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CECIDOLOGY

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Journal of the
BRITISH PLANT GALL SOCIETY

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NOTES TO CONTRIBUTORS

Recommended guide-lines, when writers have the facilities:-
Type in double spacing on one side of the paper only. Give margin of 2 cm at upper and left-hand margin.
Include a second (e.g. carbon) copy; a third copy is useful, and writers should also keep a copy.
Give sketches on a separate sheet, in black and white. Indication of scale and any other writing at least 5 cm. clear of sketch(es).
Underline scientific names, and nothing else; use a separate sheet to indicate any other special printing instructions.

Copy should be received by the Editor by March 20/September 20 for publication in May/November. Approximately intermediate dates apply to the *Newsletter* prepared by the Secretary.

31 May, 1986 for all material intended for *Newsletter* No. 2, addressed to Dr. C.K. Leach.

20 September 1986 for all material intended for *Cecidology* No. 2, addressed to Mr. F.B. Stubbs.

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CECIDOLOGY

Vol. 1, No. 1 Spring 1986

Journal of the British Plant Gall Society
Editor — F.B. Stubbs

EDITORIAL

For a fledgling Society within its first year to launch a varied and active programme denotes a degree of confidence which it must now determine to justify. Membership extends very widely across the country, and this is reflected in the series of meetings already arranged.

As the subject has never previously had its own definable forum here, all aspects should be covered, at all levels. No observation can be regarded as trivial, while an apparently simple question may lead to fruitful discussion. So too may the reasoned presentation of controversial or speculative views. Accounts of research methods and findings are very important; here, a quite brief explanation or parenthesis will allow the less experienced reader to appreciate the uses of scientific terminology.

The word "cecidology" is not new, but it is unfamiliar to many naturalists and completely ignored by dictionaries. Galls have been known since early times, usually as a source of tannin and related products. To the Ancient Greeks, the oak-apple was "kekis" and to the Romans it was "galla", roots from which many modern terms are derived. Evidence points to the pronunciation "sesidology".

In the 16th century curative properties were attributed to these growths. The existence of "worms" in enclosed specimens supported the belief in spontaneous generation, and provided inspiration for the soothsayers. Studies tending towards the modern line of approach were pioneered by Marcello Malpighi in 17th century Italy and, as botany and entomology developed, galls began to receive more attention. Cases affecting farm crops and other cultivated plants have been regularly investigated. Otherwise, after a few productive decades from around 1880, the subject in itself suffered a decline, at least in Britain, for well over fifty years. This left the handful of surviving or would-be enthusiasts in a no-man's-land.

Now we are claiming to represent an every-man's-land. with something for the botanist, the entomologist and the mycologist, as well as for the one who traces the obscure ways of bacteria or eel-worms, genes or hormones. The British Plant Gall Society encourages the exchange of news and opinion among the followers of the several disciplines, whether their interests are broad or specialised. It welcomes all attempts to reach an understanding of the whole scene.

ARNOLD DARLINGTON

It was sad to learn of the recent death of Arnold Darlington. He was a versatile biologist and field naturalist, whose inspired approach to cecidology was translated into warm support for the British Plant Gall Society. An appreciation of Arnold Darlington and his work will appear in the next issue of this Journal.

GALL OCCURRENCE — THE QUESTION OF RECORDS

Records of gall occurrence are of fundamental interest to the Society and its members, yet devising a comprehensive system which would be universally applicable presents a number of difficulties. Records are, after all, generated in a number of ways. There are those produced by "professional" or "expert" observers from long term and frequent studies while others arise from casual, one-off visits to sites by "non-experts". Clearly the records produced will differ in both qualitative and quantitative terms. Yet all types of records have their value. The danger is, therefore, if the Society produces an ill-considered format for producing records, much valuable information might be lost or the "non-expert" may be put off from contributing by being unsure about some aspect of the information sought. Faced with this type of difficulty, the 4th issue if the Bulletin of Plant Galls (Autumn 1985 p.9) carried a request for comments on the presentation of records. The following remarks arise as an initial response to the many contributions made by members on this topic.

The overwhelming number of letters referred to the need for the production of check-lists of the known British Gall-causers. These are, of course, vitally important. Before a record can be made, it is essential that a gall be recognised and identified. Arnold Darlington's book "The Pocket Encyclopaedia of Plant Galls", excellent though it is, is long out of print and not now available. The need for suitable keys and checklists was, therefore, predictable and, through the action of the Chairman, a preliminary "Handbook of Keys" is in preparation. These will become available by summer 1986. It is hoped that this will at least temporarily fill the gap while a fuller publication is prepared.

As for the records themselves, there has been a general agreement that the minimal information should include: causer, host, date, grid/ref. Less common ground is found in whether-or-not there should be an attempt to quantify the occurrence of each gall-type recorded. It is unrealistic to ask observers to numerically quantify the occurrence of all galls observed in such terms as 'average number of spangle galls/leaf' or '% catkins bearing currant galls'. Such an approach is a mammoth task and, like the mammoth, is likely to die the death. More appropriate is the suggestion to use semi-quantitative terms such as rare, common, abundant, frequent etc. Although the use of such terms is likely to be rather subjective and prone to different application by different authors, at least their use would give some impression of whether-or-not a particular gall type is likely to be regularly found in large numbers in a particular area or whether its presence might be difficult to detect.

Our correspondents also split into two main schools of thought over the order in which the records should be presented. There are those who preferred the records to be listed under causes while others preferred them to be listed under the host plant. The problem is not a new one. In describing galls most texts, including those of Darlington (1975), Buhr (1965) Swanton (1912) and Houard (1909-1913), primarily separated galls on the basis of the plant species bearing them. This seems entirely appropriate if the text is to be used as an aid to identification. Cecidologists usually recognise a particular gall by identifying the host plant first.

Most of us are, after all, more likely to recognise an oak tree long before we can distinguish between common, cupped and silky spangle galls caused by various species of Neuroterus. On the other hand the texts of Ananthakrishnan (1984) primarily separate galls on the basis of gall-causer. Again such divisions are entirely appropriate in monographs centering upon a discussion of the gall causers. One would expect, for example, there to be much in common between hymenopterous gall causers irrespective of the natures of the host plants.

For records of galls, however, a strong case can be made for giving priority to details of the gall-causer rather than the host. In the words of D.H. Smith of Kirkbymoorside

> ". . . . . causer details should take priority in a listing otherwise one is out of step with all other recording. Siphonaptera may initially be identified with the help of host details but the fleas are the basis of the records, not the mammalian hosts".

Most of the records we have hitherto received have been based on this division (see S.A. Manning; B.M. Spooner; J. Royston; P.I. Morris in Bulletin of Plant Galls, vol. 4).

As a starting point, therefore, in bringing some unity to record keeping, we would suggest that members should attempt to present records in the following format.

1) Major Sub-group of Gall Causer
   (e.g. Bacteria; Fungi; Nematode; Acarina; Aphid; Psyllidae; Hymenoptera-Cynipoidea; Hymenoptera-Tenthredinoidea etc.).
2) Name of Gall Causer
   (e.g. Eriophyes macrorhynchus cephalodes).
3) Name of Host
   (e.g. Acer campestre).
4) Date
5) Grid Reference.
6) Abundance
   (e.g. rare; abundant etc.).
7) Comments.

Such a system would enable the records from different authors to be handled together and, ultimately, able to provide data covering the distribution of galls throughout Britain. It is our intention that this data could also be computerised and could be recalled, and/or processed, at the touch of a button giving either a computer listing of the type produced by Don Smith from the records of the Ryedale Natural History Society illustrated below.

6 Eriophyes macrorhynchus cephalodes — Acer campestre — Acari

44/82 84	1982	wgb	44 56 82	1979	wgb		44/80 82	1979
54/01 35	1979	wgb	44/80 82	1980	wgb	:	44/82 86	1981
45/88 04	1981	wgb	45/84 11	1981	wgb	..	44/80 82	1981
44/81 82	1982	wgb	44/80 86	1982	wgb		44/86 88	1982
44/75 88	1984	wgb						

We are fortunate that the Institute of Terrestrial Ecology at Monks Wood are prepared to handle this data for us. The first A.G.M. of the Society has been arranged at Monks Wood for the specific purpose of working out final details for the transfer of information.

Finally, if you already have records which do not quite fit the format described above, please send them in. **All** records are useful.

References

Ananthakrishnan, T.N. (1984) *"The Biology of Gall Insects"* Arnold, London.

Buhr, H. (1965) *"Bestimmungstabellen der Gallen (200-und Phytocecidien) an Pflanzen Mittel-und Nordeuropas"*

Darlington, A. (1975) *"The Pocket Encyclopaedia of Plant Galls"* Blandford, Poole.

Houard, C. (1909-1913) *"Less Zoocecidies des Plants d'Europe et du Bassin de la Mediterranee"* Paris.

Swanton, E.W. (1912) *"British Plant Galls"* Methuen, London.

C.K.L.

PLANT GALLS IN NORTH WALES

MRS. M.J. MORGAN

School of Animal Biology, University College of North Wales, Bangor, Gwynedd.

Stimulated by the receipt of the Bulletin and the announcement of a new journal I have been searching through the many thousands of file cards I hold referring to insect records in North Wales. I intend to produce an account of the occurrence of Arthropod-induced galls for all the six vice-counties which will draw attention not only to the common and less common species but also to the considerable gaps in the available information.

I should be grateful for any observations made by visitors to the area which I can include, with details of locality, grid reference, date, host plant, etc. Avoid the present county system — 'Gwynedd' is so imprecise as to be virtually useless; it stretches from North Anglesey to South Merioneth! All my records refer to the vice counties of Anglesey, Caernarvonshire, Denbighshire, Flintshire, Merionethshire and Montgomeryshire.

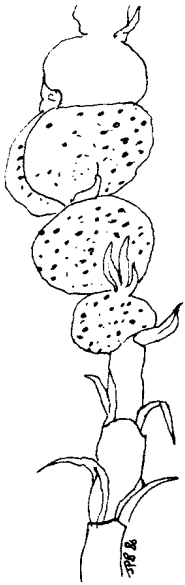
The marble gall on oak (*Andricus kollari*) seems to be fairly common, though I find that I have no records for Denbs. and Flints., but the oak apple (*Biorhiza pallida*) seems to be much scarcer. I would be interested in comments and any records for these well known species.

PLEASE NOTE:

The B.P.G.S. Mailing List is to be computerised, for use by the Society only. If you wish your name to be excluded from the computer, please inform the Secretary promptly.

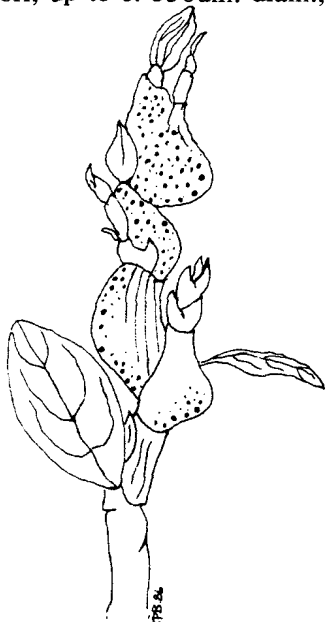
MELANOPSICHIUM NEPALENSE (USTILAGINALES) FROM GALLS OF POLYGONUM AVICULARE IN BRITAIN

BY B.M. SPOONER
Illustrated By J.P. Bowdrey



Species of the smut genus *Melanopsichium* Beck induce hard, irregular galls on the stem or inflorescence of their host plants. Of the six known species, three cause galls on species of *Polygonum*. Although almost world-wide in distribution, the genus has only recently been reported from the British Isles (Spooner, 1985). The purpose of this note is to bring this record to wider attention and to provide an illustration and brief description of the gall which may facilitate the identification of any further collections.

The British record is of *Melanopsichium nepalense* (Liro Zundel, perhaps the most widely distributed member of the genus, being recorded from Africa, Asia, Australia, China, Egypt, Europe, India, Japan, North America and Vietnam, and known to induce galls on at least seventeen species of *Polygonum*. In July, 1984 I collected galled plants of *Polygonum aviculare* from a small area surrounded by garage lock-ups at Ham, Surrey. *Polygonum aviculare* has been previously reported as a host for this fungus on only four occasions, twice from North America: California and New York in 1943, and twice from Europe: from Spain in 1936 and Germany in 1959. Galls take the form of irregular swellings on the inflorescence axis and measure 2-4.5mm diam., though sometimes becoming confluent along the axis. They are greenish, dotted with black due to the sori, up to c. 350um. diam., developed in the host tissue and containing olive-brown spores. The spores remain agglutinated and, unlike many smut fungi, never become powdery in mass. They are subglobose to ovate in form, and often slightly angular in outline; they have a finely echinulate or prickly wall and measure 8-15 x 6-10 um.



Galls of *Melanopsichium nepalense* have also been recorded in Europe on *Polygonum lapathifolium*. They are distinctive and should be readily recognisable, and further British records would be of undoubted interest.

Reference

Spooner, B.M. (1985). *Melanopsichium* (Ustilaginales), a genus new to the British Isles. Trans. Br. mycol. Soc. 85: 540-544.

HISTORICAL USES OF PLANT GALLS

JONATHAN D. BRIGGS
Montgomery Canal Ecological Survey, Preston Montfield Field Centre, Montford Bridge, Shrewsbury. SY4 1DX.

In the past, particularly during the nineteenth century, certain species of gall were valued in a wide variety of economic processes. These uses included dyeing, ink-making, tanning and as astringent drugs[1] . In each case it was the high tannin content of the galls that was exploited, tannins reacting with iron compounds to form black dye or ink and with hide proteins to produce leather. European trade in galls was once considerable, Britain alone importing some 50,000 cwt in 1880[1] . This short paper is intended to draw attention to this little-known aspect of plant galls and perhaps prompt deeper investigation.

The principal species of commercial value are described below. Most are cynipid-generated oak-galls which, in common with oak-bark and certain types of acorn-cup ('valonia') were a source of particularly valuable tannins[1] .

Aleppo Galls (= Turkey, Levant Galls) were the commonest used in Europe. They are caused by *Andricus gallae-tinctoriae* (Oliv.) on *Quercus infectoria* Oliv. and were imported from Eastern Europe and the Middle East. Use was ancient and varied; there being evidence of similar galls being used in medicine and dyeing in Greek times[2]. Use in ink-making and tanning is less ancient but was of considerable importance. They were said to be the best galls for ink-making and were still in use in the early 20th century for bank-note inks etc. Aleppo Galls were the 'richest' of all galls for tanning which seems to have been their main use[2]. The galls were at their best when 'unripe' (i.e. prior to adult emergence) and there are accounts of illegal adulteration of the raw material with inferior older galls dyed to match the colour of the younger[1] .

Mecca Galls caused by *'Cynips insana'* were another important product of the Eastern Mediterranean[2]. However there seems to be some confusion between these and Aleppo Galls and it may be that they were really the same species. Many of the commercially important oak-galls were known by place-names (e.g. also Istrian and Morea Galls) and it seems doubtful that they all were different species. The identity of the now familiar Knoppern (*Andricus quercus-calicis* [Burgs.]) is of course without question. It too was of commercial value and was said to be next to the Aleppo Gall in importance. It was best prior to adult emergence and was used mainly in tanning. Some accounts credit the Marble Gall (*Andricus kollari* [Hartig]) with some value in tanning and dyeing. A relatively low tannin content makes such use improbable and it is likely that any encouragement to use it was part of the hysteria to halt its 'disastrous' spread in Britain in the mid-19th century[1] .

After oak-galls the most significant galls used in northern Europe were the Chinese Galls, caused by the aphid *Schlechtendalia chinesis* Bell. on the petioles of *Rhus semialata* Murr. (Anacardiaceae)[3]. These peculiarly-shaped galls, velvety in life but resin-like when dry, were also at their best when immature and were harvested widely in China, Japan and South-East Asia. The aphid causer was killed by immersing the galls in boiling water and sun-drying them before export. The use of Chinese Galls in the East is very ancient and may even predate Aleppo Galls in Europe. They remained in use into the 20th century in medicine, tanning and dyeing. Like the genus *Quercus* the family Anacardiaceae yielded

tannins of high quality. Aphid galls from species of *Pistacia* particularly *P.terebinthus*) were also of commercial value and one of the better known vegetable tanstuffs still used today consists of the powdered leaves of Sumach *Rhus coriaria* L.

It is interesting to speculate on what made a particular gall species suitable for commercial use. The tannin content is obviously important. Of those mentioned above Aleppo Galls contain up to 65%, Knopperns 50% and Chinese Galls 60%[1] . The type of tannin must also be important. Most of the widely-used galls yielded named tannins (e.g. 'Turkish Tannin' in Aleppo Galls) whose particular virtues were known[1] . There was plainly much variation in the quantity and quality of tannins. Quantity seems to vary with the stage of development of the gall. Quality seems to have varied with the same species according to place of origin. These variations are reflected in the widespread adulteration of good galls with older ones of the same origin and the naming of the types according to provenance rather than by true species.

Through these subtle variations in quality the export/import trade became highly complicated and is confusing to study. Sources of information are numerous but obscure and often misleading. Trade figures are relatively easily come by but invariably fail to give precise details of which species were involved and for what purpose. Information on harvesting and processing is especially scattered. If any reader has or knows of any information on this subject I would be very interested to hear from them.

References

1. Briggs, J.F. (1984) *An introduction to the use of exotic vegetable tanning materials 1800-1935.* Unpublished thesis, Insititute of Industrial Archaeology, University of Birmingham.
2. Fagan, M.M. (1918) 'The Uses of Insect Galls' *American Naturalist 52,* 155-176.
3. Howes, F.N. (1962) 'Tanning Materials. Botanical Part' Part III in *Gerbstoffe, Tanning Materials* (Ed. Von Weisner.) J. Cramer.

PROVISIONAL KEYS TO BRITISH PLANT GALLS

Material for this guide is now being refereed and edited. More line drawings would be welcome, especially for cases where fairly similar galls are known to appear on the same part of the same host; offers of help, however limited, to the Editor, please.

Including introduction and indexing, the keys will cover about 100 pages. The price will be £4.50 post free, with Full Members of the BPGS each being allowed one copy at £3.50.

Advance orders received by the Treasurer by 10 June 1986 will facilitate estimation of numbers to be printed for distribution by August. Re-printing will be arranged later as required.

HERBARIA AS A SOURCE OF GALL RECORDS

R. COLIN WELCH

(Insititute of Terrestrial Ecology, Monks Wood Exp. Stn., Abbots Ripton, Huntingdon, Cambridgeshire. PE17 2LS.)

For a number of years now I have been accumulating records of Cynipidae, and leaf mining insects, from exotic species of *Quercus* introduced into arboreta, botanic gardens and large private estates in Britain. In February 1983, during a brief visit to the herbarium at Kew, Richmond, Surrey, I learned of the existence of a small separate collection of specimens of cultivated oaks. Later, in March, through the kind offices of G. Ll. Lucas and A. Radcliffe-Smith, I was able to examine this collection.

The herbarium collection contained some specimen from foreign localities, but most were from a wide range of sites throughout the British Isles, predominantly in England. 323 sheets, containing specimens of 23 species of *Quercus*, were examined of which 11 sheets, representing 7 species of introduced oak, were found to bear galls of *Neuroterus quercusbaccarum* (L,) the "common spangle gall". One specimen of the North American "swamp white oak", *Q. bicolor* Willd., collected at Benton Castle, Pembroke, in August 1937 also had two "red pea galls" of *Cynips divisa* Hart. on the side veins on the undersurface of one leaf. The remaining galled oaks were all of Palaearctic origin:-

Q. canariensis Willd., from Spain and Northern Algeria (2 specimens from Kew and Barrow, Cumbria).

Q. pubescens Willd., from most of south and Central Europe (2 spec. from Kew).

Q. pontica K.L. Koch, from Armenia and the Caucasus (from Kew).

Q. macranthera Fisch. & Mey., from nth. Iran and the Caucasus (2 spec. from Kew and Syon House, Middx.).

Q. dentata Thunb., from Japan, Korea and China (2 spec. from Kew and Barrow).

Q. x turneri Willd. (from Bayfordbury, Herts.) a hybrid between *Q. robur* L. and the southern European evergreen Holm oak, *Q. ilex* L.

Another specimen of *Q. macranthera* collected in November 1883, probably at Kew, had one terminal bud deformed which may have been a failed "artichoke gall" of *Andricus fecundata* Hart. The herbarium sheets examined dated from 1835 to 1979, with 33% of the specimens collected in the 1880's and 80% between 1880 and 1919.

One should not forget that herbarium specimens are collected primarily for the benefit of botanists who have a tendency to select against small, atypical, damaged or deformed specimens. Galled leaves would normally fall into this category. Herbarium specimens do, however, often include examples of the fruits and a number of the *Quercus* sheets examined contained bulky acorns. Nevertheless, it would take someone very favourably disposed towards galls to include large specimens of the "oak apple galls" of *Biorrhiza pallida* (01.) or the "marble galls" of *Andricus kollari* (Hart.). A cursory inspection of the small herbarium here at Monks Wood revealed a specimen of *Q. petraea* (Matt.) Liebl. from Ballyeighter Loughs, Co. Clare, bearing a single *Neuroterus quercus-baccarum* gall. A Monks Wood specimen of *Q. robur* had one small gall of the same species plus two mines of *Stigmella atricapitella* (Haw.) (Lep., Nepticulidae). The stems were also covered with the shrivelled remains of coccids,

possibly *Asterodiapsis variolosa* (Ratz.). In the Monks Wood herbarium the specimens have been glued to the sheets leaving only the upper leaf surfaces visible. Since most foliage galls develop on the undersurface, this could present difficulties. However, most samples of *Quercus* contain sufficient leaves to ensure that examples of both surfaces are available for examination.

Some herbarium sheets are embellished with cuttings and written notes which may provide an unexpected source of information. One sheet, in the Kew collection, containing a specimen of *Q. dentata* collected at Barrow, Elvaston (? Ulvertson) on 14.10.1885 by Geo. Nicholson, bore a contemporary note by R.A. Rolfe concerning *Neuroterus lenticularis* 01. (= asexual generation of *N. quercusbaccarum*) which he has "seen before on this species". In another such note dated 30.9.1880, in which specimens of *Q. x turneri*, Rolfe records *Spathegaster baccarum* L. (= sexual generation of *N. quercusbaccarum*) "on this hybrid in spring of 1880 at Kew on specimen between Fernery and Grand Entrance".

Herbaria records such as these, dating back one hundred or more years are of great interest to someone, like myself, studying the colonisation of introduced tree species. In many cases the specimen number of individual trees is recorded, or the tree can be identified from the notes, so that it may be visited and the degree of galling reassessed. 3.7% of the herbarium sheets which I examined at Kew yielded galls, but their value was such that I would recommend other cecidologists to pay their nearest local herbarium a visit.

POTENTIAL FOR BIOLOGICAL CONTROL OF HAWKWEED

A.P. BENNELL

The stoloniferous hawkweeds *Hieracium* spp. (more correctly *Pilosella*) originate from Europe and U.K. Many parts of the species have reached the status of weeds when introduced to other parts of the world – in particular mouse-ear hawkweed (*P. officinarum* = *H. pilosella*) in New Zealand and orange hawkweed (*P. aurantiaca* = *H. aurantiacum*) in eastern North America and Japan. A rust fungus, *Puccinia hieracii* ssp. *piloselloidarum*) confined to these species has not yet spread to the weed affected countries. Following the successful introduction into Australia of *Chondrilla* rust for the control of their introduced broadleaf weeds, New Zealand is undertaking preliminary investigation of similar control of *Pilosella* by *Puccinia hieracii* ssp. *piloselloidarum*. David Scott of Grasslands Division, DSIR, New Zealand will be based at the Royal Botanic Garden, Edinburgh from April to October 1986 and would be grateful to hear of the location of any substantial population of *Pilosella* species, especially where there is evidence of fungal, aphid or gall-agent damage.

Please contact Dr. David Scott,
c/o Royal Botanic Garden, Edinburgh. EH3 5LR. (031-552-7171.)

THE PHENOLIC CONTENTS OF SOME BRITISH CYNIPID GALLS

Dr. C.K. LEACH
School of Life Sciences, Leicester Polytechnic.

Introduction

Cecidologists have long been motivated by the desire to understand the mechanisms involved in the development of galls. Although much progress has been achieved in the study of bacterially-induced galls, knowledge of how the more complex, cynipid galls are induced and developed is much more limited. One approacj to elucidating the manner in which cynipid wasp larvae are able to modify the normal growth and development of their host plants is by first establishing qualitative and quantitative biochemical differences between gall and normal tissues and then to select suitable candidates to investigate the mechanism(s) by which these differences are achieved. Although many histological, cytological and morphological studies have been conducted on oak cynipid galls (see for example, Hough, 1953; Bronner, 1977) very little quantitative are available on the biochemical composition of galls. The historical use of galls in medicine, ink manufacture, tanning and dyeing (Swanton, 1912) invariably depended on their relatively high tannin content and a reasonable starting point for establishing biochemical differences between gall and normal tissues would appear to be in the production of tannin and tannin-like compounds. Here I report the phenolic composition in oak galls induced by a variety of cynipid wasps and so make comparisons between these and normal tissues.

Methods

Plant Materials: The galls and leaves used in this study were collected from oaks from the Charnwood Forest area of Leicestershire. Collected materials were crushed and immediately freeze dried prior to the extraction of the phenolic compounds. Care was taken to select leaves of the same physiological age as those bearing galls under study.

Preparation of Gall Extracts: Extracts were prepared by the procedure of Marigo and Gadal (1973) employing Marigo's (1973) method for fractionating the extracts into: condensed tannins, hydrolysable tannins, flavonides and simple phenols.

Estimation of the Phenolic Contents of Fractionated Extracts: Swain and Hillis's (1959) modification of the Folin and Ciocalteu reaction, using Gallic acid as a standard, was used.

Results and Discussion

The phenolic contents of a variety of cynipid oak galls and oak leaves are recorded in Table 1. These data indicate that the induction of gall formation by different cynipids may have profoundly different effects on the biosynthesis of tannins and other phenolic compounds. Thus, in the cases of *Andricus fecundator, Andricus kollari, Biorhiza pallida* and *Cynips divisa* there is a marked stimulation in the production of phenolics while in spangle galls induced

by various species of *Neuroterus* there is not only a reduction in the accumulation of phenolics but also a switch away from hydrolysable to condensed tannins. Of particular interest is the apparent complete suppression of tannin production in currant galls induced by *Neuroterus quercus-baccarum*. All of the spangle gall group produced lower levels of tannins than is found in normal leaf tissue. In general, the phenolic contents of galls produced by the deformation of buds (oak apples, marble galls, artichoke galls) are greater than those of galls produced on leaves. A similar result has been obtained by Marig and Gadal (1973) with the equivalent galls from the Toulouse region of France.

The differences in the amount and types of phenolic compounds found in galls raise questions regarding how the expression of the genetic information coding for their biosynthesis is modified by the presence of the gall-inducing larvae. It would appear from these observations that the production of phenolic compounds in cynipid galls provides model systems for examining the influence of cynipid wasps on host plant gene expression.

The historical uses of oak galls depended upon their tannin contents; it is because of this that it has become widely assumed that *all* cynipid oak galls are rich in tannins. This is clearly not so. Even the most tannin-rich of the British oak galls are much inferior to the Aleppo galls as sources of tannins. The superior quality of these latter galls, with a reputed tannin contents of around 75% of the dry weight (Fagan, 1918), has long been recognised and, even as late as 1861, over 800 tons of these galls were imported annually into the U.K. (Swanton, 1912). The introduction of the marble galls (*Andricus kollari*) into the U.K. during the early 1830's after several unsuccessful attempts to introduce the Aleppo gall, was a step in the right direction for the dyeing and tanning industry in providing material containing higher tannin content (Connold, 1908) but it nearly had disastrous consequences. Such was the success of *A. kollari* in becoming established that many people were apprehensive that the spread of this insect and its gall would lead to substantial damage to oak twigs with a concomitant loss in acorn yield. it will be recalled that, at that time, acorns were an important source of winter fodder for pigs. The extent of the fear generated may be judged by the fact that a press campaign was run encouraging labourers to "rally round the pig" and destroy the marble gall. Marble galls, oak trees and pig farming all seemed to have survived this alarm. The low tannin content of spangle galls also offers an explanation as to why they are acceptable to pheasants as a source of food and the data presented in Table 1 also gives a substance to Culpepper's claim that oak apples (*Biorhiza pallida*) were of inferior quality to some other galls for ".. . fastening loose and faint parts . . . . drying up rheums and other fluxes". The medical uses of gall extracts through to the 19th century invariably depended upon the astringent properties arising from their tannin content.

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PHENOLIC CONTENTS OF GALLS (in g/100 g of dry plant material - using gallic acid as a standard)

Gall Causer (Gall)	Date Galls Collected	Tannins			Non-tannins			Total Phenols
		Total	Condensed	Hydrolysable	Total	Flavonoides	Simple Phenols	
Neuroterus quercus-baccarum (currant gall)	28/5/83	0	0	0	1.45	0	1.45	1.45
Neuroterus quercus-baccarum (spangle gall)	30/9/83	4.4	4.4	0	0.73	0.08	0.65	5.13
Neuroterus numismalis (silk button)	30/9/83	5.3	5.3	0	1.8	0.8	1.0	7.1
Neuroterus albipes (smooth spangle)	30/9/83	2.8	2.8	0	2.5	0.5	2.0	5.3
Cynips divisa (red pea gall)	23/9/83	12.7	1.3	11.4	12.1	1.4	10.7	24.8
Cynips quercus-folii (cherry gall)	23/9/83	5.4	5.5	0.9	7.1	0.9	6.2	13.5
Biorhiza pallida (oak apple)	20/5/84	4.4	1.2	3.2	6.7	0	6.7	11.1
Andricus kollari (marble gall)	28/7/84	14.4	1.7	12.7	9.3	0	9.3	23.7
Andricus fecundator (artichoke gall)	29/8/84	10.2	1.9	8.3	10.4	3.1	7.3	20.6
Leaves unparasitised	28/5/83	4.4	0.4	4.0	5.1	0	8.1	9.5
parasitised by Nqb	28/5/83	4.7	0.8	3.9	5.7	0	5.7	10.4
Leaves unparasitised	23/9/83	5.1	0.82	4.18	2.5	0.6	1.9	7.6
parasitised by Nqb	23/9/83	6.1	0.4	5.7	2.7	0.5	2.2	8.3
Leaves unparasitised	30/9/83	6.3	0.8	5.5	4.1	0.9	3.2	10.4
parasitised by Nqb	30/9/83	6.5	0.5	6.0	4.0	0.7	3.3	10.5

MISCELLANEOUS PLANT GALL RECORDS FROM NORTHERN ENGLAND & SCOTLAND

Plant galls from various localities in Northern England and Scotland were recorded during a holiday in June 1985. These records are presented here as adistributional data on British galls is generally scanty. Though many of the examples listed are considered to be widespread, some, such as *Dasyneura acrophila* and *Taphrina padi*, are seldom reported, and *Eriophyes sorbeus* may be new to the British Isles.

Code letters are used for localities. For A to S, the dates were 9 to 14 June 1985; for T to DD, 22 to 25 June 1985.

A	Winster SD416928	B	Langdale NY285601
C	Ben Lawers NN615395	D	Killiecrankie NN917626
E	Loch Tummel NN863599	F	Rannoch Forest NN615570
G	Spean Bridge NN220820	H	Fort Augustus NH378095
I	Invermoriston NH418170	J	Beinn Eighe N.R. NG997652
K	Loch Maree NH001650	L	Poolewe NG857807
M	Inverewe NG860820	N	Gruinard Bay NG952900
O	Knockanrock N.R. NC189091	P	Scourie NC153446
Q	Durness Nc403678	R	Tongue NC591567
S	Reay NC960650		
T	Dunnet ND221712	U	Mey ND289728
V	Wick ND359511	W	Clava cairns NH757444
X	Loch Garten NH972183	Y	Daviot NJ747388
Z	Easter Aquorthy NJ616222	AA	Inverurie NJ778208
BB	Cove Bay NJ955006	CC	Hawick NT503146
DD	Teviothead NT410058		

Gall Agent on.....	Host Plant at.....	Localities
FUNGI — Uredinales		
Puccinia caricina ss.lato.	*Urtica dioca*	Q
P. septemtrionalis	*Thalictrum alpinum*	C
P. violae	*Violae* sp.	F O
Trachyspora intrusa	*Alchemilla* sp.	O Z
— Taphrinales		
Taphrina padi	*Prunus padus*	B (* footnote)
ACARI (Mites)		
Eriophyes axillare		E J AA
E. betulae	*Betula pubescens*	X
E. brevitarsus	*Alnus glutinosa*	J
E. fraxinivora	*Fraxinus*	L
E. goniothorax	*Crataegus monogyna*	D H L DD
E. laevis	*Alnus*	E J
E. leiosoma	*Tilia*	
E. macrorhynchus	*Acer pseudo-platanus*	B G W
E. nervisequus	*Fagus sylvatica*	D I
E.n. var. maculifer	*Fagus sylvatica*	D I AA

E. padi	*Prunus* sp.	A B K
E. pseudoplatini	*Acer pseudoplatanus*	B I R S U W Y AA
E. pyri	*Crataegus monogyna*	L M
E. pyri	*Sorbus aucuparia*	B D F G J W CC
E. rudis	*Betula pubescens*	J M Y
E. sorbeus	*Sorbus aucuparia*	J (* footnote)
E. stenaspis	*Fagus sylvatica*	D I
E. tetanothrix	*Salix* sp.	N X
HOMOPTERA		
Adelges abietis	*Abies* sp.	L
Dysaphis sp.	*Crataegus monogyna*	L DD
Erisoma ulmi	*Ulmus* sp.	S T V
Hayhurstia atriplicis	*Atriplex* sp.	P
Myzus cerasi	*Prunus cerasus*	A
Philaenus spumarius	*Epilobium angustifolium*	BB
Philaenus spumarius	*Plantago maritima*	N
Phyllaphis fagi	*Fagus sylvatica*	Y
Psyllopsis fraxini	*Fraxinus excelsior*	I AA
DIPTERA		
Dasyneura acrophila	*Fraxinus excelsior*	B (* footnote)
Jaapiella veronicae	*Veronica chamaedrys*	Y
Rhabdophaga rosaria	*Salix ? cinerea*	N
HYMENOPTERA		
Biorhiza pallida	*Quercus* sp.	D
Blenocampa pusilla	*Rosa* sp.	K
Diplolepis spinosissimae	*Rosa pimpinellifolia*	BB
Neuroterus q-baccurum (b)	*Quercus* sp.	D (* footnote)
Pontania ? leucapsis	*Salix ? cinerea*	D N

References:

Bagnall, R.S. & Harrison, J.W.H. (1928). *A Catalogue of the British Eriophyidae. Annals and Magazine of Natural History,* ser. 10,2: 427-445.

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*** Footnotes.**

Taphrina padi causes "pocket plum" on *P. padi.* Previous known British Records: Bishops Castle, Salop (1885); Darlington (1913), Pickering, Yorks. (W.G. Bramley 1974).

Eriophyes sorbeus: no previous British record known. The status of species and sub-species of mites associated with trees of the *Rosaceae* is far from clear and needs further investigation.

Dasyneura acrophila: An affected ash leaflet comes to resemble a full pea pod. Yorkshire records are occasional and widely scattered; so far, reports from Southern England are negative.

Neuroterus quercus-baccarum—(b) indicates bisexual gall.

B.M. Spooner.

A PRELIMINARY ACCOUNT OF PLANT GALLS FROM ORKNEY

B. M. SPOONER

The study of plant galls in Orkney has hitherto received little attention. Not a single publication dealing with Orkney galls has yet come to my attention for the bibliography of regional lists and, other than fungus galls, I have discovered only a single published record for the islands. This is of *Livia juncorm* forming tassel galls on *Juncus acutiflorus*, reported by Trail (1890) as very common in Orkney. It is the only Orkney record cited by Trail in his series of papers on Scottish Galls, published between 1872 and 1890 in the Scottish Naturalist. Various gall-causing fungi have been listed for Orkney, though incidentally amongst collections reported by Trail (1889, 1890) and Dennis (1972), without reference, of course, to their gall-causing nature. There is no reference to plant galls in the recent and excellent New Naturalist volume on the Natural History of Orkney (Berry, 1985), though full species lists of many plant and animal groups are included and there is an extensive bibliography.

The influence of man over the past 5000 years has resulted in almost total destruction of the scrub vegetation which may once have covered the islands, reducing it to a few scattered remnants. The most extensive of these occurs at Berriedale on Hoy and forms the most northerly natural woodland in Britain, consisting largely of birch (*Betula pubescens*), rowan (*Sorbus aucuparia*) and willows (*Salix* sp.), with some aspen (*Populus tremula*) and hazel (*Corylus avellana*). Various species of *Salix* and small plantings of a few other trees such as sweet chestnut (*Castanea sativa*), oak (*Quercus* spp.), beech (*Fagus sylvatica*), alder (*Alnus glutinosa*), hawthorn (*Crataegus* sp.) and elm (*Ulmus* sp.) also exist in Orkney, and sycamore (*Acer pseudiplatanus*) is more extensively planted, but these give little scope for the establishment of gall-causing organisms. The islands as a result are exposed and windswept, though comparatively mild despite their latitude due to the warming effect of the Gulf Stream.

During a visit to the islands from 15-22 June 1985 the opportunity to collect plant galls was taken and the following short list is offered as a result. Most of those listed are gall-causing fungi and, despite the brief duration of the visit, this is perhaps some indication of the paucity of zoocecidia which are present in Orkney. The only non-fungal gall discovered on trees at Berriedale Wood was that of *Eriophyes pyri* on rowan. Other trees appeared devoid of galls, apart from *Dysaphis ranunculi* on *Crataegus* and *Eriosoma ulmi* on *Ulmus*; even mite galls on sycamore were not evident.

There is need for an extensive survey of Orkney galls, and I hope this brief note may stimulate further interest. Should anyone know of works dealing with Orkney galls, I would be pleased to learn of them.

FUNGI

Uredinales

Puccinia caricina ss. lato. Aecidia on *Urtica dioica*, Orphir church, 16.6.85.

Puccinia heraclei. Aecidia forming leaf-galls on *Heracleum sphondylium*, near Broch of Gurness, 16.6.85.

Puccinia ? *magnusiana*. Leaf-galls of *Ranunculuc repens*, Orphir church & Houton, 16.6.85.

Puccinia poarum. Aecidia, causing swellings on leaves of *Tussilago farfara*, Evie, 16.6.85.

Puccinia punctiformis. Causing severe distortion of leaves and stems of *Cirsium arvense*. Houton, 16.6.85; south shore of Rousay, 19.6.85; Birsay 20.6.85.

Trachyspora intrusa. On leaves of *Alchemilla glabra*, south shore of Rousay, 19.6.95.

Triphragmium ulmariae. Leaf-galls of *Filipendula ulmariae*, Smoogro Lane, Orphir, 15.6.85.

Uromyces nerviphilus. Distortion and swelling of stems and leaves of *Trifolium repens*, Orphir church, 16.6. 85; Wideford Hill, 17.6.85.

Others

Synchytrium taraxaci. Leaf-galls of *Taraxacum officinale*, Finstown, 16.6.85.

Taphrina betulina. Witches-brooms with stunted leaves bearing the fungus, on *Betula pubescens*, Berriedale Wood, 21.6.85.

APHIDS

Dysaphis ranunculi. Cahracteristic greenish-yellow pouch-like leaf-galls on *Crataegus*, Orphir church, 16.6.85.

Eriosoma ulmi. Characteristic leaf-galls of *Ulmus*, Burray village, very common on young trees, 18.6.85.

Hayhurstia atriplicis. Leaf-galls of *Atriplex* sp., south shore of Rousay, 19.6.85.

MITES

Eriophyes pyri. On leaves of *Sorbus aucuparia*, Berriedale Wood, Hoy, 21.6.85.

UNDETERMINED

Swelling on leaf of *Festuca* sp., Unstan carn, 16.6 85.

Distortion of leaves of *Atriplex* sp., Birsay, 20.6.85.

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Berry, R.J. (1985). *The Natural History of Orkeny*. Collins, New Naturalist no.70.

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Trail, J.W.H. (1890a). *Scottish Galls*. Scottish Naturalist 10: 226-232.

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MEETINGS

13th May — 17th June, Birmingham

An extramural course on "Gall Insects" at the University of Birmingham (Room WE2, Department of Zoology, Biology Building). The course consists of 6 Tuesday evening sessions with Dr. Margaret Cameron (nee dRefern). Details from Dr. Cameron, c/o Department of Zoology, University of Birmingham.

14th June, Wyre Forest

Meet at the Frank Chapman Centre at Ribbesford near Bewdley at 10 a.m. Field Leader is Peter Shirley, Open, free of charge, to all full members. A fee of £1 per head (payable on the day) is charged for non-members. Participants should bring their own food and drink.

12th July, Monks Wood, near Huntingdon

British Plant Gall Society — A.G.M.

Commencing at 10.30 a.m. at the Institute of Terrestrial Ecology, Monks Wood, Abbots Ripton. The meeting has been arranged in four phases:

10.30 a.m.-11.00 a.m.	A.G.M. — including Chairman's, Secretary's and Treasurer's Reports.
11.00 a.m.-12.30 p.m.	Discussion on Gall Records (+ any other issues raised by members).
12.30 p.m.-1.30 p.m.	Lunch (tea/coffee available)
2.00 p.m.-4.00 p.m.	Field Excursion

Members wishing to include an item on the discussion agenda should inform the Secretary by 24th June 1986. Members should bring their own lunches.

Further details, including maps etc. are available from the Secretary.

9th August, Selkirk (11.00 a.m. — 4.30 p.m.)

To be held at Bowhill, about 3 miles SW of Selkirk. A field meeting led by Alan Bennell and run jointly with the Botanical Society of Edinburgh. Carry food and drink. Meet Bowhill Bridge on A708 (NT 433 282).

29th — 31st August, Dorking

A week-end course on 'Insects and Thistles' run by Dr. Margaret Cameron (nee Redfern) under the auspices of the Field Studies Council. To be held at Juniper Hall, Dorking, Surrey, RH5 6DA. Details from the Warden on 0306-883849.

7th September, Scarborough

A field meeting at the SSSI and Woodland Trust Reserve at Scar and Castlebeck Woods and Jugger How Dale. Meet at 10.30 a.m. at Chapel Farm (SE 952.967) just west of the Scarborough-Whitby Road. Further details of this meeting, organised in conjunction with the Yorkshire Naturalist Union Entomological Section, are available from Dr. Roger Key, NCC, Northminster House, Peterborough, PE1 1UA.

14th September, Thetford

Organised by Rex Hancy (address overleaf). Meet at 10.30 a.m. by sign for Ride 79 on minor road which leaves the A1066 for East Harsley about 3 miles east of Thetford. Bring food and drink. With the Norfolk and Norwich Natural History Society. Grid Ref: TL 977 842.

28th September, Leicester/Loughborough

A "Gall Gathering" commencing at 11.00 a.m. at Out Woods near Loughborough. Details from Chris Leach, School of Life Sciences, Leicester Polytechnic, Scraptoft Campus, Leicester, LE7 9SU.

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Approaching the date, the following details as appropriate: Date, Time (start and approx. finish). Food/drink to be carried? Meeting place with directions; 6-figure Grid Ref. useful. Type of meeting, purpose or topic. Speaker or Leader. Book in advance? Visitors can be accommodated? Charge for expenses? Address/ Telephone No. for enquiries.

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Please address correspondence to the Secretary, OR, for specific purposes, to the officer concerned.