The conservation of the British species of the weevil genus *Cathormiocerus* (Coleoptera, Curculionidae, Entiminae)

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THE CONSERVATION OF THE BRITISH SPECIES OF THE WEEVIL GENUS *CATHORMIOCERUS* (COLEOPTERA, CURCULIONIDAE, ENTIMINAE)

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SUMMARY

1. The characteristics, particularly zoogeography, of the species of *Cathormiocerus* Schoenherr are briefly described.

2. Ecological investigations undertaken in 1993 are outlined. Four of the five British species of the genus were found and studied. The achievements of the work are assessed in relation to its objectives.

3. Accounts of each species are given. The distribution, status, habitat, information from the 1993 survey, and conservation are described.

4. A general account of the conservation of species in the genus is provided. It is concluded that, although the threats to the species are well understood, more work is needed on details of the species' distribution and ecology in order to evaluate these threats.

5. Proposals are included for future work on conserving the species.

6. A full bibliography of the British *Cathormiocerus* is provided.

1 THE GENUS *CATHORMIOCERUS*

Cathormiocerus was established as a genus of broad-nosed weevils by Schoenherr (1843). There is no up-to-date catalogue of the species, but Winkler (1932) listed 86 (with a further 14 "varieties", or forms). These are distributed between four subgenera: *Cathormiocerinus* de la Escalera (2); *Mitomerus* Jacquelin du Val (5+1); *Cathormiocerus* s. str. (43+5) and *Schaumius* Brisout (30+8). Six species are not assigned to subgenera in Winkler's Catalogue.

It has not been possible to search the literature for the species of *Cathormiocerus* described between 1932 and the present, but there certainly are some. For instance Gregori & Osella (1989) have described and illustrated *C. sardous* from Sardinia. The obscurity and rarity of species in the genus make it likely that other species remain to be discovered.

Cathormiocerus is currently placed in the tribe Otiorhynchini of the curculionid subfamily Entiminae, which includes most of the broad-nosed species (Thompson 1992). The genus has never been revised in its entirety, though de la Escalera (1918) did so for the species of the Iberian Peninsula and Morocco. Most of the described species occur in this area.

Species in the genus are closely related in structure, size and habits to those in *Trachyphloeus* and several were originally described as members of the latter genus or included in it by later authors (eg Joy, 1932). Species in the two genera are separable mainly by the structure of the scrobes, which are dorsal in *Cathormiocerus* but lateral in *Trachyphloeus*. This has led to the two genera being placed in different tribes by some authors (eg Tempère & Péricart, 1989).

Although the British species of *Cathormiocerus* have been listed by Kloet & Hincks (1977), there is no modern comprehensive key, though an illustrated one is expected shortly (Morris, in press). All five British species are currently placed in the subgenus *Cathormiocerus s.str.*

All the British species of *Cathormiocerus* are parthenogenetic. The 19th century literature refers quite extensively to males, but this appears to be erroneous. The species are believed to be polyphagous, though there is no extensive information on feeding habits.

One of the most characteristic features of species in the genus is their zoogeography. The genus is not known from central Europe (Frieser, 1981) and it is conspicuously restricted to the western edge of the Palaearctic region (Map 1). At the eastern side of this range four species are known from Italy, the relatively widely-distributed *C. curvipes* (Wollaston), a Sicilian endemic and two species endemic to Sardinia (Abbazzi & Osella, 1992). *C. curvipes* occurs also in Madeira, together with one other species of *Cathormiocerus* (Roudier, 1963), but no species are known from other Atlantic islands. Four species are known from the Netherlands, again including *C. curvipes* (Heijerman 1993), making this species the most widely distributed one of the genus, though it has not been found in Britain. Eleven species have been recorded from France, including *C. curvipes* (Hoffmann, 1950; Tempère & Péricart, 1989). However, Spain, and to some extent Morocco, is the centre of the species' distribution (de la Escalera, 1918; Winkler, 1932). For a considerable time in the mid-19th century it was believed that *Cathormiocerus* was a south European genus, and records of species from Britain were discounted. However, it is now well established that we have five resident species. Information on these forms the substance of this report.

Before the land-bridge to the Continent was broken, and at suitable times when the climate was favourable, other species of *Cathormiocerus* inhabited what are now the British Isles. The Isleworth, Middlesex, fauna, dated to 43 000 yr B.P., enjoyed summer temperatures higher than there are at the present day (Coope & Angus 1975). This fauna included many beetle species no longer found in the British Isles, including *Cathormiocerus curviscapus* Stierlin, currently found in southern Spain and North Africa, and *C. validiscapus* Rouget, restricted to France and Spain. It is interesting that the fauna does not include *C. curvipes*. A notable feature of the Ilseworth fauna demonstrated by Coope & Angus (1975) is that it contains no species associated with trees. The open type of habitat deduced by the authors for the terrestrial component of the fauna accords well with what is known about the habitat of species of *Cathormiocerus*.

Speculation about the increased favourability of the British Isles for *Cathormiocerus* following global warming must be tempered by recognition of the way climate change interacts with land-use change in a highly man-modified and fragmented landscape. There is also much greater difficulty than formerly facing potential immigrant species by the English Channel.

2 INVESTIGATIONS IN 1993

The five areas of work included in the application for a Species Recovery Grant from English Nature were:

1. Distribution. All species are found only in the extreme south (especially south-west) of England. The distribution of all 5 species will be clarified by:
   a. an appeal for records;
   b. a literature search;
   c. limited fieldwork;
   d. requests to selected museums and individuals.

   Fieldwork will be concentrated in south-west England, particularly areas adjacent to the Lizard Peninsula, from which several species are well known.

2. Phenology. All records will be examined to determine the seasonal occurrence of the species.

3. Biology. Two main aspects will be investigated:
   a. feeding habits of adults;
   b. oviposition and the possibility of rearing the species.

4. Behaviour. It is suspected that all the species are active at night. This will be tested.

5. Conservation. A detailed, intensive programme is not possible, but insights into the conservation of the species should be obtained by:
   a. Accurate description of physiognomic and vegetation characteristics of sites of occurrence.
   b. Assessment of effects of management (if suitable examples can be found);
   c. Assessment of accessibility of sites to human disturbance (suggested as a possible threat in Hyman, 1992);

d. Assessment of possible reasons for pronouncedly western distribution in Europe (e.g. competition, climate) and likely effects of climate change.

Study of *C. socius* was excluded from the grant as actually awarded, at English Nature's request.

Fieldwork included two extended visits to Devon and Cornwall, together with regular frequent monitoring of the Furzebrook site for *C. britannicus* from April to July (when further work became unprofitable). The periods of intensive study in the west country were 17-20 May 1993 and 23-26 August 1993.

Laboratory work included the keeping and regular examination of all the British species (except *C. socius*) in captivity, with observations made on feeding, oviposition and longevity.

Bibliographical study comprised a professional literature search, work in the libraries of the Natural History Museum (central and entomological) and the Royal Entomological Society, and an examination of a personal bibliographical database .

Museum work was centred on the British Collection of the Natural History Museum, all specimens of *Cathormiocerus* being examined. Limited study of specimens in the Hope Department, Oxford, the National Museum of Ireland (in 1992), and Norwich Museum (before 1993) was also undertaken. Assessment of achievements against objectives is as follows:

Objective 1 (Distribution). It was not possible to undertake as fully comprehensive a survey of existing records as was intended, but it is not thought that any previously unrecognised ones have been omitted. Work will continue in this broad area, mainly by further individual contacts with British coleopterists. Output in the form of distribution maps of each species is included in the report. A future refinement could be the allocation of records to date-classes. However, in assessing a group of such rare and obscure species, the distinction between pre- and post-1970 records (eg Hyman, 1992) is not thought to be particularly helpful.

Objective 2 (Phenology). The phenology of each species has been assessed, using existing data and 1993 information. More needs to be done in this area, including more winter work.

Objective 3. (Biology). Feeding of adults and the possibility of rearing the species were both examined, with only partial success. Some useful information on feeding preferences was obtained, but a broader range of potential foodplants needs to be tested. Rearing broad-nosed weevils *ab ovo* was always likely to be difficult, particularly where time was limited. However, eggs and larvae of some species were obtained and preserved. A search for larvae in the field, especially at the Stoke Point site, could be profitable.

Objective 4 (Behaviour). The long resting periods undergone by individual weevils militated against the full achievement of this objective. However, the finding that such resting periods occur is itself useful information.

Objective 5 (Conservation). Although the assessment of the conservation needs of each species is subjective and speculative, the main findings appear to be sound. They are given in the accounts for each species and in a final general section of this report.

3 SPECIES ACCOUNTS

Standard headings are adopted for each of the five British species, including *C. socius*, which was not examined in the field.

3.1 *CATHORMIOCERUS ATTAPHILUS* BRISOUT

3.1.1 Range

Known only from France (Brittany: Departments of Morbihan and Finistère) (Hoffmann 1950; no new records in Tempère & Péricart 1989) and England. Not recorded from the Iberian Peninsula (de la Escalera 1918).

3.1.2 British Distribution

Known from only two small areas of the S.W. peninsula of England: the Lizard, Cornwall, and the Wembury region of South Devon (Map 2).

3.1.3 First British record

The account of Keys (1921) refers to specimens taken at the Lizard in 1917.

3.1.4 Status

RDB1 (Hyman 1992). Unchanged from Shirt (1987).

3.1.5 Information from 1993 investigation

Despite several hours searching in May and August, no specimens were found in the Kynance area of the Lizard where there are recent records of the species (J. Owen, *in litt.*). However, on 26 August it was discovered in reasonable numbers at Stoke Point, S. Devon, where a single specimen had been recorded in 1989 (T. Eccles, *in litt.*). The 14 individuals collected (from one very small area) were used in feeding trials. Although the area of apparent habitat is limited (about 100 m of narrow undercliff), only a small patch (*c.* 30 x 50 cm) was intensively worked. The weevil was therefore present at a high density of individuals. Four specimens of *C. myrmecophilus* were taken in the same area.

3.1.6 Habitat

The Stoke Point locality is an area of soft, shaly undercliff, very close to the sea. The vegetation cover is not complete and consists of *Plantago coronopus* in a virtually pure, single-species stand.

3.1.7 Associated weevil species

Apart from *C. myrmecophilus* (mentioned above), only the polyphagous *Trachyphloeus angustisetulus* and the stenophagous *Trichosirocalus dawsoni* were taken with *C. attaphilus* at the Stoke Point site.

3.1.8 Feeding trials

Initially, the Stoke Point specimens were divided into two equal groups, each individual being given either *Plantago lanceolata* or *P. coronopus* foliage. The weevils fed on both species, there being apparently no preference for either. Mortality was heavy, but this was not attributed to the provision of inappropriate

foodplants. Collecting the weevils had led to damage to some specimens and mortality in the pre-overwintering stage was not unexpected.

After feeding on *P. lanceolata* or *P. coronopus*, four weevils were given *Plantago media* leaves. These were accepted readily. Foliage of *Bellis perennis* and *Senecio vulgaris* was also accepted by individual weevils.

Slightly senescent leaves of *Plantago coronopus* and *P. lanceolata* were equally as acceptable as fresh foliage in later trials.

Continuing mortality brought the feeding trials to an end on 20 October 1993, but the surviving specimens were kept alive on *P. lanceolata*. Two individuals have survived into December. These limited trials have confirmed that *C. attaphilus* is polyphagous, but with a preference for species of *Plantago*. It is virtually certain that the species is limited in its distribution and abundance by factors unrelated to the availability of its food.

3.1.9 Immature stages

There is no information on the immature stages of this species. Specimens were taken too late in the year for any oviposition to be observed.

3.1.10 Conservation

C. attaphilus is an exceptionally rare species in the world, with only two states (France and UK) currently having populations. Its status as RDB1 in UK could perhaps be highlighted to reflect its international importance. However, nothing would be served by placing the species under the formal protection of Schedule 5 of WCA. It is an obscure species, difficult to find, and poorly known. It is certainly not impossible that it will be found at sites

between the two known areas of occurrence (or elsewhere on the south-west coast), and the small number of coleopterists competent to discover it should not be inhibited from investigations by protected status. *C. attaphilus* is under no threat from field entomologists.

In common with other species of the genus, *C. attaphilus* is possibly threatened by successional changes in its habitats and, less certainly, by public pressure and development. It is assumed that the Stoke Point site is part of an SSSI, and protection of this site is of the utmost importance for the conservation of this species. Because of the eroding nature of the undercliff here, successional changes are unlikely to be threatening. This is not the case on the Lizard sites, where this threat and that of public pressure are likely to be much more severe. On Kynance Cliffs, which were examined in some detail, no area dominated by *Plantago coronopus* similar to the Stoke Point site was found. However, the inaccessibility and "fractal" nature of the cliffs at the Lizard make it likely that such habitat occurs away from the well-trodden cliff paths.

3.2 *CATHORMIOCERUS BRITANNICUS* BLAIR

3.2.1 Range and British Distribution

C. britannicus is endemic to the British Isles. The statement in Shirt (1987) that it has occurred in France is erroneous. The mistake occurred because the species is included in Hoffmann (1950), on the basis that it might possibly be found in France. However, it has not been recorded from that country (Tempère & Péricart 1990).

The weevil has been taken quite widely in Cornwall, but mostly from the Lizard area (map 3). Recently it has been recorded in Dorset.

3.2.2 First British Record

The distinctness of this species from *C. myrmecophilus* was first recognised by E.C. Bedwell, who convinced K.G. Blair, leading to the latter's description of the new species (Blair 1934).

3.2.3 Status

RDB1 (and ENDEMIC) (Hyman 1992). Unchanged from Shirt (1987).

3.2.4 Information from 1993 investigation

This was the species on which most information accrued. Two specimens were found close to Furzebrook Research Station, Dorset, on 30 April and 4 May and confirming an earlier record of 1992. The occurrence of *C. britannicus* in Dorset, at a considerable distance from the known sites at the Lizard, Cornwall, was most surprising. The site, a steep roadside bank on sandy soil, was worked frequently from April until the end of July, by which time it had become overgrown. However, no other specimens were found.

The two 1993 specimens were kept alive; one died in early December 1993 and the other is still active at the time of writing (December 1993), having survived over six months. Neither specimen has laid any eggs, a circumstance which has probably contributed to their longevity.

C. britannicus was also found at Rinsey Cliffs, Cornwall (SW594268) (5 specimens) on 18 May, and Lesceave Cliff (SW588273) (one example) on the same day. A further specimen was taken at Rinsey on 25 August. Most of the Rinsey examples were taken by "brushing" vegetation at the sides of overgrown walls and grassy banks, paying particular attention to clumps of

Plantago spp. (*P. lanceolata*, *P. maritima* and *P. coronopus* are all common on the site). The May specimens were kept alive for feeding trials and for observations on oviposition.

3.2.5 Habitat

The adults of *C. britannicus* appear to occur in a broader range of ecological conditions than some other species in the genus. At the Furzebrook, Rinsey and Lesceave sites they were found in tall, cliff-top or roadside vegetation as well as in shorter swards. Earlier work (1963 to 1984) obtained the species from short, often rabbit-cropped, swards, and the more recent records may show that the species has a wide ecological amplitude, or that it can persist under sub-optimum conditions.

The vegetation on the Rinsey site included *Daucus carota*, *Anthyllis vulneraria*, *Lotus corniculatus*, *Ononis repens*, *Sedum anglicum*, *Rumex acetosa* the *Plantago* spp. mentioned above, and a range of grasses, mostly fine-leaved (*Festuca*) species. In places, *Pteridium aquilinum*, *Rubus fruticosus* agg., and other woody species predominated, indicating a general lack of management. However, it was very clear that between 1988 and 1993, substantial clearing of *Ulex europaeus* and *Prunus spinosa* scrub had been undertaken by the National Trust.

The vegetation on Lesceave Cliff was different in character from that of Rinsey, being less influenced by the proximity of the sea. *Viola* spp. were plentiful, with *Veronica chamaedrys*, *Trifolium* spp. locally abundant and some *Vicia sativa* present. In small, open areas there were *Plantago coronopus*, *Ornithopus perpusillus* and *Sedum anglicum*. However, the plant cover of the site was not characterised in detail, being very variable.

The Furzebrook site was a rich and diverse roadside bank on which *P. lanceolata* was the only species of *Plantago* present; it occurred as small clumps and was not abundant. Other herbs on

the bank included *Primula vulgaris*, *Ranunculus* spp., *Fragaria vesca*, *Veronica chamaedrys*, *Lotus corniculatus*, *Trifolium repens*, *T. pratense*, *Campanula trachelium*, *Bellis perennis*, *Anthriscus sylvestris*, *Taraxacum officinale* agg., *Viola* spp. and *Silene maritima*. Woody plants were occasionally present, having grown down the bank from the hedge at its top. Grasses predominated.

3.2.6 Associated weevil species

Both the Cornish and Dorset sites were rich in other weevils. Those recorded at Rinsey Cliffs included: *Apion curtirostre*, *A. loti*, *A. ononis*, *A. fulvipes* (= *dichroum*), *A. apricans*, *Trachyphloeus angustisetulus*, *Caenopsis waltoni*, *Polydrusus confluens* (on *Ulex europaeus*), *Strophosoma retusum*, *Barypeithes sulcifrons*, *Hypera plantaginis*, *H. arator*, *Trichosirocalus dawsoni*, *T. troglodytes*, *Ceutorhynchus contractus*, *Tychius picirostris*, *Mecinus pyraster* and *Gymnetron pascuorum*.

Fewer species were recorded from Lesceave Cliff. Besides those associated with *Plantago* and *Trifolium* species, *Apion pomonae* was noted.

Species recorded from the Furzebrook site for *C. britannicus* included *Rhynchites germanicus*, *Apion curtirostre*, *A. hydrolapathi*, *A. violaceum*, *A. assimile*, *A. fulvipes (=dichroum)*, *A. nigritarse*, *A. punctigerum*, *A. loti*, *A. frumentarium*, *Otiorhynchus ovatus*, *O. rugosostriatus*, *O. singularis*, *Phyllobius roboretanus*, *P. pomaceus*, *P. oblongus*, *Philopedon plagiatum*, *Cneorhinus plumbeus*, *Brachysomus echinatus*, *Barypeithes araneiformis*, *B. pellucidus*, *Sitona lineatus*, *Hypera plantaginis*, *Trichosirocalus troglodytes*, *Nedyus quadrimaculatus*, *Parethelcus pollinarius*, *Glocianus distinctus*, *Ceutorhynchus erysimi*, *C. floralis*, *Pelonomus quadrituberculatus*, *Amalus scortillum*, *Rhinoncus castor*, *R. pericarpius*, *Tychius picirostris*, *Mecinus pyraster* and *Gymnetron pascuorum*.

3.2.7 Feeding trials

The aim of keeping the Dorset and Cornwall specimens alive was to obtain information on egg-laying and longevity, so the weevils were fed mostly on *Plantago lanceolata*. However, limited testing of foodplant preferences of the Cornish *C. britannicus* showed that *P. maritima* and *P. coronopus* were accepted readily by some individuals. *Ranunculus* sp. and *Bellis perennis* were also tested, leaves of each species being offered to two different weevils on two separate occasions in May. Neither plant was accepted as food.

The Dorset weevils were principally fed on *P. lanceolata*, but in May one of the two specimens was offered, and accepted, *Ranunculus* sp. The other was offered, but rejected, *Primula vulgaris*.

These limited observations suggest that *C. britannicus* is polyphagous, but that there is a preference for species of *Plantago*.

It was very noticeable that the specimens tested fed erratically. Observations were made at approximately weekly intervals throughout the summer. Evidence from these observations showed that bouts of feeding of a few days or weeks were followed by periods of quiescence and inactivity, during which feeding was minimal.

3.2.8 Oviposition

The two weevils collected from near Furzebrook laid no eggs (see above - information from 1993 investigation).

The five specimens collected in Cornwall on 18 May 1993 laid from 0 to 28 eggs each (mean 10.6) over a total period of 80 days (28 May to 16 August).

The egg of *C. britannicus* is cylindrical, white, and measures 0.34 x 0.59 mm.

3.2.9 Longevity and phenology

Observations over a period of less than a year are not a good guide to the life-history and phenology of any species. However, the observations of 1993 do give some indication of the probable pattern of occurrence of *C. britannicus* over time. It is almost certain that the weevil overwinters in the adult stage, though it may also do so in other stages. The oviposition data show clearly that eggs are produced and laid during the summer. As the Dorset weevils laid no eggs but lived for over six months, it is quite possible that adult weevils live two (or more) years, possibly not laying eggs until their second (or later) summer, though this is clearly speculative.

Having regard to the conditions under which specimens were kept, it is clear that the weevils are generally long-lived. However, much longer and more detailed observations are required for the life-history of the species to be thoroughly understood.

3.2.10 Immature stages

Most of the eggs laid by *C. britannicus* hatched without difficulty and a number of first-instar larvae were preserved for later examination. Because of the artificial conditions under which the adults were kept and eggs laid, few clues were available for successful rearing of the species. Attempts using detached roots and rootstocks of *Plantago lanceolata* failed, probably because the foodplant dried out. Some larvae were introduced onto *P. lanceolata* plantlets growing in small flower pots, but no signs of mature larvae, pupae or adults were found subsequently.

In all probability, the successful rearing of *Cathormiocerus* immature stages is a full-time job for an experienced laboratory technician or other expert. It is not an easy task to integrate into other activities.

3.2.11 Conservation

The national responsibility for the conservation of endemic species, particularly those that are endangered, is clearly great. Fortunately, *C. britannicus* does not appear to be as threatened by natural successional changes as was at first thought. Its occurrence among quite dense vegetation at the sites examined in 1993 is an encouraging sign for its persistence.

Nevertheless, it would be wrong to be too complacent about the future of the weevil. It seems to have disappeared from at least one Cornish site (Parc-an-Als cliffs, Porthleven) where it was taken in the 1980s. This is an area where there has been much public pressure and considerable changes in the disposition of footpaths, etc. These kinds of land-use changes may well be more damaging than succession for this particular species. It is likely that public pressure will be a potentially adverse activity on most of the known Cornish sites. On the other hand, as is probably the case with *C. attaphilus* and *C. maritimus*, possibly with all *Cathormiocerus* species, it is impossible to work thoroughly the steep cliffs and many inaccessible sites along the Cornish coast. It may be that a determined effort to record in great detail one small section of coast could give insights into the likelihood of the species occurring away from easily accessible areas. The distribution of the weevil along a transect perpendicular to the coastline, and including well-trodden pathway, taller ungrazed vegetation of the clifftop, and a range of rock-ledges and steeper, vegetated slopes on the cliff itself, would be of great interest and importance for conservation.

The Dorset site for *C. britannicus* is in an altogether different category. It is unlikely that this small section of roadside bank is the main area of occurrence, and one recommendation is for the general region to be more thoroughly searched for the weevil. However, the known site should be protected and, equally as important, managed. Already there are signs that it has become overgrown as a result of reduced verge-cutting along these infrequently used minor roads. The site should be monitored regularly in 1994, both for the occurrence of the weevil and for management.

3.3 *CATHORMIOCERUS MARITIMUS* RYE

3.3.1 Range

Apart from England, this species is known from the Netherlands (Heijerman 1993) and NW France, particularly Brittany, in the Departments of Calvados, Finistère and Loire-Inférieure (Hoffmann, 1950). No new records are given by Tempère & Péricart (1989).

de la Escalera (1918) referred specimens from Brittany to his "var. *armoricus*". According to Hoffmann (1950) this form is very rare. de la Escalera (1918) gave no other localities for the species.

3.3.2 British Distribution

This is the most widely distributed British species of *Cathormiocerus*, with the exception of *C. myrmecophilus*. *C. maritimus* is known from the Channel coast of SW England from the Scillies to South Hampshire, and from the Atlantic coasts of East Cornwall and North Devon (Map 4). Although known from eleven 10km squares, several records of the weevil are old and

from areas which have been much changed, particularly by coastal development and recreation. However, there are post-1970 records from three vice-counties, and the species was found during the 1993 programme of field work, though only as a single specimen.

The statement in Hyman (1992) that the species "can be numerous where found" may well be true, but is not the experience of the author of this report. In his experience, other species of the genus can equally well be so described.

3.3.3 First British record

This species was first referred to by Rye (1870), though he did not formally describe it until later (Rye, 1874b). The type locality is Portsea, Hants., where it was taken by H. Moncreaff, whose manuscript name Rye adopted.

3.3.4 Status

RDB3 (Shirt, 1987; Hyman 1992). Consideration might be given to revising this status in view of the very limited range of the species and its possible existence in France as a distinct form, together with the fact that several of the English sites for the weevil have been destroyed.

3.3.5 Information from 1993 investigation

Only a single specimen of this species was taken during field work in 1993. This weevil was collected from near Gew Graze, Kynance, Cornwall (SW675143), on 19 May. It was kept alive, mainly on *Plantago lanceolata*, and laid several eggs (see below). However, it had died by 18 July.

3.3.6 Habitat

The Cornish specimen was taken from a dry patch of cliff grassland under *Plantago lanceolata*. In other Cornish localities the habitat has been similar. At Parc-an-Als cliffs, Porthleven (SW635249), on 29 March 1974, 13 April 1984 and 25 May 1988, it was taken from short vegetation growing on top of a stone wall.

Earlier accounts of this species have also recorded the higher and dryer parts of saltmarshes as its habitat. Moncreaff's original locality was described as "a low bank near a salt marsh" (Rye, 1874b).

3.3.7 Associated weevil species

In the immediate vicinity of the 1993 site the following were taken: *Hypera arator* (under *Cerastium* sp.), *Trichosirocalus dawsoni* (under *Plantago coronopus*) and *T. troglodytes* (under *P. lanceolata*).

Although a full record of the species taken at the Parc-an-Als site was not kept, the species taken in association with *C. maritimus* included: *Apion violaceum*, *A. loti*, *Trachphloeus angustisetulus*, *Phyllobius roboretanus*, *Strophosoma retusum*, *Alophus triguttatus*, *Trichosirocalus dawsoni*, *T. troglodytes*, *Ceutorhynchus contractus* and *Gymnetron pascuorum*.

3.3.8 Feeding trials

The single specimen of *C. maritimus* fed readily on *Plantago lanceolata* and *P. maritima*, but no other plant species were offered as food.

3.3.9 Oviposition

Four eggs were laid between 28 May and 4 June, but no others during the weevil's life; the specimen died between 11 and 18 July. Unfortunately, none of the eggs hatched.

3.3.10 Longevity and Phenology

Despite there being little additional information from the 1993 investigation, there appears to be little doubt that the phenology of *C. maritimus* is similar to that of other *Cathormiocerus* species. Adults almost certainly overwinter and lay eggs in early summer. The immature stages are presumably passed later in the summer, with adults of the new generation emerging in early autumn. What is unknown is whether adults live more than one year, and if the immature stages can occur over two (or more) seasons.

3.3.11 Immature Stages

The egg is similar to that of *C. britannicus*, but the dimensions of the few eggs obtained were not taken. There is no other information about the immature stages of this species.

3.3.12 Conservation

The potential threats to this species are those which confront other species of the genus. Partly because it is (or has been) rather more widely distributed than *C. attaphilus* or *C. britannicus*, several former sites almost certainly no longer support the weevil. Although there is no positive evidence, development has doubtless destroyed the 19th century localities in Southsea and Portsea. On the other hand, the species may not have been recently worked for in several of its old locations. As with all members of the genus, a thorough survey of potential, as well as recorded, sites is

desirable, though the manpower required to do this adequately would be considerable.

At the Lizard sites the familiar threats of public pressure, coastal "development", and the antithetical one of natural succession in the absence of sheep- and rabbit-grazing remain the potentially adverse influences. As my own experience of this species is only of single individuals, my conclusions are necessarily tentative. It would be useful to know of the threats to sites where the species has been found in numbers (Hyman 1992).

3.4 *CATHORMIOCERUS MYRMECOPHILUS* (SEIDLITZ)

3.4.1 Range

This species has a wider area of distribution than our other *Cathormiocerus* and is known from Spain (Seidlitz, 1868; de la Escalera, 1918), the Netherlands (Heijerman, 1993), Belgium and Portugal (Hoffmann, 1950) and France, where it has been reported from the departments of Eure-et-Loire, Manche, Orne, Ille-et-Villaine, Finistère, Loire-Inférieure, Ayeyron, Tarn and Hérault (Hoffmann, 1950) and, more recently, Maine-et-Loire and Pyrénées-Orientales (Tempère & Péricart, 1989).

3.4.2 British Distribution

C. myrmecophilus extends further east than our other species of *Cathormiocerus*, and is more widely distributed, having been recorded from 14 10 Km squares. It has been taken frequently and over a wide area of the Hastings district of Sussex and from there westwards to East and West Cornwall, including the Scilly Islands (Map 5).

3.4.3 First British Record

Rye (1870) (as *Trachyphloeus myrmecophilus*).

3.4.4 Status

RDB3 (Shirt, 1987; Hyman, 1992). There would seem to be no justification for changing this status.

3.4.5 Information from 1993 investigation

Four specimens were taken at Stoke Point, S. Devon, with *C. attaphilus*, on 26 August. This was too late in the year for information on oviposition and longevity to be obtained, but limited observations on habitat and foodplant choice were made.

3.4.6 Habitat

The description of the Stoke Point habitat for *C. attaphilus* also applies to *C. myrmecophilus* taken there in 1993.

At Fairlight Glen, Sussex, the weevil occurred at the edge of cliff paths in grassy areas not far from the sea in March 1961. However, at Cathole Cliff, S. Devon (SX 690380), in October 1987, it occurred on a clifftop amongst heathy vegetation, dominated by *Calluna vulgaris*.

3.4.7 Associated weevil species

See under *C. attaphilus* for the few species found at the Stoke Point site.

3.4.8 Feeding trials

Only *Plantago coronopus* and *P. lanceolata* were tested as foodplants for the adult weevils; both were accepted readily.

3.4.9 Oviposition

Two eggs were laid by one of the Stoke Point weevils between 30 August and 3 September. These soon shrivelled and no other eggs were found.

3.4.10 Longevity and phenology

Three of the four specimens from Stoke Point, including the individual which laid eggs, died in September. The other weevil is still alive (December 1993). This is consistent with the accepted pattern that adults overwinter, with the early stages present during the summer. The laying of eggs as late as August/September may mean that the larvae also overwinter, perhaps doing so in their first year of existence. This would indicate that *C. myrmecophilus* has a two-year (or longer) life-history, but this must be regarded as very speculative until more information is available.

3.4.11 Immature stages

The egg of *C. myrmecophilus* is similar to that of *C. britannicus* (see above), but neither of the available specimens was measured. There is no other information on the immature stages.

3.4.12 Conservation

C. myrmecophilus is certainly less rare and more widely distributed than our other species of the genus, both in Britain and on the European continent. Its less precarious conservation status is reflected in its RDB rating (but see under *C. maritimus*, also categorised as "Rare").

The generalised threats to this species are those which confront the others in the genus. Natural succession on an eroding site such as the Stoke Point one cannot be regarded as damaging, but this small locality should be formally protected. At other sites, particularly those on clifftops close to footpaths, public pressure is likely to be an adverse activity, though virtually nothing is known about the small-scale distribution of individuals in relation to microtopography, including the formation of footpaths and the heterogeneity induced by patchy grazing, especially by rabbits. In some areas, such as Cathole Cliff, S. Devon, the species appears to survive in dense vegetation, quite unlike that at Stoke Point, for instance.

It is probable that this species, in common with others of the genus, survives in places on sea-cliffs which are inaccessible to coleopterists. It is difficult, both conceptually and practically, to evaluate this supposition. A partial answer must lie in much more comprehensive survey of possible sites and a monitoring programme on known ones.

3.4.13 Bibliographical note

C. myrmecophilus was described in 1868 by Seidlitz. The publication in which the description appeared was described as a *Beiheft* of the *Berliner Entomologische Zeitschrift* (12th year) by Rye (1870). The only runs of the journal which I have examined, in the libraries of the Royal Entomological Society and Entomological Department of the Natural History Museum, do not

include this supplement. However, the work in question is held in the former library as a separate publication, in which there is no reference to the *Zeitschrift*. I have therefore included in the Bibliography only the citation of the separate. In this the page reference to the description of *C. myrmecophilus* is 125, not 124 as stated by Rye.

3.5 *CATHORMIOCERUS SOCIUS* BOHEMAN

3.5.1 Range

Relatively quite widely distributed in Europe being known from France Hoffmann, 1950), the Netherlands (Heijerman, 1993) and Spain (de la Escalera, 1918). In France it is particularly rare, being known only from Finistère, and was long confused with *C. maritimus*, according to Hoffmann (1950). In Spain it has been reported from the Sierra Nevada (Seidlitz, 1868; Champion & Sharp, 1888; Hoffmann, 1950), but de la Escalera (1918) gives only Escorial.

3.5.2 British Distribution

Known only from the Isle of Wight, where it has been recorded from three 10km squares. Recent records have been from the Sandown/Whitecliff Bay and Ventnor/Steephill Cove seacliff areas, but the record of Rye (1868) was from Freshwater.

3.5.3 First British Record

Boheman in Schoenherr (1843): "Patria: Anglia Mus. Dom Walton". This record was doubted for some years, it being

perceived that *Cathormiocerus* was a south-European or Mediterranean (rather than an extreme western Palaearctic) genus. Rye (1868; 1869) reinstated *C. socius* as British and discussed the earlier record in some detail. His conclusions were discussed and confirmed in all details by Champion & Sharp (1888).

3.5.4 Status

RDB2 (Shirt, 1987; Hyman, 1992).

3.5.5 Information from 1993 investigation

Examination on this species in the field fell outside the terms of the programme. No visit to the Isle of Wight was made in 1993.

3.5.6 Habitat

C. socius has occurred on cliffs at the edge of paths and in grassland. A specimen taken at Steephill Cove (SZ 549768) in April 1977 was found by grubbing under *Spergularia rupicola*, but the species is usually associated with *Plantago* spp.

3.5.7 Associated weevil species

No detailed information.

3.5.8 Feeding trials

None.

3.5.9 Immature Stages

No information.

3.5.10 Conservation

Although *C. attaphilus* has been recorded from fewer 10 km squares than *C. socius*, the narrower British range of the latter species makes it arguably the most threatened of our *Cathormiocerus* species. It is somewhat surprising that a species which occurs also in at least three other European states should be so restricted in the United Kingdom. Although almost all the sites for British *Cathormiocerus* are in holiday areas, those which support *C. socius* are under particular pressure. To some extent also, the soft Cretaceous and Jurassic rocks of the Isle of Wight create cliffs which are rather more accessible than the harder and older strata of Devon and Cornwall. These differences have not been quantified, but in general they contribute to the impression that *C. socius* is particularly threatened. It would be useful to evaluate this, and to undertake a detailed survey of the south coast of the Island to determine the exact localities of the weevil.

Natural succession is probably less of a threat to *C. socius* than is public pressure and development, but this is another aspect which a survey could address.

4 CONSERVATION OF *CATHORMIOCERUS* SPECIES: GENERAL CONCLUSIONS

The habitats of the five British species of *Cathormiocerus* are all very alike and the perceived threats to the species are also similar. Evaluation of these threats is hampered on all sides by lack of knowledge of all aspects of the species' ecology, a lack which the 1993 programme helped only a little to fill. It is difficult to see how the position can be improved without considerable resources of time and effort, though some proposals are made below.

A major difficulty in studying the species lies in determining their exact distribution in their areas of occurrence. All the species are difficult to find in the field, but the main problem is the disposition of the weevils on inaccessible and dangerous sea-cliffs. It is quite possible that the insects are commoner than it seems but are more frequent in areas which cannot be reached by field workers. If this is so, coleopterists are looking at only a small, and possibly atypical, part of the population of each species.

Although the habitats of the species are similar they are also variable within themselves. Although a "degree of openness" (Hyman, 1992) is certainly a feature of the localities for all species, the habitat of *C. britannicus*, at least, includes quite dense herbaceous vegetation. Again, it is uncertain whether such sites are atypical or part of the natural range of the species' habitat. In other words, is the species in these sites "hanging on", or perhaps declining, or is it maintained as a stable population? Because so little is known about the species, these questions remain, at least for the moment, unanswered.

The threats to each of the British *Cathormiocerus* remain as the two antithetical processes of natural succession and public pressure. Coastal development is seen as a less severe threat, except perhaps in the case of *C. socius* (on which no first-hand experience was gained during 1993).

Natural succession has become a more intractable problem following the decline of rough cliff-top grazing by sheep and the variable grazing by rabbits consequent upon populations being periodically eliminated by myxomatosis. Because of the inaccessibility of cliffs where natural succession may be reduced or retarded by exposure, it is quite possible that the threat has been exaggerated.

On the other hand, the mild, moist climate of the SW Peninsula induces luxuriant growth of vegetation in protected places, and some successional changes may be expected on cliffs which might otherwise have been grazed by rabbits.

Similar considerations may be applied to the threat posed by excessive wear on cliffs, and especially cliff-top paths, caused by human trampling by walkers and holiday-makers. In especially popular areas, for example the cliffs close to Kynance Cove, Lizard, Cornwall (a well-known locality for *Cathormiocerus* spp.), wear is both extensive and severe. It is impossible for *Cathormiocerus* or any other invertebrates (save possibly a few highly specialised species) to survive under such conditions. In general, invertebrate animals are much more sensitive than plants to human trampling (Duffey, 1975), and it is virtually certain that by the time any wear on vegetation is apparent the associated invertebrates have long since disappeared. Parenthetically, it may be wondered why most conservation studies on human trampling focus on vegetation when on both theoretical grounds and experience, invertebrates are so much better indicators of effects, particularly in the early stages of pressure.

Be that as it may, it can be confidently asserted that species of *Cathormiocerus* cannot survive under conditions of even moderate human trampling. The problem facing conservationists is to quantify the loss of *Cathormiocerus* habitat so occasioned, and to assess its significance in terms of effects on numbers and populations. It is here that the uncertainty regarding the inaccessible habitat of the species under consideration makes itself felt. As far as practical management is concerned, it is difficult to make plausible proposals. Although in some ways the two threats of natural succession and human trampling are equal and opposite, in practice it is certain that, at least in their extreme manifestations, neither will be effective in redressing the imbalance caused by the other. In other words, both are equally damaging, except in their mildest forms.

On cliffs which are very badly eroded, measures for the restoration of vegetation are often taken. These may include the fencing of worn areas so as to allow natural vegetation to grow, the replacement of eroded soil, and re-seeding. In the long-term these activities may be effective in restoring habitat for *Cathormiocerus* spp., but probably only if wear on the re-established areas

is prevented or severely reduced. In the short-term it is unlikely that restoration activities would produce areas in which the weevil can live. Restoration is usually attempted only on the very worst affected cliffs and, as has been seen, such areas probably lose their associated invertebrates long before wear becomes apparent, let alone severe. Studies of restoration have usually concentrated on vegetation and there is little information on the success in restoring the former invertebrate component of eroded areas. This would be a useful field of study.

On the formal side of conservation it should be noted that most existing localities for *Cathormiocerus* species are protected, either by SSSI notification or by establishment as conservation areas, particularly by the National Trust (or of course by both). Conservation bodies with responsibilities for *Cathormiocerus* sites need to be made aware of the needs of the species and, particularly, of their zoogeographical and international importance. Encouragement should be given by these conservation bodies and other landowners to field workers who can demonstrate their probity and competence to collect and study the species by giving their approval to applications for work on the sites for which they have responsibility.

A particular trap to avoid is giving protected status to the species. Although this may appear to be paradoxical, even anti-conservation, the reality is that so little is known about the species of *Cathormiocerus* that any restrictions placed on collecting the weevils are likely to be counter-productive. Most entomologists are responsible people and it is more important to publicise the international importance of the British *Cathormiocerus* and to encourage increasing knowledge about them. In the long-term this will be more effective than protected status in ensuring the conservation of these important weevils.

5 PROPOSALS FOR FUTURE WORK

Until the British *Cathormiocerus* are better known and understood, their conservation is unlikely to make progress. Further study of all the species should be encouraged. A comprehensive investigation is unlikely unless undertaken, and funded, as a PhD studentship or post-doctoral research programme. However, progress can certainly be made through less intensive studies. Suggestions are:

1. Survey of the distribution and status of *C. socius*. This species was originally included in the proposals for 1993, but was taken out, mainly for reasons of cost. A survey of this species in the Isle of Wight might be considered by English Nature for a "second phase" of *Cathormiocerus* work, on a shared costs basis.
2. Investigation of the early stages (and other aspects) of *C. attaphilus*. This species is suggested for a number of reasons, including conservation importance, abundance at its 1993 site, ease of working, and site accessibility.
3. Intensive survey of one site using several observers, and possibly involving members of a rock-climbing or similar group. The aim should be to work a broad belt transect across a cliff and to concentrate on areas normally inaccessible to coleopterists.
4. Survey of a large, but well-demarcated, area of the SW peninsula, emphasising sites which have been poorly, or not, worked in the past. A "Coleopterists' Meeting" might be a suitable occasion for such a survey. The aim would be to search for *Cathormiocerus* species in suitable but sparsely-worked parts of the coast and to break new ground.

There are many other areas of future work which would be worth establishing and supporting.

In a wider context, work on the conservation of biodiversity in Europe should include some attention to the 90 or so species of this very interesting and localised genus. One particular study should aim to link investigations in Cornwall and in Britanny, which have similar ecological characteristics and conservation problems.

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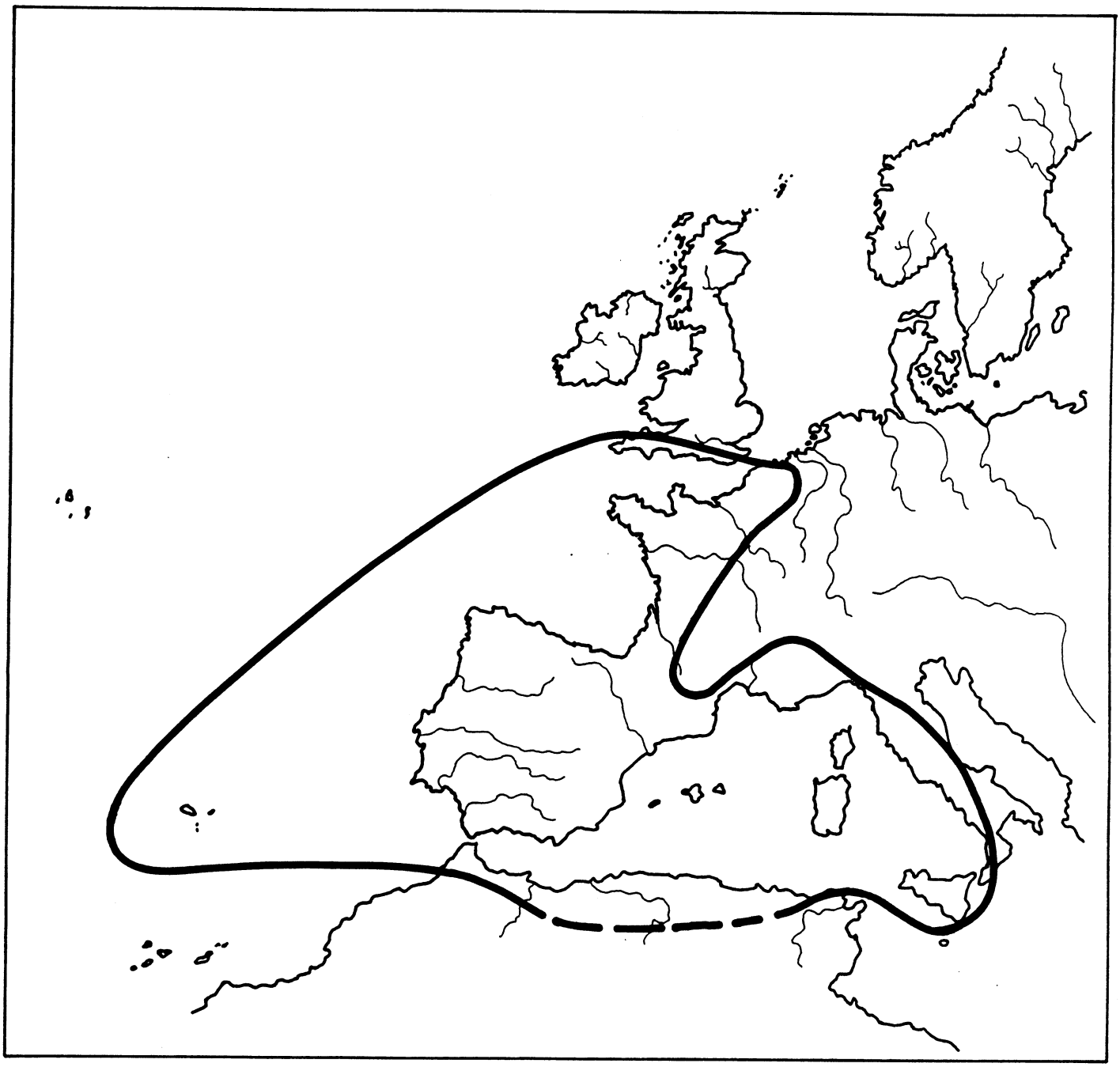
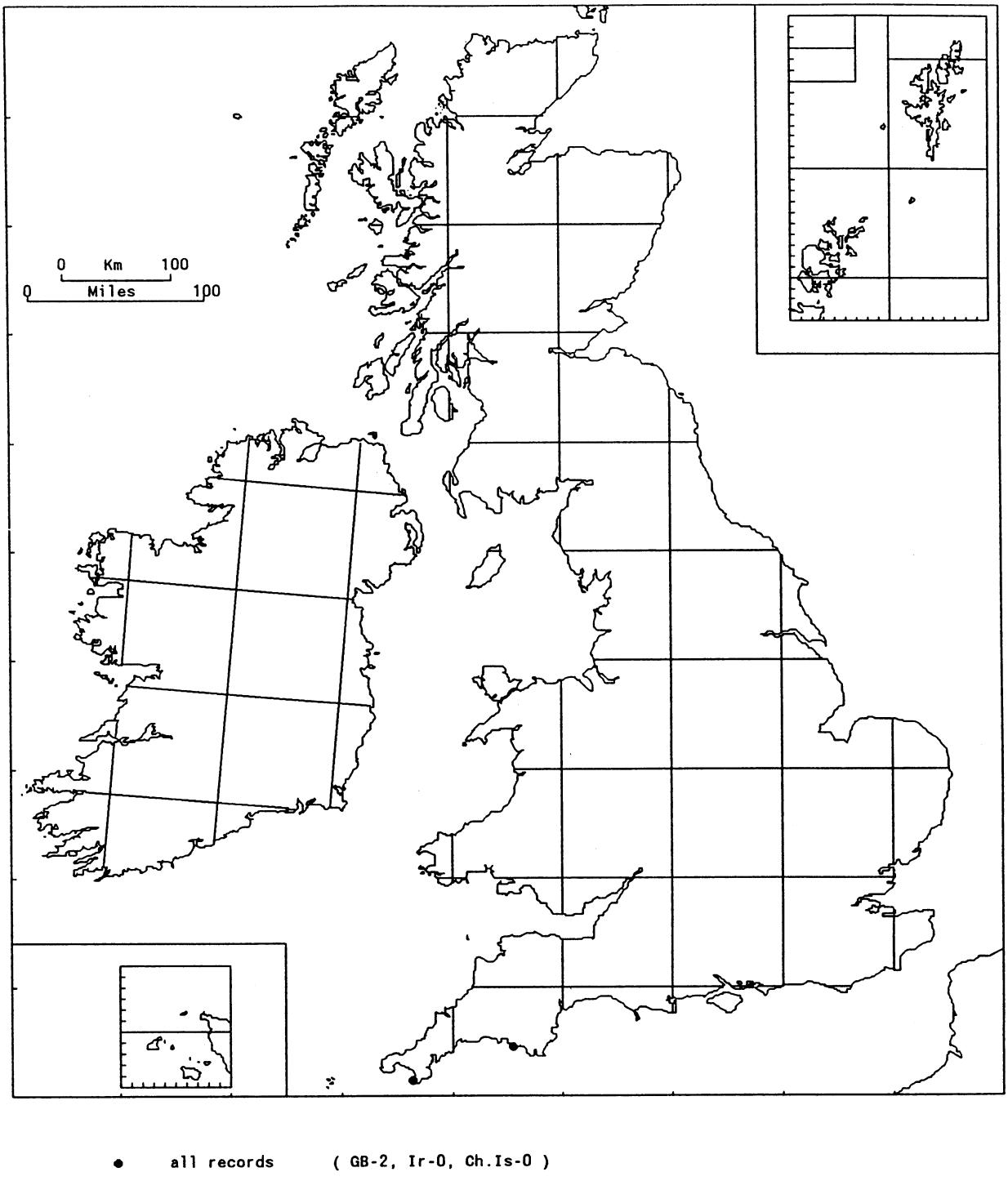


Map 1 Area of distribution (range) of the genus *Cathormiocerus* (all species). Modified from Gregori & Osella, Fig. 25 (1989)

Cathormiocerus attaphilus

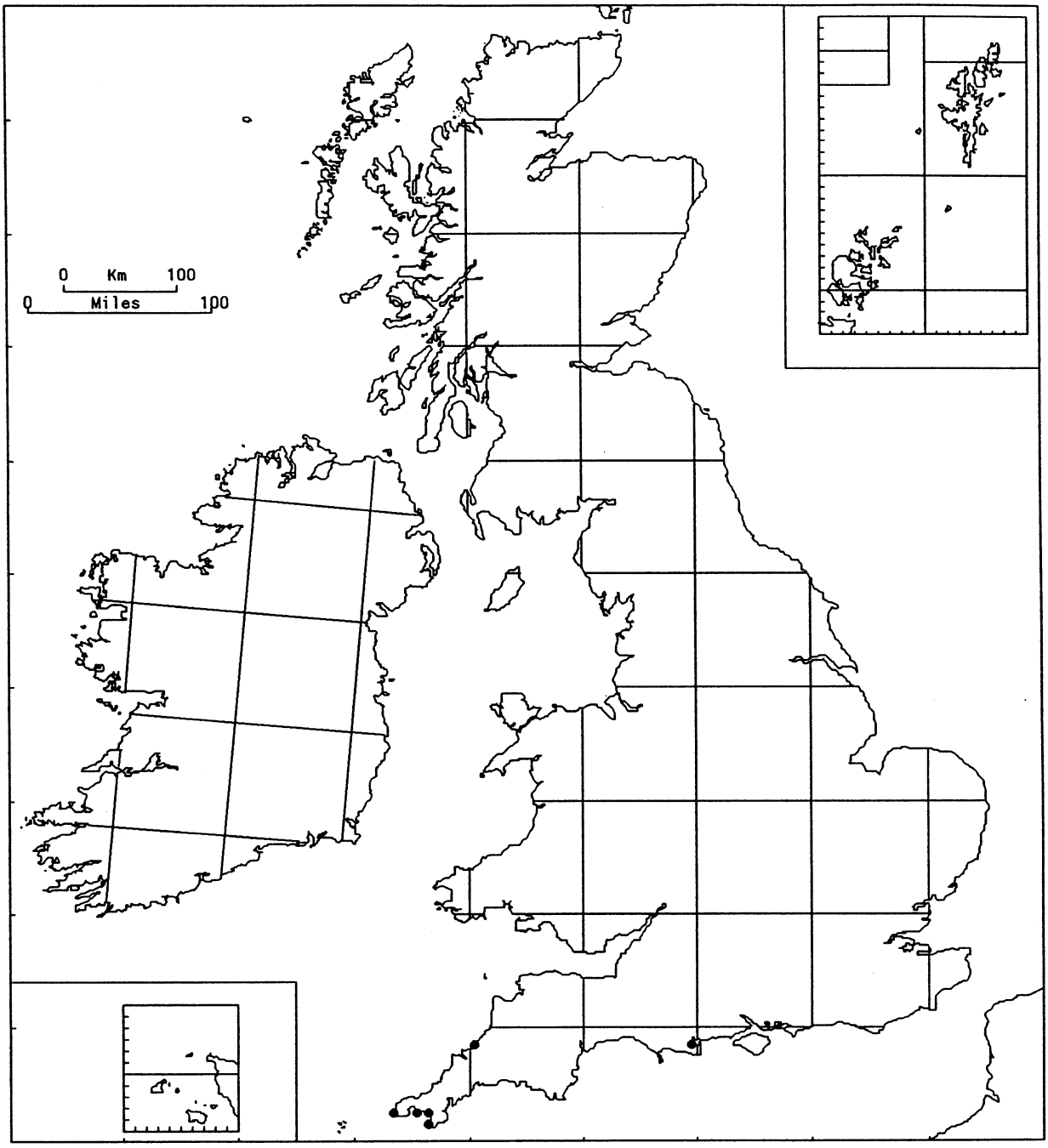
6455 83701



Map 2 British distribution of *Cathormiocerus attaphilus* Brisout (all records)

Cathormiocerus britannicus

6455 83702

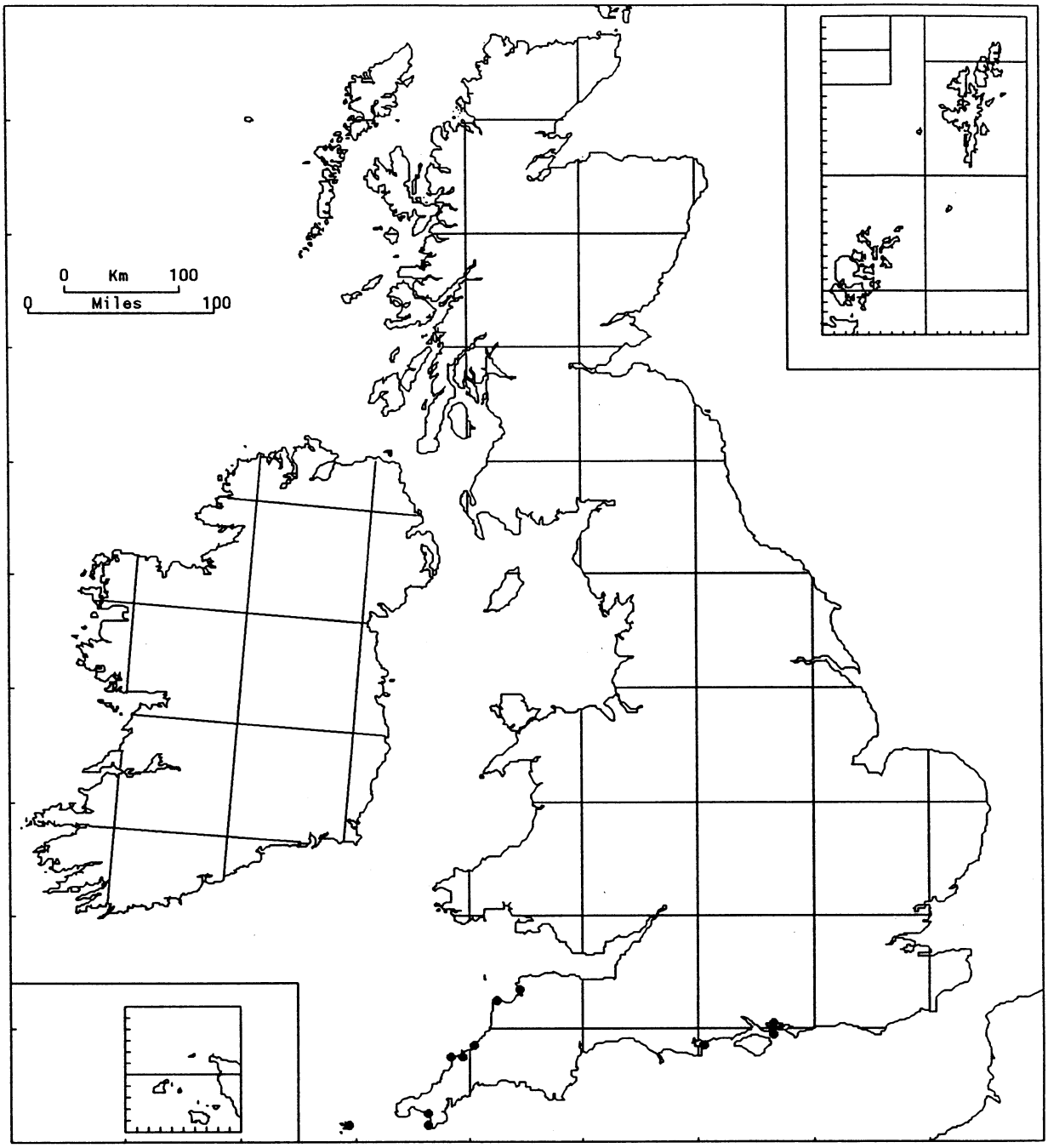


● all records (GB-6, Ir-0, Ch.Is-0)

Map 3 British distribution of *Cathormiocerus britannicus* Blair (all records)

Cathormiocerus maritimus

6455 83703

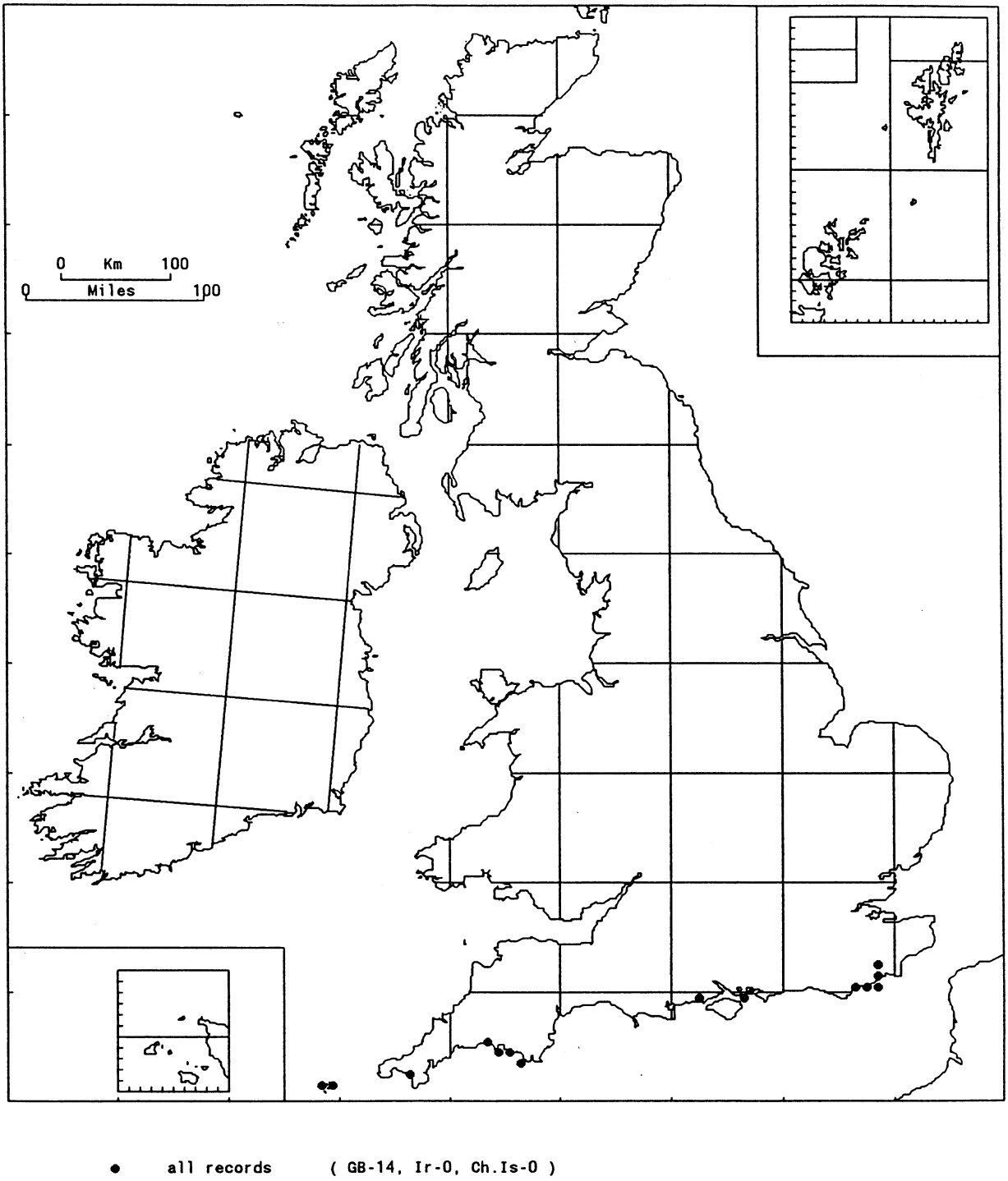


● all records (GB-11, Ir-0, Ch.Is-0)

Map 4 British distribution of *Cathormiocerus maritimus* Rye (all records)

Cathormiocerus myrmecophilus

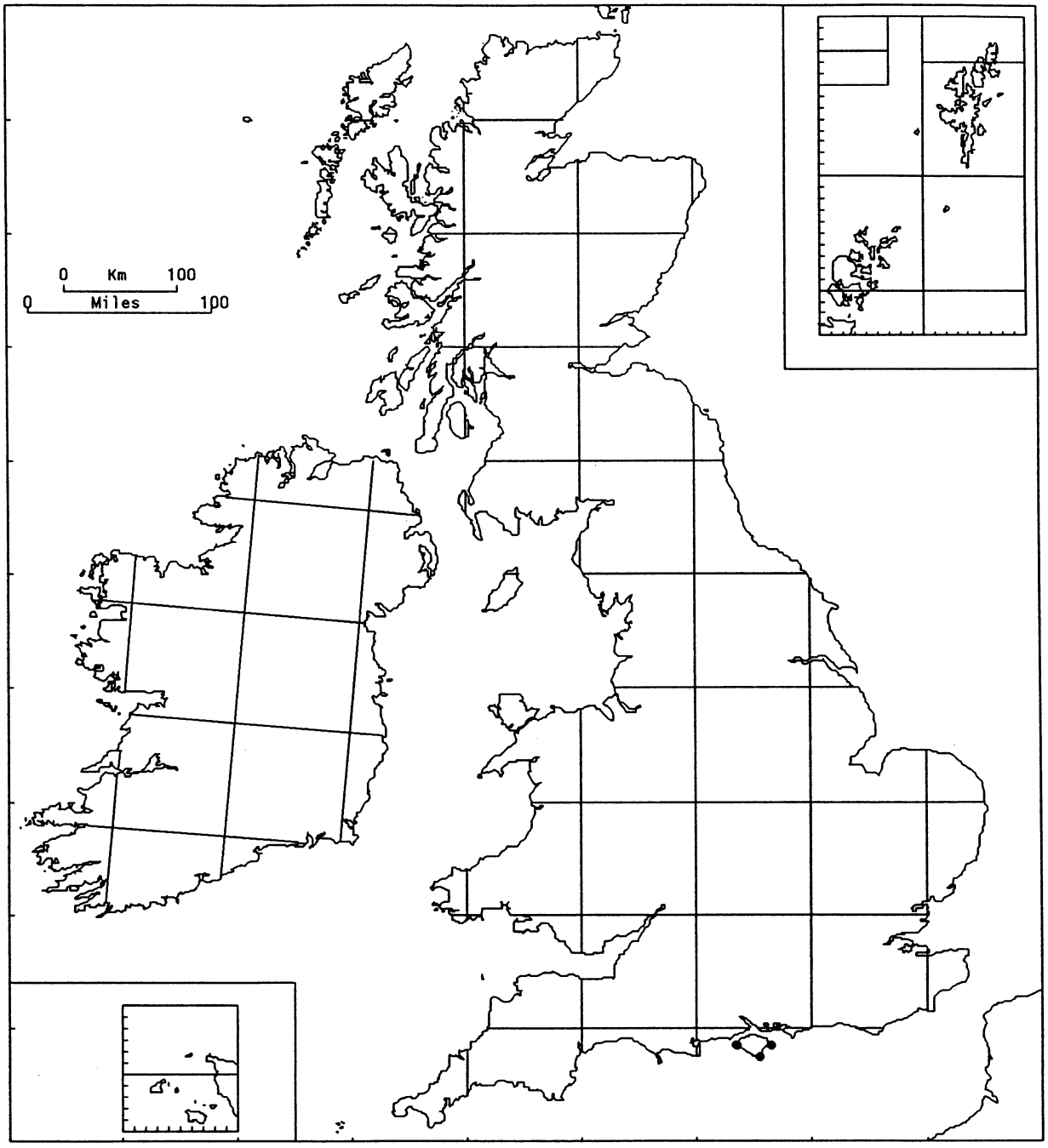
6455 83704



Map 5. British distribution of *Cathormiocerus myrmecophilus* (Seidlitz) (all records).

Cathormiocerus socius

6455 83705



● all records (GB-3, Ir-0, Ch.Is-0)

Map 6 British distribution of *Cathormiocerus socius* Boheman in Schoenherr (all records)