Bullock collection in NMI are all (MS) *B.lampros* with one or two punctures indicating the seventh elytral stria.

+ *B.quadrinaculatum*(L.)

The records of "*B.quadrinaculatum* F." given in J & H could relate to specimens of either *B.genei*, *B.quadrinaculatum* or even *B.quadrinaculatum* Serv. *B.quadrinaculatum*(Fab.) is now a synonym of *B.quadrinaculatum*(L.). We have not located any Irish specimens of *B.quadrinaculatum*(L.) and there is so far no indication that this species occurs in Ireland. The species in this group which is known here is *B.genei* Kust., which is the "*B.quadrinaculatum* Fab." of Illiger and thus probably the "*B.quadrinaculatum* F." of J & H.

+ *Brachinus crepitans*(L.)

Two reputedly Irish specimens of this species formed the basis for its inclusion in J & H. These specimens are presumably the two labelled "Ireland" still(MS) in the collection of NMI. There have been no further records of this species from Ireland and we have been unable to locate additional Irish specimens.

*Bradycellus distinctus*(Dej.)

All Irish specimens of "*B.distinctus*" that we have examined (including recently collected material from Inishtearaght, Co.Cork, det.C.O'Toole) have proved to belong to other *Bradycellus* species and usually to *B.sharpi*: see notes under *B.sharpi*. There is no evidence so far that the true *B.distinctus* occurs in Ireland.

*Calosoma inquisitor* (L.)

Included as Irish by J & H on the basis of early 19th ct. specimens collected in Wicklow - Powerscourt. These specimens still exist (MS) in the collections of NMI. There are no subsequent records. Halbert (1922) records searching for *C.inquisitor* at Powerscourt, to no avail. It has been argued by Speight (1980) that this species is extinct in Ireland.

*Carabus cancellatus* Ill.

Mentioned by J & H as having been collected once in Ireland in the vicinity of Roscarberry (Cork). There is otherwise no evidence for the occurrence of this beetle in Ireland.

*C.monilis* Fab.

According to J & H this beetle was collected from "Dublin" in 1853 and from Fermanagh (Tempo) in 1897. They also mention an undated capture from Wicklow (Dargle). There is one specimen labeled "Ireland" in the collections of NMI (MS). The complete absence of more recent records of this large, beautiful and distinctive beetle suggests it is now extinct in Ireland.

*C.violaceus* L.

Recorded by J & H as having occurred in Antrim (Rathlin Is.), Cork and Donegal (Pt.Salon). A Standen specimen from Pt.Salon and a Hardy specimen from Rathlin Is. are in NMI (MS). There has been great confusion between this species and *C.problematicus* and consequently all records of *C.violaceus* not backed by voucher specimens must be treated as doubtful. The series of "*C.violaceus*" in NMI contained specimens of *C.problematicus* (MS). There are no 20th ct. Irish records of *C.violaceus* backed by voucher specimens. The existing Antrim and Donegal specimens are equivocal (see Introduction). Hopefully, if this species is extant in Ireland new records will soon come to light to settle the issue of its status here.

*Dicheirotichus obsoletus* (Dej.)

J & H include this species as Irish on the basis of one record from Cork - Queenstown. We have been unable to locate any Irish specimens of this species. All Irish specimens of "*D.obsoletus*" in the Bullock collection in NMI belong to (MS) *D.gustavi*.

*Dromius agilis*(Fab.)

A solitary 19th ct. record from Co.Dublin formed the basis for inclusion of this species as Irish by J & H. But they state they had never seen an Irish specimen. We have been unable to trace any Irish material of this species and there have been no records of it from Ireland subsequent to publication of J & H. So, although both Moore(1957) and Lindroth(1974) include *D.agilis* as Irish there seems no justification for regarding it as an Irish insect.

*Dyschirius aeneus* Dej.

All Irish specimens standing under *D.aeneus*, and which we have examined, have proven to belong to *D.luedersi*, a species which was not described until 1915 (J & H was published in 1902). Neither Moore(1957) nor Lindroth(1974) apparently checked the identity of Irish "*D.aeneus*", since they include it as an Irish species.

++ *Harpalus brevicollis* Serville

This species has been recorded from Ireland by Bullock(1932), or, at least, a species by him designated as "*Harpalus brevicollis*" has been. The "*H.brevicollis*" of British authors has proved to be a mixture of three different species. *H.brevicollis* Serville is now regarded as a synonym of *H.melleti* Heer, which is not known to occur in Ireland (see below). The other two species confused under "*H.brevicollis*" are *H.rufibarbis*(Fab.) and *H.shaubergerianus* Puel. There are many Irish records of *H.rufibarbis*(Fab.), but no confirmed Irish records of *H.shaubergerianus* Puel (see below). Irish specimens standing under "*H.brevicollis*" in the Bullock collection in NMI(MS) belong to *H.rufibarbis*(Fab.).

*H.melancholicus* Dej.

One 19th ct. Irish record, from Cork - Glengarriff, is cited by J & H. There are no subsequent published records. We have been unable to locate any Irish specimens of this species.

++ *H.melleti* Heer

This species is recorded from Kerry - Killarney, in Speight(1972), based on misinterpreted specimens of "*H.brevicollis*" in the Bullock collection in NMI(MS). These specimens all belong to *H.rufibarbis*(Fab.).

*H.neglectus* Serville

One 19th ct. record of this species from Antrim - Rathlin Is., is cited

by J & H. This Hardy specimen is (MS) in the collections of NMI. There are no other published Irish records and we have been unable to trace any other Irish specimens. *H.neglectus* is a sand-dune species known in Great Britain from the W.coast of England to as far North as Cheshire and on the South coast East to Hampshire. It has also been found on the Yorkshire coast, so its occurrence on Rathlin is feasible, if unexpected, in the light of there being no other Irish records either from further South or from other localities with more extensive dune systems. If *H.neglectus* is extant in Ireland there is little evidence to this effect and, in our view, insufficient evidence to warrant retaining the species on the Irish list.

*H.punctatulus*(Duft.)

One 19th ct. record from "near Dublin" is the basis for inclusion of this species on the Irish list in J & H. We have not located any Irish specimens of *H.punctatulus* and there are no additional literature references to the occurrence of this ground beetle in Ireland, except that Moore(1957) and Lindroth(1974) include the species as Irish.

± *H.puncticollis*(Payk.)

Regarded as common in Ireland by J & H and recorded subsequently from Kerry - Killarney by Speight(1972). All specimens standing under "*H.puncticollis*" in NMI, including the Bullock specimens upon which the record in Speight(1972) is based, belong to either *H.puncticeps* or *H.rufibarbis*(MS). We have been unable to locate Irish specimens of *H.puncticollis*(Payk.) and conclude there is no justification for including this species on the Irish Carabid list.

++ *H.schaubergerianus* Puel

Added to the Irish list by Speight(1972), based on misinterpreted specimens of *H.rufibarbis*(Fab.) in the Bullock collection in NMI(MS). No other Irish records.

*Leistus ferrugineus*(L.)

J & H cite records of *L.ferrugineus* from Antrim - Rathlin Is., Belvoir Pk.; Down - Belfast and "Dublin", adding that they had seen only the Belvoir Pk. specimen and suggesting that some of the records may refer to *L.rufescens*. One Irish specimen of *L.ferrugineus*, a Rathlin Is. specimen collected by Hardy, is in NMI(MS). One of us (RA) has searched for *L.ferrugineus* on Rathlin Is., but without

success. We have come across no additional specimens of *L.ferrugineus* from Ireland and apart from Bullock(1914)(who recorded it from Kerry) are aware of no published Irish records of the species subsequent to J & H. At present, there thus seems insufficient justification for retaining *L.ferrugineus* on the Irish list.

*L.spinibarbis*(Fab.)

Two records from Antrim - Rathlin Is. and Kinbane Hd., are the basis for inclusion of this species as Irish in J & H. A Hardy specimen from Rathlin Is. is in NMI(MS), but we have failed to locate additional Irish material. Attempts by one of us (RA) to find *L.spinibarbis* on Rathlin Is. have proved unsuccessful. So far as we know, there are no published Irish records of *L.spinibarbis* subsequent to J & H. There thus seems little reason to retain *L.spinibarbis* on the Irish list.

++ *Notiophilus aestuans*(Motsch.)

Added to the Irish list by Speight(1972), based on misdetermined specimens standing under this name in the Bullock collection in NMI. These specimens have proved (MS) to be rather small individuals of *N.biguttatus*.

*Pterostichus lepidus*(Leske)

J & H cite Irish records from Donegal - Pt.Salon and "Waterford". There are no subsequent published Irish records and we have been unable to locate any Irish specimens of *P.lepidus*.

*P.macer*(Marsh.)

One 19th ct. Dublin record (as *P.picimanus*) cited by J & H. We can trace no Irish specimens and there are no published records subsequent to J & H.

Summary

A reviewed list of Irish Carabidae is presented, based on a re-examination of specimens in Museum collections in Dublin, Belfast and London, augmented by other Irish material also checked by the authors. Available Irish records of the rarer species and the species added only recently to the Irish list are documented. 198 species are listed as Irish, one of them (*Bembidion lunulatum*) for the first time. 34 species are removed from the Irish list, the reasons for

each removal being summarised in an Appendix. All papers in which Carabid species have been added to the Irish list since publication of Johnson and Halbert(1902) are detailed.

### Resumé

Une révision critique de la faune des Carabiques (Col.Carabidae et Cicindelidae) de l'Irlande est présentée. Des spécimens de toutes les espèces inclus ont été ré-examinés. Une espèce (*Bembidion lunulatum*) est signalée pour la première fois en Irlande. 34 espèces ont été éliminées de la faune. La faune complète des Carabiques Irlandaises comprend maintenant 198 espèces. Des données fauniques sont incluses pour certaines espèces, y comprises les espèces rare et les espèces qui sont signalées pour la première fois depuis la dernière révision(1902). La littérature du vingtième siècle qui traite de la faune des Carabiques de l'Irlande est détaillé.

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BULLETIN OF THE IRISH BIOGEOGRAPHICAL SOCIETY : INSTRUCTIONS TO CONTRIBUTORS (revised December 1982).

During 1982 various changes in the character and content of the Bulletin were discussed and agreed by the committee. These necessitated production of a revised version of the Instructions to Contributors. The objectives of the Bulletin remain the same - to provide a venue for the publication of papers and short notes dealing with the distribution of the Irish flora and fauna, or with more general biogeographical topics. However, a particular intention from now on will be to ensure that space is provided in the Bulletin for distribution records resulting from the Society's field meetings. Well-authenticated local species lists with a minimum of accompanying text will be considered for publication. Such material should be sent to the Assistant Editor, whether based on the Society's field meetings or on other sources.

All authors considering submission of manuscripts to the Bulletin are requested to adhere to the following instructions. Please note point 10, concerned with camera-ready copy.

1. Manuscript should be submitted as typed copy on A4 paper, using double-spacing and 2½ cm (1 inch) margins.
2. It helps if the copy is clean and not embellished with a mass of super-imposed corrections!
3. Names of organisms: latin names should be given for all species mentioned in the text, and underlined. When a genus is mentioned for the first time, please give its generic name in full, as in Kisme, after which it can be abbreviated, as in K.kate.
4. Records: please ensure that, at minimum, the following information is incorporated into each record included in a manuscript:-
  - a) latin name of organism,
  - b) statement of reference work used as source of nomenclature employed in text,
  - c) locality details including at least a four figure Irish Grid reference, as in M 0978, county, vice-county number and some ecological data about the collection site, plus date of capture,
  - d) collector's name and determiner's name (where different from collector's name), and

e) altitude data should be included where relevant.

5. Diagrams: please use black on white and avoid large solid areas of black. Shading should be by means of lines or dots, not half-tones. Please produce diagrams the size you wish them to appear in the Bulletin. Legends should be provided separately.
6. Acknowledgements: insert after the text and before the references.
7. Summary: if you wish to include a summary, please insert it between the acknowledgements and references.
8. References: where a reference is referred to in the text, please give author's (or editor's) name, plus year of publication, e.g. O'Sheagda(1976); the full reference should then appear at the end of the text as follows:-  
O'Sheagda, M.D.(1976) Coprolites from Provencal soutteraines.  
J.Med.Arch., 7 (5): 21-376.  
Phut, D.von (ed.)(1982) Ausfahrtgas und der autobahnfauna.  
Irren Press, München. 2 vols., 4765 pp.  
Abbreviations used for periodicals referred to should conform with the entries in the World List of Scientific Periodicals.  
Unfortunately, the latest edition of the "World List" was published so long ago that many newer, existing journals (including the Bulletin of the Irish biogeographical Society) are unmentioned in it. In such a case authors are requested to either follow the abbreviation recommended by the periodical itself, or, in cases where no recommended abbreviation is provided, to quote the title of the periodical in full. The abbreviation recommended for the Bulletin of the Irish biogeographical Society is Bull.Ir.biogeog.Soc.
9. Authors' addresses: should be given at the end of the text, after the references.
10. Camera-ready copy: each edited manuscript will be returned to its author(s) for production of a final draft. Authors are then expected to produce mistake-free typescripts (camera-ready copy), which, on receipt by the editors, can be photocopied as they are, for incorporation into the Bulletin.
11. Offprints: ten off-prints are offered free to authors. A charge

(given on the offprint request form, see below) is made for additional offprints. The charge is based on the number of pages of text in the article concerned. When edited manuscripts are returned to authors for production of camera-ready copy they are accompanied by an offprint request form, for completion by the author(s).

12. Larger papers will be sent to referees before being accepted for publication in the Bulletin. All larger papers (3 or more A4 sheets of typing) other than local species lists should be submitted to the editor, at the following address:-

Dr M.C.D.Speight,  
Research Branch,  
Forest & Wildlife Service,  
Sidmonton Place,  
Bray, Co.Wicklow,  
Ireland.

13. Short notes and local species lists, such as those derived from the Society's field meetings, should be sent to the Assistant Editor, at the following address:-

Dr J.O'Connor,  
National Museum of Ireland,  
Kildare Street,  
Dublin 2,  
Ireland.

N.B.: It is intended that articles received by the editors before 1 September 1983 will, if accepted for publication, appear in Bulletin no.7. Manuscripts received later than 31 August 1983 may be held over for publication in Bulletin no.8.

