# Oak-galls in Britain

## by Robin Williams

*Neuroterus quercusbaccarum* ♂, Currant gall causer photo: robin williams

## volume one

## Philosophy behind the project

The amateur naturalist has long been a driving force behind recording and identifying insects in this country – a tradition extending back to the 'greats' of the 18th and 19th centuries who were responsible for providing the engine, and texts, for driving on growing public interest in the subject. However, it has become clear that new generations require a published guide which clearly, and as simply as possible, sets out how to identify a particular group or set of insects with a common background. Hoverflies have sprung to the public notice as a result of just such a guide being produced by Stubbs & Falk. My intention has been to take this approach and apply it to British oak galls and their many inhabitants.

At the point where an insect keys out, I believe it is important to:

- Set out a brief description of the whole insect, to confirm whether the chosen path has been correct; (for instance, the specimen is small & black, while the correct identification should be a large yellow insect)
- Provide sets of ratios to complete this confirmation
- Show flight times, where available.

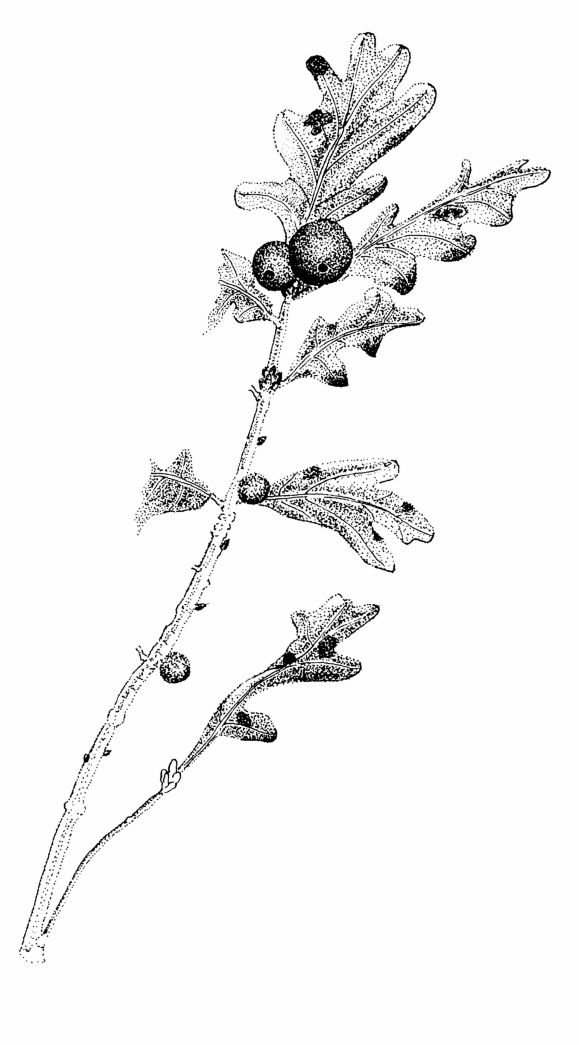
I also believe it essential to keep the text simple and as free from jargon as possible, with a clear glossary of terms that have been used, and to provide drawings to illustrate locations and structure at the point in the key where they occur. Without the above, it may be impossible for the less expert to be confident that identification is at least near-correct. Clearly there are difficult insects, where separation from a similar species may be minimal, but these simple principles remain the cornerstone of what is needed and are those I have attempted to implement here.

**measurements** have been taken from the natural position in which the insects die. Nevertheless, it is important to understand that while actual measurements are indicative, they do vary, and a note of this variation has been placed in brackets after body length in the main descriptions in Section 3, e.g. [Body 5mm (3.3-6.2)]. Body length excludes external, rigid ovipositor sheaths, as in *Torymus* and *Eupelmus*, though it does include the rather vague thickening seen in, for instance, *Mesopolobus* and *Aulogymnus*. However, the most important calculations are those expressed as ratios. After five to ten sets of measurements, these prove remarkably consistent and are a very real guide for final confirmation of identification.

Volume 1, 'sections one & two'

# oak-galls in Britain

## Introduction & keys



# 'Oak-galls in Britain'

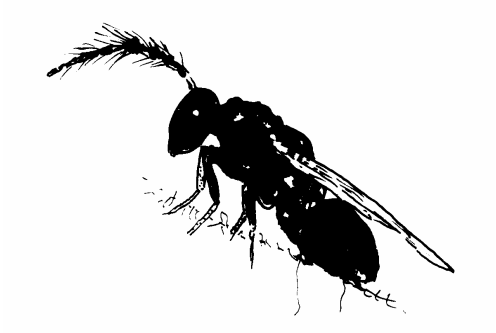
(revised 27/7/2010)

bringing together fresh & already published information on oak-galls and their inhabitants in Great Britain

Presented in three main sections -

- introduction,
- keys,
- appendices, including full descriptions of the insects found inside the galls.

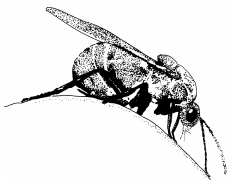
Bound in two volumes, for ease of use, with descriptions and appendices in the second.



*** If further information is found, or problems arise in identification, please let me know so it may be incorporated in future editions.

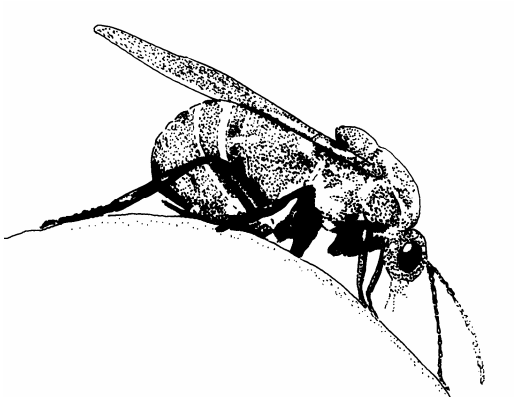


-Robin Williams-



# 'section one'







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## Section two: keys



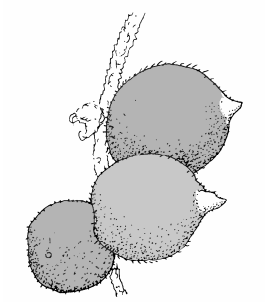


## Section three: (bound separately, for ease of use)
## Appendices

A. FULL DESCRIPTIONS







*Andricus grossulariae* ♂



# 1. Introduction

**START OF THE PROJECT** - When Margaret Redfern and Dick Askew's marvellous book, *Plant Galls* (Redfern & Askew, revised 1998), first appeared in the Naturalists' Handbook series in 1992, a group of friends and I were converted to out-and-out gall enthusiasts overnight and, from then on, spent most Saturdays in the year pursuing our study out in the field. The seminal moment came when I saw my first brilliantly-coloured chalcid in the wild, glistening in metallic gold and green, like some living jewel.

Early on, I settled on some degree of specialisation, deciding to concentrate on the 70 odd varieties of galls then found on oaks in Britain (by 2005, these had risen to 79), made especially fascinating because of the wide range of insects found inside the galls. Where we live on the Somerset Levels, in easy reach of Mendip, there are sufficient oak trees to make life interesting and these had always intrigued me, with the huge variety of wildlife they support, so the study was a natural one.

As time moved on it became clear that a great deal of information had to be brought together from many sources if any chance of understanding and recognising the insects was to happen. As the scale of this became clear, and my friends found out what was going on, it was decided to plan a careful study and write down the findings in the form of a book, so we could all benefit. The first stage of this research was represented by a study into a limited range of insects, those 19 that were then known to be found in the Marble-gall in our country (considerably increased in recent years). *The Oak Marble-Gall in Britain, with keys, descriptions & drawings,* (Williams, 1998), was published as a direct result and provided a first step into the complexity of the whole.

The main study, into the inhabitants of all British oak-galls, ran alongside this and culminates in the publication of this work – though it may never be absolutely complete, with new galls reaching Britain periodically - as will be discussed later.

The work is split into two volumes quite deliberately, for ease of use; when using keys, it is most convenient to have descriptions open beside the keys. **The first volume** consists of two sections bound together: **Section one** is a general introduction, and includes descriptions of the galls and when they are mature; the range of possible inhabitants and their flight periods. **Section two** contains a set of keys for all the hymenopteran inhabitants, which covers the great majority of insect causers, inquilines and parasitoids. A major problem for the non-professional user is knowing whether their keying is correct; a short description and accompanying sizes/ratios makes the process easier and more reliable. **Volume 2** contains a comprehensive set of back-up appendices, including full descriptions of the hymenopteran & other inhabitants, to a standard format, showing comparative sizes and ratios. Of particular importance is a glossary, which explains some necessary technical terms.



**WHAT IS A GALL?** - as in many matters scientific, opinions vary as to the exact definition, but a simple explanation does seem to cover it for many people. In their classic book, *Plant Galls*, (Redfern & Askew 1998), the authors provide a clear description which certainly seems to meet the criteria, *'a gall is an abnormal growth produced by a plant under the influence of an organism (virus, bacterium, fungus, plant or animal); it involves enlargement and proliferation of plant cells which provide shelter and food for the gall maker. The gall of a particular gall former is constant and specific in form denoting that, although it is composed entirely of plant tissue, its growth is regulated by the gall former'.*

The vital points in this are:

- abnormal growth in the host plant
- provision of shelter & food for the gall-maker
- constant shape and form arising from a particular gall-maker
- entirely plant tissue, made from the host's cells
- the larva of the causer remaining in the gall until maturity

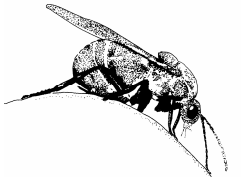
**CAUSERS, INQUILINES & PARASITOIDS** - the insects which may be found in a gall come under four possible categories, only three of which are part of this study. The fourth, 'followers' refers to insects which take advantage of the gall as shelter, rather than food, after it has been emptied of its original inhabitants, using the exit holes drilled by these to give access to the interior. Flower-bugs, earwigs, weevils, spiders and many others fit this category of opportunist inhabitants and do not concern this work which covers the original causer and its immediate reactants - inquilines and parasitoids.

**The causer** is the original inhabitant, the organism which triggers the reaction in the plant which then causes it to grow a gall. Curiously, it is not the laying of the egg which causes the gall, but the hatching of that egg. So the causer **is** the generation (see the next section for explanation of 'alternate generations') of the larva which hatches and eventually emerges as a perfect insect and **not** the insect which laid the egg.

At present, there are 70 hymenopteran causers and 7 insect causers from other taxa, producing 79 different galls on British oaks, but it is a far from static process. During the last few years 6 new galls have been found and one, thought to have been a misidentification in the last century, has been found once again.

**Inquilines** are insects which lay their eggs in an existing gall, at an early stage, when the causer is still in residence, with the object of using the same food store. In some cases this leaves the causer unharmed, where their food is situated well away from the causer larva's location. But for others, where the egg is laid in the larval chamber, or close-by, the competitive fight for food may end in the causer dying. In neither case has the inquiline set out to feed on the causer directly, as in parasitism. Inquilines found in oak-galls are all fully sexual, with males and





females in each generation. Adult inquilines are much more active than most causers, though not as nervous in their movements as many parasitoids.

**Parasitoids** are the real 'bad boys' of the story, using the insects in the gall as a direct source of food and eventually cause death. These insects are parasitic on the causer, inquilines, or even other parasitoids in the galls, eventually killing their host. The great majority of parasitoids found in oak galls are chalcids, (Chalcidoidea), but three ichneumons (Ichneumonoidea) & one diapriid (Proctotrupoidea) are also involved.

Chalcids are generally slender creatures, with longer or shorter ovipositors, some permanently extruded between two ovipositor sheaths which protect them, others hidden inside the gaster in normal circumstances. These are all normal, fully-sexual males and females.

Through constantly-moving antennae, the insect is able to sense the presence of a larva beneath the skin of the gall, drill through the wall and into the body of the larva, where it injects its venom, in the case of ectoparasitoids, before laying its egg on the surface of the insect. In the case of an endoparasitoid it lays its egg directly into the body of the larva. In both cases the larva is paralysed and, when the parasitoid hatches, it feeds on the living larva of the host - until it eventually kills it. The adult parasitoid then emerges, bites its way out to the surface, leaving a very small hole relative to its size, before searching for a mate to start the process again.

Chalcids are extremely lively insects, which are constantly on the move, and can jump surprisingly long distances; while many are beautifully, almost fantastically, coloured, with gleaming blue, green, gold or red tints in their shining metallic bodies - breathtaking when first seen under a photographic lens, or beneath a stereo microscope. My first glimpse of *Torymus auratus (=nitens)* – one of the commonest - convinced me that these were the insects I most wished to study. Males generally have flatter, often shorter, gasters. Chalcid wings are quite distinctive, having what appears to be a single vein running on or near the front edge of the forewing.

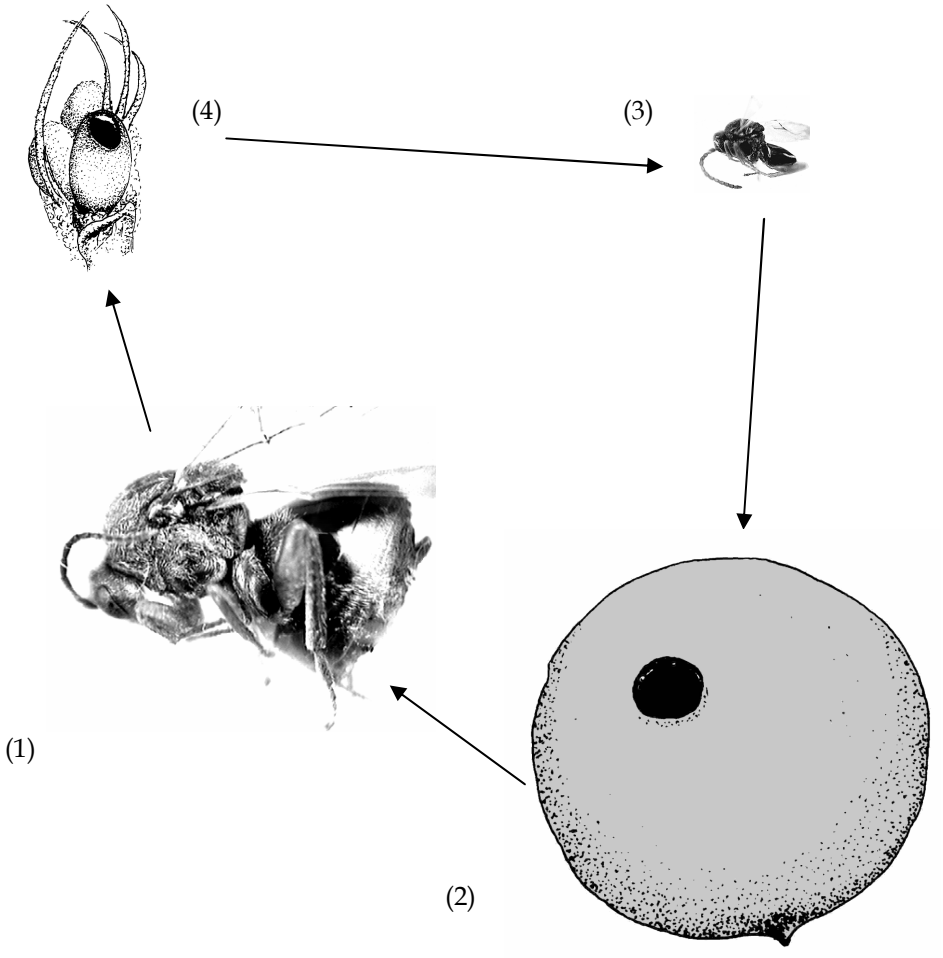
Body sizes vary, from around one millimetre to 6 or 7mm in the largest chalcids, excluding any external, protruding ovipositor sheaths. These sheaths may more than double the total body length in some species.

**ALTERNATE GENERATIONS** - It is difficult to envisage how people became aware of the fact that many cynipid gall-causers exist in two totally different generations which do not resemble each other in size or shape. Each generation forms a quite different gall, in some cases on a different species of tree. To all appearances the generations contain totally different insects with differing lifestyles.

The story is well-illustrated in the common Oak marble-gall. The causer is a fat, slow-moving, heavily hunched gall-wasp (1), some 5mm in length, of the agamic



generation of *Andricus kollari* and forms the hard, round Marble-gall (2), some 8 to 12mm across, on *Quercus robur* or *Quercus petraea* - Pedunculate and Sessile oaks. The wasp is a female who reproduces without the benefit of a male, therefore she is asexual or **agamic**. The alternate generation is a tiny wasp (3), some 1.5mm long, and largely black in colour, with relatively large wings - very active. This generation is fully **sexual**, with males and females performing the usual role, while the tiny, 2mm, bud-gall (4) is produced on a Turkey oak, *Quercus cerris*. The sexual female leaves the Turkey-oak and flies to a Sessile or Pedunculate oak, where she lays her egg in a bud, on a twig. The hatching of the egg stimulates gall growth and the larva feeds on surrounding gall tissue forming a smallish central cavity, before pupating and then emerging in the pitch-black of the interior. The Marble gall has an extremely hard exterior and the adult insect has to bite her way through this before emerging onto the surface. Her first action is to clean off the debris and sawdust before flying off to look for the Turkey-oak. Here she oviposits inside a bud to start the whole process once again.






We are fortunate that earlier entomologists recognised this extraordinary life-cycle, which appears to be confined to cynipids forming oak galls, and painstakingly researched and teased out the full story so we are now aware of which wasp causes which gall and how each links with the alternate generation. Not all cynipid oak-gall causers have two generations, but the great majority do; while it is believed that some of the former may have as yet undiscovered alternates, though these may only appear infrequently.

The two generations offer a highly efficient method of survival which is much more flexible than a sexual generation on its own. In certain circumstances, where favourable conditions exist, one form may breed a number of generations in succession, then the situation changes and the second form again appears, moving the species into a different environment which may, for instance, be less predated and therefore favour survival. The existence of both sexual and agamic forms makes the study of these galls of particular interest and was a major factor in starting this study.

**IDENTIFICATION** - The first question that arose when we started our interest was, 'how can galls and insects be identified?'

Fortunately there are few problems in identifying the majority of the galls, as excellent keys exist. *Plant Galls* (Redfern & Askew 1998), in the Naturalists' Handbook series, is an excellent choice still, but AIDGAP and the British Plant Gall Society (BPGS) have brought out an even more comprehensive volume – *British Plant Galls,* (Redfern, Shirley & Bloxham 2002). This has wonderful, clear descriptions and drawings which make the task of identification as easy as possible, though some species inevitably remain difficult. This book has attracted considerable attention and praise. However existing keys, with a few additions for new arrivals, are fine for the great majority of oak galls and a simple version has been added to this book.

A very different picture emerges when trying to identify the various insects found in oak-galls. At the last count, it proved necessary to describe 256 insects, taking into account sexes; a formidable number even if they had been available already under one cover - which was not so.

If the insects are reared from the living galls, this reduces the problems considerably, identifying causers immediately - though failing to address free-flying insects found in numbers on oak trees at the right time of year. However, this still leaves inquilines and parasitoids, of which there are many in galls, where keys become essential - but are there any such comprehensive keys? Is it possible to go out and buy a set and are they easy for a beginner to this group to use?

It turned out that keys did exist for the majority of insects, though for the un-trained amateur they were not easy to follow. They use words which do not appear



in normal dictionaries and some which do not even appear in entomological or biological dictionaries. Without understanding these words it proved virtually impossible to use the keys effectively. So the first task was to prepare a glossary of terms, which would enable the appropriate translations to be made (Williams, revised 2005).

The second problem was that none of the keys described the whole insect, nor did they give a real idea of sizes.

While it is perfectly understandable that the trained scientist, brought up in the daily use of keys, finds it useful to have quite precise terms available for colours, locations, body parts and skin sculpture, this is of little help to the amateur who does not understand what they mean and does not have a comprehensive dictionary at his fingertips. This had already been noted by the Field Study Council, which led to the production of their excellent AIDGAP identification keys, though unfortunately none cover the insects found in oak galls. Nevertheless the principle is clear, to use non-specialist terms where possible and utilise modern computer technology to locate explanatory diagrams next to the appropriate couplets. By this means, even complicated and minor differences may be readily understood by anyone who is interested.

In the eyes of our strictly amateur group, unfamiliar with entomological language, there were two important questions concerning existing keys:

- **what did those many obscure terms mean and,**

  **even more important,**

- **once an identification had been reached, was it correct?**

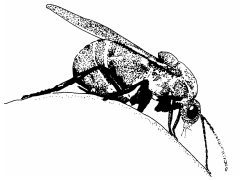
These were tackled and overcome through a series of specific actions:

- **rearing insects from galls** - the prime source of knowledge of the various insect inhabitants. The principal problem is that, while it is easy to keep 'hard' galls (those with hard skins) in pots, and have success in the emergence of the insects, it is a very different case in the many 'soft' galls such as form directly on or in leaves. These often appear, form and the insect emerges, in under a week. Keep them too long and they rot; pick the right day and you will succeed, but it is a chancy business.

- **opening galls to examine their interior** - useful in the case of 'soft' galls in the early part of the year, such as the Common spangle, *Neuroterus quercusbaccarum* ♂, in which the complete insect emerges from the pupa but rests inside the gall before emerging later in the spring,

- **examining museum collections** - a time-consuming business but essential to fill in the many gaps which remain from other processes. Even





so, there are insects which do not apparently exist in collections and these remain without descriptions at present.

- **producing a tailor-made glossary** - essential if existing keys are to be thoroughly understood and used reliably. This was started immediately and is now in its fourth edition and continues to grow as more articles and books are read. To be of real use it has had to go back over the last 100 years, during which many terms have changed considerably, as some early keys are still in use. *British Hymenoptera; Glossary - for use with Identification Keys* (Williams 2003), covers all Hymenopteran groups, including aculeates, sawflies and other Parasitica, but has proved of particular value in the case of cynipids & chalcids.

- **collecting free-flying insects on oaks -** a question of 'chicken & egg', as this really is the final test that you are confident in the use of the keys.

**KEYS USED IN THIS WORK** - two main keys have been used as the bedrock of the keys, both with kind permission of the authors or publishers, as noted in the appendices:

- **Cynipids - Handbooks for the Identification of British Insects**, Vol. V111. Part 1 (a), *'Hymenoptera, Cynipoidea. Key to families and sub-families and CYNIPINAE (including galls)'*, By R.D. Eady & J. Quinlan; published by the Royal Entomological Society of London, in 1963.

  A most remarkable set of keys which cover a far wider range than is required just for oaks. The appropriate sections have been extracted from these keys and the drawings moved to the point in the text where the picture is mentioned, as is possible using modern computer technology. In addition, new drawings have been prepared, and inserted, where points are mentioned which are not absolutely clear to the untrained reader. Some of the original drawings have had arrows or explanatory labels added for the same reason.

  Completely new keys and drawings have been added for recently found species, or those not covered in the original, and the whole integrated so that identification may be made by following the one set of keys from a single starting point. However, it should be pointed out that this is a far-from-easy group of insects and personal comments have been added in 'technical' script, to point out where there are particular problems and how to overcome these.

- **Chalcids** - an article in **Transactions of the Society for British Entomology**, Vol. 14, Part X1, in November 1961, *'On the Biology of the Inhabitants of Oak Galls of Cynipidae (Hymenoptera) in Britain'*, by R.R. Askew.



A superb overview of the subject, with very clear keys, which still makes complete sense. Modern technology has enabled some of the more difficult points to be illustrated now at the point where they occur and the insertion of extra drawings, measurements and descriptions has eased the job of checking identification for the purely amateur user. Dr Askew has been most kind and helpful in answering queries and helping clear up problems associated with the more difficult species.

**A draft set of Europe-wide keys** produced by R. R. Askew & Csaba Thuroczy (Askew & Thuroczy, 2002) for the forthcoming Ray Society volume on '*Oak galls in Europe*' (Stone et al., in prep.), has been enormously helpful in sorting out certain problem species.

Checks have been made, and extra identification points added, where appropriate, from a series of articles listed in the bibliography at the end and, in particular, from:

- Bulletin of the British Museum (Natural History) Entomology, *'Pteromalidae of North Western Europe (Hymenoptera: Chalcidoidea)'*, by M.W.R. de V. Graham, published in 1969.

**NOMENCLATURE** - the names of some species of *Torymidae* have been changed recently in a book:

- Zoologische Verhandlingen 317, *'Revision of the European Species of Torymus Dalman (s. lat.) (Hymenoptera: Torymidae)'*, by M.W.R. de Vere Graham & M..J. Gijswijt, published in March 1998 by the Natural History Museum of the Netherlands.

This introduces some major changes into the naming of collections of chalcids, and confusion to many of us who have become used to the old names, nevertheless it is the new form and must be observed. Particular confusion will occur where old names have been swapped between species; the previous *Torymus nitens* (Walker 1833) becomes *T. auratus* (Müller 1764), while *T. auratus* (Geoffroy in Fourcroy 1785) is now *T. flavipes* (Walker 1833). New names have been used in the text but the old name has been shown in brackets to help avoid confusion for those brought up on the old names. In my case, at least, it has involved large amounts of re-labelling of specimens and photographic slides. It all serves to emphasise the necessity of **including the authority** when quoting names, or labelling specimens and photographs. If this is done, then specimens, pictures or descriptions can always be tied in to the correct insect, even where names have changed.

**REARING** - the most important part of getting to know and understand this incredibly complex world. It is a fascinating business, and far from easy, however it does introduce the living insect in its own environment. There is nothing like



watching a chalcid emerge through a tiny hole from the totally black interior and into the light.

'Hard' galls, such as the Marble-gall, Cola-nut or Knopper gall, are relatively easy to keep. They may be stored in any container, such as old transparent film canisters, ideally outside under cover, where they undergo normal winter and summer temperatures. A crystal of **thymol** (available from DJ & D Henshaw) should be added, to help stop the formation of mould inside the container. This substance is an aid but not an absolute cure, green galls are so full of moisture they often become mouldy in spite of this. If picked early and green, it may be sensible to leave the gall to dry naturally in the open and then pot it – though some insects may emerge during that period. Alternately, leave off the lid and cover with fine insect-proof netting (available from B & S Entomological Services).

It is important to record the date of collection of the gall, together with its location; without this information, future emergences will not prove nearly as interesting, or useful in scientific terms..

'Soft' galls, such as some on buds or catkins, and short-lived leaf-galls, such as *Neuroterus numismalis* ♀♂, the Blister gall, are particularly difficult and it is largely a case of luck in picking the right time. Thymol helps avoid mould, but many will still die. Keith Harris, a leading specialist on gall-midges, suggests keeping such soft galls on a bed of well-washed sand mixed with a ground up crystal of water gel, as used in pot plants and hanging baskets (available at most garden centres). Add a few drops of water and it should keep the gall from drying out, but don't forget the thymol. He has had considerable success in hatching out gall-midges from their soft galls and the system is now being tested with other gall-insects.

While this method suits pupae which have fallen from galls and buried themselves in the soil, other insects emerge directly from the gall. Some of the soft leaf-galls, such as spangles, are difficult to rear because of mould, or the tissues darkening and dying after drying out. A possible solution is to use the 'Harris' method, but leave out the sand or peat. The leaf is put directly into the pot, dribbling in a drop or two of water with a small crystal of water-gel, together with some Thymol. The gel-crystal mops up the natural sweat which exudes from a green leaf, but keeps the atmosphere moist. This appears to work sometimes and it is easier to spot when an insect has emerged than where there is soil in the base.

Nevertheless, it is an unpredictable process and, ultimately, persistence is the only solution; if you go on trying, eventually some galls will produce their insects.

Mark Shaw, in his excellent book, *Rearing Parasitic Hymenoptera* (Shaw 1997), suggests that breathable cork-stoppers help avoid mould, while leading rearer Malcolm Jennings says this works well with soft galls but, 'wipe off any mould that does form'.

Some of the later-ripening leaf-galls may be found in leaf litter during the winter, swollen up and easy to see. They contain pupae and should produce insects if kept.



A good example of this is the Common spangle, which is less likely to produce causers if a living leaf is picked. If a pupa is found, not a larva (which will still be feeding), it may be put in a gelatine capsule (available from Meadow Laboratories) and kept in a pot, ideally using the 'Harris' method. With any luck it should produce a living adult.

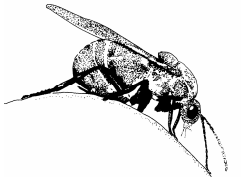
Recently, I put some Common spangles straight off the leaf into pots full of water, with a lid on, and left them outside from autumn on. They swelled up and looked really healthy in spite of being totally surrounded by the water. In early March, the water was emptied and within two days the first couple of insects emerged. Subsequent tests with other soft galls have showed equally promising results – one batch producing insects, which emerged while the gall was still under water. So this looks a promising method of dealing with 'soft' galls, particularly if you know when they are likely emerge. What is interesting, is that it seems there is no need for direct permeation of air into the galls for survival of the larvae.

Another useful method is sleeving, for those who are lucky enough to have oaks in their garden, or in an area which is unlikely to be visited by others. This involves enclosing living galled leaves or buds in a piece of 28 gauge Terylene netting, fine enough to keep in even the smallest insects, (available from B & S Entomological Services). It is easiest to sew a little bag and fasten this round a twig. Ensure that only one gall species is enclosed within each sleeve, or considerable confusion can arise.

Old, apparently dead, galls should be kept, as parasitoids may emerge later. One apparently empty Robin's Pincushion (also known as Rose bedeguar gall - on rose species) - clearly at least a year old when taken - produced a dozen chalcids a year later and went on to produce a single insect two years after that. *Callirhytis bella* is said to take up to 7 years before emergence; while an apparently derelict, rotting Turkey-oak acorn kept in a pot for 6 years contained a fully-emerged adult inside one cell when it was opened up. Another acorn still had a tiny living larva inside after three years in a pot, while Marble-galls have produced insects after three years.

The process of dissecting galls is an excellent method of sampling causers, in particular. In a number of galls, such as Knopper and the various spangles, the causers pupate and form the adult imago well before emergence, spending quite a bit of the winter in this form, then emerge in the spring. More needs to be found out about this, as well as the larval and pupal stages of individual causers, inquilines and parasitoids. Excellent keys to the genera of larvae may be found in *Plant Galls* (Redfern & Askew, 1998). Old galls, from which the insects have emerged, retain the pupal skins, which would be a means of identifying the inhabitants if we knew how to identify all the species. There is no problem in opening up commoner galls, but one would be reluctant to lose the opportunity of normal emergence with uncommon galls. Post-emergence dissection would seem the best option in those cases.





**PRESERVATION & PRESENTATION –** While there may be cases where insects can be examined in the Spi-pot described on P. 22, particularly the larger causers; other insects may have to be killed for identification, though many die with the effort of emerging from the gall. Familiarity with the species will render this unnecessary for the majority of insects in the course of time.

There are three main methods used for killing them. The old method was to put them in a pot containing Portuguese laurel leaves, which exude cyanide vapour. Another method is to keep the insects in the freezer overnight. This certainly kills them, but can produce some unwanted effects when internal fluids freeze. The insects become extremely brittle and will need relaxing to set the wings, limbs etc. into the best positions to examine all the features. The final method, which many use, is to put a few drops of Ethyl acetate (available from DJ & D Henshaw) onto twists of kitchen roll in a small jar, then put the insect inside this. A more sophisticated version is to put an inch or so of Plaster-of-Paris in the bottom of a jar and dribble the fluid onto this, which keeps the insect much drier. It is important to leave insects in the jar for at least 12 hours, particularly the larger ones, otherwise they may wake from their sleep.

A number of methods have been advocated in the past for presenting these insects in collections, but they have not always proved the best for taking measurements and identifying difficult species.

In a museum collection, there is a strong case for displaying the insects singly, so that the majority of the body is clearly seen, for comparison with other specimens. Since the majority of species are small or very small, from 5mm down to as little as 1mm, it is normally recommended that they should be glued to triangles, or small squares, of card, which are then pinned on stout stainless steel continental pins with brass heads (40mm X 45 – No 4 – (available from DJ & D Henshaw). It is possible to obtain pre-cut triangles from entomological suppliers, which lends consistency and neatness to the collection.

However, for general use in identification, taking measurements etc, there is nothing to compare with keeping the insects in small glass tubes with plastic stoppers (50X12mm). Before they harden finally, ensure that the wings do not cover the gaster, and that legs are extended so as to reveal all the side of the thorax. Store the insects with a small crystal of thymol and they should last for ever, preserved against insect parasites by the stopper. Do NOT store chalcids or cynipids in 70% alcohol, as is common with other groups of insects; colours change in time and, more importantly, they may swell up, soften and bits fall off. They are much better stored naturally–dried.

Sometimes, it is necessary to clean insects which have become contaminated by outside materials, or where the wings have become creased and folded. The



recommended method, used by professionals, is to immerse the insect in absolute alcohol (100%), leave for a day or so, then drain and place in ethyl acetate before decanting quickly (NOT pulling out with tweezers) onto a paper kitchen-towel. If you are lucky, all will have straightened out; if not, repeat the last stage until it does. If unable to get hold of this alcohol, try using 70% alcohol which is obtainable for entomological purposes through an HM Customs licence.

If an insect has dried in the wrong position, it can be softened and relaxed. Take a piece of blotting paper or kitchen towel, moisten it and put it in a small airtight sandwich box, with the insect on a separate, dry piece of towel and leave for no more than two days. At the end of this, it should be possible to move legs, wings or other parts to the positions that are wanted. It is also possible to buy relaxing fluid, which may be painted onto the part to achieve the same objective but damp does the job in most cases - and it is free!

To examine, measure and identify the insects, all that is needed is an excavated glass block (38 X 38 X 16mm deep) filled with miniature glass beads (Size 40#) – (available from DJ & D Henshaw). The beads hold the insect in whatever position is needed and there is no need to cover any part with glue. The size of the beads is important, that suggested here works well with dry specimens. The insect will sit firmly in the beads in virtually any position if pushed lightly down. For example, a *Synergus* needs to be examined from the side, from directly above, and at various angles; with the head and body vertically up, so as to see the area between the ocelli, and whatever angle is needed to measure the length of a wing. This involves moving the insect several times, to an exact point each time, so as to reveal a specific structure.

Correct labelling is vital. Experts suggest that labels should be on light card or heavy paper, inserted into the tube. These can sometimes damage or distort the specimens – which become brittle with time but this may be overcome by keeping the specimens in a gelatine capsule inside the tube. These should contain the following information:

> Gall, sex (agamic ♂, sexual ♀♂)
> Location, map reference, Vice-County,
> collected – emerged
> scientific name of insect, authority, sex, family

ex Knopper-gall, ♂
Dolebury, Mendip, Somerset ST45 59
VC6, c.12/12/2000 – em.7/6/2001
*Torymus auratus* (Müller) ♀, Chalcid

**MEASUREMENT & RATIOS** - For reliable identification I have found it important to record several measurements from each insect, calculate various ratios and count the number of antennal segments, while noting their types. Ratios



have proved a reliable and particularly useful means of separating species or confirming identification where species are similar in appearance.

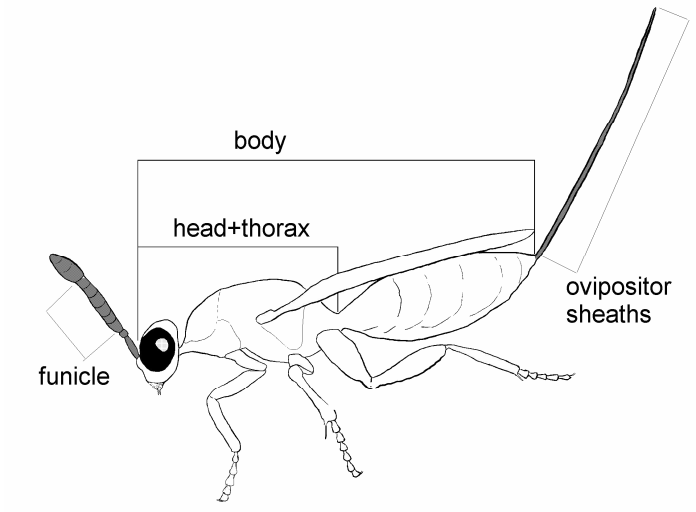
- **Antennal segments** - for cynipid causers, inquilines and ichneumons, count the total number of antennal segments; for chalcids, note the numbers of ring and funicle segments (between the ring segments and the club).

- **Causer** - overall body (the length of head+thorax+gaster, but excluding clearly-defined external ovipositor sheathes, where present) and wing length are measured and the ratio for Wing/Body calculated as a %.

- **Inquiline & ichneumon** - measurements are taken of body, head+thorax, antenna, and wing-length. From these, ratios for: Head+Thorax/Body; Antenna/Body; Wing/Body. are calculated as %'s.

- **Chalcids** - measurements are more complicated. Body; head+thorax; funicle; forewing; & external ovipositor-sheath lengths are recorded. **Female:** ratios for head+thorax/body; funicle/head+thorax; wing/body; ovipositor/body, are calculated as %'s. **Males** are the same, but without the ovipositor %

It is important that all measurements are taken the same way, from the same points on the body. The following drawings illustrate how these have been taken in the measurements used throughout this book:

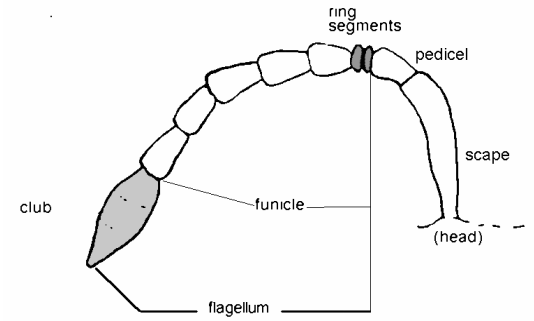



Torymid ♀

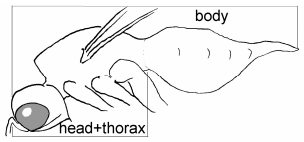
(The term 'Thorax' has been used throughout, being understood by many people to mean the mid-section of the body between the gaster (apparent abdomen) and the head. Dr



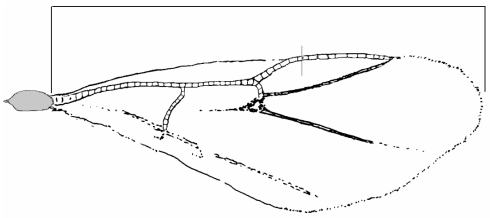
Askew has pointed out that the modern term for this part of the insect is 'mesosoma', which contains the 'true' thorax and propodeum; while the 'abdomen' consists of the propodeum plus gaster, separated by the obvious constriction. However so many keys, books and people use the term as described above, that I have retained this form. I trust this explanation makes the true position clear and seems a reasonable compromise in making the insect structure readily understood by all).



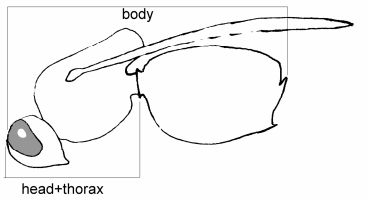

antenna



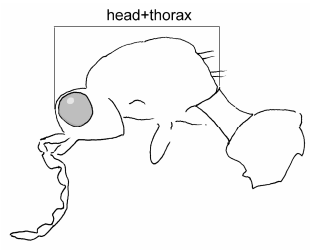

Pteromalid



wing




Cynipid ♀




The *Synergus* head+thorax measurement is taken to the front of the short petiole between gaster & thorax, as is the case for insects with distinct, long petioles

*Eurytoma* ♂

Synergus

The resultant ratios are remarkably consistent, once measurements have been made of a dozen or so insects, though there may be wider variations in some species, which then demand greater numbers. Sizes may vary quite widely but even those average out after measuring numbers of insects and are a remarkably useful guide for identification. For example, in looking at certain cynipids it has sometimes been possible to measure first, look at the table of sizes in Section 6, and



then confirm the identification through the keys. It is surprising how accurate this proves.

**MICROSCOPES & LIGHTING** - Unfortunately Chalcids and Cynipids are such small insects that there is no way to avoid the use of a microscope. A stereoscopic instrument is the most useful, though ideally it needs to be capable of high magnification to cope with the smallest insects, at just over 1 millimetre in length, where it is necessary to examine small proportions of the whole.

It is possible to pay thousands of £s out for the finest of stereo instruments – such as Wild or Zeiss – and it must be marvellous to have the benefit of such optics and construction. However, it is possible to buy new or second-hand microscopes at a fraction of that cost and they should provide all the facilities needed to identify and explore the insects found in British oak-galls. I bought a second-hand Meiji zoom for well under list price and the optics and mechanical precision are first class. With 20X eyepieces and a 2X converter, it goes up to a magnification of 180X, which I have found necessary to examine some of the finer points of surface sculpture, to identify some of the smallest species. Why so much magnification? may be better appreciated when considering that one of the identification points for inquilines is the pattern of sculpture between the ocelli, on an insect which may be only 1.2mm long, with a black cuticle. To see anything at all needs lots of non-reflective light as well as high magnification.

However I still find myself using my first microscope for part of the work, as it has built-in measuring facilities. This is a Russian MBS-10 stereo of remarkable quality yet modest cost, with a versatile range of equipment as standard. The microscope comes with 8X and 14X eyepieces, and a practical stepped-zoom design, giving five degrees of fixed magnification. There is also a 8X eyepiece with a built-in measuring scale, which superimposes a measured line over the image of the object being examined. Since each click of the stepped zoom is fixed, this allows the makers to print a table giving exact measurements for the scale at each setting. However, unfortunately this instrument has since been discontinued, though no doubt second-hand versions are still obtainable and well worth the search.

Since measurements, and extrapolated ratios, play such a part in confirming identification, fortunately it is possible to measure on most microscopes, using a special eyepiece, or fitting a scale (Eyepiece Micrometer) into an existing eyepiece, but the actual reproduction for any setting needs to be determined by measuring a scale on an engraved slide (Stage Micrometer) and calculating the result.

In 2005, reasonably-priced Russian stereo microscopes may be obtained from Lakeland Microscopes, which provide converters, variously-powered eyepieces and measuring facilities, with excellent performance. Meiji stereo microscopes provide a further step up in performance and are built in modular form so that extra facilities may be fitted later. Their quality is superb, and prices are highly competitive for the quality and practicality of the design.



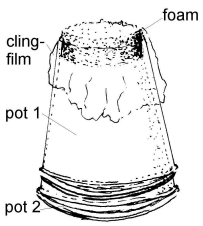
While many modern microscopes comes with built-in lighting, which operates either as a direct beam down onto the specimen or from underneath, more light is needed to see microsculpture on the tiniest black insects. After much experiment, I have found that, to show up reticulation, rugosity and other such sculptural minutiae, a **fluorescent light** provides by far the best solution. Direct lighting by a conventional bulb, or even through fibre optics, reflects back from the often-shiny cuticle and confuses the picture.

A light shining from beneath a plate of ground glass, is extremely useful for some features that are crucial to identification, often occurring at the start of a key; two such are counting antennal and tarsal segments. Both of these are made more of a problem in some insects by hair obscuring the already difficult-to-see divisions.

Particularly difficult, at even the highest magnifications, are ring segments found on many chalcid antennae. However, a compound microscope will often show these up where even the highest magnifications of the stereo might not help - the latter never seems to have enough light at top magnifications. The high quality optics of the compound microscope, with properly focussed under-stage lighting, may reveal what is needed for identification. An ancient second-hand compound microscope provided me with what was needed. At 100X magnification, there is enough space between specimen and lens to avoid crushing the insect when focussing and proved very useful in saving time.

However, do not despair; compound microscopes are not essential for general use, though useful if you are looking at many specimens and do not want to spend a great deal of time manipulating the specimen to reveal the final detail. I was searching for reasonably rapid comparative means of identification.

**Lighting** - If someone is looking for a cheap, good-quality light, for general microscopic use with larger insects, then the under £10 halogen lights supplied by various well-known stores are excellent. However, expensive fibre optic lights, specially made for microscopy, have two major advantages. They have flexible pipes that may be twisted in any direction to give direct or grazed light to show up features, while the light-beam is cool, which makes it possible to study live insects and then let them go, without harm. Using Michael J. Roberts 'Spi-pot', as shown in his excellent book, '*The Spiders of Great Britain and Northern Europe*' (Roberts, 1995), it is possible to hold a larger cynipid under the cling-film on the top, measure it, look for its diagnostic features, then watch it fly off.




The Spi-pot is made from two 'cocktail cherry' pots. One has a piece of foam glued to the bottom, outside, while the second has this bottom cut out. Put the first, top down on the table, while the second, which is covered in a piece of cling-film over the space where the bottom was cut out, sits over it. An insect, such as an agamic *Andricus kollari*, can be placed on the foam and will be held as firmly as is needed – without any injury. Using this I have measured many of these insects and let them



go without harm. A cold, fluorescent light ensures the insect is not cooked while looking down the microscope. The cling film is so clear it does not obscure any of the features.

Even the finest 'conventional' light has its limitations for such small insects as are involved in these studies. The main problem is that many are black, with shiny cuticles. A normal light causes intense reflections from the surface and detail vanishes in haloes of indistinctness. For example, you may be looking at a cynipid 1.5mm long, trying to determine intricate differences in minute surface sculpture in the area between the ocelli; even the slightest reflections render this impossible to see. The solution is to use a fluorescent light source which has the property of reducing reflections to virtually nothing.

I was amazed when I looked at a specimen under this light for the first time; features I had been searching for sprang into life and I was forced to go back to a considerable number of previously checked specimens and take a second look, often changing the identification. It was an object lesson in how easy it is to persuade yourself you have seen a feature which is badly lit, where in fact no such structure had been seen. The second point is how important it is to have sufficient intensity of light. Dark objects absorb a great deal of light before they show detail and it is vital to show up even the smallest punctuation marks or the faintest of surface sculpture to differentiate between species which are often remarkable similar.

The finest light I have come across for showing up microsculpture on a black insect, is the Minifluor, supplied by Meiji Techno. This can be free standing, or fit to the body of Meiji stereo microscopes, and consists of a reflector containing a 7 watt florescent tube that gives a clean white light which does not distort colours and is close to daylight at 4000K. The lack of reflection reveals every last detail of sculpture and it is bright enough to illuminate the specimens adequately. There is a downside – cost – but there is also the option of making your own from the latest long-life domestic fluorescent bulbs, though they tend to be bulky. The Minifluor is extremely compact and throws its light from very close to the specimen without interfering with your vision. Cheaper computer lamps using longer fluorescent lamps are fine but it is often difficult to place the tube close enough to the specimen for sufficient illumination. Finally, there is another solution, to use a flexible-stem or jointed desk light and fit it with one of the new generation fluorescent economy bulbs. I know several people who use these with success. Experiment and see which suits your needs best, but persist if you want to be certain of identification of difficult species, such as the genus *Synergus*.

**DESCRIPTIONS** - all descriptions have been made directly from specimens, either reared by our group or held in museum collections. They have been done to a standard format, entirely by myself, ensuring a consistent use of terms and ways of measuring - however idiosyncratic. At the same time the dictum, **'it must be easy for the relatively un-trained to understand',** has been born in mind. The object of



this is to open the world of oak-galls and their inhabitants to new people - the interested but not necessarily already-expert.

**KEYS TO GALLS –** This volume contains a simple key, divided into areas on the tree where the galls should be found. It is not a dichotomous key, but shows the features which identify each gall, under its location, including size. For ease of use, a separate table shows the time when the gall is ripe. Another section of this volume describes each gall in detail. Other sets of keys are available which take another approach. These include, '*Plant Galls*' (Redfern & Askew, 1998), which is first-class for taking into the field. Finally, but most importantly, there is the AIDGAP key, '*British Plant Galls, Identification of Galls on Plants and Fungi*' (Redfern, Shirley & Bloxham, 2002), written and researched by members of the British Plant Gall Society. This provides the most up to date information and keys and is both reliable and easy to use, with superb illustrations of key points.

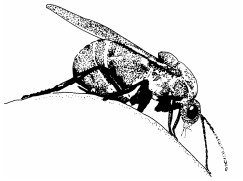
**KEYS TO GALL-INHABITANTS –** After a great deal of thought, it was decided to concentrate in this edition principally on the majority hymenopteran inhabitants of oak-galls, though information on other than this group is contained in descriptions of the galls they form, and elsewhere where appropriate.

This volume contains a full set of keys to all known hymenopteran inhabitants of oak galls in Britain. The most comprehensive keys to **British cynipids** were produced by the Royal Entomological Society from original research (Eady & Quinlan, 1963), but these excluded a number of galls which have since been added to the list. The exclusions included the sexual generations of *Andricus corruptrix, Andricus quercuscalicis* and *Andricus lignicola,* as well as a number of newly-arrived galls. Keys have been prepared for these, with drawings, and added to the original keys to bring this up to date.

The most difficult part of this has been the separation of the sexual generations of *Andricus corruptrix, A. kollari, A. lignicola* and *A. quercuscalicis* from each other, though some agamic generations have also caused problems. Clearly they are all very closely related, as measurements, ratios and colouring are so similar. In trying to come to terms with these, numbers of physical characteristics, such as colouring, body sculpture and measurements, were examined and in certain cases, differences discovered which pointed to clear distinctions. But examination of more specimens showed that these characters were not reliable. In the end, three of the sexual generations could only be separated by slight differences in the ratios between various segments of the antennae. Two of the ratios, taken in conjunction with each other, proved reliable in separating the species, though clearly this is not the most satisfactory of solutions and efforts are continuing to see whether better characters can be located.

An exciting recent development has been the discovery of 5 galls completely new to this country and the re-discovery of two other galls after many years apparent absence. Specimens of all the gall-causers have been examined and from these





drawing prepared and the results have been added in to the original keys. Completely new galls include *Andricus aries* ♂ (found originally in Hampstead Heath in 1999), *A. grossulariae* ♂ & ♀♂ (discovered by Pat Walker – Entomologists' Monthly Magazine 2001), and *Aphelonyx cerricola* ♂ (first found in Berkshire during 1997).

*Andricus lucidus* ♂ was restored to the British list in 1992, after Eady & Quinlan removed it in 1963 (Its previous history was a single record from Yorkshire in 1982), while its sexual generation has since been discovered. During the 1999 annual weekend of the British Plant Gall Society, the editor of 'Cecidology', Michael Chinery, rediscovered the gall *Andricus rhizomae* ♂ on some oak trees in Buckinghamshire, although no causers have been reared from these to confirm the identification. Eady and Quinlan removed this gall from the British list in 1963. (They said: 'This gall, recorded by Bagnall and Harrison in 1918, and Burkhill in 1932, may easily have been confused with *Andricus testaceipes* ♂. The authors have not been able to examine any British material and have only seen the agamic generation from Continental material')

The main keys cover **hymenopteran** inhabitants only, though the flight tables and gall lists also cover galls caused by Acari (mites), Hemiptera (bugs), Diptera (flies) and Lepidoptera (moths), which are also fully described.

**POSSIBLE INQUILINE & PARASITOID INHABITANTS** (p. 62) - This, one of the most important parts of this book, has been prepared from a variety of sources:

- **Book & Journals** - examination of existing information from whatever sources were available, but covering England, Wales & Scotland only. Over the years, starting with Connold's seminal book on British oak-galls, (Connold 1908), a considerable body of information exists on the subject, though widely scattered through a mass of literature.

- **Rearing** - has provided more than just confirmation of other findings. Species new to some galls have been identified and confirmed by others where doubt existed. Some galls are new to the country and it is to be expected that other insects, particularly parasitoids, will continue to invade these.

- **Museum specimens** - many record the galls from which the insects emerged and usually give dates of emergence, though the importance of this information does depend on whether rearing was in indoor or 'natural' conditions .

The list of currently-known inhabitants of oak-galls is as up-to-date as can be determined, but it will undoubtedly grow over the years as more people take an interest in rearing from galls and new species find suitable conditions in newer or even well-established galls.



**FLIGHT PERIODS –** have been developed from two main sources of information:

- **Rearing** - provides quite precise information as to when the insect emerges - though it is important to keep the galls in as natural conditions as possible to avoid forced emergence. I keep mine in pots outside in an open shed, which ensures natural temperature ranges and natural humidity, though lacking the effect of rainfall. Although, as is shown later, this may be closely imitated by using certain rearing techniques.

- **Articles in journals** - have provided information on various species or genera which can be added to my own findings. Full information on sources is shown in Appendix D.

It is notable that causers and inquilines have reasonably confined times of flight, consistent over many rearings, while parasitoids are much more varied. It may be imagined that parasitoid emergences would coincide, to some extent, with that of their prey, but this does not always prove to be so. The commonest chalcids, and those with a wide variety of prey in different galls, appear throughout the year, a good example being *Mesopolobus sericeus***,** which has been recorded in every month. This is a particularly interesting area of speculation which would repay further study in the future.

Do records indicate that they attack galls where a limited causer life span is found, yet they emerge randomly over the year? Do the parasitoids attack the causer, inquiline, or indeed other parasitoids, over much of the life-span of the larva, or is the attack confined to a particular stage of larval development? Is it a strategy enabling them to parasitise new prey regardless of emergence time? A long series of records should offer answers to these questions. Where I have reared the insect myself, using standard techniques, this has been noted in the table **'Flight times, British oak-gall inhabitants',** (p. 75)**,** by using dark shading; light shading indicates flight-times obtained from other sources.

**USING THIS BOOK** - I believe firmly in trying to shorten the process of identification by making it easier for people to:

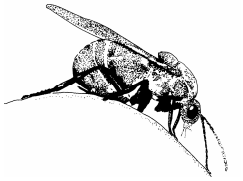
- have an idea of what **might** be present in a particular type of gall,

- understand technical terms or descriptions **at the point** where they are used in a key

- determine whether they are **right or wrong** at the point where an insect apparently keys out.

These have all been answered here though whether effectively, only time will tell. The list, **'Inquilines and parasites, by gall'** (p. 62), shows what may be present, which is a good starting point when looking at a number of insects that have emerged from a known gall. It shortens the odds and aids confirmation - though





you should be aware that a species new to a specific gall may be present, as has occurred several times during the preparation of this work. In fact one of the most notable things to emerge from this study has been the large increase in numbers of inhabitants found in particular galls. Whether this is due to climate change. or much more concentration on rearing, are questions which cannot presently be answered.

The other list, '**Gall-hosts of oak inquilines & parasitoids'** (p. 68), shows in which galls each species may be found, illustrating the diversity or otherwise of prey species.

**CHECKING RESULTS** - the assessment of whether keying is correct, has been eased by using 6 factors listed at the point where the insect keys out:

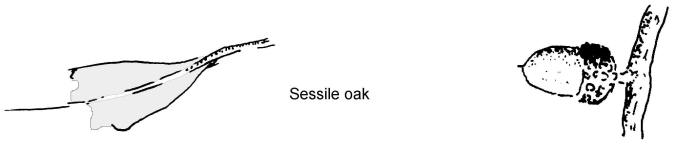
- **A brief description** - if it is red, when it should be green, then clearly something has gone wrong; where everything checks, the answer is probably correct,
- **Gall hosts** – a list of known galls where the insects have been found, in the case of inquilines & parasitoids,
- **Antennal or funicle & ring segment numbers** - instant separators of some difficult species, though they may prove difficult to count,
- **Size** - a good indicator, even where insects vary considerably,
- **Ratios** - often the most telling indicator of 'rightness'. Once a genus has been identified for certain, it may be able to make the first identification purely from the ratios which emerge from measurement,
- **Flight times** – may be the final clincher and have been known to show how wrong other assumptions may have been.

**IDENTIFICATION OF OAK TREES – Throughout the text, *Quercus robur* and *Quercus petraea* are the 'normal species', unless Turkey oak is specifically mentioned.**

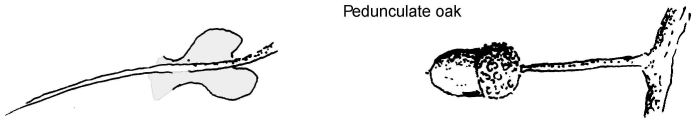
The majority of oak-galls are found on *Q. robur* and *Q. petraea*, with apparently no bias towards one or another, except the height of the location where they grow. The exceptions, living on Turkey oak, are 9 galls, many of whose other generations are found on one or both of the former species. These are *Andricus corruptrix* ♀♂, *Andricus grossulariae* ♀♂, *A. kollari* ♀♂, *A. lignicola* ♀♂, *A. lucidus* ♀♂, *A. quercuscalicis* ♀♂, *Aphelonyx cerricola* ♂ and *Callirhytis erythrocephala* ♂ & ♀♂. This compares with the 70 other galls found on *Quercus petraea* and *Q. robur*.



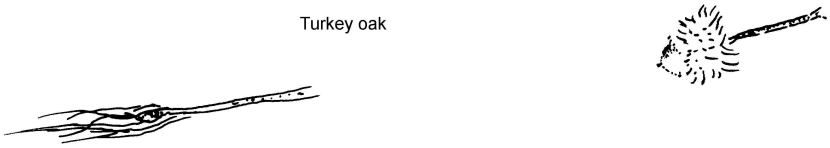
*Quercus petraea* (Mattuschka) Liebl, the Sessile oak, is found generally on higher ground. It has its leaf-base running straight into the stem of the leaf, while the acorn has a very short stalk.




*Quercus robur* Linnaeus, the Pedunculate or Common oak, generally found on lowlands, differs from the above in that its leaf-base is lobed where it meets the stem; while the acorn is produced on a long stalk. Both the above species have elongated 'conventional' acorns in a roughened half-cup.




The Turkey oak, *Quercus cerris* Linnaeus, has a quite different appearance. The buds at the tip of the twigs are entwined in a mass of characteristic long fibres (stipules); whereas buds on the other two species are quite bare. The acorn differs considerably from the other two, as its nut is much shorter and the cup is covered in short coarse hairs. The leaves have a faint trace of lobe, somewhere between the other two species, but at the margins are deeply cut towards the centre vein.




Oaks are strange trees, as they vary greatly in appearance. One will have short, near-hidden buds and another, beside it, long, swollen, conspicuous buds of a completely different colour. The leaves also vary; from deeply cut to merely waved margins, while the size of these go from tiny to super-large. Soil conditions and stress are responsible for this. Don't be put off, look at the features set out above. Another giveaway is that, if they show prominent galls, such as Oak-apples or Marble-galls, then they must be oaks other than Turkey.



# 2. Insects and galls
## Causers, inquilines & parasitoids

causer names are the same as galls
*** - arbitrary numbers given to galls - used throughout**:
*** the generation symbol (**☿,** agamic, or ♀♂, sexual) may be used.

**DEALING WITH A CHANGING SITUATION**

As this work was nearing completion a series of changes to the nomenclature of Cynipidae were sent to me by Graham Stone and his team, busy researching their new publication, *Oak Galls of Europe*, for the Ray Society (under preparation 2005). At first I contemplated changing the names in the book to suit, with all the re-writing that would have involved.

However, it is essential that names are not used which have yet to be published - doing so could lead to considerable confusion.

At the same time I was involved in helping to interpret the differences between the Field Studies Council/British Plant Gall Society Aidgap book 'British Plant Galls' and existing records in the MapMate recording program.

These had similar problems in that the names used were familiar ones, many in use for a numbers of years, describing both the gall and the insect causer. Would immediate changes have any benefit or merely cause confusion, particularly to the amateur towards whom both sets of information were heavily biased?

Graham Stone sent me a letter on the subject, (March 2005), from which it is worth quoting:

*'The taxonomic status of the cynipid inquilines is undergoing something of a revolution:, species and genera are being revised, both on the basis of painstaking morphological study, and of analyses based on DNA sequence data. While the current situation is an improvement on that of five years ago, further revision with respect to the fauna of the Western Palaearctic as a whole is certainly necessary. Such large scale reassessment can lead to extensive confusion, particularly for ecologists unfamiliar with the intricacy of inquiline taxonomy. All the ecologist sees is the disappearance of a familiar name, and the appearance of a new one. There is thus much to be said for maintaining the continuity of accepted names until the status of the group as a whole is stable.'*

After consideration of the implications of this, I have decided to retain the names in general use for years and append here the current position as seen by Graham and his team. This should make it easier for the many gall specialists familiar with the old names to identify their inhabitants while giving the opportunity to rename them in line with the latest thinking. It will also allow time for any further changes to be accommodated later.



**PROPOSED CHANGES TO CYNIPID NAMES – 2005 (Stone et al.)**

| OLD NAMES (used in this work) | PROPOSED NAMES |
|---|---|
| **Causers:** | |
| *Andricus albopunctatus* (Schlechtendal 1870 | *A. paradoxus* (Radoszkowski 1866) |
| *Andricus fecundator* (Hartig 1840) | *A. foecundatrix* (Hartig 1840) |
| *Andricus lignicola* (Hartig 1840) | *A. lignicolus* (Hartig 1840) |
| *Andricus nudus* Adler 1881 | *A. malpighii* (Adler 1881) |
| *Andricus rhizomae* Hartig 1843 | *A. rhyzomae* Hartig 1843 |
| *Neuroterus aprilinus* (Giraud 1859) | *N. politus* Hartig 1840 |
| **Inquilines:** | |
| *Ceroptres arator* Hartig 1841 | *C. clavicornis* Hartig 1840 |
| {*Synergus albipes* Hartig 1841 }<br>{*Synergus nervosus* Hartig 1840} | *S. pallipes* Hartig 1840 |
| *Synergus rotundiventris* Mayr 1872 | *S. tibialis* Hartig 1840 |

**WORKING CHECKLIST - AS USED IN THIS WORK**

| AGAMIC | SEXUAL |
|---|---|
| **<u>Causers</u> (agamic & sexual)** | |
| **HYMENOPTERA - CYNIPOIDEA** | |
| ***Andricus*** | |
| 1. *A. albopunctatus* (Schlechtendal 1870) | - |
| - | 2. *A. amenti,* Giraud 1859 |
| 3. *A. aries* (Giraud 1859)) | - |
| 4. *A. callidoma* (Hartig 1841) | 5. *A. callidoma* (=*cirratus*) (Hartig 1841) |
| 6. *A. corruptrix* (Schlechtendal 1870) | 7. *A. corruptrix* (=*larshemi*) (Schlechtendal 1870) |
| 8. *A. curvator* (=*collaris*) Hartig 1840 | 9. *A. curvator,* Hartig 1840 |
| 10. *A. fecundator* (Hartig 1840) | 11. *A. fecundator* (=*pilosus*) (Hartig 1840) |
| 12. *A. glandulae* (Hartig 1840) | 13. *A. glandulae* (=*xanthopus*) (Hartig 1840) |
| 14. *A. grossulariae* Giraud 1859 | 15. *A. grossulariae* (=*mayri*) Giraud 1859 |
| 16. *A. inflator* (=*globuli*) Hartig 1840 | 17. *A. inflator,* Hartig 1840 |
| 18. *A. kollari* (Hartig 1843) | 19. *A. kollari* (=*circulans*) (Hartig 1843) |
| 20. *A. legitimus,* Wiebes-Rijks 1980 | - |
| 21. *A. lignicola* (Hartig 1840) | 22. *A. lignicola* (=*vanherni*) (Hartig 1840) |
| 23. *A. lucidus* (Hartig 1843) | 24. *Andricus lucidus* (=*aestivalis*) (Hartig 1843) |
| 25. *A. nudus* (=*malpighii*) Adler 1881 | 26. *A. nudus,* Adler 1881 |



| AGAMIC | SEXUAL |
|---|---|
| **Causers (agamic & sexual)** | |
| ***Andricus*** | |
| 27. *A. quadrilineatus* (=*marginalis*) Hartig 1840 | - |
| 28. *A. quercuscalicis* (Burgsdorf 1783) | 29. *A. quercuscalicis* (=*cerri*) (Burgsdorf 1783) |
| 30. *Andricus quercuscorticis* (Linnaeus 1761) | 31. *A. quercuscorticis* (=*gemmatus*) (Linnaeus 1761) |
| 32. *A. quercusradicis* (Fabricius 1798) | 33. *A. quercusradicis* (=*trilineata*) (Fabricius 1798) |
| 34. *A. quercusramuli* (=*autumnalis*) (Linnaeus 1761) | 35. *A. quercusramuli* (Linnaeus 1761) |
| 36. *A. rhizomae* (=*nodifex*) (Hartig 1843) | - |
| 37. *A. seminationis* (Giraud 1859) | - |
| 38. *A. solitarius* (Fonscolombe 1832) | 39. *A. solitarius* (=*occultus*) (Fonscolombe 1832) |
| 40. *A. testaceipes* (=*seiboldi*) Hartig 1840 | 41. *A. testaceipes*, Hartig 1840 |
| ***Aphelonyx*** | |
| 42. *A. cerricola* (Giraud 1859) | - |
| ***Biorhiza*** | |
| 43. *B. pallida* (=*aptera*) (Olivier 1791) | 44. *B. pallida* (Olivier 1791) |
| ***Callirhytis*** | |
| - | 45. *C. bella* (Dettmer 1930) |
| 46. *C. erythrocephala* (=*erythrostoma*) (Giraud 1859) | 47. *C. erythrocephala* (Giraud 1859) |
| ***Cynips*** | |
| 48. *C. agama*, Hartig 1840 | - |
| 49. *C. disticha*, Hartig 1840 | 50. *C. disticha* (=*indistincta*) Hartig 1840 |
| 51. *C. divisa*, Hartig 1840 | 52. *C. divisa* (=*verrucosa*) Hartig 1840 |
| 53. *C. longiventris*, Hartig 1840 | 54. *C. longiventris* (=*substituta*) Hartig 1840 |
| 55. *C. quercusfolii*, Linnaeus 1758 | 56. *C. quercusfolii* (=*taschenbergi*)Linnaeus 1758 |
| ***Neuroterus*** | |
| 57. *N. albipes* (=*laeviusculus*) (Schenck 1863) | 58. *N. albipes* (Schenck 1863) |
| 59. *N. anthracinus* (Curtis 1838) (=*Andricus anthracina)* (=*Andricus ostreus*) | 60. *N. anthracinus* (Curtis 1838) (=*Andricus anthracina)* (=*Andricus ostreus*) |
| 61. *N. aprilinus* (=*schlechtendali*) (Giraud 1859) | 62. *N. aprilinus* (Giraud 1859) |
| 63. *N. numismalis* (=*vesicator*) (Geoffroy 1785) | 64. *N. numismalis* (Geoffroy in Fourcroy 1785) |



| AGAMIC | SEXUAL |
|---|---|
| ***Neuroterus*** | |
| 65. *N. quercusbaccarum* (=*lenticularis*) (Linnaeus 1758) | 66. *N. quercusbaccarum* (Linnaeus 1758) |
| 67. *Neuroterus saliens* (Kollar 1857) | 68. *Neuroterus saliens* (Kollar 1857) |
| 69. *N. tricolor* (=*fumipennis*) (Hartig 1841) | 70. *N. tricolor* (Hartig 1841) |
| ***Trigonaspis*** | |
| 71. *T. megaptera* (= *renum*) (Panzer 1801) | 72. *T. megaptera* (Panzer 1801) |

nb. Various books use the above form of synonymy for causers. The more conventional form is used in the remainder of this work

## SYNONYM

### ACARI

***Epitrimerus***

(73) *E. cristatus* (Nalepa)

### LEPIDOPTERA

***Heliozela -***

\- (74) *H. sericiella* (Haworth)

***Stenolechia***

\- (75) *S. gemmella* (Linnaeus)

### HEMIPTERA

***Asterodiaspis***

\- (76) *A. variolosa* Ratzeburg 1870

***Trioza***

\- 77) *T. remota* Förster 1848

## Causers (sexual only)

### DIPTERA

***Arnoldia***

– (78*) A. libera* (Kieffer 1909)
*Dasineura libera* (Kieffer 1909)

***Macrodiplosis***

\- (79) *M. pustularis* (Bremi 1847)
*M. dryobia* (Löw, F; 1877)

\- (80) *M. roboris* (Hardy 1854)
*M. volvens* (Kieffer 1895)

***Polystepha***

\- (81) *P. malpighii* (Kieffer 1909)
*Dasineura malpighi* (Kieffer 1909)



**SYNONYM**

## Inquilines (all sexual)

***Ceroptres*** (may possibly be parasitic)
*C. arator,* Hartig 1841

***Saphonecrus***
*S. connatus* (Hartig 1840)

***Synergus***
*S. albipes,* Hartig 1841

*Synergus apicalis,* 1952 Hartig 1841

*S. clandestinus,* Eady 1952

*S. crassicornis,* (Curtis 1838)
*S. evanescens,* Mayr 1872

*S. gallaepomiformis,* (Fonscolombe 1832)

*Synergus incrassatus,* Hartig 1840

*S. nervosus,* Hartig 1840

*S. pallicornis,* Hartig 1841

*Synergus pallidipennis,* Mayr 1872

*S. reinhardi,* Mayr 1872

*S. rotundiventris,* Mayr 1872

*S. ruficornis,* Hartig 1840

*S. thaumacerus* (Dalman 1823)

*S. umbraculus* (Olivier 1791)

*S. variabilis* Mayr 1872

## Parasitoids (all sexual)

**HYMENOPTERA - CHALCIDOIDEA** (current; & synonyms from 1960)

**Eurytomidae**

***Eurytoma***
*E. brunniventris,* Ratzeburg 1852

***Sycophila***
*S. biguttata* (Swederus 1795)
*Eudecatoma biguttata* (Swederus 1795)

*S. flavicollis* (Walker 1834)
*Eudecatoma flavicollis* (Walker 1834)

*S. variegata* (Curtis 1831)
*Eudecatoma variegata* (Curtis 1831)



**SYNONYM**

## Torymidae

***Megastigmus***

*M. dorsalis* (Fabricius 1798)

*M. stigmatizans* (Fabricius 1798)

***Torymus***

*Torymus affinis* (Fonscolombe 1832)
*Syntomaspis apicalis* (Walker)

***Torymus***

*T. auratus (=nitens)* (Müller 1764)
*T. nitens* (Walker 1833)
*T. nigricornis*, Boheman 1834, misident.

*T. cyaneus*, Walker 1847
*Syntomaspis cyaneus* (Walker 1847)

*T. erucarum* (Schrank 1781)

*T. fastuosus*, Boheman 1834
*Syntomaspis fastuosa*, Boheman 1834

*T. flavipes (=auratus)* (Walker 1833)
*T. auratus* (Geoffroy *in* Fourcroy 1785)

*T. formosus* (Walker 1833)
*T. amaenus*, Boheman 1834

*T. geranii* (Walker 1833)
*T. cingulatus*, misident.

*T. nobilis*, Boheman 1834

*T. notatus* (Walker 1833)
*Syntomaspis notata* (Walker 1833)

*T. roboris* (Walker 1833)

*T. scutellaris* (Walker 1833)
*T. pleuralis*, Thomson 1876

## Ormyridae

***Ormyrus***

*O. nitidulus* (Fabricius 1804)

*O. pomaceus* (Geoffroy in Fourcroy 1785)
*O. punctiger*, Westwood 1832

## Pteromalidae

***Arthrolytus***

*A. ocellus* (Walker 1834)
*A. albiscapus* (Thomson 1878)



**SYNONYM**

***Caenacis***

*C. lauta* (Walker 1835)
*C. divisa* (Walker 1836)

***Cecidostiba***

*C. fungosa* (Geoffroy *in* Fourcroy 1785)
*C. hilaris* (Walker 1836)
*C. leucopeza* (Ratzeburg 1844)

*C. geganius* (Walker 1848)

*C. semifascia* (Walker 1835)

***Hobbya***

*H. stenonota* (Ratzeburg 1848)
*H. kollari* (Askew 1959) & *H. stenonota* (Ratzeburg 1848) (as separate species)

***Mesopolobus***

*M. albitarsus* (Walker 1834)

*M. amaenus* (Walker 1834)

*M. dubius* (Walker 1834)

*M. fasciiventris,* Westwood 1833

*Mesopolobus fuscipes* (Walker 1834)

*M. sericeus* (Forster 1770)
*M. jucundus* (Walker 1834)

*M. tibialis* (Westwood 1833)

*Mesopolobus xanthocerus* (Thomson 1878)

*Ormocerus latus,* Walker 1834

*O. vernalis,* Walker 1834

## Eupelmidae

***Eupelmus***

*Eupelmus annulatus* Nees 1834
*Eupelmus spongipartus* Förster 1860

*Eupelmus urozonus,* Dalman 1820

*Eupelmus vesicularis* (Retzius 1783)
*Macroneura vesicularis* (Retzius 1783)

## Eulophidae

***Aprostocetus***

*A. aethiops* (Zetterstedt 1838)
*Tetrastichus aethiops* (Zetterstedt 1838)



**SYNONYM**

***Aulogymnus***

*A. arsames* (Walker 1838)
*Olynx arsames* (Walker 1838)

*A. euedoreschus* (Walker 1839)
*Olynx euedoreschus* (Walker 1839)

*A. gallarum* (Linnaeus 1761)
*Olynx gallarum* (Linnaeus 1761)

*A. gallarum f. pulchra* (Linnaeus 1761)
*Olynx gallarum f. pulchra* (Linnaeus 1761)

*A. skianeuros* (Ratzeburg 1844)
*Olynx skianeuros* (Ratzeburg 1844)

*A. trilineatus* (Mayr 1877)
*Olynx trilineata* (Mayr 1877)

***Baryscapus***

*B. diaphantus* (Walker 1839)
*Tetrastichus diaphantus* (Walker 1839)

***Pediobius***

*P. clita* (Walker 1839)
*P. lysis* (Walker 1839)

***Quadristichus***

*Q. anysis* (Walker 1839)
*Tetrastichus anysis* (Walker 1839)

***Tamarixia***

*T. pubescens*

## HYMENOPTERA - ICHNEUMONOIDEA

## Ichneumonidae

***Gelis***

*G. areator* (Panzer 1804)

*G. formicarius* (Linnaeus 1758)

***Mastrus***

*M. deminuens* (Hartig 1838)
*M. castaneus* (Taschenberg 1865)

## HYMENOPTERA – PROCTOTRUPOIDEA

## Diapriidae

***Spilomicrus***

*S. stigmaticalis*, Westwood 1832



# 3. Gall identification

## Keys to British oak-galls

**C/R = comparative rarity**
**R – rare**
**UC - uncommon****
**L – local**
**QC - quite common**
**LC - locally common**
**C – common**

***** for galls on POINTED BUDS**
**A - in axillary bud (leaf scale)**
**T - in terminal bud**
**L - in lateral bud**

**♀♂ - sexual generation**
**ȣ - agamic, asexual generation**

| | GALL | C/R | SEX | SIZE mm | DESCRIPTION |
|---|---|---|---|---|---|
| **on Turkey oak** | | | | | |
| **in bud** | | | | | |
| — | *Andricus corruptrix* | LC | ♀♂ | 2 X 1 | **single** gall per bud; **dark tip,** golden-brown body; curving to blunt point. |
| — | *Andricus kollari* | C | ♀♂ | 3 X 1.5 | **1-8** galls per bud; thin, **pointed,** with faint ridge; yellow to yellow-brown. |
| — | *Andricus lignicola* | C | ♀♂ | 3 X 1.5 | **1-8** galls per bud; dull golden-brown, with blunt, **rounded tip** |
| **on catkin** | | | | | |
| **—** | *Andricus grossulariae* | R | ♀♂ | 5.5 X 7 | unilocular but found in numbers together; deep purple; rounded, with point |
| — | *Andricus quercuscalicis* | C | ♀♂ | 1.5 | slender, pointed with darker husk; pale, **bright gold**; single per flower. |
| **—** | *Andricus lucidus* | R | ♀♂ | 20mm +- | aggregation of few to many galls; bright apple to yellow-green, turning brown. y |
| **on shoot** | | | | | |
| **—** | *Aphelonyx cerricola* | R | ȣ | 25 X 10 | often grouped **surrounding** shoot; brown with slight gloss |
| **in acorn** | | | | | |
| **—** | *Callirhytis erythrocephala* | LC | ȣ & ♀♂ | 2 | 6-8 cells filling acorn |
| | *Neuroterus saliens* | R | ♀♂ | Stunted acorn | multilocular; flushed with red; sometimes with disc-like eruptions in upper surface |
| **On leaf-vein or petiole** | | | | | |
| | *Neuroterus saliens* | R | ȣ | 3 X 1 | unilocular, starts lime-green, changes to brown with a few paler pimples on surface, dark below. |



| | GALL | C/R | SEX | SIZE mm | DESCRIPTION |
|---|---|---|---|---|---|
| **on Pedunculate or Sessile oaks** | | | | | |
| **ON LEAVES** | | | | | |
| **1. disc-shaped, on underside of leaf** | | | | | |
| SMOOTH SPANGLE | *Neuroterus albipes* | QC | ♂ | 5 | smooth, **central bump**, hairless |
| COMMON SPANGLE | *Neuroterus quercusbaccarum* | C | ♂ | 3 | disc with **central bump**; yellow, red **hairs** |
| SILK-BUTTON | *Neuroterus numismalis* | C | ♂ | 3 | thick, rolled-edge button-disc, gold **hairs**; **no** central bump; distinctive, as name |
| CUPPED SPANGLE | *Neuroterus tricolor* | UC | ♂ | 3 | rolled rim, yellow, red hairs; **no** central bump |
| **2. spherical , on underside of leaf ,** | | | | | |
| **a) no sign of gall on top surface** | | | | | |
| OYSTER GALL | *Neuroterus anthracinus (=Andricus anthracina)* | C | ♂ | 3 X 2 | along vein, **tissue flap** either side, yellow |
| YELLOW-PEA GALL | *Cynips agama* | R | ♂ | 5 X 4 | **thin-walled**, round, yellow |
| TWO-CELL GALL | *Cynips disticha* | R | ♂ | 6 X 4 | knobbly, **flattened**-globular; 2 storey cell |
| CHERRY GALL | *Cynips quercusfolii* | C | ♂ | 10-20 | globular, **bright** yellow/red; stalked to vein |
| RED-PEA GALL | *Cynips divisa* | C | ♂ | 6 X 5 | **thick-walled**, round, brown to reddish |
| STRIPED-PEA GALL | *Cynips longiventris* | LC | ♂ | 10 X 8 | **Striped** globe with slightly knobbly skin |
| KIDNEY GALL | *Trigonaspis megaptera* | UC | ♂ | 2 X 1 | beneath vein in **parallel rows;** yellow to brown; kidney-shaped |
| **b) patch of colour/texture seen on top surface of leaf** | | | | | |
| CURRANT GALL | *Neuroterus quercusbaccarum* | C | ♀♂ | 4 | like **red-currants**, from green to red |
| HAIRY-PEA GALL | *Neuroterus tricolor* | UC | ♂ | 5 | Globular, yellow, strong **violet hairs** |
| **3. on leaf, (shows on both sides)** | | | | | |
| CURVED-LEAF GALL | *Andricus curvator* | C | ♀♂ | 8 X 8 | bulging round a twisted **swollen** leaf-vein |
| APRIL-BUD GALL | *Neuroterus aprilinus* | C | ♀♂ | 8 X 6 | colourful, ovoid; in **leaf-stalk** |
| BLISTER-GALL | *Neuroterus numismalis* | C | ♀♂ | 3 X 0.5 | circular **blister** with radiating lines |



| | GALL | C/R | SEX | SIZE mm | DESCRIPTION |
|---|---|---|---|---|---|
| **on Pedunculate or Sessile oaks** | | | | | |
| **3. on leaf, (shows on both sides)** | | | | | |
| FURROWED-CATKIN GALL | *Andricus quadrilineatus* | C | ♂ | 4 X 2.5 | **tall,** with flattened end, furrowed, yellow to plum colour |
| KNOT GALL | *Andricus quercusradicis* | C | ♀♂ | 2 X 1 | swelling in **petiole** |
| LEAF-VEIN GALL | *Andricus testaceipes* | UC | ♀♂ | 2 X 1 | green swollen oval on **ribs** |
| — | *Arnoldia libera* | R | ♀♂ | 2 X 4 | blister with pit below |
| — | *Heliozela sericiella* | C | ♀♂ | ? | almost **invisible** internal mine |
| — | *Polystepha malpighii* | R | ♀♂ | 2 X 4 | raised blister above |
| **4. on leaf-margin** | | | | | |
| SPINDLE-GALL | *Andricus seminationis* | UC | ♂ | 6 X 2.5 | **Rarely** in this situation. |
| RED-WART GALL | *Cynips divisa* | C | ♀♂ | 4 X 1.8 | bright **orange,** glossy, hairless; leaf-margin or end of rib of developing leaf. |
| SCHENK'S GALL | *Neuroterus albipes* | C | ♀♂ | 2 X 1 | On **deeply-indented** leaf-margin, ovoid. |
| CURRANT GALL | *Neuroterus quercusbaccarum* | C | ♀♂ | 4 | like **red-currants**, from red to green. |
| — | *Macrodiplosis pustularis (=dryobia)* | C | ♀♂ | 15 X 2 | Edge of leaf folded **underneath.** |
| — | *Macrodiplosis roboris (=volvens)* | C | ♀♂ | 15 X 2 | Edge of leaf folded **over top.** |
| **BUDS** | | | | | |
| **1. globular** | | | | | |
| — | *Neuroterus anthracinus (=Andricus anthracina)* | C | ♀♂ | 4 X 3 | At **start** of young leaf, ovoid. |
| GLOBULAR GALL | *Andricus inflator* | QC | ♂ | 6 | **Seamed,** like segmented orange; on end of twig. |
| MARBLE GALL | *Andricus kollari* | C | ♂ | 10-20 | Round, hard, **smooth** with small bumps, rich brown. Starts pointed, with red spots. |
| COLA-NUT | *Andricus lignicola* | C | ♂ | 10 | Neutral brown, **leathery** surface. |
| OAK-APPLE | *Biorhiza pallida* | C | ♀♂ | to 40 | Soft when young; then hard, with multiple inner cells **exposed** on surface. |
| CURRANT GALL | *Neuroterus quercusbaccarum* | C | ♀♂ | 4 | Like **red-currant**, from green to red. |
| PINK-BUD GALL | *Trigonaspis megaptera* | LC | ♀♂ | 10-30 | **Waxy**, shining, from cream to red-brown. |



| | GALL | C/R | SEX | SIZE mm | DESCRIPTION |
|---|---|---|---|---|---|
| **on Pedunculate or Sessile oaks** | | | | | |
| **2. irregular, different** | | | | | |
| SPOTTED-BUD GALL | *Andricus albopunctatus* | QC | ♂ | 8 X 4 | No stalk; brown with **longitudinal grooves** and white spots; long and thin. **(L) ***** |
| — | *Neuroterus anthracinus (Andricus anthracina)* | C | ♀♂ | 3 X 4 | Brown, within **open** bud-scales. **(A,T)** |
| RAMSHORN GALL | *Andricus aries* | R | ♂ | | **Curling growth** from gall, in leaf-axil; usually tall but very variable |
| STALKED-SPINDLE GALL | *Andricus callidoma* | L | ♂ | 18 X 3 | Ridged, pointed, streamlined, with **long stalk. (A)** |
| — | *Andricus corruptrix* | LC | ♂ | 8 | **3/5-lobed** tip to smooth, dark-brown bud. |
| COLLARED-BUD GALL | *Andricus curvator* | C | ♂ | 3 X 2 | Shows **tip only** when mature; brown. **(L,T)** |
| ARTICHOKE GALL | *Andricus fecundator* | C | ♂ | 20 X 12 | **Scaly, cone-shaped**, soft. |
| HEDGEHOG GALL | *Andricus lucidus* | R | ♂ | 30 | Round, covered with **round-tipped spines;** |
| MALPIGHI'S GALL | *Andricus nudus* | R | ♂ | 4 X 1.5 | Green+red; feathered, **pointed. (A)** |
| **3. pointed; bud-shaped, or inside conventional bud** | | | | | |
| THATCHED GALL | *Andricus glandulae* | R | ♂ | 5 X 4 | Hidden in bud, covered **white hairs**. **(A)** |
| VIOLET-EGG GALL | *Cynips quercusfolii* | C | ♀♂ | 3 X 2 | Velvety **violet-purple**, grouped in 3 or so; often on twiggy growths on large trees. |
| THE AUTUMN-GALL | *Andricus quercusramuli* | UC | ♂ | 5 X 4 | **Ridged,** green or brown; protrudes above bud. **(A,T,L)** |
| THE BUD-GALL | *Andricus quercuscorticus* | UC | ♀♂ | 2 X 1 | Pale green to brown; little shows; **blunt. (A)** |
| HAIRY-SPINDLE GALL | *Andricus solitarius* | C | ♂ | 9 X 3 | **Pear-shaped**, pointed; few hairs. **(A,T)** |
| — | *Callirhytis bella* | R | ♀♂ | 5 X 4 | **Inside** scales of bud. (**A,T)** |
| GREEN VELVET-BUD GALL | *Cynips longiventris* | UC | ♀♂ | 2 X 1.5 | Hidden, covered long **white hairs;** point**. (T)** |
| VIOLET-EGG GALL | *Cynips quercusfolii* | C | ♀♂ | 3 X 2 | on **adventitious** buds on bark, or twiggy outgrowths sometimes. |
| — | *Cynips disticha* | R | ♀♂ | 6 X 4 | Long and **thin,** dull surface. **(A,T)** |
| APRIL-BUD GALL | *Neuroterus aprilinus* | C | ♀♂ | 8 X 6 | Large, **colourful, smooth**; tip only visible in distorted bud. **(A,T)** |



| | GALL | C/R | SEX | SIZE mm | DESCRIPTION |
|---|---|---|---|---|---|
| **on Pedunculate or Sessile oaks** | | | | | |
| **BUDS** | | | | | |
| **3. pointed; bud-shaped, or inside conventional bud** | | | | | |
| RED-WART GALL | *Cynips divisa* | C | ♀♂ | 4 X 1.8 | Bright yellow to brown, glossy, hairless, on **terminal bud** of twig. **(A,T)** |
| **CATKINS** | | | | | |
| **Cotton-wool (tufted) galls** | | | | | |
| TUFTED GALL | *Andricus callidoma* | R | ♀♂ | 5 mass | **Small** bunch of cotton-wool. |
| COTTON-WOOL GALL | *Andricus quercusramuli* | UC | ♀♂ | 20 mass | **Larger** bunch of cotton-wool. |
| **Very small (under 2mm)** | | | | | |
| HAIRY-CATKIN GALL | *Andricus amenti* | R | ♀♂ | 2 X 1 | **2 ridges** on each side. |
| HAIRY-CATKIN GALL | *Andricus fecundator* | C | ♀♂ | 2 X 1.5 | **Solitary;** covered in white hairs. |
| — | *Andricus glandulae* | UC | ♀♂ | 1.5 X1 | Almost hairless, **rounded**. |
| BALD-SEED GALL | *Andricus nudus* | R | ♀♂ | 1.5 X 0.8 | **Square tip** to pointed end; hairless. |
| — | *Neuroterus aprilinus* | C | ♂ | 1.5 X 1 | Green, yellow or brown. |
| **Well over 2mm in length** | | | | | |
| FURROWED-CATKIN GALL | *Andricus quadrilineatus* | C | ♂ | 4 X 2.5 | Ridged and **furrowed.** |
| SPINDLE-GALL | *Andricus seminationis* | UC | ♂ | 6 X2.5 | Large **stalked gall**. |
| — | *Andricus solitarius* | C | ♀♂ | 3 X 2 | Flattened cone-shape; **1 ridge** on each side. |
| CURRANT GALL | *Neuroterus quercusbaccarum* | C | ♀♂ | 4 | **Red-currant** shape and appearance; red. |
| **TWIGS** | | | | | |
| CURVED-LEAF GALL | *Andricus curvator* | C | ♀♂ | 13 X 9 | Twisted swelling **angling** the twig. |
| KNOT GALL | *Andricus quercusradicis* | C | ♀♂ | 2 X 1 | ovoid swellings under bark; show as groups of holes **after emergence**. |
| RED-BARNACLE GALL | *Andricus testaceipes* | LC | ♂ | 6 X 6 | Near ground; crimson, then brown, **cones** with **ridges** radiating out from point. |



| | GALL | C/R | SEX | SIZE mm | DESCRIPTION |
|---|---|---|---|---|---|
| **on Pedunculate or Sessile oaks** | | | | | |
| **ROOTS & TRUNK** | | | | | |
| COLLARED-BUD GALL | *Andricus curvator* | C | ♂ | 3 X 2 | on **end-bud** of twiggy growths on trunk, often just below head-height; inconspicuous. |
| BARK-GALL | *Andricus quercuscorticus* | UC | ♂ | 3-4 | Usually in callus; series of **funnels** show on surface, characteristic small holes **on rim.** |
| TRUFFLE GALL | *Andricus quercusradicis* | C | ♂ | 60 mass | Reddish, or paler, **potato-like,** rough-surfaced mass just **below soil** on root. |
| TWIG GALL | *Andricus inflator* | QC | ♀♂ | 15 X 10 | Swollen, widened **tip of twig**, typically with a couple of buds offset to one side. |
| RED-BARNACLE GALL | *Andricus testaceipes* | LC | ♂ | 6 X 6 | Near ground; crimson, then brown, **cones** with **ridges** radiating out from point. |
| THE ROOT GALL | *Biorhiza pallida* | C | ♂ | 10 X 8 | Globular, brown galls on **thinner roots;** usually in large, but separated, groups. |
| VIOLET-EGG GALL | *Cynips quercusfolii* | C | ♀♂ | 3 X 2 | on **adventitious** buds on bark, as well as on twiggy outgrowths sometimes. |
| PINK-BUD GALL | *Trigonaspis megaptera* | LC | ♀♂ | 10-30 | Rounded, **waxy**-white to red; often under **moss** at bottom of trunk. |
| — | *Asterodiaspis variolosa* | C | ♀♂ | 2 X 1.5 | **Pits** with grey caps over sitting insect. |
| — | *Stenolechia gemella* | ? | ♀♂ | 1 | **Indistinct** swelling beneath bark |
| **ACORNS** | | | | | |
| — | *Andricus grossulariae* | R | ♂ | 6.5 X 10 | green to purple & black; **spined** like a sea-anemone; aggregated; multilocular. |
| STUNTED ACORN GALL | *Andricus legitimus* | UC | ♂ | 4 X 3 | 7-8 cells inside **misshapen** acorn |
| HEDGEHOG GALL | *Andricus lucidus* | R | ♂ | 30 | Round, covered with **long purple-brown spines with rounded tips**; unilocular |
| KNOPPER GALL | *Andricus quercuscalicis* | C | ♂ | 20 | Irregular hard, **mass** round old acorn. |



# Sexual generations on Turkey-oaks

There have long been problems in finding, then identifying, the sexual generation of *Andricus corruptrix, A. kollari, A. lignicola* and *A. quercuscalicis*, particularly the first three, which are all bud-galls. Indeed it led to these galls being described as 'rare' or 'difficult', in spite of the fact they are the alternate generation of some of the commonest agamic galls on oak. Since all four are said to require strictly definite alternate generations for survival, this means these galls must be both plentiful and widespread.

Our West Mendip Invertebrate Group was fortunate enough to find a single Turkey oak which was absolutely covered in these galls. Once they had been seen, this led to the finding of many other trees with galls on them. The problems turned out to be threefold:

- They were present on the trees early in the year
- They were small and insignificant
- No-one knew exactly what to look for

More recently, Pat Walker, of Silwood Park, sent me boxes of Turkey-oak galls, together with observations on the differences between them (personal com. 2000). It may be helpful to make this fresh information part of this work, to help people to identify these common galls which have been consistently overlooked over the years. Her original observations of the development of these galls have been used here, for which I am most grateful.

**Gall identification**

The galls are often enclosed in the long, curled fibres that are characteristic of the Turkey oak. Before emergence, many of these galls remain largely hidden within the bud-scales, so it is important to examine twigs and bud carefully. Even after emergence, many of the galls nestle in the base of the old bud and may only be visible because of the obvious exit-holes, rather than the shape of the gall.

The emergence holes are relatively large and often to one side at the tip of the gall, obscuring the shape of the top. A careful scan of the gall from all angles should reveal the original form, especially if a number of galls are examined.

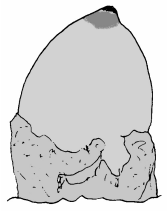
The time of emergence can be a guide to identification. The first to emerge is *Andricus lignicola*, in late March, followed by *A. corruptrix*, then *A. kollari* and finally, *A. quercuscalicis*, at the end of May (from catkin-galls, as opposed to bud-galls). 'Mature gall' refers to final shape, size and colour of gall, **not** the time of adult emergence, though this may be the same in some species.



*Andricus corruptrix* ♀♂ - galls become large enough to see properly in **late January/early February**. At this time the gall is either off-white, or has changed to pale green, but during **February & March** the colour changes from off-white to pale green, then become tinged with rose pink.

The pink flush spreads across the whole and deepens, turning to the **warm burnt sienna, or orangey-brown**, of the mature gall. The apical region darkens, becoming inky black, then tones down to leave a darkened ring round the tip. Occasionally this ring may be white. Adult insects start to emerge in **mid-April**.

MATURE GALL



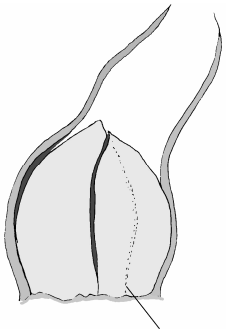
Shape: **wide-based** shouldered cone, with **point**.
Texture: rough, with fibrous surface and bud-scale remnants at the base.
Colour: **warm golden-brown**, with a faintly darker ring round the tip which may disappear or even leave a paler ring than the surround. Often with a tiny dark mark at the very tip.

**Galls per bud: single** usually**,** though two have been found together**;** separated out from ***A. lignicola*** by the **pointed tip.**
Size: from **2.6 X 1.6mm** to **2.4 X 1.4mm**.
Gall mature: from **late March**

*Andricus kollari* ♀♂ - galls become obvious in late January/early February, when the colour is apple green, with a pink flush along one side or at the tip. This rarely covers the gall and more unusually becomes deep purple. The pink flush recedes to round the tip, turns inky black, before reducing to a small inky spot, then disappearing on the mature gall.

When mature, the gall is **yellow-brown, canary yellow, or yellow fawn.** In some, small tufts of hair are found on the upper part of the gall. When present, this is useful confirmation. Adult insects start to emerge in **mid-April**.

MATURE GALL



Shape: **thin**, conical, **pointed** normally but extremely variable. From thin, pointed galls to wide, but slender, galls curved around another and even some short, fat, rounded ones. May have darkened point.
Texture: less fibrous than rest, surface finely granulated; galls separated from bud-scales.
Colour: **yellow-brown, canary yellow** or **yellow-fawn**. It can appear varied in colour, with darker patches because of remnants of the bud-scales clinging on. The tip often has dark markings. A **ridged seam** runs up many galls, as shown on the right hand gall in the illustration.
Galls per bud: usually **multiple**.
Size: from **2.8 X 1.3mm** to **2 X 1mm**.
Gall mature: from **late March** onwards



*Andricus lignicola* ♀♂ - by **late September/ early October** the galls are half-size – in contrast with the other bud-galls, which do not become truly visible until early Spring. Colour changes from bright green to pink, which gradually deepens to blood-blister purple, characteristic of winter galls.

From **early February**, the colour changes to the characteristic **fawn-brown** of the mature gall. Adult insects start to emerge in **late March**.

MATURE GALL

Shape: conical, ROUNDED TIP, often flattened on one side where the galls press against each other.

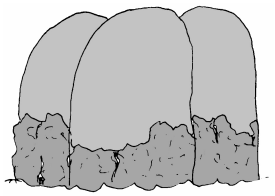
Texture: rough, with fibrous, and reticulated, surface, closely attached to bud remnants, which may well cover the lower half or more.

Colour: DULL GOLDEN-BROWN all over.

Galls per bud: usually MULTIPLE, with the tops level with each other.

Size: from **3.0 X 1.6mm** to **1.8 X 1.2mm**

Gall mature: from **February** onwards.



*Andricus quercuscalicis* ♀♂ - (I am not aware of early development)

MATURE GALL

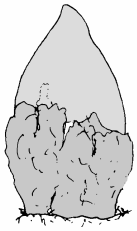
Shape: slender, POINTED.

Texture: finely reticulated surface; more or less covered by a slightly hairy
darker husk.

Colour: the gall is PALE, BRIGHT GOLD; the husk golden-brown.

Galls per catkin-flower: SINGLE.

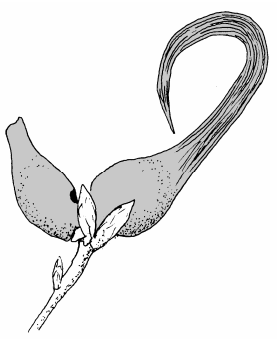
Size: from **2.5 X 1.4mm** to **1.7 X 1mm**.





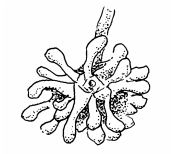
# New or re-discovered galls

Eight galls have turned up in recent years, after a gap since the discovery of *Andricus corruptrix, A. lignicola and A. quercuscalicis*, in the 60's and 70's, showing how important it is to keep looking for unusual-looking growths on oak trees.



*Andricus aries* (Giraud) ♂, the **Rams-horn gall** - bud-galls found on *Quercus robur* and, probably, *Q. petraea*. The first colony was found at Hampstead Heath in 1999. From there the gall has spread throughout the Home Counties and West London, as far as Buckingham and Essex and has now reached Somerset. The galls have a single chamber (unilocular), but there may be clusters of up to three galls per bud. The basal larval chamber may be merely domed, or have a long curling tail. Size up to 7 X 30mm., but varies considerably. Colour grey-brown when mature.

*Andricus grossulariae* Giraud ♀♂ - a gall on the catkins of the Turkey-oak. Found by Pat Walker at two sites in Berkshire in 2000 and since spread more widely. The gall is unilocular (contains a single causer) but is found in numbers on catkins. Pat Walker expects that it will spread rapidly and widely. Size 5.5-7 X 5mm. Colour deep purple.



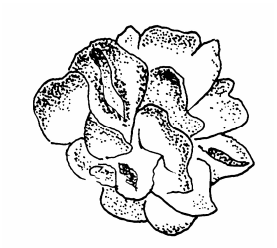
*Andricus grossulariae (=mayri)* Giraud ♂ - a gall found on the acorn cups of *Quercus robur,* by Pat Walker, in the spring of 2000 in Berkshire. The gall is multilocular and described as resembling a 'sea-anemone'. It is around 6.5 X 11mm in size, though this varies with number of galls aggregated. The colour varies but early green turns to purple or part-purple on tips. Later it blackens.

*Andricus lucidus* (Hartig) ♂, the **Hedgehog gall** – acorn galls (picture a) on *Quercus robur*; near-spherical, 5-10mm in diameter, covered in purple-brown spines with rounded tips. Also found on terminal buds, (b), where the gall has a bulky, obvious inner globe and smaller, finer spines. Found again at Maidenhead, in 1992, with one earlier record in the 19thC. Since then it has spread quite widely. The gall is multilocular (contains several causers) but is located singly.

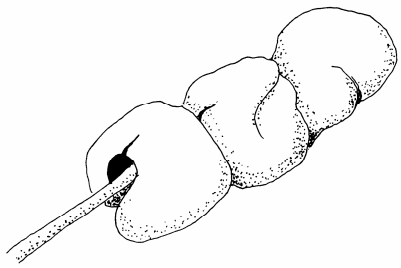
a. b.



*Andricus lucidus (=aestivalis)* (Hartig) ♀♂ - galls found on catkins of the Turkey oak, by Pat Walker, in 2000, in Berkshire. The gall is multilocular and found in aggregations of up nearly 70 in number all on one catkin floret. Size varies but up to 20mm or more. Colour varies from bright glossy yellow-green to apple green.

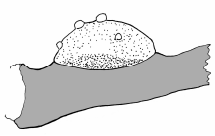


*Aphelonyx cerricola* (Giraud) ♂ - is found only on the Turkey-oak. It was first seen at Maidenhead Thicket in 1997, though it appears that it must have been there for many years, unseen. Expansion of its range appears slow. The gall forms on shoots and, although there is only one chamber per gall (unilocular) , they have a habit of linking along the shoot in a colony. Size 10-25mm. Reddish straw-coloured.

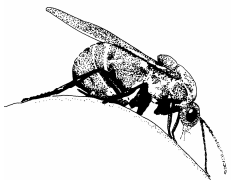


*Neuroterus saliens* (Kollar) ♀♂ - found for the first time in Britain by Brian Wurzell in London in 2006. It is a pest on Turkey oaks in southern Europe (Stone, personal communication 2006) and is found as a swelling in the edge of the cup of young acorns, leaving the acorn stunted and brilliantly flushed with red. The gall is multilocular and matures in the first year, unlike *Callirhytis* galls.

*Neuroterus saliens* (Kollar) ♂ - found in Britain for the first time by Michael Chinery in Virginia Water in 2006. Very small, from 1 - 3mm long; a distinct, separate bulge on the leaf stalk or mid-vein. It starts lime-green and darkens to brown on ripening; found on Turkey oak.







# Descriptions of galls

**T = time when gall found** **♂= agamic female**
**F = special features** **♀♂ = sexual generation**
**C - causer** **I/P = inquiline/parasite spp.**
**twig-GALL - (lower case) no formal name known, refers to location/type of gall**
**SPOTTED-BUD GALL - (UPPER case) established formal English name**

**Where NO YEAR is given for emergence or maturity, it refers to 1st year**
**MATURE - normal time, though emergence may take place earlier**

**CYNIPOIDEA - Cynipinae.**

## *Andricus albopunctatus.*

1. **SPOTTED-BUD GALL - ♂**
FAIRLY COMMON, in lateral BUD. 8 X 4mm
T: May & June, mature end JUNE.
C: emerges 2nd year, MARCH/APRIL
F: brown with white spotting & longitudinal grooves when mature; long and thin, without stalk; sometimes in terminal buds; single cell, pupates in gall, either on the tree or on ground.
I/P: (2/4)

## *Andricus amenti.*

2. **HAIRY-CATKIN GALL - ♀♂**
RARE, in CATKIN. 2 X 1mm
T: May/June, mature end JUNE.
C: emerges MAY TO JULY.
F: pointed, hairy surface; pear-shaped, double-ridged; no stalk; single cell, pupates in gall on tree.
I/P: (0/0)

## *Andricus aries.*

3. **RAMS-HORN GALL - ♂**
Believed arrived in Britain 1998. In axillary BUD. 7 X 30mm long, more or less.
T: July to December, mature AUGUST.
C: emerges AUGUST to OCTOBER & APRIL/MAY.
F: Long curling, but variable; growth from gall in leaf axil.
I/P: (6/4)



## *Andricus callidoma.*

4. **STALKED-SPINDLE GALL - ♂**
LOCAL, in axillary BUDS. 18 X 3mm
T: May to October, maturing end AUGUST.
C: emerges MARCH/APRIL 2nd year.
F: Ridged; pointed; streamlined, with long stalk; single cell, pupates in gall on ground.
I/P: (1/2)

5. **TUFTED GALL - ♀♂**
RARE, in CATKIN. 5mm, massed.
T: End April to May, matures MAY.
C: emerges MAY/JUNE.
F: small cotton-wool masses of gregarious clusters high in tree; single cell, pupates in gall on ground.
I/P: (0/3)

## *Andricus corruptrix.*

6. **lobed GALL - ♂**
Spreading rapidly; in BUD. Up to 8mm
T: May to July & onwards, mature JULY.
C: emerges OCTOBER 1st year, and JULY/AUGUST 2nd year.
F: 3/5 lobed gall in tip; characteristic shape even when young; pupates in gall on tree.
I/P: (5/15)

7. **bud GALL - ♀♂**
Increasing rapidly, spreading; in BUD. 2 X 1mm
T: February to June, mature late MARCH.
C: emerges mid-APRIL to MAY.
F: On Turkey-oak; SINGLE gall per bud, occasionally 2; elongated, pointed; in terminal or lateral buds; single cell, pupates in gall on tree.
I/P: (0/4)

## *Andricus curvator.*

8. **COLLARED-BUD GALL - ♂**
COMMON, on lateral & terminal BUDS. 3 X 2mm
T: August to September, mature end SEPTEMBER.
C: emerges next spring, MARCH/APRIL.
F: Often in Artichoke gall scales in leaf-bud as well as ordinary buds; well-hidden until mature and showing tip only; brownish; single cell, pupates in gall on ground.
I/P: (2/1)

9. **CURVED-LEAF GALL - ♀♂**
COMMON, on LEAF, 8 X 8mm, and TWIG, 13 X 9mm.
T: May to July & onwards, mature JULY.
C: emerges MAY to AUGUST.
F: underside; a twist in the leaf forming a gall which persists on tree when leaf rots away; or forming a swollen bend in a twig; 2 cells but one larva, pupates in gall on tree.
I/P: (4/15)



## *Andricus fecundator.*

10. **ARTICHOKE GALL - ♂**
COMMON, on axillary & terminal BUDS. 20 X 12mm
T: June to September, mature end JULY.
C: emerges Spring, MARCH/APRIL, from 1-3 years on.
F: like a hop; pointed with scales; inner gall drops out onto ground when quite young; single cell, pupates in gall on ground.
I/P: (1/4)

11. **HAIRY-CATKIN GALL - ♀♂**
COMMON, on CATKIN. 2 X 1.5mm
T: May to June, mature end MAY.
C: emerges end MAY to AUGUST.
F: in ♂ catkin; pointed and covered in hair; single cell, pupates in gall, usually on tree;
I/P: (0/1)

## *Andricus glandulae.*

12. **THATCHED GALL - ♂**
RARE, in axillary BUD. 5 X 4mm
T: July to September, mature SEPTEMBER.
C: emerges OCTOBER first year & MARCH/APRIL, 2nd year.
F: covered in silky white hairs, well hidden in bud; 2-celled, with single larva, pupates in gall on ground.
I/P: (1/0)

13. **catkin GALL - ♀♂**
UNCOMMON, in CATKIN. 1.5 X 1mm
T: April/May, matures by JUNE.
C: emerges MAY/JUNE, 2nd year.
F: curved, elongated; rough-surfaced; few hairs; green or brown.
I/P: (0/0)

## *Andricus grossulariae*

14. **acorn GALL - ♂** (=*mayri*)
NEWLY DISCOVERED (Pat Walker) , on ACORN cups. around 6.5mm X 10.1mm
T: Matures in AUTUMN.
C: emerges JANUARY to APRIL 2nd year.
F: covered in heavy projections like 'sea-anemone' (P. Walker). Several galls may be aggregated, multilocular.
I/P (1/8)

15. **catkin GALL - ♀♂**
RARE, newly introduced, in CATKIN. 5.5-7 X 5mm
T: May
C: emerges JUNE/JULY.
F: pointed, rounded gall in axis of Turkey-oak catkins; often clustered; hard; hairy when young, then hairless; dark red with green tinges when mature.
I/P (1/10)



## *Andricus inflator.*

16. **GLOBULAR GALL - ♂**
QUITE COMMON, on lateral/terminal buds on bole-TWIGS. 6mm.
T: September to December, mature end OCTOBER.
C: emerges MARCH/APRIL, 2nd year.
F: a spherical growth which often includes part of the bud; single cell, pupates in gall on the ground.
I/P: (1/2)

17. **TWIG GALL - ♀♂**
MODERATELY COMMON, on TWIG. 15 X 10mm
T: Any month, mature SEPTEMBER.
C: emerges MARCH to AUGUST 2nd year.
F: Swollen; widened tip of twig, typically with a bud or two offset to one side; 2 cells but single larva, pupates in gall on tree.
I/P: (1/3)

## *Andricus kollari.*

18. **MARBLE GALL - ♂**
COMMON, on BUD. 20mm
T: June onwards, growth complete end SEPTEMBER.
C: emerges AUGUST to OCTOBER, year 1, & MARCH to SEPTEMBER 2nd year, or can emerge in 3rd or 4th or even longer.
F: round, green to brown; parasitised galls are small; single cell, pupates in gall on tree.
I/P: (8/21)

19. **bud GALL - ♀♂**
COMMON on Turkey oak BUD. 3 X 1.5mm
T: March to June, matures end MARCH.
C: emerges MARCH to JUNE.
F: on TURKEY OAK, brown, pointed; several per bud; single cell, pupates in gall on tree.
I/P: (1/4)

## *Andricus legitimus*

20. **STUNTED ACORN - ♂**
UNCOMMON? DIFFICULT TO SPOT; 4 X 3mm, inside ACORN. –
T: May to September and on, mature end SEPTEMBER.
C: emerges APRIL/MAY & SEPTEMBER, 3 to 4 years later.
F: Misshapen brown acorn; 7-8 cells, pupate in gall on ground. (*Synergus* cells in acorns may betray the presence of *A. legitimus* in an area)
I/P: (2/0)



## *Andricus lignicola*

21. **COLA -NUT** - ♂
COMMON, on BUDS. 10mm
T: JULY to OCTOBER, mature OCTOBER.
C: emerges NOVEMBER/DECEMBER, year 1, & APRIL to JULY 2nd year.
F: netted appearance; spherical.
I/P: (8/13)

22. **bud GALL** - ♀♂
WIDESPREAD, on BUD. 3 X 1.5mm
T: April/May, mature MARCH on.
C: emerges SEPTEMBER 1st year & MARCH to JUNE 2nd year
F: on TURKEY OAK but difficult to spot, hence previous belief in rarity; several galls in bud; rounded top; single cell, pupates in gall on tree.
I/P: (0/5)

## *Andricus lucidus.*

23. **HEDGEHOG or BRISTLY GALL** - ♂
NEW, one location, on BUD & also ACORNS, very obvious. 5 to 10mm in diameter
T: mature JULY on.
C: emerges JANUARY to APRIL, 2nd year.
F: Multilocular; acorn-gall spherical, covered with close-set radiating spines; bud-gall with longer, thicker coarse growths, hiding inner sphere.
I/P: (1/3)

24. **catkin GALL** - ♀♂ *(=aestivalis)*
NEWLY DISCOVERED (Pat Walker), on Turkey oak CATKINS. up to 2cms or more.
T: late spring, mature SEPTEMBER
C: emerges SEPTEMBER, 1st winter, & FEBRUARY/MARCH, 2nd year.
F: aggregates of numbers of galls, each multilocular.
I/P: (0/2)

## *Andricus nudus.*

25. **MALPIGHI'S GALL** - ♂
RARE, on axillary BUDS. 4 X 1.5mm
T: September/October, mature end SEPTEMBER.
C: emerges OCTOBER 1st year & MARCH/APRIL 2nd year.
F: in leaf-axil; green with red, feathered and pointed; single cell, pupates in gall on ground, falling after few weeks growth only.
I/P: (1/0)

26. **BALD-SEED GALL** - ♀♂
RARE, on CATKIN. 1.5 X 0.8mm
T: May to June, mature end MAY.
C: emerges MAY/JUNE.
F: high up in tree and inconspicuous, like seeds; single cell, pupates in gall on tree.
I/P: (0/0)



## *Andricus quadrilineatus.*

27. **FURROWED-CATKIN GALL - ♂**
COMMON, on CATKINS or EDGE OF LEAF. 4 X 2.5mm
T: May and June onwards, mature end JUNE.
C: emerges 2nd spring, FEBRUARY to APRIL.
F: ovoid, furrowed; yellow to plum-colour; single cell, pupates in gall.
I/P: (3/5)

## *Andricus quercuscalicis.*

28. **KNOPPER GALL - ♂**
COMMON, on ACORN. 20mm
T: May to October, mature SEPTEMBER.
C: sometimes emerges OCTOBER to DECEMBER, 1st year; but usually JANUARY to APRIL in 2nd year.
F: sticky; irregular shape; single cell, pupates and emerges to live in gall on ground.
I/P: (4/19)

29. **catkin GALL - ♀♂**
COMMON but easily missed, on ♂ CATKIN. 1.5mm
T: April to June, matures early APRIL on.
C: emerges APRIL to JUNE.
F: pale bright gold; reported rarely seen, but more readily found once spotted; on TURKEY OAK; single cell but several galls in bud, pupates on tree.
I/P: (0/6)

## *Andricus quercuscorticis.*

30. **BARK-GALL - ♂**
UNCOMMON, in STEM., 3-4mm diameter
T: any month, mature MAY.
C: emerges APRIL to JULY.
F: in callus; series of funnels show on surface; single cell, pupates in gall on tree.
I/P: (1/0)

31. THE **BUD GALL - ♀♂**
UNCOMMON, in axillary BUDS. 2 X 1mm
T: June & July, mature JUNE.
C: emerges JUNE
F: pale green to brown; dull point, with little showing from within bud; single cell, pupates in gall on tree; often gregarious.
I/P: (1/0)



## *Andricus quercusradicis.*

32. **TRUFFLE GALL - ♂**
COMMON, on ROOTS. To 60mm
T: September on, mature end of 2nd year - AUGUST.
C: emerges 3rd Spring, MARCH/APRIL.
F: near surface; cream to reddish; about 60 larval chambers; pupates in gall on tree.
I/P: (1/5)

33. **KNOT GALL - ♀♂**
COMMON, in STEM and LEAF PETIOLE. 2 X 1mm
T: June to August, mature JULY.
C: emerges JULY to NOVEMBER.
F: Grouped hidden swellings, lift bark to see; shows as groups of holes after emergence; single cell, pupates in gall on tree.
I/P: (4/1)

## *Andricus quercusramuli.*

34. **THE AUTUMN-GALL - ♂**
HIGHLY LOCALISED, on axillary, lateral & terminal BUDS. 5 X 4mm
T: September/October, mature MID-OCTOBER.
C: emerges spring of 2nd year, MARCH to JUNE.
F: ridged, green to brown; protrudes from bud top; single cell; pupates in gall on ground.
I/P: (0/1)

35. **COTTON-WOOL GALL - ♀♂**
UNCOMMON, in CATKIN. 2 X 1mm individual, 20mm bunch
T: May/June, mature JUNE.
C: emerges MAY to AUGUST.
F: conspicuous, white and woolly; up to a dozen cells conglomerated, pupates in gall on tree.
I/P: (1/4)

## *Andricus rhizomae*

36. **bark GALL – ♂**
Believed VERY RARE (newly re-discovered), on bark. 6mm across.
T: Mature SEPTEMBER
C: emerges FEBRUARY to APRIL
I/P: (0/0)

## *Andricus seminationis.*

37. **SPINDLE or BARLEY-CORN GALL - ♂**
UNCOMMON, in CATKIN or LEAF-MARGIN. 6 X 2.5mm long
T: April to June, mature end of JUNE.
C: emerges MARCH to MAY, 2nd year.
F: thin, long, pointed stalked gall; ribbed, with tip hairs; gall may remain all summer on thickened catkin stem; leaves indented/twisted; single cell, pupates in gall on ground.
I/P: (3/3)



## *Andricus solitarius.*

38. **HAIRY-SPINDLE GALL - ♂**
COMMON, in axillary or terminal BUDS. 9 X 3mm
T: June to September, mature end AUGUST.
C: emerges AUGUST/SEPTEMBER.
F: pear-shaped with pointed tip; normally largely hairless; single cell, pupates inside gall on tree or ground.
I/P: (2/4)

39. **bisected GALL - ♀♂**
COMMON, in base of CATKIN. 3 X 2mm
T: April, mature APRIL.
C: emerges APRIL.
F: oval, with ridge splitting the gall; coloured hairs.
I/P: (0/0)

## *Andricus testaceipes.*

40. **RED BARNACLE GALL - ♂**
LOCALLY COMMON, on TWIGS. 6 X 6mm
T: September, mature SEPTEMBER, 2nd year.
C: emerges 3rd Spring, FEBRUARY to APRIL.
F: near ground level, on trunk or twigs; crimson then brown cones; ridged; single cell, clustered galls; pupates and emerges to live in gall for winter.
I/P: (2/5)

41. **LEAF-VEIN GALL - ♀♂**
UNCOMMON, on LEAF. 2 X 1mm
T: July to September, mature end AUGUST.
C: emerges AUGUST/SEPTEMBER.
F: green swollen ovals on petiole/ribs; single cell, but grouped, pupates in gall.
I/P: (0/0)

## *Aphelonyx cerricola*

42. **Shoot-GALL- ♂**
NEW, HIGHLY RESTRICTED, gall develops surrounding SHOOT. 10-25mm
T: develops in summer, mature JULY.
C: emerges from AUGUST to DECEMBER 1st year, to JANUARY to MARCH, year 2.
F: on TURKEY OAK; often several on shoot; round, single inner gall.
I/P: (4/11)



## *Biorhiza pallida.*

43. **root GALL** - ♂

COMMON, on ROOTLETS. 8 X 10mm
T: all the year, mature OCTOBER – 2nd year.
C: emerges SEPTEMBER to DECEMBER, year 2, and during MARCH – year 3.
F: round, brown galls, often in large groups, rarely alone; single cell, pupates in gall on tree.
I/P: (0/2)

44. **OAK-APPLE** - ♀♂

COMMON, in axillary & terminal BUDS. up to 40mm
T: May to July and on, mature end JUNE.
C: emerges MAY to AUGUST.
F: pink and spongy, often around 30 cells, pupates in gall on tree.
I/P: (2/20)

## *Callirhytis bella.*

45. **bud GALL** - ♀♂

EXTREMELY RARE, on BUD. 5 X 4mm
T: late autumn, early winter, mature OCTOBER.
C: emerges APRIL to JULY, 2nd year.
F: enclosed in scales of bud of *Quercus robur*.
I/P: (0/0)

## *Callirhytis erythrocephala.*

46. **acorn GALL** - ♂

LOCALLY COMMON, on ACORN. 2mm, 10mm conglomerate
T: SEPTEMBER/OCTOBER on tree; matures OCTOBER; spends 3/8 years on ground.
C: emerges APRIL to JULY.
F: on TURKEY OAK; distorted acorn, with several ovoid cells; pupates in gall on ground.
I/P: (0/0)

47. **acorn GALL** - ♀♂

LOCALLY COMMON, on ACORN. 2mm, 10mm conglomerate
T: SEPTEMBER/OCTOBER on tree; matures OCTOBER; spends 3/8 years on ground.
C: emerges MARCH to JULY.
F: on TURKEY OAK; distorted acorn, with several ovoid cells; pupates in gall on ground.
I/P: (0/2)



## *Cynips agama.*

48. **YELLOW-PEA GALL - ♂**
LOCALISED, UNCOMMON, on underside of LEAF. 5 X 4mm
T: June to November on tree, mature SEPTEMBER.
C: emerges SEPTEMBER to NOVEMBER.
F: thin-walled, rounded gall on veins, with no sign on top of leaf; short stout stalk; single cell, pupates in gall on leaf on ground or tree.
I/P: (0/0)

## *Cynips disticha.*

49. **TWO-CELL GALL - ♂**
LOCAL, INFREQUENT; on underside of LEAF. 6 X 4mm
T: July to September, mature end AUGUST.
C: emerges from SEPTEMBER to NOVEMBER.
F: knobbly, globular, with depression; no sign above leaf; 2 cells with single larva; pupates in gall.
I/P: (0/3)

50. **bud GALL - ♀♂**
SCARCE, in axillary & terminal BUDS. 5 X 2.5mm
T: mature MAY.
C: emerges MAY
F: long and thin, with dull surface; may also be on leaf-rib.
I/P: (0/0)

## *Cynips divisa.*

51. **RED-PEA GALL - ♂**
COMMON, on underside of LEAF. 5 X 6mm.
T: from mid-summer to October, matures SEPTEMBER on.
C: emerges AUGUST to DECEMBER, year 1, and occasionally JANUARY/FEBRUARY – year 2.
F: Glossy; flattened; short stalk from vein; single cell, pupates from gall on leaf on ground or tree.
I/P: (3/12)

52. **RED-WART GALL - ♀♂**
COMMON, in axillary or terminal BUDS and LEAF. 4 X 1.8mm.
T: April to June, matures MAY.
C: emerges during MAY.
F: brightly coloured, yellow, orange to brownish; glossy, hairless; located at end of mid-rib, on leaf margin or in terminal bud on twig; inconspicuous, only showing when mature; single cell, pupates in gall on tree.
I/P: (0/0)



## *Cynips longiventris.*

53. **STRIPED-PEA GALL** - ♂
LOCALLY COMMON, under LEAF. 8 X 10mm
T: July to October, mature end SEPTEMBER.
C: emerges SEPTEMBER to DECEMBER, year 1, and JANUARY to MARCH, year 2.
F: striped globe (though in Highlands it does not appear to be striped), under vein; single cell, pupates in gall on tree or on ground; stays on leaf on ground.
I/P: (0/10)

54. **GREEN VELVET-BUD GALL** - ♀♂
SCARCE, in dormant BUDS on bark & twigs. 2 X 1.5mm
T: April to May, mature end MAY.
C: emerges during MAY & JUNE.
F: pointed; difficult to see; covered in white hairs; single cell, pupates in gall on tree.
I/P: (1/1)

## *Cynips quercusfolii.*

55. **CHERRY GALL** - ♂
COMMON, beneath LEAF. 10-20mm
T: July to October (on fallen leaves until May next, mature end AUGUST.
C: emerges SEPTEMBER to DECEMBER, year 1, and JANUARY to MARCH, year 2.
F: brightly coloured, globular; attached to vein; single cell, pupates in gall on ground' often still on leaf; emerging in winter, staying inside until spring.
I/P: (2/9)

56. **VIOLET-EGG GALL** - ♀♂
COMMON, on TWIGS and DORMANT BUDS on bark. 3 X 2mm.
T: April to May, mature end MAY.
C: emerges APRIL to JUNE.
F: velvety violet and purple, in groups of 3 or so; usually on twiggy growths on large trees; single cell, pupates in gall on tree.
I/P: (1/1)

## *Neuroterus albipes.*

57. **SMOOTH SPANGLE** - ♂
QUITE COMMON, below LEAF. 3mm.
T: July to September and on, mature end AUGUST.
C: emerges FEBRUARY to APRIL 2nd year.
F: smooth; flat, central bump; hairless; normally beneath base of leaf, but quite often above; single cell, pupates in gall on ground.
I/P: (2/6)

58. **SCHENCK'S GALL** - ♀♂
COMMON, on LEAF-margin, sometimes terminal or axillary BUDS. Less than 2 X 1mm.
T: April to June, mature end MAY.
C: emerges APRIL to JULY.
F: on deeply indented leaf-margin or mid-rib; thin wall; pale brown, smooth, ovoid; single cell, pupates in gall on tree.
I/P: (0/9)



## *Neuroterus anthracinus (=Andricus anthracina).*

59. **OYSTER GALL - ♂**
VERY COMMON, below LEAF. 3 X 2mm
T: mid-summer to October, mature SEPTEMBER.
C: emerges SEPTEMBER to DECEMBER, year 1, & MARCH to APRIL 2nd year.
F: Usually on underside; green/pink, red spots; attached to vein by typical flap of tissue on either side (sometimes one side only); single cell, pupates in gall on leaf or on ground.
I/P: (3/7)

60. **bud-GALL - ♀♂**
COMMON, on axillary or terminal BUDS. 3 X 4mm
T: March to May, normally mature APRIL.
C: emerges MARCH to JUNE.
F: brown, within opened bud-scales; may be grouped together.
I/P: (0/3)

## *Neuroterus aprilinus.*

61. **seed-like GALL - ♂**
COMMON, in CATKIN. 1.5 X 1mm.
T: May & June, mature MAY.
C: emerges JULY/AUGUST.
F: no stalk; longitudinal ridge round gall; no hair; yellow to brown.
I/P: (0/0)

62. **APRIL-BUD GALL - ♀♂**
COMMON, in terminal, sometimes axillary, BUD or LEAF-STALK. 8 X 6mm.
T: April & May, mature MAY.
C: emerges APRIL/MAY
F: large, colourful, smooth; only tip seen in deformed bud; growth only takes a few days; single cell, pupates in gall on tree.
I/P: (0/2)

## *Neuroterus numismalis.*

63. **SILK-BUTTON - ♂**
ABUNDANT, beneath LEAF. 3mm
T: August to October, mature end SEPTEMBER.
C: emerges FEBRUARY to APRIL, 2nd year.
F: no mark on top of leaf; thick, rolled-edge disc, gold hairs; single cell, pupates in gall on ground in winter.
I/P: (1/5)

64. **BLISTER GALL - ♀♂**
COMMON, on LEAF. 3 X 0.5mm
T: May to October, mature end MAY.
C: emerges APRIL to JULY.
F: convex blister on both surfaces; smooth with paler lines; single cell, pupates in gall.
I/P: (1/8)



## *Neuroterus quercusbaccarum.*

65. **COMMON SPANGLE** - ♂
ABUNDANT, beneath LEAF. 5mm.
T: July to October, mature AUGUST.
C: emerges JANUARY to MAY, 2nd year.
F: Disc with rising centre; yellow with red hairs; single cell, pupates in gall on ground in winter.
I/P: (2/9)

66. **CURRANT GALL** - ♀♂
COMMON, LEAVES, CATKIN & end of stems on TWIGS. 4mm.
T: May to June, mature MAY/JUNE.
C: emerges MAY to JULY.
F: red-currants in catkin and singles below leaf with red mark above; single cell, pupates in gall on tree.
I/P: (5/8)

## *Neuroterus saliens*

67. **a leaf -GALL** - ♂
MAY NOT YET BE IN BRITAIN, on LEAF-VEIN or LEAF-STALK.
T: mature SEPTEMBER.
C: emerges SPRING.
F: On Turkey oak; single cell in distinctly separate bulge on vein or stalk, with several paler rounded projections on surface when mature; starts lime-green and ends brown with darker base.
I/P: (0/0)

68. **an acorn-GALL** - ♀♂
EXTREMELY RARE, in ACORN.
T: mature APRIL/MAY.
C: emerges JUNE to AUGUST.
F: On Turkey oak; multilocular inside a stunted acorn, which has reddish flush; sometimes with disc-like projections on upper surface.
I/P: (0/4)



## *Neuroterus tricolor.*

69. **CUPPED SPANGLE** - ♂
UNCOMMON, below LEAF. 3mm.
T: July to October, mature end AUGUST.
C: emerges OCTOBER/NOVEMBER, year 1, & MARCH to JULY, 2nd year.
F: rolled rim; yellow with red hairs; sparse but gregarious; single cell, pupates in gall in soil or still attached to leaf.
I/P: (0/1)

70. **HAIRY-PEA GALL** - ♀♂
UNCOMMON, on LEAF. 5mm.
T: May to August, mature end JUNE.
C: emerges JULY.
F: Spherical; yellow, with strong red/violet hairs; often in clusters on ribs; single cell, pupates in gall on tree or on ground.
I/P: (2/2)

## *Trigonaspis megaptera.*

71. **KIDNEY GALL** - ♂
UNCOMMON, under LEAF. 2 X 1mm
T: September to November, mature OCTOBER and falls to ground.
C: emerges SEPTEMBER to DECEMBER, year 1, & MAY/JUNE 2nd year.
F: yellow-green to brown; bunched beneath vein on short slender stalk, often in parallel rows; gregarious; single cell, pupates in gall on ground.
I/P: (3/0)

72. **PINK-BUD or PINK-WAX GALL** - ♀♂
LOCALLY COMMON, especially the north-west, on TRUNK growths. 10-30mm.
T: April to June, mature MAY.
C: emerges MAY to JULY.
F: round, waxy-white to red; often grouped under moss; single cell, pupates in gall.
I/P: (2/5)

# ACARI

## *Epitrimerus cristatus* – Eriophyoidea

73. **leaf GALL** - ♀♂
?
T: ?
C: ?
F: leaf rolled upwards & crinkled, with mites inside.
I/P: (0/0)



## LEPIDOPTERA.

### *Heliozela sericiella* - Heliozelidae.

74. **leaf-GALL - ♀♂**
COMMON, on LEAF, thickening the leaf petiole; small
T: June to July, mature JULY.
C: emerges APRIL/MAY, 2nd year.
F: internal mine, virtually invisible from exterior.
I/P: (0/0)

### *Stenolechia gemmella* - Gelechiidae.

75. **twig-GALL - ♀♂**
on TWIG. 60mm long; common in Scotland.
T: June to July, mature JULY.
C: emerges AUGUST to OCTOBER.
F: indistinct swelling beneath bark.
I/P: (0/0)

## HEMIPTERA

### *Asterodiaspis variolosa* - Asterolecaniidae.

76. **twig-GALL - ♀♂**
COMMON on TWIGS. 2 X 1.5mm
T: May to October, mature OCTOBER.
C: emerges OCTOBER.
F: scale insect sits in pit, or forms grey cap over it.
I/P: (0/0)

### *Trioza remota* – Psylloidea

77. **leaf-GALL - ♀♂**
common, on upper side of leaf. 1-2mm.
T: MAY to OCTOBER.
C: emerges during any month
F: pimple, with nymph inside.
I/P: (0/1)



# DIPTERA.

## *Arnoldia libera* - Cecidomyiidae.

78. **leaf GALL** - ♀♂
Rare, on LEAF. 2 X 4mm
T: - MAY - JUNE, mature end of JUNE.
C: emerges end JUNE on.
F: green becoming darker; blister with upper surface slightly raised and pit below.
I/P: (0/0)

## *Macrodiplosis pustularis (=dryobia)* - Cecidomyiidae.

79. **leaf GALL** - ♀♂
COMMON, on LEAF. 15 X 2mm
T: June to September, mature end JULY.
C: emerges MARCH/APRIL.
F: pocket made from side-vein folded UNDER.
I/P: (0/1)

## *Macrodiplosis roboris (=volvens)* - Cecidomyiidae.

80. **leaf GALL** - ♀♂
COMMON, on LEAF. 15 X 2mm.
T: June to September, mature end JULY.
C: emerges MARCH/APRIL.
F: pocket made from side of leaf folded UPWARDS.
I/P: (0/0)

## *Polystepha malpighii* - Cecidomyiidae.

81. **leaf GALL** - ♀♂
Rare, on LEAF. 2 X 4mm
T: - MAY - JUNE, mature end of JUNE.
C: emerges end JUNE on.
F: green becoming darker; blister with distinctly raised upper surface without lower pit.
I/P: (0/1)



# 4. Insect inhabitants
## Possible hymenopteran inquiline & parasitoid inhabitants - by gall

| |
|---|
| * **Andricus albopunctatus ♂** (sic) - gall causer |
| *** **(2i/4p)** (sic) - species other than causer (i = inquiline/p = parasitoid) |

**Andricus albopunctatus ♂** * - *Synergus gallaepomiformis, S. nervosus, Eurytoma brunniventris, Caenacis lauta, Mesopolobus tibialis, Eupelmus urozonus* **(2i/4p) *****

**Andricus amenti** ♀♂ - (none known)

**Andricus aries ♂** (RAMS-HORN GALL) – *Ceroptres arator*, *Synergus gallaepomiformis, S. pallicornis, S. pallidipennis, S. reinhardi, S. rotundiventris, Sycophila biguttata, S. flavicollis, Megastigmus dorsalis, Ormyrus nitidulus*. **(6i/4p)**

**Andricus callidoma ♂** (STALKED-SPINDLE GALL) - *Synergus gallaepomiformis, Eurytoma brunniventris, Mesopolobus sericeus,*. **(1i/2p)**

**Andricus callidoma** ♀♂ (TUFTED GALL) - *Mesopolobus fusciipes, M. xanthocerus, Aulogymnus gallarum.* **(0i/3p)**

**Andricus corruptrix ♂** - *Ceroptres arator, Synergus apicalis, S. gallaepomiformis, S. reinhardi, S. umbraculus, Eurytoma brunniventris, Sycophila biguttata, S. variegata, Megastigmus dorsalis, Torymus auratus (=nitens), T. flavipes, Ormyrus pomaceus, Cecidostiba fungosa, Mesopolobus amaenus, M. dubius, M. fasciiventris, M. fuscipes, M. sericeus, M. tibialis, Eupelmus urozonus*. **(5i/15p)**

**Andricus corruptrix** ♀♂ - *Mesopolobus dubius, M. fuscipes, M. tibialis, M. xanthocerus.* **(0i/4p)**

**Andricus curvator ♂** (COLLARED-BUD GALL) - *Synergus albipes, S. nervosus, Mesopolobus amaenus.* **(2i/1p)**

**Andricus curvator** ♀♂ (CURVED-LEAF GALL) - *Synergus albipes, S. crassicornis, S. gallaepomiformis, S. nervosus, Eurytoma brunniventris, Megastigmus dorsalis, Torymus flavipes, T. geranii, T. notatus, Mesopolobus albitarsus, M. amaenus, M. fasciiventris, M. fuscipes, M. sericeus, M. tibialis, Eupelmus urozonus, Aulogymnus arsames, A. gallarum, A. gallarum f. pulchra.* **(4i/15p)**



**Andricus fecundator ♂** (ARTICHOKE GALL) - *Synergus crassicornis, Megastigmus dorsalis, Torymus auratus (=nitens), Eupelmus urozonus, Aulogymnus trilineatus*. **(1i/4p)**

**Andricus fecundator** ♀♂ (HAIRY-CATKIN GALL) - *Mesopolobus xanthocerus*. **(0i/1p)**

**Andricus glandulae ♂** - *Synergus nervosus*. **(1i/0p)**

**Andricus glandulae** ♀♂ - (none known)

**Andricus grossulariae ♂** - *Synergus albipes, Eurytoma brunniventris, Sycophila biguttata, Megastigmus dorsalis, Ormyrus nitidulus, Cecidostiba fungosa, Mesopolobus sericeus, M. tibialis, Scambus planatus*. **(1i/8p)**

**Andricus grossulariae** ♀♂ - *Synergus gallaepomiformis, Eurytoma brunniventris, Sycophila flavicollis, S. variegata, Megastigmus dorsalis, Torymus flavipes, Cecidostiba fungosa, Mesopolobus dubius, M. fuscipes, M. xanthocerus, Eupelmus urozonus.* **(1i/10p)**

**Andricus inflator ♂** (GLOBULAR GALL) - *Synergus ruficornis, Eurytoma brunniventris, Mesopolobus sericeus.* **(1i/2p)**

**Andricus inflator** ♀♂ (TWIG-GALL) - *Synergus crassicornis, Megastigmus dorsalis, Torymus flavipes, Aulogymnus arsames.* **(1i/3p)**

**Andricus kollari ♂** (MARBLE-GALL) **-** *Ceroptres arator, Saphonecrus connatus, Synergus albipes, S. gallaepomiformis, S. pallicornis, S. pallidipennis, S. reinhardi, S. umbraculus, Eurytoma brunniventris, Sycophila bigutatta, S. variegata, Megastigmus dorsalis, M. stigmatizans, T. auratus (=nitens), Torymus geranii, Ormyrus nitidulus, Caenacis lauta, Cecidostiba fungosa, C. semifascia, Hobbya stenonota, Mesopolobus amaenus, M. dubius, M. fasciiventris, M. fuscipes, M. sericeus, M. xanthocerus, Eupelmus annulatus, Eupelmus urozonus, Aulogymnus trilineatus.* **(8i/21p)**

**Andricus kollari** ♀♂ **-** *Mesopolobus dubius, M. fuscipes, M. tibialis, M. xanthocerus.* **(0I/4p)**

**Andricus legitimus ♂** (STUNTED ACORN) - *Synergus clandestinus, S. crassicornis.* **(2i/0p)**



**Andricus lignicola ♂** (COLA-NUT) **–** *Ceroptres arator, Saphonecrus connatus, Synergus albipes, S. apicalis, S. crassicornis, S. gallaepomiformis, S. reinhardi, S. umbraculus, Eurytoma brunniventris, Sycophila bigutatta, Megastigmus dorsalis, Torymus auratus (=nitens), T. geranii, Ormyrus nitidulus, Mesopolobus amaenus, M. fasciiventris, M. fuscipes, M. sericeus, M. xanthocerus, Eupelmus urozonus, Aulogymnus skianeuros.* **(8i/13p)**

**Andricus lignicola ♀♂** - *Mesopolobus dubius, M. fuscipes, M. tibialis, M. xanthocerus, Aulogymnus skianeuros.* **(0i/5p)**

**Andricus lucidus ♂** (HEDGEHOG GALL) **–** *Synergus umbraculus, Sycophila biguttata, Mesopolobus sericeus, Eupelmus urozonus.* **(1i/3p)**

**Andricus lucidus ♀♂** - *Torymus auratus (=nitens), Eupelmus urozonus.* **(0i/2p)**

**Andricus nudus ♂** (MALPIGHI'S GALL) *Synergus nervosus* - **(1i/0p)**

**Andricus nudus ♀♂** (BALD-SEED GALL) - (none known)

**Andricus quadrilineatus ♂** - *Synergus albipes, S. gallaepomiformis, S. nervosus, Torymus flavipes, M. xanthocerus, Aulogymnus arsames, A. eudoreschus, Hemiteles spp.* **(3i/5p)**

**Andricus quercuscalicis ♂** (KNOPPER GALL) - *Synergus gallaepomiformis, S. nervosus, S. pallicornis, S. umbraculus, Eurytoma brunniventris, Sycophila bigutatta, Megastigmus dorsalis, M. stigmatizans, Torymus auratus (=nitens), T. cyaneus, T. geranii, Ormyrus nitidulus, Cecidostiba fungosa, C. semifascia, Mesopolobus amaenus, M. sericeus, M. tibialis, Arthrolytus ocellus, Eupelmus urozonus, E. vesicularis, Gelis formicarius, Mastrus deminuens (=castaneus), Spilomicrus stigmaticalis.* **(4i/19p)**

**Andricus quercuscalicis ♀♂** - *Mesopolobus dubius, M. fuscipes, M. tibialis, M. xanthocerus, Aprostocetus aethiops, Pediobius clita.* **(0i/6p)**

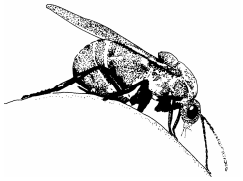
**Andricus quercuscorticis ♂** - *Synergus incrassatus.* **(1i/0p)**

**Andricus quercuscorticis ♀♂** - *Synergus incrassatus.* **(1i/0p)**

**Andricus quercusradicis ♂** (TRUFFLE GALL) - *Synergus incrassatus, Torymus erucarum, T. formosus, T. nobilis, T. scutellaris, Cecidostiba geganius.* **(1i/5p)**

**Andricus quercusradicis ♀♂** (KNOT GALL) - *Ceroptres arator, Saphonecrus connatus, Synergus apicalis, S. rotundiventris, Megastigmus dorsalis.* **(4i/1p)**





**Andricus quercusramuli ♂** (THE AUTUMN GALL) - *Mesopolobus sericeus.* **(0i/1p)**

**Andricus quercusramuli** ♀♂ (COTTON-WOOL GALL) - *Synergus gallaepomiformis, Torymus flavipes, Cecidostiba fungosa, Aulogymnus gallarum, Aulogymnus skianeuros.* **(1i/4p)**

**Andricus rhizomae ♂ –** (none known)

**Andricus seminationis ♂** (SPINDLE-GALL) - *Synergus albipes, S. gallaepomiformis, S. nervosus, Torymus flavipes, Mesopolobus sericeus, Aprostocetus aethiops.* **(3i/3p)**

**Andricus solitarius ♂** - *Synergus gallaepomiformis, S. nervosus, Eurytoma brunniventris, Mesopolobus amaenus, M. sericeus, Eupelmus urozonus.* **(2i/4p)**

**Andricus solitarius** ♀♂ - (none known)

**Andricus testaceipes ♂** (RED-BARNACLE GALL) - *Ceroptres arator, Synergus incrassatus, Eurytoma brunniventris, Torymus nobilis, Ormyrus nitidulus, Caenacis lauta, Eupelmus urozonus.* **(2i/5p)**

**Andricus testaceipes** ♀♂ (LEAF-VEIN GALL) – (none known)

**Aphelonyx cerricola ♂ -** *Synergus apicalis, S. gallaepomiformis, S. incrassatus, S. variabilis, Eurytoma brunniventris, Sycophila biguttata, Megastigmus dorsalis, Torymus auratus (=nitens), Ormyrus nitidulus, O. pomaceus, Cecidostiba fungosa, C. semifascia, Hobbya stenonota, Mesopolobus sericeus, Gelis areator.* **(4i/11p)**

**Biorhiza pallida ♂** - *Torymus nobilis, T. roboris* **(0i/2p)**

**Biorhiza pallida** ♀♂ (OAK APPLE) - *Synergus gallaepomiformis, S. umbraculus, Eurytoma brunniventris, Sycophila variegata, Megastigmus dorsalis, Torymus affinis, T. auratus (=nitens), T. flavipes, T. geranii, Ormyrus pomaceus, Cecidostiba fungosa, C. semifascia, Hobbya stenonota, Mesopolobus amaenus, M. dubius, M. sericeus, M. tibialis, M. xanthocerus, Eupelmus urozonus, A. skianeuros, Aprostocetus aethiops, Baryscapus diaphantus.* **(2i/20p)**

**Callirhytis bella** ♀♂ - (none known)

**Callirhytis erythrocephala ♂** - (none known)

**Callirhytis erythrocephala** ♀♂ - *Eurytoma brunniventris, Megastigmus dorsalis.* **(0i/2p)**

**Cynips agama ♂** (YELLOW-PEA GALL) - (none known)



**Cynips disticha ♂** (TWO-CELL GALL) - *Eurytoma brunniventris, Torymus flavipes, Mesopolobus sericeus.* **(0i/3p)**

**Cynips disticha ♀♂** - (none known)

**Cynips divisa ♂** (RED-PEA GALL) - *Synergus albipes, S. nervosus, S. pallicornis, Eurytoma brunniventris, Sycophila bigutatta, Torymus auratus (=nitens), T. cyaneus, T. flavipes, T. geranii, Caenacis lauta, Mesopolobus dubius, M. fasciiventris, M. sericeus, Eupelmus urozonus, Aprostocetus aethiops.* **(3i/12p)**

**Cynips divisa ♀♂** (RED-WART GALL) - (none known)

**Cynips longiventris ♂** (STRIPED-PEA GALL) - *Eurytoma brunniventris, Sycophila biguttata, Torymus auratus (=nitens), T. cyaneus, T. flavipes, T. geranii, Mesopolobus fasciiventris, M. sericeus, Eupelmus urozonus, Aprostocetus aethiops.* **(0i/10p)**

**Cynips longiventris ♀♂** (GREEN VELVET-BUD GALL) - *Synergus pallicornis, Mesopolobus fuscipes.* **(1i/1p)**

**Cynips quercusfolii ♂** (CHERRY GALL) - *Synergus albipes, S. pallicornis, Eurytoma brunniventris, Sycophila bigutatta, Megastigmus dorsalis, Torymus auratus (=nitens), T. cyaneus, T. flavipes, Mesopolobus fasciiventris, M. sericeus, Aprostocetus aethiops.* **(2i/9p)**

**Cynips quercusfolii ♀♂** (VIOLET-EGG GALL) - *Synergus gallaepomiformis, Mesopolobus fuscipes.* **(1i/1p)**

**Neuroterus albipes ♂** (SMOOTH SPANGLE) - *Synergus albipes, S. nervosus, Torymus flavipes, Mesopolobus fasciiventris, M. tibialis, Aulogymnus gallarum, Pediobius clita, P. lysis.* **(2i/6p)**

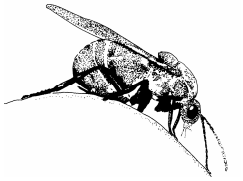
**Neuroterus albipes ♀♂** (SCHENK'S GALL) - *Eurytoma brunniventris, Torymus flavipes, Ormocerus latus, O. vernalis, Mesopolobus fasciiventris, M. fuscipes, M. tibialis, Aulogymnus arsames, Aprostocetus aethiops.* **(0i/9p)**

**Neuroterus anthracinus (=Andricus anthracina) ♂** (OYSTER GALL) - *Synergus albipes, S. gallaepomiformis, S. nervosus, Eurytoma brunniventris, Torymus geranii, Mesopolobus fasciiventris, M. sericeus, Eupelmus urozonus, Aulogymnus arsames, Aprostocetus aethiops.* **(3i/7p)**

**Neuroterus anthracinus (=Andricus anthracina) ♀♂** (APRIL-BUD GALL) - *Mesopolobus fuscipes, M. tibialis, M. xanthocerus.* **(0i/3p)**

**Neuroterus aprilinus ♂** - (none known)





**Neuroterus aprilinus** ♀♂ (APRIL-BUD GALL) - *Mesopolobus fuscipes, Aulogymnus arsames.* **(0i/2p)**

**Neuroterus numismalis ♂** (SILK-BUTTON) - *Synergus albipes, Torymus flavipes, Mesopolobus fasciiventris, M. tibialis, Aulogymnus gallarum, Pediobius lysis.* **(1i/5p)**

**Neuroterus numismalis** ♀♂ (BLISTER GALL) - *Synergus albipes, Eurytoma brunniventris, Torymus flavipes, Mesopolobus fasciiventris, M. fuscipes, M. sericeus, M. tibialis, Aprostocetus aethiops, Aulogymnus arsames.* **(1i/8p)**

**Neuroterus quercusbaccarum ♂** (COMMON SPANGLE) - *Synergus albipes, S. nervosus, Eurytoma brunniventris, Torymus flavipes, Mesopolobus dubius, M. fasciiventris, M. tibialis, Aulogymnus gallarum, A. gallarum f. pulchra, Pediobius clita, P. lysis.* **(2i/9p)**

**Neuroterus quercusbaccarum** ♀♂ (CURRANT GALL) - *Synergus albipes, S. apicalis, S. gallaepomiformis, S. nervosus, S. thaumacerus, Eurytoma brunniventris, Torymus auratus (=nitens), T. flavipes, Mesopolobus sericeus, M. tibialis, Eupelmus urozonus, Aulogymnus arsames, A. gallarum.* **(5i/8p)**

**Neuroterus saliens ♂** - (none known)

**Neuroterus saliens ♀♂** - *Eurytoma brunniventris, Torymus scutellaris, Cecidostiba fungosa, Cecidostiba semifascia.* **(0i/5p))**

**Neuroterus tricolor ♂** (CUPPED SPANGLE) **–** *Torymus flavipes.* **(0i/1p)**

**Neuroterus tricolor** ♀♂ (HAIRY-PEA GALL) - *Synergus gallaepomiformis, S. thaumacerus, Eurytoma brunniventris, Mesopolobus tibialis.* **(2i/2p)**

**Trigonaspis megaptera ♂** (KIDNEY GALL) - *Synergus albipes, S. nervosus, S. thaumacerus.* **(3i/0p)**

**Trigonaspis megaptera** ♀♂ (PINK-BUD GALL) - *Synergus gallaepomiformis, S. thaumacerus, Torymus fastuosus, Mesopolobus dubius, M. fusciipes, M. tibialis, Aulogymnus trilineatus.* **(2i/5p)**

**Epitrimerus cristatus** ♀♂ - (none known)

**Heliozela sericiella** ♀♂ - (none known)

**Stenolechia gemella** ♀♂ - (none known)

**Asterodiaspis variolosa** ♀♂ - (none known)

**Trioza remota** ♀♂ - *Tamarixia pubescens* (1)

**Arnoldia libera** ♀♂ - (none known)



**Macrodiplosis pustularis (=dryobia)** ♀♂ - *Torymus chloromerus.* **(0i/1p)**

**Macrodiplosis roboris (=volvens)** ♀♂ - (none known)

**Polystepha malpighii** ♀♂ - *Quadrastichus anysis* **(0i/1p)**



# Gall-hosts of oak inquilines and parasitoids

(currently known hosts for each parasitoid & inquiline gall-inhabitant)

**INQUILINES - CYNIPINAE.**

**Ceroptres**

**C. arator –** *Andricus aries* ♂, *A. corruptrix* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quercusradicis* ♀♂, *A. testaceipes* ♂. **(6)**

**Saphonecrus**

***S. connatus* –** *Andricus kollari* ♂, *A. lignicola* ♂, *A. quercusradicis* ♀♂. **(3)**

**Synergus**

**S. albipes –***Andricus curvator* ♂, *A. curvator* ♀♂, *A. grossulariae* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quadrilineatus* ♂, *A. seminationis* ♂, *Cynips divisa* ♂, *C. quercusfolii* ♂, *Neuroterus albipes* ♂, *N. anthracinus* (=*Andricus anthracina)* ♂, *N. numismalis* ♂, *N. numismalis* ♀♂, *N. quercusbaccarum* ♂, *N. quercusbaccarum* ♀♂, *Trigonaspis megaptera* ♂. **(16)**

**S. apicalis** - *Andricus corruptrix* ♂, *A. lignicola* ♂, *A. quercusradicis* ♀♂, *Aphelonyx cerricola* ♂, *Neuroterus quercusbaccarum* ♀♂. **(5)**

**S. clandestinus** - *Andricus legitimus* ♂. **(1)**

**S. crassicornis** - *Andricus curvator* ♀♂, *A. fecundator* ♂, *A. inflator* ♀♂, *A. legitimus* ♂, *A. lignicola* ♂. **(5)**

**S. gallaepomiformis** - *Andricus albopunctatus* ♂, *A. aries* ♂, *A. callidoma* ♂, *A. corruptrix* ♂, *A. curvator* ♀♂, *A. grossulariae* ♀♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quadrilineatus* ♂, *A. quercuscalicis* ♂, *A. quercusramuli* ♀♂, *A. seminationis* ♂, *A. solitarius* ♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Cynips quercusfolii* ♀♂, *Neuroterus anthracinus (=Andricus anthracina)* ♂, *N. quercusbaccarum* ♀♂, *N. tricolor* ♀♂, *Trigonaspis megaptera* ♀♂. **(20)**

**S. incrassatus** - *Andricus quercuscorticis* ♂, *A. quercuscorticis* ♀♂, *A. quercusradicis* ♂, *A. testaceipes* ♂, *Aphelonyx cerricola* ♂. **(5)**

**S. nervosus** - *Andricus albopunctatus* ♂, *A. curvator* ♂, *A. curvator* ♀♂, *A. glandulae* ♂, *A. nudus* ♂, *A. quadrilineatus* ♂, *A. quercuscalicis* ♂, *A. seminationis* ♂, *A. solitarius* ♂, *Cynips divisa* ♂, *Neuroterus albipes* ♂, *N. anthracinus (=Andricus anthracina)* ♂, *N. quercusbaccarum* ♂, *N. quercusbaccarum* ♀♂, *Trigonaspis megaptera* ♂. **(15)**



**Synergus pallicornis –** *Andricus aries* ♂, *A. kollari* ♂, *A. quercuscalicis* ♂, *Cynips divisa* ♂, *C. longiventris* ♀♂, *C. quercusfolii* ♂. **(6)**

**S. pallidipennis** - *Andricus aries* ♂, *A. kollari* ♂. **(2)**

**S. reinhardi** - *Andricus aries* ♂, *A. corruptrix* ♂, *A. kollari* ♂, *A. lignicola* ♂. **(4)**

**S. rotundiventris –** *Andricus aries* ♂, *A. quercusradicis* ♀♂. **(2)**

**S. ruficornis** - *Andricus inflator* ♂. **(1)**

**S. thaumacerus** - *Neuroterus quercusbaccarum* ♀♂, *N. tricolor* ♀♂, *Trigonaspis megaptera* ♂, *T. megaptera* ♀♂. **(4)**

**S. umbraculus –** *Andricus corruptrix* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. lucidus* ♂, *A. quercuscalicis* ♂, *Biorhiza pallida* ♀♂. **(6)**

**S. variabilis –** *Aphelonyx cerricola* ♂. **(1)**

**PARASITOIDS.**

**Eurytomidae**

**Eurytoma**

**E. brunniventris** - *Andricus albopunctatus* ♂, *A. callidoma* ♂, *A corruptrix* ♂, *A. curvator* ♀♂, *A. grossulariae* ♂, *A. grossulariae* ♀♂, *A. inflator* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quercuscalicis* ♂, *A. solitarius* ♂, *A. testaceipes* ♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Callirhytis erythrocephala* ♀♂, *Cynips disticha* ♂, *C. divisa* ♂, *C. longiventris* ♂, *C. quercusfolii* ♂, *Neuroterus albipes* ♀♂, *N. anthracinus (=A. anthracina)* ♂, N. *numismalis* ♀♂, *N. quercusbaccarum* ♂, *N. quercusbaccarum* ♀♂, *N. saliens* ♀♂, *N. tricolor* ♀♂. **(26)**

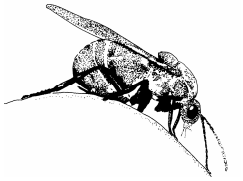
**Sycophila**

**S. biguttata** - *Andricus aries* ♂, *A. corruptrix* ♂, *A. grossulariae* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. lucidus* ♂, *A. quercuscalicis* ♂, *Aphelonyx cerricola* ♂, *Cynips divisa* ♂, *C. longiventris* ♂, *C. quercusfolii* ♂. **(11)**

**S. flavicollis –** *Andricus aries* ♂, *A. grossulariae* ♀♂, **&** on oak twigs **(3)**

**Sycophila variegata** - *Andricus corruptrix* ♂, *A. grossulariae* ♀♂, *A. kollari* ♂, *Biorhiza pallida* ♀♂. **(4)**





**Torymidae**

**Megastigmus**

**M. dorsalis** - *Andricus aries* ♂, *A. corruptrix* ♂, *A. curvator* ♀♂, *A. fecundator* ♂, *A. grossulariae* ♂, *A. grossulariae* ♀♂, *A. inflator* ♀♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quercuscalicis* ♂, *A. quercusradicis* ♀♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Callirhytis erythrocephala* ♀♂, *Cynips quercusfolii* ♂. **(15)**

**M. stigmatizans** - *Andricus kollari* ♂, *A. quercuscalicis* ♂. **(2)**

**Torymus**

**T. affinis** - *Biorhiza pallida* ♀♂. **(1)**

**T. auratus (=nitens) –** *Andricus corruptrix* ♂, *A. fecundator* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quercuscalicis* ♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Cynips divisa* ♂, *C. longiventris* ♂, *C. quercusfolii* ♂, *Neuroterus quercusbaccarum* ♀♂. **(11)**

**T. chloromerus –** *Macrodiplosis pustularis (=dryobia)* ♀♂. **(1)**

**T. cyaneus –** *Andricus quercuscalicis* ♂, *Cynips divisa* ♂, *C. longiventris* ♂, *C. quercusfolii* ♂. **(4)**

**T. erucarum** - *Andricus quercusradicis* ♂. **(1)**

**T. fastuosus** - *Trigonaspis megaptera* ♀♂. **(1)**

**T. flavipes** - *Andricus corruptrix* ♂, *A. curvator* ♀♂, *A. grossulariae* ♀♂, *A. inflator* ♀♂, *A. lucidus* ♀♂, *A. quadrilineatus* ♂, *A. quercusramuli* ♀♂, *A. seminationis* ♂, *Biorhiza pallida* ♀♂, *Cynips disticha* ♂, *C. divisa* ♂, *C. longiventris* ♂, *C. quercusfolii* ♂, *Neuroterus albipes* ♂, *N. albipes* ♀♂, *N. numismalis* ♂, *N. numismalis* ♀♂, *N. quercusbaccarum* ♂, *N. quercusbaccarum* ♀♂, *N. tricolor* ♂. **(20)**

**T. formosus** - *Andricus quercusradicis* ♂. **(1)**

**T. geranii –***Andricus curvator* ♀♂, *A. kollari* ♂, *A. lignicola* ♂, *A quercuscalicis* ♂, *Biorhiza pallida* ♀♂, *Cynips divisa* ♂, *C. longiventris* ♂, *Neuroterus anthracinus (=Andricus anthracina)* ♂. **(8)**

**T. nobilis** - *Andricus quercusradicis* ♂, *A. testaceipes* ♂, *Biorhiza pallida* ♂. **(3)**

**T. notatus**- *Andricus curvator* ♀♂. **(1)**



**Torymus roboris –** *Biorhiza pallida* ♂. **(1)**

**T. scutellaris** - *Andricus quercusradicis* ♂, *Neuroterus saliens* ♀♂. **(2)**

**Ormyridae**

**Ormyrus**

**O. nitidulus** - *Andricus aries* ♂, *A. grossulariae* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quercuscalicis* ♂, *A. testaceipes* ♂, *Aphelonyx cerricola* ♂. **(7)**

**O. pomaceus –** *Andricus corruptrix* ♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂. **(3)**

**Pteromalidae**

**Arthrolytus**

**A. ocellus –** *Andricus quercuscalicis* ♂. **(1)**

**Caenacis**

**C. lauta** - *Andricus albopunctatus* ♂, *A. kollari* ♂, *A. testaceipes* ♂, *Cynips divisa* ♂. **(4)**

**Cecidostiba**

**C. geganius** - *Andricus quercusradicis* ♂. **(1)**

**C. fungosa –** *Andricus corruptrix* ♂, *A. grossulariae* ♂, *A. grossulariae* ♀♂, *A. kollari* ♂, *A. quercuscalicis* ♂, *A. quercusramuli* ♀♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Neuroterus saliens* ♀♂. **(9)**

**C. semifascia –** *Andricus kollari* ♂, *A. quercuscalicis* ♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Neuroterus saliens* ♀♂. **(5)**

**Hobbya**

**H. stenonota** - *Andricus kollari* ♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂. **(3)**

**Mesopolobus**

**M. albitarsus** - *Andricus curvator* ♀♂. **(1)**

**M. amaenus** - *Andricus corruptrix* ♂, *A. curvator* ♂, *A. curvator* ♀♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quercuscalicis* ♂, *A. solitarius* ♂, *Biorhiza pallida* ♀♂. **(8)**



**Mesopolobus dubius –** *Andricus corruptrix* ♂, *A. corruptrix* ♀♂, *A. grossulariae* ♀♂, *A. kollari* ♂, *A. kollari* ♀♂, *A. lignicola* ♀♂, *A. quercuscalicis* ♀♂, *Biorhiza pallida* ♀♂, *Cynips divisa* ♂, *Neuroterus quercusbaccarum* ♂, *Trigonaspis megaptera* ♀♂. **(11)**

**M. fasciiventris -** *Andricus corruptrix* ♂, *A. curvator* ♀♂, *A. kollari* ♂, *A. lignicola* ♂, *Cynips divisa* ♂, *C. longiventris* ♂, *C. quercusfolii* ♂, *Neuroterus albipes* ♂, *N. albipes* ♀♂, *N. anthracinus (=Andricus anthracina)* ♂, *N. numismalis* ♂, *N. numismalis* ♀♂, *N. quercusbaccarum* ♂. **(13)**

**M. fuscipes –***Andricus callidoma* ♀♂, *A. corruptrix* ♂, *A. corruptrix* ♀♂, *A. curvator* ♀♂, *A. grossulariae* ♀♂, *A. kollari* ♂, *A. kollari* ♀♂, *A. lignicola* ♂, *A. lignicola* ♀♂, *A. quercuscalicis* ♀♂, *Cynips longiventris* ♀♂, *C. quercusfolii* ♀♂, *Neuroterus albipes* ♀♂, *N. anthracinus (=Andricus anthracina)* ♀♂, *N. aprilinus* ♀♂, *N. numismalis* ♀♂, *Trigonaspis megaptera* ♀♂. **(17)**

**M. sericeus** –*Andricus callidoma* ♂, *A. corruptrix* ♂, *A. curvator* ♀♂, *A. grossulariae* ♂, *A. inflator* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. lucidus* ♂, *A. quercuscalicis* ♂, *A. quercusramuli* ♂, *A. seminationis* ♂, *A. solitarius* ♂, *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Cynips disticha* ♂, *C. divisa* ♂, *C. longiventris* ♂, *C. quercusfolii* ♂, *Neuroterus anthracinus (=Andricus anthracina* ♂, *N. numismalis* ♀♂, *N. quercusbaccarum* ♀♂. **(20)**

**M. tibialis -** *Andricus albopunctatus* ♂, *A. corruptrix* ♂, *A. corruptrix* ♀♂, *A. curvator* ♀♂, *A. grossulariae* ♂, *A. kollari* ♀♂, *A. lignicola* ♀♂, *A. quercuscalicis* ♂, *A. quercuscalicis* ♀♂, *Biorhiza pallida* ♀♂, *Neuroterus albipes* ♂, *N. albipes* ♀♂, *N. anthracinus (=Andricus anthracina)* ♀♂, *N. numismalis* ♂, *N. numismalis* ♀♂, *N. quercusbaccarum* ♂, *N. quercusbaccarum* ♀♂, *N. tricolor* ♀♂, *Trigonaspis megaptera* ♀♂. **(19)**

**M. xanthocerus –***Andricus callidoma* ♀♂, *A. corruptrix* ♀♂, *A. fecundator* ♀♂, *A. grossulariae* ♀♂, *A. kollari* ♂, *A. kollari* ♀♂, *A. lignicola* ♂, *A. lignicola* ♀♂, *A. quadrilineatus* ♂, *A. quercuscalicis* ♀♂, *Biorhiza pallida* ♀♂, *Neuroterus anthracinus (=Andricus anthracina)* ♀♂. **(12)**

**Ormocerus**

**O. latus -** *Neuroterus albipes* ♀♂. **(1)**

**O. vernalis -** *Neuroterus albipes* ♀♂ **(1)**



**Eupelmidae**

**Eupelmus**

**E. annulatus –** *Andricus kollari* ♂. (1)

**E. urozonus** - *Andricus albopunctatus* ♂, *A. corruptrix* ♂, *A. curvator* ♀♂, *A. fecundator* ♂, *A. grossulariae* ♀♂, *A. kollari* ♂, *A. lignicola* ♂, *A. lucidus* ♂, *A. lucidus* ♀♂, *A. quercuscalicis* ♂, *A. solitarius* ♂, *A. testaceipes* ♂, *Biorhiza pallida* ♀♂, *Cynips divisa* ♂, *C. longiventris* ♂, *Neuroterus anthracinus (=A. anthracina)* ♂, *N. quercusbaccarum* ♀♂. **(17)**

**E. vesicularis -** *A. quercuscalicis* ♂. **(1)**

**Eulophidae**

**Aprostocetus**

**A. aethiops** - *Andricus quercuscalicis* ♀♂, *Andricus seminationis* ♂, *Biorhiza pallida* ♀♂, *Cynips divisa* ♂, *C. longiventris* ♂, *C. quercusfolii* ♂, *Neuroterus albipes* ♀♂, *N. anthracinus (=Andricus anthracina)* ♂, *N. numismalis* ♀♂. **(9)**

**Aulogymnus**

**A. arsames –***Andricus curvator* ♀♂, *A. inflator* ♀♂, *A. quadrilineatus* ♂, *Neuroterus albipes* ♀♂, *N. anthracinus (=Andricus anthracina)* ♂, *N. aprilinus* ♀♂, *N. numismalis* ♀♂, *N. quercusbaccarum* ♀♂, **(8)**

**A. euedoreschus** - *Andricus quadrilineatus* ♂. **(1)**

**A. gallarum** - *Andricus callidoma* ♀♂, *A. curvator* ♀♂, *A. quercusramuli* ♀♂, *Neuroterus albipes* ♂, *N. numismalis* ♂, *N. quercusbaccarum* ♂, *N. quercusbaccarum* ♀♂. **(7)**

**A. gallarum f. pulchra –** *Andricus curvator* ♀♂, *Neuroterus quercusbaccarum* ♂. **(2)**

**A. skianeuros –** *Andricus lignicola* ♂, *A. lignicola* ♀♂, *A. quercusramuli* ♀♂, *Biorhiza pallida* ♀♂. **(4)**

**A. trilineatus** - *Andricus fecundator* ♂, *A. kollari* ♂, *Trigonaspis megaptera* ♀♂. **(3)**

**Baryscapus**

**B. diaphantus** - *Biorhiza pallida* ♀♂. **(1)**

**Pediobius**

**P. clita –** *Andricus quercuscalicis* ♀♂, *Neuroterus albipes* ♂, *N. quercusbaccarum* ♂. **(3)**



**Pediobius lysis** - *Neuroterus albipes* ♂, *N. numismalis* ♂, *N. quercusbaccarum* ♂. **(3)**

**Quadrastichus**

**Q. anysis –** *Polystepha malpighi* ♀♂. **(1)**

**Tamarixia**

T. pubescens **–** *Trioza remota* ♀♂. **(1)**

**Ichneumonidae**

**Gelis**

**G. formicarius** - *Andricus quercuscalicis* ♂. **(1)**

**G. areator –** *Aphelonyx cerricola* ♂ **(1)**

**Hemiteles**

**H. spp** - *Andricus quadrilineatus* ♂. **(1)**

**Mastrus**

**M. deminuens (=castaneus) –** *Andricus quercuscalicis* ♂ **(1)**

**Scambus**

**S. planatus –** *Andricus grossulariae* ♂ **(1)**

**Diapriidae**

**Spilomicrus**

**S. stigmaticalis –** *Andricus quercuscalicis* ♂ **(1)**



# Flight/Emergence times (see explanation at end of table)

| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **CAUSERS** | | | | | | | | | | | | |
| | **Cynipidae** | | | | | | | | | | | | |
| ♂ | *Andricus albopunctatus* | | | | | | | | | | | | |
| ♀♂ | *A. amenti* | | | | | | | | | | | | |
| ♂ | *A. aries* | | | | | | | | | | | | |
| ♂ | *A. callidoma* | | | | | | | | | | | | |
| ♀♂ | *A. callidoma* | | | | | | | | | | | | |
| ♂ | *A. corruptrix* | | | | | | | | | | | | |
| ♀♂ | *A. corruptrix* | | | | | | | | | | | | |
| ♂ | *A. curvator* | | | | | | | | | | | | |
| ♀♂ | *A. curvator* | | | | | | | | | | | | |
| ♂ | *A. fecundator* | | | | | | | | | | | | |
| ♀♂ | *A. fecundator* | | | | | | | | | | | | |
| ♂ | *A. glandulae* | | | | | | | | | | | | |
| ♀♂ | *A. glandulae* | | | | | | | | | | | | |
| ♂ | *A. grossulariae* | | | | | | | | | | | | |
| ♀♂ | *A. grossulariae* | | | | | | | | | | | | |
| ♂ | *A. inflator* | | | | | | | | | | | | |
| ♀♂ | *A. inflator* | | | | | | | | | | | | |
| ♂ | *A. kollari* | | | | | | | | | | | | |
| ♀♂ | *A. kollari* | | | | | | | | | | | | |
| ♂ | *A. legitimus* | | | | | | | | | | | | |
| ♂ | *A. lignicola* | | | | | | | | | | | | |
| ♀♂ | *A. lignicola* | | | | | | | | | | | | |
| ♂ | *A. lucidus* | | | | | | | | | | | | |
| ♀♂ | *A. lucidus* | | | | | | | | | | | | |
| ♂ | *A. nudus* | | | | | | | | | | | | |
| ♀♂ | *A. nudus* | | | | | | | | | | | | |
| ♂ | *A. quadrilineatus* | | | | | | | | | | | | |
| ♂ | *A. quercuscalicis* | | | | | | | | | | | | |
| ♀♂ | *A. quercuscalicis* | | | | | | | | | | | | |
| ♂ | *A. quercuscorticis* | | | | | | | | | | | | |
| ♀♂ | *A. quercuscorticis* | | | | | | | | | | | | |
| ♂ | *A. quercusradicis* | | | | | | | | | | | | |
| ♀♂ | *A. quercusradicis* | | | | | | | | | | | | |
| ♂ | *A. quercusramuli* | | | | | | | | | | | | |
| ♀♂ | *A. quercusramuli* | | | | | | | | | | | | |
| ♂ | *A. rhizomae* | | | | | | | | | | | | |
| ♂ | *A. seminationis* | | | | | | | | | | | | |



| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
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| | **CAUSERS (cont'd)** | | | | | | | | | | | | |
| ♂ | *Andricus solitarius* | | | | | | | | | | | | |
| ♀♂ | *A. solitarius* | | | | | | | | | | | | |
| ♂ | *A. testaceipes* | | | | | | | | | | | | |
| ♀♂ | *A. testaceipes* | | | | | | | | | | | | |
| ♂ | *Aphelonyx cerricola* | | | | | | | | | | | | |
| ♂ | *Biorhiza pallida* | | | | | | | | | | | | |
| ♀♂ | *B. pallida* | | | | | | | | | | | | |
| ♀♂ | *Callirhytis bella* | | | | | | | | | | | | |
| ♂ | *C. erythrocephala* | | | | | | | | | | | | |
| ♀♂ | *C. erythrocephala* | | | | | | | | | | | | |
| ♂ | *Cynips agama* | | | | | | | | | | | | |
| ♂ | *C. disticha* | | | | | | | | | | | | |
| ♀♂ | *C. disticha* | | | | | | | | | | | | |
| ♂ | *C. divisa* | | | | | | | | | | | | |
| ♀♂ | *C. divisa* | | | | | | | | | | | | |
| ♂ | *C. longiventris* | | | | | | | | | | | | |
| ♀♂ | *C. longiventris* | | | | | | | | | | | | |
| ♂ | *C. quercusfolii* | | | | | | | | | | | | |
| ♀♂ | *C. quercusfolii* | | | | | | | | | | | | |
| ♂ | *Neuroterus albipes* | | | | | | | | | | | | |
| ♀♂ | *N. albipes* | | | | | | | | | | | | |
| ♂ | *N. anthracinus* | | | | | | | | | | | | |
| ♀♂ | *N. anthracinus* | | | | | | | | | | | | |
| ♂ | *N. aprilinus* | | | | | | | | | | | | |
| ♀♂ | *N. aprilinus* | | | | | | | | | | | | |
| ♂ | *N. numismalis* | | | | | | | | | | | | |
| ♀♂ | *N. numismalis* | | | | | | | | | | | | |
| ♂ | *N. quercusbaccarum* | | | | | | | | | | | | |
| ♀♂ | *N. quercusbaccarum* | | | | | | | | | | | | |
| ♂ | *N. saliens* | | | | | | | | | | | | |
| ♀♂ | *N. saliens* | | | | | | | | | | | | |
| ♂ | *N. tricolor* | | | | | | | | | | | | |
| ♀♂ | *N. tricolor* | | | | | | | | | | | | |
| ♂ | *Trigonaspis megaptera* | | | | | | | | | | | | |
| ♀♂ | *T. megaptera* | | | | | | | | | | | | |
| | **Acari** | | | | | | | | | | | | |
| ♀♂ | *Epitrimerus cristatus* | | | | | | | | | | | | |
| | **Lepidoptera** | | | | | | | | | | | | |
| ♀♂ | *Heliozella sericiella* | | | | | | | | | | | | |
| ♀♂ | *Stenolechia gemmella* | | | | | | | | | | | | |



-Robin Williams-

| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **CAUSERS (cont'd)** | | | | | | | | | | | | |
| | **Hemiptera** | | | | | | | | | | | | |
| ♀♂ | *Asterodiaspis variolosa* | | | | | | | | | | | | |
| | **Diptera** | | | | | | | | | | | | |
| ♀♂ | *Trioza remota* | | | | | | | | | | | | |
| ♀♂ | *Macrodiplosis pustularis* | | | | | | | | | | | | |
| ♀♂ | *M. roboris* | | | | | | | | | | | | |
| ♀♂ | *Polystepha malpighii* | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| ♀♂ | **INQUILINES** | | | | | | | | | | | | |
| | *Ceroptres arator* | | | | | | | | | | | | |
| | *Saphonecrus connatus* | | | | | | | | | | | | |
| | *Synergus albipes* | | | | | | | | | | | | |
| | *S. apicalis* | | | | | | | | | | | | |
| | *S. clandestinus* | | | | | | | | | | | | |
| | *S. crassicornis* | | | | | | | | | | | | |
| | *S. gallaepomiformis* | | | | | | | | | | | | |
| | *S. incrassatus* | | | | | | | | | | | | |
| | *S. nervosus* | | | | | | | | | | | | |
| | *S. pallicornis* | | | | | | | | | | | | |
| | *S. pallidipennis* | | | | | | | | | | | | |
| | *S. reinhardi* | | | | | | | | | | | | |
| | *S. rotundiventris* | | | | | | | | | | | | |
| | *S. ruficornis* | | | | | | | | | | | | |
| | *S. thaumacerus* | | | | | | | | | | | | |
| | *S. umbraculus* | | | | | | | | | | | | |
| | *S. variabilis* | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| ♀♂ | **PARASITOIDS** | | | | | | | | | | | | |
| | **Chalcids** | | | | | | | | | | | | |
| | **Eurytomidae** | | | | | | | | | | | | |
| | *Eurytoma brunniventris* | | | | | | | | | | | | |
| | *Sycophila bigutatta* | | | | | | | | | | | | |
| | *S. flavicollis* | | | | | | | | | | | | |
| | *S. variegata* | | | | | | | | | | | | |
| | **Torymidae** | | | | | | | | | | | | |
| | *Megastigmus dorsalis* | | | | | | | | | | | | |
| | *M. stigmatizans* | | | | | | | | | | | | |
| | *Torymus affinis* | | | | | | | | | | | | |
| | *T. auratus (=nitens)* | | | | | | | | | | | | |
| | *T. chloromerus* | | | | | | | | | | | | |



| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
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| | *Torymus cyaneus* | | | | | | | | | | | | |
| | *T. erucarum* | | | | | | | | | | | | |
| | *T. fastuosus* | | | | | | | | | | | | |
| | *T. flavipes* | | | | | | | | | | | | |
| | *T. formosus* | | | | | | | | | | | | |
| | *Torymus geranii* | | | | | | | | | | | | |
| | *T. nobilis* | | | | | | | | | | | | |
| | *T. notatus* | | | | | | | | | | | | |
| | *T. roboris* | | | | | | | | | | | | |
| | *T. scutellaris* | | | | | | | | | | | | |
| | **Ormyridae** | | | | | | | | | | | | |
| | *Ormyrus pomaceus* | | | | | | | | | | | | |
| | *O. nitidulus* | | | | | | | | | | | | |
| | **Pteromalidae** | | | | | | | | | | | | |
| | *Arthrolytus ocellus* | | | | | | | | | | | | |
| | *Caenacis lauta* | | | | | | | | | | | | |
| | *Cecidostiba geganius* | | | | | | | | | | | | |
| | *C. fungosa* | | | | | | | | | | | | |
| | *C. semifascia* | | | | | | | | | | | | |
| | *Hobbya stenonota* | | | | | | | | | | | | |
| | *Mesopolobus albitarsus* | | | | | | | | | | | | |
| | *M. amaenus* | | | | | | | | | | | | |
| | *M. dubius* | | | | | | | | | | | | |
| | *M. fasciiventris* | | | | | | | | | | | | |
| | *M. fuscipes* | | | | | | | | | | | | |
| | *M. sericeus* | | | | | | | | | | | | |
| | *M. tibialis* | | | | | | | | | | | | |
| | *M. xanthocerus* | | | | | | | | | | | | |
| | *Ormocerus latus* | | | | | | | | | | | | |
| | *O. vernalis* | | | | | | | | | | | | |
| | **Eupelmidae** | | | | | | | | | | | | |
| | *E. annulatus* | | | | | | | | | | | | |
| | *E. urozonus* | | | | | | | | | | | | |
| | *E. vesicularis* | | | | | | | | | | | | |
| | **Eulophidae** | | | | | | | | | | | | |
| | *Aulogymnus arsames* | | | | | | | | | | | | |
| | *A. eudoreschus* | | | | | | | | | | | | |
| | *A. gallarum* | | | | | | | | | | | | |
| | *A. gallarum f. pulchra* | | | | | | | | | | | | |
| | *A. skianeuros* | | | | | | | | | | | | |
| | *A. trilineatus* | | | | | | | | | | | | |
| | *Aprostocetus aethiops* | | | | | | | | | | | | |



-Robin Williams-

| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Baryscapus diaphantus* | | | | | | | | | | | | |
| | *Pediobius clita* | | | | | | | | | | | | |
| | *P. lysis* | | | | | | | | | | | | |
| | **Eulophidae** | | | | | | | | | | | | |
| | *Quadrastichus anysis* | | | | | | | | | | | | |
| | **Ichneumonidae** | | | | | | | | | | | | |
| | *Gelis formicarius* | | | | | | | | | | | | |
| | *G. areator* | | | | | | | | | | | | |
| | *Mastrus deminuens* | | | | | | | | | | | | |
| | *Scambus planatus* | | | | | | | | | | | | |
| | **Diapriidae** | | | | | | | | | | | | |
| | *Spilomicrus stigmaticalis* | | | | | | | | | | | | |

**REARED BY AUTHOR -**

**FROM OTHER SOURCES -**

Dick Askew,
Scotty Dodd
S. Dunleavy,
R.D. Eady & J. Quinlan,
Hewett A. Ellis
Philip Entwistle
Maggie Frankum
M.W.R. de Vere Graham,
John Ismay,
Malcolm Jennings,
Robert Maidstone,
M. Mayr
Chris Raper,
Karsten Schönrogge,
Pat Walker,
Brian Wurzell.

Nb. This table reflects a mixture of times when insects have been found flying free and emergences from galls reared outside in open-fronted sheds. However, Dr Askew points out that however close to nature such rearings are, there may be distortions leading to artificially earlier emergence times. The months concerned have been interpreted elsewhere in this work as 'flight times' – when it is possible that the insects may be found, a significant point when looking at insects where they key out.



# Gall maturity times

| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **CAUSERS** | | | | | | | | | | | | |
| | **Cynipids** | | | | | | | | | | | | |
| ♂ | *Andricus albopunctatus* | | | | | | ◆ | | | | | | |
| ♀♂ | *A. amenti* | | | | | | ◆ | | | | | | |
| ♂ | *Andricus aries* | | | | | | | | ◆ | | | | |
| ♂ | *A. callidoma* | | | | | | | | ◆ | | | | |
| ♀♂ | *A. callidoma* | | | | | ◆ | | | | | | | |
| ♂ | *A. corruptrix* | | | | | | | ◆ | | | | | |
| ♀♂ | *A. corruptrix* | | | ◆ | | | | | | | | | |
| ♂ | *A. curvator* | | | | | | | | | ◆ | | | |
| ♀♂ | *A. curvator* | | | | | | | ◆ | | | | | |
| ♂ | *A. fecundator* | | | | | | | ◆ | | | | | |
| ♀♂ | *A. fecundator* | | | | | ◆ | | | | | | | |
| ♂ | *A. glandulae* | | | | | | | | | ◆ | | | |
| ♀♂ | *A. glandulae* | | | | | | ◆ | | | | | | |
| ♂ | *A. grossulariae (=mayri)* | | | | | | | | | ◆ | | | |
| ♀♂ | *A. grossulariae* | | | | | ◆ | | | | | | | |
| ♂ | *A. inflator* | | | | | | | | | | ◆ | | |
| ♀♂ | *A. inflator* | | | | | | | | | ◆ | | | |
| ♂ | *A. kollari* | | | | | | | | | ◆ | | | |
| ♀♂ | *A. kollari* | | | ◆ | | | | | | | | | |
| ♀♂ | *A. legitimus* | | | | | | | | | ◆ | | | |
| ♂ | *A. lignicola* | | | | | | | | | | ◆ | | |
| ♀♂ | *A. lignicola* | | | ◆ | | | | | | | | | |
| ♂ | *A. lucidus* | | | | | | | ◆ | | | | | |
| ♀♂ | *A. lucidus (=aestivalis)* | | | | | | | | | ◆ | | | |
| ♂ | *A. nudus* | | | | | | | | | ◆ | | | |
| ♀♂ | *A. nudus* | | | | | ◆ | | | | | | | |
| ♂ | *A. quadrilineatus* | | | | | | ◆ | | | | | | |



| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Cynipids (cont)** | | | | | | | | | | | | |
| ♂ | *Andricus quercuscalicis* | | | | | | | | | ◆ | | | |
| ♀♂ | *A. quercuscalicis* | | | | ◆ | | | | | | | | |
| ♂ | *A. quercuscorticis* | | | | | ◆ | | | | | | | |
| ♀♂ | *A. quercuscorticis* | | | | | | ◆ | | | | | | |
| ♂ | *A. quercusradicis* | | | | | | | | ◆ | | | | |
| ♀♂ | *A. quercusradicis* | | | | | | | ◆ | | | | | |
| ♂ | *A. quercusramuli* | | | | | | | | | | ◆ | | |
| ♀♂ | *A. quercusramuli* | | | | | ◆ | | | | | | | |
| ♂ | *A. rhizomae* | | | | | | | | | ◆ | | | |
| ♂ | *A. seminationis* | | | | | | ◆ | | | | | | |
| ♂ | *A. solitarius* | | | | | | | | ◆ | | | | |
| ♀♂ | *A. solitarius* | | | | ◆ | | | | | | | | |
| ♂ | *A. testaceipes* | | | | | | | | | ◆ | | | |
| ♀♂ | *A. testaceipes* | | | | | | | | ◆ | | | | |
| ♂ | *Aphelonyx cerricola* | | | | | | | ◆ | | | | | |
| ♂ | *Biorhiza pallida* | | | | | | | | | | ◆ | | |
| ♀♂ | *B. pallida* | | | | | | ◆ | | | | | | |
| ♀♂ | *Callirhytis bella* | | | | | | | | | | ◆ | | |
| ♂ | *C. erythrocephala* | | | | | | | | | | ◆ | | |
| ♀♂ | *C. erythrocephala* | | | | | | | | | | ◆ | | |
| ♂ | *Cynips agama* | | | | | | | | | ◆ | | | |
| ♂ | *C. disticha* | | | | | | | | ◆ | | | | |
| ♀♂ | *C. disticha* | | | | | ◆ | | | | | | | |
| ♂ | *C. divisa* | | | | | | | | | ◆ | | | |
| ♀♂ | *C. divisa* | | | | | ◆ | | | | | | | |
| ♂ | *C. longiventris* | | | | | | | | | ◆ | | | |
| ♀♂ | *C. longiventris* | | | | | ◆ | | | | | | | |
| ♂ | *C. quercusfolii* | | | | | | | | ◆ | | | | |
| ♀♂ | *C. quercusfolii* | | | | | ◆ | | | | | | | |
| ♂ | *Neuroterus albipes* | | | | | | | | ◆ | | | | |
| ♀♂ | *N. albipes* | | | | | ◆ | | | | | | | |
| ♂ | *N. anthracinus* | | | | | | | | | ◆ | | | |
| ♀♂ | *N. anthracinus* | | | | ◆ | | | | | | | | |



| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Cynipids (cont)** | | | | | | | | | | | | |
| ♂ | *Neuroterus aprilinus* | | | | | ◆ | | | | | | | |
| ♀♂ | *N. aprilinus* | | | | | ◆ | | | | | | | |
| ♂ | *N. numismalis* | | | | | | | | | ◆ | | | |
| ♀♂ | *N. numismalis* | | | | | ◆ | | | | | | | |
| ♂ | *N. quercusbaccarum* | | | | | | | | ◆ | | | | |
| ♀♂ | *N. quercusbaccarum* | | | | | | ◆ | | | | | | |
| ♂ | *N. saliens* | | | | | | | | | ◆ | | | |
| ♀♂ | *N. saliens* | | | | | ◆ | | | | | | | |
| ♂ | *N. tricolor* | | | | | | | | ◆ | | | | |
| ♀♂ | *N. tricolor* | | | | | | ◆ | | | | | | |
| ♂ | *Trigonaspis megaptera* | | | | | | | | | | ◆ | | |
| ♀♂ | *T. megaptera* | | | | | ◆ | | | | | | | |
| | **Acari** | | | | | | | | | | | | |
| ♀♂ | *Epitrimerus cristatus* | | | | | | | | | | | | |
| | **Lepidoptera** | | | | | | | | | | | | |
| ♀♂ | *Heliozela sericiella* | | | | | | | ◆ | | | | | |
| ♀♂ | *Stenolechia gemella* | | | | | | | ◆ | | | | | |
| | **Hemiptera** | | | | | | | | | | | | |
| ♀♂ | *Asterodiaspis variolosa* | | | | | | | | | | ◆ | | |
| ♀♂ | *Trioza remota* | | | | | ◆ | ◆ | ◆ | ◆ | ◆ | ◆ | | |
| | **Diptera** | | | | | | | | | | | | |
| ♀♂ | *Arnoldia libera* | | | | | | ◆ | | | | | | |
| ♀♂ | *Macrodiplosis pustularis* | | | | | | | ◆ | | | | | |
| ♀♂ | *M. roboris* | | | | | | | ◆ | | | | | |
| ♀♂ | *Polystepha malpighii* | | | | | | ◆ | | | | | | |

Maturity is the time by which all galls are fully developed. Emergence make take place earlier than this with galls on certain plants, but by this date all the galls will have reached their fullest, ripest state. In the case of some galls this may trigger full emergence, in others the insect may hatch out and emerge inside the gall but stay there over winter, before drilling its way out through the wall of the gall. If you are seeking to keep galls to see what emerges, this is the optimum date to take them, though earlier times may be as satisfactory for some species. The most difficult to time are the very short-lived 'soft' galls on leaves or in buds, which may take only a few days from the hatching of the egg to emergence of the perfect insect.



# 'section two'

## 5. **Hymenopteran keys**, based on:

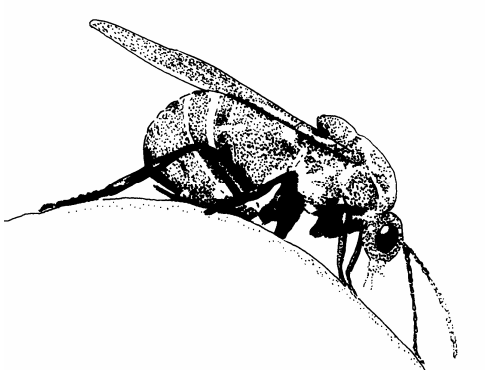
- *RES Handbooks for the identification of British Insects, Hymenoptera Cynipoidea*, By R.D. Eady & J. Quinlan - 1963
  (by kind permission of the Royal Entomological Society)

- an article, *On the Biology of Oak Galls of Cynipidae in Britain*, by R. R. Askew - 1961
  (by kind permission of Dr Askew)

- a draft of, *Keys to Chalcidoid Parasitoids in Cynipid galls on Oak* – by R.R. Askew & Csaba Thuroczy (by kind permission of the authors)

With observations, additions and interpretations by the author

## 6. **Conclusion – 'afterthoughts'**



Drawings taken from RES Handbook, some with added explanatory features by the author - marked at each appropriate drawing by the letters 'res'. The remainder are original drawings by the author.

*** The best piece of advice given me about using keys was to be aware that they are not infallible or an exact science; they are the best effort available at the time of writing. If one branch of a couplet is not easy to distinguish from the other route, try both. If you reach an impasse, or you are clearly wrong, go back and try the other fork. Ideally, try to see a properly identified specimen and compare it with your insect.



# Keys to families, for those hymenoptera found in British oak galls

1. Antennae with more than 18 segments

**Ichneumons** - (p. 213)

- Antennae with 16 segments or less.....2

2(1). Apparent single main vein on front of forewing .....3

- Multiple veins on forewing (fig 1)

**Cynipids** - (p. 88)

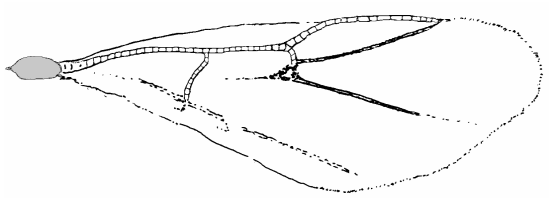


**fig 1**



3(2). Long vein on front of forewing (fig 2)

**Chalcids** - (p. 176)

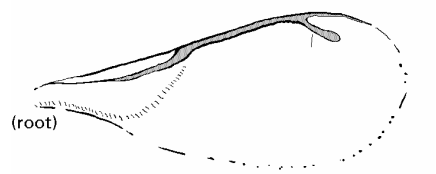



**fig 2**

- Short vein at base of forewing (fig. 3)

**Diapriids** (Proctrotrupoidea) – (p. 215)

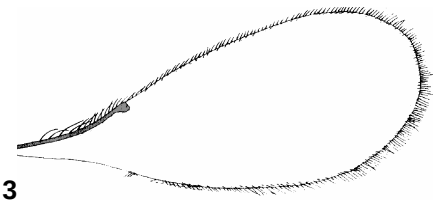
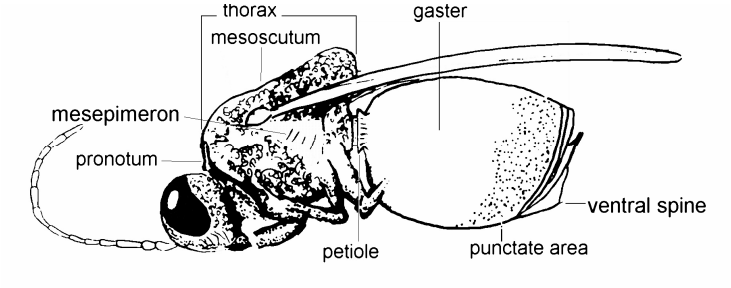


**fig 3**

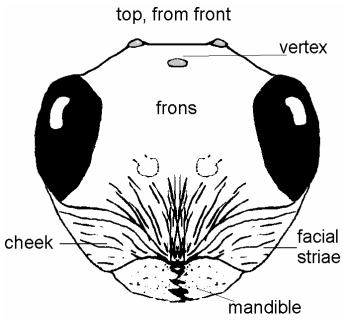


# Cynipids

## Drawings showing Cynipid structure



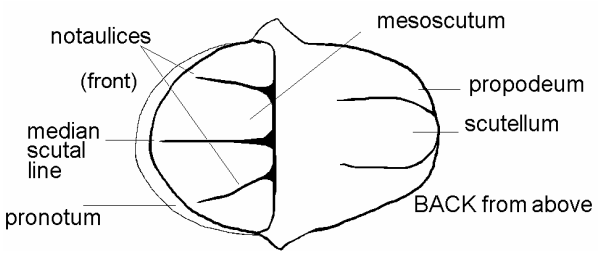

***Synergus* ♀, from side**



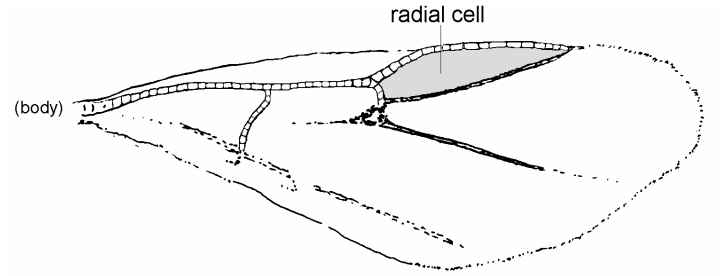

**Head, from front**

**Thorax, from above**

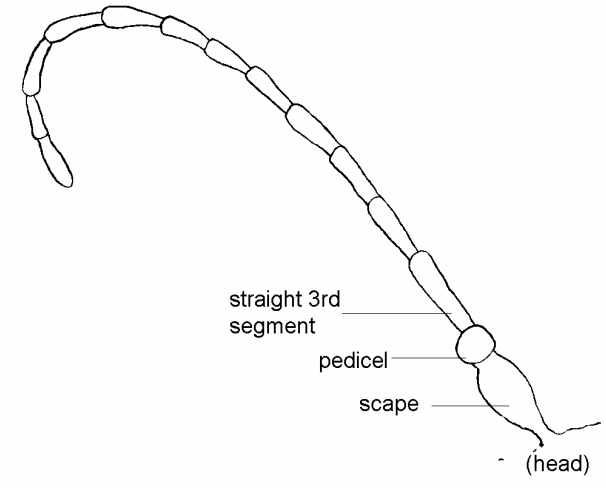




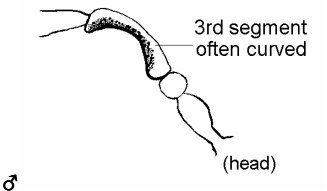

**Thorax**




**Forewing**




♀ **Antenna**




♂



# Keys to genera of Cynipinae (Cynipidae) in British oak galls

1. LONG pronotum (fig 1) ..... 2

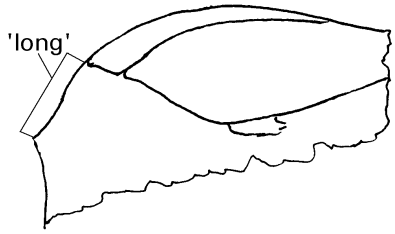



fig 1(res)

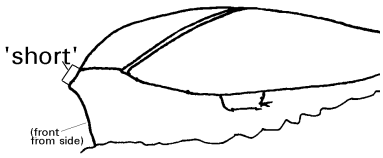



fig 2(res)

- SHORT pronotum (fig 2) (One of the most difficult but vital distinctions. Can be almost impossible to determine in some specimens; go back to the beginning if there is a query); radial cell open at the front ..... 5

2.(1) Tergites 2-7 free (fig 3);..... 3

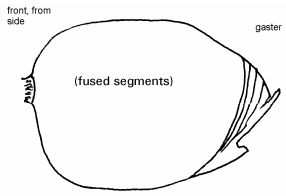



fig4(res)

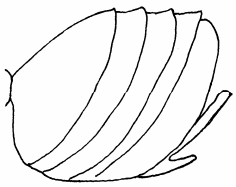


fig 3(res)

- .. Tergites 2-3 FUSED into one major segment (fig 4); first segment of gaster longitudinally GROOVED, with only moderate gloss (fig 6 next page); face covered with striae radiating out from mouth ... 4



3. (2) First segment of gaster (like a short petiole) SMOOTH & SHINING (fig 5); face with two vertical & parallel carinae giving the appearance of a shallow CANYON between (fig 7).

***Ceroptres***, Hartig 1840 ♀♂ - (p. 155)

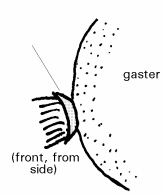



fig 5

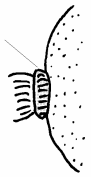


fig 6

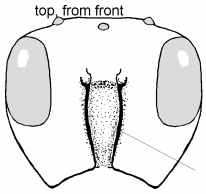



fig 7

- First gastral segment NOT a shiny scale, but as fig 6, with juncture largely hidden by masses of long white hairs. Conventional face structure, without the canyon.

***Aphelonyx***, Giraud ♂ - (p. 134)



4.(2) FEMALE antennae 14 segments; MALE 15; lateral pronotal carinae (fig 8) present in all species except *S. variabilis*; notaulices distinct; radial cell CLOSED (fig 9), however, *S. apicalis* & *S. rotundiventris* have only indistinctly closed radial cell and indistinct notaulices.

***Synergus*** Hartig 1840 ♀♂ - (p. 157)

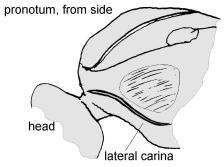



fig 8

- FEMALE 13 antennal segments; MALE usually 14; notaulices generally absent at front; radial cell OPEN (fig 10); pronotal carinae ABSENT.

***Saphonecrus*** Dalle Torre & Kieffer 1910 ♀♂ - (p. 156)

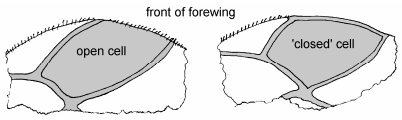



fig 10(res) fig 9(res)



5.(1) Face covered with striae FANNING out from mouth (fig 11); mesoscutum with conspicuous transverse ridges.

***Callirhytis*** Foerster 1869 ♂ ♀ ♂ - (p. 136)

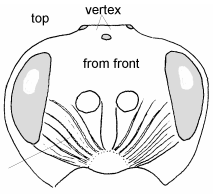



fig 11

- Mesoscutum smooth, leathery or pubescent; face having at most only a FEW radiating striae ..... 6

6.(5) ALL FORMS fully-winged; notaulices WEAK, INCOMPLETE OR ABSENT; mesoscutum deeply emarginate behind and joined to scutellum without a groove, though there may be a weak carina (fig12).....7

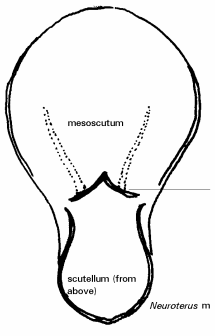



fig 12(res)

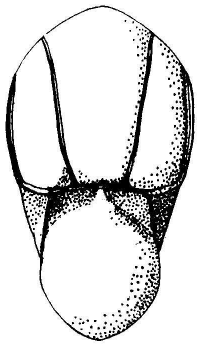


fig 13(res)

- FULLY WINGED; scutellum separated from mesoscutum by a distinct narrow groove or line, which is bordered posteriorly by an arched or nearly straight TRANSVERSE carina (fig 13) or WINGLESS; complete distinct notaulices in all winged forms..... 9



7.(6) Mesoscutum joined to scutellum without a carina (fig 14); propodeum smooth, alutaceous, coriaceous or rugulose, sometimes with carinae above

***Neuroterus*** Hartig 1840 ☿♀♂ - (p. 145)

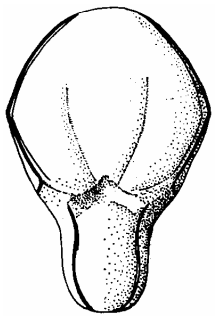


fig 14(res)

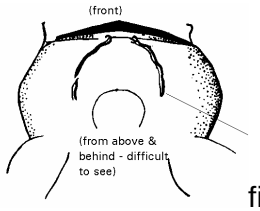



fig 15(res)

- Either mesoscutum separated from scutellum by a weak but distinct transverse carina or propodeum with two longitudinal carinae (fig 15) ..... 8

8. (6) Mesoscutum separated from scutellum by a distinct carina; propodeum WITHOUT carinae

*Neuroterus albipes* (Schenk) ☿ (p.150)

- Mesoscutum NOT separated from scutellum by carina; propodeum with two longitudinal carinae

*Neuroterus aprilinus* (Giraud) ☿♀ (p.151) ♂ (p. 152)



9.(6) **females**: WITH ventral spine; bulky gaster with closed, often pointed, end (fig 16); third antennal segment always straight (fig 17) ..... 10

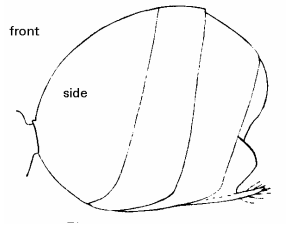



fig 16 (♀)

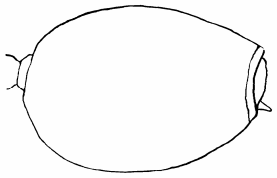


fig 18 (♂)

- **males**: NO ventral spine, but the male organ may be expressed in the form of a downward pointing curved spine (fig 18); end of gaster often appears like a blunt, open tube; most with bent or distorted third antennal segment (fig 19)..... 13

fig 17 (♀)(res)


fig 19 (♂)(res)



10.(9) Ventral spine of gaster SLENDER, often long; sub-basal hairs often short & sparse but, if long, do not reach the end of the spine (fig 20); all forms fully-winged.

***Andricus*** Hartig ♂ & ♀ (p. 100)

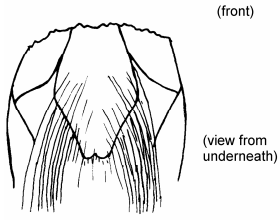
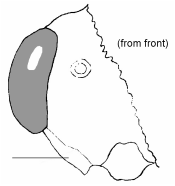
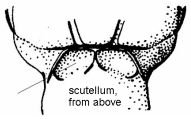



fig 21(res) fig 20(res)

- Ventral spine of gaster short, often wide, and always with long sub-apical hairs which project BEYOND the tip in a broad square-ended tuft (fig 21); agamic females sometimes wingless ..... 11

11.(10) Sub-ocular groove PRESENT (from bottom of eyes to edge of clypeus - fig 22) (though very difficult to see in paler, yellow insects); Sexual forms winged; agamic wingless; neither form pubescent; scutellar foveae (pits) (fig 23) distinctly separate in sexual form; shallow, joining or absent in agamic forms ..... 12



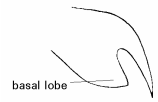
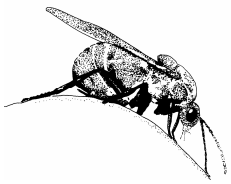




fig 22 fig 23(res) fig 24(res)

- NO sub-ocular groove; all forms fully-winged; sexual not pubescent; agamic pubescent; claws with distinct basal lobe (fig 24); foveae join, but shallow in sexual female.

***Cynips*** Linnaeus1758 ♂♀ (p. 138)





12.(11) Claws WITH a basal lobe (difficult to see because of hairs – persist!) (fig 25); wingless forms with the top of the thorax domed.

***Trigonaspis*** Hartig 1840 ♂♀ - (p. 154)

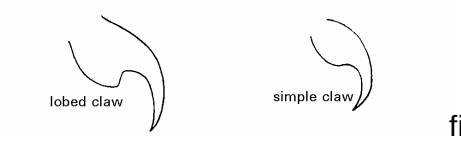



fig 25(res) fig 26(res)

- Claws plain, WITHOUT a basal lobe (fig 26); wingless forms with the top of the thorax flattened.

***Biorhiza*** Westwood 1840 ♂♀ - (p. 135)

13.(9) (MALES) Claw WITHOUT basal lobe.

***Biorhiza*** Westwood 1840 ♂ - (p. 135)

- Claw WITH basal lobe..... 14

14.(13) Scutellar foveae JOINING, forming a broad, shallow depression (fig 27) ..... 15

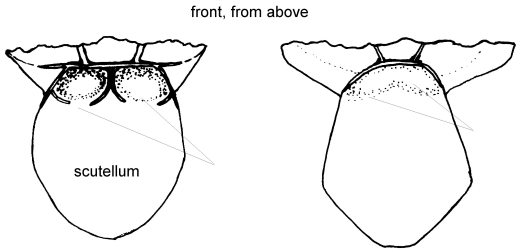



fig 28(res) fig 27(res)

- scutellar foveae clearly SEPARATED (fig 28) ..... 16



15.(14) Scutellar depression bordered at front by a SEMI-CIRCULAR carina (fig 29); no sub-ocular groove (see fig 31).

***Cynips*** Linnaeus 1758 ♂ - (p. 138)

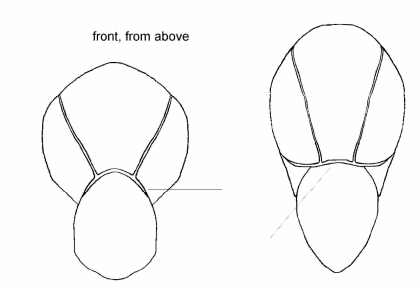



fig 29 fig 30

- Carina present between bottom of Scutellar depression, with a weaker but almost STRAIGHT carina at front (fig 30); WEAK sub-ocular groove present (fig 31).

*Neuroterus anthracinus (=Andricus anthracina)* ♂ Curtis (p. 102)

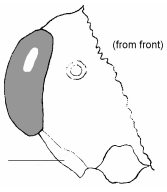



fig 31(res)

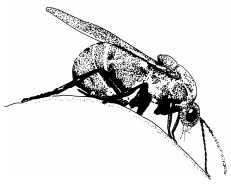
16.(14) NO carina between bottom of eye and clypeus; small clypeus with only partial projection of edge.

***Andricus*** Hartig 1840 ♂ - (p. 100)

- Carina PRESENT between bottom of eye and clypeus (fig 31); large clypeus which projects strongly and has square end.

***Trigonaspis*** Hartig 1840 ♂ - (p. 154)





# Causers found in British oak-galls

## Keys to Andricus species

1. CLEARLY **striate genae** (cheeks), **but may be nearly obscured** (check carefully where pubescence present; best under fluorescent light) (fig 1)..... 2

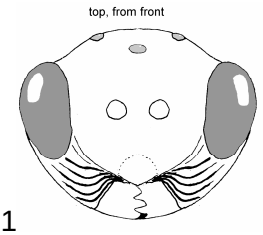



fig 1

- **Cheeks NOT extensively and clearly striate** (other Andricus may have striae around the lower cheeks and corner of mouth but these are neither well-defined nor extensive) .....3

2.(1) BLACK head, thorax & mesopleuron; antennae dark.

*lucidus*, Hartig ♂ - 'Hedgehog gall'

♂-(Body **2.9mm**, Wings/Body **132%.**
**13** antennal segments.
Hunched, black head & thorax; dark & chestnut gaster; dark antennae; brown legs)

Flying: from **January to April**

- CHESTNUT & BLACK head & thorax; mesopleuron largely black with some brown or chestnut below; first part of antennae more or less pale, darkening completely for last seven or so segments (fig 2).

*grossulariae* Giraud 1859 ♂ - an acorn gall

♂-(Body **3.1mm**, Wing/Body **130%.**
**13** antennal segments.
Bulky, hunched, with segmented gaster; chestnut & black head & thorax; chestnut gaster; chestnut & black legs; pale & dark antennae)

Flying from **January to April**


fig 2



3.(1) **males (♂):** third antennal segment ALWAYS bent or distorted (fig 3); without a ventral spine (fig 4).....4

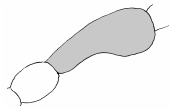


fig 3

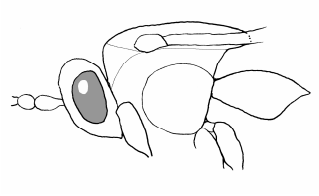


fig 4

- **females (♀ϑ):** STRAIGHT third antennal segment (fig 5); gaster with obvious ventral spine (fig 6) .....21

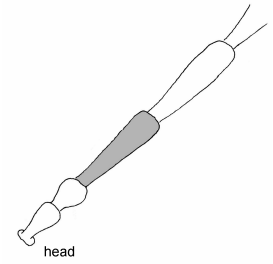



fig 5

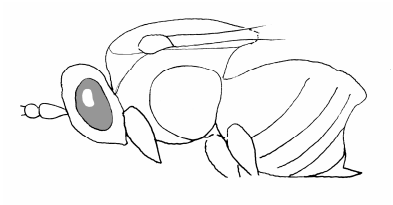


fig 6



4.(3) (**all males**) Third antennal segment usually shorter and broader, distinctly CURVED; dorsally flattened and excavate, sometimes expanded at the outer end (fig 7); foveae of scutellum distinctly separated (fig 8), often deep, or in colour-contrast to rest of the area; antenna with 14 to 15 segments; .....5

fig 7(res)

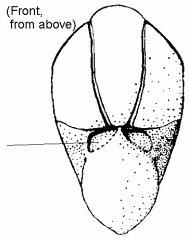



fig 8(res)

- Third segment LONG, dorsally flattened or slightly excavate (fig 9); foveae of scutellum shallow, weakly separated or running together (fig 9); antenna with 15, rarely 16, segments;.....6

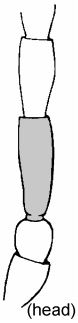



fig 9(res)

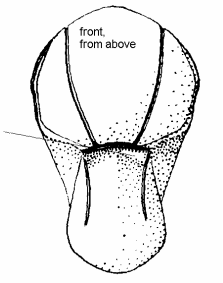



fig 10(res)



5.(4) Third antennal segment distinctly curved, dorsally flattened and excavate, but NOT expanded at outer end (fig 11); antenna with 15 segments ..... 8

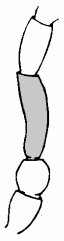


fig 11(res)

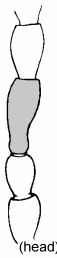
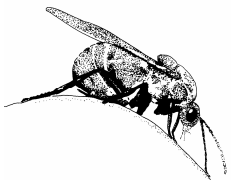



fig 12(res)

- Third segment curved and flattened at the back, excavate at inner and EXPANDED at the outer end (fig 12); antenna with 14 or 15 segments ..... 16





6.(4) OOL (distance between the outer edge of the rear ocellus and the edge of the closest compound eye) **at MOST equal to greatest width of an ocellus, sometimes less; POL** (distance between inner margins of the two rearmost ocelli) **at least twice OOL** (fig 13); **carinae of propodeum weak, sometimes hardly developed but, when present, always bowed strongly outwards** (fig 14) (difficult to see, view from behind with insect near-vertical).

*Neuroterus anthracinus* (Curtis) ♂ - 'Hairy-catkin gall'
*(=Andricus anthracina)*

♂-(Body **3.3mm**, Wing/Body **131%.**
**15/16** antennal segments.
Slender, lightly hunched, semi-glossy; dark brown, with brown antennae & yellow-brown legs)
Flying from **March to June**

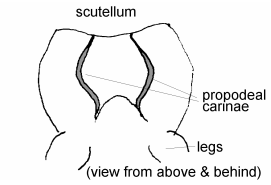


fig 14(res)

- OOL a little LONGER than greatest width of an ocellus; POL not more than 1.75 X OOL, usually less (fig 15); carinae of propodeum DISTINCT, near STRAIGHT and almost parallel .....7

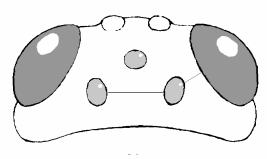


fig 13

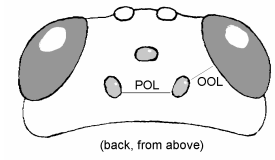


fig 15



7.(6) Mesoscutum smooth and SHINING; OOL a little more than the greatest width of a side ocellus.

*curvator* Hartig 1840 ♂ - 'Curved-leaf gall'

♂-(Body **2.0mm**, Wing/Body **138%.**
**15** antennal segments.
Black body; dark yellow antennae; dirty yellow legs)
Flying from **May to August**

- Mesoscutum weakly sculpted, NOT glossy; 'OOL' about 1.5 X greatest width of a side ocellus.

*inflator* Hartig 1840 ♂ -'Twig-gall'

♂-(Body **2.8mm**, Wing/Body **150%.**
**15/16** antennal segments.
Lightly hunched; dark brown body; yellow-brown legs & antennae; blocky, with heavily segmented gaster)
Flying from **March to August**

8.(5) Transfacial line LESS than the height of an eye (fig 16); ocelli large; OOL rarely more than greatest width of an ocellus (fig 17) .....14

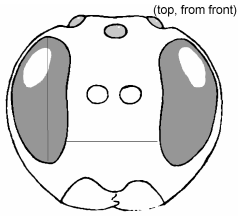



fig 16(res)

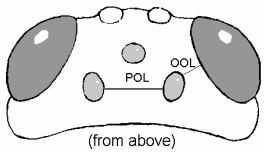



fig 17(res)

- Transfacial line AT LEAST as long as the height of an eye (fig 18); OOL always more than greatest width of an ocellus .....9

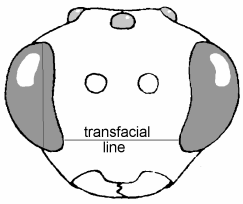



Fig 18(res)



9.(8) Transfacial line EQUAL to height of an eye ..... 13

- Transfacial line LONGER than the height of an eye OR head and thorax YELLOWISH-BROWN to BLACK; the rear margin of front ocellus very clearly in front of a line joining the front margins of the rear ocelli ..... 10

10.(9) Head, thorax and gaster BLACK; pedicel nearly spherical (fig 19); scape short and broad ..... 11

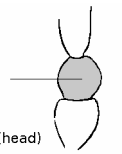



fig 19 (res)

fig 20 (res)

- Head and thorax YELLOW or YELLOW-BROWN; pedicel clearly a little longer than broad (fig 20); long scape ..... 12

11.(10) Scutellum weakly sculpted and DULL in the middle.

*fecundator* (Hartig 1840) ♂ - 'Hairy-catkin gall'

♂-(Body **1.6mm**, Wing/Body **144%.**
**14** antennal segments.
Black to brown head & thorax; dark brown gaster; brown and yellow legs; golden-Brown antennae)

Flying from **May to August**

- Scutellum smooth & SHINING in middle.

*nudus* Adler 1881 ♂ - 'Bald-seed gall'

♂-(Body -mm, Wing/Body -%;
**15** antennal segments
All black body)

Flying during **May & June**



12.(10) Head, thorax and gaster YELLOW-BROWN; legs and underside of scape, pedicel and third antennal segment pale yellow; remainder of antenna brownish-yellow; antennal sensillae pale and distinct.

*callidoma* (Hartig 1841) ♂ - 'Tufted gall'

♂-(Body **1.5mm**, Wings/Body **153%;**
**15** antennal segments.
Yellow-brown body, with contrasting dark eyes; yellow legs & antennae)
Flying during **May & June**

- Head and thorax yellow to rich brown, gaster dark BROWN; legs and antennae yellow, the former a little paler; sensillae scarcely paler than flagellar segments and difficult to distinguish.

*quercusramuli* (Linnaeus 1761) ♂ - 'Cotton-wool gall'

♂-(Body **2.1mm**, Wings/Body **130%.**
**15** antennal segments.
Head & thorax orange-yellow; gaster variably dark chestnut; translucent yellow antennae & legs)
Flying from **May to August**



13.(9) Pedicel slightly flattened but appearing near SPHERICAL, (fig 21); top of head, part of the rear of mid-thorax, part lower thorax, and underside of thorax and gaster, red-brown to brown.

*glandulae* (Hartig 1840) ♂ - on catkin

♂-(Body **1.6mm**, Wing/Body **150%.**
**15** antennal segments.
Translucent yellow-brown head; dark yellow-brown thorax; two-tone brown gaster; yellow to darker antennae; beige-yellow legs)

Flying during **May & June**

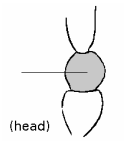



fig 21 (res)

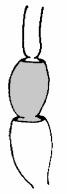


fig 22 (res)

- Pedicel 1.5 X LONGER than wide (fig 22); the ocellar triangle, mid-area underneath the thorax, back and apex of gaster, reddish-brown.

*amenti* Giraud 1859 ♂ - 'Hairy-catkin gall'

♂-(Body **2.8mm**, Wings/Body **148%.**
**15** antennal segments.
yellow and brown head; chestnut-yellow & brown thorax; dark & paler yellow-brown gaster; translucent yellow legs & yellow antennae)

Flying from **May to July**



14.(8) Temples SIMILAR width to eyes (fig 23).

*quercuscorticis* (Linnaeus 1761) ♂ - 'The bud-gall'

♂-(Body **?mm**, Wings/Body **?%**.
**15** antennal segments.)
Flying during **May & June**

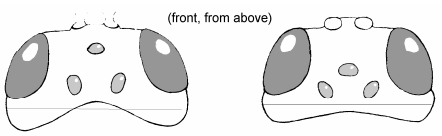



fig 23(res) fig 24(res)

- Temples DILATED behind (fig 24); ..... 15

15.(13) Head, gaster and thorax REDDISH-YELLOW; antennae rich yellow; legs testaceous.

*testaceipes* Hartig 1840 ♂ - 'Leaf-vein gall'

♂-(Body **?mm**, Wings/Body **?%**.
**15** antennal segments)
Reddish-yellow body; yellow legs & antennae)
Flying during **August & September**

- Head, thorax and gaster DARK BROWN; yellow legs; the first three antennal segments yellow, the remainder dark.

*quercusradicis* (Fabricius 1798) ♂ - 'The knot-gall'

♂-(Body **2.5mm,** Wings/Body **159%;**
**15** antennal segments.
Hunched & blocky; dark brown body; yellow legs & antennae)
Flying from **July to November**



16.(5) Vertex RUGOSE (fig 25).....17

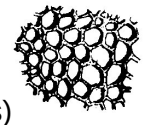


fig 26(res)

fig 25(res)

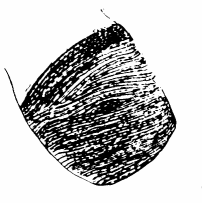


fig 27 (res)

- Vertex RETICULATE (fig 26); mesepimeron entirely closely striate longitudinally (fig 27).....19

17.(16) THREE-QUARTER length median line; mesoscutum with transverse rugose striae at front changing to sloping backwards on either side of median line (fig 28); 14 antennal segments.

*grossulariae* Giraud ♂ on Turkey-oak catkins

♂-(Body **1.9mm**; Wing/Body **143%.**
**14** antennal segments.
Hunched, bulky; black head & thorax; black-brown gaster; largely yellow legs; yellow antennae)

Flying during **June & July**

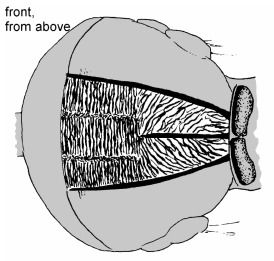



fig 28

- NO median line; mesoscutum other than this.....18



18.(17) FIFTEEN antennal segments; mesepimeron closely longitudinally striate (*see* fig 27, *on previous page*); golden scape, rest of antennal segments dark yellow, becoming dark near tip; centre of mesoscutum reticulate, with coriaceous (leathery) microsculpture.

## *solitarius* (Boyer de Fonscolombe 1832) ♂ - on catkin

♂-(Body **3.3mm,** Wings/Body **146%.**
**15** antennal segments.
Hunched; black head & thorax; very dark brown gaster; dark yellow legs; brown antennae, darkening near tip)

Flying during **April**

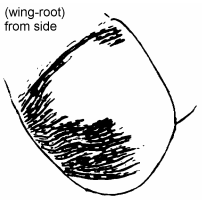



fig 29 (res)

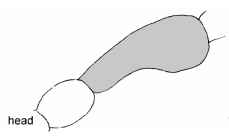



fig 30

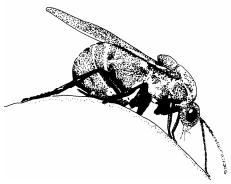
● FOURTEEN antennal segments; mesepimeron with comparatively widely-spaced longitudinal striae (fig 29); all golden antennae; centre of mesoscutum coarsely rugose; male third antennal segment as in (fig 30).

## *lucidus* (Hartig 1843) ♂ - Turkey oak catkin

♂-(Body **2.5mm**, Wings/Body **125%.**
**14** antennal segments.
Hunched; black head & thorax; translucent chestnut gaster; translucent gold antennae & legs)

Flying during **February & March** and in **September**





19.(16) **Mesoscutum ALL reticulate** (*view from side/above*).

***quercuscalicis*** (Burgdorf 1783) ♂ - on Turkey-oak catkin

♂-(Body **1.3mm,** Wings/Body **160%.**
**14** antennal segments.
Hunched; black body; golden-brown legs; translucent gold antennae with dark tip)
Flying from **April to June**

- **Mesoscutum reticulate at front, longitudinal STRIAE at back** (fig 31) (*view from side/above*) ..... 20

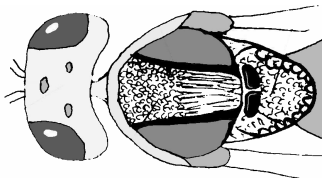


fig 31



20.(19) **For the following three, apparent visual differences have proved unreliable. However, two sets of ANTENNAL RATIOS (fig 32), expressed as percentages* and read together, appear reliable in separating the species. All three species are dark, with normally dark antennae and dark legs tapering to lighter, though these last may vary** (Antennal colours vary over numbers of specimens, although apparently providing differences between species in many instances; see 'descriptions' in Section 3) and special section at the end of *Andricus*, p.132

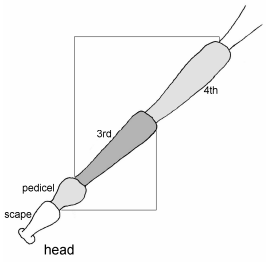



fig 32

- **3rd/pedicel 210-250%; 3rd/4th 139-140%**

  ***kollari*** (Hartig 1843) ♂ - on Turkey-oak buds

  ♂-(Body **1.8mm**, Wing/Body **173%.**
  **14** antennal segments.
  Hunched, dark brown to black head & thorax; black gaster; dark brown & gold legs; translucent gold or pale brown antennae)
  Flying from **March to June.**

- **3rd/pedicel 230/300%; 3rd/4th 142/145%.**

  ***corruptrix,*** (Schlechtendal 1870) ♂ - in Turkey-oak bud

  ♂-(Body **1.7mm**, Wing/Body **167%.**
  **14** antennal segments.
  Hunched; black body; dark brown antennae; brown legs with lighter ends)
  Flying during **April & May**

- **3rd/pedicel 170/200%; 3rd/4th 111-125%**

  ***lignicola*** (Hartig 1840) ♂ - in Turkey-oak bud

  ♂-(Body **1.9mm**, w/b **161%:**
  **14** antennal segments.
  Hunched; black body; brown antennae; dark legs lightening at end; colour varies in intensity)
  Flying from **March to June**, and during **September**

*Antennal ratio '3rd/pedicel' = say, $^{18}/_{12}$ X 100 = 150%



21.(3) **(all females)** Head viewed from above, with width across temples not more than 2.5 X depth at centre, with temples NOT dilated behind eyes (fig 33); body not pubescent **(all sexual forms except one)**.....22

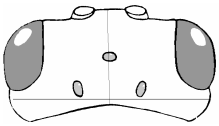


fig 33(res)

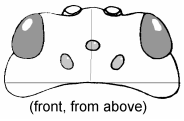



fig 34(res)

- Head, viewed from above, with width at temples at least 3 X depth, and with temples CONSPICUOUSLY dilated behind eyes (fig 34); body often pubescent **(all are agamic forms)**. .....40

22.(21) Ventral spine projection short, BLUNT at the tip and with long close hairs (fig 35); gaster strongly compressed; propodeal carinae strongly bowed outwards (fig 36) (difficult to see, view from behind with insect tilted to near-vertical); mesepimeron rather smooth and shining.....23

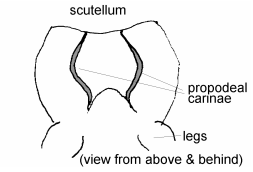



fig 36(res)

- Ventral spine projection ACUTE apically, sparsely hairy, with no distinct end tuft, often long or very long (fig 37); gaster not strongly compressed; mesepimeron more often not completely smooth and shining.....24

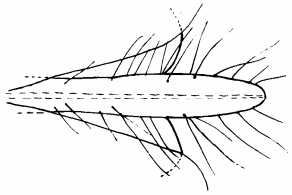


fig 35(res)

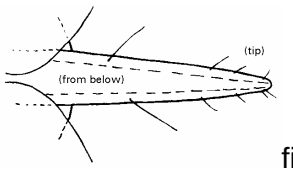



fig 37(res)



23.(22) Whole body BLACK; gaster with no pubescence; transfacial line equal to, or a little shorter than, the height of an eye (fig 38).

*Neuroterus anthracinus* (Curtis) ♀ - 'April-bud gall'
*(=Andricus anthracina)*

♀-(Body **2.2mm,** Wings/Body **144%.**
**15** antennal segments.
Long-winged; black body; yellow legs & dark antennae)

Flying from **March to June**

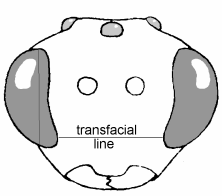



fig 39(res)

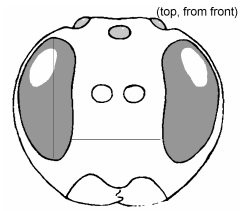



fig 38(res)

- Body partly YELLOW-BROWN; fine pubescence only at base of gaster; transfacial line clearly longer than the height of an eye (fig 39).

*Neuroterus anthracinus* (Curtis) ♂ - 'Oyster gall'
*(=Andricus anthracina)*

♂-(Body **2.2mm**, Wings/Body **133%;**
**13** antennal segments.
Red-brown head & striped thorax; large yellow-brown gaster; yellow legs; yellow-brown antennae)

Flying from **September to December** and during **March & April.**



24.(22) Mesoscutum wholly, or in part, smooth, or leathery (fig 40) ..... 25

fig 40(res) fig 41(res) fig 42(res)

- Mesoscutum pustulate/rugose (fig 41), or reticulate (fig 42) ..... 35

25.(24) Head and Thorax entirely BLACK, gaster black or dark red; from the side, gaster equal in size to thorax, or a little smaller; antenna with 13/14 segments ..... 26

- Head and thorax entirely YELLOW, YELLOW-BROWN or pale RED, antenna with 13 segments ..... 30

- Head RED or BLACK; thorax dark BROWN to BLACK; gaster YELLOW to RED, sometimes black at the end; 13 antennal segments ..... 33



26.(25) Ventral spine projection very LONG (fig 43); mesoscutum and mesepimeron often smooth and shining, sculpture weak or absent ..... 27

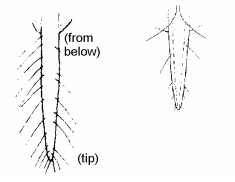



fig 43(res) fig 44(res)

- Ventral spine projection comparatively SHORT (fig 44); mesoscutum and mesepimeron always with sculpture..... 28

27.(26) Gaster BLACK; mesepimeron smooth and SHINING; transfacial line equal to, or not visually longer than, the height of an eye.

*curvator* Hartig 1840 ♀ - 'Curved-leaf gall'

♀-(Body **2.3mm,** Wings/Body **131%.**
**14** antennal segments.
Moderately hunched; black body; paler & darker chestnut antennae; yellow-brown legs; strong wing veins)

Flying from **May to August**

- gaster mainly RED; mesepimeron very weakly, longitudinally rugulose at the front; transfacial line clearly longer than the height of an eye.

*inflator* Hartig 1840 ♀ - 'Twig-gall'

♀-(Body **3.6mm**, Wings/Body **145%.**
**14** antennal segments.
Heavily hunched; dark brown head & thorax; translucent red-brown gaster; testaceous legs; yellow antennae)

Flying from **March to August**

28.(26) Gaster ENTIRELY black or dark chestnut-red; the mid-back of the mesoscutum, and most of the mesepimeron, are smooth and shining; ..... 29

- Gaster ONLY red beneath; mesoscutum and mesepimeron entirely sculpted & dull..... 31



29.(28) All femora in greater part BROWN, with extremities dark yellow; forewing with radial cell broader and vein Rs2 evenly curved (fig 45) (*a difficult comparison*).

***fecundator*** (Hartig 1840) ♀ -
'Hairy-catkin gall'

♀-(Body **1.6mm,** Wings/Body **141%;**
**13/14** antennal segments.
All black or red-brown body; brown & yellow legs; golden-brown antennae)
Flying from **May to August**

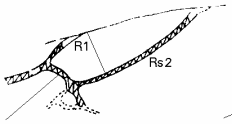



fig 45(res)

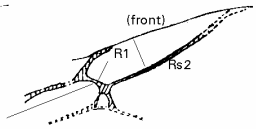



fig 46(res)

- All legs yellow, with femora DARK YELLOW; forewing with radial cell narrower and Rs2 weakly curved at the far end and almost straight at the body end (fig 46).

***nudus*** Adler 1881 ♀ - 'Bald-seed gall'

♀-[Body **1.5mm**, Wings/Body **145%;**
**13** antennal segments.
Squat, hunched; rich dark brown body; all yellow legs & antennae)
Flying during **May & June.**



30.(25) Forewing with RS2 EVENLY curved over the greater part of its length (fig 47); radial cell relatively broad (both difficult features, check carefully) ..... 31

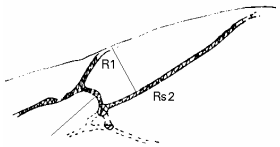



fig 47(res)

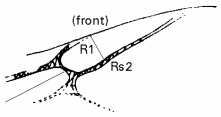



fig 48(res)

- Forewing with Rs2 weakly curved at start but almost straight or weakly waved later (fig 48); radial cell comparatively narrow..... 32

31.(28/30) Ventral spine projection comparatively SHORT (fig 49) head, thorax and dorsal apex of gaster yellow to dark brown or black; mesepimeron almost entirely longitudinally striate.

*callidoma* (Hartig 1841) ♀ - 'Tufted gall'

♀-(Body **1.5mm**, Wings/Body **135%.**
**13** antennal segments.
Mid-brown head & thorax; yellow legs, antennae & gaster)
Flying during **May & June**

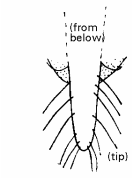



fig 49(res)

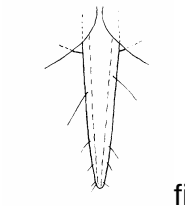


fig 50(res)

- Ventral spine projection LONG (fig 50); head & thorax yellow; gaster yellow to chestnut, paler or darker; mesepimeron with large smooth area on the top, at the front.

*quercusramuli* (Linnaeus 1761) ♀ - 'Cotton-wool gall'

♀-(Body **1.7mm**, Wings/Body **142%.**
**13** antennal segments.
Pale to darker orange-yellow body; yellow legs & antennae)
Flying from **May to August**



32.(30) Gaster dark RED; dark brown markings on the back of, and below, the thorax.

*glandulae* (Hartig 1840) ♀ - on catkins

♀-(Body **1.5mm**, Wings/Body **139%.**
**13** antennal segments.
Slight; brown & yellow head; mid-brown thorax; two-tone brown gaster; yellow to darker antennae; beige-yellow legs)

Flying during **May & June**

- Gaster REDDISH-YELLOW, red-brown at tip; thorax yellow, sometimes weakly marked with brown beneath.

*amenti* Giraud 1859 ♀ - 'Hairy-catkin gall'

♀-[Body **2.4mm**, Wing/Body **150%;**
**13** antennal segments.
Dark yellow head; yellow-brown thorax; reddish-yellow gaster; yellow-brown legs & antennae)

Flying from **May to July**

33.(25) Head giving a transversely oval appearance from the front (fig 51); the distance across head at temples much the same as across the head, at the eyes (fig 52).

*quercuscorticis* (Linnaeus 1761) ♀ - 'The bud gall'

♀-(Body **2.8mm**, Wing/Body **123%.**
**13** antennal segments)

Flying during **June**

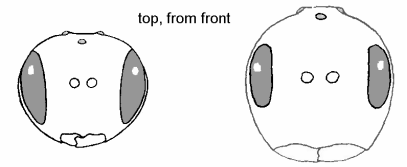



fig 51(res) fig 53(res)

- Head near circular from the front (fig 53), distance across head at temples clearly GREATER than across head at eyes (fig 54) .... 33

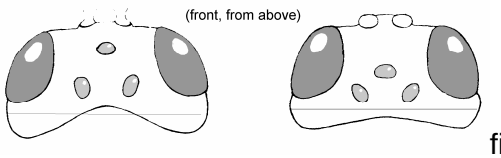



fig 52(res) fig 54(res)



34.(33) BLACK head & thorax; chestnut legs & antennae.

*testaceipes* Hartig 1840 ♀ - 'Leaf-vein gall'

♀-(Body **1.5mm,** Wing/Body **149%.**
**13** antennal segments.
Hunched; black head & thorax; chestnut gaster, legs & antennae; large ploughshare)
Flying during **August & September**

- YELLOW head, legs & antennae; striped yellow & black thorax.

*quercusradicis* (Fabricius 1798) ♀ - 'Knot-gall'

♀-(Body **3.0mm,** Wing/Body **131%; 13** antennal segments.
Yellow head, contrasting dark eyes; striped yellow-black thorax; testaceous-chestnut gaster; yellow legs & antennae)
Flying from **July to November**

35.(24) DARK BROWN head & thorax; chestnut gaster; golden scape; gold pedicel; mesoscutum pustulate/rugose (fig 55) in parts.

*solitarius* (Boyer de Fonscolombe 1832) ♀ - on catkins

♀-(Body **2.8mm**, Wing/Body **131%.**
**13** antennal segments.
Hunched; dark brown, granulated head & thorax; chestnut gaster; yellow legs & antennae)
Flying during **April**

fig 55 (res)

- BLACK head & thorax..... 36

36.(35) Mesoscutum AT LEAST part-reticulate (fig 56) ..... 37

fig 56 (res)

- mesoscutum WITHOUT any reticulation..... 38



37.(36) Mesoscutum ALL reticulated; black gaster; golden scape, pedicel and flagellum.

***quercuscalicis*** (Burgdorf 1783) ♀ - on Turkey-oak catkin

♀-(Body **1.4mm,** Wings/Body **153%.**
**13** antennal segments.
Hunched; black head, thorax & gaster; mainly golden legs; translucent gold antennae with dark tips)

Flying from **April to June**

- mesoscutum reticulated at front; longitudinal STRIAE at back (fig 57) (*view from side/above*) ..... 39

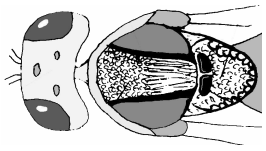


fig 57

38.(36) Mesoscutum with TRANSVERSE rugose striae at front, changing to angled on either side of median line (fig 58).

***grossulariae*** Giraud ♀ - on Turkey-oak catkins

♀-(Body **2.1mm**; Wing/Body **114%.**
**13** antennal segments.
Hunched, bulky; black head & thorax; black-brown gaster; gold-brown antennae with dark tip; dark legs)

Flying during **June & July**

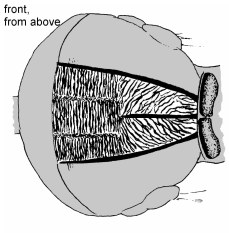



fig 58

- mesoscutum ALL rugose, without the striae shown above.

***lucidus*** Hartig ♀ - on Turkey-oak catkins

♀-(Body **2.8mm**; Wing/Body **119%.**
**13** antennal segments.
Black head & thorax; translucent dark & chestnut-gold gaster; golden antennae with dark tips; chestnut-buff legs)

Flying during **February, March & September**



39.(37). **In the following three, apparent visual differences have proved unsatisfactory; however, TWO sets of antennal ratios, expressed as %, are reliable in separating the species when read together. All have dark bodies, with dark antennae and dark legs tapering to lighter tarsi, though both may vary** (Antennal colours vary over numbers of specimens, although apparently providing differences between species over many instances; see 'descriptions' in Section 3).

- **3rd/pedicel 200-220%; 3rd/4th 118-120%**

  ***kollari*** (Hartig 1843) ♀ - on Turkey-oak buds

  ♀-(Body **1.8mm**, Wing/Body **158%.**
  **13** antennal segments.
  Hunched; black head & thorax; dark brown gaster; brown to yellow legs; dirty yellow antennae)
  Flying from **March to June**

- **3rd/pedicel 230/250%; 3rd/4th 122/130%.**

  ***corruptrix*** (Schlechtendal 1870) ♀ - in Turkey-oak bud

  ♀-(Body **1.9mm**, Wing/Body **157%.**
  **13** antennal segments.
  Hunched, black head & thorax; black-brown gaster, brown to dirty yellow legs; dark brown antennae)
  Flying during **April & May**

- **3rd/pedicel 170/200%; 3rd/4th 116-120%**

  ***lignicola*** (Hartig 1840) ♀ - in Turkey-oak bud

  ♀-(Body **1.8mm**, w/b **154%.**
  **13** antennal segments.
  Hunched; black head & thorax; black-brown gaster; dark brown antennae; brown & yellow legs lightening at end)
  Flying from **March to June** and during **September**

40.(21) **(all agamic forms)** Head and thorax DARK; gaster chestnut or darker; antenna with at least 14 articulated segments; at most very weakly pubescent ..... 41

- All YELLOW, YELLOW-BROWN or RED; if sometimes more heavily marked with black, then conspicuously pubescent, or antenna with only 13 segments ..... 43



41.(40) Mesoscutum alutaceous (fig 59), sometimes lightly, but shining, with NO pubescence in the middle.

*curvator* Hartig 1840 ♂ - 'Collared-bud gall'

♂-Body **2.8mm,** Wing/Body **125%; 14** antennal segments.
Glossy, hunched; dark brown head; black thorax; chestnut gaster, legs & antennae)
Flying during **March & April**

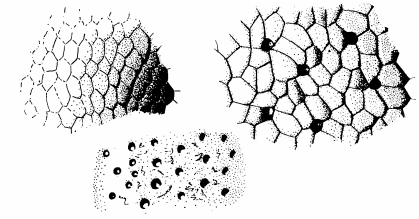


**fig 59**(res) **fig 60**(res) **fig 61**(res)

- Mesoscutum with short SPARSE pubescence, either punctate (fig 60) or coriaceous (fig 61), ..... 42

42.(41) Face & mesoscutum faintly CORIACEOUS (leathery); some shallow punctures.

*inflator* Hartig 1840 ♂ - 'Globular gall'

♂-(Body **1.9mm**, Wing/Body **143%.**
**14/15** antennal segments.
Dark brown head & thorax; dark to chestnut gaster; chestnut-yellow legs; darker or yellow-chestnut antennae)
Flying during **March, April & October**

- Face & mesoscutum clearly PUNCTATE, with smooth interspaces.

*fecundator* (Hartig 1840) ♂ -
'Artichoke gall'

♂-(Body **3.5mm**, Wing/Body **127%;**
**14** antennal segments.
Striking bright insect; black head & thorax; bright chestnut gaster; dark antennae, brown legs)
Flying during **March & April**



43.(40) Mesoscutum at most WEAKLY pubescent; scutellum often without pubescence, alutaceous or coriaceous in the middle at least ..... 44

- Mesoscutum STRONGLY pubescent; scutellum pubescent, rugose, rugulose or punctate in the middle..... 49

44.(43) The median scutal line shows as a short, shallow but DISTINCT furrow (fig 62), or the equivalent length in a series of distinct foveae, which together are at least as long as the distance between the notaulices at the rear edge of the mesoscutum (fig 63)..... 45

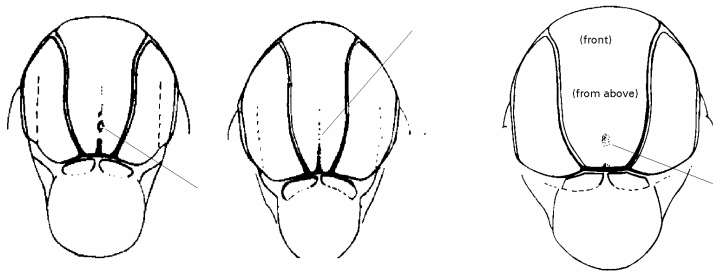



fig 63(res) fig 62(res) fig 64(res)

- Median scutal line ABSENT, or consisting at most of a very shallow truncate fovea, or one or two shallow or rudimentary punctures near the back (fig 64)..... 47



45.(44) **Median line completely interrupted, narrowly or broadly, once or twice** (variable and difficult to appreciate in many specimens. For this generation, the species in this couplet are ideally separated by the galls from which they arose)**; rear furrow of median line conspicuously shorter than the distance between notaulices at back edge of mesoscutum** (fig 65).

*nudus* Adler 1881 ♂ - 'Malpighi's gall'

♂-(Body **2.9mm**, Wing/Body **145%.**
**14** antennal segments.
black head; chestnut-yellow & dark thorax; dark & chestnut-yellow gaster; dirty pale chestnut legs; dark yellow-chestnut antennae)
Flying in **March, April** and during **October**

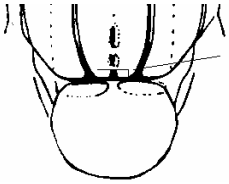


fig 65(res)

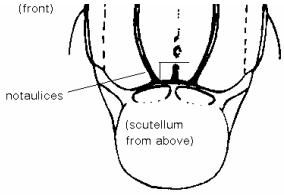



fig 66(res)

- **Median line NOT completely interrupted or, if wholly or partially interrupted, then posterior furrow of line about as long as distance between notaulices at the back margin of mesoscutum** (fig 66)..46



46.(45) Median line clearly LONGER than distance between the notaulices at posterior margin of mesoscutum, sometimes shallow near middle and almost interrupted (fig 67).

*seminationis* (Giraud 1859) ♂ - 'Spindle-gall'

♂-(Body **3.0mm**, Wing/Body **141%.**
**14** antennal segments.
Hunched & sturdy; gold head; translucent red-gold thorax; testaceous gaster; gold-brown legs; brown antennae)

Flying from **March to May**

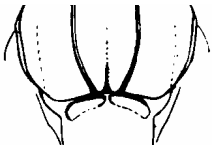


fig 67(res)

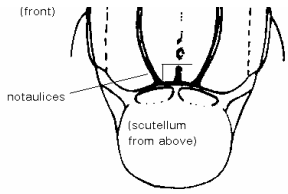



Fig 68(res)

- Median line about AS long as distance between the notaulices at the back of the mesoscutum (fig 68).

*quadrilineatus* Hartig 1840 ♂ - 'Furrowed-catkin gall'

♂-(Body **2.6mm**, Wing/Body **147%.**
**14** antennal segments.
Heavily hunched; orange-brown head; orange & dark-striped thorax; golden chestnut & dark gaster; orange-brown legs & antennae)

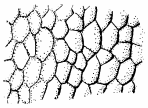
Flying from **February to April**



47.(44) Mesoscutum ALUTACEOUS (fig 69), less developed in the middle; with some punctures in the centre at the front; sometimes the median line is shown at the back in the form of two or three long shallow depressions (fig 70).

*albopunctatus* Trotter ♂ - 'Spotted-bud gall'

♂-(Body **2.9mm**, Wing/Body **142%.**
**14** antennal segments.
Steeply hunched; chestnut & dark head; chestnut & dark-striped thorax; dark & golden gaster; dark antennae & golden-brown legs)
Flying during **March & April**



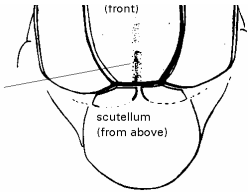



fig 69(res) fig 71(res) fig 70(res)

- Mesoscutum CORIACEOUS (fig 71) ..... 48

- Mesoscutum almost SMOOTH & SHINY, with only sparse hairs on the front, sides and along the distinct full-length notaulices; median line absent or consisting only of one or two shallow depressions; conspicuous projection in the radial cell of the first abscissa of the radius of the forewing (fig 72).

*legitimus* ♂ - 'Stunted acorn gall'

♂-(body **4.5mm approx.**, wing/body **%**;
**14** antennal segments.
Hunched; chestnut & black head; dark-striped chestnut thorax, dark antennae & legs)
Flying: in **April, May** and during **September.**

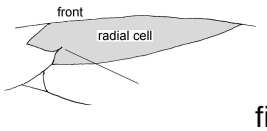



fig 72



48.(47) **mesoscutum ALMOST without pubescence; scutellum only sparsely pubescent; there is a short longitudinal carina at the back of the area between the main propodeal carinae (**look from behind, with insect almost vertical**);.**

*glandulae* (Hartig 1840) ♂ - 'Thatched gall'

♂-(Body **3.3mm**, Wing/Body **132%.**
**14** antennal segments.
Hunched; golden-brown body & legs; brown antennae)
Flying in **March, April** and during **October**

- **Mesoscutum and scutellum finely but CLEARLY pubescent; area between carinae on propodeum without a longitudinal carina;.**

*callidoma* (Hartig 1841) ♂ - 'Stalked-spindle gall'

♂-(Body ?mm, Wing/Body ?%.
? antennal segments)
Flying during **March & April.**

*quercusramuli* (Linnaeus 1761) ♂ - 'The autumn-gall'

♂-(Body ?mm, Wing/Body ?%.
? antennal segments)
Flying from **March to June.**

(these insects appears to key out at the same place (see RES Handbook Vol. V11, Part 1 [a]). No British specimens have been examined by the RES or myself to confirm this or otherwise)



49.(43) Mesoscutum DISTINCTLY punctate; the area between the punctures smooth and shining, alutaceous or weakly coriaceous ..... 50

- Mesoscutum rather dull alutaceous, WITHOUT punctures, or at most with these very sparse, weak, indistinct and obscured by other sculpture ..... 53

50.(49) Carinae of propodeum bowed outwards in middle, weakly converging at the back and front(fig 73); and of approximately even thickness throughout, ..... 51

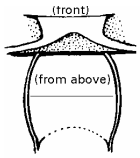


fig 73(res)

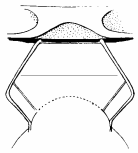


fig 74(res)

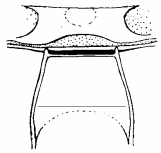


fig 75(res)

- Carinae of propodeum strongly diverging from the back, then angled sharply in well before the middle (fig 74); or nearly parallel (fig 75) ..... 52



51.(50) head brownish-red, extensively black marked on top; rear of mesoscutum strongly STRIPED red & black (fig 76); middle lobe of mesoscutum closely punctate at the back, punctures separated from each other by clearly less than their width; gaster pubescent on side and behind; mesepimeron yellow-brown, with black at lower edge; strikingly longitudinally-striped black & orange femora.

*quercuscalicis* (Burgsdorf 1783) ♂ - 'Knopper gall'

♂-(Body **4.8mm**, Wing/Body **130%;**
**14** antennal segments.
Steeply hunched, bulky; black & orange head & striped thorax; mainly black gaster; dark antennae; orange & black-striped legs)

Flying from **October to April**

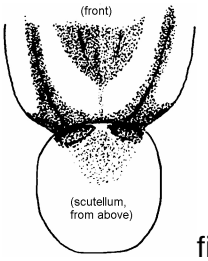


fig 76

- Head dark brown, face, frons and vertex marked with black; thorax MOSTLY black; the front of the mid-lobe of mesoscutum leathery, with sparse punctures, separated from each other by much more than their width; gaster shining, without pubescence except at extreme base.

*quercuscorticis* (Linnaeus 1761) ♂ - 'The bark-gall'

♂-(Body **3.7mm**, Wing/Body **117%.**
**14** antennal segments.
dark brown head; brown thorax with black; bright chestnut gaster; light chestnut legs; paler & dark antennae. fourteen antennal segments)

Flying from **April to July**



52.(50) Carinae of propodeum near-PARALLEL (fig 77) (difficult to spot, view from behind); head and thorax reddish, extensively marked with black; mesepimeron BLACK.

*quercusradicis* (Fabricius 1798) ♂ - 'Truffle gall'

♂-(Body **3.8mm,** Wing/Body **131%.**
**14** antennal segments.
Hunched; red-brown head & antennae; black-striped red-brown thorax; orange gaster & legs)

Flying during **March & April**

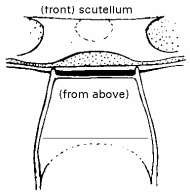



fig 77(res)

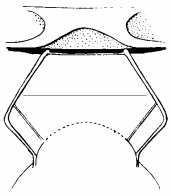


fig 78(res)

- Propodeal carinae strongly DIVERGING from the back, then angled sharply in before the middle (fig 78); mesepimeron, & much of head and thorax, CHESTNUT or yellow; mesepimeron largely smooth except for narrow band of striae above and a patch of punctures at back.

*testaceipes* Hartig 1840 ♂ - 'Red-barnacle gall'

♂-(Body **4.0mm**, Wing/Body **124%;**
**14** antennal segments.
Hunched, granular; orange-brown head & legs; testaceous & dark thorax; orange-brown & chestnut gaster; testaceous antennae)

Flying from **February to April**

- Carinae of propodeum conspicuously THICKENED & DORSALLY flattened in upper third, weakly bowed after the middle; mesepimeron virtually smooth except for patch of punctures at back, dark chestnut.

*rhizomae* Hartig 1843 ♂ - on bark

♂-(Body **4.1mm**, Wing/Body **139%;**
**14** antennal segments.
hunched & bulky; mostly dirty chestnut head; dark thorax; chestnut gaster; dark antennae; mainly dark legs)

Flying during from **February to April**



53.(49) **Ventral spine projection SHORT** (fig 79); **mesepimeron mostly smooth and shining beneath fine pubescence, weakly rugulose on front margin.**

***solitarius*** (Boyer de Fonscolombe 1832) ♂ - 'Hairy-spindle gall'

♂-(Body **3.0mm**, Wing/Body **?%.**
**14** antennal segments
yellow-brown head, gaster, legs & antennae; dark thorax)
Flying during **August & September**

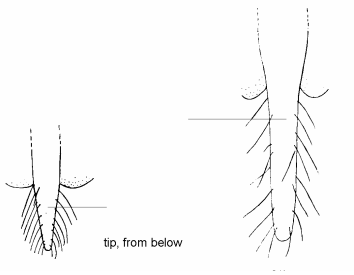



fig 79(res) fig 80(res)

- **Ventral spine LONG and slender** (fig 80); **mesepimeron sculpted in greater part, often entirely and always at the front** (the following cynipids are easily confused, so some features have been emphasised) ..... 54

54.(53) **Mesoscutum BI-COLOURED (with black patches)**..... 55

- **Mesoscutum basically all ONE COLOUR** ..... 56

55.(54) **VARIES from bright orange-brown to dark neutral-brown; antennae with at least the middle segments darkened** (fig 81), **but may be all dark neutral-brown; plain thorax; pale first main gastral segment, though a dark specimen may be near-black but not contrasting with other parts, which will also be dark.**

***corruptrix*** (Schlechtendal 1870) ♂ - 'a lobed gall'

♂-(Body **3.7mm**, Wing/Body **123%.**
**13** antennal segments.
Hunched, with segmented gaster; varies from light to darker; bright orange-brown body, legs & antennae)
Flying from **July to October**

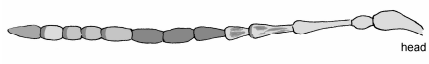



fig 81



56.(54) Mesoscutum yellow-brown, with MUCH pubescence, with herringbone pattern pale hairs (fig 82a**);** scutellar foveae (fig 82b) glossy chestnut to dark, with black carina above; mesepimeron all yellow-brown & hairy; antennae often with darker tip; length of antenna/body length around 55% (*see A. lignicola for comparison – these two insects are extremely similar*)

*kollari* (Hartig 1843) ♂ - 'Marble gall'

♂-(Body **5.1mm**, Wing/Body **117%.**
**13** antennal segments.
Steeply hunched; yellow-brown head, with only faintly-striped thorax; dark yellow gaster; yellow-brown legs & antennae)
Flying from **March to October**

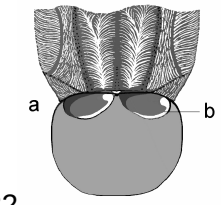


fig 82

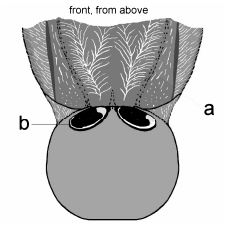


fig 83

- Golden-brown thorax with black foveae; mesoscutum without dark markings, with SPARSE but patterned hairs; (Fig 83), mesepimeron yellow-brown & hairy; antenna/body around 62%.

*lignicola* (Hartig 1840) ♂ - 'Cola nut'

♂-(Body **4.7mm**, Wing/Body **114%.**
**13**antennal segments.
Steeply hunched; bright yellow-brown body, antennae and legs)
Flying from **April to July** and during **November/December**

- Specimens are ALL orange-brown, with unmarked mesoscutum; mesepimeron translucent orange all over; antennae translucent orange-brown throughout; antenna/body around 66%.

*aries* (Giraud 1859) ♂ – 'Rams-horn gall'

♂**-(**Body **3.4mm**, Wings/Body **126%;**
**13** antennal segments.
Heavily hunched, segmented gaster; golden-chestnut head; orange-brown thorax, gaster, legs & antennae)
Flying during **April and May** & from **August to October**



# Significant features in distinguishing 4 closely-related, difficult to separate, Andricus species:

Four species with alternate generations on Sessile/ Pedunculate oaks and the Turkey oak, are similar to each other within each form. The tables summarise differences for identification where insects have been found free, without association with a particular gall.

AGAMIC FORMS

| ♂ | *A. aries* | *A. corruptrix* | *A. kollari* | *A. lignicola* | *A. quercuscalicis* |
|---|---|---|---|---|---|
| body length mm | 3.4 | 3.7 | 5.1 | 4.7 | 4.8 |
| wing/body% | 126 | 123 | 117 | 114 | 130 |
| Antennal segments | 13 | 13 | 13 | 13 | **14** |
| **Mesoscutum** | | | | | |
| colour | all one colour | bi-coloured | all one colour | all one colour | bi-coloured |
| hairiness | | | dense | lighter | |
| Foveae | black | black | chestnut | black | black |

SEXUAL FORMS

| ♀ | - | *A. corruptrix* | *A. kollari* | *A. lignicola* | *A. quercuscalicis* |
|---|---|---|---|---|---|
| body length mm | | 1.9 | 1.8 | 1.8 | 1.4 |
| Wing/Body % | | 157 | 158 | 154 | 153 |
| **Antennae** | | | | | |
| Number of segments | | 13 | 13 | 13 | 13 |
| Pedicel | | Dark | Darker | Dark | Golden |
| Scape | | Dark | Dirty yellow | Dark | Golden |
| Last 4 segments | | dark | Dirty yellow | dark | Darker |
| Rest of flagellum | | dark | Dirty yellow | dark | golden |
| 3rd/pedicel% | | 230-250 | 200-220 | 170-200 | 150-170 |
| 3rd/4th% | | 122-130 | 118-120 | 116-120 | 128 |
| **Mesoscutum** | | | | | |
| All reticulate | | | ✔ | | |
| Striae at back | | ✔ | | ✔ | ✔ |

| ♂ | - | *A. corruptrix* | *A. kollari* | *A. lignicola* | *A. quercuscalicis* |
|---|---|---|---|---|---|
| Size mm | | 1.8 | 1.7 | 1.9 | 1.3 |
| Wing/Body % | | 173 | 167 | 161 | 160 |
| **Antennae** | | | | | |
| Number of segments | | 14 | 14 | 14 | 14 |
| Pedicel | | Dark | Darker | Dark | Dark gold |
| Scape | | Dark | Dirty yellow | Dark | Golden |
| Last 4 segments | | dark | Dirty yellow | dark | Darker |
| Rest of flagellum | | dark | Dirty yellow | dark | golden |
| 3rd/pedicel% | | 230-300 | 210-250 | 170-200 | 180-200 |
| 3rd/4th% | | 142-145 | 139-140 | 111-125 | 125-133 |
| **Mesoscutum** | | | | | |
| All reticulate | | | ✔ | | |
| Striae at back | | ✔ | | ✔ | ✔ |



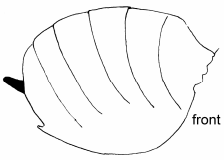
# Key to Aphelonyx species

1. Just one British species of which only the agamic generation is known.

*cerricola* (Giraud 1859) - ♂ - on Turkey-oak shoot

♂-(Body **5.5mm**, Wing/Body **126%**.
**14** antennal segments.
Hunched, heavy: bright chestnut-orange head & thorax; chestnut & dark gaster with stubby black tip; dark antennae; pale chestnut legs)

Flying from **August to March**




Gaster



# Key to Biorhiza species

1. The WINGED sexual generation; domed thorax.

   *pallida* (Olivier 1791) ♀ ♂ - 'The Oak apple'

   ♀-(Body **3.0mm**, Wing/Body **104%.**
   **14** antennal segments.
   Hunched; golden to brown body; legs & antennae)

   ♂-(Body **2.9mm**, Wing/Body **123%.**
   **15** antennal segments.
   Hunched, but slight build; chestnut-yellow head & thorax; chestnut gaster; yellow-brown legs & antennae)

   Flying: from **May to August**

- The agamic, WINGLESS generation; flat thorax.

   *pallida* (Olivier 1791) ☿ - on roots

   ☿-(Body **5.3mm**, Wings/Body **0%**
   **15** antennal segments.
   Very large segmented gaster; yellow-brown to orange body & legs; mid-brown & Orange antennae; wingless)

   Present: during **March** & from **September to December**



# Key to Callirhytis species

1. Claws with, AT MOST, a weak or blunt basal lobe (fig 1) ..... 2

fig 1(res)

fig 2(res)

- Claws with a POINTED basal tooth (fig 2).

  *bella* (Dettmer 1930) - ♀ ♂ - on bud

  ♀-(Body **1.9mm**, Wing/Body **120%**;
  **14** antennal segments.
  Brown head; dark thorax & chestnut gaster; golden-brown antennae & legs)

  ♂-(Body 1.6mm, Wing/Body 126%;
  15 antennal segments.
  Brown & orange head; black thorax & chestnut gaster; golden-brown antennae & legs)

  Flying from **April to July**



2.(1) Frons rugulose, with some transverse rugae in front of forward ocellus (fig 3).

*erythrocephala* (Giraud 1859) ♀♂ - in Turkey-oak acorn

♀-(Body **1.9mm**, Wing/Body **120%.**
**14** antennal segments.
Yellow-brown head; chestnut-brown thorax; glossy pale chestnut gaster; pale legs & antennae)

♂-(Body **1.7mm**, Wing/Body **135%.**
**16** antennal segments.
Black head & thorax; chestnut gaster; mid-brown antennae; pale translucent legs)

Flying from **March to July**

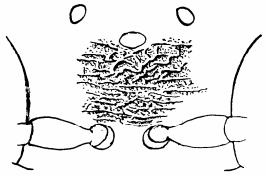


fig 3(res)

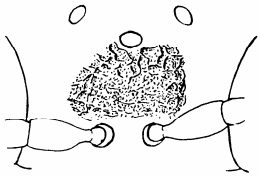


fig 4(res)

- Frons coriaceous in the middle, rugulose on the side (fig 4).

*erythrocephala* (Giraud 1859) ♂ - in Turkey-oak acorn

♂-(Body **3.0mm**, Wing/Body **122%;**
**15** antennal segments.
Steeply hunched; orange-brown head; black thorax; brown gaster; golden-brown legs; black & gold-brown antennae)

Flying from **April to July**



# Key to Cynips species

1. **(sexual generation, ♀♂)** ventral spine projection of female pointed and ACUTE at the end (fig 1); male 15, female 14 antennal segments.....2

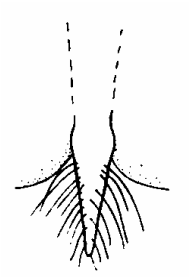


fig 1(res)

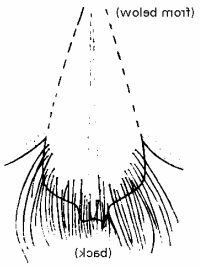



fig 2(res)

- **(agamic generation, ♂)** ventral spine BROAD & square-ended, or waved at the end (fig 2); antenna with 13 articulated segments, but the last segment consisting of 2 segments fused, with the line between indistinct.....5



2.(1) **(sexual)** Propodeum with carinae incomplete or interrupted in the front, and with the sculptured area in the middle narrower at front edge (fig 3) (stand insect near vertical and look beneath the scutellum); claws generally a little narrower (fig 4) .....3

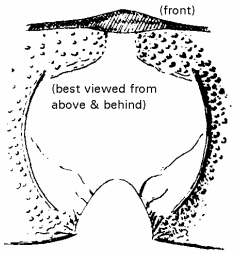



fig 3(res)

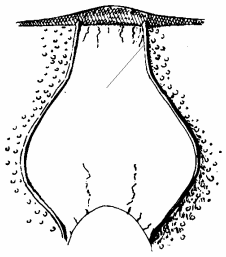


Fig 5(res)

- Propodeum with carinae complete, and enclosing a relatively unsculpted area which is broad at the front edge (fig 5); claws broad (fig 6) .....4

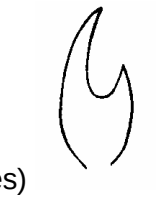


fig 4(res)

fig 6(res)



3.(2) Unsculpted central area of propodeum with front part differentiated from external areas of propodeum by only lightly defined CARINAE, which project into the transverse groove at the front (fig 7), (difficult to differentiate from next species - examine carefully, turning specimen); male frons lightly sculpted and shining.

*quercusfolii* Linnaeus 1758 ♀ ♂ - 'Violet-egg gall'

♀-(Body **2.3mm**, Wing/Body **134%;**
**14** antennal segments.
Translucent yellow-brown body; yellow legs & antennae)

♂-(Body **2.5mm**, Wings/Body **150%.**
**15** antennal segments.
Slender & glossy; dark brown body, yellow-brown legs & dark antennae)

Flying from **April to June**

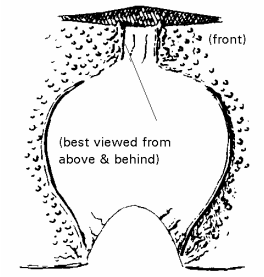



fig 7(res)

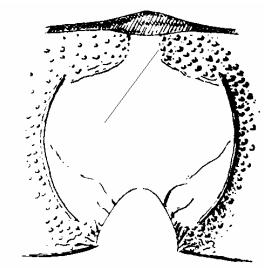


fig 8(res)

- unsculpted mid-area of propodeum with front part only differentiated from external areas of propodeum by ABSENCE of sculpture, not by carinae (fig 8); male frons leathery & dull.

*longiventris* Hartig 1840 ♀ ♂ - 'Green velvet-bud gall'

♀-(Body **2.5mm,** Wing/Body **140%.**
**14** antennal segments.
Semi-glossy, hunched; deep brown head & thorax; brown gaster; yellow legs; chestnut antennae)

♂-(Body **2.5mm**, Wing/Body **145%.**
**15** antennal segments.
Hunched, deep brown head & thorax; small dark brown gaster; yellow legs; dark antennae)

Flying during **May & June**



4.(2) From above, the width of the head across the temples is EQUAL to the width across the eyes (fig 9).

*divisa* Hartig 1840 ♀ ♂ - 'Red-wart gall'

♀-(Body **2.7mm**, Wing/Body **140%;**
**14** antennal segments.
Dark brown head & gaster; black thorax; yellow legs; pale & dark antennae; large gaster)

♂-(Body **2.2mm**, Wing/Body **158%.**
**15** antennal segments.
Dark brown head & gaster; dark neutral-brown thorax; deep yellow legs; brown antennae)

Flying during **May**

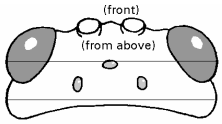



fig 9(res)

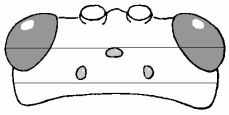


fig 10(res)

- From above, the width of the head across temples is LESS than the width across the eyes (fig 10).

*disticha* Hartig 1840 ♀ ♂ - on buds

♀-(Body **2.9mm**, Wing/Body **121%.**
**14** antennal segments.
Glossy body; hunched but not particularly bulky; black head & thorax; dark brown gaster; yellow legs; yellow-grey antennae)

♂-(Body **2.7mm**, Wing/Body **145%.**
**15** antennal segments.
Hunched, slender; with long wings; black head & thorax; dark brown gaster; brown & yellow legs; dark antennae; petiolate)

Flying during **May**



5.(1) **(agamic)** From the side, the 2nd gastral tergite is wedge-shaped, (fig 11); the remaining segments are minutely punctate; claws with small acute basal lobe (fig 12) .....6

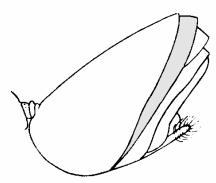


fig 11(res)

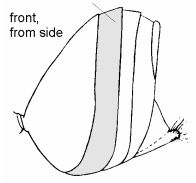



fig13(res)

- From side, 2nd gastral tergite near parallel (fig 13); other segments not punctate; claws with large, less acute lobe (fig 14)..8

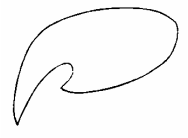


fig 12(res)

fig 14(res)

6.(5) BLACK gaster; mid-lobe of mesoscutum with some punctures - in the front and rear at least.....7

- Gaster, head, thorax, legs all RED-BROWN; mid-lobe of mesoscutum completely smooth;.

*agama* Hartig 1840 ♂ - 'Yellow-pea gall'

♂-(Body **3.0mm**, Wing/Body **154%.**
**13** antennal segments.
Hunched; chestnut body & legs; dark brown antennae)
Flying from **September to November**



7.(6) Head & thorax mostly BLACK, sometimes with reddish patches, particularly on the cheeks and the front of the mesoscutum; second gastral tergite completely smooth; front pair of tibiae oversized, hefty.

*quercusfolii* Linnaeus 1758 ♂ - 'Cherry gall'

♂-(Body **3.7mm**, Wing/Body **135%.**
**13** antennal segments.
Hunched & hairy; black with some brown on head; black thorax; brown-tinged black gaster; dark antennae; black & dark brown legs)

Flying from **September to March**

- Head & thorax REDDISH, marked with black; second gastral tergite narrowly & finely punctate at the back; fore tibiae normal, slender.

*longiventris* Hartig 1840 ♂ - 'Striped-pea gall'

♂-(Body **3.2mm**, Wing/Body **143%;**
**13** antennal segments.
Very hunched; chestnut head; chestnut & black-striped thorax, glossy dark brown gaster; chestnut legs; dark antennae)

Flying from **September to March**



8.(5) very front of gaster BLACK, rear dark red-brown; ocelli forming strongly obtuse triangle (fig 15).

*divisa* Hartig 1840 ♂ - 'Red-pea gall'

♂-(Body **3.4mm**, Wings/Body **140%;**
**13** antennal segments.
Varies from Bright orange-brown to all dark chestnut body; black beneath thorax; dark chestnut legs; dark antennae)
Flying from **August** to **February**

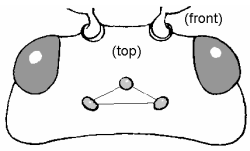



fig 15(res)

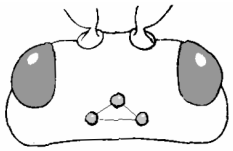


fig 16(res)

- Whole gaster RED-BROWN; ocelli forming less strongly obtuse triangle (fig 16).

*disticha* Hartig 1840 ♂ - '2-cell gall'

♂-(Body **3.3mm**, Wing/Body **144%.**
**13** antennal segments.
Hunched; chestnut & black head & thorax; red-gold legs; dark antennae)
Flying from **September to November**



# Key to Neuroterus species

1. **(females, ♀ ♂)** petiole SHORT (fig 1); third antennal segment not modified (straight & round) (fig 2).....2

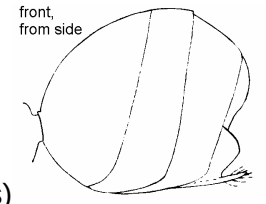



fig 1(res)

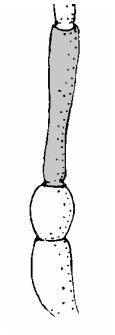


fig 2(res)

- **(males, ♂)**: petiole LONG (fig 3); third antennal segment modified (bent or twisted) (fig 4), though sometimes indistinctly.....11

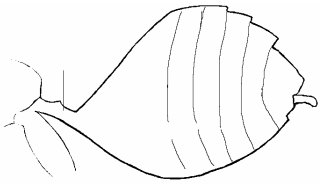


fig 3(res, modified)

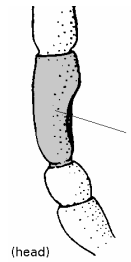



fig 4(res)



2.(1) **Propodeum with two distinct carinae, diverging at the back, sharply bowed or angled outwards at the back** (fig 5) (look under scutellum, from behind, a most difficult feature); **no notaulices; wings clear; 13/14 antennal segments** ..... 10

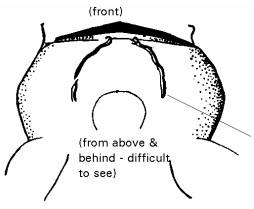



fig 5(res)

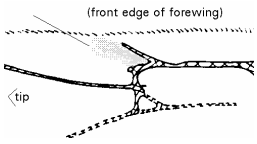



fig 6(res)

- **Propodeum with NO distinct carinae; 14/15 antennal segments; notaulices usually present, though may be very weak; sometimes wings have fuscous blotch around first abscissa of radius** (fig 6)..3

3.(2) **Gaster SMOOTH & SHINING; hind claws with an enlarged but blunt basal lobe** (fig 7)..... 4

fig 7(res) ...

fig 8(res)

fig 9(res)

- **Gaster SMOOTH or SHAGREENED** (finely roughened); **hind claws with a distinct basal tooth-like lobe** (fig 8) <u>or</u> **claws almost split into two equal parts** (fig 9)..... 5



4.(3) Notaulices DISTINCT (fig 10); genal furrow distinct (fig 11).

*tricolor* (Hartig 1841) ♂ - 'Cupped spangle'

♂-(Body **2.2mm**, Wings/Body **140%.**
**15** antennal segments.
Black head & thorax; black almost circular gaster with translucent chestnut beneath; brown antennae; dark & yellow legs)

Flying from **March to July** & during **October/November**

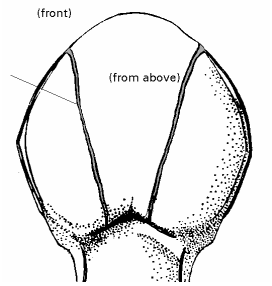



fig10(res, modified)

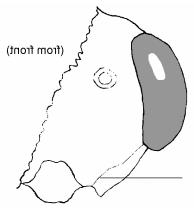



fig 11(res, modified)

- Notaulices very WEAK; GOLD & BROWN gaster; genal furrow weak.

*tricolor* (Hartig 1841) ♀ - 'Hairy-pea gall'

♀-(Body **2.2mm**, Wings/Body **121%.**
**15** antennal segments.
Dark neutral-brown head & thorax; gold & brown gaster; dark antennae; golden legs)

Flying during **July**

- NO notaulices; BLACK gaster; no discernible genal furrow.

*saliens* (Kollar 1857) ♀ - a Turkey-oak acorn gall

♀ (body **2.3mm**, Wings/Body **122%.**
15 antennal segments.
black body; mainly testaceous legs; black & testaceous antennae. fifteen antennal segments.

Flying from **May** to **August**



5.(3) Relatively SLENDER ventral spine, with sparse hairs which are seldom very long and which, if grouped to form a weak apical tuft, are short, curved and very fine (fig 12); wings with fuscous patch surrounding first abscissa of radius and usually another in mid-wing (fig 13) ..... 6

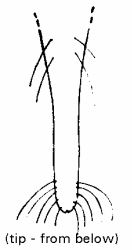



fig 12(res)

fig 14(res)

- Ventral spine with straight hairs, long at base of spine and reducing towards apex, forming a distinct apical tuft (fig 14); wings clear, or with a very FAINT and small suffusion round the first abscissa of radius only ..... 9

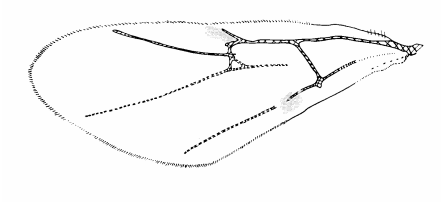


fig 13(res)

6.(5) Sides of gaster SMOOTH & SHINING; wing areolet large (fig 15); sometimes only weakly pigmented; 15 antennal segments .....7

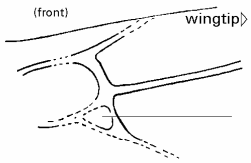



fig 15(res)

- Sides of gaster rather DULL, with minute obsolete sculpture; areolet of forewing indistinct or very small; 14/15 antennal segments .....8



7.(6) Notaulices DISTINCT in middle and at rear; genal furrow distinct; ventral spine sparsely-haired (fig 16); sculpted scutellum.

*quercusbaccarum* (Linnaeus 1758) ♂ - 'Common spangle'

♂-(Body **2.5mm**, Wings/Body **137%.**
**15/16** antennal segments.
Long-winged, hairless; hunched; black head & thorax; black to very dark brown gaster; largely dark brown legs; dark brassy antennae)

Flying from **January to May**

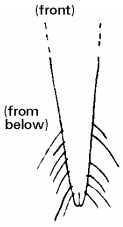



fig 16(res)

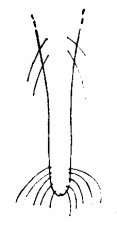


fig 17(res)

- Notaulices very WEAK, present only in middle, or absent entirely; furrow on cheek weak; ventral spine with small but distinct apical tuft (fig 17); scutellum largely smooth.

*quercusbaccarum* (Linnaeus 1758) ♀ - 'Currant gall'

♀-(Body **2.7mm**, Wings/Body **130%;**
**15** antennal segments.
Dark neutral-brown body; yellow legs; yellow-brown antennae)

Flying from **May to July**



8.(6) 15 antennal segments; notaulices absent at the front, distinct at rear; furrow on cheek obvious & clear.

*numismalis* (Geoffroy *in* Fourcroy 1785) ♂ - 'Silk button'

♂-(Body **2.5mm**, Wings/Body **137%; 15** antennal segments.
Hunched; black head & thorax; heavy neutral-brown gaster; dark & yellow legs; dark brown antennae)

Flying from **February to April**

- 14 antennal segments; notaulices completely absent, or absent at front and very weak at rear.

*numismalis* (Geoffroy *in* Fourcroy 1785) ♀ - 'Blister gall'

♀-(Body **2.1mm**, Wings/Body **162%;**
**14** antennal segments.
Brown body & legs; yellow-brown antennae)

Flying from **April to July**

9.(5) Gaster LONGER than head+thorax; 15 antennal segments; furrow on cheek obvious & clear; gaster sides smooth & shining.

*albipes* (Schenk 1863) ♂ - 'Smooth spangle'

♂-(Body **2.5mm**, Wings/Body **128%.**
**15** antennal segments.
Hunched, long-winged; yellow-brown head; dark brown thorax & gaster; dark antennae; brown legs)

Flying from **February to April**

- Gaster at MOST scarcely longer than head+thorax; 14/15 antennal segments; furrow on cheek very weak; second gastral segment, at least, dull.

*albipes* (Schenk 1863) ♀ - 'Schenk's gall'

♀-Body **1.7mm**, Wings/Body **147%.**
**14/15** antennal segments.
Hunched; black head & thorax; black-brown gaster, largely dark yellow legs; golden antennae with dark ends)

Flying from **April to July**

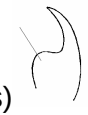


10.(2) 13 antennal segments; mesoscutum smooth & SHINING; claws with basal tooth (fig 18).

***aprilinus*** (Giraud 1859) ♂ - on catkin

♂-(Body **1.3mm**, Wings/Body **150%.**
**13** antennal segments.
Brown head; translucent golden-brown thorax & gaster; golden-brown legs & antennae; short petiole)

Flying during **July & August**

fig 18(res)   fig 19(res)

- 14 antennal segments; mesoscutum leathery and DULL; claws simple (fig 19).

***aprilinus*** (Giraud 1859) ♀ - 'April-bud gall'

♀-(Body **2.2mm**, Wings/Body **138%.**
**14** antennal segments.
Chunky, hunched; black head; dark thorax & gaster; neutral-brown antennae; brown to yellow legs)

Flying during **April & May**



11.(1) **(males)** (fig 20); third antennal segment a little shorter than fourth, slightly CURVED and expanded at the top, the first two-thirds with excavate and flattened surface; claws simple (without a basal tooth) ..... 12

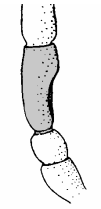


fig 20(res)


fig 21(res)

- STRAIGHT third antennal segment, longer than fourth (fig 21) ..... 13

12.(11) Dark brown body; extra long wings

*aprilinus* (Giraud 1859) ♂ - 'April-bud gall'

♂-(Body **2.6mm**, Wings/Body **156%.**
**14** antennal segments.
Shiny all over; dark brown body, legs & antennae; small gaster; short petiole)
Flying during **April & May**

- Black body

*saliens* (Kollar 1857) ♂ - a Turkey-oak acorn gall

♂-(Body **2.0mm**, Wings/Body **134%.**
**15** antennal segments.
black body, testaceous legs; black & testaceous antennae; small gaster; short petiole)
Flying from **May** to **August**



13.(11) All coxae, legs, petiole & basal half of second segment of gaster, YELLOW; claws simple (fig 22); gaster smooth & shining.

***tricolor*** (Hartig 1841) ♂ - 'Hairy-pea gall'

♂-(Body **2.5mm**, Wings/Body **140%.**
**15** antennal segments.
Slender; brown body; yellow legs; brown antennae; petiole)
Flying during **July**

fig 22(res)

fig 23(res)

- At least hind coxae, petiole & gaster, BROWN; claws with strong basal tooth (fig 23).....14

14. (13) Gaster smooth & SHINING; areolet large (fig.24).

***quercusbaccarum*** (Linnaeus 1758) ♂ - 'Currant gall'

♂-(Body **2.9mm**, Wings/**Body 127%;**
**15** antennal segments.
long-winged; dark wing-veins; small head; dark brown body; pale straw legs; brassy antennae; long petiole)
Flying from **May to July**

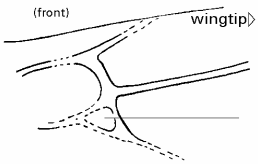



fig 24(res)

- Gaster largely DULL, minutely sculpted.....15



15.(14) 2nd gastral segment smooth & SHINING on top, others minutely sculpted; areolet small (fig 24).

*numismalis* (Geoffroy in Fourcroy 1785) ♂ - 'Blister gall'

♂-(Body **1.9mm**, Wings/Body **141%.**
**15** antennal segments.
Dark brown head; mid-brown thorax & gaster; testaceous legs; pale straw-coloured antennae)

Flying from **April to July**

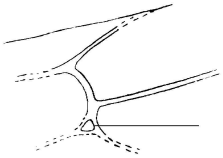


fig 24(res)

- second gastral segment DULL; areolet large.

*albipes* (Schenk 1863) ♂ - 'Schenk's gall'

♂-(Body **1.6mm**, Wings/Body **145%.**
**15** antennal segments.
All brown, including antennae & legs; short petiole.)

Flying from **April to July**



# Key to Trigonaspis species

1. WINGED, sexual generation.

*megaptera* (Panzer 1801) ♀ ♂ - 'Pink-bud gall'

♀-(Body **3.6mm**, Wing/Body **136%, 13/14** antennal segments.
dark glossy-brown head & thorax; translucent golden-brown gaster; yellow legs; dark brown antennae)

♂-(Body **2.8mm**, Wing/Body **158%.**
**15** antennal segments.
Dark brown head; black thorax; yellow-brown gaster; yellow legs; dark brown antennae)

Flying: from **May to July**

- WINGLESS, agamic generation.

*megaptera* (Panzer 1801) ☿ - 'Kidney gall'

☿-(Body **1.8mm**, Wing/Body **0%,** 13 antennal segments.
wingless; very fat gaster; mid-brown head; yellow-brown thorax, gaster, legs & antennae)

Present: during **May & June** & from **September to December**



# Inquilines in British Oak-galls

## Keys to Ceroptres species

1. The only British species; a pair of facial carinae form an apparent & characteristic CANYON between (fig 2); first gastral segment smooth and shining (fig 1); gaster segmented.

*arator*, Hartig 1841 ♀ ♂

(EX GALLS: *Andricus aries* ♂, *A. corruptrix* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quercusradicis* ♀♂, *A. testaceipes* ♂)

♀-(Body **1.7mm**; Wing/Body **116%.**
**13** antennal segments.
Very dark brown body; yellow/brown legs & antennae)

♂-(Body **1.3mm**, Wing/Body **118%.**
**14/15** segments.
Very dark brown head; dark brown thorax & gaster; yellow legs & antennae)

Flying from **April to September**

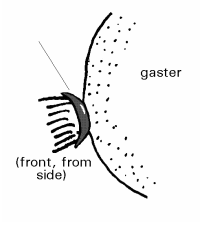



fig 1

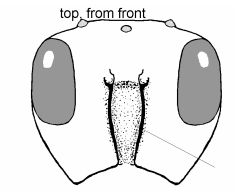



fig 2



# Key to Saphonecrus species

1. **The only British species; radial cell OPEN (fig1); first segment of gaster** (like short petiole) **longitudinally grooved** (fig 2) (as in Synergus)**; pronotal carina absent; dark neutral-brown with yellow legs and antennae; one main gastral segment.**

   ***connatus*** (Hartig 1840) ♀ ♂

   (EX GALLS: *Andricus kollari* ♂, *A. lignicola* ♂, A. *quercusradicis* ♀♂)

   ♀-(Body **1.5mm**; Wing/Body **114%.**
   **13** antennal segments.
   Black head & thorax; dark brown gaster; yellow legs & antennae)

   ♂-(Body **1.4mm**, Wing/Body **121%,**
   **15** segments.
   Black head & thorax; very dark brown gaster; yellow legs & antennae)

   Flying from **April to July**

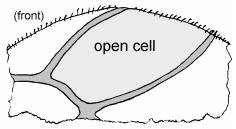


fig 1

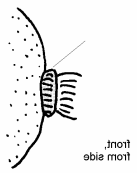


fig 2



# Key to Synergus species

[all *Synergus,* and *Saphonecrus connatus*, have the apparent petiole, the 1st segment of the gaster and the last of the thorax, longitudinally grooved. NO other cynipid wasps have this feature].

This genus is especially difficult to key out. Drawings have been provided to illustrate points raised in the keys but, inevitably, with such small differences, the eye of the beholder may have problems. Particular difficulties lie in five areas and it is important to read these in conjunction with other pointers in the couplets and not rely on these characters completely. The tricky areas are:

- Colouring, particularly of antennae, which may vary considerably from yellow to dark brown. Colours shown are those generally found.
- the shape of the head and the direction of markings on the cheek,
- the sculpture on the mesoscutum – it is only too easy to over-emphasise the shininess between carinae and come to perhaps the wrong answer,
- the shape of carinae and sculpture on the back of the head – can you really see whether they form a semicircular arrangement or whether this is really a series of interrupted carinae?
- the sculpture, punctuations and carinae bordering the area between the ocelli stretching down to where the antennae emerge.
- the shape of the pedicel; accurate measuring is essential as this can be deceptive.

Lighting is crucially important, as is magnification. Many of the these insects are black or very dark, often with near-glossy surfaces. Normal lighting reflects off these and confuses the picture, whereas fluorescent lights discourage reflection and show the many intricate, and minute, shapes on the surface of the cuticle in detail. Lighting needs to be intense, so as not to become absorbed in the dark surface.

Some of these insects are under 2mm in length, so the areas referred to are truly minute. I normally use a magnification of from 180 to 135X which shows even the smaller features at reasonable size, but 90X is really a minimum for accurate identification where no clue exists as to the identity - as in insects which have been caught free-flying. Moving the insect round a fixed light often reveals more features, or ones which had been hidden previously by hairs. To reveal all the features, hold the dried specimens in glass beads, which makes manoeuvring far easier.



1. Lateral pronotal carina ABSENT; the pronotum rounded where it vanishes towards the collar.

## *variabilis* Mayr 1872

(EX GALLS: *Aphelonyx cerricola* ♂)

♀-(Body **1.7mm**, Wing/Body **105%.**
**14** antennal segments.
Dark chestnut head & pronotum; black thorax; black gaster with chestnut tinges; testaceous-yellow antennae & legs)

♂-(Body **1.6mm**, Wing/Body **107%.**
**15** antennal segments.
Yellow-testaceous head & pronotum; black thorax; black gaster with chestnut tinges; yellow-testaceous antennae & legs)

Flying from **March to September**

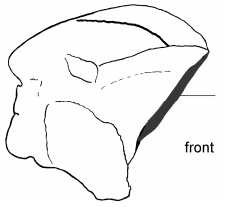



fig 1

- Lateral pronotal carina PRESENT (Fig 1) on visible edge of pronotum, before the rest disappears towards the collar (all other British *Synergus* spp.).....2

2.(1) Segment 2+3 of gaster closely PUNCTATE at the back, the minute punctures extending the full depth and at least quarter the length of the segment (fig 2).....3

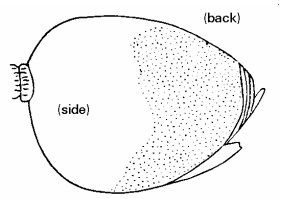



fig 2(res)

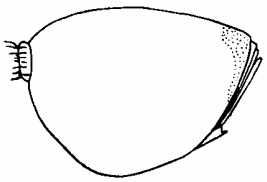


fig 3(res)

- Segment 2+3 of gaster NOT punctate at the back or with punctures forming a small patch at the top of the back (fig 3) or, in the case of *S. nervosus*, sometimes extending right down the very back edge.....8



3. (2) Mesoscutum with median line extending to AT LEAST the middle (fig 4), from the back; frontal carinae reach side ocelli .....4

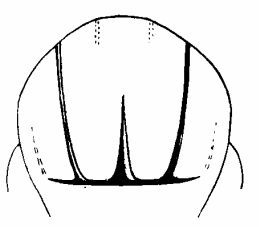


fig 4(res)

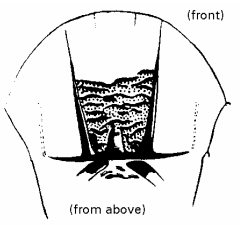



fig 5(res)

- NO median scutal furrow or a short narrow triangle extending from rear to no more than one eighth of scutellum (fig 5), though the cross sculpture may be lightly depressed along the whole central line; frontal carinae not reaching side ocelli .....7

4.(3) Pedicel SHORT (fig 6), slightly longer than broad, sometimes almost spherical in the male; male third segment as (fig 7).

***umbraculus*** (Olivier 1791) ♀ ♂

(EX GALLS: *Andricus corruptrix* ♂, A. *kollari* ♂; *A. lignicola* ♂; *A. lucidus* ♂, *A. quercuscalicis* ♂, *Biorhiza pallida* ♀♂)

♀-(Body **2.5mm**, Wing/Body **104%.**
**14** antennal segments.
Hunched; head darker or lighter brown; black thorax; dark brown gaster; brown & pale legs; mid-brown antennae)

♂-(Body **2.2mm**, Wing/Body **110%;**
**15** antennal segments.
Head variable from paler to darker yellow; black thorax; dark brown shiny gaster; yellow or darker antennae & legs)

Flying from **February to October**

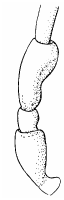


fig 7(res) ♂

fig 6 (res) ♀

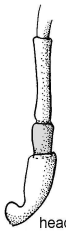



fig 8(res) ♀

- Pedicel distinctly LONGER than broad (fig 8) .....5



5.(4) Face with strong central carina raised ABOVE surface when seen from the side (fig 9); comparison of male & female third antennal segments (figs 10 & 11); shape of female gaster (fig 12); length/width of radial cell over 2 but below 2.5.

## *reinhardi* Mayr 1872 ♀ ♂

(EX GALLS: *Andricus aries* ♂, *A. corruptrix* ♂, *A. kollari* ♂; *A. lignicola* ♂)

♀-(Body **3.5mm,** Wing/Body **95%.**
**14** antennal segments.
Heavy, hunched; black head & thorax, chestnut-edged black gaster; mainly dark legs, with yellow; yellow-brown antennae)

♂-(Body **2.9mm,** Wing/Body **102%.**
**15** antennal segments.
Hunched; black head & thorax, chestnut-edged black gaster; mainly dark legs with yellow; yellow-brown antennae)

Flying **throughout the year**

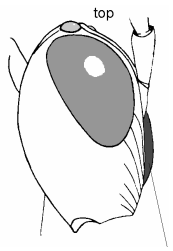



fig 9(res)

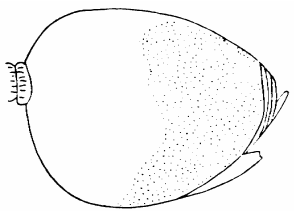


fig 12(res) ♀

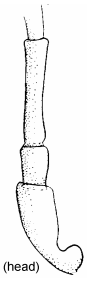



fig 10(res) ♀

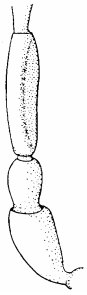


fig 11(res) ♂

- Face without a strong central carina; though a number may join, they do NOT project above the rest ..... 6



6.(5) The punctures on gastral segments 2+3 form a band of at least quarter of the segment's length, increasing below (fig 13); third antennal segment of male as (fig 14); length/width of radial cell over 2.5; summer emergence.

*pallidipennis* Mayr 1872 ♀ ♂

(EX GALLS: *Andricus aries* ♂. *A. kollari* ♂)

♀-(Body **2.7mm**, Wing/Body **98%.**
**14** antennal segments.
Black head & thorax, dark chestnut gaster; dark & gold/brown legs; rich gold/brown antennae)

♂-(Body **3.0mm**, Wing/Body **103%.**
**15** antennal segments.
Black head & thorax, brown-black gaster; dark & gold-brown legs; rich gold antennae)

Flying from **April to July** & during **October and November**

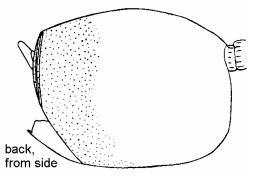



fig 13(res) ♀

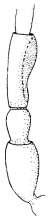


fig 14(res) ♂

- Apical punctures of gastral segment 2+3 on a much lesser area whose greatest width is less than quarter and much less in parts (fig 15); male third antennal segment as (fig 16): length/width of radial cell between 2 and 2.5; autumnal emergence.

*ruficornis* Hartig 1840 ♀ ♂

(EX GALLS: *Andricus inflator* ♂)

♀-(Body **2.0mm**, Wing/Body **119%.**
**14** antennal segments.
Black head & thorax; dark brown gaster; yellow legs & antennae)

♂-(Body **2.2mm**, Wing/Body **103%;**
**15** antennal segments
Black head & thorax; dark brown gaster; yellow legs & antennae))

Flying from **June to September**

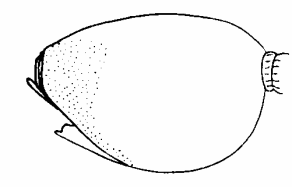


fig 15(res) ♀

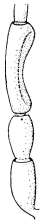


fig 16(res) ♂



7.(3) Median scutal line in female a short, narrow, SHINING TRIANGLE (fig 17); male has third antennal segment distinctly expanded at top & bottom (fig 18); segments 2+3 of female gaster cut away slightly at apex; length of radial cell not more than 2.3 X width; second abscissa of Rs2 fairly strongly curved (fig 19).

*crassicornis (=evanescens)* Curtis ♀ ♂

(EX GALLS: *Andricus curvator* ♀♂; *A. fecundator* ♂; *A. inflator* ♀♂; A. legitimus ♂; *A. lignicola* ♂)

♀-(Body **2.3mm**, Wing/Body **101%**.
**14** antennal segments.
Black head; dark brown thorax; dark gaster; brown legs & antennae)

♂-(Body **1.8mm**, Wing/Body **117%**.
**15** antennal segments.
Black head; dark brown thorax; dark chestnut gaster; gold legs; dark gold antennae)

Flying from **April to August**

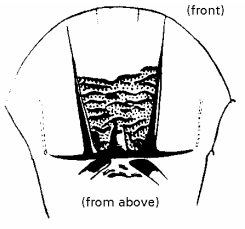



fig 17(res)

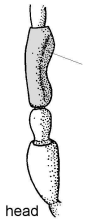



fig 18(res)

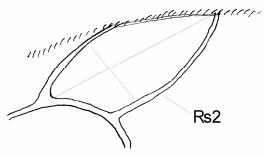



fig 19

(Continued on next page)



- 7.(continued) NO median line (fig 20); male 3rd antennal segment not expanded but only slightly curved, with inner surface of curve flattened (fig 21), giving the appearance of a female antenna if not examined carefully; female gastral segments 2+3 NOT cut away at apex; length of radial cell at least 2.5 X width; Rs2 only slightly curved (see fig 19 on previous page).

## *clandestinus* Eady 1952 ♀ ♂

(EX GALLS: *Andricus legitimus* ♂)

♀-(Body **2.2mm**, Wing/Body **111%**;
**14** antennal segments.
Black head & thorax; black gaster with chestnut edging; dark & paler legs; gold & dark antennae)

♂-(Body **1.9mm**, Wing/Body **118%;**
**15** antennal segments.
Black head & thorax; black gaster with chestnut edging; dark & paler legs; gold & dark antennae)

Flying during **June to August**

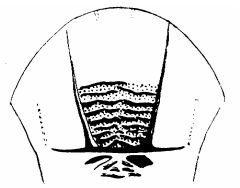


fig 20(res)

mesoscutum, from above

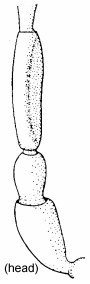



fig 21(res)



8.(2) Head, particularly of female, trapezoid from front, with cheeks nearly STRAIGHT, not converging (fig 22); distinctive semicircular arrangement of carinae on vertex, around & between ocelli (fig 23); frontal carinae strong, often much-branched near front ocellus; sub-parallel carinae running transversely between side ocelli; face rather flat except for weak medial mound; long third antennal segment in both sexes (fig 24), in female nearly twice the length of the fourth; all yellow antennae.

***pallicornis*** Hartig 1841 ♀ ♂

(EX GALLS: *Andricus aries* ♂; *A. kollari* ♂, *A. quercuscalicis* ♀♂, *Cynips divisa* ♂; *C. longiventris* ♀♂, C. *quercusfolii* ♂)

♀-(Body **2.3mm**, Wing/Body **109%.**
**14** antennal segments.
Small, rounded, high-gloss; dark or uniformly yellow-brown head & thorax; chestnut gaster; yellow legs & antennae)

♂-(Body **1.6mm**, Wing/Body **108%.**
**15** antennal segments.
Small, slender; dark to yellow-brown head & thorax; pale brown gaster edged with chestnut;
yellow legs & antennae; distinct petiole)

Flying from **April to September**

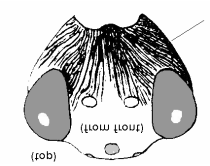


fig 22(res)

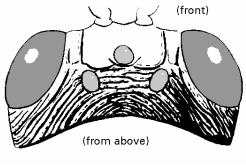


fig 23(res)


fig 24(res) ♂

- Head transversely oval or rounded from front, with cheeks strongly CONVERGING (fig 25); rough and netted appearance on the vertex, around and between the ocelli, (punctate, rugose or coriaceous), with no long carinae (fig 26); face rounded & convex; third antennal segment not obviously long.....9

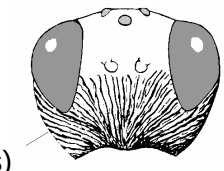


fig 25(res)

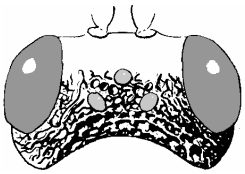


fig 26(res)



9.(8) **Mesoscutum with interrupted, sharp, wide-spaced carinae** (fig 27), **interspaces shining, smooth or very lightly sculpted** (check, easily confused with fig. 28, but clearly wider, more differentiated spaces); **frons, between frontal carinae and particularly near front ocellus, always with some punctures, though they may be sparse** ..... 10

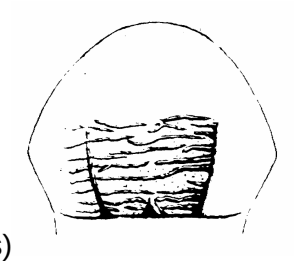


fig 27(res)

- **Mesoscutum coriaceous** (leathery), **with transverse carinae of varying depths** (figs 28/29); **frons with or without punctures**..... 12

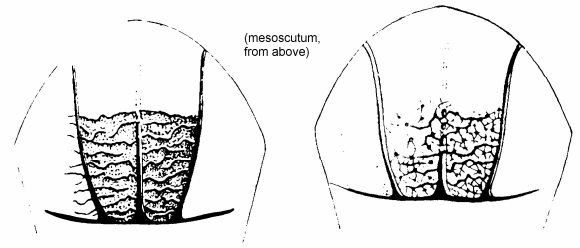



fig 28(res) fig 29(res)



10.(9) Pedicel as BROAD as long; ♀ third antennal segment not outstandingly longer than fourth (fig 30); ♂ heavy, distorted third antennal segment (fig 31); flagellum near parallel (fig 32); median furrow present in at least the back half of mesoscutum; ♂ with golden head, ♀ dark head.

*incrassatus* Hartig 1840 ♀ ♂

(EX GALLS*: Andricus quercuscorticus* ȣ & ♀♂; *A. quercusradicis* ȣ; *A. testaceipes* ȣ, *Aphelonyx cerricola* ȣ)

♀-(Body **2.8mm**, Wing/Body **97%**.
**14** antennal segments.
Hunched, shiny; gold or dirty brown head; brown-black thorax; chestnut gaster; gold legs & antennae)

♂-(Body **2.3mm**, Wing/Body **103%**.
**15** antennal segments.
Hunched, shiny; dark gold head, black thorax; chestnut gaster; gold legs & antennae)

Flying. From **March to July**

fig 31(res) ♀

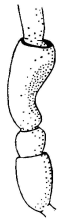


fig 31(res) ♂

fig 32(res) ♀

● Pedicel LONGER than broad (fig 33); median furrow present, at most, in back quarter, sometimes absent; flagellum clearly tapered (fig 34)..... 11

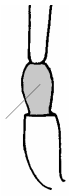


fig 33

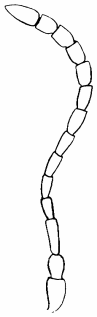


fig 34(res)



11.(10) **Notaulices showing for AT LEAST three-quarters of mesoscutum, from back** (fig 35) (check carefully, by moving the specimen round to reflect the light off different parts); **head RED to YELLOW in male, red-brown to black in female, but if the latter then red-tinged round mouth and on lower cheeks; legs yellow to yellowish-brown, sometimes tinged with darker; median furrow normally no more than one eighth of the length of mesoscutum** (fig 35), **or may be absent; radial cell narrow, with Rs2 only slightly curved** (see P.161); **frontal carinae short, reaching no more than middle of frons which is coriaceous in the middle and rugulose at the side; female gaster near flat-topped** (fig 36); **globular head-shape; third antennal segments as in** (figs 37/38)

## *apicalis* Hartig 1841 ♀ ♂

(EX GALLS*: Andricus corruptrix* ☿, *A. lignicola* ☿, *A. quercusradicis* ♀♂, *Aphelonyx cerricola* ☿, *Neuroterus quercusbaccarum* ♀♂)

♀-(Body **1.9mm**, Wing/Body **108%;**
**14** antennal segments.
Variable, from chestnut to black head; black thorax; dark brown gaster with pale chestnut edge; deep yellow-brown legs; dark yellow-grey antennae)

♂-(Body **1.4mm**, Wing/Body **122%;**
**15** antennal segments.
Yellow to red-brown head; black thorax; dark brown gaster; testaceous legs; chestnut antennae)

Flying from **March to June**

fig 36(res) ♀

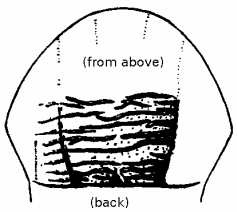



fig 35(res)

fig 37(res) ♀

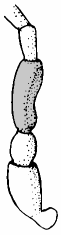


fig 38(res) ♂

(continued overleaf)



● 11.(continued) SHORT notaulices on rear quarter of mesoscutum; head black in both sexes; legs mostly dark brown to black; Rs2 strongly curved, cell wide; shape of female gaster (fig 39); third antennal segment of male only slightly expanded (fig 40), gives appearance of a female; yellow-brown male and brown female antennae.

## *rotundiventris* Mayr 1872 ♀ ♂

(EX GALLS: *Andricus aries* ♂; *A. quercusradicis* ♀♂)

♀-(Body **1.8mm**, Wing/Body **113%.**
**14** antennal segments.
Black head; dark neutral-brown thorax; dark brown gaster; mid-brown antennae; brown legs)

♂-(Body **1.7mm**, Wing/Body **113%.**
**15** antennal segments.
Black head; dark neutral-brown thorax; dark brown gaster; yellow-brown antennae & legs)

Flying from **May to September**

fig 39(res) ♀

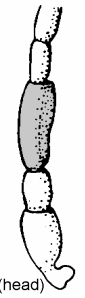



fig 40(res) ♂



12.(9) **Deep median scutal line, AT LEAST three quarters of length of mesoscutum, or complete, & broad at back** (fig 44) (tricky! Look from above and the front, moving the specimen; the front end can be very faint & thin; making the insect overlap with the other half of the couplet); **flagellum near parallel or weakly tapered** (difficult to determine), **with stoutish segments** (fig 41); **frons generally with some shallow punctures, or punctate-rugulose, particularly in front of side ocelli and near front ocellus, but punctures sometimes sparse or weak** (figs 42/43); **vertex behind ocelli with distinct punctures though these may be hidden in rugulose sculpture;** ..... 13

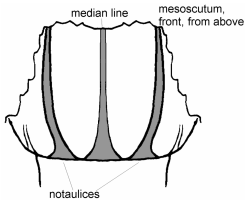


fig 44

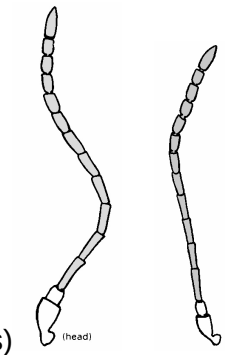


fig 41(res)


fig 45(res)

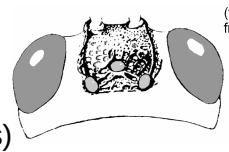


fig 42(res)

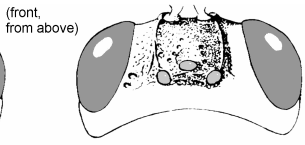


fig 43(res)

- **Median scutal line shallow, HALF-LENGTH or less; flagellum distinctly tapered, with slender first few segments** (fig 45); **frons coriaceous between frontal carinae, which may be branched near ocelli, with occasional small indistinct punctures** (figs 46/47);..... 14

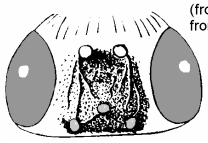


fig46(res)

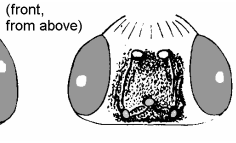


fig47(res)



13.(12) **Pedicel nearly as BROAD as long (length/breadth% <120, but variable)** (see similar *S. nervosus/ S. albipes*)**; frons coriaceous, and closely, though often shallowly punctate, especially in front of front ocellus** (fig 48) (often difficult to see, or punctuations may be virtually absent, the overall shape of markings is more important)**; some deep punctures, or punctate- rugulose, behind lateral ocelli; male 3rd segment weakly excavate, flattened on back and expanded before apex** (fig 49)**; fourth antennal segment not shorter than fifth; antennae variable, often all yellow in southern counties, but may be dark elsewhere, with or without a yellow scape; shape of female gaster as** (fig 50).

## *gallaepomiformis* Fonscolombe 1832 ♁ ♂

(EX GALLS: *Andricus albopunctatus* ♁; *A. aries* ♁; *A. callidoma* ♁; *A. corruptrix* ♁, *A. curvator* ♀♂; *A. grossulariae* ♀♂; *A. kollari* ♁; *A. lignicola* ♁; *A. quadrilineatus* ♁; *A. quercuscalicis* ♁; *A. quercusramuli* ♀♂; *A. seminationis* ♁; *A. solitarius* ♁; *Aphelonyx cerricola* ♁; *Biorhiza pallida* ♀♂; *C. quercusfolii* ♀♂; *Neuroterus anthracinus* ♁; *N. quercusbaccarum* ♀♂; *N. tricolor* ♀♂; *Trigonaspis megaptera* ♀♂)

♀-(Body **2.3mm,** Wing/Body **108%**)
♂-(Body **1.8mm**, Wing/Body **114%**)

1st summer form
(♀-**14** antennal segments.
Mainly dark yellow-brown head, black thorax; glossy dark brown gaster; brown & yellow legs; antennae variable from brown to yellow overall)
(♂-**15** antennal segments.
Mainly yellow head, black thorax; glossy dark brown gaster; brown & yellow legs; antennae variable from brown to yellow overall)

2nd spring form
(♀-**14** antennal segments.
Dark head, black thorax; glossy dark brown gaster; brown & yellow legs; antennae variable from brown to yellow overall)
(♂-15 antennal segments.
Dark head, black thorax; glossy dark brown gaster; brown & yellow legs; antennae variable from brown to yellow)

Flying from **January to October**

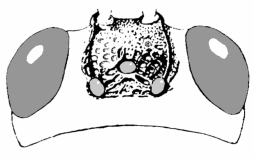


fig 48(res)

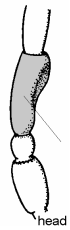



fig 49(res) ♀

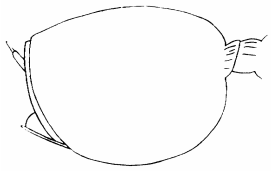


fig 50(res) ♂

(Continued overleaf)



- 13. (continued) pedicel LONGER than broad; frons coriaceous, often without punctures, or with a few widely spaced indistinct punctures (fig 51); vertex, behind lateral ocelli, coriaceous or rugulose, with some scattered shallow punctures; third antennal segment of male grossly inflated (fig 52); fourth antennal segment shortest of flagellum; in female, face is yellow to red or almost black, yellow in male.

  ***thaumacerus*** (Dalman 1823) ♀ ♂

  (EX GALLS: *Neuroterus quercusbaccarum* ♀♂; *N. tricolor* ♀♂; *Trigonaspis megaptera* ♂ & ♀♂)

  ♀-(Body **2.3mm**, Wing/Body **112%;**
  **14** antennal segments.
  Head variable from yellow to black; dark neutral brown thorax; brown & chestnut gaster; yellow legs & antennae)

  ♂-(Body **1.5mm**, Wing/Body **114%;**
  **15**antennal segments.
  Yellow head, legs & antennae; black thorax; brown gaster)

  Flying during **June**

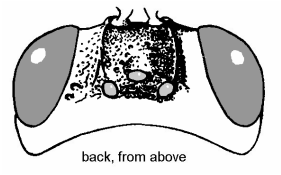



fig 51(res) ♀

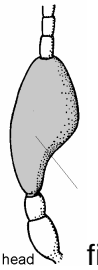



fig 52(res) ♂



14.(12) (The final two wasps are extremely alike, in size, appearance & physical characteristics & are similar to *S. gallaepomiformis*. An important feature for distinguishing them is the ratio of length to breadth of the pedicel & length of median line.

**Pedicel noticeably ELONGATED (fig 53) (length/breadth% 130+); third antennal segment of male flattened on inner face but not strongly curved or expanded (fig 54); frontal carinae distinct and generally branched in females of summer emergence (fig 55), but often weak or missing in other forms** (move specimen round the light)**; small punctures on the apex of the main segment of gaster (fig 56), but often more extensive, reaching almost to ventral edge of tergite in spring emergences; mesoscutum as (fig 57); variable from all-brown to black head/thorax, dark to chestnut gaster.**

### *nervosus* Hartig 1840 ♀ ♂

(EX GALLS: *Andricus albopunctatus* ♂; *A. curvator* ♂ & ♀♂; *A. glandulae* ♂; *A. nudus* ♂; *A. quadrilineatus* ♂; *A. quercuscalicis* ♂; *A. seminationis* ♂; *A. solitarius* ♂; *Cynips divisa* ♂; *Neuroterus albipes* ♂; *N. anthracinus* ♂; *N. quercusbaccarum* ♂ & ♀♂; *Trigonaspis megaptera* ♂)

♀-(Body **1.9mm**, Wing/Body **112%;**
**14** antennal segments.
Rich yellow-brown to all dark body; yellow-brown legs; antennae variable from pale yellow to dark brown)

♂-(Body **1.7mm**, Wing/Body **119%;**
**15** antennal segments.
Granular; black head & thorax; dark gaster; dark & gold legs, antennae variable from Pale yellow to dark brown)

Flying from **March to November**

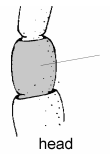



fig 53(res)

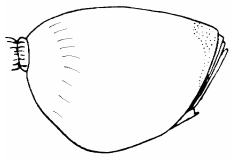


fig56(res) ♀

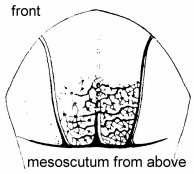



fig 57(res)

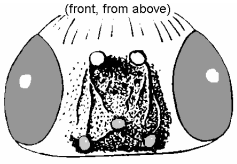



fig 55(res mod) ♀ **(rear, from above)**

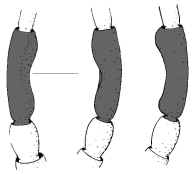


fig 54(all res, mod) ♂ ♂ ♂
spring emergence (View inside) | spring em. (outside) | summer em. (inside)

(Continued on next page)



- 14.(continued) **Pedicel almost as BROAD as long** (fig 58) (length/breadth 120%-), **slightly longer in summer-brood** (fig 59), **but not as long as** *S. nervosus*; **bulky, enlarged male third antennal segment, concave on inner face, twisted and expanded at top** (fig 60); **frontal carinae usually distinct in summer-emergence females but often weak or absent in other forms - similar to** *nervosus*, **but the central area never has carinae and those between the ocelli are double, or more** (fig 61); **body variable, from very dark to yellow-brown; gaster often with patch of punctures at end on top**.

## *albipes* Hartig 1841 ♀ ♂

(EX GALLS:; *A. curvator* ♂ & ♀♂; *A. grossulariae* ♂, *A. kollari* ♂, *A. lignicola* ♂, *A. quadrilineatus* ♂; *A. seminationis* ♂; *Cynips divisa* ♂; *C. quercusfolii* ♂; *Neuroterus albipes* ♂; *N. anthracinus* ♂; *N. numismalis* ♂ & ♀♂; *N. quercusbaccarum* ♂ & ♀♂; *Trigonaspis megaptera* ♂)

♀-(Body **1.8mm**, Wing/Body **113%;**
**14** antennal segments.
Variable from dark to paler brown; black head & thorax; dark gaster fringed with chestnut; brown & dirty gold legs; yellow antennae)

♂-(Body **1.5mm**, Wing/Body **121%;**
**15** antennal segments.
Variable from dark to paler brown; black head & thorax; black to brown gaster, fringed with chestnut; dark to yellow legs; yellow antennae)

Flying from **March to August**

fig 58(res) ♀ summer

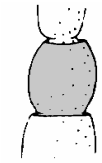


fig 59(res) ♀ spring

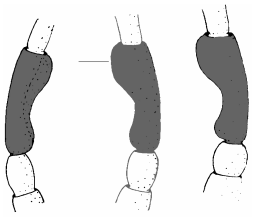


fig 60(all res, mod) ♂ summer em. (inside view) ♂ summer em. (outer) ♂ spring emergence (outer)

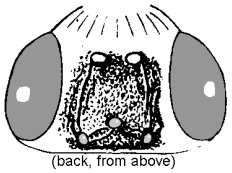



fig 61(res) ♀



# Separation of Synergus gallaepomiformis, nervosus, albipes

within 3 common oak galls, where appearance, ratios and size tend to confuse

**median thoracic line**

LONG - **>3/4,** Wide, deep at back)
(But beware; difficult to see the often slender front end;
turn the specimen to get clear view. Not the easiest of features.

SHORTER- **<1/2**

**antennal shape**

THICKER, near parallel
(Tricky until a number have been seen)

SLENDER, distinct taper

***S. gallaepomiformis***
knopper gall
marble-gall
oak-apple

VARIABLE (not reliable)

**pedicel**

ONLY TOP ENLARGED

SHORT
(Ratio, length to breadth, 100-120%

LONG
(Ratio, 130+%

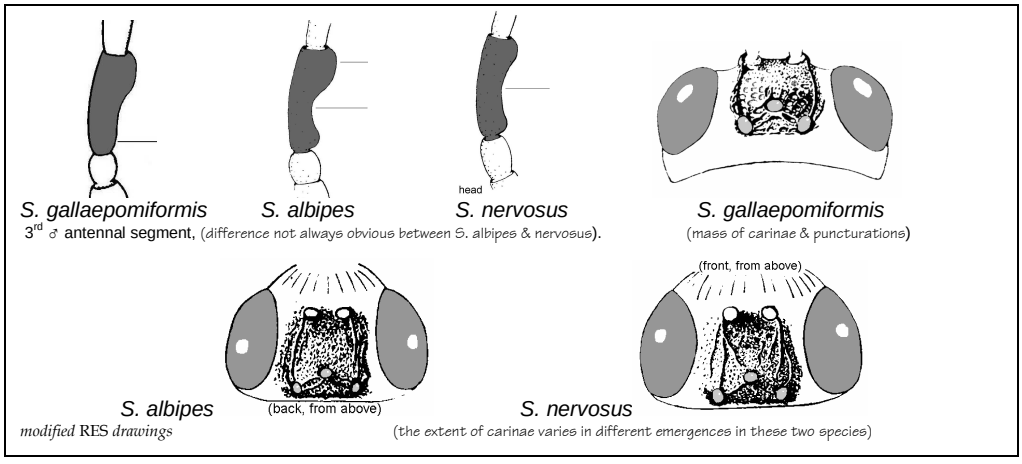
**3rd ♂ antennal segment**

***S. albipes***
marble-gall

HEAVY
(distorted)

LIGHTER SHAPE
(only slightly distorted)

***S. nervosus***
knopper gall




*S. gallaepomiformis* 3rd ♂ antennal segment, (difference not always obvious between S. albipes & nervosus).

*S. albipes* *S. nervosus*

*S. gallaepomiformis* (mass of carinae & punctures)

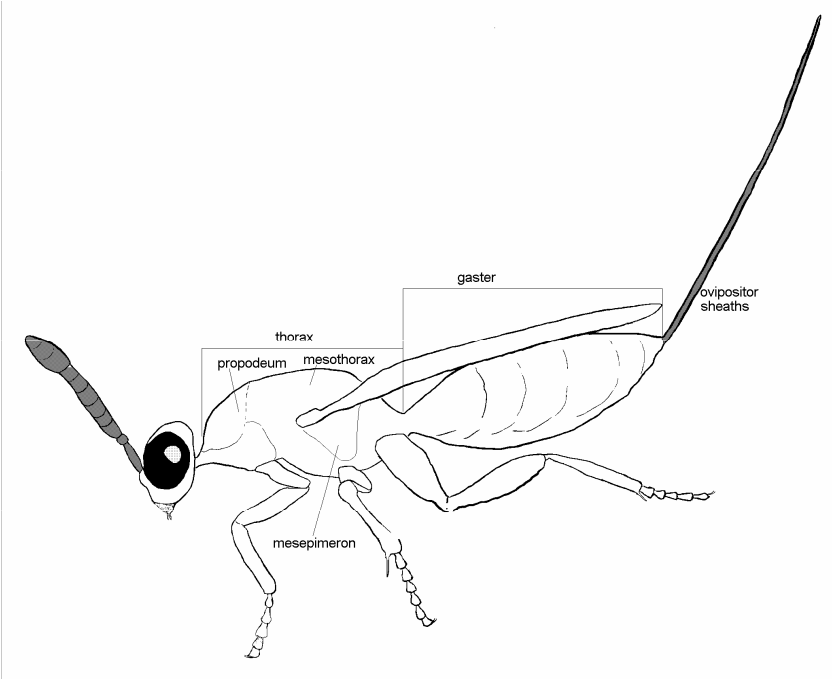
*S. albipes* *modified* RES *drawings*

*S. nervosus* (the extent of carinae varies in different emergences in these two species)

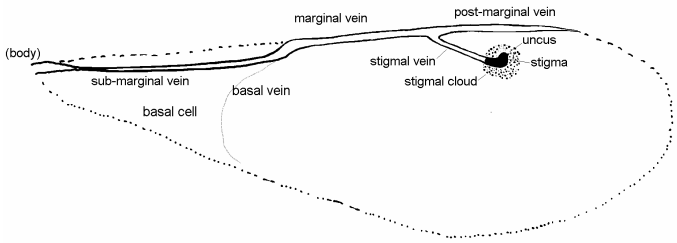


# Parasitoids in British Oak-galls

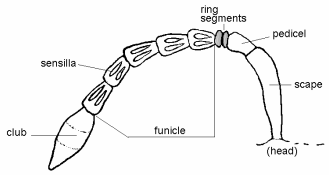
## Drawings showing Chalcid structure




*Torymus*, ♀ **from side**




**forewing**




**an antenna**



# Typical shapes of Chalcid families

not to scale

Eurytomidae

Torymidae

Ormyridae

Pteromalidae

Eupelmidae

Eulophidae

♀ ♂



# Key to Chalcid species

Adapted from R.R. ASKEW - Transactions of the Society for British Entomology, Vol. 14, November 1961, Part X1. '*On the Biology of the Inhabitants of Oak Galls of Cynipidae (Hymenoptera) in Britain*.', by kind permission of the author.

Brought up to date where information has become available, particularly on naming the species, giving extra emphases on special features, with the aid of further keys by Boucek and Graham, as well as my own observations.

In 2002, Graham Stone kindly provided a draft of, '*Keys to Chalcidoid Parasitoids in Cynipid galls on Oak*', by R.R. Askew & Csaba Thuroczy (with the kind permission of the authors), which covered the much wider area of all European chalcids and some changes have been incorporated as a result.

My gratitude for all this help cannot be underestimated.

**Symbols: ☿ = agamic generation; ♀♂ = sexual.**

**A.** FOUR tarsal segments (sometimes difficult to distinguish the two because joints may be obscured by short hair, try light from below and varying the angle.....**EULOPHIDAE** (p. 181)

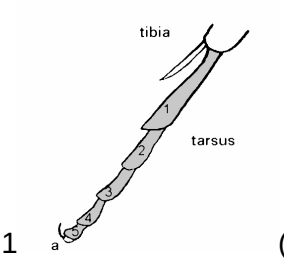



fig 1 (*a = claw*)

- Tarsi FIVE-segmented (fig 1).....**B.** (p.189)



## A. Eulophidae

1a. Scutellum with a pair of DISTINCT, longitudinally-grooved lines, near the centre (fig 2a); mesoscutum with a very faint, grooved line lengthwise along the centre (fig 2b), (the latter is difficult to see, sometimes near-impossible; move the light round to different angles) ..... 2

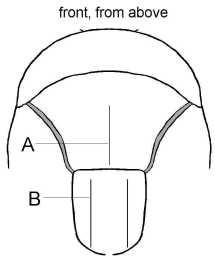



fig 2

- Thorax WITHOUT lines or, in the case of *Aulogymnus arsames*, very faint grooved lines ..... 3

2a. All black body..... 2

- Body colour otherwise..... 4



3a.(2) Body black; non-metallic; only a single line of hairs on each side of mid-lobe of mesoscutum; OBVIOUS notaulices.

## *Aprostocetus aethiops* (Zetterstedt 1838) ♀ ♂

(**EX GALLS**: *A. quercuscalicis* ♀♂, *Andricus seminationis* ♂, *Biorhiza pallida* ♀♂; *Cynips divisa* ♂; *C. longiventris* ♂; *C. quercusfolii* ♂; *Neuroterus albipes* ♀♂; *N. anthracinus* ♂; *N. numismalis* ♀♂)

♀-(Body **2.0mm**, Wing/Body **93%**; ovipositor/body **0%**;
TWO ring, THREE funicular & FOUR tarsal segments.
Long, slender black body; brown to yellow legs; straw-coloured antennae)

♂-(Body **1.2mm**; Wing/Body **108%**;
TWO ring, THREE funicular & FOUR tarsal segments.
Slender dark body; dark to yellow legs; brown antennae)

FLYING during **June & July**

- Body black; non-metallic; without line of hairs on each side of mid-lobe of mesoscutum; NO notaulices; main identification by gall and by ratios.

## *Tamarixia pubescens*

(**EX GALL**: *Trioza remota* ♀♂)

♂-(Body **1.3mm**; Wing/Body **114%**; ovipositor/body **0%**
TWO ring, THREE funicular & FOUR tarsal segments.
wide black body; dark legs with yellow bands; straw'brown antennae)

♂-(Body **1.2mm**; Wing/Body **121%**;
TWO ring, THREE funicular & FOUR tarsal segments.
Wide black body; dark legs with yellow banding; straw antennae)

FLYING during **?**



- **4a.(2)** Body dark METALLIC blue-green & bronze-green; several longitudinal lines of hairs on each side of mid-lobe of mesoscutum (fig 3).

## *Baryscapus diaphantus* (Walker 1839) ♀ ♂

**(EX GALLS:** *Biorhiza pallida* ♀♂)

♀-(Body **1.4mm**; Wing/Body **90%**; ovipositor/body **10%**
TWO ring, THREE funicular; FOUR funicular segments.
Very dark metallic blue-green head & thorax; bronze-green gaster; brown & yellow legs; brassy antennae; post-marginal vein not present)

♂-(Body **1.1mm**; Wing/Body **92%**
TWO ring, FOUR funicular; FOUR tarsal segments.
Very dark metallic green head & thorax; brown-green gaster; brassy antennae; brown & pale legs; post-marginal vein not present)

Flying from **March to June**

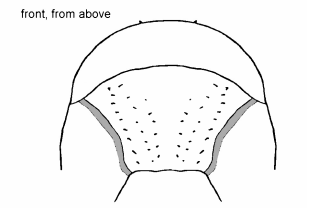



fig 3

- Head & thorax dark neutral-brown & yellow; gaster neutral brown with TRANSLUCENT YELLOW BAND at front.

## *Quadrastichus anysis* (Walker 1839) ♀ ♂

**(EX GALLS:** *Polystepha malpighii* ♀♂)

♀-(Body **0.95-1.2mm**; Wing/Body ?**%**; ovipositor/body **0%**
TWO ring, THREE funicular; THREE funicular segments.
Yellow & dark head; dark thorax; dark & yellow-banded gaster; straw-coloured antennae; pale legs; post-marginal vein not present)

♂-(Body **0.9mm**; Wing/Body **114%**
TWO ring, FOUR funicular; FOUR tarsal segments.
Largely dark neutral brown head & thorax; dark neutral gaster with front part banded dirty yellow; pale yellow legs; mainly straw-coloured antennae; post-marginal vein not present)

Flying ?

♂



5a.(1) **Scutellum with ONE pair of long bristles** (fig 4) (best seen in silhouette, from side, difficult character); **back of head with strong marginal carina** .....6

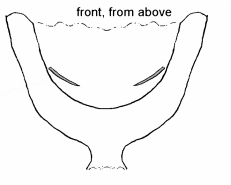



fig 4

fig 5

- **Scutellum with TWO pairs of long bristles** (fig 5); **margin at back of head without a carina**.....7



6a.(5) Lower eye margin distinctly CLOSER to mouth than antennal sockets (figure 6); short malar space; cuticle of tarsi part white.

## *Pediobius clita* (Walker 1839) ♀ ♂

**(EX GALLS:** *Andricus quercuscalicis* ♀♂: *Neuroterus albipes* ♂, *N. quercusbaccarum* ♂)

♀-(Body **1.8mm**; Wing/Body **77%**; Ovipositor/Body **0%**
ONE ring, THREE funicular & FOUR tarsal segments
Brilliant metallic green head & gaster; purple-shot green thorax; metallic legs with part-white tarsi; metallic antennae; long petiole)

♂-(Body **1.6mm**; Wing/Body **76%**
ONE ring, THREE funicular & FOUR tarsal segments
Brilliant to darker metallic green head & gaster; purple-shot green thorax; metallic Legs with part-white tarsi; petiole)

Flying from **May to July**

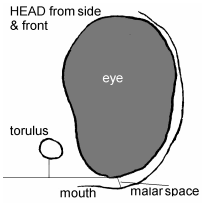



fig 6

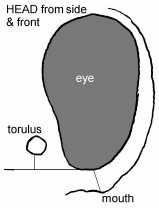



fig 7

- Lower eye margin AT LEAST as close to antennal sockets as the mouth; malar space obvious (fig 7); tarsi mainly darker;

## *Pediobius lysis* (Walker 1839) ♀ ♂

**(EX GALLS:** *Neuroterus albipes* ♂; *N. numismalis* ♂, *N. quercusbaccarum* ♂)

♀-(Body **1.6mms**, wing/body **87%**, ovipositor/body **0%**
ONE ring, THREE funicular & FOUR tarsal segments
Brilliant gold-tinted metallic green head & thorax; purple or green gaster; blue-green & dark legs; metallic antennae; petiole)

♂ -(Body **1.5mms**; wing/body **89%.**
ONE ring, THREE funicular & FOUR tarsal segments
Metallic blue/green head; blue-green or purple thorax; short purple or green gaster; blue-green & dark legs; metallic antennae; petiole)

Flying during **June**



7a.(3) Speculum CLOSED below by a line of hairs (fig 8) .....8

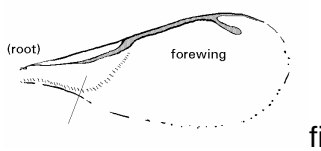



fig 8

- Speculum OPEN below (without a line of hairs) .....9



8a.(7) Scutellum CONTRASTING in colour with mesoscutum; first funicular segment about equal in length to pedicel (fig 9); forewing of female usually with one dark spot.

## *Aulogymnus arsames* (Walker 1838) ♀ ♂

(**EX GALLS**: *Andricus curvator* ♀♂; *A. inflator* ♀♂; *A. quadrilineatus* ♂; *Neuroterus albipes* ♀♂; *N. anthracinus* ♂; *N. aprilinus* ♀♂; *N. numismalis* ♀♂; *N. quercusbaccarum* ♀♂)

♀-(Body **2.1mm**, Wing/Body **81%**; ovipositor/body **0%**
TWO ring, THREE funicular, FOUR tarsal segments.
Chubby; dark metallic bronze-green head; contrasting green & bronze thorax; dark brown gaster with green tinges; metallic to pale yellow legs; brown antennae)

♂-(Body **1.8mm**; Wing/Body **82%**
TWO ring, FOUR funicular segments, FOUR tarsal segments.
Chubby; dark metallic green head; contrasting green & bronze thorax; bronze gaster; dark to pale legs; mid-brown antennae)

Flying from **March to May**

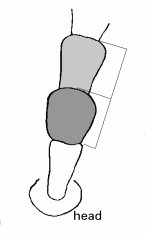



fig 9

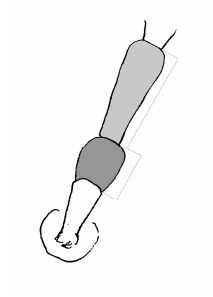


fig 10

- Colour of scutellum NOT contrasting with mesoscutum; 1st funicle segment longer than pedicel (fig 10); forewing of female usually clear; but sometimes with dark flush in both sexes round stigma and at basal end of marginal vein; paleness of tibiae & tarsi a striking feature.

## *Aulogymnus skianeuros* (Ratzeburg 1844) ♀ ♂

(**EX GALLS:** *Andricus lignicola* ♂ & ♀♂, *A. quercusramuli* ♀♂; *Biorhiza pallida* ♀♂)

♀-(Body **2.8mm**; Wing/Body **80%**; Ovipositor/Body **0%**
TWO ring, THREE funicular, FOUR tarsal segments.
Dark green-gold head & thorax; dark green gaster; gold-brown antennae; metallic to yellow legs)

♂-(Body **2.1mm**; Wing/Body **84%**
TWO ring, FOUR funicular, FOUR tarsal segments.
Darker metallic green-gold head & thorax; green-brown gaster; metallic to yellow legs; brown antennae)

Flying **throughout the year.**



9a.(7) Middle & hind tibiae rich GOLDEN yellow; marginal vein (fig 11a) usually less than twice as long as stigmal vein (11b) strong fuscous cloud on forewing of ♀; (Males are rare).

## *Aulogymnus euedoreschus* (Walker 1839) ♀ ♂

**(EX GALL:** *Andricus quadrilineatus* ♂**)**

♀-(Body **2.9mm**: Wing/Body **81%;** Ovipositor/Body **0%**
TWO ring, THREE funicular, FOUR tarsal segments.
Darkish metallic green head & gaster; contrasting green & gold thorax; metallic & gold legs; yellow-brown antennae)

♂ -(Body **2.0mm**; Wing/Body **90%**
TWO ring, FOUR funicular, FOUR tarsal segments.
Darkish metallic green head & thorax; green & dark copper gaster; metallic & gold legs; brassy-gold antennae)

Flying during **April & May**

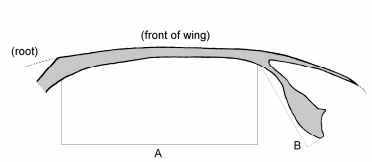



fig 11

● Middle & hind tibia mainly PALE yellow ..... 10

10a.(9) Large species, OVER 3.5mm; marginal vein more than 2 X as long as stigmal vein; female forewing with faint dark markings only.

## *Aulogymnus trilineatus* (Mayr 1877) ♀ ♂

**(EX GALLS:** *Andricus fecundator* ♂, *A. kollari* ♂, *Trigonaspis megaptera* ♀♂)

♀-(Body **3.8mm**; Wing/Body **84%**; ovipositor/body **0%**
TWO ring, THREE funicular, FOUR tarsal segments.
Brilliant metallic green head & thorax; brilliant green & bronze gaster; metallic & yellow legs; dark yellow antennae, like a string of sausages; ovipositor not visible)

♂-(Body **2.9mm**; Wing/Body **85%**
TWO ring, FOUR funicular, FOUR tarsal segments.
Dark green metallic body; yellow & brown legs; dark brown antennae)

Flying from **March to July**

● smaller species, NOT over 2.7mm; female forewing with stronger markings..... 11



11a.(10) Middle tibia ALL pale yellow

## *Aulogymnus gallarum* (Linnaeus 1761) ♀ ♂

(**EX GALLS**: *A. callidoma* ♀ ♂, *A. curvator* ♀♂; *Andricus quercusramuli* ♀♂; *Neuroterus albipes* ♂; *N. numismalis* ♂; *N. quercusbaccarum* ♂ & ♀♂)

♀-(Body **2.3mm**; Wing/Body **81%;** Ovipositor/Body **0%**
TWO ring, THREE funicular; FOUR tarsal segments.
Dark metallic bronze-green head & thorax; dark brown gaster with green tinges; metallic to pale yellow legs; dark brassy antennae; no visible ovipositor)

♂-(Body **1.8mm**; Wing/Body **82%**
TWO ring, FOUR funicular, FOUR tarsal segments.
Dark green metallic head & thorax; dark brown and green metallic gaster; metallic to yellow legs; brassy antennae)

Flying from **March to July**

- Middle tibia with a BROWN line on yellow inner surface.

## *Aulogymnus gallarum f. pulchra* ♀ ♂

(Linnaeus 1761)

(**EX GALLS:** *Andricus curvator* ♀♂; *Neuroterus quercusbaccarum* ♂)

♀-(body **2.2mm**; Wing/Body **91%**; Ovipositor/Body **0%.**
TWO ring, THREE funicular, FOUR tarsal segments.
Dark metallic green head & thorax; brown & green gaster; legs tapering from dark to pale; mid-brown antennae)

♂-(body **2.0mm**; Wing/Body **98%**
TWO ring, FOUR funicular, FOUR tarsal segments.
Dark green head & thorax; dark brown & green gaster; legs tapering from dark to yellow; dark antennae)
Flying during **April & May**

**B.**(A) Funicle 7-segmented .....(p.189)

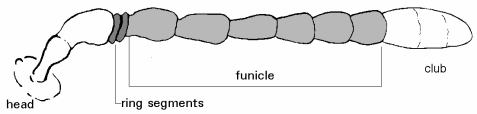



fig 12

- **Funicle 4, 5 or 6 segments** (fig 12) (sometimes difficult to distinguish from above, try under-stage lighting, changing angles & intensifying the light – otherwise try the keys for both parts of couplet) .....(p.203)



**B**.(A) Hind coxa enlarged, at least TWICE as long as middle coxa. If NOT (*Megastigmus* only), then thorax and head marked with yellow, and forewing with a distinct DARK CLOUD around enlarged stigma; stigmal vein very short; long ovipositor sheaths strongly extended from body.....**TORYMIDAE**

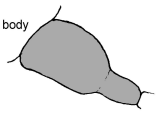


fig 13

- **C**. Hind coxa SMALL, only slightly longer than middle coxa (measure carefully, beware of failing to see & measure the narrow end of the middle coxa, see (fig 13).....**EUPELMIDAE** (P.202)

## B. Torymidae

1b. Hind coxa LESS than twice as long as middle coxa.....2

- Hind coxa AT LEAST twice the length of middle coxa.....3



2b.(1) **Stigma** (excluding dark cloud round it) **more or less CIRCULAR** (fig 14); **ovipositor sheaths about equal in length to head + thorax; the smaller of two species, length of body,** (less ovipositor) **seldom exceeding 5mm.**

## *Megastigmus dorsalis* (Fabricius 1798) ♀ ♂

**(EX GALLS:** *Andricus aries* ♂; *A. corruptrix* ♂, *A. curvator* ♀♂, *A. fecundator* ♂, *A. grossulariae* ♂ & ♀♂, A. *inflator* ♀♂*; A. kollari* ♂*; A. lignicola* ♂; *A. quercuscalicis* ♂; *A. quercusradicis* ♀♂; *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂; *Callirhytis erythrocephala* ♀♂; *Cynips quercusfolii* ♂)

♀-(Body **3.2mm**; Wing/Body **98%**; Ovipositor/Body **76%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Metallic green & yellow head & thorax; brown & yellow gaster; yellow legs; yellow-brown antennae)

♂-(Body **2.8mm**; Wing/Body **91%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Variable; plain yellow & metallic green head; dark green metallic thorax; chocolate & yellow gaster; brown & yellow legs; dark antennae)

Flying throughout **the year**

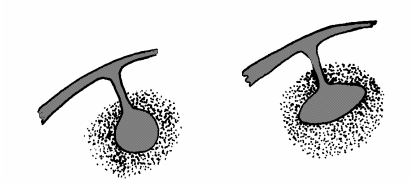


fig 14 fig 15

- **Stigma ELONGATE, more than twice as long as broad** (fig 15); **ovipositor sheaths nearly twice as long as head+thorax; larger species, body from 6-8mm.**

## *Megastigmus stigmatizans* (Fabricius 1798) ♀ ♂

(**EX GALLS**: *Andricus kollari* ♂; *A. quercuscalicis* ♂)

♀-(Body **6.3mm**; Wing/Body **83%**; Ovipositor/Body **113%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Yellow & metallic green head & thorax; gaster yellow with some brown; metallic & yellow legs; dark antennae)

♂-(Body **5.2mm**; Wing/Body **80%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Variable plain yellow & metallic green head & thorax; chocolate gaster; brown & yellow legs; dark antennae)

Flying in **February** & during **June and July**



3b.(1) Scutellum WITH transverse furrow marking off shiny area from rough, sculpted front (fig 16), (move light round to catch it).... 11

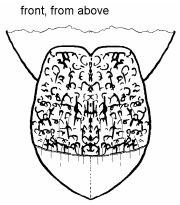



fig 16

- Scutellum more or less UNIFORMLY sculpted all over.....4

4b.(3) Long inner spur of hind tibia, at least HALF the length of basitarsus and much greater than width of tibia, (fig 17) (often awkward to spot, but obvious once seen; persist in rotating insect); hind coxa WITHOUT prominent fringe of pale hairs on top; body predominantly bright green.

## *Torymus flavipes (=auratus)* (Walker 1833) ♀ ♂

**(EX GALLS:** *Andricus corruptrix* ♂, *A. curvator* ♀♂*; A. grossulariae* ♀♂; *A. inflator* ♀♂*; A. lucidus* ♀♂; *A. quadrilineatus* ♂*; A. quercusramuli* ♀♂*; A. seminationis* ♂; *Biorhiza pallida* ♀♂*; Cynips disticha* ♂; *C. divisa* ♂*; C. longiventris* ♂*; C. quercusfolii* ♂, *Neuroterus albipes* ♂ & ♀♂; *N. numismalis* ♂ & ♀♂; *N. quercusbaccarum* ♂ & ♀♂; *N. tricolor* ♂)

♀-(Body **2.5mm**, Wing/Body **113%**; Ovipositor/Body **58%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Brilliant metallic golden-green body; yellow legs; dark brown antennae)

♂ (Body **2.4mm**; Wing/Body **100%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Brilliant metallic green head & thorax; green & bronze gaster; yellow legs; dark antennae)

Flying from **March to October**

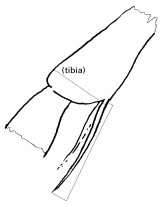



fig 17

- Length of inner SPUR of hind tibia around the width of the apex of hind tibia; though some may appear fractionally longer *(Torymus chloromerus)* ..... 5



5b.(4) Dorsal edge of hind coxa with from six to many WHITE HAIRS on top edge (fig 18); body mostly BRIGHT GREEN, with or without BLUE tints.....6

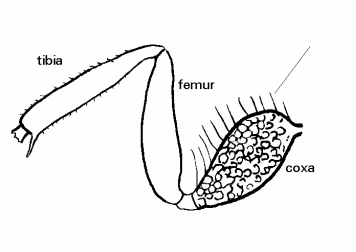



fig 18

- Dorsal edge of the hind coxa with, AT MOST, 1 or 2 hairs above; body darker than bright, with reddish purple or bronze-green reflections.....7



6b.(5) **Female gaster with TESTACEOUS BAND at front** (fig 19); **ovipositor sheath normally around the same length as the body; the first funicle segment is shorter than the pedicel** (this needs careful measurement; for it is virtually the only difference between the male of this species & T. auratus); **dark antennae with dark sensillae.**

## *Torymus geranii* (Walker 1833) ♀ ♂

**(EX GALLS:** *Andricus curvator* ♀♂; *A. kollari* ♂; *A. lignicola* ♂, *A. quercuscalicis* ♂, *Biorhiza pallida* ♀♂; *Cynips divisa* ♂; *C. longiventris* ♂; *N. anthracinus* ♂)

♀-(Body **3.4mm**; Wing/Body **93%**; Ovipositor/Body **98%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Gleaming metallic bronze, green & blue head & thorax; always some testaceous-pink beneath green & bronze gaster; yellow legs; dark antennae)

♂-(Body **2.5mm**; Wing/Body **91%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Metallic green head & thorax; bronze & testaceous gaster; metallic & yellow legs; dark antennae)

Flying throughout **the year**

fig 19

- **Female with ovipositor sheath nearly always much LONGER than body, single-coloured gaster; in both sexes, the first funicle segment is at least as long as the pedicel dark antennae with dark sensillae.**

## *Torymus auratus (=nitens)* (Müller 1764) ♀ ♂

**(EX GALLS:** *Andricus corruptrix* ♂, *fecundator* ♂, *A. kollari* ♂; *A. lignicola* ♂; *A. quercuscalicis* ♂; *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂; *Cynips divisa* ♂; *C. longiventris* ♂; *C. quercusfolii* ♂; *Neuroterus quercusbaccarum* ♀♂)

♀-(Body **3.5mm**; Wing/Body **98%**; ovipositor/body **122%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Brilliant metallic green body; yellow legs; dark antennae)

♂-(Body **2.6mm**; Wing/Body **95%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Glistening metallic green head & thorax, with bronze tints; bronze & testaceous gaster; metallic & yellow legs; grey-brown antennae; visually indistinguishable from *T. geranii* – see above)

Flying **throughout the year**

(continued on next page – 3 species keyed out)



(continued from previous page)

- **Female: with ovipositor sheaths LESS than body length** (around 80%), **gaster with some unobtrusive testaceous areas below, body with distinct rich blue tints catching the light, particularly from above; male: bright green with only small amount of blue lights; in both sexes the pedicel & third antennal segment are approximately equal, antennae dark brassy-gold with prominent pale sensillae, while the hind coxae have a sparse row of white hairs on top edge.** (The only known oak-gall host, Macrodiplosis dryobia, is not known to be host for either of the other species).

## *Torymus chloromerus* (Walker 1833) ♀ ♂

**(EX GALLS:** *Macrodiplosis pustularis (=dryobia)* ♀♂)

♀-(Body **2.7mm**; Wing/Body **97%**; ovipositor/body **80%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Bright green metallic body with brilliant blue tints; metallic, brown & yellow legs; dark brassy antennae)

♂-(Body **2.2mm**; Wing/Body **83%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Bright metallic green body with some blue tints; metallic green, brown & yellow legs; dark brassy antennae)

Flying from **May to September**

7b.(5) **Scape extends AT LEAST to top of vertex** (fig 20).....8

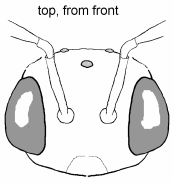



fig 20

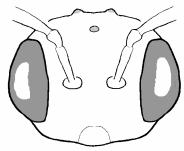


fig 21

- **Scape BARELY reaching middle ocellus** (fig 21) (beware! difficult to judge these factors immediately, move round and make sure that the view is from directly in front, with the ocelli in the indicated position, and the antennae are facing up) ..... 10



8b.(7) Ovipositor sheaths distinctly LONGER than body.

*Torymus erucarum* (Schrank 1781) ♀ ♂

(**EX GALL:** *Andricus quercusradicis* ♂)

♀-(Body **4.1mm**; Wing/Body **91%**; ovipositor/body **138%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Purple metallic head & thorax; brown gaster with yellow band which may be reduced to a spot on each side; metallic & pale yellow legs; dark antennae)

♂-(Body **2.8mm**; Wing/Body **94%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Purple metallic head & thorax; brown gaster with partial yellow band; metallic & testaceous legs; dark antennae)

Flying during **August**

- Ovipositor sheaths SHORTER than body but longer than gaster; antennal scape reaches higher than vertex ..... 9



9b(8) Antennal scape LESS than length of an eye; malar space (cheek) around a third of eye length (fig 22).

*Torymus nobilis* Boheman 1834, ♀♂

(**EX GALLS:** *Andricus quercusradicis* ♂; *A. testaceipes* ♂; *Biorhiza pallida* ♂)

♀-(Body **3.0mm**; Wing/Body **84%;** Ovipositor/Body **58%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Dark purplish metallic head & thorax; dark & pale gaster; purple & testaceous legs; dark antennae)

♂ (Body **2.1mm;** Wing/Body **90%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Dark purple metallic head & thorax; gaster banded brown, purple & testaceous; purple & mid-brown legs; dark antennae)

Flying from **February to May** & during **September**

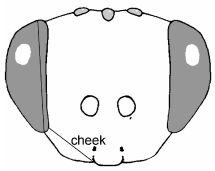


fig 22

● Antennal scape LONGER than length of an eye; malar space around half the length of an eye.

*Torymus roboris* (Walker 1833), ♀♂

(**EX GALL:** *Biorhiza pallida* ♂)

♀-(Body **3.4mm**; Wing/Body **77%;** Ovipositor/Body **79%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Purple head & thorax; orange gaster tapering to purple; orange-yellow legs; dark bronze antennae)

♂ (Body **2.2mm;** Wing/Body **85%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Dark purple-tinged head & thorax; gaster purple-tinged bronze with orange; dark yellow legs; bronze antennae)

Flying during **September**



10b.(7) Ovipositor sheaths about EQUAL in length to thorax+gaster; female gaster with pale testaceous base; male scape a bit more than half the height of an eye.

*Torymus scutellaris* (Walker 1833) ♀ ♂

(**EX GALL**: *Andricus quercusradicis* ♂, *Neuroterus saliens* ♀♂.)

♀-(Body **2.9mm**; Wing/Body **95%**; Ovipositor/Body **80%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Gold-tinted metallic green head & thorax; gaster half testaceous, half green; yellow legs; dark antennae)

♂-(Body **2.0mm**; Wing/Body **86%**)
ONE ring, SEVEN funicular & FIVE tarsal segments.
Dark metallic green head & thorax; gaster with testaceous front, brown rear; brown to yellow legs; brassy-gold antennae)

Flying during **April**

- Ovipositor sheaths much SHORTER than thorax + gaster; female gaster without a pale band; male scape 0.7 X height of an eye.

*Torymus formosus* (Walker 1833) ♀ ♂

(EX GALLS: *Andricus quercusradicis* ♂)

♀-(Body **3.1mm**; Wing/Body **87%**; Ovipositor/Body **66%**.
ONE ring, SEVEN funicular & FIVE tarsal segments.
Glowing copper metallic head & thorax with gold & green tints; golden-brown, coppery gaster; largely yellow legs; neutral-brown antennae)

♂-(Body **3.4mm**; Wing/Body **78%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Dark metallic green head & thorax; purple tinted gaster; golden legs; dark antennae)

Flying during **August**



11b.(3) Eyes large; in frontal view, width of eye GREATER than half the distance between inner borders of eyes (fig 23); frons very concave; ovipositor sheaths about as long as head+thorax.

*Torymus cyaneus* Walker 1847, ♀ ♂

(**EX GALLS**: *Andricus quercuscalicis* ♂, *Cynips divisa* ♂; *C. longiventris* ♂; *C. quercusfolii* ♂)

♀-(Body **3.4mm**, Wing/Body **97%**; Ovipositor/Body **61%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Brilliant metallic blue-green head & thorax with gold tints; green & blue gaster; metallic & largely dark legs; dark antennae)

♂ (Body **2.5mm**; Wing/Body **94%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Dark bright blue-green head & thorax; very dark metallic-tinted gaster; metallic & pale legs; dark antennae)

Flying from **May to July**

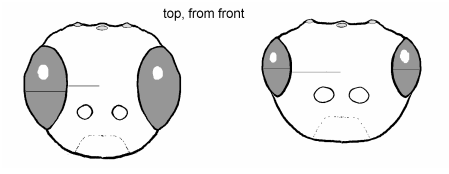



fig 23 fig 24

- Eyes normal; in frontal view, width of eye LESS than half the distance between inner borders of eyes (fig 24); frons not so noticeably concave ..... 12



12b.(11) Body BRONZED; a robust species; from above, the head is wider in relation to depth, the post-orbital region narrow, with width less than half the transverse diameter of an eye (fig 25); ovipositor sheath shorter than head+thorax.

*Torymus fastuosus* Boheman 1834, ♀ ♂

(**EX GALL**: *Trigonaspis megaptera* ♀♂)

♀-(Body **3.6mm**; Wing/Body **89%**; Ovipositor/Body **47%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Copper-green metallic body; dark legs & antennae)

♂-(Body **2.6mm**; Wing/Body **100%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Metallic green body; dark & yellow legs; dark antennae)

Flying during **March**

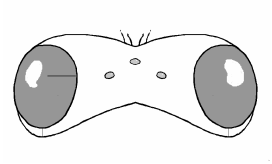


fig 25

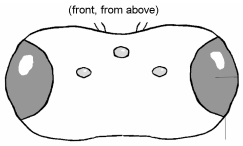



fig 26

- Body predominantly GREEN; a less robust species; from above, the head is deeper in relation to width, the post-orbital region broader, with width greater than half the transverse diameter of the eye (fig 26);.....12



13b.(12) Ovipositor sheaths at least THREE times length of head+thorax; basal cell of forewing hairy (fig 27); stigma not edged with dark cloud.

## *Torymus affinis* (Fonscolombe 1832) ♀ ♂

(**EX GALL**: *Biorhiza pallida* ♀♂)

♀-(Body **3.0mm**; Wing/Body **98%**; Ovipositor/Body **194%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Brilliant metallic green body; metallic & yellow legs; metallic & bronze antennae)

♂-(Body **2.3mm**; Wing/Body **100%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Bright metallic green body; metallic & yellow legs; dark antennae)

Flying **throughout the year**

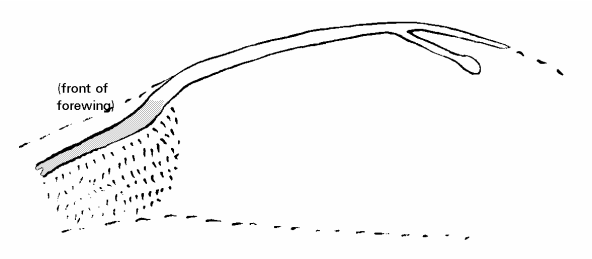



fig 27

- Ovipositor sheaths LESS than one and a half times the length of head+thorax; basal cell of male forewing sparsely hairy; stigma edged by slight dark cloud (not obvious, try different light levels).

## *Torymus notatus* (Walker 1833) ♀ ♂

(EX GALLS: *Andricus curvator* ♀♂)

♀-(Body **2.4mms**, Wings/Body **100%**; Ovipositor/Body **65%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Head & thorax metallic blue-green with copper tints; bronze-green gaster with testaceous streak; metallic & dark legs; gold-brown antennae)

♂-(Body **1.7mm**; Wings/Body **109%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Head & thorax metallic blue-green with copper tints; metallic green-brown gaster; metallic legs; dark antennae)

Flying during **April & May**



## C (B). Eupelmidae

1c. Female with RUDIMENTARY wings (brachypterous); slender male with a group of specialist sensillae on a PROJECTION extending below each of funicle segments 1-3 (difficult to see); both sexes with strongly tapered antennae.

*Eupelmus vesicularis* (Retzius 1783) ♀ ♂

(**EX GALLS**: *Andricus quercuscalicis* ♂)

♀-(Body 2.8**mm**, Wings/Body 0**%**; Ovipositor/Body 13**%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
dark bronze-green head; dingy metallic green thorax; dark neutral brown gaster with testaceous base; dark brassy antennae; brown & yellow legs; inconspicuous tiny ovipositor sheaths; rudimentary wings)

♂ (Body 1.6**mm**; Wings/Body 80**%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
very dark metallic body with green & purple tints; dark antennae; dark & yellow banded legs; full-length wings)

Flying during **April & May**

- Female with FULL-LENGTH wings; slender male with conventional PLAIN underside to funicle segments 1-3. ..... 2

2c.(1) Female with short but obvious protruding ovipositor sheaths, NOT longer than 2/3rds of the hind tibia, with a clear YELLOW band round the middle; antennae NOT tapered in either sex.

## *Eupelmus urozonus* Dalman 1820, ♀ ♂

(**EX GALLS**: *Andricus albopunctatus* ♂; *A. anthracina* ♂; *A. corruptrix* ♂, *A. curvator* ♀♂; *A. fecundator* ♂; *A. grossulariae* ♀♂, *A. kollari* ♂; *A. lignicola* ♂; *A. lucidus* ♂, *A. quercuscalicis* ♂; *A. solitarius* ♂, *A. testaceipes* ♂; *Biorhiza pallida* ♀♂; *Cynips divisa* ♂; *C. longiventris* ♂; *Neuroterus quercusbaccarum* ♀♂)

♀-(Body **2.7mm**, Wings/Body **80%**; Ovipositor/Body **18%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Very dark slender metallic green body; dark metallic & yellow legs; dark antennae)

♂ (Body **1.8mm**; Wings/Body **78%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Very dark metallic head & thorax; dark metallic green-brown gaster; purple & green metallic legs with pale bands; dark antennae)

Flying from **January to October**

- Female ovipositor sheaths similar in appearance but LONGER than above, often nearly as long as the whole rear tibia and with yellow extending to a clouded tip; male & female funicles with constant TAPER.

## *Eupelmus annulatus* Nees 1834, ♀ ♂

(**EX GALLS**: *Andricus kollari* ♂)

♀-(Body 2.3**mm**, Wings/Body 78**%**; Ovipositor/Body 27**%.**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Dark metallic green body; dark neutral antennae; brown & yellow banded legs; ovipositor sheaths yellow with dark base)

♂ (Body **1.8mm**; Wings/Body ?**%**
ONE ring, SEVEN funicular & FIVE tarsal segments.
Dark metallic body as *E. urozonus* above)

Flying ?

**G**.(F) HIND coxae MUCH enlarged, nearly 4 X length of middle coxa; gaster strongly sculptured; stigmal vein very short ..... **ORMYRIDAE** (p. 204)

- Hind coxae AT MOST twice length of mid coxa; gaster never strongly sculpted; stigmal vein well-developed..... **I.** (p. 205)



## G. Ormyridae

1g. Last tergite of ♀ gaster NOT LONGER than its base width (fig 28); gaster+ovipositor, at most as long as thorax (fig 29).

### *Ormyrus pomaceus* (Geoffroy in Fourcroy 1785) ♀ ♂

(**EX GALLS**: *Andricus corruptrix* ♂, *Aphelonyx cerricola* ♂; *Biorhiza pallida* ♀♂)

♀-(Body **2.7mm**, Wings/Body **81%;** Ovipositor/Body **4%.**
TWO ring, SIX funicular & FIVE tarsal segments.
Steeply hunched; dark blue-green head & thorax; bronze-green gaster; dark legs; dark antennae)

♂-(Body **1.8mm**; Wings/Body **97%**
TWO ring, SIX funicular & FIVE tarsal segments.
Hunched; very dark metallic blue head & thorax; dark gaster with blue tints; dark brown legs & antennae)

Flying from **June to August** & in **November**

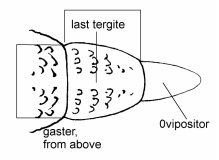



fig 28

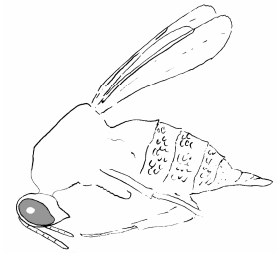


fig 29

- Last tergite of ♀ gaster at least ONE & A HALF TIMES AS LONG as its basal breadth; gaster, including ovipositor, at least twice as long as thorax; apart from relative sizes, there appears no other way of distinguishing males of the two species.

### *Ormyrus nitidulus* (Fabricius 1804) ♀♂

(**EX GALLS**: *Andricus aries* ♂; *A. grossulariae* ♂; *A. kollari* ♂, *A. lignicola* ♂, *A. quercuscalicis* ♂, *A. testaceipes* ♂; *Aphelonyx cerricola* ♂)

♀-(Body **5.1mm**, Wings/Body **73%**; Ovipositor/Body **9%.**
TWO ring, SIX funicular & FIVE tarsal segments.
Steeply hunched; body all deep metallic blue & blue-green; gaster with bands of large puncturation; dark legs with pale knees and tarsi; black antennae)

♂ (Body **2.3mm**; Wings/Body **93%**
TWO ring, SIX funicular & FIVE tarsal segments.
Deeply hunched; head green-gold; thorax & gaster deep metallic blue, purple & green; gaster with bands of prominent puncturation; dark legs with pale knees & tarsi; black antennae)

Flying from **April to November**



**H.**(G) Pronotum SHORT and wide (fig 30); metallic green or bronze ..... **PTEROMALIDAE**

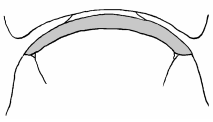


fig 30

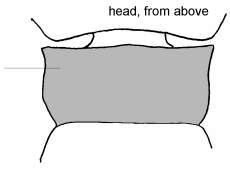



fig 31

- I. Pronotum QUADRATE (fig 31), colour black or black & yellow – never metallic.....**EURYTOMIDAE** (p.217)

## H. Pteromalidae

1h. Notaulices COMPLETE (fig 32) (*Ormocerus*).....2

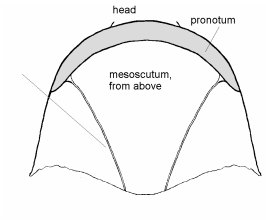



fig 32

- Notaulices INCOMPLETE at back.....3



2h.(1) Forewing CLEAR, basal cell hairy; maxillary palps (mouth appendages) yellow

*Ormocerus latus* Walker 1834, ♀ ♂

(**EX GALL**: *Neuroterus albipes* ♀♂)

♀-(Body **1.8mm**, Wings/Body **95%**; ovipositor/body **0%.**
TWO ring, SIX funicular & FIVE tarsal segments.
Metallic dark gold-green head & thorax; green & bronze gaster; metallic green legs; metallic antennae)

♂-(Body **1.4mm**; Wings/Body **112%**
TWO ring, SIX funicular & FIVE tarsal segments.
Dark bronze head; dark metallic green thorax; bronze-green gaster; metallic legs; bronze antennae)

Flying during **April & May**

- forewing with TWO DARK clouds; basal cell almost bare; maxillary palps dark.

*Ormocerus vernalis* Walker 1834, ♀ ♂

(**EX GALL**: *Neuroterus albipes* ♀♂)

♀-(Body **2.3mm**, Wings/Body **85%**; Ovipositor/Body **0%.**
TWO ring, SIX funicular & FIVE tarsal segments.
Metallic green head; blue-green thorax; dark metallic green gaster; metallic & dark legs; metallic green & dark antennae; ovipositor sheaths not visible)

♂ (Body **1.5mm**; Wings/Body **103%**
TWO ring, SIX funicular & FIVE tarsal segments.
Metallic green head; blue-green thorax; dark metallic blue gaster; largely metallic legs; dark antennae)

Flying from **April to June**

3h.(1) Antennae inserted AROUND or just above bottom edge of eyes (fig 33).....4

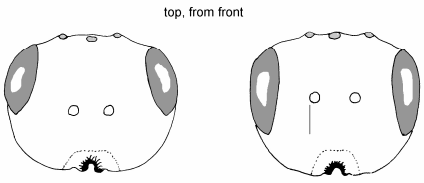



fig 33 fig 34

- Antennae inserted WELL above bottom edge of eyes (fig 34) (these two are difficult to judge, move specimen to different angles, but ensure the correct position of ocelli in relation to head, as sketched).....12



4h.(3) Female forewing with DARK CLOUD across, usually forming a transverse band from marginal & stigmal veins or two distinct clouds; the male has a single dark cloud below the stigmal vein; clypeus only slightly emarginated in centre (fig 35).

## *Arthrolytus ocellus* (Walker 1834) ♀ ♂

(**EX GALL**: *Andricus quercuscalicis* ♂)

♀-(Body **3.0mm**, Wings/Body **57%;** Ovipositor/Body **0%.**
TWO ring, SIX funicular & FIVE tarsal segments.
Very dark head & thorax with coppery tints; gaster brilliant copper with hint of purple; metallic & orange-brown legs; very dark brassy antennae; clouded forewings)

♂ Body **1.6mm**; Wings/Body **60**%
TWO ring, SIX funicular & FIVE tarsal segments.
Dark metallic head; dark thorax with green & gold tints; translucent pale & dark gaster; metallic & orange-brown legs; black antennae; clouded forewings)

Flying during **May, June & September**

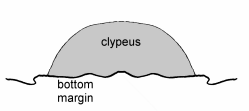



fig 35

fig 36

- Wings CLEAR throughout; clypeus clearly, though variably, incised (fig 36).....5

5h.(4) Antennae with TWO ring & SIX funicular segments (fig 37) (sometimes difficult to see ring segments, or even count funicular segments; under-stage lighting often helps; very important to crack this one as it is the obvious means for splitting these groups).....6

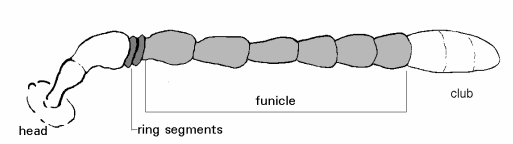



fig 37

- Antennae THREE ring & FIVE funicular segments.....8



6h.(5) Female with body elongate, gaster LONGER than whole of head+thorax (fig 38); colour predominantly green; male, with antennae uniformly yellow .....7

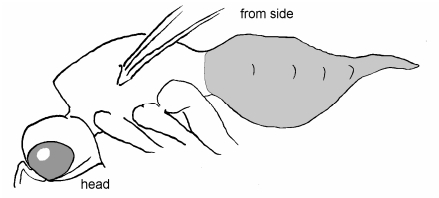



fig 38

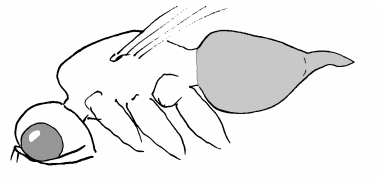


fig 39

- Female with gaster SHORTER than head+thorax (fig 39); colour usually bronze; male with antennal clubs dark and striped middle tibiae, and with a dark distal spot not borne on a projection (fig 40).

## *Mesopolobus tibialis* (Westwood 1833) ♀ ♂

(**EX GALLS**: *Andricus albopunctatus* ♂; *A. anthracina* ♀♂; *A. corruptrix* ♂ & ♀♂, *A. curvator* ♀♂; *A. grossulariae* ♂, *A. kollari* ♀♂, *A. lignicola* ♀♂, *A. quercuscalicis* ♂ & ♀♂; *Biorhiza pallida* ♀♂; *Neuroterus albipes* ♂ & ♀♂; *N. numismalis* ♂ & ♀♂; *N. quercusbaccarum* ♂ & ♀♂; *N. tricolor* ♀♂ *Trigonaspis megaptera* ♀♂)

♀-(Body **2.3mm**, Wing/Body **89%** Ovipositor/Body **0%.**
TWO ring, SIX funicular & FIVE tarsal segments.
Bronze-green head & thorax; metallic green-bronze gaster; yellow legs; yellow-brown antennae)

♂-(Body **1.7mm**; Wing/Body **94%**
TWO ring, SIX funicular & FIVE tarsal segments.
Large bright metallic green head; bronze thorax; bronze, yellow & green gaster; yellow legs; gold & brown antennae)

Flying from **May to December**

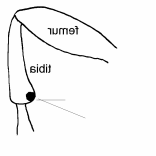



fig 40

♀



7h.(6) Clypeus with OBVIOUSLY visible incision in the middle (fig 41); male tibia without a projection; male gaster with distinctive shuttle mark (fig 42).

## *Mesopolobus sericeus* (Forster 1770) ♀ ♂

(**EX GALLS**: *Andricus callidoma* ♂; *A. corruptrix* ♂; *A. curvator* ♀♂; *A. grossulariae* ♂; *A. inflator* ♂; *A. kollari* ♂; *A. lignicola* ♂; *A. lucidus* ♂; *A. quercuscalicis* ♂; *A. quercusramuli* ♂; *A. seminationis* ♂, *A. solitarius* ♂; *Aphelonyx cerricola* ♂; *Biorhiza pallida* ♀♂; *Cynips disticha* ♂; *C. divisa* ♂; *C. longiventris* ♂; *C. quercusfolii* ♂; *Neuroterus anthracinus* ♂; *numismalis* ♀♂; *N. quercusbaccarum* ♀♂)

♀-(Body **3.1mm**, Wing/Body **88%**; Ovipositor/Body **0%.**
TWO ring, SIX funicular & FIVE tarsal segments.
Metallic green body with some gold tints; largely yellow legs; brassy-olive antennae)

♂-(Body **2.1mm**; Wing/Body **97%**
TWO ring, SIX funicular & FIVE tarsal segments.
Brilliant metallic blue, bronze, gold, and brown head & thorax; brown gaster with clear-cut yellow shuttle mark; bright pale yellow legs & antennae)

Flying **throughout the year**.

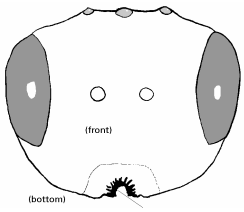


fig 41

fig 42

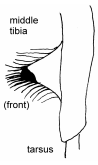


fig 43

- Clypeus with WAVED edge; male middle tibia WITH a small triangular dark-spotted projection at the end (fig 43).

## *Mesopolobus fasciiventris* Westwood 1833, ♀ ♂

(**EX GALLS:** *Andricus corruptrix* ♂, *A. curvator* ♀♂; *A. kollari* ♂; *A. lignicola* ♂; *A. quercuscalicis* ♀♂; *Cynips divisa* ♂; *C. longiventris* ♂; *C. quercusfolii* ♂; *N. albipes* ♂ & ♀♂; *N. anthracinus* ♂; *Neuroterus numismalis* ♂ & ♀♂; *N. quercusbaccarum* ♂)

♀-(Body **2.6mm**, Wing/Body **90%**; Ovipositor/Body **0%**
TWO ring, SIX funicular & FIVE tarsal segments.
Brilliant golden-green, green or blue-green body; pale yellow legs; yellow-brown antennae)

♂-(Body **1.8mm**; Wing/Body **94%**
TWO ring, SIX funicular & FIVE tarsal segments.
Brilliant green head & thorax, with or without blue or gold tints; yellow-banded brown gaster, bright pale yellow legs & antennae)

Flying from **April to November**



8h.(5) Pronotal collar BROAD, about equal in width in the middle to the distance between side ocellus and edge of eye; male middle tibiae without projections.

## *Mesopolobus amaenus* (Walker 1834) ♀ ♂

(**EX GALLS**: *Andricus corruptrix* ♂, *A. curvator* ♂ & ♀♂; *A. kollari* ♂; *A. lignicola* ♂; *A. quercuscalicis* ♂; *A. solitarius* ♂; *Biorhiza pallida* ♀♂)

♀-(Body **2.6mm**, Wing/Body **100%**: Ovipositor/Body **0%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Metallic green head & thorax; dark bronze-green gaster; dark to yellow legs; golden-brown antennae)

♂-(Body **2.0mm**; Wing/Body **103%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Bright metallic green head & thorax; dark brown gaster with
more or less testaceous-yellow across; pale yellow legs; orange-gold antennae with brown bands)

Flying **throughout the year**

- Pronotal collar NARROW median width, much less than distance between side ocelli and orbit ..... 9

9h.(8) Male - middle tibia with COLOURED STRIPE and triangular, dark-spotted PROJECTION at lower end; female – femora dark with pale ends; scape pale yellowy-testaceous; lower sheath of ovipositor long, about two-thirds the length of gaster (inside gaster, it needs to be pulled out when relaxed).

## *Mesopolobus xanthocerus* (Thomson 1878) ♀ ♂

(**EX GALLS**: *Andricus corruptrix* ♀♂, *A fecundator* ♀♂; *A. grossulariae* ♀♂, *A. kollari* ♂ & ♀♂; *A. lignicola* ♂ & ♀♂, *A. quadrilineatus* ♂; *A. quercuscalicis* ♀♂, *Biorhiza pallida* ♀♂; *N. anthracinus* ♂)

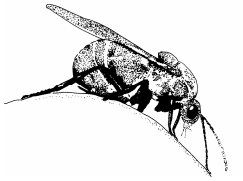
♀-(Body **2.1mm;** Wing/Body **98%**; Ovipositor/Body **0%**)
THREE ring, FIVE funicular & FIVE tarsal segments.
Metallic golden-green head & thorax; gaster green shot with dark bronze; yellow-brown legs with over-sized femora; deep yellow antennae)

♂-(Body **1.7mm**; Wing/Body **98%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Bright green metallic head & thorax; yellow-banded metallic gaster; dark to yellow legs with enlarged middle tibiae; yellow-brown antennae with dark clubs)

Flying from **January to August**

- Male tibiae WITHOUT projections; female with ovipositor sheaths at most only slightly longer than half the length of the gaster (normally hidden inside the gaster); scape other than above ..... 10





10h.(9) Female femora & tibiae uniformly DARK; scape mid-brown; stigmal vein rather strongly curved; middle tibia of male with coloured stripe.

*Mesopolobus fuscipes* (Walker 1834) ♀ ♂

(**EX GALLS**: *Andricus callidoma* ♀♂, *A. corruptrix* ♂ & ♀♂, *A. curvator* ♀♂; *A. grossulariae* ♀♂, *A. kollari* ♂ & ♀♂; *A. lignicola* ♂ & ♀♂, *A. quercuscalicis* ♀♂, *Cynips longiventris* ♀♂; *C. quercusfolii* ♀♂; *Neuroterus albipes* ♀♂; *N. anthracinus* ♀♂; *N. aprilinus* ♀♂; *N. numismalis* ♀♂, *Trigonaspis megaptera* ♀♂)

♀-(Body **2.3mm**, Wing/Body **92%**; Ovipositor/Body **0%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Dark metallic green-gold head & thorax; dark green-brown gaster; dark legs; mid-brown antennae)

♂ -(Body **1.8mm**; Wing/Body **103%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Brilliant green & red-gold head & thorax; yellow-banded brown gaster; yellow legs; yellow antennae with some dark segments)

Flying from **January to June** & from **October to December**.

- Female tibiae TESTACEOUS or YELLOW; stigmal vein only slightly curved; male middle tibia without a stripe..... 11



11h.(10) Body colour BLUISH; all funicular segments longer than broad (fig 44); normal-shaped mid-tibiae; female scape mid-brown.

## *Mesopolobus albitarsus* (Walker 1834) ♀ ♂

**(EX GALL:** *Andricus curvator* ♀♂)

♀-(Body **2.2mm**, Wing/Body **81%**; Ovipositor/Body **0%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Dark metallic blue-green head & thorax; bronze-green gaster; from dark to pale legs; light brown antennae)

♂-(Body **1.7mm**; Wing/Body **88%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Very dark metallic head & thorax with green, blue or violet tints; bronze-brown gaster; dark legs; gold antennae)

Flying during **June & July**

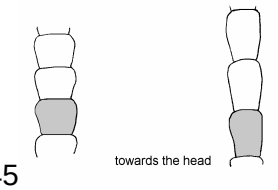



fig 45 fig 44

- Body colour BRONZE-GREEN; the furthest out funicular segments broader than long (fig 45); obviously enlarged, flattened middle tibiae; female scape deep yellow.

## *Mesopolobus dubius* (Walker 1834) ♀ ♂

(**EX GALLS**: *Andricus corruptrix* ♂ & ♀♂, *A. grossulariae* ♀♂, *A. kollari* ♂ & ♀♂, *A. lignicola* ♀♂, *A. quercuscalicis* ♀♂, *Biorhiza pallida* ♀♂; *Cynips divisa* ♂; *Neuroterus quercusbaccarum* ♂, *Trigonaspis megaptera* ♀♂)

♀-(Body **2.1mm**, Wing/Body **85%**; Ovipositor/Body **0%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Large head; dark green-bronze head & thorax; green & brown gaster; dark to yellow legs; brassy antennae)

♂-(Body **1.7mm**; Wing/Body **93%**
THREE ring, FIVE funicular & FIVE tarsal segments.
Large head; bright metallic green head & thorax; gaster banded in metallic green, yellow & brown; yellow legs; yellow antennae with brown bands)

Flying throughout **the year.**



12h.(3) **Marginal vein ABOUT 1.5 X length of post marginal vein, and at least 2 X as long as stigmal vein** (measure, not judge, as it can be deceptive)**; clypeus with radiating STRIAE which extend well up face & cheeks** (fig 46)**; wing venation usually slightly interrupted where marginal & sub-marginal veins meet at the edge of the forewing** (fig 47).

## *Hobbya stenonota* (Ratzeburg 1848) ♀ ♂

(**EX GALLS**: *Andricus kollari* ♂; *Aphelonyx cerricola* ♂; *Biorhiza pallida* ♀♂)

♀-(Body **2.1mm**, Wing/Body **88%**; Ovipositor/Body **0%**
TWO ring, SIX funicular & FIVE tarsal segments.
Large head; dark metallic green head & thorax; dark bronze-green gaster; dark to yellow legs; brassy antennae)

♂-(Body **1.8mm**; Wing/Body **86%**
TWO ring, SIX funicular & FIVE tarsal segments.
Large head; green-bronze head & thorax; golden-bronze gaster; metallic, brown & dirty yellow legs; brassy antennae)

Flying from **March to September**

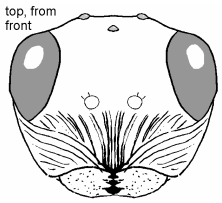



Fig 46

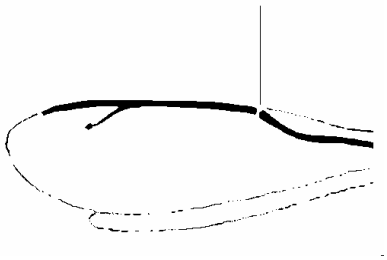


fig 47

- **Marginal vein AT MOST equal in length to post-marginal, and between 1.2 & 1.75 x as long as stigmal; striae on face extend only slightly up cheek** (fig 48) ..... 13

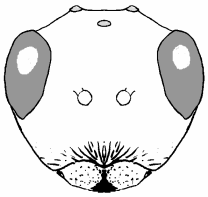


Fig 48



13h.(11) Clypeus with front edge with a STRONG and obvious notch in the middle (fig 49); the WHOLE basal cell of forewing hairy (fig 50).

## *Caenacis lauta* (Walker 1835) ♀ ♂

(**EX GALLS**: *Andricus albopunctatus* ♂; *A. kollari* ♂; *A. testaceipes* ♂; *Cynips divisa* ♂)

♀-(Body **2.6mm**, Wing/Body **88%**; Ovipositor/Body **0%**)
TWO ring, SIX funicular & FIVE tarsal segments.
Large head; darkish metallic green head & thorax; dark metallic gaster; yellow-brown legs; brassy antennae)

♂-(Body **2.5mm**; Wing/Body **87%**
TWO ring, SIX funicular & FIVE tarsal segments.
Darkish metallic green head & thorax; brown gaster; dark to yellow legs; brassy antennae)

Flying during **February** & from **May to August**

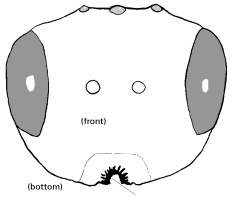


fig 49

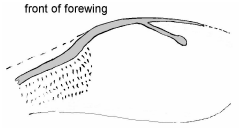


fig 50

- Clypeus with bottom edge straight, or only SLIGHTLY notched; *Cecidostiba* spp..... 14



14h.(13); Large brown CLOUD on disc (51b); basal cell of forewing HAIRY in outermost third (fig 51a); first funicle segment SHORTER than pedicel.

## *Cecidostiba geganius* (Walker 1848) ♀ ♂

(**EX GALL**: *Andricus quercusradicis* ♂)

♀-(Body **3.0mm**, Wing/Body **68%**; Ovipositor/Body **0%**
TWO ring, SIX funicular & FIVE tarsal segments.
Dark greeny-bronze body with purple tints; testaceous legs; brassy antennae; conspicuous brown cloud on mid-forewing)

♂-(Body **1.6mm**; Wing/Body **76%**
TWO ring, SIX funicular & FIVE tarsal segments.
Dark greeny-bronze head; bronze thorax & gaster; brown & yellow legs; yellow-brown antennae)

Flying from **May to August**


fig 51

- Wing NOT clouded; basal cell of forewing BARE, or with only one or two hairs; first funicle segment at least as LONG as pedicel ..... 15



15h.(14) **Clypeus with slight but DISTINCT median incision** (fig 52); **stigma as wide as long** (fig 53). (*check characters carefully*).

## *Cecidostiba fungosa* (Geoffroy *in* Fourcroy 1785) ♀ ♂

(**EX GALLS**: *Andricus corruptrix* ♂, *A. grossulariae* ♂ & ♀♂; *A. kollari* ♂, *A. quercuscalicis* ♂, *A. quercusramuli* ♀♂; *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Neuroterus saliens* ♀♂.)

♀- (body **2.6mm**, wing/body **78%**; ovipositor/body **0%**
TWO ring, SIX funicular & FIVE tarsal segments.
Metallic green head & thorax, sometimes with gold, bronze or red tints; largely bronze gaster; yellow & brown legs; brassy antennae)

♂-(body **1.9mm**, wing/body **82%**
TWO ring, SIX funicular & FIVE tarsal segments.
Dark to brighter metallic green head & thorax, sometimes with gold, bronze or red tints; dark brown
gaster; brown & pale legs; brassy antennae)

Flying **throughout the year**.

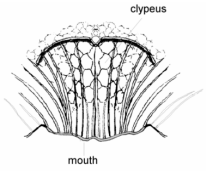



fig 54

fig 52

- **Clypeus WITHOUT median incision** (fig 54), showing a wavy edge; **stigma longer than wide** (*the proportion varies - for confirmation rather than complete identification; the drawing shows extreme conditions for comparison*) (fig 55).

## *Cecidostiba semifascia* (Walker 1835) ♀ ♂

(**EX GALLS**: *Andricus kollari* ♂, *A. quercuscalicis* ♂; *Aphelonyx cerricola* ♂, *Biorhiza pallida* ♀♂, *Neuroterus saliens* ♀♂.)

♀-(Body **2.6mm**, Wing/Body **78%**; Ovipositor/Body **0%**)
TWO ring, SIX funicular & FIVE tarsal segments.
Darker to bright metallic green head & thorax with more or less extensive gold tints; bronze-green gaster; legs tapered from dark to light; brassy antennae)

♂-(Body **1.7mm**; Wing/Body **89%**
TWO ring, SIX funicular & FIVE tarsal segments.
Dark metallic green head & thorax, with gold tints; dark gaster; legs tapered from dark to light; brassy antennae)

Flying **throughout the year**

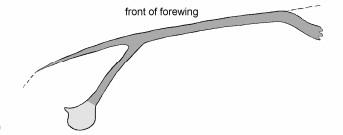



fig 53

fig 55



## I. Eurytomidae

1i. **Forewing CLEAR,** (with no trace of cloud)

*Eurytoma brunniventris* Ratzeburg 1852, ♀♂

(**EX GALLS**: *Andricus albopunctatus* ♂; *A. callidoma* ♂; *A. corruptrix* ♂, *A. curvator* ♀♂; *A. grossulariae* ♂ & ♀♂; *A. inflator* ♂; *A. kollari* ♂; *A. lignicola* ♂, *A. lucidus* ♀♂; *A. quercuscalicis* ♂; *A. solitarius* ♂; *A. testaceipes* ♂; *Aphelonyx cerricola* ♂; *Biorhiza pallida* ♀♂; *Callirhytis erythrocephala* ♀♂; *Cynips disticha* ♂; *C. divisa* ♂; *C. longiventris* ♂; *C. quercusfolii* ♂; *Neuroterus albipes* ♀♂; *N. anthracinus* ♂; *N. numismalis* ♀♂; *N. quercusbaccarum* ♂ & ♀♂; *Neuroterus saliens* ♀♂. *N. tricolor* ♀♂)

♀-(Body **2.8mm**, Wing/Body **79%**; Ovipositor/Body **0%**
ONE ring, FIVE funicular & FIVE tarsal segments.
Black non-metallic body; dark legs; dark antennae)

♂-(Body **1.9mm**; Wing/Body **95%**
ONE ring, FIVE funicular & FIVE tarsal segments.
Black non-metallic body & legs; knobbly whorled dark antennae; petiolate)

Flying from **February to September**

- Forewing with a distinct CLOUD stretching back from the front edge.....2



2i.(1) Sub-marginal cloud LARGE, spreading onto disc of forewing (fig 56); hind tibial end spines distinctly longer than tibial width.

## *Sycophila flavicollis* (Walker 1834) ♀ ♂

(**EX GALLS**: *Andricus aries* ♂, *A. grossulariae* ♀♂; & oak twigs)

♀-(Body **1.6mm**, Wing/Body **91%**; Ovipositor/Body **0%**
ONE ring, FIVE funicular, FIVE tarsal segments.
Non-metallic; yellow head & thorax, with some brown; gaster orange with dark brown; bright yellow legs & antennae; petiolate)

♂-(Body **1.6mm**; Wing/Body **91%**
ONE ring, FOUR funicular, FIVE tarsal segments
Non-metallic; yellow head & thorax with some brown; yellow-brown gaster; yellow legs & antennae; petiolate)

Flying during **June**

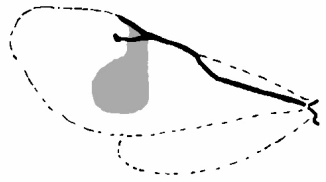


fig 56

- Forewing with a DISTINCTIVE long bent cloud (fig 57); stigmal vein shorter than marginal vein

## *Sycophila biguttata* (Swederus 1795) ♀ ♂

(**EX GALLS**: *Andricus aries* ♂, *A. corruptrix* ♂, *A. grossulariae* ♂; *A. kollari* ♂; *A. lignicola* ♂, *A. lucidus* ♂, *A. quercuscalicis* ♂; *Aphelonyx cerricola* ♂, *Cynips divisa* ♂; *C. longiventris* ♂; *C. quercusfolii* ♂)

♀-(Body **3.4mm**, Wing/Body **83%**; Ovipositor/Body **0%**
ONE ring, FIVE funicular, FIVE tarsal segments.
Non-metallic; black head & thorax with or without pale markings; dark brown gaster; dark & paler legs; dark antennae; clouded wing; petiolate)

♂-(Body **2.1mm**; Wing/Body **94%**
ONE ring, FOUR funicular, FIVE tarsal segments.
Dark non-metallic body; dark legs & antennae; dark cloud at stigma; petiolate)

Flying from **February to October**

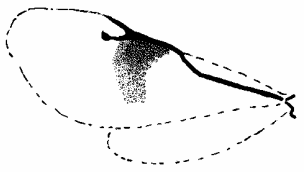


fig 57

(continued on next page)



(continued from last page)

- Sub-marginal cloud on wing SMALL (fig 58); stigmal vein longer than marginal

## *Sycophila variegata* (Curtis 1831) ♀ ♂

(**EX GALLS**: *Andricus corruptrix* ♂, A. grossulariae ♀♂; *A. kollari* ♂; *Biorhiza pallida* ♀♂)

♀-(Body **1.9mm**, Wing/Body **89%;** Ovipositor/Body **0%**
ONE ring, FIVE funicular, FIVE tarsal segments.
Non-metallic; body variable from mostly yellow to amounts of dark brown; yellow & brown striped legs; yellow-brown antennae; clouded wings; petiolate)

♂ **1.6mm**; Wing/Body **92%**
ONE ring, FOUR funicular, FIVE tarsal segments.
Non-metallic; Non-metallic; body variable from mostly yellow to amounts of dark brown; yellow & brown striped legs; yellow-brown antennae; clouded wings; petiolate)

Flying during **June**

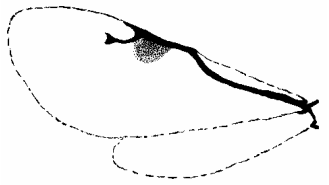


fig 58



# Keys to Ichneumons

1. WINGLESS

*Gelis formicarius* (Linnaeus 1758) ♀

(**EX GALL**: *Andricus quercuscalicis* ♂)

♀-(Body **3.0mm**, Wing/Body **0%**; Ovipositor/Body **24%**
? antennal, FIVE tarsal segments.
Wingless; ant-like; black & red head; yellow-red thorax; red-brown, red & black gaster; red-yellow legs; yellow-red & black antennae)

Present from **April to September**

- WINGED ..... 2

2.(1) All BLACK head & thorax.....3

- Colouring OTHER than above ..... 4

3.(2) Gaster brown, with pale centre above

*Gelis formicarius* (Linnaeus 1758) ♂

(**EX GALL**: *Andricus quercuscalicis* ♂)

♂-(Body **3.3mm**; Wing/Body **91%**
TWENTY-FOUR antennal, FIVE tarsal segments.
Winged; black head & thorax; dark brown & pale gaster; testaceous legs; dark antennae)

Flying from **April to September**

- Gaster all black above

*Scambus planatus* (Hartig 1838) ♀ ♂

(**EX GALL**: *Andricus grossulariae* ♂)

♀-(Body **6.5mm**, Wing/Body **96%;** Ovip/Body **72%**
TWENTY THREE antennal, FIVE tarsal segments.
Black body; white, dark & testaceous legs; dark brown antennae)

♂-(Body **7.4mm**, Wing/Body **67%**
TWENTY FIVE antennal, FIVE tarsal segments.
Black head & thorax; gaster black above, white below; black, white & testaceous legs; brown antennae)

Flying during **April**



4.(2) BLACK head & RED thorax

*Mastrus deminuens (=castaneus)* (Hartig 1838) ♂

(**EX GALL**: *Andricus quercuscalicis* ♂)

♂-(Body **?mm**; Wing/Body **?%**
? funicular, ? tarsal segments.
Black head; red thorax; abdomen black with some red across top; legs dark red & black; antennae testaceous to brown tip)

Flying during **February**

- RUST-COLOURED head & BLACK thorax

*Mastrus deminuens (=castaneus)* (Hartig 1838) ♀

(**EX GALL**: *Andricus quercuscalicis* ♂)

♀-(Body **?mm**, Wing/Body **?%**; Ovipositor/Body **?%**
? funicular, ? tarsal segments.
Red head; black thorax; black gaster with some red; red legs; testaceous & brown antennae)

Flying during **February**

- CHESTNUT body with black PATCHES

*Gelis areator* (Panzer 1804) ♀ (♂ ?)

(**EX GALL**: *Aphelonyx cerricola* ♂)

♀-(Body **4.3mm**, Wing/Body **82%,** Ovipositor/Body **21%**
TWENTY TWO antennal, FIVE tarsal segments.
Chestnut & black head & thorax; chestnut & dark brown gaster; chestnut legs & antennae; petiolate)

Flying during **May**



# Proctrotrupoidea
# Diapriidae

1. Distinctive band of silver hair round petiole

*Spilomicrus stigmaticalis* Westwood 1832

(**EX GALL**: *Andricus quercuscalicis* ♂)

♂ (Body **2.8mm**, wing/body **90%,** ov/body **0%**
THIRTEEN antennal, FIVE tarsal segments.
Black body; black antennae; dark & pale legs)

♀ (Body **2.9mm,** wing/body **104%**
THIRTEEN antennal, FIVE tarsal segments.
Black body; black antennae; dark legs)

Flying from **April to September**



# Key to larval stages of hymenopteran oak-gall inhabitants

(Selected from **'The Biology of Gall Wasps'**, by R.R. Askew; pp 262-3, within 'The Biology of Gall Insects', edited by T.N. Ananthakrishnan, Edward Arnold (Publishers) Ltd, 1984); recently brought up to date by the author, who kindly allowed me to use it.

1. Larval mandibles each with three or four teeth (further checks needed) .....2

• Larval mandibles with one or two teeth .....4

2.(1) Body with short setae (slender sense organ, like a hair but tapered & more definite, joined to body by a socket) and tapering posteriorly; head with a median frontal pit; front edge of labrum notched .*Megastigmus*

• Body without setae, broadly rounded posteriorly; other characters disagreeing..... (**Cynipinae**) 3

3.(2) Larva in stunted gall or with larval chamber modified, sometimes divided into compartments; often several in a single gall .....*Ceroptres, Saphonecrus, Synergus*

• Larva in unmodified gall; solitary unless gall is normally plurilocular ..... *Andricus, Aphelonyx, Biorhiza, Cynips, Neuroterus, Trigonaspis*

4.(1) Larval mandibles each with two teeth .....5

• Larval mandibles each with a single tooth .....6

5.(4)Ectophagous (feeding on 'outside' of host); ventral body setae almost as long as body segments; mandibles strong and conspicuous ..... *Eurytoma*

• Endophagous (feeds inside host); body setae short; mandibles weak ..... *Sycophila*



6.(4) Larva with numerous body setae, the longest about as long as the body segment ..... 7

• Larva with body setae absent, or much shorter than the body segments ..... 8

7.(6) Lower edge of clypeus serrated ..... *Eupelmus*

• Lower edge of clypeus entire ..... *Torymus*

8.(6) Larva with short body setae; antennae relatively conspicuous, borne on frontal prominences ..... 9

• Larva without body setae; antennae inconspicuous . (**Eulophidae**) 10

9.(8) Head with four pairs of long setae, almost as long as distance separating antennae ..... **Ormyridae**

• Head with very short setae ..... **Pteromalidae**

10.(8) Endophagous ..... *Pediobius*

• Ectophagous & solitary ..... *Aprostocetus, Aulogymnus, Baryscapus*



# 6. Conclusion - afterthought

The broadly accepted view on the status of oak-galls and their inhabitants in Britain has changed considerably since this study was started in 1992. Parasitoids and inquilines, which previously had only gradually changed their pattern of relationships with specific galls, have now spread widely into other galls. For example, the chalcid *Aulogymnus skianeuros* was previously seen in this country as being present only in the Oak apple, *Biorhiza pallida* ♀♂; it has now been found in the galls of *Andricus lignicola* ☿, *A. quercusramuli* ♀♂ as well as the Rose bedeguar, *Diplolepis rosae*. The effect of this is well illustrated by the Marble gall, *Andricus kollari* ☿, which, in 1992, was believed to have a total of 18 inquilines and parasitoids, and is now known to have at least 29. Is this a reflection of the effects of climate change or of a concentrated, intense rearing programme revealing what might already be there? It is impossible to be certain at this time but there may well be elements of both, giving extra urgency to further work.

During the course of the study, *Eupelmus annulatus, E. vesicularis* and *Quadrastichus anysis* have emerged as new parasitoids in British oak-galls, together with *Torymus chloromerus*, while *Synergus variabilis*, an inquiline new to Britain, has been found in the gall *Aphelonyx cerricola* ☿. Current figures for inhabitants are: 72 hymenopteran causers (agamic & sexual generations counting as distinct); 9 non-hymenopteran causers; 17 inquilines; and 55 parasitoids (including some possibly doubtful ichneumons & diapriids).

New galls have arrived from the Continent during recent years and, instead of gradually building up a population of parasitoids and inquilines, as has previously been the case, they have been found with numbers of inhabitants already present. For example, in early 2006 (*Neuroterus saliens* ☿ & ♀♂ have only been found this year and have not yet been reared in quantity):

| Gall | Generation | Inquilines | Parasitoids |
|---|---|---|---|
| *Andricus aries* | ☿ | 6 | 4 |
| *Andricus grossulariae* | ☿ | 1 | 8 |
| *Andricus grossulariae* | ♀♂ | 1 | 10 |
| *Andricus lucidus* | ☿ | 1 | 3 |
| *Andricus lucidus* | ♀♂ | 0 | 2 |
| *Aphelonyx cerricola* | ☿ | 4 | 11 |
| *Neuroterus saliens* | ☿ | None known | None known |
| *Neuroterus saliens* | ♀♂ | None known | None known |

The work being carried out on European oak-galls by Dr Graham Stone and his associates, (Stone et al. 2009) has made clearer the extent of alternative generations on the Continent which are not, apparently, found in this country. Traditionally, we have taken it that certain galls exist only in one form, for instance, *Andricus amenti* ♀♂. An agamic generation of this insect is found on the Continent; might it not be here also? Work undertaken by Pat Walker at Silwood Park, (Walker 2002), showed that *Andricus grossulariae* ☿ and *Andricus mayri* ♀♂ are alternative generations of *Andricus grossulariae* Giraud, and are now both present in Britain.

One thing is certain, previously entertained beliefs are no longer set in stone; while we have much more information on what does exist in oak-galls, there may be more species to come. An exciting and challenging time for all. (RW-April/09)



# Index of gall names
## Scientific names (in 'Descriptions of Galls)
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| *Andricus amenti* | Hairy-catkin gall | ♀♂ | 48 |
| *Andricus aries* | Rams-horn gall | ♂ | 48 |
| *Andricus callidoma* | Stalked-spindle gall | ♂ | 49 |
| *Andricus callidoma* | Tufted gall | ♀♂ | 49 |
| *Andricus corruptrix* | - | ♂ | 49 |
| *Andricus corruptrix* | - | ♀♂ | 49 |
| *Andricus curvator* | Collared-bud gall | ♂ | 49 |
| *Andricus curvator* | Curved-leaf gall | ♀♂ | 49 |
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| *Andricus fecundator* | Hairy-catkin gall | ♀♂ | 50 |
| *Andricus glandulae* | Thatched gall | ♂ | 50 |
| *Andricus glandulae* | - | ♀♂ | 50 |
| *Andricus grossulariae* | - | ♂ | 50 |
| *Andricus grossulariae* | - | ♀♂ | 50 |
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| *Andricus inflator* | Twig gall | ♀♂ | 51 |
| *Andricus kollari* | Marble-gall | ♂ | 51 |
| *Andricus kollari* | - | ♀♂ | 51 |
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| SCIENTIFIC | ENGLISH NAME | GENERATION | PAGE |
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