CECIDOLOGY

Vol. 20, No. 1 Spring 2005

Journal of the British Plant Gall Society

Edited by Michael Chinery

Editorial

Members of the Society's Invertebrate Group are making great progress in their quest to discover what lives in various galls in addition to the rightful occupants, but other animals were undoubtedly taking an interest in gall inhabitants long before we came on the scene. It is well known that birds and other animals attack a variety of galls to get at the juicy larvae or pupae inside. Tits and finches commonly eat small galls, such as those of the gall wasp *Andricus quadrilineatus* on oak catkins, and they also forage diligently for spangle galls among the fallen leaves in winter. Even the hardest and toughest galls sometimes yield up their occupants to determined predators, and this fact was entertainingly demonstrated to me recently while sitting in my car on the edge of a small oakwood. It was a damp February afternoon, too wet for a walk, so I sat and watched and listened, and before long I became aware of a tapping sound. Just a few yards away a great spotted woodpecker was hammering vigorously at the trunk of a mature oak. It flew off after several minutes, leaving half of a marble gall wedged firmly into a bark crevice. The rightful occupant of the gall – *Andricus kollari* – would have long gone, assuming that it avoided attack by parasitoids, but the woodpecker had clearly felt that the gall was worth attacking. Inquilines were probably still present, so was the woodpecker able to detect these insects inside the gall and, if so, how? The relationship between birds and galls is, perhaps, another worthwhile field of study for the cecidologist, and it is one that can be pursued into the winter months when other fieldwork often tails off.

Michael Chinery

The cover photograph, taken by Len Worthington, shows a fine example of the spiked pea gall, sometimes known as a sputnik gall, on wild rose. Induced by the gall wasp *Diplolepis nervosa*, the gall usually develops on a leaflet, but occasionally sprouts from the petiole or even a flower stalk.

ACERIA ANCEPS (NALEPA) AND *ACULUS MAGNIROSTRIS* (NALEPA) (ERIOPHYOIDEA) NEW TO IRELAND, WITH NOTES ON OTHER GALLS

James P. O'Connor, National Museum of Ireland,
Kildare Street, Dublin 2, Ireland

In 2004, the author discovered two eriophyoid species new to the Irish fauna. A total of fifty-four species have now been reported from Ireland (O'Connor 2004). Several other interesting records were also obtained. Details of these finds are given below. The counties are shown in O'Connor (2000). The material was identified using Redfern, Shirley & Bloxham (2002). Voucher specimens of the new species have been deposited in the National Museum of Ireland.

ERIOPHYOIDEA

Aceria anceps (Nalepa) New to Ireland

NORTH KERRY (H2): Banna (Q7522), plentiful on germander speedwell (*Veronica chamaedrys* L.) in localized areas of the sand-dunes, 4 viii 2004, JPOC.

Aculus magnirostris (Nalepa) New to Ireland

MEATH (H22): Rathbeggan Lakes (O0046), near Dunshaughlin, abundant on crack willows (*Salix fragilis* L.) planted near man-made lakes, 30 viii 2004, JPOC.

DIPTERA: CECIDOMYIIDAE

Contarinia barbichi (Kieffer)

NORTH KERRY (H2): Banna (Q7521), on common bird's-foot-trefoil (*Lotus corniculatus* L.) 11 viii 2004, JPOC.
Previously known from Clare and Wexford (O'Connor *et al.* 1997; O'Connor 2000).

Rabdophaga marginemtorquens (Bremi)

NORTH KERRY (H2): the Cashen River (Q8637) near Moneycashen, abundant on a single osier (*Salix viminalis* L.) growing in the hedgerow 30 viii 2004, JPOC.
This species was previously known only from Stoneyford in Co. Wexford (O'Connor *et al.* 1997).

Wachtliella persicariae (L.)

NORTH KERRY (H2): the Cashen River (Q8637) near Moneycashen, abundant on amphibious bistort (*Persicaria amphibia* (L.) Gray) growing on waste ground near the river 3 viii 2004, JPOC.

This species was previously known from Kildare, Mayo, Roscommon, and Wexford (O'Connor *et al.* 1996; O'Connor & Wistow 1999; O'Connor 2002).

Acknowledgement

The author is grateful to his daughter Helen for her help during the field-work.

REFERENCES

O'CONNOR, J.P. 2000 Seven gall-causing species (Diptera & Eriophyoidea) new to Ireland with notes on other species. *Cecidology* 15: 92-98

O'CONNOR, J.P. 2002 Four gall-causing species (Diptera & Eriophyoidea) new to Ireland, with other records from 2001. *Cecidology* 17: 25-30

O'CONNOR, J.P. 2004 A review of the Irish gall-wasps (Hymenoptera: Cynipidae) with notes on the gall-midges (Diptera: Cecidomyiidae) and gall-mites (Acarina: Eriophyoidea). *Irish Naturalists' Journal* 27: 335-343

O'CONNOR, J.P., ASHE, P. & WISTOW, S. 1996 Five species (Diptera and Eriophyoidea) new to Ireland, with notes on some other galls. *Cecidology* 11: 26-28

O'CONNOR, J.P. & WISTOW, S. 1999 Fourteen gall-causing species (Diptera & Eriophyoidea) new to Ireland with notes on other species. *Cecidology* 14: 5-10

O'CONNOR, J.P., WISTOW, S., ASHE, P. & O'CONNOR, M. A. 1997 Nine galls (Hemiptera, Diptera and Eriophyoidea) new to Ireland with notes on other species. *Cecidology* 12: 14-23

REDFERN, M., SHIRLEY, P. & BLOXHAM, M. 2002 British plant galls. Identification of galls on plants and fungi. *Field Studies* 10: 207-531

BPGS MEETING IN THE WYRE FOREST OCTOBER 2ND 2004

John Meiklejohn, 1 Avon Bank, Defford, Worcester, WR8 9BD

A small party of BPGS members and colleagues from the Wyre Forest Study Group spent an enjoyable day gall-hunting in the vast reaches of the Wyre Forest. The morning was spent searching along the somewhat shaded banks of Dowles Brook, which forms the boundary between Shropshire and Worcestershire. After lunch, the party left the shaded conditions of the Forest and visited some old hedged grasslands with old fruit trees and hedgerow trees, enjoying the sunshine and the added interest of more herbaceous plants.

The day produced a total of 35 different galls, two of which were of special interest. On a shady bank by the Dowles Brook, a seedling oak (*Quercus robur*), no more than 75 cm high and with a mere half a dozen leaves on it, had a good crop of the kidney-shaped galls of *Trigonaspis megaptera* ♀♀. The afternoon session produced another oak gall that most of the participants had not seen before. This was the agamic bud gall of *Andricus glandulae*. This rare gall is clothed with silky white hairs and, although it varies in shape, it is usually more or less bell-shaped (See Plate 13).

A full list of the galls recorded is available from the above address on request. Please send a stamped, addressed envelope.

Carmarthenshire Galls: An addition and a correction

There is an important addition to be made to the list that appeared in the last issue of *Cecidology* (2002 19 (2) 52-55). The galls of the mite *Aceria megaceras* were quite common on *Mentha aquatica* at one site, but I did not receive confirmation of the identity of this mite in time for inclusion in the original account. This is an excellent find because it would appear to be only the third British record for these galls. A local botanist tells me that the galls were found at the same site back in 1997, so the mite is clearly well established there.

The last sentence for *Cynapion gyllenhali* should read: This record for VC 44 represents only the fifth vice-county known to me for which we have records of these galls.

John Robbins, 123b Parkgate Road, Coventry, CV6 4GF

FLOWER BUD GALLS ON *SAGINA PROCUMBENS* INDUCED BY *SIBINIA PRIMITA* (COLEOPTERA, CURCULIONIDAE)

Keith M. Harris, 81 Linden Way, Ripley, Woking, Surrey, GU23 6LP
and
Brian Wurzell, 47 Rostrevor Avenue, Tottenham, London, N15 6LA

In June and early July 2004 Brian Wurzell found small flower-bud galls on procumbent pearlwort (*Sagina procumbens* Linnaeus) growing on dry gravelly path verges near mineral works at Spitalbrook, Broxbourne, Herts. [TL 378 068] and again on the same host at Stutton, Suffolk [TM 159 351] on 26 vii 2004. Affected flower buds remained closed and were slightly larger than normal flower buds (Plate 1). The cause of these galls was not immediately apparent as a number of different insects were associated with them, but examination by Keith Harris detected weevil larvae within some of the galls. These larvae had been feeding on the developing ovaries and soon left the galls to pupate in sifted, sterilised leaf mould. Adults emerged from mid-July and were identified as *Sibinia primita* (Herbst) by Dr Mike Cox, Entomology Department, Natural History Museum, London. He reported that this weevil (Plate 2) has been recorded from *Sagina, Spergularia, Daphne, Linoniastrum*, and *Reseda*, representing four different plant families (Caryophyllaceae, Thymelaeaceae, Plumbaginaceae, and Resedaceae). There are apparently no records of this species inducing galls and the larvae have not been described, although Dauphin & Aniotsbehère (1993) recorded a related but distinct species, *Sibinia triangulifer* Desbrochers, inducing identical galls on *Sagina procumbens* in Corsica.

This gall is new to Britain and merits further study. At Broxbourne, *Sagina apetala* growing with *S. procumbens* was unaffected.

REFERENCE

DAUPHIN, P. & ANIOTSBEHÈRE, J.-C. 1993. Les galles de France. *Memoires de la Société Linnéenne de Bordeaux* 2: 1-316

VERIFICATION OF GALLS

Margaret Redfern, 2 Victoria Road, Sheffield S10 2DL

Many members of the BPGS, armed with a copy of *British Plant Galls* (Redfern, Shirley & Bloxham 2002), will find that they can confidently identify most of the common galls they encounter, at least after they have had some experience. Novice cecidologists should attend as many field meetings as they can (these are advertised in the BPGS Calendar each year), where they will find more experienced people always willing to give newcomers a helping hand. But however experienced we become, we sometimes come across galls that are difficult to identify or that require determination of the causer, or for which we would like a second opinion. The purpose of this article is to outline the procedure of verification for those galls that create problems.

One of the aims of the BPGS is to build up knowledge of the distribution of galls in Britain with the eventual aim of producing distribution maps for every species, and in this endeavour we need large numbers of records of galls from all parts of the British Isles. So, we would like to encourage as many of you as possible to record the galls that you find and to send your records to the Records Data Manager, Janet Boyd (her address is on the back cover of this issue of *Cecidology*). You will soon find that you are able to contribute to this project. Most people will be able to identify most of the galls they encounter, but there will often be some uncertainties, galls that do not quite fit the key, and some that you have not come across before. The points that follow indicate the procedure that should be taken to identify and verify these problem galls.

1. Identify the host plant as accurately as possible; ask a botanist friend to check it if you are unsure. The advantage of doing fieldwork with a group of naturalists is that there is likely to be someone present who is able to check your plant identification.
2. Identify the gall using *British Plant Galls*; if there is a problem, consult other identification guides to which you have access, and note the references you have consulted.
3. If possible, ask the opinion of a more experienced cecidologist, perhaps the Recorder for your area. You can find the Recorders' addresses inside the back cover of *Cecidology*.
4. If there is still a problem, especially if you suspect that the gall is uncommon or rare, send it to one of the experts listed below (all are members of the BPGS). These people will do their best to identify your

gall and will consult taxonomic experts specialising in the particular group if they have problems.

It is important to include as much information as possible with the gall that you send (and to keep a copy of this information). You should send:

- The unknown gall and the part of the plant it is on (leaf, twig, flower, fruit, etc.), plus an equivalent but ungalled piece of the plant (a sketch of the gall on its plant part would be useful too).
- The name of the host plant, identified to species.
- The date of collection, and name of the site where collected, with its county and grid reference.
- A summary of the attempts you have made to identify the gall.
- Your name, address, telephone number, and any e-mail address.

5. Pack the gall and plant carefully:
    - Wrap the specimen in several thicknesses of kitchen roll/toilet paper and if the gall causer needs to be reared, put the specimen into a polybag – but *do not put fungal galls in polybags*. Fungal galls should be carefully dried to discourage moulds from developing, and then sent in paper bags or envelopes.
    - Small and/or delicate galls, and those containing live larvae or nymphs, should be put into a small rigid container (e.g. film canister, specimen tube, small plastic or tin box).
    - Ensure the specimen will be protected in the post – use bubble-wrap in a padded envelope or pack it into a box – and post it first class to the appropriate BPGS expert. Include an s.a.e. for a reply (or your e-mail address, if available) and, if you want the specimen to be returned, include enough postage to cover this.

The BPGS experts willing to verify identification of galls and their causers in the following groups are listed below (their addresses are given at the end):

* Gall midges, Cecidomyiidae: Keith Harris
* Gall wasps, Cynipidae: the galls: Peter Shirley
  galls, causers and their inquilines and parasitoids: Robin Williams
* Gall aphids, Aphididae (including pemphigids): John Robbins
* Gall mites, Eriophyoidea and others: Brian Gale, John Smeathers
* Galling fungi: Tom Preece, Brian Spooner
* Galling bacteria, phytoplasmas and viruses: Tom Preece
* Other groups, or if you have no idea to which group the galler belongs:
  Margaret Redfern

If you suspect that your gall is new to Britain or is a new county record, the *causer must be identified* and *verified by a taxonomist* expert in the group. If an insect, it may need to be reared to the adult stage. The BPGS expert to whom you send your gall will attempt to rear and identify it, or will send it to the appropriate taxonomist.

The experts listed are all busy people and will not welcome galls from people who have not attempted to identify them themselves. On the other hand, they will welcome problems – galls that turn out to be rare or unusual or to be new records.

The keys in *British Plant Galls* are designed for typical galls that are mature and healthy. Even familiar ones may cause problems if they are young, or if the gall causer has been parasitised, or if the gall contains inquilines; then they may be smaller than usual or enlarged and with a distorted shape. So, be aware of this and, if possible, check several specimens to find a typical gall. Most galls in the following groups should be straightforward to identify, and should not need verification:

- Common galls that run down easily in the keys.
- Galls on oaks and roses (except for the *Diplolepis* pea galls).
- Most gall wasp galls on other host plants.

The main problem groups, which should be verified and their causers determined, are:

- Galls identified tentatively in the keys or where a problem is noted.
- Rare galls and those you suspect are new to Britain or are new county records.
- Galls on host species not listed in the keys.
- Most gall midge galls in swollen or closed flowers and flower buds.
- Gall midges that cause leaves to cluster together at shoot tips in herbaceous host plants and in woody shrubs; although rosettes and artichokes on trees are better known, those caused by species of *Rabdophaga* on *Salix* often also cause problems.
- *Rabdophaga* galls in stems and twigs of *Salix* (apart from *R. salicis* which is well known).
- Galls on *Carex* sedges and on grasses (apart from *Phragmites*).
- Most beetle galls.
- Many aphid galls (apart from most galls caused by Adelgidae, *Pemphigus*, *Eriosoma*, and *Tetraneura*).

Eriophyid gall mite taxonomy is confused on many host plants (e.g. *Acer, Betula, Sorbus, Tilia, Ulmus*) mainly because identification has relied on the gall with no reference to the mite. Work is in progress on mite determination but will proceed slowly because there are so few expert eriophyid taxonomists in Britain or elsewhere. For the time being, determine mite galls as accurately as possible and consider taking part in the mite identification project described in *Cecidology*, 2004, 19 (1), pp. 22-24.

The publication of *British Plant Galls* in 2002 has stimulated searches for and identification of galls, and the last few years have seen many advances in the study of galls. Since publication, the names of some gall causers have changed and there are other improvements that will be made to the keys – a full revision is planned for 2007. In the meantime, because the stock of keys is low, the 2002 edition is being reprinted. We are taking the opportunity to update the names and to note some important amendments in a leaflet that will be inserted into each copy of the reprint. A copy of this leaflet will also be distributed with this issue of *Cecidology*, so that members already owning *British Plant Galls* can use it to update the keys. We will put the amendments on to the website, too. Other papers that have appeared in *Cecidology* in recent years provide information to update the keys, and I recommend that you annotate your copies with this information.

Names and addresses of experts listed above:

Brian Gale, 6 Roker Way, Fair Oak, Eastleigh, Hampshire SO50 7LD
Dr Keith Harris, 81 Linden Way, Ripley, Woking, Surrey GU23 6LP
Dr Tom Preece, Kinton, Turner's Lane, Llynclys Hill, Oswestry, Shropshire SY10 8LL
Dr Margaret Redfern, 2 Victoria Road, Sheffield S10 2DL
John Robbins, 123b Parkgate Road, Coventry CV6 4GF
Peter Shirley, 72 Dagger Lane, West Bromwich, West Midlands B71 4BS
John Smeathers, 274 Main Road, New Duston, Northampton NN5 6PP
Dr Brian Spooner, Mycology Section, Royal Botanic Gardens, Kew, Richmond, Surrey TW9 3AE
Robin Williams, Kynton's Mead, Heath House, Wedmore, Somerset BS28 4UQ

REFERENCE

REDFERN, M., SHIRLEY, P. & BLOXHAM, M. 2002 British Plant Galls. Identification of galls on plants and fungi. *Field Studies* 10: 207-531

NEW RECORDS OF *STEFANIELLA* KIEFFER (DIPTERA, CECIDOMYIIDAE) GALLS ON *ATRIPLEX* SPECIES IN THE THAMES ESTUARY

Keith M. Harris, 81 Linden Way, Ripley, Woking, Surrey, GU23 6LP
and
Brian Wurzell, 47 Rostrevor Avenue, Tottenham, London, N15 6LA

The presence of an unidentified species of *Stefaniella* galling spear-leaved orache (*Atriplex prostrata* Boucher ex DC) at Thorness Bay, Isle of Wight, was reported by Harris (2003), who suggested that the species involved might be rare and indicated that further research on the genus was needed. As a direct result of that publication, Brian Wurzell found galls induced by larvae of this genus on various species of *Atriplex* at Leigh-on-Sea, between Leigh Creek and Two Tree Island [TQ 823 858], and on Canvey Island [TQ 780 853] along the south Essex coast of the Thames Estuary [51^{o} N, 0^{o} E] in autumn 2003. Galls were of variable size (1 to 10 mm long) and shape, hard, with one or more larvae in separate internal cavities and mostly on stems (Plates 8-10). They were found on all four annual *Atriplex* species present in the area surveyed, namely *A. prostrata* (spear-leaved orache), *A. patula* Linnaeus (common orache), *A. longipes* Drejer (long-stalked orache), and *A. littoralis* Linnaeus (grass-leaved orache), and also on *A.* × *gustafssoniana* Taschereau, which is a natural hybrid between *A. prostrata* and *A. longipes.* At Leigh-on-Sea, galls were thinly distributed over many hectares of rank *Puccinellia*/*Halimione* turf along the high-water zone of the tidal marsh and were difficult to detect, with only 4-5 galls found per hour of searching. At Canvey Island they were present in drier areas of muddy grazing pastures and dry weedy track sides and were more concentrated. Some plants bore up to six swellings per stem and more than 20 galls on the whole plant. The general impression was that of a genuine native population long integrated into a stable herbaceous community rather than of a chance introduction in a hot summer. The galls occurred only within a very narrow habitat niche on succulent halophytic varieties of their food-plants. Eggs, larvae, pupae, and adults survive in a harsh environment that would seem quite unsuited to the development of gall midges. But this is in keeping with the known biology of *Stefaniella* and other baldratiine genera, such as *Baldratia* and *Stefaniola,* which are closely associated with halophytic and xerophytic species of *Atriplex* elsewhere in the Palaearctic region.

Between 14 viii 2004 and 9 x 2004, eight field surveys were made by BW and during that period no galls were found on *Atriplex portulacoides* Linnaeus (sea purslane), a species that was formerly assigned to *Halimione*. This observation is of particular importance as the only species of *Stefaniella* previously recorded in Britain is *S. brevipalpis* Kieffer, recorded (without voucher specimens) from Durham by Bagnall & Harrison (1917) and from Devon by Bagnall (1926). The species was originally described from Italy on *A. portulacoides*. There may therefore be more than one species of *Stefaniella* on *Atriplex* in Britain and the need for further research is again emphasised.

At the time of collection, in early October, the galls collected by BW and sent to KMH for examination contained fully fed larvae, many of which were in tough, cylindrical, brown silken cocoons plugging the exit holes that had been excavated by larvae before the cocoons were formed (Plate 11). These larvae were 2-3 mm long, pale yellow to light orange and with a distinct but small sternal spatula with bifid blade (Plate 12). Some larvae were preserved for DNA analysis, which is yet to be completed, and live larvae were overwintered in an unheated garage at Ripley, Surrey. Adult *Stefaniella* (1♂ and 4 ♀) emerged between 15 vi 2004 and 5 vii 2004, but were outnumbered by parasitoids, especially in the sample from *A. patula* in which larvae were heavily parasitised by ectoparasitic Hymenoptera.

A preliminary examination of the *Stefaniella* larvae, pupal exuviae, and reared adults indicates that this material from the Thames Estuary represents the same species as that found in the Isle of Wight (Harris 2003) but it is still not possible to name the species with certainty. *Stefaniella cecconii* Kieffer, 1909 was originally described from galls on *Atriplex patula* in Italy and has since been recorded from central Europe and possibly from France (Dauphin & Aniotsbehère 1993). The British records from Leigh-on-Sea and Canvey Island, and the earlier record from the Isle of Wight, may possibly relate to this species but further taxonomic research will be needed before this can be confirmed.

REFERENCES

BAGNALL, R. S. 1926 Some interesting salt-marsh or maritime gall-mites. *The Vasculum* 12 (2): 93-95

BAGNALL, R. S. & HARRISON, J.W. H. 1917 New and rare British Cecidomyiidae II. *The Entomologist's Record* 29: 228-230

DAUPHIN, P. & ANIOTSBEHÈRE, J.-C. 1993 Les galles de France. *Memoires de la Société Linnéenne de Bordeaux* 2: 1-316

HARRIS, K.M. 2003 Records of *Stefaniella* (Diptera, Cecidomyiidae) in Britain. *Cecidology* 18: 14-16

OBSERVATIONS ON THE AGAMIC (KNOPPER) GALL OF *ANDRICUS QUERCUSCALICIS* AND THE ASSOCIATED INQUILINES AND PARASITOIDS IN NORTHUMBERLAND

Hewett A. Ellis, 16 Southlands, North Shields, NE30 2QS

Introduction

Since the cynipid gall wasp *Andricus quercuscalicis* (Burgsdorf) was first reported in Britain (Claridge 1962), there has been much interest in the spread of this species, and particularly in the degree to which the native cynipid inquilines and chalcid parasitoids have exploited this new host resource (Hails, Askew & Notton 1990; Schönrogge, Stone & Crawley 1995; 1996a; 1996b; Schönrogge, Walker & Crawley 1998; 2000). Most of these publications deal with the inquilines and parasitoids found in knopper galls in south and south-east England, in East Anglia, and as far north as Tatton Park in Cheshire. More recently, Randolph (2003) has given an account of the inquilines and parasitoids reared from knopper galls in the Bristol region of south-west England.

Since very little is known of the inhabitants of knopper galls as far north as Northumberland, I decided to sample the galls in the area and to rear the inhabitants to determine which inquilines and parasitoids, if any, are present (Ellis 2004). The present paper reports the results of observations made on galls collected from six different locations in south-east Northumberland (Watsonian Vice-County 67) during the past five years.

Materials and Methods

435 knopper galls of various sizes were collected from the ground under oak trees (*Quercus robur* L.) at six locations (Table 1). Galls collected between September and December were more or less green and sticky, while those collected in February and March were brown and more woody. The galls were generally kept in individual transparent plastic containers in an unheated room, although the inner galls were removed from one Gosforth Park collection and reared separately. Other galls were dissected at some time to reveal the inner galls and any unemerged insects. All galls were examined at regular intervals and, over the periods of emergence, they were checked daily.

Measurements were made of the height and width of each gall. The diameters of samples of exit holes of *A. quercuscalicis* in the inner galls and of inquilines and parasitoids in the outer gall walls were measured with a Peak Scale Lupe $\times$ 10, which permits readings to 0.1 mm. Depending on the times of collection, galls were observed for up to four years, by which time some of them were in the 6^{th} calendar year (see Table 1). Comparisons of the mean values of the various groups of data have been made using Student's 't-Test', and means are quoted as Mean ± Standard Error (S.E.).

Results

A) The Galls

Galls varied widely in both height and width, with the width normally exceeding the height: the width/height ratio exceeded unity in 90.2 per cent of the 429 galls measured. The heights ranged from 7.0 mm to 23.0 mm (mean 13.3 ± 0.2 mm), and the widths from 7.0 mm to 25.0 mm (mean 17.6 ± 0.2 mm). Comparisons of the mean heights and widths revealed that the width was significantly greater ($P<0.001$) in collections made at all six sites. The number of galls per acorn varied from one to five, with the smallest galls occasionally solitary on an acorn cup but more often in a group.

Generally, the size of the aperture in the main gall chamber was more than adequate to permit the escape of the emerging adult *A. quercuscalicis* (Plate 4). Occasionally the opening was malformed and extremely narrow (stenosed) or completely blocked, trapping the adult in the main chamber, where it often died. Some emerging insects had overcome the problem by chewing their way through the full thickness of the gall wall, or through the base where the wall is relatively thin. In some galls with long stalks the inner gall was fixed tightly into the stalk and the emerging gall wasp had either died or had eaten through the stalk wall to escape.

Considering the wide variation in the overall size of the galls, the shape and size of the inner galls (Plate 4) were remarkably constant. The inner gall was more or less elliptical and a sample of 40 galls revealed a mean length of 4.9 mm (range 4.0-5.2 mm) and a mean width of 3.6 mm (range 3.4-4.5 mm). The adult *A. quercuscalicis* invariably emerged from one pole of the inner gall after making a circular hole in the thin wall. The size of this exit hole was fairly constant, the mean values of two diameters at right angles ranging from 1.5 to 2.6 mm (mean 2.0 ± 0.03 mm).

In three examples the inner gall appeared to be ‘twinned’. In one there was an enlarged hour-glass-shaped inner gall, measuring 6.4×4.2 mm and containing a dead *A. quercuscalicis* larva. In the second example the inner gall was again hour-glass-shaped, measuring 7.0×3.5 mm, and a large dead adult occupied both halves of the centrally constricted chamber. The third example contained two contiguous inner galls with a tiny connecting aperture and a dead adult *A. quercuscalicis* in each of the two chambers. This appeared to be an example of true twinning, the gall being connected to the acorn cup by a single stalk. I know of no previous records of this phenomenon in knopper galls.

Measurements of 243 inquiline and parasitoid exit holes in the outer gall walls showed them to range from 0.3 to 1.1 mm (mean 0.7 ± 0.01 mm). In general, the smaller holes, measuring from 0.3 to 0.6 mm, were made by chalcids and the larger holes, up to 1.1 mm in diameter, were made by *Synergus gallaepomiformis,* although there was a considerable overlap because some of the inquilinous adults were smaller than average.

B) The Insects Reared

1. *Andricus quercuscalicis*

Including the twinned gall, 436 inner galls were removed from the 435 knoppers in order to determine the fate of the insect occupants. The fate of *A. quercuscalicis* in the galls is summarised in Table 2.

Overall, there was evidence of delayed diapause in 126 (28.9 per cent) of the 436 inner galls. Considering only the 284 adults with a known date of emergence, 175 (61.6 per cent) emerged as expected in the second calendar year, 102 (35.9 per cent) in the third calendar year, and 7 (2.5 per cent) in the fourth calendar year.

The timing of emergence of the *A. quercuscalicis* adults was remarkably constant, whether the galls had been collected in the autumn of their first calendar year or in the following spring after overwintering in the wild. In addition, the emergence times were similar whether the adults emerged in the second, third, or fourth calendar years. Thus *A. quercuscalicis* emerged between January 21st and March 25th in the second calendar year and between January 23rd and February 24th in the third calendar year. In the fourth calendar year all seven adults emerged on January 27th.

When more than one gall arose on a single acorn, the times of emergence from the individual galls did not always coincide: it sometimes happened that one of a pair emerged, as expected, in the spring of the second calendar year while its partner underwent prolonged diapause to emerge in the third or fourth year (see Table 3). The adult insects survived in their containers for up to 28 days without being fed.

2. Inquilines

The knopper galls yielded two species of inquiline.

Pammene fasciana L., a tortricoid moth, was found only in galls from Gosforth Park. In six of the galls the moth larva appeared to have eaten into the inner gall: the gall wasp larva was missing and the chamber was filled with frass. Two galls each contained a *P. fasciana* larva, one of which was successfully reared to the adult state to permit identification (Ellis 2001).

The cynipid *Synergus gallaepomiformis* (Boyer de Fonscolombe) (Plate 7) occurred in knopper galls from all the samples. Excluding the 17 galls from one of the Gosforth Park collections, in which only the inner galls were retained for rearing, the remaining 418 galls yielded 735 adult *S. gallaepomiformis*. The overall mean infestation rate was thus 1.76 per gall, with an average of nearly six inquilines to each affected gall (see Table 5).

The great majority (99 per cent) of adult *S. gallaepomiformis* emerged in the second calendar year, with only seven individuals (six from the Rising Sun Country Park and one from the Bedlington Country Park collections) undergoing prolonged diapause to emerge in the third calendar year. Overall, the first *S. gallaepomiformis* emerged on April 8th and the last on June 1st, but the emergence periods were often shorter for the individual site collections (see Table 5). Also, the majority from any one site emerged over a relatively short period. The Gosforth Park galls, for example, yielded 106 adult *S. gallaepomiformis* between April 11th and June 1st, but 91.4 per cent of these emerged between April 25th and May 17th. Galls from Holywell Dene produced adult insects between April 23rd and May 21st, but 96.2 per cent of the males and 65.8 per cent of the females had emerged by May 14th.

The total count for *S. gallaepomiformis* was 407 males and 327 females, plus one unsexed pupa cut from one of the galls, giving a male:female ratio of 1.24:1.0. The males started to emerge before the females, and the latter continued to emerge after the males had ceased (see Figure 1).

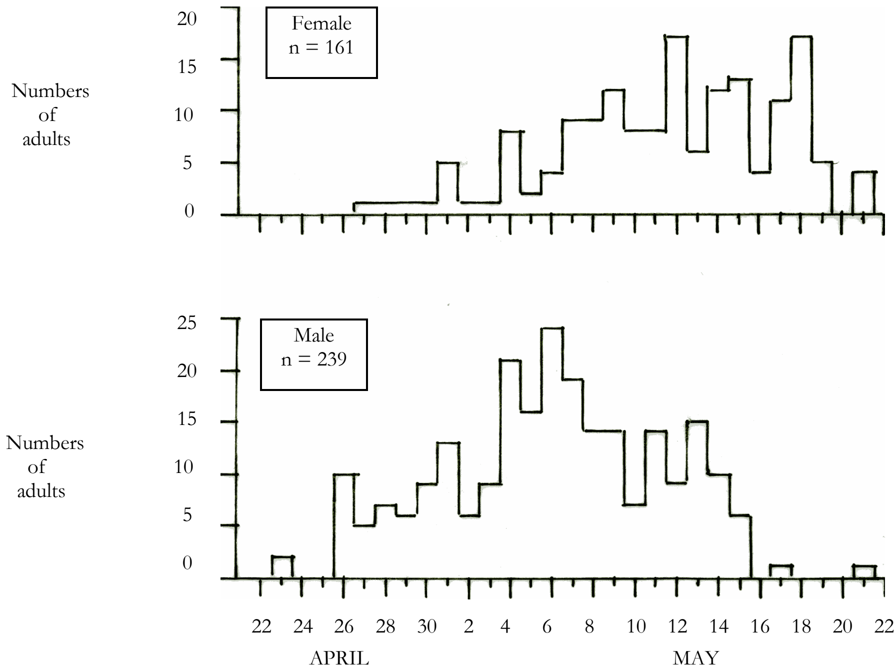

Figure 1.

Histograms showing the emergence dates of male and female *Synergus gallaepomiformis* from knopper galls collected from Holywell Dene.
[Based on 400 insects for which the precise date of emergence was known.]

The number of *S. gallaepomiformis* obtained from the different gall collections varied widely, both within and between locations (see Table 5). Two collections – one from Gosforth Park and one from Wansbeck Riverside Park – yielded none at all. The most heavily infested gall, from Holywell Dene, yielded 60 adults (28 males and 32 females). This gall was also attacked by 19 chalcid parasitoids – 16 *Mesopolobus sericeus* and 3 *M. amaenus* (see below). Adult *S. gallaepomiformis* emerged from almost anywhere on the outer surface of the gall, although the favoured position appeared to be at or near its base. Occasionally, its chamber was located deep in the gall wall and the adult emerged into the main chamber and thence through the apical vent. In general, the *S. gallaepomiformis* larvae did not interfere with the *A. quercuscalicis* larva in the inner gall, although in three galls with concentrations of *S. gallaepomiformis* in the base the inner gall wall appeared to have been breached by the adjacent inquilinous larvae and the gall-causer itself was not found (see Table 2, item 8).

To investigate any relationship between gall size and the presence of inquilines, the height and width of 129 galls attacked by *S. gallaepomiformis* were compared with the same dimensions of 273 galls free of the inquiline. The heights were similar in the two groups (means 13.1 ± 0.27 mm and 13.2 ± 0.17 mm; $p > 0.05$), whereas the mean width was significantly greater in the group with *S. gallaepomiformis* (18.2 ± 0.26 mm) than in the unattacked group (17.2 ± 0.20 mm; $p < 0.01$).

The number of *S. gallaepomiformis* attacking individual galls was independent of gall size: neither the height nor width of 40 galls from Holywell Dene correlated with the numbers of inquilines and parasitoids present (correlation coefficients -0.1424 and -0.2289 respectively; $P > 0.10$).

3. Chalcid Parasitoids

Overall, 169 chalcid parasitoids were obtained from 418 knopper galls, giving an average of 0.40 parasitoids per gall. Four species, in two families and three genera, were reared (Table 4). All of these parasitoids emerged from the outer gall and none was recorded as attacking the gall-causer in its inner gall. All emerged in the second calendar year of the galls.

a) *Mesopolobus sericeus* (Table 6) was the only species occurring at all six locations and it was the commonest parasitoid at all sites apart from Wansbeck Riverside Park. It was the only chalcid parasitoid found in galls from Gosforth Park and Bedlington Country Park. In total, 127 *M. sericeus* were obtained from 46 (11 per cent) of the 418 galls, giving an overall average of 0.30 parasitoids per gall, although the 46 affected galls had an average of 2.76 parasitoids. One particular gall (see above) yielded 16 *M. sericeus* adults, but this is perhaps not surprising in view of the large number of inquilines present as potential hosts.

Emergence occurred between January 29th and April 11th, with males often appearing earlier than the females. For example, the Gosforth Park galls yielded 14 males between February 6th and March 31st and 12 females between March 4th and April 11th; galls from Holywell Dene yielded 24 males between February 26th and March 8th and 19 females between March 6th and March 27th.

b) *Mesopolobus amaenus* was uncommon. Three males emerged between March 28th and 30th from a single gall from Holywell Dene (an average of only 0.07 per gall at this site). This gall was heavily infested by the inquiline *S. gallaepomiformis*, which had also been attacked by *M. sericeus* (see above). *M. amaneus* had not attacked the *A. quercuscalicis* in the inner gall, since a normal adult *quercuscalicis* emerged after a delayed diapause on January 23rd of the third calendar year.

c) *Cecidostiba fungosa* occurred at two of the six sites. A single female was obtained on March 24th from a collection of 42 galls from Holywell Dene, and the same gall also gave rise to six *M. sericeus* and an adult *A. quercuscalicis*. *M. sericeus* was the commonest parasitoid at this site, accounting for 43 (91.5 per cent) of the 47 parasitoids obtained. In contrast, at Wansbeck Riverside Park *C. fungosa* was commoner than *M. sericeus* and accounted for 36 (94.7 per cent) of the 38 chalcids obtained. The others were a male *M. sericeus* and a female *Eurytoma brunniventris*.

The 2003 collection of 38 galls from Wansbeck Riverside Park did not produce any parasitoids. All of the *C. fungosa* – 20 males, 14 females, and two pupae cut from one gall – came from eight galls out of a total of 72 collected in the spring of 2004, giving an average of 4.5 parasitoids per affected gall and an overall average of 0.5 per gall. Emergence occurred between April 12th and April 18th.

d) *Eurytoma brunniventris* was the least frequent parasitoid; only a single individual was obtained from each of two sites. One male emerged on March 5th from a gall from the Rising Sun Country Park and one dead female was cut from a gall from the Wansbeck Riverside Park. These represent an average of 0.034 and 0.009 per gall respectively, and an overall average for the six sites of only 0.005 per gall.

An estimate of the original population of *S. gallaepomiformis* was made by combining parasitised and unparasitised individuals (see Randolph 2003) and the percentage of those parasitised at each site is shown in Table 7. Attack by inquilines varied markedly between the different gall collections, both within and between localities.

Discussion

Whether the galls were collected in late autumn or early spring did not influence the time of emergence of *A. quercuscalicis*. This is reassuring, indicating that the conditions in captivity during the winter had no adverse effects. Although Schönrogge, Stone & Crawley (1996a) state that prolonged diapause of *A. quercuscalicis* is unusual in British knopper galls, the long follow-up of galls in the present study indicates that diapause is often extended into the third calendar year and occasionally into the fourth year. Randolph (2003) has reported the same phenomenon in galls collected in the Bristol area, and the emergence dates he reported are remarkably similar to those found here in the north-east.

The staggered emergence of *A. quercuscalicis* from the galls of a single season has a distinct survival value for the species, compensating for fluctuations in the annual numbers of acorns (Ellis 2004). Prolonged diapause cannot be attributed solely to adverse climatic conditions here in the north-east, since it also occurs in the Bristol area some 400 km further south.

The presence of the lethal inquiline *Pammene fasciana* in some of the galls from Gosforth Park (Ellis 2001; 2004) is unusual and, as far as I am aware, there are no other published records of this moth larva affecting knopper galls in Britain. Schönrogge *et al* (1995) reported a related species, *P. amygdalana* (Duponchel) as a lethal inquiline of knopper galls in Austria, the Czech Republic, Hungary, and Italy, but not in Britain.

Synergus gallaepomiformis, the only inquilinous cynipid found in the present study, is the commonest and most widespread of the four species known to attack knopper galls in Britain. The others are: *S. pallicornis* Hartig; *S. umbraculus* (Olivier); and *S. nervosus* Hartig (Hails *et al* 1990; Schönrogge & Crawley 2000; Schönrogge *et al* 1996a, 1996b, and 2000). Apart from a single *S. nervosus*, the only cynipid inquiline emerging from Randolph's 2003 Bristol collections was *S. gallaepomiformis*. In Bristol, as here in the north-east, the attack rates were variable both within and between sites. Randolph obtained 633 *S. gallaepomiformis* from 127 galls (an average of 5 per gall), although the values in individual collections ranged from 1.08 to 11.0 per gall. This contrasts with my collection of 735 *S. gallaepomiformis* from 418 galls (1.76 per gall). The most heavily attacked galls were from Holywell Dene, with 444 *S. gallaepomiformis* from 42 galls (10.57 per gall).

The present study has shown that *S. gallaepomiformis* is now a significant inquiline of knopper galls in north-east England as well as in the south.

It is generally accepted (Eady & Quinlan 1963) that *S. gallaepomiformis* has two broods, one in spring and the other in summer. Insects emerging in the spring require an intermediate host, whereas any emerging in summer could breed continuously using only knopper galls. Schönrogge *et al* (1996a) reported that *S. gallaepomiformis* emerged from galls collected in Britain and Ireland between May and mid-August, and Randolph (2003) noted that in Bristol 65 per cent of the insects emerged between May 25th and June 13th and that 99 per cent had emerged by July 7th. My data suggest that there is a distinctly earlier emergence of *S. gallaepomiformis* from galls in north-east England. At six sites the inquiline emerged between April 8th and June 1st, and at five sites emergence was completed between May 16th and May 26th (Table 5). Even at Gosforth Park, with a long emergence period from April 11th to June 1st, 91.4 per cent of the insects emerged between April 25th and May 17th.

This marked discrepancy in emergence dates could be the result of differences in the conditions prevailing in captivity in the several studies[1], but there is another possible explanation. In south-east England, where native *S. gallaepomiformis* were already well-established in various other galls, including the oak apples of *Biorhiza pallida*, there was a delay of several decades before the knopper galls were attacked by *S. gallaepomiformis*. It is possible that the native *S. gallaepomiformis* required a long period of adjustment before it could exploit the new host, but Schönrogge *et al* (1996a) suggested that the time lag was due to the delayed arrival in Britain of a continental strain of *S. gallaepomiformis* already accustomed to attacking knopper galls and having a late emergence period. The early emergence observed in the present study suggests that in north-east England it might be the native strain of *S. gallaepomiformis* that attacks knopper galls and also uses an additional host, whereas in southern England the continental strain attacks the knoppers and emerges later in the summer, thus avoiding the need for a second host in order to survive from one year to the next.

The great majority (90.0 per cent) of *S. gallaepomiformis* emerged in the spring of the second calendar year and the seven individuals with a prolonged diapause emerged during a similar period in the third calendar year. Jennings (quoted by Randolph, 2003) has also observed that small numbers of this inquiline emerge from knopper galls in the third calendar year.

In general, the presence of inquilinous cynipids such as *S. gallaepomiformis* in the outer gall does not interfere with the developing *A. quercuscalicis* larva in the inner gall chamber. In the present study, dissections revealed that in three of the galls, from which *A. quercuscalicis* had failed to emerge, part of the inner gall wall was lacking and its chamber was continuous with those of the adjacent *S. gallaepomiformis* larvae. In each of these galls the *quercuscalicis* larva had died.

---

[1] Randolph kept his 2000/1 galls in a "cool room indoors", and the 2001/2 galls were kept in "a shed outside at ambient temperatures" (*Cecidology* 2003 18(2) 42-50). Schönrogge *et al* kept all rearings in an "outdoor insectary".

Plate 1 Flower bud galls induced by the weevil *Sibinia primita* on procumbent pearlwort (*Sagina procumbens*). Broxbourne, Herts., 6 vii 2004. Galls are up to 2mm across. (See p. 5.) Scan by K. M. Harris.

Plate 2 *Sibinia primita* adult (2 mm long) reared from flower bud gall of *Sagina procumbens.* Scan by K. M. Harris.

Plate 3 The two-year gall of *Taxomyia taxi* on yew (see p. 36). Photo: M. Chinery

Plate 4 The adult agamic *Andricus quercus-calicis*, photographed by Robin Williams, and (right) a sectioned knopper gall showing the ovoid inner gall. (See p. 12.)

Plate 5 *Mesopolobus sericeus*, the commonest parasitoid found in knopper galls in Northumberland. Photo: Robin Williams

Plate 6 *Cecidostiba fungosa*, another parasitoid found in knopper galls. Photo: Robin Williams

Plate 7 *Synergus gallaepomiformis*, a common inquiline in knopper galls. Photo: Robin Williams

Plate 8 *Stefaniella* gall (5 mm long) on *Atriplex patula*. Canvey Island, 9 x 2003

Scans by K. M. Harris
See pp 10-11.

Plate 9 A gall cut open to expose a cocoon in the internal cavity.

Plate 11 Dissected gall showing the tough brown cocoon in which the larva overwinters.

◄ **Plate 10** *Stefaniella* gall (8 mm long) on *Atriplex prostrata*, showing exit hole created by the larva before cocooning. Leigh-on Sea, 6 x 2003.

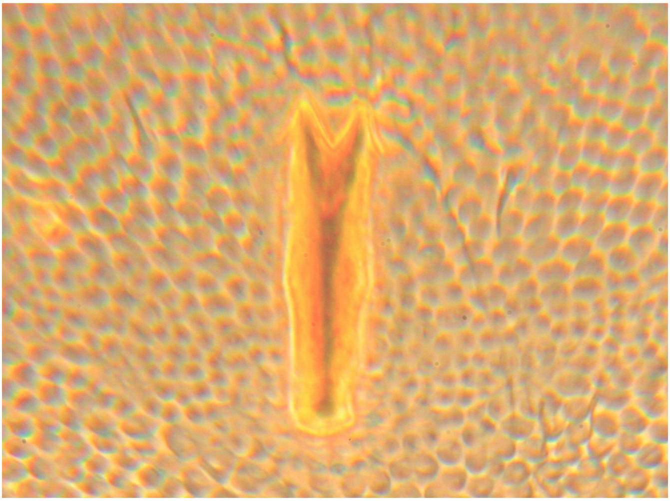

Plate 12 Larval sternal spatula of *Stefaniella* on *Atriplex patula* (cecid slide no. 20210c). Spatula length = 0.12 mm. Photo: K. M. Harris. See p. 11.

Plate 13 The rarely-seen agamic gall of *Andricus glandulae* was found on a BPGS field trip to the Wyre Forest (see p. 4). Photo: Len Worthington

Plate 14 Galls of *Obolodiplosis robiniae* (Haldeman) on leaflets of *Robinia pseudoacacia* (L.) (see p. 34).

This rare phenomenon has been noticed previously by Schönrogge *et al* (1995). The mean width of galls infested with *S. gallaepomiformis* was significantly greater than in uninfested galls. This suggests that the inquilines cause an increase in gall tissue, but there was no correlation between the numbers of inquilines present and the size of the gall.

Since the report by Hails *et al* (1990), the number of chalcid species known to be associated with knopper galls has grown (Schönrogge *et al* 1996a; Randolph 2003). In the present study it was necessary to dissect certain galls in order to determine the fate of the *A. quercuscalicis* inside the inner gall, but these dissections failed to reveal any evidence that *A. quercuscalicis* had been attacked by any of the chalcid parasitoids. The numbers collected at each site were small, however, and it is possible that a larger sample might reveal parasitism of the gall-causer.

Much of the recruitment of new parasitoid species to the knopper gall insect guild in Britain is attributable to the dramatic increase in attack rates by inquilines, particularly by *S. gallaepomiformis* whose larvae provide hosts for a variety of additional chalcid parasitoids. In this study, four chalcid species parasitised the inquiline. In Bristol, Randolph (2003) found six chalcid species, but the two additional species – *Eupelmus urozonus* and *Torymus auratus* – were both rare, with only two *E. urozonus* and one *T. auratus* from 127 galls. 31.5 per cent of the Bristol galls gave rise to parasitoids, compared to 13.2 per cent in the north-east, but this is to be expected since the infestation rate by *S. gallaepomiformis* was greater in Bristol (5.0 per gall) than in the north-east (1.76 per gall). Two *Eurytoma brunniventris* were reared from the 127 Bristol galls, while two were obtained from 418 galls in the north-east.

The main difference between the two regions is in the proportion of galls attacked by *Mesopolobus sericeus* and *Cecidostiba fungosa*. In the north-east, *M. sericeus* was the commonest parasitoid and the only one to occur at all six sites. It accounted for 75.1 per cent of all parasitoids, with an average of 0.30 per gall. In contrast, it accounted for only 12.2 per cent of parasitoids in Bristol, with an average of only 0.19 per gall. *Cecidostiba fungosa* was the commonest parasitoid in the Bristol studies, accounting for 84.3 per cent of all parasitoids and averaging 1.31 per gall. In the north-east, *C. fungosa* was common only at Wansbeck Riverside Park and the attack rate for this species in the north-east as a whole was only 0.09 per gall.

Cecidostiba fungosa is a common parasitoid of knopper galls on the continent (Schönrogge *et al* 1995). It seems to have been first reported in Britain in 1994 in Silwood Park, where it was already one of the commonest parasitoids with 3.2 per gall (compared with *M. sericeus* at 0.80 per gall) (Schönrogge *et al* 2000). *C. fungosa* was subsequently reported from knopper galls in Kent (Jennings 2002) as well as in the Bristol area (Randolph 2003). It may become more common in the north in the future. It will be interesting to carry out further observations on knopper galls in north-east England during the next few years to see whether *C. fungosa* supplants *M. sericeus* as the commonest parasitoid, as it seems to have done in the south.

Acknowledgements

I wish to thank Dr R.R. Askew for his continued help and for the determinations of the Hymenoptera inhabiting the galls. I am indebted to Kevin Tuck of the Natural History Museum in London for confirming the identity of *Pammene fasciana* and to Dr Karsten Schönrogge for providing copies of his published papers.

REFERENCES

ASKEW, R.R. 1961 Some biological notes on the Pteromalid (Hym., Chalcidoidea) genera *Caenacis* Förster, *Cecidostiba* Thomson and *Hobbya* Delucchi, with descriptions of two new species. *Entomophaga* 6 (1): 57-67

CLARIDGE, M.F. 1962 *Andricus quercuscalicis* (Burgsdorf) in Britain. *The Entomologist* 95: 60-61

EADY, R.D. & QUINLAN, J. 1963 *Handbooks for the Identification of British Insects* Vol. VIII Part 1(a) Hymenoptera: Cynipoidea. Royal Entomological Society, London

ELLIS, H.A. 2001 The larva of *Pammene fasciana* L. (Lepidoptera: Tortricidae) as a lethal inquiline of *Andricus quercuscalicis* (Burgsdorf). *Cecidology* 16 (2): 84-86

ELLIS, H.A. 2004 Observations on the agamic (knopper) gall of *Andricus quercuscalicis* (Burgsdorf) and its inquilines and parasitoid in Gosforth Park Nature Reserve. *The Vasculum* 89 (2): 5-19

HAILS, R.S., ASKEW, R.R. & NOTTON, D.G. 1990 The parasitoids and inquilines of the agamic generation of *Andricus quercuscalicis* (Hym.; Cynipidae) in Britain. *The Entomologist* 109 (3): 165-172

JENNINGS, M. 2002 *Cecidostiba fungosa* (Geoffroy) (Hymenoptera: Pteromalidae). A new association with the agamic generation of *Andricus quercuscalicis* (Burgsdorf) (Hymenoptera: Cynipidae) in Britain. *British Journal of Entomology and Natural History* 15 (1): 23

NOTTON, D.G. 1990 Predation of the knopper gall *Andricus quercuscalicis* (Burgsdorf) (Hym., Cynipidae) *Cecidology* 5 (2): 63-64

RANDOLPH, S. 2003 Parasitism by *Cecidostiba fungosa* (Hymenoptera: Pteromalidae) on the inquiline *Synergus gallaepomiformis* and observations on other community members of the agamic (knopper) galls of *Andricus quercuscalicis* in the Bristol area. *Cecidology* 18 (2): 42-50

SCHÖNROGGE, K. & CRAWLEY, M.J. 2000 Quantitative webs as a means of assessing the impact of alien insects. *Journal of Animal Ecology* 69: 841-868

SCHÖNROGGE, K., STONE, G.N. & CRAWLEY, M.J. 1995 Spatial and temporal variation in guild structure: parasitoids and inquilines of *Andricus quercuscalicis* (Hymenoptera: Cynipidae) in its native and alien ranges. *Oikos* 72 (1): 51-60

SCHÖNROGGE, K., STONE, G.N. & CRAWLEY, M.J. 1996a Alien herbivores and native parasitoids: rapid developments and structure of the parasitoid and inquiline complex in an invading gall wasp *Andricus quercuscalicis* (Hymenoptera: Cynipidae). *Ecological Entomology* 21: 71-80

SCHÖNROGGE, K., STONE, G.N. & CRAWLEY, M.J. 1996b Abundance patterns and species richness of the parasitoids and inquilines of the alien gall-former *Andricus quercuscalicis* (Hymenoptera: Cynipidae). *Oikos* 77 (3): 507-518

SCHÖNROGGE, K., WALKER, P. & CRAWLEY, M.J. 1994 The distribution and abundance of alien, host-alternating *Andricus* spp (Hymenoptera: Cynipidae) on *Quercus* spp (oak) in Ireland. *Proceedings of the Royal Irish Academy* 94b (3): 265-274

SCHÖNROGGE, K., WALKER, P. & CRAWLEY, M.J. 1998 Invaders on the move: parasitism in the sexual galls of four alien gall wasps in Britain (Hymenoptera: Cynipidae). *Proceedings of the Royal Society of London* 265: 1643-1650

SCHÖNROGGE, K., WALKER, P. & CRAWLEY, M.J. 2000 Parasitoid and inquiline attack in the galls of four alien, cynipid gall wasps: host switches and the effect on parasitoid sex ratios. *Ecological Entomology* 25: 208-219

Location (number of galls)	Grid Reference	Collection Date	Number of Galls	Gall Season	Calendar year of galls at collection	Calendar year of galls at final review
Gosforth Park Nature Reserve, Newcastle upon Tyne (n = 105)	NZ 258702	11 ii 2000 28 ix 2000 30 x 2001 2 iii 2002	10 17 49 29	1999 2000 2001 2001	2nd 1st 1st 2nd	6th 5th 4th 4th
Bedlington Country Park, Bedlington (n = 84)	NZ 265806	4 x 2000 2 xii 2000 24 ii 2003	12 29 43	2000 2000 2002	1st 1st 2nd	5th 5th 3rd
Rising Sun Country Park, Wallsend (n = 29)	NZ 299693	15 xi 2001 14 iii 2003	19 10	2001 2002	1st 2nd	4th 3rd
Holywell Dene, Holywell (n = 42)	NZ 327747	25 ix 2002	42	2002	1st	3rd
Monkseaton, Whitley Bay (n = 69)	NZ 344723	6 x 2002	69	2002	1st	3rd
Wansbeck Riverside Park, Ashington (n = 106)	NZ 269861	19 iii 2003 29 iii 2004	34 72	2002 2003	2nd 2nd	3rd 2nd

Table 1. Locations, collection dates, numbers, and ages of 435 knopper galls from six sites in Northumberland between latitudes 55° 0′ North (Rising Sun Country Park) and 55° 10′ North (Wansbeck Riverside Park)

Fate of *Andricus quercuscalicis*	Number of galls	Percentage of all galls
1. Adult emerged:		
a) in spring of 2nd calendar year prior to collection (as indicated by the presence of a normal polar exit hole in the inner gall)	82	18.8
b) in spring of 2nd calendar year	93	21.3
c) in spring of 3rd calendar year	102	23.4
d) in spring of 4th calendar year	7	1.6
2. Live insect in intact inner gall after prolonged diapause	4	0.9
3. Live larva in intact inner gall undergoing prolonged diapause	13	3.0
4. Dead adult found:		
a) trapped in main chamber	12	2.7
b) partially emerged from inner gall	22	5.0
c) in intact inner gall	37	8.5
5. Dead larva in intact inner gall	14	3.2
6. Dead pupa in intact inner gall	26	6.0
7. Larva destroyed by lethal inquiline *Pammene fasciana*	6	1.4
8. Larva affected by adjacent inquiline *Synergus gallaepomiformis*	3	0.7
9. Inner gall malformed/empty/mouldy	9	2.1
10. Base of gall and inner gall missing, presumed eaten by small rodents (Notton 1990)	6	1.4

Table 2. The fate of *Andricus quercuscalicis* in 435 knopper galls.
[Total number of inner galls is 436, since one gall possessed a pair of inner galls.]

Number of acorns	Calendar year in which *A. quercuscalicis emerged*		
	Gall 1	Gall 2	Gall 3
With 2 galls			
10	2nd	2nd	
7	2nd	3rd	
3	2nd	4th	
With 3 galls			
2	2nd	2nd	3rd
1	2nd	3rd	3rd

Table 3. Varying calendar years in which 49 individual adult *Andricus quercuscalicis* emerged from two and three galls arising on 23 single acorns

****

Chalcid parasitoid species	Number of parasitoids	Percentage of total parasitoids
Pteromalidae		
Mesopolobus sericeus (Förster)	127	75.1
Mesopolobus amaenus (Walker)	3	1.8
Cecidostiba fungosa (Geoffroy)*	37	21.9
Eurytomidae		
Eurytoma brunniventris Ratzeburg	2	1.2

Table 4. Numbers of chalcid parasitoids and percentage of total parasitoids (169) for four species obtained from 418 knopper galls from six sites in Northumberland.
*[NB: *Cecidostiba fungosa* = *C. adana* Askew. Askew (1961) described *C. adana* as a new species based on material collected in France , but now believes *C. adana* to be a synonym of *C. fungosa* (Askew, pers. comm. 2004)

Location	Total galls	Number of affected galls (percentage)	*S. gallaepomiformis*			
			Emergence dates	Number (sex)	Mean number per:	
					affected gall	total galls
Gosforth Park	10	0	-	-	0	0
	49	19 (38.8)	11 iv -1 vi	65 (29m: 36f)	3.42	1.33
	29	10 (34.5)	2 v-18 v	41 (22m: 19f)	4.10	1.41
Combined	88	29 (33.0)	11 iv-1 vi	106 (51m: 55f)	3.66	1.20
Bedlington Country Park	12	2 (16.7)	14 v-20 v	2m	1.0	0.17
	29	4 (13.8)	18 iv-26 v	15 (7m: 8f)	3.75	0.52
	43	13 (30.2)	23 iv-19 v	41 (25m: 16f)	3.15	0.95
Combined	84	19 (22.6)	18 iv-26 v	58 (34m: 24f)	3.05	0.69
Rising Sun Country Park	19	14 (73.7)	8 iv-14 v	61* (32m:28f)	4.36	3.21
	10	1 (10.0)	18 v	1f	1.00	0.10
Combined	29	15 (51.7)	8 iv-18 v	62 (32m: 29f)	4.13	2.14
Holywell Dene	42	40 (95.2)	23 iv-21 v	444 (269m:175f)	11.10	10.57
Monkseaton, Whitley Bay	69	10 (14.5)	18 iv-16 v	30 (12m: 18f)	3.00	0.43
Wansbeck Riverside Park	34	0	-	-	0	0
	72	10 (13.9)	22 v-25 v	35 (9m: 26f)	3.50	0.49
Combined	106	10 (9.4)	22 v-25 v	35 (9m: 26f)	3.50	0.33
Grand Totals	418	123 (29.4)	8 iv-1 vi	735* (407m:327f)	5.97	1.76

Table 5. Dates of emergence and numbers of *Synergus gallaepomiformis* reared from 418 knopper galls collected from six sites in Northumberland.
* Includes a dead pupa cut from a gall.

Location	Total galls	Number of affected galls (percentage)	*Mesopolobus sericeus*			
			Date emerged	Number (sex)	Mean number per:	
					Affected gall	Total galls
Gosforth Park	10	0	-	0	0	0
	49	7 (14.3)	6 ii-22 iii	12 (7m: 2f)*	1.71	0.24
	29	8 (27.6)	29 iii-11 iv	17 (7m: 10f)	2.13	2.59
Combined	88	15 (17.0)	6 ii-11 iv	29 (14m:12f)*	1.93	0.33
Bedlington Country Park	12	0	-	0	0	0
	29	3 (10.3)	7 ii-10 iii	9 (5m: 4f)	3.00	0.31
	43	0	-	0	0	0
Combined	84	3 (3.6)	7 ii-10 iii	9 (5m: 4f)	3.00	0.11
Rising Sun Country Park	19	10 (52.6)	29 i-25 iii	35 (16m: 19f)	3.50	1.84
	10	0	-	0	0	0
Combined	29	10 (34.5)	29 i-25 iii	35 (16m: 19f)	3.50	1.21
Holywell Dene	42	13 (31.0)	26 ii-27 iii	43 (24m: 19f)	3.31	1.02
Monkseaton, Whitley Bay	69	4 (5.8)	3 iii-8 iii	10 (6m: 4f)	2.50	0.14
Wansbeck Riverside Park	34	0	-	0	0	0
	72	1 (1.4)	**	1m	1.00	0.013
Combined	106	1 (0.9)	**	1m	1.00	0.009
Grand Totals	418	46 (11.0)	29 i-11 iv	127 (66m:58f)*	2.76	0.30

Table 6. Dates of emergence and numbers of *Mesopolobus sericeus* reared from 418 knopper galls in twelve collections from six sites in Northumberland.
* includes 3 unsexed individuals
** one male *M. sericeus* found dead

Location	Total Galls	Number of inquilines*	Inquilines per gall	Percentage of inquilines parasitised by:		
				All parasitoids	*M. sericeus*	*C. fungosa*
Gosforth Park	10	0	0	0	0	0
	49	77	1.57	15.6	15.6	0
	29	58	2.00	29.3	29.3	0
Combined	88	135	1.53	21.5	21.5	0
Bedlington	12	2	0.17	0	0	0
Country Park	29	24	0.83	37.5	37.5	0
	43	41	0.95	0	0	0
Combined	84	67	0.80	13.4	13.4	0
Rising Sun	19	97	5.11	37.1**	36.1	0
Country Park	10	1	0.10	0	0	0
Combined	29	98	3.38	36.7	35.7	0
Holywell Dene	42	491	11.69	9.57+	8.8	0.2
Monkseaton, Whitley Bay	69	40	0.58	25.0	25.0	0
Wansbeck	34	0	0	0	0	0
Riverside Park	72	73	1.01	52.1**	1.4	49.3
Combined	106	73	0.69	52.1	1.4	49.3
Grand Totals	418	904	2.16	18.7	14.1	4.1

Table 7. Mean attack rates by the inquiline *Synergus gallaepomiformis* and rates of parasitism by all chalcids, and by *Mesopolobus sericeus* and *Cecidostiba fungosa*, in twelve collections of knopper galls from six sites in Northumberland.
*including those parasitised
**including one *Eurytoma brunniventris*
+ including three *Mesopolobus amaenus*

DOES THE GALL MIDGE *OBOLODIPLOSIS ROBINIAE* OCCUR IN ENGLAND?

Marcela Skuhravá and Vaclav Skuhravý,
Bitovska 1227, 140 00 Praha 4, Czech Republic

The gall midge *Obolodiplosis robiniae* (Haldeman) is a North American species whose larvae cause galls on leaflets of false acacia (*Robinia pseudoacacia* L.), which is also known as the black locust tree. The midge species was first described by Haldeman in 1847 as *Cecidomyia robiniae* and was later described by Felt in 1907 as *Cecidomyia orbiculata*, which is a junior synonym.

Robinia pseudoacacia is a leguminous tree native to the eastern part of North America. It was introduced into continental Europe at the beginning of the 17th century and was first grown as an ornamental tree in parks and gardens and alongside roads. Over many years the trees multiplied at some locations and are now considered to be invasive weeds in many places as they suppress native vegetation and forest stands. According to Gagné (1989), *Obolodiplosis robiniae* occurs in the north-eastern USA from Maine to Maryland.

Prof. Carlo Duso found galls on leaflets of black locust at Paese, Treviso Province, in north-eastern Italy in July 2003 and sent them to Marcela Skuhravá for identification. This was the first record of *Obolodiplosis robiniae* in Europe (Duso & Skuhravá 2003). Interestingly, in 2002 the galls of this species were first found in eastern Asia – in Japan and Korea (Kodoi *et al*. 2003).

In July 2004, in the course of our faunal investigations in northern Italy, we found large numbers of galls of *Obolodiplosis robiniae* on leaflets of *Robinia pseudoacacia* at three localities near the town of Bolzano, at altitudes of 260-350 m. A month later, in August 2004, we also found galls of this species in the Czech Republic. Galled leaflets occurred in large numbers on almost all black locust trees growing in parks and along streets and roads in Prague. At the same time galls were found at two other localities situated about 60 km south-east and about 80 km west of Prague.

Larvae of *Obolodiplosis robiniae* live in small developing leaflets. Attacked leaflet margins remain rolled downwards, swell and form small orbicular galls (hence Felt´s species name *orbiculata*) (see Plate 14). Usually up to four larvae develop in each gall, but exceptionally eight larvae were found in a single gall. Fully grown larvae (third larval instar) are 4 mm long, whitish or pale yellow, and during the summer months they pupate in the galls. Shortly after emergence, females lay eggs on the youngest developing leaflets of the same twig on which they developed. When the larvae are young, the gall is light green but it later changes to dark green. A single leaf of *Robinia pseudoacacia*, which consists of up to ten pairs of leaflets, may bear only one gall on a leaflet but heavily infested trees may bear galls on all leaflets.

Obolodiplosis robiniae is a polyvoltine species. During the summer three or four generations may develop and larvae of these summer generations spin small, incomplete cocoons in the galls. In the autumn larvae of the last generation leave the galls and fall to the ground, where they hibernate.

Obolodiplosis robiniae is an immigrant gall midge species that appeared suddenly in Europe, in Italy and in the Czech Republic. Nobody knows how it arrived but it is possible that it may occur elsewhere in Europe, including England. We would be thankful for information of its occurrence. Please send it by e-mail to **skuhrava@quick.cz** or by mail to our home address.

REFERENCES

DUSO, C. & SKUHRAVA, M., 2003 First record of *Obolodiplosis robiniae* (Haldeman) (Diptera Cecidomyiidae) galling leaves of *Robinia pseudoacacia* L. (Fabaceae) in Italy and Europe. *Frustula entomol.* (2002), n.s. 25 (38): 117-122

GAGNÉ, R.J. 1989 *The Plant-Feeding Gall Midges of North America.* Cornell University Press, 356 pp

KODOI, F., LEE, H.-S., UECHI, N. & YUKAWA, J., 2003 Occurrence of *Obolodiplosis robiniae* (Diptera: Cecidomyiidae) in Japan and South Korea. *Esakia* 43: 35-41

British Plant Galls

With this issue of *Cecidology* you will find five pages of additions and amendments to *British Plant Galls*. If you would like further copies of these notes, please send a stamped addressed envelope to the Editor of *Cecidology* at the address below.

A New Publication on *Taxomyia taxi*

Redfern, M. & Hunter, M.D. (2005) Time tells: long-term patterns in the population dynamics of the yew gall midge, *Taxomyia taxi* (Cecidomyiidae), over 35 years. *Ecological Entomology*, 30: 86-95.

This paper analyses data collected from three populations of *Taxomyia taxi*, the gall midge that causes artichoke galls on yew trees (*Taxus baccata*). Data on the two parasitoids of *T. taxi* – *Mesopolobus diffinis* and *Torymus nigritarsus* – and on the host tree have also been collected. The site of the study is Kingley Vale National Nature Reserve in West Sussex, and the populations have been monitored each year since 1966 or 1968.

Taxomyia taxi is unusual in having two life cycle times, lasting one or two years, with each causing a different type of gall and with the two-year life cycle usually much commoner than the one-year cycle. Both galls form from a bud, either at the tip of a shoot or in a leaf axil. The two-year artichoke gall (Plate 3) is large, between 1 and 3 cm tall, and consists of modified leaves bunched together due to the failure of the shoot axis to elongate. The one-year gall is much smaller, usually considerably less than 1 cm tall and with far fewer leaves; it is no more than a swollen bud. In both forms, the single larva sits on the modified meristem in the centre of the gall.

Since 1966/1968, the three populations have fluctuated in synchrony, with high numbers at the start and in the early to mid 1980s, and troughs in the periods 1972-1975 and 1991-1992. These fluctuations were closely tracked by *M. diffinis* and followed, after a delay, by *T. nigritarsus*.

The study investigates the causes of these fluctuations. Do they occur because of interaction with the host trees or the environment? Or are they the result of interactions with the parasitoids? Answering these questions requires a long run of data, the longer the better. The project is now in its 40th year and is continuing, and it forms one of the longest time series that exists for any insect.

The results indicate that interaction between the plant (yew) and the gall causer (*T. taxi*) is minor – each host tree does not affect the varying numbers of galls that occur on it over the years and neither does it affect the survival of *T. taxi*; and the galls do not affect the growth of the tree. Climate, too, seems to have little effect, either on *T. taxi* or on the two parasitoids, although severe drought (as in 1976) does restrict the growth of the tree.

Much more important is the interaction between *T. taxi* and one of its parasitoids, *Torymus nigritarsus*, which is specific to *T. taxi*. It seems that each species regulates the other in a reciprocal fashion. But the regulation is neither precise nor immediate: there are time delays in the effects that one has on the other, and these delays result in the long cycles of peaks and troughs that are observed. The second parasitoid, *Mesopolobus diffinis*, fluctuates with its host, closely tracking its peaks and troughs. Its numbers depend on the numbers of *T. taxi*, but there is no effect in the other direction – *M. diffinis* does not help to regulate *T. taxi*. The main conclusion of the study is that *T. nigritarsus* regulates the density of *T. taxi*, but imprecisely, causing long-term cycles in abundance of the galls.

The next trough in numbers of *Taxomyia taxi* at Kingley Vale should occur in about 2011 and I hope to be able to record it. What will happen further into the future? Will the cycles continue or will other factors become important, perhaps via the tree if drought and high temperatures were to increase in frequency? I fear that one lifetime is inadequate for this project!

If anyone would like a copy of the paper, I can send one, either as a pdf attachment to e-mail or as a reprint, in the post.

Margaret Redfern, 2 Victoria Road, Sheffield S10 2DL.
E-mail: **m.redfern@sheffield.ac.uk**

2005 ANNUAL GENERAL MEETING AND GALL-GATHERING WEEKEND

This year's meeting has been fixed for September 16th to 18th and we will be based at the Hotel Campanile on the edge of the Doncaster Dome leisure and shopping complex. The weekend will, of course, include our Annual Dinner as well as the AGM, and we can be sure of good company and some fine and varied gall-rich habitats within easy reach. Further details will be announced later, but please book the date now. Other halves will be more than welcome, and those not cecidologically inclined will certainly find something of interest in and around the Dome.

LESLIE HAYDN PINKESS 1909 - 2005

Leslie Pinkess was a stalwart of Birmingham Natural History Society and a founder member of the British Plant Gall Society. He and I first met when what is now the Wildlife Trust for Birmingham and the Black Country was being formed in 1980. Leslie was the organisation's first treasurer. An engineer by profession, a musician by inclination, and a naturalist by dedication, Leslie became successful and widely respected in all of his fields of endeavour.

Born at a time when people had to make their own entertainment, and often made the equipment needed to pursue their interests as well, Leslie famously designed and made his own camera and enlarger. His engineering knowledge enabled him to manipulate the leather, brass, and wood needed to accomplish this feat. Many years after this I remember his continuing interest and skill in photographing gall specimens. Leslie's engineering background also stood him in good stead as a naturalist. Engineering demands precision, as does the identification of species in critical and difficult groups. Very knowledgeable about a wide range of organisms, he nevertheless always 'knew what he didn't know', and was meticulous in ensuring that his identifications were correct before submitting records. He was a great supporter of the Gall Society and attended many of the early meetings. He and I once had to scrounge a lift home when I lost my car keys in Monk's Wood!

Leslie became President of Birmingham Natural History Society, edited its newsletter until a couple of years before his death, and was for a long period Chair of the Edgbaston Pool Nature Reserve Management Committee. His final months were very difficult, but the last thing that drew a response from him was news of a significant species appearing on the Reserve.

Leslie possessed a fine voice and sang in various choirs for much of his life. He met his wife Cecily (who survives him) when they found themselves in the same choir in the 1930s, and he was still singing in the choir of St George's, Edgbaston in Birmingham until well into his nineties. The family tradition continues through his daughter Stella, who sings in the Birmingham Choral Union alongside another Gall Society member, Mike Bloxham.

Both Mike and I were able to represent the Society at Leslie's funeral on February 1st. Our condolences go to Cecily, Stella, and his son Justin.

Peter Shirley

A Gall on Greater Periwinkle (*Vinca major*): a request for specimens

On three occasions during the last 14 years I have noted a gall on *Vinca major*, caused, I think, by an aphid that I cannot name. Both leaf margins become thickened and rolled upwards, sometimes nearly to the mid-ribs, and, because the undersides of the leaves are paler than the uppersides, the effects are quite conspicuous. I have been unable to find anything on this gall in the literature: Buhr and Theobald mention less obvious attacks by certain polyphagous aphids, but the inrolling is downwards. I am pretty certain that the aphid under consideration is specific to *Vinca*, but no such aphid is listed by Heie, and Dr J.H. Martin of the Natural History Museum states that no such host-specific aphid is known to him or his colleagues. He also suggested that the galls could have been induced by some other organism and later invaded by the aphid, but this strikes me as unlikely. And even if it is true, the gall is one that is not yet described in the literature. We need occupied specimens of the galls so that the inducer can be identified.

The time to look for the galls is towards the end of May, and anyone finding them should look for the insects inside. If there are aphids, they should be sent to me, together with details of the locality, and I will pass them on to the Natural History Museum for further investigation if necessary. Enclose them in a box sturdy enough to prevent their being crushed in the post, and mark the package 'Live aphids'. The last time I saw the galls was in 2001, here in Parkgate Road, when I noticed galled leaves on a couple of stems in a garden. Two days later, I returned to ask permission to collect some specimens but found that the whole periwinkle bed had been dug up!

REFERENCES

BUHR, H. 1964-5 *Bestimmungstabellen der Gallen (Zoo- und Phytocecidien) an Pflanzen Mittel- und Nordeuropas* Bands I & II Fischer Verlag, Jena

HEIE, O. E. 1980-1985 The Aphidoidea (Hemiptera) of Fennoscandia and Denmark *Fauna Entomologica Scandinavica* Vols 9, 11, 17, 25, 28 & 31

THEOBALD, F. V. 1926-1929 *The Plant Lice or Aphididae of Great Britain.* Vols 1-3 Headley, Ashford & London

John Robbins, 123b Parkgate Road, Coventry, CV6 4GF

Oh! That Dr Kinsey

When someone achieves fame in one field it can be a surprise to learn that they may have been eminent in a completely unrelated one. Reading a review of the film that has just been made about the life and work of the famous sexologist Alfred Kinsey I was surprised to read '.... Kinsey, whose initial area of research was the gall wasp.' (*The Guardian* 16th February 2005.) No doubt many readers of *Cecidology* are already aware of this research, but it was news to me. It sent me to the bibliographies of my gall books. Just two produced references to works by Kinsey A.C.:

> **Nieves-Aldrey, J.L.**, *Fauna Iberica* Volume 16: Hymenoptera Cynipida. Madrid, 2001. Museo Nacional de Ciencias Naturales Consejo Superior de Investigaciones Cientificas.
>
> **Mani, M.S.**, *The Ecology of Plant Galls*. The Hague 1964. Dr. W. Junk.

Nieves-Aldrey has six references and Mani has four, and only one is common to both. The papers were published from 1919 to 1937 and cover fossil cynipids, cynipid phylogeny, the economic importance of cynipids, studies of both *Cynips* and *Neuroterus*, new species, and life histories.

Further investigation (thanks to Google) revealed that Kinsey's doctoral thesis was about gall wasps, that he was said to have 'introduced the gall wasp to the scientific community', and that he was especially interested in the evolutionary history and origins of gall wasps. He studied at Harvard and was appointed an assistant professor at Indiana University in 1920.

Presumably, after more than thirty years struggling with the complexities of sexuality in gall wasps, human sexuality must have seemed so much simpler!

Peter Shirley

The next issue of *Cecidology* will be published in the autumn. Please send all contributions to me at **Mousehole, Mill Road, Hundon, Sudbury, Suffolk, CO10 8EG,** to arrive no later than September 23rd, a few days after the AGM Weekend. Short items without illustrations can be faxed to me on 01440 786755. Please note the instructions to authors inside the front cover of this issue.

Michael Chinery, Editor of *Cecidology*