

THE IDENTIFICATION OF LEAF-MINING LEPIDOPTERA

INTRODUCTION

The aim of this booklet is to enable the user to identify most of the leaf-mining lepidoptera. It is not possible to cover all the leaf-mining species in such a small booklet, however over 90% of the true mining species should be identifiable with its use.

The guide has been kept as simple as possible. Along with the usual keys I have added a chart on hawthorn to assist with the identification of the Nepticulidae. Much of the information contained herein is gleaned from volumes 1 and 2 of "The Moths and Butterflies of Great Britain and Ireland" with some addition notes supplied by A. Maitland Emmet along with the occasional modification of my own. I have also included within the birch feeding miners a key written by David Manning on the Eriocraniidae.

A word of warning before you start to look at mines, some flies, beetles, wasps and sawflies also produce larvae that mine leaves, so it is possible that these could be mistaken for lepidopterous mines. A good guide is that the larvae of the Nepticulidae usually leave their frass, droppings, in a continuous line and the larvae of the Gracillariidae usually pile their frass in a particular place inside the mine; there are, of course, a few exceptions to this. Generally flies etc. leave their frass in irregular patches and usually there is much less frass in the mines of flies etc. than in those produced by lepidoptera. A further guide is to look at the list of foodplants which follows, if the plant you have found a mine in is not in this list it is quite likely that it will not be a lepidopteran mine.

Once you have found a mine the next stage is to decide which family it belongs to. The Nepticulidae (**Ectoedemias** and **Stigmellas**) are the largest group of true miners, making a tunnel in the leaf in which all the parenchyma is consumed leaving behind the larva a trail of frass. The mines of the Ectoedemias often start with an irregular mine in close proximity to the egg; the mine then becomes a tunnel, which often leads to a blotch mine. Tenanted Ectoedemia mines can be found in fallen leaves as late as November. The Stigmellas usually mine tunnel fashion away from the egg, sometimes leading to a blotch or false blotch.

The Gracillariidae (**Caloptilias**, **Parornix** and **Phyllonorycters**) either fold over a leaf edge, make a 'blister' on the surface of the leaf or consume the parenchyma making a blotch. All the Gracillariidae feed on sap until the third instar and are virtually impossible to identify at this early stage. The Parornix finish their feeding under a folded leaf edge with the exception of *P. anglicella*, which makes a cone. The Phyllonorycters form a blotch on the surface of the leaf and all species pupate inside the blotch. It is possible to identify Phyllonorycters by microscopic examination of the pupal case.

The **Tischeriidae** make a blotch mine on top of the leaf, which is lined with silk. The way the silk is placed in the mine depends on the species, but it is used by the larva as an aid to facilitate movement within the mine. They also make a slit in the upper epidermis through which they eject their frass.

The **Heliozelidae** and the **Antispila** feed as miners and then cut an oval hole from the blade of the leaf, which is used to construct a cocoon.

The **Bucculatrix** start feeding as leaf-miners, and then most species leave the mine as they develop to feed externally. While feeding externally the larva eats out small windows in the leaf, generally from below, leaving the upper epidermis intact.

The **Eriocraniidae** mine in the spring from May to July eating out large areas of the parenchyma of their host leaf leaving long strings of frass in the mine making them easily distinguishable from the mines of other species.

I have included the **Momphidae** that feed on Enchanter's Nightshade and Rock-rose, but have not found it possible to write a simple key for those species that feed on Willowherbs, so I refer the reader to the literature for those species.

A few members of the following families are also included, **Incurvariidae**, **Lyonetiidae** and **Yponomeutidae**. However, many members of these families are not miners. There are a few other species of lepidoptera that do mine leaves that are not covered in this booklet. Many of these only mine for the first instar before they start to feed externally, so most of them should present no problem as they are unlikely to be confused with the true miners.

There is a moth that is very common and whose mines can be confused with those of the Nepticulidae by the inexperienced. This is *Lyonetia clerkella*, which mines many different plants. The commonest being members of the Rosaceae, but it can also be found on birch, hawthorn and apple. However, the mine can be readily distinguished from that of a Nepticulidae by the following points. Firstly the egg is laid inside the leaf, as the female pierces the lower epidermis before laying, whereas the female Nepticulidae lay their eggs on the surface of the leaf. Secondly, the mine is very long, often spreading over most of the leaf in any direction, whereas the Nepticulidae have relatively short mines, which often follow a set pattern.

The numbers which follow the description in the key and are in square brackets [] refer to the months when the mines should be occupied by larva. (e.g. [7+9-10] refers to July and September to October, showing that this species is bivoltine). There may be some variation in this depending on the season and which part of Britain the mines are found. The numbers following the names of the moths are the British Log Book numbers as recorded by J.D. Bradley and D.S. Fletcher in 1979; and are there to make cross-references to other works easier. The nomenclature follows Bradley 2000 with additions as published in the entomological journals.

There have been quite a number of changes since Bradley and Fletcher was published in 1979. Several species have been synonymised with other species and others have been deleted because of misidentification. Others have undergone name changes, so be aware that if you compare the following with previous lists there may be discrepancies.

Barry Dickerson
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IDENTIFICATION OF LEAF-MINING LEPIDOPTERA

FOODPLANTS

Agrimony	Comfrey	Lungwort	Rowan
Alder	Cowberry	Maple	St. Johns Wort
Apple	Dogwood	Meadowsweet	Salad Burnet
Ash	Dropwort	Medick	Sallows
Aspen	Elm	Mountain Avens	Sea Aster
Azalea	Enchanters Nightshade	Mugwort	Selfheal
Beech	Gorse (stems)	Norway Maple	Small Scabious
Bindweed	Guelder-rose	Oak	Snowberry
Bilberry	Hairy Greenweed	Ox-eye Daisy	Sorrel
Birds-foot Trefoil	Hawthorn	Pear	Strawberry
Birch	Hazel	Pine	Sweet Chestnut
Blackthorn	Honeysuckle	Plum	Sycamore
Bog Myrtle	Hop	Poplars	Tormentil
Brambles	Hornbeam	Privet	Water Avens
Broom	Horse-chestnut	Pyracantha	Wayfaring-tree
Buckthorn	Laburnum	Rock-rose	Whitebeam
Bush Vetch	Lilac	Quince	Wild Service Tree
Cherry	Lime	Restharrow	Willows
Clover	London Plane	Ribwort Plantain	Wood Avens
Cinquefoils	Loosestrife	Rose	Yarrow

AGRIMONY

Nepticulidae

- Mine gallery throughout frass with clear margins [5-6+7-8+10-3]*Stigmella aurella* 50
 Mine gallery leading to blotch, pupa in mine [8-11]*Ectoedemia agrimoniae* 26
 Mine gallery leading to blotch, pupa external [7+9-11]*Stigmella aeneofasciella* 55

ALDER

Nepticulidae

- Mine in buds or twig bark [?-5]*Bohemannia quadrimaculella* 19
 Mine a gallery in the leaves with linear frass filling only one third of mine [7+9-10]
 *Stigmella alnetella* 115
 Mine a gallery in the leaves frass dispersed or linear, filling two thirds of the mine;
 larvae with dark prothoracic plate [7+9-10]*Stigmella glutinosae* 114

N.B. Extreme forms of each mine should be easy to determine, but mines of an intermediate form could belong to either species. Tenanted mines should present no problem, but the dark prothoracic plate is not always easy to see.

Heliozelidae

Mine in midrib, inconspicuous, then into a lateral vein and across leaf back into midrib finally cutting out a hole in leaf blade approximately 5 x 3mm [6-9] Heliozela resplendella 156

Bucculatricidae

Mine long, narrow almost filled with black linear frass beside a vein, later the larvae leaves the mine from upperside and eats out windows from the underside of the leaf [8-9] Bucculatrix cidarella 272
N.B. early mine can be confused with that of a Nepticulidae, but egg matt black and rough in appearance.

Gracillariidae

- 1 Mine on upperside of leaf2
Mine on underside of leaf3
- 2 Mine suboval contracting into a tube, upper cuticle silvery, flecked with brown frass, later the larva feeds in a rolled leaf [6-7] Caloptilia elongella 282
Mine subcircular with strong central crease, but remaining flat, cuticle pale green, sometimes discoloured brown, not flecked with brown frass [7+9-10] Phyllonorycter stettinensis 357
(N.B. mines that do not have cease are hymenopterous)
- 3 Mine on leaf margin about 10mm long with brownish lower cuticle. Larvae feeding later in folded leaf-edge [7-8] Caloptilia falconipennella 289
Mine usually away from leaf-margin and more than 10mm long; lower cuticle green; larvae mine throughout4
- 4 Mine very large, extending from midrib almost to leaf margin; larva grey; pupa in a cocoon without frass in centre of mine [9-10] Phyllonorycter froelichiella 358
Mine smaller, not exceeding 20mm in length; larvae whitish5
- 5 Pupae in a cocoon edged with frass, larva with pale greenish tinge [7+9/10] Phyllonorycter rajella 345
Pupae in a cocoon not edged with frass6
- 6 Always on Grey Alder; pupa usually in middle of mine [7+9-10] Phyllonorycter strigulaella 344
Usually on other Alder species; pupa usually at one end of mine, larva with pale yellowish tinge [9-10] Phyllonorycter kleemannella 360

ALDER BUCKTHORN

Bucculatricidae

Mine starts as a tightly wound spiral staining leaf blackish violet; then the mine straightens with no staining; after leaving mine larva eats out windows from below [8-9] Bucculatrix frangulella 270

APPLE

Nepticulidae

- 1 Mine terminating in a blotch2
Mine forming a gallery throughout, though sometimes ending in a false blotch4
- 2 Blotch small, generally in an angle of veins; larva yellow [6-7+10-11]
.....Stigmella incognitella 78
Blotch larger, generally on leaf margin3
- 3 Blotch usually absorbing earlier gallery; frass black and linear; larva yellow feeding in
June and July, exit hole on underside [6-7]Bohemannia pulverosella 40
Gallery usually along leaf-margin; frass brown, dispersed; larva greenish white with
dark head and ventral spots (mines venter upwards); feeding late August to early
October; exit hole on upperside [8-10]Ectoedemia atricollis 29
- 4 Frass, except at beginning of mine, dispersed; larva green feeding in September and
October [9-10]Stigmella oxyacanthella 100
Frass linear throughout mine5
- 5 Early mine more contorted; later gallery often with hairpin bends resulting in false
blotches; larva green and often gregarious [8-10] Stigmella desperatella 105
Early mine less contorted; gallery widening considerably, but seldom forming a false
blotch larva yellow and not gregarious [6-7+9-10]Stigmella malella 97

Lyonetiidae

- Mine a brown circular blotch with the frass forming darker spiral markings in the centre.
Egg laid well away from margin [8-9].....Leucoptera malifoliella 260
Mine a fine gallery with reddish frass leading to a large blotch where frass is dispersed.
Blotch may be separated from mine, occasionally on a different leaf. Not recorded in
Britain since 1902. [7-8] Lyonetia prunifoliella 262
Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The
egg is laid inside the leaf being injected through the epidermal layer. This feature helps to
distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf.
[5+7+9-10] Lyonetia clerkella 263

Bucculatricidae

- Mine short contorted, linear black, close to a major vein. Later the larva eats out
windows from upperside [7-8].....Bucculatrix bechsteinella 275

Gracillariidae

- 1 Mine on upperside of leaf.....2
Mine on underside of leaf.....3
- 2 Mine usually between veins, about 10mm diameter, without central differently coloured
patch; larva later feeds in folded leaf edge [7-8] Callisto denticulella 310

- Mine usually over a vein, about 20mm in diameter, with centrally differently coloured patch, larva mines throughout [7+9-10].....Phyllonorycter corylifoliella 332
 Mine over mid-rib, silvery [7+10-4].....Phyllonorycter leucographella 332a
- 3 Mine with lower epidermis silvery white [7-8]Callisto denticulella 310
 Mine with lower epidermis green or brown.....4
- 4 Mine subrectangular, both upper and lower epidermis brown; larva feeds later in a tight pleat resembling a mine in centre of leaf or in a folded leaf-edge [7+8-9]
Parornix scoticella 305
 Mine with lower epidermis usually with several folds [6-7+9-10]
Phyllonorycter cydoniella 327
or Phyllonorycter blancardella 326
- N.B. It is impossible to distinguish between the mines of *P. cydoniella* and *P. blancardella*.
 The adults must be reared and preferably dissected to be certain of their identity.

ASH

Gracillariidae

- Mine narrow, larval spinning causes leaf to fold downwards; after leaving mine larvae construct a cone by rolling leaf tip downwards; two cones are made; upper epidermis silvery [7-9] Caloptilia cuculipennella 280
 Mine narrow, often several parallel galleries which merge to form a large blotch; after leaving mine larvae construct a cone by rolling leaf tip downwards feeding gregariously; two cones are made; upper epidermis yellow or brown [6+8-9]...Caloptilia syringella 293

ASPEN & POPLARS

Nepticulidae

- Mine wholly in leaf on Black and Lombardy Poplar [6-7+9-10].Stigmella trimaculella 73
 On Aspen [8-10]Stigmella assimilella 74
 Mine starts in petiole & finishes in leaf
 On Aspen [7-11] Ectoedemia argyropeza 23
 On Grey Poplar [7-10]Ectoedemia turbidella 24
 On Black Poplar or Lombardy Poplar [7-11]Ectoedemia hannoverella 24a

Gracillariidae

- 1 Mine an epidermal gallery, larva feeds later in a cone or blotch2
 Mine an epidermal gallery throughout, long and sinuous4
- 2 Epidermal gallery long, sometimes extending from mid-rib to leaf-margin; tentiform mine small about 10mm long; larva feeds later in a cone or fold on the leaf margin [7-9]Caloptilia stigmatella 288
 Epidermal gallery short, usually obscured by later blotch; tentiform mine larger, about 13mm long3

- 3 On Aspen [6+8-9]Phyllonorycter sagitella 366
 On White Poplar, Grey Poplar and occasionally other Poplar species [7-8+9-10]
 Phyllonorycter comparella 365
- 4 On Black Poplar or Lombardy Poplar, mine epidermal on the side the egg was laid.
 Difficult to see, looks as though a snail has crawled over leaf. No visible frass [6+8-9]
Phyllocnistis unipunctella 368
 On White Poplar or Grey Poplar, snail trail like mine with dark central frass trail [6-7+8-
 9].....Phyllocnistis xenia 369

AZALEA

Gracillariidae

Feeding starts in an irregular gallery which develops into a blotch, after leaving the mine
 the larva makes two successive cones rolling the tip of a leaf downwards [6+9]
Caloptilia azaleella 285

BEECH

Nepticulidae

Gallery completely without coiled frass, egg on underside against mid-rib amongst hairs
 in angle with vein [6-7+8-10]Stigmella tityrella 77
 A section of coiled frass soon after start of gallery, egg on underside away from mid-rib
 [6+8-9]..... Stigmella hemargyrella 81

Gracillariidae

- 1 Mine on upperside of leaf2
 Mine on underside of leaf3
- 2 Mine with creases, contracted (rare aberration) [7+9-10] Phyllonorycter maestingella 341
 Mine a blister over midrib, occasionally over a major lateral vein, silvery [7+10-4?]
Phyllonorycter leucographella 332a
- 3 Mine sub-rectangular, less than 9mm long lightly spun and a little arched; both upper
 and lower epidermis with veins showing as reticulation (network); larva feeds later in a
 folded leaf edge [7+9].....Parornix fagivora 302
 Mine oval or elongate, more strongly spun and arched; lower epidermis green without
 reticulation; larva mines throughout3
- 4 Mine a broad oval, about 12mm long, larva yellow; cocoon edged with frass [7+10]
 Phyllonorycter messaniella 321
 Mine an elongate tube between veins or on leaf-margin, larva pale greenish yellow;
 cocoon to one side of frass which is piled neatly along middle of mine [7+9-10]
Phyllonorycter maestingella 341

BILBERRY

Nepticulidae

Early mine highly contorted, becoming more direct, frass linear or broken linear leaving clear margins. May lead to a blotch often near leaf margin. Egg underside near mid-rib. Larva amber yellow, head brown [7+9-10] *Stigmella myrtillella* 72

BINDWEED

Lyonetiidae

Mine starts as a narrow gallery leading to a clear blotch. The larva frequently makes a new mine and sometimes changes leaf. Frass is ejected from the mine, but remains caught up in the silken web beneath the mine which the larva constructs for support when entering a new mine [7-8+9] *Bedellia somnulentella* 264

BIRCH

Eriocraniidae (May to July)

- 1 Mine begins well away from leaf edge, with a narrow gallery containing linear frass. This feature normally remaining visible when absorbed in the later blotch.....2
Mine begins at or near leaf edge. A short length of feeding, if present, widens abruptly into a blotch.....3
- 2 Early gallery, in centre of leaf, absorbed by an elongate oval blotch, leading to a large blotch on leaf edge. Larval feeding starts in May. Final instar larva white, with pale brown head and darker mouth parts, lateral projections on first abdominal segment [5-6] *Eriocrania salopiella* 10
Early gallery, in centre of leaf, somewhat angular and absorbed by narrow angular blotch leading to a larger blotch on leaf edge. Larval feeding starts in June. Final instar larva white, head brown with black lateral edges. On the prothorax (dorsal surface) are two cloudy brown spots [6-8] *Eriocrania sparmannella* 9
- 3 The blotch, on the edge of the leaf, contains more than one, usually two or three pale watery-white larvae [5] *Eriocrania cicatricella* 11
The blotch contains only a single larva.....4
- 4 Larva dark grey [4-5] *Eriocrania sangii* 12
Larva whitish.....5
- 5 Larva (final instar) with pale brown head. Lateral projections on first abdominal segment [4-5] *Eriocrania semipurpurella* 13
Larva (final instar) with dark brown head. The posterior points of the head-capsule show as two black spots. Lateral projections on second abdominal segment [4-5]
..... *Eriocrania unimaculella* 8

Nepticulidae

- 1 Mine forming a blotch2
 Mine forming a gallery3
- 2 Blotch with a conspicuous brown central spot [8-10] Ectoedemia occultella 34
 Blotch without such a spot; but with the earlier contorted gallery in one corner [7-9]
Ectoedemia minimella 35
- 3 Frass dispersed..... 4
 Frass linear 5
- 4 Mine starting from a brown spot; frass green without clear margins, turning brown with
 age [6-7+9-10] Stigmella continuella 64

 Mine not starting from a brown spot; frass coiled and black, but leaving narrow clear
 margins [7-10]Stigmella sakhalinella 113
- 5 Mine long and angular with narrow linear frass in its second half..... 6
 Mine shorter and more contorted; frass broken linear and thicker 7
- 6 First fourth of mine filled with cloudy green frass [6-7]..... Stigmella lapponica 116
 Frass black and linear throughout the mine [7-8].....Stigmella confusella 117
- 7 Mine much contorted at the start; larva yellow with pale brown head and without dark
 abdominal spots; seldom gregarious [8-11] Stigmella luteella 112
 Mine less contorted at the start; larva yellow with dark brown head and dark abdominal
 spots; frequently gregarious [7+9-11]Stigmella betulicola 110

N.B. Vacated mines of the above two are sometimes difficult to separate, however if the larva is present there should be no problem.

Incurvariidae

Mine starts as a linear gallery expanding into a blotch. When full grown larva cut out an oval hole about 4mm long [7-4]Phylloporia bistrigella 128

Heliozelidae

Mine in pith of twig. When almost fully grown larva enters petiole of a leaf and then into midrib, it then cuts out an oval hole 5 x 2mm in the blade of the leaf [7-8]
Heliozela hammoniella 157

Lyonetiidae

Mine a fine gallery with reddish frass leading to a large blotch where frass is dispersed. Blotch may be separated from mine, occasionally on a different leaf. Not recorded in Britain since 1902. [7-8] Lyonetia prunifoliella 262

Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The egg is laid inside the leaf being injected through the epidermal layer. This feature helps to distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf [5+7+9-10].....*Lyonetia clerkella* 263

Bucculatricidae

Mine narrow, often contorted at first, later following a vein, final chamber often at right angle to previous mine, frass filling mine. Later the larva eats out windows from either side of leaf [8]*Bucculatrix demaryella* 276

Gracillariidae

- 1 Mine on upperside of leaf2
 Mine on underside of leaf3
- 2 Mine occupying most of the leaf which eventually almost closes over it; larva mines throughout [7+9-10]*Phyllonorycter corylifoliella* f. *betulae* 332
 Mine small, less than 12mm long; larva feeds later in a rolled leaf [5+7].....
 *Caloptilia betulicola* 283
- 3 Mine with lower cuticle brown; larva feeds later in a rolled or folded leaf4
 Mine with lower cuticle greenish, turning brown with age ; larva mines throughout..... 7
- 4 Larva completes growth in a folded leaf edge..... 5
 Larva completes growth in a rolled leaf 6
- 5 Bivoltine, feeding June and August to September [6+8-9].....*Parornix betulae* 301
 Univoltine, feeding July to August [7-8]*Parornix loganella* 300
- 6 Final leaf-roll longitudinal [7-8].....*Caloptilia populetorum* 281
 Final leaf-roll transverse [5+7]*Caloptilia betulicola* 283
- 7 Mine 15-20mm long; lower epidermis with 7-12 folds [9-10]..*Phyllonorycter cavella* 338
 Mine 10-15mm long; lower epidermis with 1-6 folds 8
- 8 Mine almost exclusively on seeding birches, larva without orange spot on sixth segment; pupa without a cocoon [7+9-10]*Phyllonorycter anderidae* 347
 Mine on seeding or mature birches, larva with orange spot on sixth segment; pupa in a cocoon [7+9-10]*Phyllonorycter ulmifoliella* 353

BIRD'S FOOT TREFOIL

Nepticulidae

- Slender galley terminating in blotch
- Frass black, preferring a woodland biotype [6-9]*Trifurcula cryptella* 48
- Frass brownish, preferring a downland biotype [6-7+9-10]*Trifurcula eurema* 49

Lyonetiidae

Mine a circular blotch without any gallery. The blackish frass is arranged in a spiral, spurs project from the blotch where feeding has taken place. Larva may move to a fresh leaf, more than once [5-6+7-8].....Leucoptera lotella 259

BLACKTHORN, PLUM and CHERRY

Nepticulidae

Mine a gallery with coiled green frass [7+9-10] Stigmella prunetorum 109

Early gallery slender leading to a large blotch rounded with frass in centre [7+9-10] Stigmella plagicolella 67

Early gallery highly contorted, with reddish frass, continues as an irregular gallery leading to an elongated blotch [7-10]Ectoedemia spinosella 27

Lyonetiidae

Mine a fine gallery with reddish frass leading to a large blotch where frass is dispersed. Blotch may be separated from mine, occasionally on a different leaf. Not recorded in Britain since 1902. [7-8] Lyonetia prunifoliella 262

Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The egg is laid inside the leaf being injected through the epidermal layer. This feature helps to distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf [5-7+9-10] Lyonetia clerkella 263

Gracillariidae

1 On Bird Cherry [6-7+9-10]Phyllonorycter sorbi 324
On other prunus species.....2

2 On Wild Cherry, Dwarf Cherry or cultivated cherry [7+9-4] Phyllonorycter cerasicolella 330
On Blackthorn or Wild Plum.....3

3 Mine about 12mm long; lower epidermis green; larva mines throughout overwintering in the mine, pupating in the spring [7+9-4]Phyllonorycter spinicolella 329
Mine small, about 8mm long; larva feeds later in a folded leaf edge.....4

4 Larvae grey with black legs [6-7+8-10] Parornix finitimella 308
Larva whitish green with green legs [7-9] Parornix torquillella 309

Yponomeutidae

Mine a short contorted gallery with black frass, larva leaves the mine to construct a small white cocoon in which it overwinters [9-10].....Paraswammerdamia albicapitella 440

BOG-MYRTLE

Bucculatricidae

Mine long, narrow and yellowish brown almost filled with black linear frass alongside the mid-rib, later the larvae leaves the mine and eats out windows from the under side of

the leaf [8-9].....Bucculatrix cidarella
272

N.B. early mine can be confused with that of a Nepticulidae, but egg matt black and rough in appearance.

BRAMBLES

Nepticulidae

Mine long frass linear or if dispersed occupying only one third of mine width, often on Dewberry [7+9-10]Stigmella splendidissimella 53
Mine whitish edges often with a little purple staining [5-6+7-8+10-3]
..... Stigmella aurella 50
Mined area extensively stained purple straight following veins on evergreens [10-12]
.....Ectoedemia erythrogenella 32
Mine contorted little if any purple confined to start usually on deciduous [10]
..... Ectoedemia rubivora 31
Early mine narrow, often following a vein with broken linear frass, broadening later, frass becoming dispersed linear, clear margins throughout. Often several mines in a leaf. Scotland [9-11].....Stigmella pretiosa
54a

Tischeriidae

Mine starts as a curved white gallery, which leads to a broader pale brown blotch. A tunnel of silk runs through the centre of the mine. Frass is ejected through a slit in the upper epidermis [7+9-3].....Emmetia marginata 125

BROOM

Gracillariidae

Mine long, narrow and inflated, in the green bark usually near the end of a green twig, often on a sapling [9-5] Phyllonorycter scopariella 340

BUCKTHORN

Nepticulidae

Contorted galley will dispersed frass [6-7+9-10]Stigmella catharticea 98

Bucculatricidae

Mine starts as a tightly wound spiral staining leaf blackish violet; then the mine straightens with no staining; after leaving mine larva eats out windows from below [8-9]Bucculatrix frangulella 270

BUSH VETCH

Gracillariidae

Mine underside occupying whole of leaflet; lower surface contracted causing edges to curl downwards contorting leaf [7+9-10]Phyllonorycter nigrescentella 349

* **CHERRY** see **BLACKTHORN** *

CINQUEFOILS and TORMENTIL

Nepticulidae

- 1 Frass dispersed in the early gallery [8-10]Ectoedemia arcuatella 30
Frass linear in the early gallery..... 2
- 2 Early gallery slender, abruptly changing to a blotch; larva whitish green [7+9-11]
.....Stigmella aeneofasciella 55
Early gallery following leaf margin, widening considerably, but not abruptly becoming a
blotch; larva yellow, ovum usually on upperside of leaf [7+9-10]
.....Stigmella poterii f. serella 61

CLOVER

Gracillariidae

- Mine an opaque ochreous brown gallery along midrib with clearer branches where the
larva has fed; larva changes leaves and pupates externally [4-5+6+7-8]
.....Parectopa ononidis 299
Mine on underside of leaf; larva does not change leaves and pupates in the mine
[7+9-10] Phyllonorycter insignitella 350

COMFREY

Gracillariidae

- Feeding starts in a small spiral gallery which soon develops into a blotch, frass linear,
upper epidermis brown; often two or three larvae to a mine. Larva eventually turn scarlet
and now frass is scattered in mine [7-9]Dialectica imperialella 311
N.B. Mines with blackish discoloration of the upper epidermis are caused by flies.

COWBERRY

Nepticulidae

- Mine long, slender gallery with linear black frass leaving clear margins leading to large
blotch in centre of leaf, frass heaped in middle [8-5]Ectoedemia weaveri
43

DOGWOOD

Heliozelidae

- Mine starts as a short gallery along leaf edge, abruptly changing to a blotch, finally the
larva cuts out an oval hole 5.5 to 7mm along the longer axis. N.B. before the egg is laid
the female makes several 'practice' slits, which helps to separate this from the following
species [7-8]Antispila metallella 158
Mine as above, but oval hole in blade of leaf measuring 4 to 5.5mm along the longer
Axis. There are no 'practice' slits at the egg site [8-10].....Antispila treitschkiella 159

ELM

Nepticulidae

Mine under bark in small branches, giving vein like appearance along branch [possible two year life cycle]Ectoedemia amani 41a

Mine compressed into gut like arcs; larvae green [8-9].....Stigmella viscerella 95

Frass linear then variable; larvae green, exit hole underside of leaf [8-9] Stigmella ulmivora 80

Frass dispersed, sometimes coiled; larvae yellow, exit hole on top of leaf [7+9-10] Stigmella lemniscella 63

N.B. S. lemniscella can also make mines similar to S. viscerella. To distinguish between these mines the initial S. viscerella mine has a zigzag start whereas the mine of S. lemniscella starts with concentric circles. Also the colour of the larvae is different; S. viscerella is green and S. lemniscella yellow.

Bucculatricidae

Mine a slender gallery with linear frass leaving clear margins; there are two to four frass free projections from gallery which end abruptly. After leaving mine larva eats out windows from underside of leaf [7-9]Bucculatrix albedinella 271

Mine contorted at start filled with black frass, may double back on itself forming a small blotch. Mine then straightens, often along vein, finally turning away at an angle. After leaving mine larva eats out windows from underside [5-7+8-10] ...(In Britain, at present it is found only at Farnham, Surrey)Bucculatrix ulmifoliae 274a

Gracillariidae

Mine underside of leaf, subcircular, strongly inflated. Larvae yellow, gut green, pupae in a cocoon usually light green and cigar shaped loosely attached to upper epidermis, often becomes loose when mine opened [7+9-10]..... Phyllonorycter schreberella 352

Mine underside tubular usually between two veins. Larvae pale whitish green, pupae in an olive green cocoon, remains firmly attached to lower epidermis when mine opened [7+9-10]Phyllonorycter tristrigella 356

Lyonetiidae

Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The egg is laid inside the leaf being injected through the epidermal layer. This feature helps to distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf [5+7+9-10].....Lyonetia clerkella 263

ENCHANTER'S NIGHTSHADE

Momphidae

Mine starts as an irregular gallery leading to a blotch with black frass. Larva changes leaf making a short gallery before returning to blotch feeding [6-7]Mompha langiella 880

Mine starts as a narrow gallery forming circles and/or semi-circles round egg site. Larva leaves mine making a new mine of large pale blotches on same leaf or adjacent leaf [8-9]Mompha terminella 881

GORSE

Gracillariidae

Mine long in epidermis of green bark of a thin twig, mine surface with longitudinal folds; very difficult to find [9-5] Phyllonorycter uliciolella 339

GUELDER ROSE

Gracillariidae

Mine underside between two lateral veins, a strong pucker in upperside of leaf [7+9-4]Phyllonorycter lantanellella 331

HAIRY GREENWEED

Gracillariidae

Mine upperside, folding upwards resembling a pod almost concealing mine; frass packed at tip of leaf (Cornwall only) [5-6+7-8+9-10]...Phyllonorycter staintoniella 340a

HAWTHORN

Lyonetiidae

Mine a brown circular blotch with the frass forming darker spiral markings in the centre. Egg laid well away from margin [8-9].....Leucoptera malifoliella 260

Mine a fine gallery with reddish frass leading to a large blotch where frass is dispersed. Blotch may be separated from mine, occasionally on a different leaf. Not recorded in Britain since 1902. [7-8] Lyonetia prunifoliella 262

Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The egg is laid inside the leaf being injected through the epidermal layer. This feature helps to distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf [5+7+9-10]Lyonetia clerkella 263

Bucculatricidae

Mine short contorted, linear black frass, close to a major vein. Later the larva eats out windows from upperside [7-8].....Bucculatrix bechsteinella 275

Gracillariidae

1 Edge of leaf turned under & silk visible [7+8-9] Parornix anglicella 303

Creased mine under leaf (c. 9mm long) [7+9-10] Phyllonorycter oxyacanthae 323

Blister on top of leaf2

2 Blister anywhere on upper surface of leaf, flecked with blackish frass [7+9-10] Phyllonorycter corylifoliella 332

Blister over midrib, silvery [7+10-4]Phyllonorycter leucographella 332a

Nepticulidae

No	Name	Position of egg	Mine	Larvae
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82	<u>Stigmella paradoxa</u>	Underside - about 1mm form tip of lobe	A more or less circular blotch, with frass in a black central mass [7+10-4]	Greenish white; head dark brown.
79	<u>Stigmella perpygmaeella</u>	Usually on top beside the midrib. Difficult to find.	Gallery slender; broken linear frass following rib or leaf margin usually reverses direction; may go down petiole. Makes a false blotch, compact frass near the beginning of blotch, may be coiled. [7+10]	Pale yellow, head brown
100	<u>Stigmella oxyacanthella</u>	Underside, usually close to a rib.	Long slender gallery following rib or leaf margin with linear frass sometimes going down petiole. Mine becomes broad filled with coiled reddish frass. Mine long, not forming blotch, but often making hairpin bends. [9-10]	Bright green, head pale brown to dark grey.
108	<u>Stigmella crataegella</u>	Underside, usually near midrib at base of leaf.	Mine starts slender with linear frass, usually following rib or leaf margin or along petiole. Gallery broadens abruptly with now coiled frass filling the gallery, before finishing with a central line. Gallery doubles back on itself forming a false blotch. [6-8]	Bright green, head green.
99	<u>Stigmella hybnerella</u>	Almost always underside beside a vein away from the margin.	Starts as a slender more or less direct gallery, with black linear frass and narrow clear margins. Larva now changes to blotch feeding, usually near leaf margin. [5-6+8-9]	Whitish with faint yellow tinge, head brown.
107	<u>Stigmella regiella</u>	Underside near margin	Narrow gallery with reddish frass following leaf margin expands abruptly into blotch with blackish frass deposited irregularly in centre. Blotch often absorbing earlier workings. [8-11]	Yellow, head pale brown. Cephalic ganglia conspicuous.
29	<u>Ectoedemia</u>	Underside	Starts as an erratic gallery	Whitish, gut dark

	<u>atricollis</u>		zigzagging to and fro in a small area near the egg. The mine then usually follows the leaf margin, filled with frass which leads to a blotch with the frass scattered. [8-4]	green or reddish
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HAZEL

Gracillariidae

- Blister on top of leaf [7+9-10] Phyllonorycter coryli 342
- Small subrectangular mine (c. 10mm long) larvae feeds later in a rolled leaf edge [7+9] ..
.....Parornix devoniella 304
- Long mine between veins (15-20mm) with strong central fold [7+9-10].....
.....Phyllonorycter nicellii 359

HAZEL AND HORNBEAM

Eriocraniidae (May)

- A blotch mine eating out all the parenchyma, frass black in long inter-twining threads, late April to early June [4-6]Eriocania chrysolepidella 7

Nepticulidae

- Mine highly contorted, staining leaf brown, leading to large blotch with early mine in Corner [7-9].....Ectoedemia minimella 35
- Early mine with greenish frass later irregular and wider than larvae [6-7+9-10].....
.....Stigmella floslactella 75
- Early mine with black linear frass tending to follow veins width of larvae [6-7+9-11]
.....Stigmella microtheriella 111

HORNBEAM

Gracillariidae

- 1 Mine on upperside of leaf [7+9-10]Phyllonorycter esperella 343
- Mine on underside of leaf2
- 2 Mine subrectangular, distinctly inflated with a strong central crease, epidermis mottled; all parenchyma consumed but nervures remain. larva feeds later in a folded leaf-edge usually making two such folds [6-7+9-10]Parornix carpinella 302a
- Mine elongate between veins, strongly spun and arched; without reticulated appearance; lower epidermis green [6-7+9-10] Phyllonorycter tenerella 318

HONEYSUCKLE

Gracillariidae

- Mine underside, large occupying whole of leaf, strong folds in lower epidermis puckering leaf [7+9-10]Phyllonorycter emberizaepenella 354

Mine underside, small, occupying part of leaf which is often twisted into a cone; also may produce a mine on upperside of leaf, but this is a rare aberration [3-4+7-8+10]

.....
..... Phyllonorycter trifasciella 361

HOP

Cosmopteriginae

Mine an irregular gallery on midrib or other large vein with silk lined gallery inside mine, which larva uses as a shelter. From here the mine branches in all directions. Fresh mine yellowish-white, turning brown with age [8-5]Cosmopterix zieglereella 894

Lyonetiidae

Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The egg is laid inside the leaf being injected through the epidermal layer. This feature helps to distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf [5+7+9-10].....Lyonetia clerkella 263

HORSE-CHESTNUT

Gracillariidae

Mine a brown blotch, highly visible, usually many on a leaf, pupa within mine [5-10]
.....Cameraria ohridella 366a

LABURNUM

Lyonetiidae

Mine with green frass leading to a blotch with the frass now black and deposited in a spiral [6+7+9]Leucoptera laburnella 254

LILAC

Gracillariidae

Mine narrow, often several parallel galleries which merge to form a large blotch; after leaving mine larvae construct a cone by rolling leaf tip downwards feeding gregariously; two cones are made [5-6+7-8].....Caloptilia syringella 293

LIME

Nepticulidae

Contorted gallery early mine often under leaf [7+9-10] Stigmella tiliae 90

Bucculatricidae

Mine an irregular gallery, may form a small blotch in angle of veins, frass linear or slightly dispersed; later larva eats out windows from below the leaf [7-8]
..... Bucculatrix thoracella 273

Roeslerstammiidae

Egg laid on upperside. Mines as first instar larva then feeds externally. Mine small close to margin generally in tip of leaf, pupa in a turned down leaf edge in a white silk cocoon. [7+9-10]Roeslerstammia erxlebella 447

LONDON PLANE

Gracillariidae

Mine underside, often making a fold in the leaf [7-11] Phyllonorycter platani 321a
Mine on top, a blister over midrib, occasionally over a major lateral vein, silvery [7+10-4?]Phyllonorycter leucographella 332a

LOOSESTRIFE

Gracillariidae

Mine usually on upperside leading to a blotch; on leaving mine larva cuts a strip about 30mm by 7mm from edge of leaf which it rolls downwards and secures with silk making an untidy cone. Two such rolls are made [7-9] Calybites phasianipennella 296

LUNGWORT

Gracillariidae

Feeding starts in a small spiral gallery which soon develops into a blotch, frass linear, upper epidermis brown; often two or three larvae to a mine. Larva eventually turn scarlet and now frass is scattered in mine [7-9]Dialectica imperialella 311
N.B. Mines with blackish discoloration of the upper epidermis are caused by flies.

MAPLES AND SYCAMORE

Nepticulidae

Mine in seeds, buds or adjacent bark
On Field Maple [6-8+10-4]Ectoedemia louisella 22
On Norway Maple [6+9-5].....Ectoedemia sericopeza 21
On Sycamore [7+9]Ectoedemia decentella 20

Mine in leaves

Frass black clear margins usually on Sycamore [7-8+9-10]Stigmella speciosa 65

Frass green no margins on Field Maple or Norway Maple, frass turns brown with age. [6-7+8-9]Stigmella aceris 102

Gracillariidae

Blotch mine, larva mines throughout
On Field Maple, often causing leaf edge to fold over [7+10] Phyllonorycter acerifoliella 362
..... Phyllonorycter acerifoliella 362
On Sycamore [7+10] Phyllonorycter geniculella 364

On Norway Maple [7+10] Phyllonorycter platanoidella 363
 N.B. If mine is close to the edge of the leaf or in a lobe then the mine may cause the leaf to fold over.

Blotch mine, larva feeds later in a rolled leaf or cone

- 1 A full depth transparent blotch, without internal spinning, on Sycamore; larva feeds later in a rolled leaf or cone2
 A full depth transparent blotch, without internal spinning, on Field Maple; larva feeds later in a rolled leaf or cone3
- 2 Mine about 6mm long (very rare) [7-8]Caloptilia hemidactylella 291
 Mine about 4mm long in angle between veins, after leaving mine three cones are made occasionally on the same leaf as mine, but often on an adjacent leaf [6-7]
Caloptilia rufipennella 284
- 3 Mine tenanted in May, spinning in June; recorded from Isle of Wight only [5-6]
Caloptilia hauderi 295
 Mine tenanted in June, spinning in July; recorded from southern England and Wales [6-7]Caloptilia semifascia 290

MEADOWSWEET

Nepticulidae

Mine long and winding, frass at first broken linear then in broader central line [6-7+9-10]Stigmella ulmariae 58

MEDICK

Gracillariidae

Mine underside, occupies whole of leaflet, lower surface contracted causing leaf edges to curl down [7+9-10]Phyllonorycter nigrescentella 349

MOUNTAIN AVENS

Nepticulidae

Early mine narrow, often following a vein with broken linear frass, broadening later, frass becoming dispersed linear, clear margins throughout. Often several mines in a leaf. Scotland [9-11]Stigmella pretiosa 54a

Gracillariidae

Mine starts on underside of leaf and develops into blotch often absorbing earlier workings; the larva then leaves the mine and changes leaf, the edges of which are spun together to form a pod (northern Scotland) [6-8]
Parornix alpicola 306 or P. alpicola ssp. Leucostola 307

MUGWORT

Gracillariidae

Mine starts as a long gallery following vein or leaf margin which leads to an inflated blotch; black frass usually massed in centre. Upper epidermis mottled white, first turning yellow and then purplish [7+8-9]... Leucospilapteryx omissella 314

*** NORWAY MAPLE see MAPLE ***

OAK

Eriocraniidae (May to July)

Blotch mine, usually starting from leaf edge, frass black, long inter-twining threads [5-7]Eriocrania subpurpurella 6

Nepticulidae

Ectoedemia (blotch mines)

- 1 Mine on Evergreen Oak, highly contorted, November to April. Pupa in a cocoon on upper surface of leaf [11-4]Ectoedemia heringella 36a
 Larva mining the green bark of small branches [9?-6]...Ectoedemia atrifrontella 41
 Mine forming a slender gallery terminating in a blotch.....2
- 2 Larva mines in green leaves from late August till early October; the early gallery generally follows a vein outwards from the midrib; larval head very pale brown [8-9]Ectoedemia albifasciella 37
 Larva mines in 'green islands', often in fallen leaves in late October - November; the early gallery generally follows a vein inwards towards the midrib, or follows the midrib.....3
- 3 Blotch with a slit in the lower leaf epidermis, allowing some of the frass to fall out; larva head dark brown [10-11].....Ectoedemia subbimaculella 38
 Blotch without a slit in the epidermis; larva head red-brown [10-11] Ectoedemia heringi 39
 Gallery highly contorted, occupying a small area, forming a false blotch; larva with dark ventral spots, feeding in a 'green island' often in fallen leaves in November [10-11] Ectoedemia quinquella 36

Stigmella (gallery mines)

- 1 Mine on Evergreen species.....2
 Mine on Deciduous species.....3
- 2 Mine with a broad irregular gallery with a wide line of dark frass leaving narrow clear margins, larvae yellow [7-8+11-4]Stigmella suberivora 85
 Mine sinuous in regular curves, filled with coiled greenish frass difficult to see when

- fresh (frass turns brown with age); larvae green [6-7+9-10] *Stigmella basiguttella* 89
- 3 Egg on underside.....4
 Egg on upperside usually away from margin.....4
 Egg on upperside near margin, frass black [6-7+9-10] *Stigmella ruficapitella* 84
- 4 Mine sinuous in regular curves, filled with coiled greenish frass difficult to see when fresh (frass turns brown with age); larvae green [6-7+9-10] *Stigmella basiguttella* 89
 Mine irregular; frass leaving clear margins, blackish; larvae yellow5
- 5 Frass dispersed in separated grains in middle part of course6
 Frass forming a more or less continuous central line.....7
- 6 Egg laid beside a vein; early course of mine leading away from vein more or less at right angles; mine the largest of the oak feeding *Stigmella's* univoltine, [7-8]
 *Stigmella svenssoni* 87
 Egg anywhere on leaf; early course variable; mine about the same size as that of *Stigmella ruficapitella*, frass more or less dispersed until last quarter of mine when it forms a thin central line; bivoltine, [6-7+9-10]*Stigmella samiatella* 88
- 7 Mine relatively short and broad; frass in a thick central line [6-7+9-11]
 *Stigmella atricapitella* 83
- Mine narrower, the smallest in oak; frass forming a fine central line [6-7+10-11]
 *Stigmella roborella* 86
- N.B. In the autumn all *Stigmella* mines are difficult to determine with the exception of *S. basiguttella*. Tenated mines of *S. svenssoni* should present no problems but those of the remaining *Stigmella* species are almost impossible to separate.

Tischeriidae

Mine a flat whitish blotch on the top of a leaf, occasionally several mines can be found on one leaf. The mine is free of frass, which is ejected through a slit at the edge of the mine. The mine is lined with silk [9-4]*Tischeria ekebladella* 123

Mine a flat brownish blotch on top of a leaf with darker concentric rings on the upper surface of the leaf. No frass in mine which is ejected through a slit. The mine is lined with silk [9-4]*Tischeria dodonaea* 124

Heliozelidae

Mine starts in twig proceeding into base of leaf via petiole. When almost fully fed it cuts out an oval hole in the base of the leaf measuring 4 x 2mm to 5 x 3mm.

Occasionally two larvae mine the same twig resulting in a hole being cut out from either side of the leaf [6-7]*Heliozela sericiella* 154

Bucculatricidae

Mine short, often contorted close to midrib, frass black. After leaving mine larva eats out windows from underside of leaf [7+9-10]Bucculatrix ulmella 274

Gracillariidae

- 1 Mine with epidermal gallery on underside leading to a subquadrate blotch about 5mm across (triangular if in angle of veins); larva feeds later in a cone on the leaf-margin2
 Mine formed otherwise 3
- 2 Univoltine; mine occupied July - August, cone September - October *
 Caloptilia alchimiella 286
 Bivoltine; mine occupied May and August, cone June and September - October *
 Caloptilia robustella 287
 *N.B. The second generation cones of *C. robustella* are indistinguishable from those of *C. alchimiella*.
- 3 Mine upperside, large and covering most of leaf4
 Mine underside5
- 4 Upper epidermis detached from parenchyma and silvery; mine slightly inflated [6]
Acrocercops brongniardella 313
 Mine otherwiseHymenoptera spp.
- 5 Larva mines only when young, feeding later in a cone on the leaf margin [6-9]
 Caloptilia leucapennella 292
 Larva mines throughout6
- 6 Mine on Evergreen Oak [3-4+7+10]Phyllonorycter messaniella 321
 Mine on deciduous species 7
- 7 Mine appearing to have no creases in lower epidermis8
 Mine with visible creases in lower epidermis10
- 8 Mine less than 10mm long, usually in lobe or on edge of leaf (Autumn generation only) [7+9-10]Phyllonorycter heegeriella 317
 Mine more than 17mm long9
- 9 Pupa in cocoon attached to central green patch in the upper epidermis; mine 17-20mm long, strongly contorting leaf [7-8]Phyllonorycter roboris 316
 Pupa without a cocoon, but in a silken web; mine 22-28mm long, often several in one leaf causing leaf to distort considerably [7-9]Phyllonorycter distentella 346
- 10 Lower epidermis with numerous small creases11
 Lower epidermis with a least one large crease 12
- 11 Very small mine usually in lobe or on edge of leaf, cocoon occupying most of mine

(autumn generation only) [7+9-10]	Phyllonorycter heegeriella	317
Mine underside, small, usually on margin when leaf-edge folds right over almost concealing mine, preferring high branches; pupa in flimsy, lace like cocoon [7+9-11]	Phyllonorycter kuhlweiniella	319
12 Cocoon incorporating no frass		13
Cocoon incorporating frass		14
13 Mine less than 14mm long; cocoon attached to both upper and lower epidermis (summer generation only) [6-7+9-10]	Phyllonorycter harrisella	315
Mine more than 20mm long, almost always between veins extending from midrib, often several mines in a leaf [7+9-10]	Phyllonorycter lautella	351
14 Mine 11mm or more long		15
Mine 10mm or less long, cocoon attached to both upper and lower epidermis (summer generation only [7+9-10]	Phyllonorycter heegeriella	317
15 Cocoon attached to upper epidermis only		16
Cocoon attached to both upper and lower epidermis		17
16 Cocoon completely covered in frass (summer generation only); mine irregular in shape positioned anywhere on leaf [7+9-10]	Phyllonorycter quercifoliella	320
Cocoon only lined with frass; a long mine between two veins and extending from midrib [7+9-10]	Phyllonorycter muelleriella	322
17 Cocoon flimsy and only loosely attached to the upper epidermis, usually lined with only a little frass [3-4+7+10]	Phyllonorycter messaniella	321
Cocoon strong with frass edging giving a distinct U or V shape		18
18 Mine with small patch of uneaten parenchyma on the upper leaf epidermis to which the cocoon is firmly attached (autumn generation only) [7+9-10]	Phyllonorycter quercifoliella	320
Mine with a patch of parenchyma on upper epidermis usually left uneaten, frass either deposited on each side of pupa or pupa completely covered [6-7+9-10]	Phyllonorycter harrisella	315

At present it is almost impossible to distinguish between several of the autumn mines of the oak feeding Phyllonorycters. Those presenting the most problems are Phyllonorycter quercifoliella, P. messaniella and P. heegeriella. However they can usually be determined by examination of the larva or the pupal case. It now appears that those mines that yield P. quercifoliella have the cocoon adhered very firmly to an uneaten patch of green on the upper leaf epidermis. Those yielding P. messaniella have no uneaten parenchyma at all and are only rather loosely attached to the upper epidermis.

A description of the larva is as follows:

- 317 P. heegeriella: Head very pale greenish brown, body pale whitish green, gut darker.
- 320 P. quercifoliella: Head light brown, body pale whitish green, gut darker green.
- 321 P. messaniella: Head brown, body yellow, anterior segments opaque whitish yellow.

Breeding through Phyllonorycters is fairly easy and should be attempted wherever possible to determine the species.

N.B. Other species of insects also mine oak leaves especially Sawflies.

OX-EYE DAISY

Bucculatricidae

Mine a narrow gallery, starting from a small spiral, frass fine and linear. Larva can change leaf and continue mining; mines can follow leaf margin or go down petiole before returning to blade of leaf [1-4+7].....Bucculatrix nigricomella 266

PEAR

Nepticulidae

- 1 Mine gallery with dispersed frass leading to blotch [8-4]Ectoedemia atricollis 29
Mine formed otherwise2
- 2 Mine irregular usually with linear frass, though some slight coiling may be present, broader in second half, larva green [6-7+8-9] Stigmella minusculella 91
Mine with dispersed or coiled frass in second half3
- 3 Mine relatively straight, extending across the leaf; larvae green with yellowish gut [9-10] Stigmella oxyacanthella 100
Mine strongly contorted and confined to a small area; larvae green with reddish gut [7+9]Stigmella pyri 101

Lyonetiidae

Mine a brown circular blotch with the frass forming darker spiral markings in the centre.
Egg laid well away from margin [8-9].....Leucoptera malifoliella 260

Bucculatricidae

Mine short contorted, linear black, close to a major vein. Later the larva eats out windows from upperside [7-8].....Bucculatrix bechsteinella 275

Gracillariidae

Blotch over midrib, silvery-white [7+10-4]Phyllonorycter leucographella 332a

PINES

Yponomeutidae + 1 x Gelechiidae

- 1 Mine within the needle of Scots or Lodgepole Pine feeding from the base towards the tip [4-5].....Cedestis gysselella 442

- Mine within the needle of various species of Pine starting at the tip or near the tip feeding towards the base2
- 2 Mine on Scots Pine or Larch with some internal spinning and a hole at each end through which most of the frass is ejected. Larva head black/brown, body pinkish brown, feeds externally after hibernation [9-5].....Exoteleia dodecella 760
Larvae otherwise3
- 3 On various species of Pine; larva head brown, body greenish feeding December to April [12-4]Cedestis subfasciella 443
On Scots Pine; larva yellowish, brown when young, head black4
- 4 Larva feeding April to May; pupa in a cocoon between 3 or 4 needles spun together [3-4]Ocnerostoma piniariella 444
Larva feeding December to March, June to July and occasionally September; pupa in a cocoon between 3 or 4 needles spun together [12-4+6-7+9].....Ocnerostoma friesei 445

N.B. It is impossible to distinguish between the larvae and mines of the two *Ocnerostoma* species, however the different feeding times may give some indication as to which species is present, but to be certain adults should be reared and dissected.

*** PLUM see BLACKTHORN ***

*** POPLAR see ASPEN ***

PRIVET

Gracillariidae

- Mine narrow, larval spinning causes leaf to fold downwards; after leaving mine larvae construct a cone by rolling leaf tip downwards; two cones are made; upper epidermis silvery [7-9] Caloptilia cuculipennella 280
- Mine narrow, often several parallel galleries which merge to form a large blotch; after leaving mine larvae construct a cone by rolling leaf tip downwards feeding gregariously; two cones are made; upper epidermis yellow or brown [6+8-9]....Caloptilia syringella 293

PYRACANTHA

Gracillariidae

- Mine starts along midrib then produces a blister in centre of leaf, eventually drawing the edges of the leaf together [7+10-4] Phyllonorcyter leucographella 332a

Lyonetiidae

- Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The egg is laid inside the leaf being injected through the epidermal layer. This feature helps to distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf [5+7+9-10].....Lyonetia clerkella 263

QUINCE

Lyonetiidae

Mine a fine gallery with reddish frass leading to a large blotch where frass is dispersed.

Blotch may be separated from mine, occasionally on a different leaf. Not recorded in Britain since 1902. [7-8] Lyonetia prunifoliella 262

Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The egg is laid inside the leaf being injected through the epidermal layer. This feature helps to distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf.

[5+7+9-10] Lyonetia clerkella 263

RESTHARROW

Gracillariidae

Mine an opaque ochreous brown gallery along midrib with clearer branches where the larva has fed; larva changes leaves and pupates externally [4-5+6+7-8]

.....Parectopa ononidis 299

Mine tentiform on underside of leaf; larva does not change leaves and pupates in the mine [7+9-10]

.....Phyllonorycter nigrescentella 349

RIBWORT PLANTAIN

Gracillariidae

Mine starts as long tortuous gallery in lower epidermis; then larva moves to upper epidermis and makes a large blotch astride midrib, spinning causes leaf to close over mine and finally almost conceal it [6-7+10-4]

.....Aspilapteryx tringipennella 294

ROCK ROSE

Momphidae

Mine starts as a gallery almost filled with frass, larva then changes to blotch feeding occupying the whole leaf, larva may change leaf if required [10-4+6-7]

.....Mompha miscella 884

ROSE

Nepticulidae

Early gallery much contorted then widening ending in a blotch [9-11]

.....Ectoedemia angulifasciella 28

1 Early gallery relatively straight and not ending in a blotch, filled with greenish frass in first third of mine, darkening with age, frass then turns black and is either narrowly dispersed, or coiled, leaving clear margins [7+10-12]

.....Stigmella anomalella 92

Early gallery relatively straight with linear frass leaving clear narrow margins and not ending in a blotch

.....2

2 Found only on *Rosa pimpinellifolia* [7+9] Stigmella spinosissimae 94

Found on various species of rose [6-7+9-10]..... Stigmella centifoliella 93

N.B. The mines of all these species tend to overlap in structure, so it is only safe to record them when the characters match precisely the descriptions given above. *Stigmella spinosissima* is rare and will only be found on *Rosa pimpinellifolia*, but the other two species also feed on the same foodplant.

Tischeriidae

Mine an inflated pale brown blotch on the top of the leaf causing the leaf to fold over which may conceal the mine [9-10].....*Emmetia angusticollella* 127

ROWAN, WHITEBEAM AND WILD SERVICE TREE

Nepticulidae

- 1 A slender sinuous galley leading to a large roundish blotch [6].....*Stigmella sorbi* 66
A gallery throughout the whole of the mine2
- 2 Mine on Wild Service tree3
Mine on Rowan4
- 3 Mine starts relatively straight, slender gallery, becoming contorted with linear frass, later widening almost to a blotch, larva pale yellow [7]*Stigmella torminalis* 106
Mine long and sinuous with dispersed frass, larvae green [9-10]
..... *Stigmella oxyacanthella* 100
- 4 Mine narrow, less than 1.5mm, frass linear leaving clear margins, usually confined to a small area, but occasionally follows leaf margin [7-8]*Stigmella magdalenae* 104
Mine wider, more than 1.5mm, frass dispersed may be coiled, a long contorted gallery which may follow leaf margin [6-8]*Stigmella nylandriella* 103

N.B. Intermediate forms of these mines do occur and these can be difficult to distinguish. It should also be noted that *Stigmella oxyacanthella* has also been known to feed on Rowan and has a mine similar to *S. nylandriella*, however occupied mines should present no problem as *S. oxyacanthella* feeds during September and October.

Lyonetiidae

- Mine a brown circular blotch with the frass forming darker spiral markings in the centre. Egg laid well away from margin. On Wild Service tree [8-9]
.....*Leucoptera malifoliella* 260
- Mine a fine gallery with reddish frass leading to a large blotch where frass is dispersed. Blotch may be separated from mine, occasionally on a different leaf. Not recorded in Britain since 1902. [7-8] *Lyonetia prunifoliella* 262
- Mine a long sinuous gallery, often whitish in appearance and often crossing midrib. The egg is laid inside the leaf being injected through the epidermal layer. This feature helps to distinguish it from a Nepticulid mine where the egg is laid on the surface of the leaf [5+7+9-10]*Lyonetia clerkella* 263

Bucculatricidae

Mine short contorted, linear black, close to a major vein. Later the larva eats out windows from upperside ... (on Rowan and Wild Service Trees) [7-8]

.....
.....Bucculatrix bechsteinella 275

Gracillariidae

1 Mine a blotch on upperside of leaf.....2
Mine on underside of leaf3

2 Blotch anywhere on upper surface of leaf, flecked with blackish frass [7+9-10]
.....Phyllonorycter corylifoliella 332
Blotch over midrib, silvery [7+10-4].....Phyllonorycter leucographella 332a

3 Mine approx 5-8mm long, lower epidermis turning grey or brown; larvae feeds later in a folded leaf or cone.....4
Mine narrow and approx 20-30mm long, lower epidermis remains green; larva mines throughout5

4 Larva feeds later in a cone on the leaf margin; mainly on Wild Service-tree [7+8-9]
.....Parornix anglicella 303
Larva feeds later in a folded leaf edge or in a centrally placed tight pleat that resembles a mine. (On all three species) [7+8-9].....Parornix scoticella 305

5 Mine on Wild Service-tree6
Mine on Rowan or Whitebeam7

6 Mine with lower epidermis having many longitudinal creases; pupae in very pale brown loose silken chamber; frass in a long line behind the cocoon (most common species on Wild Service-tree) [7+9-11] Phyllonorycter mespilella 325
Mine with lower epidermis with one large fold, pupa in a white silk lined chamber with the frass heaped behind the cocoon (rarely found on Wild Service-tree) [6-7+9-10]
.....Phyllonorycter cydoniella 327

7 Mine in Rowan8
Mine on Whitebeam10

8 Pupa in a silk-lined chamber with out a real cocoon with very little frass9
Pupa in a strong whitish cocoon with the frass heaped near the middle of the mine; mine along midrib or leaf-edge strongly contorting leaf (commonest species on Rowan) [6-7+9-10] Phyllonorycter sorbi 324

9 Mine with lower epidermis having many longitudinal creases; pupae in very pale brown loose silken chamber; frass in a long line behind the cocoon (infrequent on Rowan [7+9-11]Phyllonorycter mespilella 325
Very rarely found on Rowan [7+9-4]..... Phyllonorycter lantanellella 331

- 10 Mine with lower epidermis having many longitudinal creases; pupae in very pale brown loose silken chamber; frass in a long line behind the cocoon (frequent on Whitebeam) [7+9-11] Phyllonorycter mespilella 325
 Pupa in a strong whitish cocoon with the frass heaped near the middle of the mine; mine along midrib or leaf-edge strongly contorting leaf (rarely found on Whitebeam) [6-7+9-10] Phyllonorycter sorbi 324

ST. JOHN'S WORT

Nepticulidae

- Mine long slender gallery linear frass ending in blotch which often absorbs earlier workings, pupa in mine [7+10-12] Ectoedemia septembrella 42

Gracillariidae

- Mine forming an epidermal blotch with frass packed at one end; larva then forms a cone by spinning the tip of a leaf downwards [6+9-10] Eucalybites auroguttella 297

SALAD BURNET

Nepticulidae

- First follows leaf margin then filling most of leaflet [6-7+9-10] Stigmella poterii 59

SALLOWS AND WILLOWS

Nepticulidae

- Early mine in midrib, in leaf for last instar [7-11] Ectoedemia intimella 25
 All mine in leaf blade – Sallow [6-7+9-11] Stigmella salicis 68
 All mine in leaf blade - Willows [6-7+9-10] Stigmella obliquella 70

N.B. It is possible that *S. salicis* may feed on Willows

Gracillariidae

- 1 Mine small, about 8mm, tentiform; larva feeding later in a folded leaf or cone 2
 Mine over 15mm, tentiform; larva mines throughout 3
 Mine otherwise 8
- 2 Rare mountain species, larva feeds later in a folded leaf [7-8] Callisto coffeella 310a
 Common widespread species; larva feeds later in a cone [7-9].. Caloptilia stigmatella 288
- 3 Mine on Creeping Willow [7+9-10] Phyllonorycter quinqueguttella 348
 Mine on other willow species 4
- 4 Mine on smooth-leaved willow species 5
 Mine on rough-leaved willow species 6
- 5 Mine only on Osier; mine long and narrow, often near petiole; pupa naked in mine without a cocoon [7+9-10] Phyllonorycter viminetorum 334
 Mine on Osier, White Willow, Crack Willow and occasionally other species; pupa in a cocoon [6-7+9-10] Phyllonorycter viminiella 333

- 6 Cocoon white or yellow and loosely woven [7+9-10]Phyllonorycter salicicolella 335
Cocoon golden or light golden brown and strongly constructed7
- 7 Outline of cocoon visible from outside the mine [7+9-10]... Phyllonorycter hilarella 337
Outline of cocoon not or hardly visible from outside the mine [7+9-10]
.....Phyllonorycter dubitella 336

N.B. Although the above key indicates which species of Phyllonorycter is most likely to be found on a given foodplant it is not conclusive. The characteristics of some mines vary and it is not certain as to the exact variety of willow that some Phyllonorycter species feed on, so to be certain of an identification it may be necessary to breed through to adult.

- 8 Mine starting in a leaf making an epidermal gallery 9
Mine starting in a stem of current year's growth10
- 9 Mine starts as an epidermal gallery on the side the egg was laid, frass in broad central line. Larva then mines petiole and into twig and finally back into leaf. Mine usually ends at leaf margin where larva pupates under a membrane [6+8-9]...Phyllocnistis saligna 367
- 10 Mine along stem, long, up to 30cm. At first greenish ochreous turning white with age, finally ending up in the petiole of a leaf, where a cocoon is spun at the base of the leaf. May have two or three cocoons on a single leaf. Usually on Grey Willow, but has been found on SallowPhyllocnistis ramulicola 367a
(New to science in 2006, life cycle uncertain, so far only found in Hampshire, England and Portugal).

SEA ASTER

Bucculatricidae

Mine a long, narrow gallery; frass linear, black or reddish. Larva may mine throughout or may eat out 'windows' in leaf from below after initial mining phase [4-5+7-8]
.....Bucculatrix maritima 267

SELFHEAL

Nepticulidae

Slender gallery linear frass leading via petioles into second leaf stained purple [7-10]
.....Fedalmia headleyella 44

SMALL SCABIOUS

Gracillariidae

Mine underside, lower surface with several longitudinal folds, contracted downwards to form inflated blotch, epidermis tinged purple [7-8+10-4]..Phyllonorycter scabiosella 355

SNOWBERRY

Gracillariidae

Mine underside, large occupying whole of leaf, strong folds in lower epidermis puckering leaf [7+9-10]Phyllonorycter emberizaepenella 354

Mine underside, small, occupying part of leaf which is often twisted into a cone; also may produce a mine on upperside of leaf, but this is a rare aberration [3-4+7-8+10] Phyllonorycter trifasciella 361

SORREL

Nepticulidae

Mine a spiral gallery round egg site turning this area bright red, larva pale yellow, gut greenish [5-6+8-10] Enteucha acetosae 118

Gracillariidae

Mine usually on upperside leading to a blotch; on leaving mine larva cuts a strip about 30mm by 7mm from edge of leaf , which it rolls downwards and secures with silk making an untidy cone. Two such rolls are made [7-9] Calybites phasianipennella 296

STRAWBERRY

Nepticulidae

Mine gallery - frass linear [7+9-10]Stigmella splendidissima 53
Mine gallery - frass dispersed [5-6+7-8+10-3] Stigmella aurella 50
Early mine strongly contorted ending in blotch frass dispersed, brown [8-10] Ectoedemia arcuatella 30
Early mine not contorted ending in blotch frass linear, black [7+9-11] Stigmella aeneofasciella 55

SWEET CHESTNUT

Nepticulidae

Egg usually on upperside, mine long, contorted, frass in thin central line at beginning of mine, widening, but leaving clear margins finishing with a fine central line, occasionally leading to a false blotch [6-7+9-10] Stigmella samiatella 88

Tischeriidae

Mine a flat, whitish blotch on the top of a leaf, occasionally several mines can be found on one leaf. The mine is free of frass, which is ejected through a slit at the edge of the mine. The mine is lined with silk [9-4].....Tischeria ekebladella 123
Mine a flat brownish blotch on top of a leaf with darker concentric rings on the upper surface of the leaf. No frass in mine, which is ejected through a slit. The mine is lined with silk [9-4]Tischeria dodonaea 124

Gracillariidae

Mine on underside of leaf, often between two veins, sometimes causing the leaf to crease [3-4+7+10]Phyllonorycter messaniella 321

*** SYCAMORE see MAPLE ***

*** TORMENTIL see CINQUEFOIL ***

WATER AVENS

Nepticulidae

Egg on either side of leaf. Mine long with dispersed frass leaving clear margins. Larva amber-yellow with yellowish brown head [5-6+7-8+10-3]Stigmella aurella 50

Egg on upperside of leaf. Early mine narrow, often following a vein with broken linear frass, broadening later, frass becoming dispersed linear, clear margins throughout. Often several mines in a leaf. Scotland [9-11].....Stigmella pretiosa 54a

WAYFARING-TREE

Gracillariidae

Mine underside between two lateral veins, a strong pucker in upperside of leaf [7+9-4]...
.....Phyllonorycter lantanellella 331

*** WHITEBEAM see ROWAN ***

*** WILD SERVICE TREE see ROWAN ***

*** WILLOWS see SALLOW ***

YARROW

Bucculatricidae

Mine in leaflet following margin, frass black linear; after leaving mine feeds from above leaving lower epidermis intact [4-5+7].....Bucculatrix cristatella 265

Mine in leaflet eating all the parenchyma, frass black linear, after leaving mine feeds as B. cristatella (northern Scotland) [6-7]Bucculatrix obscurella 268