

THE VASCULUM

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BY THE WAY

Secretaries of societies and other contributors to the *Vasculum* should send their notes to the Editors before 15 June 1993

NATURAL HISTORY IN SUNDERLAND

We were saddened to learn last year that the Sunderland Natural History Society had folded. A city the size of Sunderland certainly **should** have its own organisation catering for naturalists and we are glad to see that a club has arisen, in the shape of the **Wearside Field Club**. The Field Club has produced a programme of interesting events for 1993: for most months they have at least one talk and one walk planned and there are two weekend outings arranged. The indoor meetings are held in the Fulwell Community Centre. Anyone interested in joining can contact D. Bulmer, 153 Sea Road, Sunderland. Perhaps NNU members could persuade the Club to affiliate to the Northern Naturalists' Union!

THE SMALL SKIPPER *Thymelicussylvestris* Poda AND THE EGG PARASITOID *Trichogramma* sp. UPDATE 1992

H.A. Ellis. 16 Southlands, Tynemouth, Tyne & Wear NE30 2QS

The Small Skipper Butterfly does not occur in Northumberland (VC67 & VC68) and is generally considered to be something of a rarity in County Durham (VC66) (Dunn & Parrack, 1986; Cook, 1990). Earlier I reported (Ellis, 1991) that there was a flourishing colony along the course of the dismantled railway near Spennymoor and subsequently that an egg parasitoid of the genus *Trichogramma* was present (Ellis,

1992). These observations have been extended during the 1992 season and form the basis of this report.

1. Bishop Auckland Walkway:

The original report covered that part of the track from the car park near Spennymoor (NZ245338) as far as Byer's Green Car Park and Picnic Site (NZ227327). On 28 July 1992 I revisited the locality and walked from Byer's Green towards Bishop Auckland for a further 2km. Numerous Small Skippers were seen I counted 137 male and female butterflies as follows: At Byer's Green Car Park, 10; between the car park and Binchester Blocks (NZ226329), 88; from there to a line of pylons (NZ226314), 24, and then along the remainder of the walk towards the golf course (NZ226308), 15. Later the same day the location near the car park and Bishop's Cottages (Spennymoor) was revisited and adults and ova of the Small Skipper were again present. Clearly the Small Skipper is thriving along much of the course of this dismantled railway.

2. Other locations for the Small Skipper:

Some of the well known localities were listed previously (Ellis, 1991). Three additional localities were encountered during 1992 near Old Wingate, near Tudhoe and near Wolviston.

a. Wingate Quarry Local Nature Reserve (NZ375375).

Several dozen males and females were seen on 20 July 1992 throughout the Quarry in the sheltered grassland and in the adjacent field near the entrance car park. At a later visit on 18 August only four worn Small Skippers were noted. This locality is not included in Cook's distribution atlas (Cook, 1990) and Tom Dunn has informed me that it is a new record for the site. To be present in such numbers it must have bred in the quarry last season at the latest.

b. Rosa Shafto Nature Reserve near Tudhoe.

On 28 July 1992 five Small Skippers were seen in rough grassland opposite the car park (NZ253356) and a further twelve in a field adjacent to the sewage works (NZ252355 NZ244357). Again, this location is not marked on Cook's distribution map. I am uncertain but this too could be a new locality for the species.

c. Castle Eden Walkway near Wolviston.

On 6 August 1992 ten male and female Small Skippers were seen flying at the sides of the dismantled railway (NZ401262). This location is not recorded on Cook's distribution map.

3. Egg Parasitoid:

In the original report (Ellis, 1992) it was noted that the parasitoid genus *Trichogramma* (Hymenoptera, Trichogrammatidae) completed its cycle of development within the Small Skipper egg but it was unclear how many parasitoids were supported by a single egg since these had not been kept separately. As a check on this aspect of the biology of the parasitoid this season I observed three *Holcus lanatus* grass sheaths collected at the original location near Spennymoor and containing 26, 10 and 4 ova respectively. Only one ovum proved to be parasitised and turned black by 31 July. It was kept separately thereafter and seven adult parasitoids emerged through four separate holes, commencing on 7 August. Microscopy revealed the same tiny *Trichogramma* as was reported the previous year. The percentage of eggs

parasitised (2.5%) was less than that expected and the number of parasitoids derived from one egg greater than expected in view of the previous findings (Ellis, 1992). It would be necessary to examine a large number of grass sheaths containing eggs in order to obtain an accurate estimate of the frequency of parasitisation. In the interests of conservation one is inhibited from undertaking such a study for the Small Skipper as ova are deposited in rows within the grass sheaths without any adhesive substance to keep them in place, and readily fall to the ground if the sheath is disturbed.

4. The successful Small Skipper:

The Small Skipper seems to be increasing its range in County Durham and may be seen in considerable numbers in several localities. I believe it is possible that the butterfly is currently more widespread in County Durham than is generally recognised. The small, somewhat dull-coloured butterfly frequently rests amongst the vegetation and a small colony is easily overlooked. Also, unless the possibility of the Small Skipper is borne in mind, it could be dismissed as a Large Skipper. The flight periods of these two Skippers overlap but characteristically the Large Skipper appears earlier and peaks from mid-June to mid-July whereas the Small Skipper peaks throughout July and early August. A review of my own records for the Large Skipper in North East England (105 records since 1977) reveals that 74.3% of the sightings were made during the period mid-June to mid-July with only 1.9% of the sightings in August. The earliest and latest records were for the 20 May and 5 August respectively.

There are relatively few records for the Small Skipper in the North East but all ten of mine since 1990 were made of sightings on or after 20 July and four were in August, the latest being 18 August.

One should always be careful to check the identity of any Skipper butterfly seen throughout the season but this is of particular importance during the latter half of July and in early August.

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1992: ANNUS MIRABILIS FUNGORUM

A.W. Legg, 36 Carleton Drive, Darlington, County Durham

Few naturalists can fail to have been aware that, as well as being a bumper year for butterflies, 1992 was one of the most remarkable years for fungal fruiting in living memory. Why this should have been so has been a matter for some speculation. The easy answer is that there was sufficient rainfall at the right times of year. William Foggitt of Thirsk recorded above-average rainfall locally in March, April, August and September the crucial months for spring and autumn fruiting (Northern Echo,

2.i.1993). Another, less obvious reason may be that inhibition of fruiting during the three successive dry years immediately preceding 1992 left a large reserve of unused nutrients for terrestrial fungi to enjoy as soon as the opportunity arose. Thus their bonanza may have been the cause of ours.

The rich harvest of fungi seems to have been a nationwide phenomenon but it was reflected in the North East in statistics from Darlington West Cemetery where the survey, reported in October 1992 (*Vasculum* 77(3)) was continued. Most records were broken. 73 previously unrecorded taxa were identified, only marginally fewer than in 1991 when the total was artificially boosted by recording of previously neglected groups. Also in 1992 278 different taxa were recorded, outstripping the previous year's record by 68 despite six fewer visits. In fact, this figure also outstrips the grand total of all records up to the end of 1988. 155 species of agarics were seen, more than the total for all years up to 1986. 31 new agaric taxa were recorded compared with only 12 in 1991. These new records included *Lactarius acerrimus*, a national rarity.

No fewer than 107 taxa were recorded for the year during four visits in the fortnight from 17 September to 1 October. To give some perspective, this figure would represent a very respectable list total for a day's foray by 20-odd people in a rich natural site in a more ordinary year. It exceeds, for example, the total for a British Mycological Society foray in Castle Eden Dene in October 1990.

It was perhaps fitting that the most exciting find of 1992 in the cemetery was made at the very end of the year when a tiny fungus, incubated on rabbit pellets, was tentatively identified at Kew as *Coprotus luteus*, described from North America but with no known published British record.

CRAYFISH PLAGUE IN NORTHUMBERLAND

S. Sutton, National Rivers Authority, Washington Laboratories, Barmston Lane, District 15, Washington, Tyne and Wear.

Crayfish belong to the same group (decapod Crustacea) as marine lobsters and crabs. They are the largest and most long-lived freshwater invertebrates found in the British Isles, living up to eleven or twelve years. Able to utilise a range of aquatic habitats, crayfish are found in ponds, lakes, streams and rivers, preferring moderately hard and well-oxygenated waters. Crayfish are omnivorous, and the diet can include aquatic plants, mosses, dead and dying invertebrates and fish: in captivity they need little persuasion to tackle almost anything including commercial fish foods, vegetables and even bacon sandwiches! In the natural ecosystem, crayfish are believed to be valuable in controlling aquatic plants and their loss could lead to increasing weeding of a river. Crayfish are abundant in certain parts of England and Ireland, relatively rare in Wales and naturally absent from Scotland. Northumbria boasts some of the most productive and, until recently, unthreatened native crayfish populations in England. There is one native British species, *Austropotamobius pallipes* (White-clawed Crayfish), but others have been introduced, such as *Astacus astacus* (Noble or Red-clawed Crayfish), *Pacifastacus leniusculus* (Pacific or Signal Crayfish) and *Astacus leptodactylus* (Slender-clawed Crayfish).

In the early 1980s mortalities of the native White-clawed Crayfish were reported from

the Bristol Avon and River Lee. The mortalities were believed to have occurred as a result of a fungal disease known as **crayfish plague** (caused by *Aphanomyces astaci*), which had been known on the continent and in Scandinavia since the late 19th Century. The disease acts quickly and deaths occur rapidly and as positive identification of crayfish plague requires dying (but not dead) individuals, problems of diagnosis can be encountered. The disease was confirmed in Britain in 1983. Healthy crayfish are almost exclusively nocturnal and one of the first signs of an outbreak is when animals are seen in daylight: they are typically lethargic and may have trembling limb movements. The next stage sees animals unable to support themselves, with little response when disturbed. The speed at which death occurs is believed to be temperature-dependent and in July the period between the first abnormal appearance in daylight and death may be as little as 24 hours. This disease only affects freshwater crayfish, and once introduced into a river system is capable of killing all native species (some introduced species exhibit resistance and may act as carriers). The upstream progression has been estimated as 0.5 Km a year, and downstream progression is very rapid: for example the entire population of the Hampshire Avon succumbed in less than a month.

In the early part of 1992 considerable mortalities of crayfish were observed in the River Blyth catchment: other aquatic fauna were found to be normal. An NRA survey of the river was undertaken, and recorded crayfish only in the head-waters they were known to have been more widespread in the past. It is, therefore, highly likely that the River Blyth and its tributaries have been affected by crayfish plague. This discovery prompted a press release and the issue of a briefing note to angling clubs and indeed our own sampling staff.

The following recommendations were made:

1. If more than one site on the Blyth or its tributaries is to be sampled or fished, work downstream.
2. Avoid visiting other catchments in the same day, or if possible ensure the Blyth is the last river visited. Alternatively, disinfect equipment.
3. Allow waders, nets etc. to dry out thoroughly after visiting the Blyth.

In addition to the Blyth, other river catchments in North-East England are known to support populations of crayfish (see accompanying list). The NRA is keen to monitor and record the distribution of crayfish and would be grateful for any information received, particularly relating to non-native species introduced into Northumbria. Over the coming year we intend to produce more detailed distribution information and to confirm or know otherwise the presence of crayfish plague.

Sightings of *Austropotamobius pallipes* (White-clawed Crayfish) by NRA biologists since 1990

Allerdean Burn: Nabhill 18.ix.1991

Shipley Beck: Shipley Wood 5.x.1990

Wansbeck: Bothal 23.x.1990, 8.viii.1991, 24.x.1991, 24.vii.1992; Morpeth CR 10.v.1992; Guaging WR 8.viii. 1991,10.v.1992,21 .vii.1992; Meldon Park 11 .vii.1990,18.x.1990, 22.iv.1991,8.viii.1991, 24.x.1991, 10.v.1992, 21 .vii.1992; Lower Angerton 10.v.i 990,23.x.1990,22.iv.1991, 8.viii.1991,24.x.1991,10.v.1992,21 .vii.1992;

Middleton M 10.v.1990, 17.vii.1990, 23.x.1990, 22.iv.1991, 8.viii.1991, 24.x.1991, 10.v.I 1992, 21.vii.1992.

Bothal Brocks Burn: Bothal 8.viii.1991.

Font: Mitford 17.vii.1990, 10.v.1992, 21.vii.1992.

Hart Burn: Hartburn 23.x.1990, 13.viii.1991, 30.x.1991, 10.v.1992, 2.vii.1992

Blyth: Bellasis 31.x.1991; Ogle Bridge 16.vii.1992, 27.x.1992.

Pont: Matfen 10.v.1990, 4.vii.1991, 5.xi.1991.

Coldcoats Burn: Near Eastcoats Farm 9.v.1990, 22.x.1990, 16.vii.1992.

Howburn: Howburn Bridge 17.vii.1990, 16.vii.1992, 27.x.1992.

North Tyne: Chollerford 7.viii.1990.

Whittle Burn: US Reservoir 2.viii.1990.

Unnamed stream: US Reservoir 4.iv.1991.

Erring Burn: Chollerford 26.vii.1990, 23.x.1990, 27.viii.1991.

Swinburn: Barrasford 26.iv.1990.

Tees: Barnard Castle 21.viii.1991.

Balder: Cotherstone 12.iii.1990, 26.ix.1990, 27.iii.1991, 9.vii.1991.

Addendum: In September 1992 following a trapping exercise on a pond near Lartington a single Signal Crayfish (*Pacifastacus leniusculus*) was recovered

RECORDS

COMMA BUTTERFLY SEEN AT CASTLE EDEN DENE

During a visit to Castle Eden Dene on 8 October 1992, at 3.45 p.m. I noticed a butterfly at the top of the old landslip opposite to that known as "Fall of Biafra". It soon settled on a leaf of a young beech near to the top North-East corner of the slip. My first impression was that it must be a Small Tortoiseshell (*Aglais urticae*) but then I noticed the more uniform, less brightly coloured upper wings which made me suspect that it was a comma (*Polygonia c-album*). As confirmation I noted the irregular edging to the wings and after a few minutes' wait it revealed the white "comma" marked on its left hind underwing.

David M. Jones

MACROLEPIDOPTERA OF GAINFORD, COUNTY DURHAM

Among the moths recorded at a Robinson-type mercury vapour light trap operated during 1992 in Gainford (near Barnard Castle) were the following notable species.

Pale Tussock (*Calliteara pudibunda*) 31.v (1).

Yellow Tail (*Euproctis similis*) 20 individuals recorded between 7-31.vii with a peak on 16.vii.

Common Footman (*Eilema lurideola*) 41 individuals recorded between 28.vi and 31.vii with a peak on 20.vii.

Muslin Footman (*Nudaria mundana*) 28.vi (1), 7.vii (2), 11.vii (1), 18.vii (1).

Short-cloaked (*Nola cucullatella*) 1.vii (1), 7.vii (1), 15.vii (2), 17.vii (2).

Pale Prominent (*Pterosoma palpina*) 22.vi (1), 8.vii (1).

Figure of Eighty (*Tethea ocellaris*) 21.vi (1), 28.vi (1).

Buff Arches (*Habrosyne pyritoides*) 16.vii (1).

Dark Sword-Grass (*Agrotis ipsilon*) An immigrant, recorded once on 27.ix.

The Flame (*Axylta putns*) 21.vi (1), 16.vii (2), 18.vii (1).

The Nutmeg (*Discestra trifolii*) singly on 23.viii and 25.viii.

Feathered Gothic (*Tholera decimalis*) singly on 10.ix.

The Delicate (*Mythimna vitellina*) A very rare immigrant in northern Britain, recorded once on 29.ix. This species has not previously been recorded from VC66, and it is interesting to note that a large influx of it in Cornwall in 1992 has been reported in the Bulletin of the Amateur Entomological Society.

The Sprawler (*Brachionycha sphinx*) once on 1.xi.

Black Rustic (*Aporophyla nigra*) 17.ix (1).

Early Grey (*Xylocampa areola*) 16.iii (3), 19.iii (1), 28.iv (1).

Lunar Underwing (*Omphaloscelis lunosa*) 16.ix(4), 17.ix(1), 18.ix(1).

Orange Sallow (*Xanthia citrago*) 24.viii (1).

Dusky-lemon Sallow (*Xanthia gilvago*) 10.ix (1), 29.ix (1).

Butterbur (*Hydraecia petasitis*) 27.ix (1).

Figure of Eight (*Diloba caeruleocephala*) 28 individuals recorded between 27.ix and 13.x.

The Phoenix (*Eulithis prunata*) Once on 16.vii.

Juniper Carpet (*Thera juniperata*) 1 .xi (2).

Dusky Thorn (*Emmomos fuscantaria*) 10.ix (2), 17.ix (1), 28.ix (1), 29.ix (2).

September Thorn (*Emmomos erosaria*) Once on 16.ix.

There are also several unusual records of common heathland species: True-lover's knot (*Lycophotia porphyrea*) once on 17.vii: Heath Rustic (*Xestia agathina*) 24.viii (1), 25.viii (1) and Narrow-winged Pug (*Eupithecia nanata*) 9.vii (1), 16.vii (1) and 18.vii (1). Since there is no heath or moorland within reasonable distance of the trap site it must be assumed that these species are residing in local heather gardens!

Robert Woods

MACROLEPIDOPTERA FROM SHILDON, COUNTY DURHAM

These species are new to the R.I.S. trap operated in my garden during 1992.

Common Footman (*Eilema lurideola*) 23.vii. (2 specimens)

Garden Tiger (*Arctia caja*) 12.vii. & 31.vii.

Least Yellow Underwing (*Noctua interjecta*) 31 .vii. (Last taken in County Durham in 1884 *teste* Dunn & Parrack).

The Nutmeg (*Dicestra trifolii*) 7.viii.

The Brick (*Agrochola circellaris*) 3. x.

Svensson's Copper Underwing (*Amphipyra berbera svenssoni*) 5.viii.

Blood-vein (*Timendra griseata*) 17.vi.

Mottled Grey (*Colostygia multistrigaria*) 10.iv.

The Streamer (*Anticlea derivata*) 14.v.

The Rivulet (*Perizoma affiniatum*) 28.v.

V-pug (*Chloroclystis v-ata*) 8.vii. (Confirmed by A. Riley)

Common White Wave (*Cabera pusaria*) 22.vi.

Oak-tree Pug (*Eupithecia dodoneata*) First taken 4.v. 1990. Further specimens taken on 30.iv.1992 and 25.v.1992 (confirmed by A. Riley). These are the only known records for County Durham (T.C. Dunn, pers. comm.).

D.Kipling

MORE BUTTERFLY RECORDS FROM 1992

Clouded Yellow (*Colias croceus*)

6.viii. Cocklawburn Dunes (NU035477) Two flying (Rev. J. Chadd).

14.viii. Elsdon Burn (NT875284) One flying (Rev. J. Chadd).

18.viii. The Bowes, Kielder Forest NY753843 (G. Simpson).

18.viii. Kielder Forest 525 m above sea level NT922135 (G. Simpson).

10.ix. Chartner Lough Moor, Harwood Forest NZ006959 (G. Simpson).

Holly Blue (*Celastrina argiolus*).

21 .viii. St Chad's Church, East Herrington, Sunderland (NZ363536) One male flying around snowberry and settling (*Rev. J. Chadd*).
Hummingbird Hawk Moth (*Macroglossum stellarum*)
23.viii. St Chad's Church, East Herrington, Sunderland (NZ363536) One feeding on *Buddleja*
(*Rev. J. Chadd*).

SOME RECORDS OF INSECTS AND FUNGI

Hylecoetus dermestoides

This species has been considered as an indicator of the presence of ancient woodland, although I find it in conifer stumps, especially Douglas Fir, and in sawlogs (large tree stumps) that have been left uncollected on roadsides. There are few forests in which this beetle cannot be found and it is increasing. There is one previous record from the North East (from Castle Eden Dene), and I have two new records: Close Wood, Wynyard NZ428282 in conifer stump 4.ii. 1986; Garden-house Plantation, Blanchland NY9549 in conifer stump 25.vi. 1986.

Melasis buprestoides There are no previous records of this species from Northumberland and Durham. I found a specimen in dead Common Alder at Black Moor Plantation, Wynyard NZ419286 on 21 .iv. 1987. Howard Mendel who coordinates the Click-beetle Recording Scheme has informed me that this is the most northerly British record.

Andricus quercuscalicis Knopper Gall

This insect is much more recognisable for its effect on acorns than by the appearance of the wasp itself.

I have two records: Darlington NZ280150 8.ix. 1990; Darlington A66 by-pass NZ324141 12.xi. 1992.

Clavariadelphus junceus

Hamsterley Forest NZ026031 on fallen Rowan leaves 3.xi. 1987.

Hamsterley Forest NZ029299 on fallen Rowan leaves 20.xi. 1987.

Rhizina undulata

Holburn Moss Plantation NU058362 under dead Sitka Spruce that had been killed by uncontrolled moor burning which spread from the moors to the south into the woods, 14.viii. 1990. Shilla Hill, Falstone Forest NY764905 on a fire site under Norway Spruce, 18.ix.1991.

Spathularia flavida

Harbottle Woods NT951024 under a narrow strip of mixed conifers between the west bank of Holystone Burn and a smallholding field, 9.vii. 1990.

G. Simpson

RECENT RECORDS OF FUNGI FROM VC66 : PART FOUR

A.W. Legg

(This is a continuation of the list in *The Vasculum* 77(4))

ASCOMYCOTINA (continued)

Hymenoscyphus vitigenus (de Not.) Dennis. On an acorn cup, Winston Riverside, 19.ix. 1989. New county record.

Hypoecyba pulvinata Fuckel. On rotting *Piptoporus betulinus*, Hamsterley Forest 15.x.1988. New county record.

Lasiobolus papillatus (Pers.) Sacc. Incubated on roe deer dung Hamsterley Forest 15.iv. 1989. Common on dung. New county record.

Mollisia cinerella Sacc. On rotting *Quercus* wood, Hamsterley Forest 15.iv. 1989. New county record.

Mollisia dituella (Fr.) Gillet. On dead stems of *Epilobium*, Hudeshope Valley, Middleton-in-Teesdale 10.vi. 1989. New county record.

Mollisia discolor v. *longispora* Le Gal. Erumpent from dead twigs of *Tilia*, Hardwick Hall, Sedgfield 29.vi.1988. New county record.

Mollisia fallax (Desm.) Gillet. On old half-buried pine-cone, Hudeshope Valley, Middleton-in-Teesdale 10.vi.1989. New county record.

Marchella elata Fr. Waste ground by Black Path, Darlington. Coll. W. Robinson 25.iv. 1989, confirmed by Royal Botanic Gardens Kew. New county record.

Nectria hedorae C. Booth. On dead ivy stems, Low Coniscliffe 25.iii.1984. Rare. New county record.

Nectria sinopica (Fr.) Fr. On lopped *Hedera* on *Quercus*, Gainford Spa Wood 8.ii. 1987. New county record.

Ophiobolus acuminatus (Sow.) Duby. Erumpent from dead *Cirsium* stems, Flatts Wood, Barnard Castle, 23.iv. 1989.

Orbilia luteorubella (Ny.) P. Karsten. On rotting wood, Rushyford Wood 10.x.1989. Del. Royal Botanic Gardens Kew. New county record.

Peziza succosella (Le Gal & Romagnesi) Moser. On ground under *Tilia*, Hardwick Hall, Sedgfield 29.vii. 1989. Det. Royal Botanic Gardens Kew. Rarely collected in Britain. New county record.

Piticaria leiocarpa (Currey) Boud. Old bonfire site, Hamsterley Forest 5.xi. 1989. Confirmed Royal Botanic Gardens Kew. Rarely collected. New county record.

Polydesmia pruïnosa (Berk & Br.) Boud. On old *Diatrypella* sp., Hamsterley Forest 15. iv. 1989. Common on such substrata. New county record.

Pyrenopeziza revincta (P. Karsten) Gremmen. On old umbellifer stem, Low Coniscliffe 21. .VI.1988. Very common on herbaceous stems.

Pyronema omphalodes (Bull.) Fuckel. Plentiful on old bonfire sites, Hamsterley Forest 11. .vii. 1989. New county record.

Rhizina undulata Fr. On old bonfire site, Hamsterley Forest 5.xi. 1989. Reported by G. Simpson, confirmed A.W.L.

Rustroemia (Lanzia) luteovirescens (Rob. ex. Desm.) White. On rotting *Acer* leaves in stream bed, Rushyford Wood 10.x.I 1989. New county record.

Sarea resinæ (Fr.) Kuntze. On exuded resin of *Picea abies*, Hamsterley Forest 15.iv. 1989. New county record.

Schizothecium vesticola (Berk. & Broome) Lundq. Incubated on rabbit dung, Witton-le-Wear Reserve 29.xii. 1988.

Sclerotinia tuberosa (Hedw.) Fuckel. On rhizomes of *Anemone* pushing through sawdust, Flatts Wood, Barnard Castle 25.iv. 1987. Confirmed Royal Botanic Gardens Kew. New county record.

Scutellinia subhirtella Svreck. On dead *Alnus* branch in a muddy pool, pasture opposite Cotherstone 6. ix. 1987. First recorded in Britain from Littlebeck near Whitby in September 1981. Probably not uncommon. New county record.

Sphaerotheca epilobii (Link) de Bary. Conidia on living leaves of *Epilobium* sp., Durham University Botanic Garden 17.vi. 1989. Probably common. New county record.

Sphaerotheca fugax Penzig & Sacc. Conidia and cleistothecia on living leaves of *Geranium*, Hardwick Hall, Sedgfield 27.vii. 1989. Probably fairly common. New county record.

Thecothous cinereus (Crouan) Chenant. Incubated on sheep dung, Snow Hall, Gainford 298.iv. 1989. New County Record.

Tricharina praecox. *praecox* (P. Karsten) Dennis. On old fire-site, Hamsterley Forest 15.iv. 1989. Det. Royal Botanic Gardens Kew. Uncommon. New County Record.

Tricharina praecox v. *intermedia* auct. On old fire-site, Flatts Wood, Barnard Castle 2.xi. 1986. Examined Royal Botanic Gardens Kew. "Recently recognised in U.S.A. and found to be quite common there". New British record.

Trichophaea hemisphaerioides (Mouton) Graddon. On old fire-sites, Hardwick Hall, Sedgfield 7.ii. 1987; Hamsterley Forest 5.xi. 1989. Not often recorded. New County Record.

Sawadaea (Uncinula) bicornis Wallr.: Fr Homma. Conidia on living leaves of *Acerpseudoplatanus*, Mowden, Darlington, 3.viii. 1989. Very common but apparently previously unrecorded in the county.

Viennotidea firmicola (Marchal) P. Cannon & D. Hawksw. Incubated on roe deer dung, Hamsterley Forest 15.iv. 1989.

NU FIELD MEETINGS

Pittington (VC66)

A party of about twenty members met at High Pittington, County Durham on 20 June 1992 on a hot sunny day, and was given a guided tour of the area by Julie Gaman.

Starting at the natural vegetation of the Permian escarpment, we saw fair numbers of the Northern Brown Argus (*Aricia artaxerxes*) together with Sam Ellis, who was working on his mark-recapture research. Moving to the east we explored the two disused quarries of Pittington and High Moorsley. The botanists were pleased to note the presence of five orchid species (a knot of botanists gathered at one stage to discuss whether or not a sixth species was present), and there was a good variety of butterflies on the wing to please the Lepidopterists.

The following species were noted by R. Boyce:

AVES

Emberiza citrinella

Yellowhammer

Phylloscopus trochilus

Willow Warbler

Alauda arvensis

Skylark

COLEOPTERA

Coccinella septempunctata

DIPTERA

Cheilosia albitarsis

Eristalis tenax

Volucella pellucens

HYMENOPTERA

Bombus lapidarius

Tenthredo arcuata

LEPIDOPTERA

Agrotis exclamationis

Heart & Dart

Aricia artaxerxes var

Northern Brown Argus

Camptogramma bilineata bilineata

Yellow Shell

Coenonympha pamphilus

Small Heath

Ermelina monodactyla

Lycæna phlaeas,

two individuals fighting

Maniola jurtina

Meadow Brown

Ochlodes venata

Odezia atrata

Chimney Sweep

Pteris brassicae

Pteris napi

Polyommatus icarus

Xanthorhoe montanata

MOLLUSCA

Candidula intersepta

Trichia hispida

VASCULAR PLANTS

Briza media

Chaerophyllum temulentum

Coeloglossum viride

Cynosurus cristatus
Dactylis glomerata
Dactylorhiza majalis ssp. *purpurella*
Dactylorhiza fuchsii
Elytrigia repens
Equisetum arvense
Galium cruciata
Galium mollugo
Galium verum
Geranium dissectum
Gymnadenia conopsea
Helianthemum nummularium
Heracleum sphondylium
Lathyrus pratensis
Leucanthemum vulgare
Unum catharticum
Listera ovata (small)
Orchis mascula
Pilosella officinarum
Plantago media
Polygala vulgaris
Potentilla reptans
Poterium sanguisorba
Sesleria caerulea
Thymuspraecox ssp. *arcticus*
Trifolium pratense
Veronica chamaedrys
Viburnum opulus

Chopwell Woods (VC66)

Perhaps because no meeting notices were sent out before this field meeting there was a disappointing turn-out, only three members attending.

The following species were noted by Dennis Hall

FUNGI

Coleosporium tussilaginis
Hygrophoropsis aurantiaca
Russula xerampelina
Ustulina deusta on exposed tree roots

BRYOPHYTES

Campylopus introflexus

VASCULAR PLANTS

Achillea ptarmica
Anthyllis vulneraria
Arctium minus
Blechnum spicant
Calluna vulgaris
Campanula rotundifolia
Carex flacca
Carex laevioata

Sneezewort
 Kidney Vetch
 Burdock
 Hard Fern
 Ling, Common Heather
 Harebell
 Glaucous Sedge
 Smooth-stalked Sedge

<i>Castanea sativa</i>	Sweet Chestnut, Spanish Chestnut
<i>Centaureum erythraea</i>	Common Centaury
<i>Cirsium palustre</i>	Marsh Thistle
<i>Cytisus scoparius</i>	Broom
<i>Deschampsia flexuosa</i>	Wavy Hair-grass
<i>Deschampsia cespitosa</i>	Tufted Hair-grass
<i>Epipactis helleborin</i> Q	Broad-leaved Helleborine
<i>Equisetum sylvaticum</i>	Wood Horsetail
<i>Euphrasia nemorosa</i>	
<i>Festuca gigantea</i>	Giant Fescue
<i>Filipendula ulmaria</i>	Meadowsweet
<i>Fragaria vesca</i>	Wild Strawberry
<i>Galeopsis tetrahit</i>	Common Hemp-nettle (agg.)
<i>Gallium palustre</i>	Marsh Bedstraw
<i>Geranium robertianum</i>	Herb Robert
<i>Holcus mollis</i>	Creeping Soft-grass
<i>Hypericum pulchrum</i>	Elegant St. John's Wort
<i>Hypochaeris radicata</i>	Common Catsear
<i>Juncus articulatus</i>	Jointed Rush
<i>Juncus conglomeratus</i>	Compact Rush
<i>Lapsana communis</i>	Nipplewort
<i>Lonicera periclymenum</i>	Honeysuckle
<i>Lucula sylvatica</i>	Great Woodrush
<i>Lysimachia vulgaris</i>	Yellow Loosestrife
<i>Lysimachia nemorum</i>	Yellow Pimpernel
<i>Melampyrum pratense</i>	Common Cow-wheat
<i>Rumexacetosella</i>	Sheep's Sorrel [agg.]
<i>Sanguisorba officinatis</i>	Great Burnet
<i>Solidago virgaurea</i>	Golden-rod
<i>Stachys officinalis</i>	Betony
<i>Stellaria graminea</i>	Lesser Stitchwort
<i>Teucrium scorodonia</i>	Wood Sage
<i>Torilis japonica</i>	Hedge Parsley
<i>Vaccinium myrtillus</i>	Bilberry, Whortleberry, Blaeberry
<i>Veronica officinalis</i>	Heath Speedwell, Common Speedwell
LEPIDOPTERA	
<i>Aglais urticae</i>	Small Tortoiseshell
<i>Caberapusaria</i>	Common White Wave
<i>Maniolajurtina</i>	Meadow Brown
<i>Pteris brassicae</i>	Large White
<i>Polyommatus icarus</i>	Common Blue
<i>Zygaena filipendulae anglicola</i>	Six-spot Burnet
MAMMALS	
<i>Sorexaraneus</i>	Common Shrew

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Edited by:

A. Coles and L. Jessop

Sunderland Museum and Art Gallery, Borough Road, Sunderland.

BY THE WAY

Secretaries of societies and other contributors to the *Vasculum* should send their notes to the Editors before 15 September 1993

THE IMPORTANCE OF RECORDING

L. Stephenson, 12 Gainsborough Road, Grindon Village, Sunderland SR4 8HU.

I was interested to read the article in *The Vasculum* of January 1993 (77(4)) by A.W. Legg about rarely-recorded or unrecorded groups of fungi. It took me back to the Spring of 1991 June in fact.

I had removed the spring bedding plants from a flower bed and was preparing the soil for the summer plants. After lightly forking over the soil surface, I raked it level and it was then that I noticed a small tuber-like structure among the stones I was removing. At first I thought it was an anemone tuber, but it was too soft. Maybe it was a pignut or earthnut, but there had been few weeds in the bed and I would have noticed such leaves among the groundsel and shepherd's purse. The object was about 1.5 cm across and resembled a potato. It was similar in texture and surface to a hardy cyclamen tuber, although neither of these have been grown in the vicinity. In rubbing the surface to clean off excess soil the surface broke revealing an interior reminiscent of the inside of a pomegranate, with a cell-like structure of yellow surrounding black rather than red, and it was shiny and sticky. I thought then that it was a truffle, as I remembered an illustration resembling it in the *Collins Guide to Mushrooms and Toadstools* by Morten Lange and F. Bayard Hora.

I searched the soil surface for others but found only the broken remains of a second 'truffle'

Thinking truffles were extremely rare, I contacted Dennis Hall. He helped me a lot in the identification of the fungus, but did not think it a true truffle but one of the more obscure species of similar but unrelated genera. The species in the *Collins Guide* that it most resembles is *Melanogaster variegatus* var *broomeianus*, especially in the illustration and description of the interior. However, as it is described as 'frequent' its novelty to me soon waned (even though it is apparently sold as a substitute for truffles).

I put the object away in a box and forgot about it until, at my next meeting with Dennis Hall he suggested I report it to *The Vasculum*. I did not, thinking that it would be unidentifiable in its dry state. According to A.W. Legg's article, Melanogastrales are apparently missing from VC66: if mine was one, then it was maybe the first.

This account shows how valuable records can be lost. In this case through my own carelessness and failure to keep proper records. How many other possible new records for VC66 have gone unrecorded through inexperienced people like myself failing to collect viable data and make and keep records of anything unusual?

My advice to anyone in a similar position is to record the object immediately, not tomorrow, but today when it's fresh in the mind. The N.N.U. is laden with specialists in many fields who will be pleased to help with identification. Everyone can contribute valid data to our records and I encourage everyone actively to do so.

THE VELVET ANT (*Mutilla europaea*)

Valerie Standen. Dept of Biological Sciences, University of Durham, Science Site,
South Road, Durham

The first specimens I have seen of this member of the family Mutillidae (Hymenoptera) were the four I found at Hedleyhope (NZ132404) last year. They were identified for me by Dr Jeremy Field of Cambridge University, who has just completed a survey of the aculeates of Durham and Northumberland, to be published shortly. Dr Field was able to provide me with three North-East records supported by specimens: from Hamsterley Forest (1990), Blanchland (1976) and Shotley Bridge (1926). There are five other records for which there are no specimens, but almost certainly correct as the insect is so characteristic: Calally Woods (1977), Muggleswick (1918), Blackhall Rocks (1915), Shull (1905) and South Shields (1870), recorded in *The Vasculum* or *Transactions of the Natural History Society of Northumbria*.

The velvet ant appears to have a scattered distribution and is never common. It is a handsome insect, although of course not an ant, about 1 cm long and with an orange-red thorax and a black abdomen with five silver bands. The female, which is illustrated in Chinery's *Collins' Field Guide*, is wingless. Part of the life history is passed as a parasite within the nests of bumble bees.

I am hoping to find out a bit more about the ecology and distribution of the Velvet Ant this summer, and would be pleased to hear of any other sightings. There is no need to collect the animal as it is unmistakable and obviously rare over all its range in Britain.

One final cautionary note it is reputed to have a particularly nasty sting!

A BILATERAL GYNANDROMORPH OF THE POPLAR HAWK MOTH (*Laothoe populi* Linn.)

H.A. Ellis, 16 Southlands, Tynemouth NE30 2QS.

Insects which have one male side and the other female are known as **bilateral gynandromorphs**. Bilateral gynandromorphs are most immediately obvious when there is marked sexual dimorphism, for example when there are marked wing colour or pattern differences in the sexes, as in the Orange Tip and Gatekeeper butterflies (Ford, 1957, Salmon, 1992) or in the case of certain moths in which the female is more or less wingless (Ford, 1955).

This note is to record the finding of a bilateral gynandromorph amongst a batch of reared Poplar Hawk Moth larvae. In the present instance the most striking feature drawing attention to the abnormality was the difference in size of the male and female wings and antennae.

In a breeding line established from an original mating between a male from a red-spotted larva found at Lytham St Annes on 20 July 1978 and a female from an unspotted larva found in North Shields, a bilateral gynandromorph emerged 4 May 1982.

The moth's larva was one of 73 reared from parents derived from red-spotted larvae and was itself conspicuously marked with subdorsal and paraspicular red spots. Apart from being a red-spotted variety of the Poplar Hawk Moth larva (which is a phenomenon well-recognised) it appeared normal externally and the red spots were bilaterally symmetrical.

The pupa appeared abnormal, with asymmetrical wings and antennal outlines. The ventral median scars of the genitalia comprised a depression towards the anterior of each of the 8th and 9th abdominal segments consistent with both male and female features. However, the presence of the depression on the 8th segment initially had led to the wrong conclusion that it was a female pupa!

The adult moth was obviously asymmetrical with male and female features on the right and left sides respectively. Although the general contour of the body was that of a male with the tail end somewhat upturned, there was some asymmetry with a more bulky rounded appearance on the left (female) side. Compared with the left side, on the right side the fore and hind wings were smaller and more darkly pigmented, and the antenna was longer and thicker. Measurements made on the set specimen were:

	Left	Right
mid-thorax to apex of fore wing	39.5	34.0
apex to tornus	20.0	17.0
length of antenna	8.5	10.5

Comparable measurements made on six normal specimens (3 males and 3 females) revealed a 5 mm difference in the lengths of male and female fore wings. Examination of the set specimen under the stereomicroscope revealed additional features such as composite male and female genitalia with prominent claspers bearing bristles on the right side. The segments of the flagellum of the right antenna

were larger than those on the left and unlike them bore prominent groups of sensory hairs. The Poplar Hawk Moth is our commonest native Hawk Moth, and gynandromorphs (although uncommon) are not rare in this species (South, 1939) and have been recognised for many years. Descriptions of such abnormal Moths may be found in the older literature, for example the Rev. Morris (1871) stated "four instances have occurred in which the wings on one side have been those of the male, and on the other those of the female, and the antennae likewise divided in the same way".

I do not believe that there is any direct connection in the present example between the bilateral gynandromorphy and the fact that the larva was of the red-spotted variety. I have reared dozens of such larvae and this is the only gynandromorph encountered amongst them.

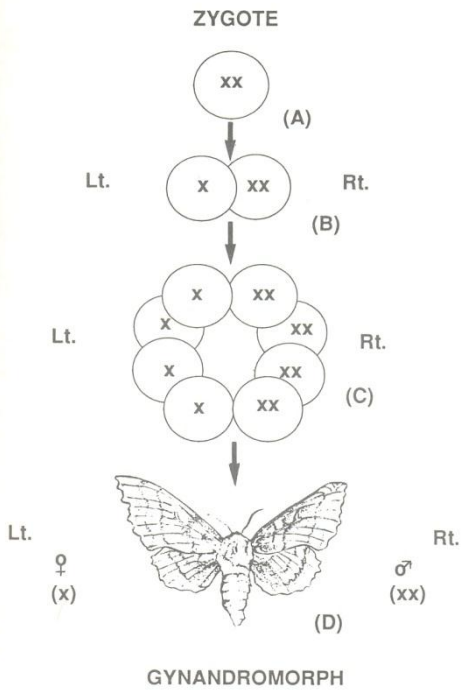
In insects the zygote derived from the fusion of the ovum and sperm divides into two cells, destined to form (by subsequent cell division, maturation and metamorphosis) the left and right halves of the adult. In Lepidoptera, as in birds, some fish and caddis flies, the male possesses two X chromosomes (XX) and the female one X chromosome (XY): this is the opposite of the human condition where males are XY and females XX. Bilateral gynandromorphy arises as a result of the loss of one X chromosome from one of the daughter cells at the time of the first cell division of the zygote of a male, one cell thus holding a single X chromosome and the other XX. That half of the body derived from the cell with one X chromosome will have female features and the other half male features (see figure).

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Figure Legend:

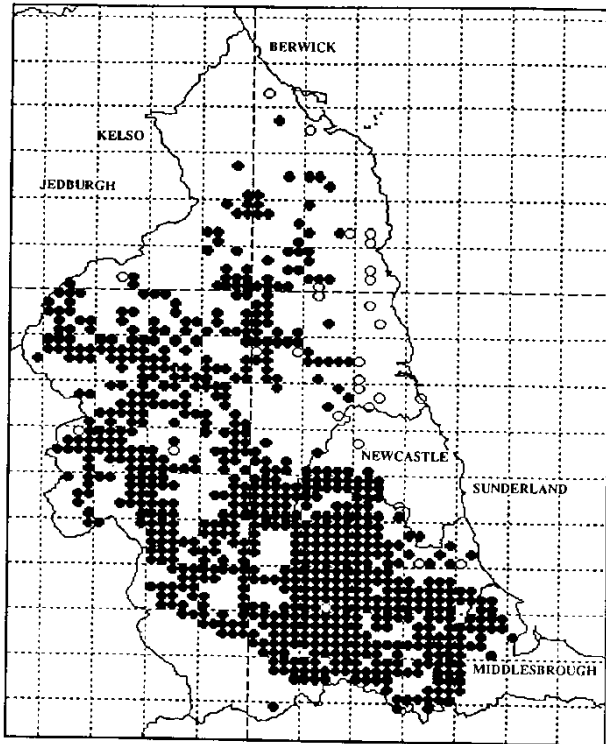
- A. Zygote (XX) destined to become a male moth
- B. Loss of X chromosome from one of the daughter cells during the first cell division.
- C. Further cell divisions followed by maturation and metamorphosis.
- D. Adult moth with male (XX) and female (X) features on the right and left sides, respectively



WILDLIFE RECORDING BY CAR

Gordon Simpson, 2 Coniston Avenue, West Auckland, Bishop Auckland, Co. Durham

The car and computer are becoming part of everyday life. The majority of the records shown on the attached map are mine, obtained over the last few years whilst travelling by car: I have recorded on a tetrad (2x2 km square) basis. The map has been produced at Sunderland Museum using a database built up on the RECORDER computer package. There are disadvantages to recording whilst in a moving car. Walls and hedges obliterate the views in many places and it is not possible, unless you have passengers, to record when driving along twisting roads or through towns and cities. It is difficult to distinguish between cowpats and molehills at times when travelling at speed, and care over driving must at all times take priority over recording. Nevertheless it is surprising what can be seen while looking straight ahead along roads or out of the corner of the eye. An Ordnance Survey map is essential, as are frequent stops on lay-bys to record details. Recording by car therefore produces an incomplete distribution picture, but other naturalists out walking in town or countryside may fill in missing tetrad records provided that the mole is present. It is possible to record moles over an extensive area without ever seeing one! This is fortunate, since dead moles are seldom seen, most being found in late summer. On the other hand, their underground activities produce molehills, which are highly visible. My records do not show the status of the mole in each tetrad, but I find it difficult to spot molehills in conurbations or intensively-farmed countryside. Moles occur in some of the most inhospitable environments such as high moorland and Purple Moor-grass (*Molinia caerulea*) habitats. I seldom record moles on Heather (*Calluna vulgaris*) moorland, most records being on moorland road verges where grasses predominate: possibly due to the soil being enriched by roadstone minerals and sheep droppings. On intensively-farmed land I suspect that multi-furrowed ploughs turning over a 1.5m-wide strip of land at each pass together with the use of large rotovators must kill most moles on such land. Moles also inhabit conifer forests, especially forest road verges that are influenced by road stone and soil disturbance. In woodland the mole produces far fewer molehills than in pasture, so signs are less evident. It appears that moles are most abundant in undisturbed pastures with thick soils. Moles tend to be more common in Weardale than Teesdale, probably because the soils are thin and lying over rock in the latter dale. Moles are seldom recorded in heather moorland, in dense conifer forests or on deep peat. The symbols on the map show mole records after 1970 as closed circles (black dots) and pre-1970 as open circles (rings).



Records of moles in north-east England.

WILLIAM HUTTON IN HARTLEPOOL

Stephen Robbins, Burn Valley Lodge, Elwick Road, Hartlepool, Cleveland.

William Hutton is remembered as an eminent North-East geologist and a collector of fossils that now form an important element in the Hancock Museum's geology collections. William Hutton is also commemorated in a display in the Gray Art Gallery & Museum that includes a recreation of his study. Born in 1797, Hutton was by profession an insurance agent. Between 1831 and 1837 he wrote, together with John Lindley, the *Fossil Flora of Great Britain*. He moved to Malta for health reasons in 1845, returning to Newcastle several years later and retiring to Hartlepool. He died in 1860.

Hutton may have come to Hartlepool to be with a relative, R.E. Hutton, who also worked for an insurance company. R.E. Hutton unfortunately died in 1857 after a short illness.

Although retired, Hutton did not lead a quiet life in Hartlepool. He continued to take an active interest in natural history, gave lectures and classes at the local Mechanics Institute and was prominent in the Institute's efforts to develop a museum in the town.

Mechanics Institutes

Hutton was involved with several societies during his life. In 1818 or 1819 he joined the Newcastle Literary and Philosophical Society. He was a founder member of the Natural History Society of Northumberland, Durham and Newcastle upon Tyne, and on moving to Hartlepool he joined the Literary and Mechanics Institute.

This latter body was involved in teaching (youth and adult groups), issuing its own certificates and those of the Royal Society of Arts. It had a lending library, organised lectures and in 1859 was arranging a museum.

In the Gray Museum & Art Gallery is a poster advertising a talk by Hutton at the West Hartlepool Literary and Mechanics Institute on 20 October 1853 on the subject of the Geology and Antiquities of the Island of Malta. This was the first of several such lectures, including 'Geology' (February 1854), 'Fossils found in the magnesium limestone' (April 1854), Coal, carburetted hydrogen gas and explosions in coal measures' (November 1855). At the last lecture it was said that there were few working men present, those attending consisted of the middle and upper grades of the society, including several clergymen and ladies.

Hutton also gave the inaugural address at the first Scientific and Literary Conversazione held at the Institute in 1855 the first of several such events. Hutton's talk on fossils and other geological specimens in the museum was followed by another speaker on the *Camera Obscura*.

The Museum at the Athenaeum

Besides being Honorary Secretary of the Mechanics Institute, Hutton was also on the Museum Committee. The idea for a museum had been first proposed in 1853, one of the first items presented to the founding collections being a collection of fossils from R.E. Hutton. Other fossils were accrued, from Lyme Regis and Whitby, and by May 1855 the museum had upwards of 3000 mineral specimens.

William Hutton arranged and classified the items in the collection, and in January 1858 the Committee noted its debt to him for work undertaken. Ralph Ward Jackson ("the founder of West Hartlepool") believed the museum to be 'a good and useful

feature in an educational institution'.

The Shipworm Problem

Shipworms (*Teredo navalis*) are bivalve molluscs that cause great damage to timbers, both in wooden ships and harbour works. The valves of the shell of the 'worm' are rocked and twisted to drill a burrow. Once ensconced in the burrow, the shipworm cannot leave it, so it is only in the early stages of growth that they are able to move freely about and thus infest new timber. They live for about two years.

In classical times galleys were all riddled with shipworm burrows, and it is only since the advent of the steel hull that this menace has receded. In the 19th century various methods were tried to combat shipworm, including sheathing timbers with iron and studding timber with broad-headed iron nails.

In December 1859 Albany Hancock reported that the shipworm had been found on the coast between Hardepool and Sunderland, and he believed that it was present in the docks at Hartlepool. Hutton contested Hancock's assertion through the local newspapers. He believed it was made 'to become a detriment to the port' of Hartlepool, which at that time was being considered along with several others for development as a harbour of refuge. Hutton noted that after many hundreds of observations, aided by others, he had not found the animal there. He directed and employed people on the survey and consulted with engineers and other people on the docks, but no trace of shipworm was found.

The original claim was based on a piece of timber bored by shipworm being found at Blackhall Rocks. Hutton stated that because of the tidal flows on the coast the wood could have come from the Tyne, the Wear, or off a passing ship.

A claim that the worm was present on Long Scar rocks also needed refuting. Hutton pointed out that shipworm can only live in timber, not in rock. Although boring animals were present on Long Scar rocks these were *Limnoria lignorum* (the Gribble), an isopod crustacean that occurs along the whole coast. In June 1860 Hutton confirmed that *L. lignorum* was present in the port of Hartlepool, but that these were 'a flea bite compared to the devastations of the *Teredo*'.

Gribbles are confined to the softer portions of timber, and leave thin shells of wood above the mouth of the burrows which are removed eventually by the tide. Gribbles do not burrow through knots, nor are they able to bore through iron. Hutton announced in October 1860 that he had invented and patented a process to stop the problem with *Limnoria*. A "sillex or water glass with muriate of lime" was used to harden the outside layer of timber. The compound was applied by placing the object to be treated "in a closed vessel and exhausted of all moisture and air", and then saturated or impregnated with calcium carbonate, calcium sulphate, iron sulphate or copperas followed by "an alkaline sillex of soda or potash".

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RECORDS

SEA MAMMAL SIGHTINGS AT WHITBURN

Sea mammals are probably more common off our coasts than most of us think. This list records the sea mammals seen from the bird observatory at Whitburn (Tyne & Wear) between September 1990 and December 1992.

Porpoise (*Phocaena phocaena*)

Two going south, 22.ix.1990 (A. Watts)

One going south, 26.xii.1990 (D. Armstrong)

One going north, 4.iv.1991 (J. Jenkins)

Three off Lizard Point, 17.vii.1991 (S. Unwin)

One off observatory, 20.vii.1991 (S. Unwin)

More than three off observatory, 23.x.1991 DM Foster & B. Unwin)

One mile offshore, 16.ii.1992 (S. Unwin)

?Porpoise

Two or three south of observatory swimming North 2 km out, 16.viii.1992 (Bill Urwin)

Bottle-nosed Dolphin (*Tursiops truncatus*)

One going South, 4.ix.1991 (T.I. Mills & S. Unwin)

One off observatory at 5 p.m., 26.iii.1992 (S. Unwin)

One dead on shore near Souter, 77" long, rope on tail, 8.vi.1992 (P. Collins)

Three surfacing off Byer's Hole, 14.vii.1992 (S. Unwin)

One swimming South off Byer's, 24.vii.1992 (B. Unwin)

One 150 yards off Byer's Hole, and later off Lizard Point, 10.viii.1992 (B. Unwin & P. Collins)

One dead at foot of cliffs north of lighthouse. 9' long, 13.viii.1992 (P. Collins)

One at Lizard Point, 15.viii.1992 (B. Unwin)

One moved in to 600 m. at Byer's, 16.viii.1992 (B. Unwin)

One north of observatory, 24.ix.1992 (B. Unwin)

Two 300 m. North of observatory, 25.ix.1992 (B. Unwin)

Indeterminate Dolphins

Three going north, 24.iii.1992 (a.m.) (D. B. Beveridge)

One going north, 24.iii.1992 (p.m.) (D. B. Beveridge)

One dead, 1 km offshore North of observatory with gulls feeding, 15.viii.1992 (Bill Urwin)

Indeterminate: Porpoises or Dolphins

Two in front of observatory 25.ix.1992 (D. Parnaby)

Grey Seal (*Halichoerus grypus*)

One pup on cliff top, moved to beach, 9.xii.1990 (B. Unwin)

Two offshore, 22.iv.1991 (D.R Beveridge)

Two close inshore off observatory, 2.1.1992 (B. Unwin)

Indeterminate Seal

One on rocks, 4.i.1991 (*T.I. Mills*)

LEPIDOPTERA AT ALLERWASH HALL IN 1992

There are four new records: Large Skipper (*Ochlodes venata*) (29.vi) at noon on catmint at the same moment as a Six-spot Burnet (*Zygaena filipendulae*). On 20.vi there was a Humming-bird Hawk Moth (*Macroglossum stellatarum*) also on the catmint. In the moth trap on 27.vi was a Four-dotted Footman (*Cybosia mesomella*) confirmed by T.C. Dunn. Described in Dunn & Parrack as "at best a very rare species in the area".

Two species turned up for only the second time in eighteen years. The Anomalous (*Stilbia anomala*) (21.viii) and Lunar Underwing (*Omphaloscelis lunosa*) (13.ix).

Other interesting records for 1992 include: Figure of Eighty (*Tethea ocellaris*). Six specimens between 8.vi. and 16.vii. Clearly becoming more common since Dunn & Parrack noted a single record at Close House in 1976.

Grass Emerald (*Pseudopternapruinata*) (27.vi). Now fully established here, having been taken in each of the last five years.

Elephant Hawk Moth (*Deilephila elpenoi*). Since 1985 this moth has been in decline but 1992 showed a remarkable resurgence. It appeared from 20.v -26.vii but in June there were four or five in the trap on several nights, peaking with eleven on 14.vi.

Dark Sword Grass (*Agrostis ipsilon*) had a good year being in the traps most nights between 7.ix and 9.x. It seems that the autumn specimens are generally smaller than those I have taken in April and May.

Pearly Underwing (*Peridroma saucia*) 'an erratic migrant' (25.ix.).

Setaceous Hebrew Character (*Xestia c-nigrum*) appeared 12.ix and remarkably there were twelve in the trap on 25.ix. This is in contrast with the comments in Dunn & Parrack about the lack of records after mid August.

Alder (*Acronicta alni*) with two specimens (1.vi and 8.vi) this species seems now to be fully established, one or two having been taken in each of the last four years.

Snout (*Hypena proboscidalis*). Captures on 26/27 and 28.ix following autumn records in the previous three years suggest that a small second brood has become established.

Rivulet (*Perizoma affinitatum*) (16.ix). My first autumn record of this common moth.

Away from Allerwash, on a visit to ICI at Billingham in July I was surprised to find a fresh Angle Shades (*Phlogophora meticulosa*) on the door of the control room in the middle of one of the region's largest industrial sites!

P.L. Tennant

A SECOND SPECIES OF SPINTURNICIDAE FROM NORTH EAST ENGLAND

In July 1990 I reported in *The Vasculum* (75: 11-12) the finding of *Spinturnix plecotinus*, a member of a family of highly-specialised mites that live on bats. Earlier this year I was given a mite that had been picked of a Daubenton's Bat (*Myotis daubentoni*) on 9 September 1990 by A.A. Wardhaugh. The mite turned out to be

Spinturnix myoti, a species that occurs on several members of the bat genus *Myotis*. The bat colony is at Croft on Tees (NZ2809), which is in North Yorkshire (VC65). There is, however, no reason why *S. myoti* should not turn up in VC66.

L Jessop

MOTHS AT MALTON NATURE RESERVE

The continuing programme of light-trapping has thrown up the following species of interest:

Oak Nycteoline (*Nycteola revayana*) (20.v. 1992). The second record from Malton.

Endotheria nigricostana (24.vi.1992). The first County Durham record since Sang took one at Dinsdale in 1860.

Elachista cerusella (20.ix.1992). The second record from Malton.

Small Yellow Underwing (*Panemeria tenebrata*) (22.V.1993).

Additionally, I have an unusually early butterfly record. I saw a Painted Lady (*Cynthia cardui*) at Salterns Gate, NZ069436, on 6 March 1993.

T. Coult

New and significant records of fungi from VC66 1990-1991
A.W. Legg 36 Carleton Drive, Darlington, County Durham DL3 9QP.

Important records of fungi from VC66 for the years 1987-1989 have been published at intervals in *The Vasculum* since April 1990. The following list supplements this series with similar such records for 1990 and 1991. Of the 175 fungi listed here, 163 are thought to be newly recorded for the county even though some of them are probably very common. Earlier records of some taxa have doubtless been made but either have been lost or remain untraced. The other 12 are of interest either because they have been recorded very rarely in VC66 or because records are in other respects significant. It should be assumed that *any listed fungus is considered newly-recorded* for the old County of Durham unless otherwise stated in the entry for that taxon. The author is always glad to receive authenticated earlier records of such taxa or to have his attention drawn to published records.

It is worth pointing out that the majority of the following records are from a handful of sites, mostly in the south of VC66. Indeed, 77 of them (44%) have been made within the immediate confines of the town of Darlington. Moreover, the present list excludes the names of a further 47 taxa thought to be new County records made in Darlington West Cemetery in 1990-91 and published in *The Vasculum* in 1992 (Legg, 1992). The author is at pains to point out that this is not because Darlington is considered particularly rich in fungi. Indeed its rather dry climate would argue the opposite case. Nor does the author wish to congratulate himself on his own industry and expertise in making these records; he is only too aware of his deficiencies, certainly in respect of the latter quality. The figures are given solely to underline the fact that so many VC66 fungi (probably far more than half) remain undiscovered and to reiterate the need for more recording to be done (see *Vasculum* 77:22).

Professional confirmations or determinations of some fungi in the list are coded as follows:

K - Royal Botanic Gardens, Kew

E - Royal Botanic Garden, Edinburgh

Four-figure National Grid references are also given for each record.

BASIDIOMYCOTINA: AGARICALES, BOLETALES, RUSSULALES

Boletus queletii Shultz. With *Quercus cerris*, Hummersknott, Darlington; NZ2614; 19.vii.1990.

Clitocybe houghtonii (Philips) Dennis. With *Salix*, Low Coniscliffe; NZ2313; 11.xi.1990.

Clitocybe lituus (Fr.) Metr. On conifer debris, Hamsterley Forest; NZ0527; 3.xi.1990.

Clitocybe metachroa (Fr.) Kummer. On *Larix* debris, Rosa Shafto Reserve; NZ2435; 27.x.1991.

Collybia cirrhata (Schum.) Kummer. Presumably from rotted agarics in *Sphagnum*, Hamsterley Forest; NZ0630; 6.x.1991. **K**.

Collybia erythropus (Pers.) Kummer. Forming a ring under *Acer*, Darlington College of Technology; NZ2814; 5.x.1990. Uncommon.

Conocybe coprophila (Kohner) Kuhner. Common on old cow dung, North Gare; NZ5328; 25.x.1990.

Conocybe cf dunensis T.J. Wallace apud P.D. Orton. Lawn of 36 Carleton Drive, Darlington; NZ2614; 23.vi.1991.

K.

Conocybe hadrocystis (van Waveren) Watling. In deciduous woodland undergrowth, Blackwell, Darlington; NZ2713; 23.x.1991. **E.**

Conocybe subpubescens P.D. Orton. Amongst deciduous debris, Rosa Shafto Reserve, NZ2435; 27.x.1991.

Coprinus cf. hemerobius M. Lange & A.H. Smith. Caespitose by old fire-site, Brinkburn Pond, Darlington; NZ2816; 24.x.1990. **K.**

Coprinus stercoreus Fr. Incubated on dung of roe-deer, Bowlees, Middleton-in-Teesdale; NY9028; 13.iv.1990.

Crepidotus cesatii (Rabenh.) Sacc. Gregarious on underside of shed deciduous bark, Winston; NZ1416; 6.iv.1991.

Crinipellis stipitaria (Fr.) Pat. Plentiful at bases of dead culms of *Ammophila arenaria*, North Gare dunes; NZ5328; 25.x.1990.

Entoloma clypeatum (Fr.) Kummer. With garden roses, Neasham Road, Darlington; NZ2913; 24.iv.1990.

Entoloma nidorosum (Fr.) Quel. Under *Corylus*, Cassop Vale; NZ3338; 7.ix.1991.

Hebeloma cf. anthracophilum R. Maire. Under *Betula*, Hamsterley Forest; NZ0630; 6.x.1991. **K.**

Hypoloma subericaceum (Fr.) Kuhn. In humus amongst decaying *Typha* debris, Brinkburn Pond, Darlington; NZ2816. **K.** There is one old record from Dryderdale.

Inocybe brunneoatra (Heim) P.D. Orton. In damp ravine, Castle Eden Dene; NZ4238; 7.ix.1991.

Inocybe cf. flavella (Karst.) Karst. With deciduous trees, Hardwick Hall Country Park, Sedgfield; NZ3429; 29.vii.1991. **K.**

Laccaria tortilis (Bolt.) S.F. Gray. Bare soil by *Taxus*, Cocken Wood, Finchale; NZ2947; 26.x.1990.

Lepiota alba (Bres.) Sacc. Plentiful in dune slacks and on golf links, North Gare; NZ5328; 25.x.1990.

Lepiota langei Knudsen. Under low vegetation in alder/willow carr, Blackwell, Darlington; NZ2713; **K.** Rare.

Lepista sordida (Fr.) Sing. Rosa Shafto Reserve, NZ2435; 27.x.1991. *Fide* A. Weir.

Marasmius epiphylloides Rea. On fallen leaves of *Hedera*, Castle Eden Dene; NZ4238; 6.x.1990.

Melanopus cf. caricicola (P.D. Orton) Guzman. On fragments of dead *Typha* stems, Brinkburn Pond, Darlington; NZ2816; 10.viii.1990. **K.**

Mycena adonis (Bull.) S.F. Gray. Under *Larix*, Rosa Shafto Reserve; NZ2435; 27.x.1991.

Mycena speirea (Fr.) Gill. On vegetation fragments, Hardwick Hall Country Park, Sedgfield; NZ3429; 29.viii.1991.

Naucoria cf. cephalascens T.J. Wallace apud P.D. Orton. Under *Salix*, Brinkburn Pond, Darlington; NZ2816; 10.vii.1990.

Pholiota lenta (Pers.) Sing. At the bases of *Salix* trunks, Brinkburn Pond, Darlington; NZ2816; 24.x.1990.

Pluteus hispidulus (Fr.) Gill. On wet ground amongst *Epilobium hirsutum* by *Alnus*, Winston; NZ1416; 19.vi.1990.

Pluteus leoninus (Schaeff.: Fr.) Kummer. On indet. dead wood, Castle Eden Dene; NZ3842; 6.x.1990.

Pluteus nanus (Pers.: Fr.) Kummer. On indet. stump, Holy Trinity churchyard, Darlington; NZ2814; 14.xi.1990.

Strobilurus stephanocystis (Hora) Sing. On indet. cone, Hamsterley Forest; NZ0530; 7.iv.1991.

Tephrocybe coracina (Fr.) Moser. On rich litter under *Salix*, Brinkburn Pond, Darlington; NZ2816; 24.x.1990.

BASIDIOMYCOTINA: APHYLLOPHORALES

- Botryobasidium aureum* Parm. *Alysidium* state on rotten *Fagus* wood, Hamsterley Forest; NZ0527;7.iv.1991.
Clavariadelphus junceus Fr. In quantity in deciduous litter in ditches etc. Rosa Shafto Reserve, NZ2435; 27.x.1991. Known also from Hamsterley Forest, *vide* G. Simpson.
Coniophora puteana (Shum. ex Fr.) P. Karst. On rotten wood, Rosa Shafto Reserve, NZ2435; 27.x.1991. *vide*. A. Weir.
Lenzites betulina (L. ex Fr.) Fr. On ground under *Betula* etc. Hamsterley Forest; NZ0931; 19.iv.1990. No modern records known.
Merismoides anomalus (Pers. ex Fr.) Sing. On fallen indet. twigs, Winston; NZ2614; 24.iii.1991.
Peniophora cinerea (Pers. ex Fr.) Cooke. On fallen *Salix* twig, Blackwell, Darlington; NZ2713; 18.V.1991. No modern records.
Typhula uncialis (Grev.) Berthier. On dead stems of *Heracleum*, Winston; NZ1416; 19.v.1990.
Typhula cl micans (Fr.) Berthier. On dead herbaceous stems, Brinkburn Pond, Darlington; NZ2816;4.v.1991.K.
Typhula setipes (Grev.) Berthier. On *Alnus* leaf debris, Blackwell, Darlington; NZ2713; 23.x.1991.
Tyromyces (Postia) subcaesia David. On dead branch of *Corytus*, Cassop Vale; NZ3338;7.ix.1991.

BASIDIOMYCOTINA: GASTEROMYCETES

- Cyathus striatus* (Huds.) Pers. On ground debris amongst *Hedera* etc., Blackwell, Darlington; NZ2813; 5.x.1991. Only one recent record.
Gastrum triplex Jungb. Amongst trees by Penshaw Monument (coll. A. Forth); NZ3354;6.x.1991.

BASIDIOMYCOTINA: UREDINALES

- Cumminsia mirabilissima* (Peck) NannF. On leaves of *Mahonia*, Cockerton Dene, Darlington; NZ2715; 25.vi.1990. Probably very common.
Kuehneola uredinis (Link.) Arth. II and III on *Rubus fruticosus*, Preston Park, Stockton; NZ4315;17.iv.1990.
Melampsora hypericorum Wint. I on *Hypericum* cultivars, Cleveland Avenue, Darlington;NZ2814; 15.vi.1990. Probably very common.
Puccinia porri (Sow.) Wint. II on leeks (*Allium porrum*) being retailed at Cockerton, Darlington;NZ2715; 2.xii.1989. No records since Winch but probably common.
P. striiformis West. II badly affecting wheat crop, Baydale, Darlington; NZ2514; 7.vi.1990.

ASCOMYCOTINA

- Anthracoibia* sp. Sides of dried-up side-channel of the Tees, Gainford. Spores much larger and fruit-bodies a richer more pinkish red than in any known species; NZ1616; 6.viii.1990. **K**.
Apiorthe veptris Hohn. In dead stems of *Rubus idaeus*, Brinkburn Pond, Darlington; NZ2816;4.v.1991.
Ascobolus crenulatus P. Karsten. Incubated on rabbit dung, Castle Eden Dene; NZ4238;2.iii.1991.
Ascozonus cf. subhirtus (Renny) Boud. Incubated on rabbit dung, Castle Eden Dene; NZ4238; 2.iii.1991.
Ascozonus woolhopensis (Renny) Boud. Incubated on rabbit dung, Castle Eden Dene; NZ4238;2.iii.1991.
Calospora platanoides (Pers.) Niessi ex. Sacc. In fallen *Acer* twigs, Bowlees; NY9028;13.iv.1990.
Calycellina sp. On indet. stick, Blackwell, Darlington; NZ2713; 5.x.1991. **K**.

Capronia sp. On dead stem of *Epilobium hirsutum*, Brinkburn Pond, Darlington; NZ2816;9.viii.1990. **K**.

Caudospora taleola (Fr.) Starb. In fallen twigs of *Quercus cerris* Carmel School Field, Darlington; NZ2614; 14.vi.1991.

Ciboria amentacea (Balb.) Fuckel. Arising from decayed catkins of *Alnus*, Blackwell, Darlington;NZ2713;5.iv.1991.

Coniochaeta scatigera (Berk. & Br.) Cain. Incubated on hare dung, North Gare; NZ5328;25.x.1990.

Coprotus albidus (Bond.) Kimbr. Incubated on rabbit dung, Castle Eden Dene; NZ4238;2.iii.1991.

Coprotus granuliformis (Crouan & H. Crouan) Kimbr. Collected on old roe deer dung, Bowlees;NY9028; 13.iv.1990.

Coprotus ochraceus (Crouan & H. Crouan) Larsen. Incubated on rabbit dung, Hamsterley Forest; NZ0629; 23.vi.1990.

Crocicreas coronatum (Bull.) S. Carp. On old indet. petiole, Rosa Shafto Reserve, Spennymoor;NZ2435; 27.x.1991. No records since Potter (1907).

Crocicreas dolosellum (P. Karsten) S. Carp. On old herbaceous stems, Hamsterley Forest;NZ0629; 23.vi.1990. Common.

Cryptodiaporthe hranicensis (Petra) Wehm. *Amphicytostroma* state in *Tilia* twigs, Hummersknott, Darlington; NZ2614; 23.v.1991.

Cryptodiaporthe salicella (Fr.) Petra. In dead *Salix* twig, Brinkburn Pond, Darlington; NZ2816;8.ix.1990.

Cryptodiaporthe saliona (Pers.) Wehm. In fallen *Salix* twig, Baydale, Darlington; NZ2514;8.viii.1990.

Cucurbitaria rubefasciens Petra. Erumpent through *Salix* bark, Blackwell, Darlington; NZ2713;18.v.1991.

Cudoniella junciseda (Velen.) Dennis. On dead *Juncus* stems, Brinkburn Pond, Darlington;NZ2816; 16.vii.1990.

Dasyyscyphus (Lachnum) clavigerus Svrcek. On dead *Epilobium* stems, Winston; NZ3016;19.vi.1990.

Dasyyscyphus controversus (Cooke) Rehm. On dead *Typha* culms, Brinkburn Pond, Darlington;NZ2816; 29.vii.1991.

Dasyyscyphus minutus (Rob. ex Desm.) Sacc. On dead *Juncus* stems, Brinkburn Pond, Darlington; NZ2816; 10.vii.1990.

Dasyyscyphus nudipes (Fuckel) Sacc. On dead stems of *Epilobium hirsutum*, Brinkburn Pond, Darlington; NZ2816; 16.vii.1990.

Dasyyscyphus cf rehmi (staritz) Sacc. On dead *Juncus* stems, Hamsterley Forest; NZ0629;23.vi.1990.

Delitschia furfuracea Niessi. ex Rehm. Incubated on hare dung, North Gare; NZ5328;25.x.1990.

Diaporthe arctii (Lasch) Nitschke. *Phomopsis* state with A and B conidia, on dead *Heracleum* stems. Low Coniscliffe; NZ2313; 28.vi.1990.

Diaporthe pardolata (Mont.) Nitschke ex Fuckel. In dead stems of *Rumex*, Winston; NZ1416;19.vi.1991.

Diaporthe pustulata (Desm.) Sacc. Fallen *Acer* twig, Castle Eden Dene; NZ4238; 2.iii.1991. **K**.

Erysiphe artemisiae Grev. Conidia on living *Artemisia vulgaris*. Crossgate Moor, Durham;NZ2542;27.vii.1991.

Erysiphe cruciferarum Opiz ex Junell. Conidia on living *Sisimbrium officinale*, Baydale,Darlington; NZ2514; 8.viii.1990.

Erysiphe lycopsidis Zheng & Cheng. Conidia and cleistothecia on *Symphyum*, Brinkburn Pond,Darlington; NZ2816;16.vii.1990

Erysiphe magnicellulata V. Braun. *Cleistothecia* on *Phlox*, garden of 36 Carleton Drive, Darlington; NZ2614; 8.ix.1990.

Erysiphe polygoni DC. Conidia on *Polygonum aviculare*, grounds of Darlington College of Technology; NZ2714; 3.ix.1991.

Erysiphe ulmariae Desm. Conidia on *Filipendula*, Hardwick Hall Country Park, Sedgfield; NZ3429; 3.vii.1991.

Eubelonia albosanguinea Hohn. indet. fallen twig, Castle Eden Dene; NZ4238; 7.ix.1991. **K.**

Fimaria cervaria (Phill. ex Stephenson) v. Brumm. On old roe-deer dung, Bowlees; NY9028; 13.iv.1990.

Glonopsis praelonga (Schw.) Zogg. On dead, decorticate *Rubus* stems, Winston; NZ1416; 6.iv.1991.

Gnomonia cerastis (Riess.) Ces. & de Not. On old *Acer* petiole, Low Coniscliffe; NZ2413; 28.vi.1990. **K.**

Helvetia queletii Bres. Under *Mercurialis* etc. in marginal fen woodland, Hardwick Hall, Sedgfield; NZ3429; 29.vii.1991. Rare in Britain. **K.**

Herpotrichia herpotrichioides (Fuckel) P. Cannon. In dead *Rubus* canes, Low Coniscliffe; NZ2413; 28.vi.1990.

Hymenoscyphus laetus (Boud.) Dennis. Below flaking bark of indet. twig, Blackwell, Darlington; NZ2713; 9.viii.1990.

Hymenoscyphus robustior (P. Karsten) Dennis. On dead stem of indet. grass, Brinkburn Pond, Darlington; NZ2816; 16.vii.1990.

Hymenoscyphus scutula v. *suspecta* (Nyl.) P. Karsten. On dead *Juncus*, Brinkburn Pond, Darlington; NZ2816; 16.vii.1990.

Hymenoscyphus vitellinus (Rehm) O. Kuntze. On dead roots of *Epilobium*, Brinkburn Pond, Darlington; NZ2816; 10.vii.1990.

Leptosphaeria centauryae E. Muller. In dead stems of *Centaurya nigra*, Baydale, Darlington; NZ2514; 5.vi.1991.

Leptosphaeria fuckelii Niessi ex Voss. In dead stems of *Phalaris arundinacea*, Gainford riverside, NZ1616; 6.viii.1990.

Leptosphaeria galiorum (Rob. ex Desm.) Ces. & de Not. In dead stems of *Galium aparine*, Winston; NZ1416; 19.v.1990.

Leptosphaeria nigrans (Rob. ex Desm.) Ces. & de Not. In dead stem of indet. grass, Brinkburn Pond, Darlington; NZ2816; 16.vii.1990.

Leptosphaeria ogliviensis (Berk. & Br.) Ces. & de Not. In dead stems of *Centaurya nigra*, Baydale, Darlington; NZ2514; 5.vi.1991.

Leptosphaeria cf pontica Retv. In dead stems of *Centaurya nigra*, Baydale, Darlington; NZ2514; 5.vi.1991. **K.** No other British record known.

Leptospora rubella (Pers.) Rabenh. In old *Heracleum* stems, Winston; NZ1416; 19.V.1990. Very common.

Lophiostoma fuckelii Sacc. In dead *Rubus* stems, Brinkburn Pond, Darlington; NZ2816; 4.v.1991.

Lophiostoma hysterooides (Schw.) Sacc. In dead *Rubus* stems, Brinkburn Pond, Darlington; NZ2816; 4.v.1991. **K.**

Lophiostoma vagabundum (Sacc.) Chesters & Bell. In dead stems of *Epilobium hirsutum*, Winston; NZ1416; 17.viii.1990.

Marcelleina rickii (Rehm.) Graddon. On damp soil, Winston; NZ1416; 15.ix.1991. **K.** Rarely collected in Britain.

Melampsora brevirostris (Fuckel) Hohnel. Incubated on hare dung, North Gare; NZ5328; 25.x.1990. **K.**

Microsphaera syringae (Schw.) Magn. Conidia on *Ligustrum*, Barnard Castle; NZ0416; 30.vii.1991.

Mollisia clavata Gremm. On dead *Rubus* stems, Winston; NZ1416; 19.v.1990. Common also on herbaceous stems.

Mollisia palustris (Rob. ex Desm.) P. Karsten. On dead *Phalaris* stems, Brinkburn Pond, Darlington; NZ2816; 9.viii.1990.

Mollisia sp. On *Typha* debris, Brinkburn Pond, Darlington; NZ2816; 9.viii.1990. **K.**

Niesslia exporioides (Desm.) Wint. On dead stems of *Epilobium hirsutum*, Brinkburn Pond, Darlington; NZ2816; 10.vii.1990. **K.**

Niptera melatephra (Lasch) Rehm. On dead *Juncus*, Hamsterley Forest; NZ0629; 23.vi.1990. **K.** Few attested British records.

Ophiobolus cirsii (P. Karsten) Sacc. In dead *Cirsium* stems, Hamsterley Forest; NZ0629; 23.vi.1990.

Orbitia sarraziniana Boud. On dead rotting *Salix* branch, Brinkburn Pond, Darlington; NZ2816; 10.vii.1990. **K.**

Peziza cf ampelma Quel. On old fire-site, Hamsterley Forest; NZ0630; 19.iv.1990. **K.**

Peziza depressa Pers. Muddy soil in deep shade, Castle Eden Dene; NZ4238; 7.ix.1991. **K.** Uncommon.

Peziza violacea Pers. On old fire site, Hamsterley Forest; NZ0630; 19.iv.1990. **K.** Said to be rare but recent records exist for VC65 (Richmond in 1991) and VC66 (Chopwell in 1971).

Pezizella alniella (Nyl.) Dennis. On old *Alnus* "cones", Winston; NZ1416; 17.viii.1990.

Pezizella chionea (Fr.) Dennis. On old pine-cone, Bowlees; NY9028; 13.iv.1990.

Pezizella discreta (P. Karsten) Dennis. On *Typha* debns, Brinkburn Pond, Darlington; NZ2816; 24.x.1991. **K.**

Pezizella vulgaris (Fr.) Sacc. Erumpent through epidermis of old *Rubus* stem, Brinkburn Pond, Darlington; NZ2816; 16.viii.1990.

Phaeohelotium cf subcarneum (Schum.) Dennis. On inner surface of loose bark of dead ?*Fagus*, Blackwell, Darlington; NZ2713; 5.iv.1991. **K.**

Phomatospora berkleyi Sacc. In dead stems of indet. grass, Blackwell, Darlington; NZ2713; 18.v.1991.

Pirottaea nigrostriata Graddon. On rotting cortex of old *Heracleum* stems, Broken Scar, Darlington; NZ2513; 26.v.1990. **K.** Described only in 1967 but apparently quite common.

Pleospora phaeocomoides (Sacc.) Winter. In dead *Arctium* stem, broken Scar, Darlington; NZ2513; 15.v.1991.

Pleospora shepherdii Peck. In dead *Crataegus* twig, Baydale, Darlington; NZ2615; 5.viii.1991.

Podospora decipiens (Wint. ex Fuckel) Niessi. Incubated on rabbit pellets, Gainford; NZ1816; 18.xi.1990.

Podospora pleiospora (Wint.) Niessi. Incubated on hare dung, North Gare dunes; NZ5328; 25.x.1990.

Pyrenopeziza adenostylidis (Rehm) Gremm. On dead *Cirsium* stems, Winston; NZ1416; 17.viii.1990.

Pyrenopeziza benesueda (Tul.) Gremm. Erumpent from dead *Alnus* twigs, Blackwell, Darlington; NZ2713; 16.vi.1991.

Pyrenopeziza escharoides (Berk. & Br.) Rehm. Erumpent from dead *Rubus* stems, Winston; NZ1416; 24.iii.1991. One recent record only.

Pyrenopeziza rubi (Fr.) Rehm. Erumpent from dead stems of *Rubus idaeus*, Brinkburn Pond, Darlington; NZ2816; 27.vi.1991.

Pyrenopeziza salicis (Felt.) NannF. Erumpent through bark of dead *Salix* twig, Brinkburn Pond, Darlington; NZ2816; 9.viii.1990.

Pyrenopeziza pulveracea (Fuckel) Gremm. On old *Filipendula* stem, Baydale, Darlington; NZ2615; 12.vii.1990.

Pyrenopeziza urticicola (Phill.) Boud. On old *Urtica* stems, Winston; NZ1416; 24.iii.1991.

Pyrenophora typhicola Mason & M.B. Ellis. *Phoma* state in dead *Typha* culm, Brinkburn Pond, Darlington; NZ2816; 16.vii.1990.

Pyronema domesticum (Sow.) Sacc. On old fire-site, Cotherstone; NZ0120; 7.x.1990.

Saccobolus caesariatus Renny ex Phill. incubated on rabbit dung, Hamsterley Forest; NZ0629; 23.vi.1990.

Saccobolus versicolor (P. Karsten) P. Karsten. Incubated on rabbit dung, Gainford; NZ1716; 18.ii.1990.

Schizothecium cf squamulosum (Crouan & H. Crouan) Lundq. Incubated on rabbit dung, Hamsterley Forest; NZ0629; 23.vi.1990. Material keyed to this species but other British records are thought to be misidentifications.

Sclerotinia sclerotiorum (Lib.) de Bary. On debris of *Petasites* under *Alnus*, Blackwell, Darlington; NZ2713; 18.v.1991.

Sordaria fimicola (Rob. ex Desm.) Ces. & de Not. Incubated on horse dung, North Gare Dunes; NZ5328; 25.x.1990.

Sporormiella australis (Speg.) Ahmed & Cain. Incubated on rabbit dung, Hamsterley Forest; NZ0629; 23.vi.1990.

Sporormiella bipartis (Cain) Ahmed & Cain. Incubated on rabbit dung, Hamsterley Forest; NZ0629; 23.vi.1990.

Sporormiella grandispora Ahmed & Cain ex Krug. Incubated on hare dung, Middleton-in-Teesdale; NY9426; 17.iii.1990

Sporormiella intermedia (Auersw.) Ahmed & Cain. On old rabbit dung, Gainford; NZ1816; 18.ii.1990.

Sporormiella lageniformis (Fuckel) Ahmed & Cain. Incubated on old rabbit dung, Gainford; NZ1816; 18.ii.1990.

Sporormiella minima (Auersw.) Ahmed & Cain. Incubated on dung of small rodent, Brinkburn Pond, Darlington; NZ2816; 22.viii.1990.

Sydowiella fenestrans (Duby) Petrak. In old *Epilobium* stems, Hamsterley Forest; NZ0931; 19.iv.1990.

Tapesia fusca (Pers.) Fuckel. On dead fallen *Alnus* branch, Bowlees; NY9028; 13.iv.1990. Fairly common but only one earlier record.

Tapesia rosae (Pers.) Fuckel. On bases of dead stems of *Rosa canina*, Winston; NZ1416; 19.vi.1991.

Trichophaea woolhopeia (Cooke & Phill.) Bond. On damp soil under *Betula*, Hardwick Hall, Sedgefield; NZ3429; 29.vii.1991 **K**.

Tuber borchii Vitt. In rich soil under *Salix*, Sheraton; NZ4435; 7.ix.1991. Coll. Mrs A. Whitwell. **K** *vide* . Weir.

DEUTEROMYCOTINA:HYPHALES

Arthrobotrys oligospora Fresen. Incubated on rabbit dung, Castle Eden Dene; NZ4238; 2.iii.1991.

Arthrobotrys superba Corda. Incubated on rabbit dung, Hamsterley Forest; NZ0629; 23.vi.1990

Botryotinia globosa Buchwald. On living leaves of *Allium ursinum*, Blackwell, Darlington; NZ2713; 18.v.1991. Very Common.

Botrytis cinerea Pers. On dying leaves of indet. weed, Carleton Drive, Darlington; NZ2614; 4.viii.1991. Very common but no records since Potter (1907).

Stachybotrys atra Corda. On dead *Heracleum* stems, Winston; NZ1316; 19.v.1990.

Trichoderma koningii Oudem. On bases of dead *Epilobium* stems, Brinkburn Pond, Darlington; NZ2816; 16.vii.1990. May be the "*T. viride*" described by Winch as "common"

Trichothecium roseum Link. On indet. fallen twig, Brinkburn Pond, Darlington; NZ2816; 10.vii.1990. No records since 1907.

DEUTEROMYCOTINA: COELOMYCETES

- Cytospora abietis* Sacc. Extruded from dead *Larix* twig, Winston; NZ1416; 21.vii.1991.
Cytospora oxyacanthae Rabenh. In dead *Crataegus* twig, Baydale, Darlington; NZ2615; 5.vii.1991.
Cytospora prunorum Sacc. & Syd. In dead *Prunus* twig, Baydale, Darlington; NZ2615; 5.vii.1991.
Lamproconium dezmaezeresii (Berk. & Br.) Grove. In dead fallen twig of *Tilia*, Hummersknott, Darlington; NZ2614; 23.v.1991.
Leptostroma spiraeinum Vestergr. In dead *filipendula* stem, Baydale, Darlington; NZ2615; 12.vii.1990.
Phoma herbarum Westend. In dead herbaceous stems, Low Coniscliffe; NZ2313; 28.vi.1990.
Phomopsis quericella (Sacc. & Roum.) Died. In fallen dead twig of *Quercus cerris*, Hummersknott, Darlington; NZ2614; 14.vi.1991.
Rhabdospora pleosporoides Sacc. In dead *Heracleum* stems, Gainford; NZ1416; 20.iv.1990.

ZYGOMYCOTINA

- Albugo candida* (Pers.) O. Kuntze. Infecting *Capsella bursa-pastoris*, grounds of Darlington College of Technology; NZ2714; 13.vi.1990. Last recorded by J.B. Nicholson in 1933.

Observations on the red-spotted form of the larva of the Poplar Hawk Moth, *Laothoe populi* Linn.

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INTRODUCTION

The ground colour of the larva of the Poplar Hawk Moth (*Laothoe populi* Linn.) is generally yellowish-green. The body is marked with tiny raised pale-yellow dots regularly arranged in rows on the segmental raised rings, of which there are eight on each abdominal segment but fewer on the thoracic ones. This imparts a rough texture to the larva. There are seven oblique yellow lateral lines, the hindmost of which is continued to the tail-horn. The head bears two yellow lines. The white spiracles are outlined in pink and there may be pink markings on the lateral aspects of the prolegs and on parts of the thoracic legs.

Less commonly the general ground colour is blue to blue-green. Occasionally larvae are encountered in the wild with a number of dark red spots on certain segments. Most of the standard texts refer briefly to these attractive red-spotted larvae, but there does not appear to be any published account of the precise segmental distribution of these markings. Furthermore it seems to be unknown whether the spotting is confined to one, or affects both sexes, is inherited or acquired, is related to the larval ground colour, (or is related to the particular food plant utilised by the larva. I have encountered several such red-spotted larvae in the wild and many years ago reared several batches to maturity and used the subsequent imagines for breeding in order to attempt to answer some of these questions.

The purpose of the present paper is to describe the anatomical distribution of the red markings in the larvae collected in the wild and those reared in captivity. Results of the breeding studies will be reported separately.

ABBREVIATIONS

Names for segments of the body are abbreviated using a combination of prefix (T = thoracic; A = abdominal) and suffix (1 = first segment; 2 = second segment, etc.).

MATERIALS AND METHODS

1 Larval ground colour and anatomical distribution of red markings

These were studied in five batches of larvae found in three different locations in the wild (28 larvae, Table 1) and in 179 spotted larvae reared in captivity. Overall, 475 larvae were examined and of these 207 were of the spotted variety. The reared spotted larvae were from two main sources:

- a) The F2 (1980:38 larvae) and F3 (1981:95 larvae) generations of an initial mating between a male reared from a spotted larva obtained in 1978 in the wild at Lytham St Annes and an unspotted female reared in captivity. This was from the F1 generation of local unspotted parents obtained initially in 1977 as ova deposited on Lombardy Poplar in the wild at North Shields.
- b) The F1 (1983: 46 larvae) generations of several matings between males and females reared from spotted larvae collected in the wild in Preston cemetery in 1982 (Table 1).

Since the appearance or full complement of red markings was sometimes delayed (*vide infra*), a final assessment of each larva was deferred whenever possible to the final instar.

Table 1 Location and food plants of 28 red-spotted larvae of *Laothoeopuli* found in the wild

Date	Location	Food plant	No. larvae
20.vii.1978	Lytham St Annes	White Poplar	3
15.viii.1982	Preston Cemetery North Shields	Lombardy Poplar	21
8.viii.1989	Holy Island, Northumberland	Willow	1
19.viii.1990	Preston Cemetery North Shields	Black Poplar	1
15.vii.1992	Preston Cemetery North Shields	Black Poplar	2

2. Sex of larvae, and larval foodplants

The sex of larvae was determined by examination of the subsequent pupae and/or adult moths. Selected batches of larvae were variously reared on poplar or willow leaves. Fresh food was provided daily.

RESULTS

Red markings were characteristically symmetrically disposed, varied in size and in depth of colour and of three main types:

Type 1. Subdorsal spots

These were arranged in a longitudinal line a few millimetres to each side of the dorsal line. They occurred on certain thoracic and abdominal segments, situated near the posterior margin of the segment. Each spot was more or less rounded to the naked eye (figure 1).

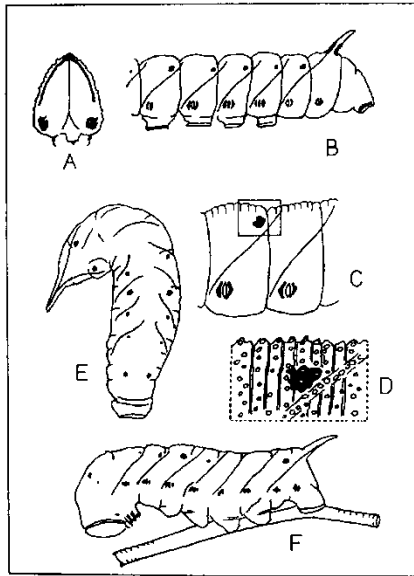


Figure 1. Types of red markings: **A** Frontal view of head with Type 3 markings around the ocelli, at the apex and laterally; **B** Abdomen with type 1 spots on A2-A7, type 2a spots on A3-A8 and type 3 markings on the base of the tail-horn and claspers; **C** Abdominal segments with type 1 and type 2a red spots; **D** Enlargement of C-inset; **E** and **F** Paired subdorsal spots on T2, A1-A4 and A7 plus paraspiracular spots on A1-A8.

Type 2. Inferior lateral spots

These were of two subtypes, both arranged at the level of the spiracular line.

Type 2a. Paraspiracular spots

Situated anterior and/or posterior to the abdominal segment spiracles and generally

crescentic in outline with the concavities directed towards the spiracle (figure 1) .

Type 2b. Infero-lateral spots

confined to segments T2 and T3, which do not possess spiracles. Each spot was more or less rounded and situated at the junction of the anterior and middle thirds of the segment.

Type 3. Miscellaneous red markings

These occurred on parts of the head capsule (at the apex and sides, and around the ocelli), the tail-horn, the thoracic legs and abdominal prolegs (figure 1).

Nature of the red spots

The subdorsal spots varied in size, up to several millimetres across, the smallest being clearly visible only with the aid of a hand lens. Although appearing round to the naked eye, on magnification it could be seen that the spots extended over an area covering from part of the width of one raised segmental fold to up to three such folds in the larger spots. The usual whitish-yellow tiny tubercles were surrounded by the red coloration but remained clearly visible. The periphery of the red spots was often irregular and indented where they abutted on the tiny whitish-yellow tubercles (figure 1 D).

The paraspiracular and infero-lateral spots were similar in appearance. The smaller paraspiracular spots tended to be irregular in outline whereas the larger and more heavily pigmented ones were crescentic. Paraspiracular spots were separate from the normal pink perispiracular markings.

The red pigment responsible for the various types of spots appeared to be located deep in the cuticle and was not recognisable in the exuvia following ecdysis.

Frequency and anatomical distribution of type 1 spots

Of the 207 spotted larvae studied, there were 166 (80.2%) with spots in the subdorsal position on one or more segment. In 11 of these there were no other segmental spots but in 155 there were accompanying paraspiracular markings (Table 2).

The numbers of larvae with a pair of red subdorsal spots on each of the thoracic and abdominal segments are shown in Figure 2 and Table 3. There is considerable variation in frequency from segment to segment with T2, A3 and A7 being the most favoured. Overall the order of diminishing frequency is:

A3 T2 A7 A4 A2 A1 A5 T1 T3 A6 A8

Only one larva was encountered with spots on A8, and in none of the larvae examined was a spot found on A9 or A 10.

Table 2 Frequency of spot positions in 207 *Laothoe populi* larvae.

Position of spots	No. of larvae	%
Subdorsal only	11	5.3
Subdorsal and paraspiracular	155	74.9
Total subdorsal	166	80.2
Paraspiracular only	36	17.4
Paraspiracular and Infero-lateral	5	2.4
Total paraspiracular	196	94.7

Table 3 Frequency of subdorsal spots on each thoracic and abdominal segment.
(207 larvae possessed spots of any kind; 166 larvae possessed subdorsal spots)

Segment	No. larvae	%	% of all spotted larvae
T1	42	25.3	20.3
T2	122	73.5	58.9
T3	19	11.4	9.2
A1	46	27.7	22.2
A2	52	31.3	25.1
A3	161	97.0	77.8
A4	93	56.0	44.9
A5	44	26.5	21.3
A6	16	9.6	7.7
A7	120	72.3	58.0
A8	1	0.6	0.5
A9	0	0	0
A10	0	0	0

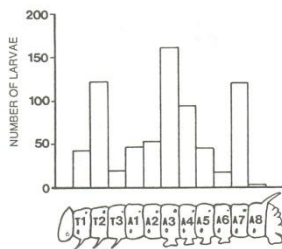


Figure 2.
Numbers of larvae with type 1 spots on each thoracic and abdominal segment

Segmental combinations of subdorsal spots

Certain combinations of subdorsal spots were more frequent than others (Table 4). In larvae with many subdorsal spots, those on T2, A3 and A7 were characteristically the largest and most heavily pigmented (Figs 1 and 2). Overall there were 34 different patterns of segmental involvement by subdorsal spots (Table 5). Thirteen (38.2%)

of the patterns comprised but one larva each, whereas the two commonest patterns (5.9%) accounted for 47 (28.4%) of the 166 larvae between them. The order, in descending frequency, for the six commonest patterns was:

T2, T3, A7 A3 T2, A3, A4, A7 T1, T2, T3, A1-A7 and A3, A7 T2, A3

Of the 166 larvae with subdorsal spots there were 11 different patterns in the 28 collected in the wild, and 30 different patterns in the 138 reared in captivity.

Table 4 Numbers of larvae with additional red subdorsal spots: segmental location and number of possible patterns. (Total number of different patterns, 34).

Segment	Number of additional segments affected									Number of patterns	
	0	1	2	3	4	5	6	7	8		9
T1(42)	0	0	0	1	7	5	5	7	6	11	14
T2(122)	2	10	29	15	16	9	14	8	8	11	27
T3(19)	0	0	0	0	0	0	1	1	6	11	5
A1(46)	1	0	0	0	0	5	13	8	8	11	14
A2(52)	0	0	0	0	4	8	13	8	8	11	16
A3(161)	23	22	35	15	16	9	14	8	8	11	30
A4(93)	1	2	11	14	16	8	14	8	8	11	25
A5(44)	0	0	1	0	6	1	10	7	8	11	12
A6(16)	0	0	0	0	0	0	0	1	4	11	4
A7(120)	0	12	29	15	15	9	14	7	8	11	24
A8(1)	0	0	0	0	0	0	0	1	0	0	1

Frequency and anatomical distribution of type 2a spots.

The majority (94.7%) of the 207 larvae examined had paraspiracular spots on one or more segments. About three-quarters of these had accompanying subdorsal spots and in but a few larvae the only accompanying marks were the type 2b spots on the T2 and T3 (Table 2).

Records for 25 larvae were incomplete with regard to the precise anatomical location of the paraspiracular spots. The following data relate to the remaining 182 larvae of which 169 had paraspiracular spots on one or more segments. The segmental distribution of anterior, posterior and combined anterior-posterior red markings is shown in Table 6 and the data for total anterior and posterior markings are summarised in Figure 3. Only one larva had a paraspiracular (anterior) spot on T1 and this was accompanied by anterior spots on A3 to A8 inclusive. An anterior spot unaccompanied by a posterior spot was of common occurrence (Table 6) on most of the abdominal segments with the exception of A8. In contrast, an isolated posterior spot was uncommon, never occurring on A3 to A6 and most frequently on A8 (Table 6). Most of the posterior spots occurred in association with an anterior one. The total number of larvae with anterior paraspiracular spots increased from A 1 through to A5 and then diminished through A6 to A8. In contrast, the totals for posterior paraspiracular spots remained more or less the same throughout all the abdominal segments (Figure 3).

Table 5 Segmental distribution and frequency of 34 different patterns of type 1 subdorsal spots in 166 larvae.

Pattern	Location of subdorsal spots	Larvae	
		No	Percent
SD1	T1 T2 A3 A7	1	0.6
SD2	T1 T2 A3 A4 A7	6	3.6
SD3	T1 T2 A2 A3 A4	1	0.6
SD4	T1 T2 A2 A3 A4 A7	3	1.8
SD5	T1 T2 A3 A4 A5 A7	1	0.6
SD6	T1 T2 A1 A2 A3 A7	1	0.6
SD7	T1 T2 A1 A3 A4 A5 A7	1	0.6
SD8	T1 T2 A1 A2 A3 A4 A7	3	1.8
SD9	T1 T2 A2 A3 A4 A5 A7	1	0.6
SD10	T1 T2 T3 A1 A2 A3 A4 A7	1	0.6
SD11	T1 T2 A1 A2 A3 A4 A5 A7	6	3.6
SD12	T1 T2 A1 A2 A3 A4 A5 A6 A7	2	1.2
SD13	T1 T2 T3 A1 A2 A3 A4 A5 A7	4	2.4
SD14	T1 T2 T3 A1 A2 A3 A4 A5 A6 A7	11	6.6
SD15	T2	2	1.2
SD16	T2 A3	9	5.4
SD17	T2 A7	1	0.6
SD18	T2 A3 A4	5	3.0
SD19	T2 A3 A7	24	14.5
SD20	T2 A3 A4 A7	14	8.4
SD21	T2 A3 A4 A5 A7	6	3.6
SD22	T2 A2 A3 A4 A7	3	1.8
SD23	T2 A1 A2 A3 A4 A7	4	2.4
SD24	T2 A1 A2 A3 A4 A5 A7	8	4.8
SD25	T2 T3 A1 A2 A3 A4 A7	1	0.6
SD26	T2 A1 A2 A3 A4 A5 A6 A8	1	0.6
SD27	T2 T3 A1 A2 A3 A4 A5 A6 A7	2	1.2
SD28	A1	1	0.6
SD29	A3	23	13.9
SD30	A3 A7	11	6.6
SD31	A3 A4	2	1.2
SD32	A3 A4 A7	5	3.0
SD33	A3 A4 A5	1	0.6
SD34	A4	1	0.6

Segmental combinations of paraspiracular spots

Overall there were 53 different combinations of paraspiracular spots depending on the segment(s) affected and the location of the spots (anterior or posterior) (Table 7). A combination of anterior and posterior spots on a segment was more frequent in larvae with paraspiracular spots on many segments (Tables 7 & 8). Larvae with the least number of segments affected frequently had anterior spots only (Table 7).

In the commonest pattern, found in 40 (21.9%) of the 182 larvae, there were anterior and posterior spots in relation to every abdominal spiracle on A 1 to A8. The second and third commonest patterns were: anterior paraspiracular spots only on A3 to A6 in 22 (12.1%), and anterior spots only on A2 to A6 in 19 (10.4%) larvae, respectively.

Table 6 Location of type 2a spots in relation to spiracles. (182 larvae analysed, of which 169 possessed type 2a spots).

Segment	No. larvae with type 2a spots			Total anterior	Total posterior
	Anterior only	Posterior only	Anterior and posterior		
T1	1 (0.5%)	0	0	1 (0.5%)	0
A1	10 (5.5%)	12 (6.6%)	55 (30.2%)	65 (35.7%)	67 (37.3%)
A2	39 (21.4%)	1 (0.5%)	73 (40.1%)	112 (61.5%)	74 (40.7%)
A3	79 (43.4%)	0	72 (39.6%)	151 (83.0%)	72 (39.6%)
A4	89 (48.9%)	0	73 (40.1%)	162 (89.0%)	73 (40.1%)
A5	95 (52.2%)	0	70 (38.5%)	165 (90.7%)	70 (38.5%)
A6	77 (42.3%)	0	72 (39.6%)	146 (80.2%)	72 (39.6%)
A7	12 (6.6%)	17 (9.3%)	62 (34.1%)	74 (40.7%)	79 (43.4%)
A8	1 (0.5%)	37 (20.3%)	44 (24.2%)	45 (24.7%)	81 (44.5%)

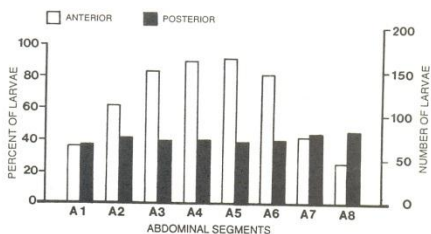


Figure 3.
Frequency of anterior and posterior type 2a spots on A1-A8

Table 7 Segmental distribution and frequency of 21 of the 53 different patterns of type 2a spots in 169 larvae.

(Note: each of the remaining 32 patterns was represented by one larva)

Segments with spiracles

Pattern	T1	A1	A2	A3	A4	A5	A6	A7	A8	No. larvae
PS1			a	a	a	a	a	a	a	1
PS5			a	a	a	a	a			19
PS6			a	a	a	a				2
PS9				a	a	a	a			22
PS10				a	a	a				6
PS13					a	a	a			7
PS14					a	a				5
PS15						a				3
PS17							a			2
PS20		a	a	a	a	a	a	a	p	2
PS23			a	a	a	a	a	p	p	2
PS27				a	a	a	a	p	p	3
PS28				a	a	a	a		p	2
PS29		ap	ap	ap	ap	ap	ap	ap	ap	40
PS30		ap	ap	ap	ap	ap	ap	ap		2
PS31		ap	ap	ap	ap	ap	ap	ap	p	7
PS32		a	ap	ap	ap	ap	ap	ap	p	2
PS36		p	ap	ap	ap	ap	ap	p	p	3
PS38		p	ap	ap	ap	ap	ap	ap	p	3
PS44		ap	ap	ap	ap	ap	ap	p	p	2
PS50			ap	ap	ap	ap	ap	ap	ap	2

Table 8 Relationship between the number of segments with paraspiracular spots and the presence of both anterior and posterior spots

Number of segments	Number of larvae	
	Total	With anterior and posterior spots on one or more segments
1-4	50	0
5	25	0
6	12	4 (33.3%)
7	18	12 (66.7%)
8	64	61 (95.3%)

Frequency and anatomical distribution of type 2b spots

The markings were confined to T2 and T3 and were situated on the level of the spiracular line. On each of the two segments the spot was towards the anterior of that segment. Thus in the case of T2 the spot was situated on the spiracular line and antero-superior to the lower end of the first of the seven yellow oblique lines.

A single infero-lateral segmental marking was noted on T2 in 86 larvae and on T3 in 3 larvae. In a further 11 larvae there were infero-lateral segmental markings on both T2 and T3 (Table 9).

Table 9 Incidence and segmental location of type 2b infero-lateral spots.

Segment affected	No. larvae	% of total larvae (207)
T2 only	86	41.6
T3 only	3	1.4
TY2 and T3	11	5.3
Total T2	97	46.9
Total T3	14	6.8
Combined Total	100	48.3

Association of infero-lateral spots on T2 and T3 with subdorsal markings

The infero-lateral spots on T2 and T3 were commonly accompanied by a subdorsal mark on the same segment. Thus, of the total of 97 larvae with an infero-lateral spot on T2 there were 82 (84.5%) with an associated subdorsal spot on that segment. Similarly, of the 14 larvae with infero-lateral spots on T3 there were 10 (71.4%) with a subdorsal spot on that segment. Of the 11 larvae with infero-lateral spots on T2 and T3 there were 10 (90.9%) with additional subdorsal spots on both segments. In addition there was frequently an association of the infero-lateral spots on T2 and T3 with subdorsal spots on other segments. In only 5 (5.2%) of the larvae with an infero-lateral spot on T2 there were no subdorsal spots on any of the thoracic or abdominal segments. In these larvae the only additional spots were to be found in the paraspiracular position in 4 (on A1-A7, A2-A6, A3-A5 and A4-A6, respectively) and in the infero-lateral position on T3 and the paraspiracular position (A1-A7) in the fifth larva. In the majority (94.8%) there were additional subdorsal spots on one or more segments (Table 10). In the case of the infero-lateral spot on T3 (14 larvae) there were characteristically one or more additional subdorsal spots, with a single exception (Table 11).

Associations between types 1,2a and 2b red markings

These were complex (Table 2). In those larvae with paraspiracular and subdorsal spots, characteristically it was the larvae that had the most subdorsal spots and infero-lateral spots that bore most paraspiracular spots. For example the 40 larvae with both anterior and posterior paraspiracular spots on all abdominal segments also had conspicuous subdorsal spots. In 38 there were four or more segments with subdorsal spots including all those larvae with a complete set of segmental markings.

Table 10. Second Thoracic Segment Type 2b Infero-lateral Spots. Number of Additional Subdorsal Spots and Patterns of Spots on the Thoracic and Abdominal Segments.

Number of additional subdorsal spots	Number of larvae (Percent)	Pattern of distribution and (number of larvae)
0	5(5.2%)	$T_2(4); T_3(1)$
1	7(7.2%)	$T_2^2A^3(6); T_2A^1(1)$
2	5(5.2%)	$T_2^2A^3(4); T_2A^3A^1(1)$
316	(16.5%)	$T_2^2A^3A^7(15); T_2A^3A^4A^7(1)$
4	12 (12.4%)	$T_2^2A^3A^4A^7(11); T^1T_2^2A^3A^7(1)$
5	10(10.3%)	$T^1T_2^2A^3A^7(4)$ $T_2^2A^2A^3A^4A^7(3)$ $T_2^2A^3A^4A^5A^7(3)$
6	5 (5.2%)	$T_2^2A^1A^2A^3A^4A^7(3)$ $T^1T_2^2A^2A^3A^4A^7(2)$
7	11 (11.3%)	$T_2^2A^1A^2A^3A^4A^5A^7(6)$ $T^1T_2^2A^1A^2A^3A^4A^7(3)$ $T_2^2T_3^3A^1A^2A^3A^4A^7(1)$ $T^1T_2^2A^1A^3A^4A^5A^7(1)$
8	10 (10.3%)	$T^1T_2^2T_3^3A^1A^2A^3A^4A^5A^7(5)$ $T^1T_2^2T_3^3A^1A^2A^3A^4A^7(3)$ $T^1T_2^2T_3^3A^1A^2A^3A^4A^7(1)$ $T_2^2A^1A^2A^3A^4A^5A^6A^8(1)$
9	5 (5.2%)	$T^1T_2^2A^1A^2A^3A^4A^5A^6A^7(2)$ $T^1T_2^2T_3^3A^1A^2A^3A^4A^5A^7(1)$ $T_2^2T_3^3A^1A^2A^3A^4A^5A^6A^7(1)$ $T_2^2T_3^3A^1A^2A^3A^4A^5A^6A^7(1)$
10	11 (11.3%)	$T_2^2T_3^3A^1A^2A^3A^4A^5A^6A^7(1)$ $T^1T_2^2T_3^3A^1A^2A^3A^4A^5A^6A^7(7)$ $T^1T_2^2T_3^3A^1A^2A^3A^4A^5A^6A^7(4)$

Symbols, for example, T_3 infero-lateral spot on the third thoracic segment; T_2^2 infero-lateral and subdorsal spots on the second thoracic segment.

Number of Additional SubDorsal markings Number of Larvae (Percent) Segmental

Table 11. Third Thoracic Segment Infero-lateral (Type 2b) Spots; Numbers of Larvae with Additional Subdorsal Spots and Segmental Distribution of Infero-lateral and Subdorsal Spots.

Number of Additional Subdorsal Markings	Number of Larvae (Percent)	Segmental Patterns
0	1 (7.1)	T ² T ³
1	2 (14.3)	T ³ A ² ; T ³ A ⁴
2	0	Nil
3	1 (7.1)	T ³ A ³ A ⁴ A ⁷
4-5	0	Nil
6	1 (7.1)	T ² ₂ T ³ ₃ A ¹ A ² A ³ A ⁴ A ⁷
7	0	Nil
8	2 (14.3)	T ² ₂ T ³ ₃ A ¹ A ² A ³ A ⁴ A ⁵ A ⁶ A ⁷ T1T ² ₂ T ³ ₃ A ¹ A ² A ³ A ⁴ A ⁵ A ⁷
9	7 (50.0)	T1T ² ₂ T ³ ₃ A ¹ A ² A ³ A ⁴ A ⁵ A ⁶ A ⁷

In contrast, the larvae without paraspiracular marks were amongst those with the fewest segments with subdorsal spots (generally on 1-3 segments) and in several of these the spots were faint. The two exceptions were: a larva with subdorsal spots on five segments (T1, T2, A3, A4, A7) although these were faint on T1 and T2, and the other had clear subdorsal spots on four segments (T2, A3, A4, A7).

Frequency and anatomical distribution of type 3 miscellaneous markings 79 of the 207 larvae were recorded as having some form of type 3 marking. These were most frequent on the head, especially around the ocelli, either alone or in combination with leg or tail-horn markings. The data are summarised in Table 12.

Table 12 Type 3 markings, anatomical location and numbers of larvae.

Location of markings	No. larvae	% of total with type 3 markings (79)	% of total larvae
Head, Legs, Tailhorn	18	22.8	8.7
Head, Legs,	18	22.8	8.7
Head	15	19.0	7.2
Tailhorn	12	15.2	5.8
Head, Tailhorn Legs,	9	11.4	4.3
Head, Legs, Tailhorn	7	8.8	3.4
Total Head	60	75.9	29.0
Total Legs,	43	54.4	20.8
Total Tailhorn	39	49.4	18.8

Intra-segmental variation in red spots

Although type 1, 2a and 2b spots were characteristically symmetrically disposed and of equal size and colour density on each of the affected segments, this was not invariably the case. For example, type 1 spots in 35 larvae appeared as relatively faint marks on 1-2 segments. The most commonly affected segment was T2, in 17 larvae (T2 only in 15, T1 and T2 in one and T2 and A4 in one), followed by T1 only in a further six larvae and T3, A1, A2, A3, A4, A6 and A7 in from 1-5 larvae each. These faint marks occurred in larvae irrespective of whether there were a few or many other spotted segments. In five larvae one or two subdorsal spots were unilateral. This phenomenon was confined to one segment in three larvae, in each of which there was a spot only on the left side of A4. In the fourth larva there was only a spot on the right of A7 and in the fifth there were left-sided spots on A3 and A4. In all five of these larvae the other subdorsal spots were arranged in the usual bilaterally symmetrical manner.

Ground colour of red spotted larvae

A record of the ground colour was made for 191 of the 207 spotted larvae. Each larva was assigned to one of five ground colours from predominantly yellow, through yellow-green, green, green-blue to predominantly blue. The ground colours merged across this spectrum and allocation of any individual larva to one or other category was somewhat subjective. However, overall there were more larvae with a ground colour towards the green-blue/blue (103: 53.9%) than there were towards the yellow-green/yellow (69:36.1%) end of the colour ranae (Table 13).

Table 13 Frequency of ground colour type in larvae with red spots (191) and in larvae with type 2a paraspiracular spots only (29)

Ground colour	All larvae	Type 2a spots
Yellow	26(13.6%)	3 (10.3%)
Yellow-green	43 (22.5%)	4 (13.8%)
Green	19(10.0%)	2 (6.9%)
Green-blue	42 (22.0%)	5 (17.3%)
Blue	61 (31.9%)	15(51.7%)
Total	191 (100.0%)	29 (100.0%)

Association between red spots and larval ground colour

No one type of red marking was specifically associated with any one particular ground colour. Although there were more spotted larvae with a ground colour towards the blue end of the spectrum, most of the larvae with types 1 and 2a spots on many segments had a yellow-green/yellow ground colour. Larvae bearing only type 2a spots were often coloured green-blue/blue. Thus of 29 larvae with only type 2a spots in which the ground colour was known the latter was green-blue/blue in 20 (69.0%) and yellow-green/yellow in 7 (24.1%) (Table 13).

The distribution of larvae with type 1 spots on nil to ten segments according to ground colour is shown in Table 14. Nine of the ten larvae with type 1 spots on the maximum number (10) of segments were in the yellow/yellow-green category.

With regard to type 2b spots on T2 and T3 there were too few larvae to allow any

meaningful assessment for T3. But the ground colour was recorded in 94 larvae with a type 2b spot on T2 and these were more or less distributed equally towards each end of the colour range: yellow/yellow-green 42 (44.7%) and green-blue/blue 46 (48.9%), the remainder being green.

The ground colour was recorded in 78 of the 79 larvae with type 3 markings. Isolated head, leg or tail-horn markings or various combinations of these, were found in all of the colour categories. However there were differences, for example blue larvae were found with head or tail markings only and larvae with red markings on head, legs and tail-horn were frequently of a yellow/yellow-green ground colour (Table 15). More than half the larvae with type 3 markings were in the yellow/yellow-green range, 53.8%, compared with 11.5% for green and 34.6% for green-blue/blue.

Table 14 Numbers of larvae with type 1 spots on from 0-10 segments, in relation to ground colour, (percentages in parentheses).

No. segments	Larval ground colour				
	Yellow	yellow-green	green	blue-green	blue
0	3 (11.5)	4 (9.3)	2 (10.5)	6 (14.3)	18 (29.5)
1	4 (15.4)	3 (7.0)	2 (10.5)	5 (11.9)	11 (18.0)
2	1 (3.8)	6 (14.0)	3 (15.8)	8 (19.0)	2 (3.3)
3	5 (19.2)	7 (16.3)	3 (15.8)	7 (16.7)	11 (18.0)
4	1 (3.8)	0 (0)	1 (5.3)	2 (4.8)	11 (18.0)
5	6 (23.1)	2 (4.7)	2 (10.5)	4 (9.5)	2 (3.3)
6	0 (0)	6 (14.0)	0 (0)	2 (4.8)	1 (1.6)
7	1 (3.8)	2 (4.7)	4 (21.1)	3 (7.1)	4 (6.6)
8	1 (3.8)	3 (7.0)	1 (5.3)	3 (7.1)	0 (0)
9	3 (11.5)	2 (4.7)	1 (5.3)	2 (4.8)	0 (0)
10	1 (3.8)	8 (18.6)	0 (0)	0 (0)	1 (1.6)
Total	26 (100)	43 (100)	19 (100)	42 (100)	61 (100)

Table 15 Distribution of type 3 red markings in 78 larvae in relation to the larval ground colour.

Location of type3 markings	Larval ground colour				
	yellow	yellow-green	green	blue-green	blue
Head	3 (18.8)	0(0)	2(22.2)	4(26.7)	6(50.)
Legs	7(43.7)	0(0)	0(0)	0(0)	0(0)
Tail-horn	3(18.8)	1(3.8)	1(11.1)	1(6.7)	6(50.0)
Head + Legs	3(18.8)	6(23.1)	5(55.6)	4(26.7)	0(0)
Head + Tailhorn	0(0)	4(15.4)	1(11.1)	4(26.7)	0(0)
Head + Legs + Tailhorn	0(0)	15(57.7)	0(0)	2(13.3)	0(0)
Totals	16(100)	26(100)	9(100)	15(100)	12(100)

Sex of larvae

The sex was determined in 63 larvae followed to pupation and/or emergence. Of

these 42 were female, 20 male and one was a bilateral gynandromorph (Ellis, 1993).

Association between sex and larval ground colour

The ground colour appears to be unrelated to the sex of the larva. 65.0% of male and 54.8% of female larvae were in the yellow/yellow-green range and 35.0% of male and 45.2% of female in the green-blue/blue range. The ground colour of the gynandromorph was blue.

Association between sex and red markings

There was no special association of the type, number or pattern of red markings with one particular sex. There was a variety of patterns of types 1, 2a and 2b markings in both sexes. Types 1 and 2b only will be mentioned further here. The three segments (T2, T3 and A7) most often bearing type 1 spots were shared more or less equally between the sexes:

T2	55.0%	50.0%
A3	15.0%	14.3%
A7	60.0%	42.9%

Also, there were males and females with the maximum number (10) of segments bearing subdorsal spots or with no spots at all.

The type 2b spots occurred with similar frequencies in males and females. Thus 14 (70.0%) of males and 28 (66.7%) of females had T2 and/or T3 type 2b spots, and type 2b spots on T2 occurred either alone or in combination with a spot on T3 in 65.0% and 64.3% of males and females, respectively.

Types of larval foodplants

The batches of spotted larvae found in the wild were already feeding on the leaves of different trees, namely White Poplar, Black Poplar and Willow. In captivity rearing larvae from the time of their hatching to maturity on Black Poplar or Willow did not affect the outcome. Red markings occurred in larvae fed on carefully selected poplar leaves apparently free from rust mould.

DISCUSSION

Previous accounts

Standard works this century refer briefly to the red-spotted form of the Poplar Hawk Moth larva but none gives any detail. Heath and Emmett (1979) mention that there is "sometimes a series of red subdorsal spots", Carter and Hargreaves (1986) that there is "sometimes a row of reddish blotches above the line of the spiracles" and Newman (1965) that "occasionally individuals are found with a row of light crimson spots along each side of the body". The presence of both subdorsal and paraspiracular spots together with markings on the head capsule, legs and tailhorn, as described here, are not mentioned by these authors.

Stokoe (1958) likewise states that "there is a reddish-spotted form which is not very uncommon" and includes an illustration from a water colour by J.C. Dollman. The quality of the reproduction in my copy of the work is poor but subdorsal and paraspiracular spots are just discernible on the thoracic and abdominal segments.

A search of the earlier literature has revealed two references to the red-spotted Poplar Hawk Moth larva, one made over 200 years ago. This is a coloured copper engraving by Christian Sepp (1762) in *De Nederlandshe Insecten*. Sepp's illustration of the stages in the life cycle of the Poplar Hawk Moth is superb and includes a mature larva with subdorsal red spots on ten segments from the first thoracic to the seventh abdominal inclusive, and anterior plus posterior paraspiracular spots in relation to each spiracle. In addition there is an infero-lateral spot on T2 and red markings on the head capsule at the apex and around the ocelli and at the base of the tail-horn, as described in the present paper. Also of interest is the depletion of the subdorsal spots as being variable in size with the largest spots on T3.

The other reference is more recent but still almost a century old. In it Barrett (1895) stated "sometimes a crimson spot lies before or on each side of the spiracles, and even the subdorsal region is enlivened by a row of larger crimson spots. This variety is frequent in the north. Mr Adam Elliott has repeatedly noticed it in Roxburghshire". Clearly the red-spotted form of the Poplar Hawk Moth larva has been known for many years and from the older accounts and illustrations it appears that the types of markings have remained similar to the present time. There are no data available on the geographical distribution of the red-spotted larva, so I cannot confirm or refute Barren's contention that it is more frequent in the north.

The present account is concerned with the Poplar Hawk Moth, but it should be noted that the larva of the Eyed hawk Moth (*Smerinthus ocellatus*) may be ornamented with similar red spots (Barrett, 1895; Stokoe and Stovin, 1958; Newman, 1965; Heath and Emmett, 1979). Barrett states that "Mr Buckler has figured a beautiful variety of the larva having a subdorsal row of red spots on each side" and the illustration shows subdorsal and paraspiracular spots. The Eyed Hawk Moth occurs sparingly here in the North East (Dunn and Parrack, 1986) and I have no personal experience of the red-spotted form of its larva.

The present study

The present study has shown that both male and female larvae, whether found in the wild or reared in captivity, may be of the red-spotted variety.

Delayed onset of spotting The wild larvae were mostly in their late instars nearing maturity and were spotted when found. Rearing larvae in captivity from ova revealed that larvae in their early instars were unspotted and sometimes the appearance of the spots was delayed until the fourth instar. Also, sometimes the full complement of spots did not appear simultaneously and after a moult faint spots might be apparent on some segments and these became larger and more distinct after a subsequent ecdysis. This is illustrated by reference to a specific example in which a faint red subdorsal spot developed on one side of A3 after the third moult. Following the fourth moult there were well-marked paired and bilaterally symmetrical subdorsal spots on A3, another on the right side of A7 and paraspiracular spots had appeared on A3-A6 and A8. For this reason it is essential that any assessment of the type and distribution of the red spots is deferred until the larvae are more or less mature.

Anatomical types and segmental distribution of spots. This report is concerned mainly with the segmental distribution of the type 1, 2a and 2b red spots. The miscellaneous (type 3) markings have not been studied in any detail but the most conspicuous pigmentation in this category affected the head capsule (at the apex,

laterally and around the ocelli and mouth parts), the thoracic legs and the abdominal and anal prolegs and the base of the tail-horn. They were characteristically associated with the extensive type 1 and type 2 markings and were a purplish red colour. Type 3 markings are readily distinguishable from the rings of pale pink coloration that sometimes affect the thoracic legs and abdominal prolegs of normal larvae.

I have found that there are many different patterns of subdorsal and paraspiracular red spotting. In larvae found in the wild and in those reared in captivity some segments were more frequently affected than others. Subdorsal spots were particularly common in T2, A3, A4 and A7. These segmental differences are statistically significant. Using the Chi-squared test, there are significantly more larvae with a pair of subdorsal spots on each of the T2, A3 and A7 (P) and A4 (P) and significantly fewer larvae than expected with spots on T3 (P), A6 (P) and A8 (P). It is not clear why A8 should be rarely affected and A9 and A10 uniformly unaffected by subdorsal spots. A9 and A10 differ from other segments in other respects and appear to be more or less fused and wedge-shaped with A10 merging into the anal claspers and forming fleshy epiprocts. Even when these two segments are omitted from the calculations the observed numbers of larvae with subdorsal spots on T2, A3 and A7 are still significantly in excess of the expected numbers (P) and there are significantly fewer than expected with spots on T3 (P) and A6 (P).

There were 34 different patterns of subdorsal spots. This is fewer than would be expected if one or more segments were spotted randomly, for there are $2^{13}-1$ (8,191) possible patterns for 13 segments and $2^{11}-1$ (2,047) patterns for 11 segments, excluding A9 and A10. Although 13 of the 34 patterns included only a single larva there was a clear dominance of certain patterns and three of the patterns (19, 20 and 29 in Table 5) together included 36.7% (61 of 166) of larvae with subdorsal spots.

There were 53 different patterns of paraspiracular spots. Since spiracles are present on nine segments and there are four possible arrangements on any segment (absent, anterior, posterior or anterior plus posterior) then theoretically there are $49-1$ (262,143) possible patterns. Although 33 of the 53 paraspiracular patterns included only one larva there was a clear dominance of certain patterns and three of the patterns (5, 9 and 29 in Table 7) together included 47.9% (81 of 169) of larvae.

Additionally the size and density of pigmentation of the spots was related to the particular segment affected and this was especially noticeable in the case of the subdorsal spots, which were characteristically most prominent on T2, A3 and A7.

Possible mechanisms

All of these observations seem to exclude the possibility that the spots are randomly distributed and highly suggest that there is an intrinsic factor or factors that predetermine their location, size and degree of pigmentation.

The fact that occasional subdorsal spots were asymmetrical or faintly pigmented and even sometimes appeared as mere "blemishes", raises the possibility that there is at least a two-stage mechanism responsible for the development of the spots in any predetermined location. The first would be necessary for the preparation of local conditions suitable for subsequent pigmentation and the second for the pigmentation process itself. Either, or both of these two stages could be single- or multi-phasic.

The underlying cause remains undetermined but it seems possible that the red markings are determined by a genetic mechanism, since environmental factors such

as the type of foodplant or the presence of pigmented rust moulds cannot be solely responsible. I have found spotted larvae in the wild on various types of poplar and willow and in captivity amongst batches of larvae reared on each of these foodplants. Although the foodplant is evidently not the sole cause of pigmentation, presumably it is the source of the chemical substances or their precursors that are necessary for its formation.

In the wild red-spotted larvae may be found in the same neighbourhood, or even on the same branch of a tree, as unspotted larvae. In Preston Cemetery, North Shields, I have encountered spotted larvae on various poplar trees over an eleven-year period and it seems highly unlikely that these spotted larvae have arisen as a result of recurrent mutation. The precise mode of inheritance is still under investigation but preliminary studies indicate that the occurrence of the red-spotted form of the Poplar Hawk Moth larva is not the result of a simple Mendelian or sex-linked mechanism. It thus differs from the abnormality in which the larva has a duplicated tail-horn, which is known to be unifactorial and recessive, and from other examples of variations in larval spotting or pigmentation in other species of moths that are due to simple recessive or dominant genes (Ford, 1955).

Although the appearance of the red-spotted larva is very striking there is nothing in the markings or colouring of the adult moth to distinguish it from normal. This is not surprising since the genetics of larvae and adult moths are nearly always partly independent, in keeping with their very different life styles and environments (Ford, 1955).

Significance of spotting

It is difficult to envisage any special advantage that a red-spotted larva may have over the normal unspotted form. However, the fact that spotted forms of larvae of both the Poplar and Eyed Hawk Moths have existed for at least two centuries indicates that the variation is not entirely detrimental to the well-being or survival of the larvae. The normal Poplar Hawk Moth larva is already well-camouflaged by its ground colour and the seven oblique pale stripes that effectively disrupt its outline and resemble the veins of the leaves of the foodplant. For example, the blue-green form of the larva closely resembles a willow leaf and the disguise is completed by the characteristic "upside-down" attitude adopted by the resting larva. It is difficult to see how the presence of the red spots could improve on the existing degree of camouflage. There are a few red galls to be found on poplar and willow (eaves (Darlington, 1975) but, with the possible exception of the red-flecked galls on poplar induced by the aphid *Thecabius affinis*, the spotted larva does not resemble a leaf affected by any of these. The possibility that some protection from bird predators is derived from the resemblance of the spotted larvae to male flowers (catkins) has been considered but rejected. Although several poplar catkins resemble a resting larva in position, shape and size and are coloured with red, the resemblance is not close and in any case the catkins open in March-April, well before the Hawk moths have emerged from their pupae (in late May). The red markings could serve as warning (aposematic) colours to predators such as birds. Larvae with warning colours are often gregarious (e.g. those of the Cinnabar Moth)', but Poplar Hawk Moth ova are laid singly or in small groups and the larvae are more or less solitary. Alternatively the larvae may receive benefit from mimicking

another red-spotted species, but I do not know what the model is. Clearly, the red spotting cannot provide protection against parasitoids, and I have found several larvae of the spotted variety in North Shields which subsequently proved to be parasitised by the gregarious larvae of the braconid *Microplitis ocellatae*.

CONCLUSIONS

The existence of a red-spotted variety of the Poplar Hawk Moth larva has been recognised for over two hundred years and is not uncommon. The present study has shown that the spots occur both in males and females and that the resulting adults are fertile. The presence of the red spots is not related to any type of food plant or to contamination of the food by rust moulds.

There are several types of markings, those in the subdorsal and paraspiracular regions being most noteworthy. Larvae with numerous spots tend to have additional red pigmentation of parts of the head capsule, the legs and tail-horn. The distribution of the subdorsal and paraspiracular spots is not random. Certain segments are more frequently affected than others, and the number of actual combinations of position and segment is relatively limited.

The special advantage to larvae of possession of red spots is unclear.

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The Barn Owl in County Durham, Its History and Current Status. - the results of the 1992 Durham Bird Club/Tyne & Wear Museums Survey into the status of the Barn Owl

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Introduction

The 1992 Barn Owl survey was first mooted in late 1991 following discussions between members of the Durham Bird Club's Project and Survey group. It was clear from the wide range of varying opinions amongst knowledgeable local birdwatchers canvassed that very little was really known about the status of the Barn Owl in County Durham, and it was suggested that the time was ripe for a re-survey of the species in the county.

The proposal was to set up an enquiry to discover more about the current status of the species within the Durham Bird Club's recording area, i.e. vice-county 66 plus the district of Startforth to the south of Barnard Castle. Realising the scale of the proposed task the Bird Club enlisted the help and advice of Tyne & Wear Museums to assist with publicity for the survey and processing the resulting data. Further to this the Hawk & Owl Trust were approached in order to gain their endorsement of the survey, to seek advice on survey method and gain access to their stored information for the region. Both organisations fully supported the venture and the survey undoubtedly benefitted from this co-operative approach.

Historical and Background Information.

The Barn Owl, *Tyto alba* has perhaps the most widespread distribution of any land bird in the world and can be found in an extremely wide range of habitats across the globe. It occurs principally in tropical and sub-tropical zones between the latitudes of 40° North and 40° South (Bunn, Warburton & Wilson, 1982).

The British sub-species *Tyto alba alba* occurs in the British Isles and on the adjacent continent south to the Mediterranean basin (Cayford, 1990). The closely related dark-breasted form, *Tyto alba guttata*, occurs in the eastern part of Europe westward as far as Sweden and Denmark, with the subspecies' nearest approach to the British Isles being those birds that penetrate into the Netherlands (Bunn, Warburton & Wilson, 1982; Mikkola, 1983).

According to Harrison (1988) there is ample evidence of the species from early interglacial periods and it would appear to have "always been widespread" in the British Isles.

Within the British context it is rather difficult to gain an accurate picture of distribution and population size of the Barn Owl. One reason for this is that it undergoes marked fluctuations in numbers within a relatively short period of time. These variations in number are closely linked to the cycles of population fluctuation experienced by its principal prey item, the Short-tailed Vole *Microtus agrestis* (Bunn, Warburton & Wilson, 1982). This means that any enquiry into the status of the species needs to take into account the potential extremes in numbers, both high and low, as a result of such prey famines or gluts.

These fluctuations can serve to mask the true long term trends within the population as a whole and they must be carefully accounted-for in any analysis. In addition the

species' ability to use a wide range of "open ground" habitats and its nocturnal behaviour, make it extremely elusive and prone to under-recording.

Over the years the species has been the target of a number of rational surveys and mapping enquiries. Included amongst these are: a national census by the RSPB in 1932 (Blaker, 1934) which suggested that there were 12,000 pairs in England and Wales; an enquiry by the BTO between 1953 and 1963 (Prestt, 1965) which reported a "long-term decline", and most recently a survey by the Hawk & Owl Trust in 1982-1985 (Shawyer, 1987). This latter exhaustive work suggested a population of 4,300 pairs for the whole of Britain. Further information on the species was forthcoming from the fieldwork, during 1968-1972, for the BTO Atlas of Breeding Birds project (Sharrock, 1972). However this last venture was not intended to be as exacting as a single species enquiry, consequently its estimate of numbers was that much less exact. The numbers estimated were deemed by Cayford (Cayford, 1990) to be on the conservative side and he suggested a population figure of between 4,500 and 9,000 pairs for the British Isles. The figure for the number of wintering birds given by the "The Winter Atlas" was 12,500-25,000 birds, however these estimates were largely derived from the *Breeding Atlas* figures since the species was, in relative terms, so poorly recorded on the *Winter Atlas* fieldwork (Lack, 1988).

The latest information from the British Trust for Ornithology further highlights the sad decline of the species across the whole of the British Isles (Marchant *et al*, 1990). Data from the Common Bird Census study showed that in 1967 birds were recorded on approximately 7% of all CBC plots but by 1988 this figure had declined to less than 1 %, with not a single CBC plot holding territorial birds! Currently there is a great deal of variation across the country in the breeding density of the Barn Owl with some areas still retaining relatively healthy populations, e.g. the Isle of Wight and South- West England, whilst other areas are facing very steep declines or even local extinction (Shawyer, 1987). Such areas would include North-West Yorkshire and Hertfordshire which both recorded declines of over 90% in a fifty year period (Cayford, 1990; Shawyer, 1987).

On the continent the species is also in decline being now almost extinct in Sweden, whilst a decline of some 80% has been noted in the Netherlands over the past three decades (Cayford, 1990; Marchant *et al*, 1990). Contrary to this there is some evidence from BTO research into Barn Owl survival and reproductive performance that numbers in Southern England improved between 1976 and 1987 (Percival, 1990). However, this information must be viewed against a general decline across the country.

The Situation in Durham

Writing of Northumberland and Durham in 1874 Hancock said, "A common resident species, but gradually diminishing in numbers like other birds of prey and from the same cause" (Hancock, 1874). During Victorian times the species was considered the commonest of our breeding owls in Durham although a decline was being noted locally as early as the 1860's and 1870's (Temperley, 1951). In his 1896 work on the birds of the Derwent valley Robson said, "This species is now rarely met with in our district, though a well established resident at one time" (Robson, 1896). The diminution in numbers of the species continued into the 20th century, a "steady decline" continuing until at least 1919 (Temperley, 1951).

Blaker's pioneering survey of 1932 probably caught the local population on some- thing of a high point after a relatively long downward trend during the latter part of the 19th and early part of the 20th century. There is some suggestion of a national recovery in numbers between 1910 and 1940, some of which would have occurred prior to Blaker's work. This was believed to have been in response to a warming up of the climate (Harrison, 1988). Blaker's survey suggested that the county population at that time was 153 pairs (Blaker, 1934).

Temperley (1951) documented the decline of the species through the early part of the century although he did note a slight increase in birds during the 1930's and he stated that "birds remained at a variety of sites" including in the Derwent valley.

The only in-depth review of the species in County Durham was undertaken by Perry as part of an enquiry into its status within a wider geographical area of north-east England that roughly corresponded to the historical area of Northumbria (Perry, 1990).

On careful inspection of the data from the British Trust for Ornithology's Breeding Atlas it can be seen that the Barn Owl was recorded in twenty-one 10km squares, with confirmed breeding in fifteen of these (Sharrock, 1972). This gives an occupancy rate, in terms of number of occupied squares, of 58%. However, since birds appearing outside of the county but within the square in question could be counted where squares overlap the vice-county boundary then this may be something of an overestimate.

The work undertaken by the Hawk & Owl Trust between 1982 and 1985 suggested that the species by the early 1980's had reached a very low ebb indeed. Their projected totals for the whole of England and Wales were 3,750 pairs, with a further 650 or so pairs in Scotland. During their work they found evidence which suggested that only 18 pairs remained in the Durham area (Shawyer, 1987), however two of those occupied sites were to the south of the River Tees, outside of vice-county 66. Comparing this total of 18 pairs with the Blaker total of 153 would mean that there had been an 88% decline in the species within the county in some 50 years (Shawyer, 1987). Perry in his work on the species during the late 1980's in the historical area of Northumbria estimated the Durham population to be 15 or 16 pairs (Perry, 1990). A search through the county archive showed that the species has been documented as nesting at 20 different sites over the years 1972-1988, although Perry noted that the species had been reported at some 30 sites on at least an occasional basis (Perry, 1990; Durham Bird Club record cards; Birds in Durham, 1972-1991). Some of these sites were occupied regularly for many years whilst others were only reported on a small number of occasions, or even once only.

In Durham the species has always been more abundant in the lowland east of the county and along the river valleys, but it was in times past by no means absent from the uplands. Even in the last 20 years it is known to have nested in some upland areas of the county, for instance in the extreme west of the county in Weardale, in the upper Wear valley in at least two localities and in the upper Derwent valley, just over the border into Northumberland (Durham Bird Club record cards; Birds in Durham 1972-1991).

Perhaps the most noteworthy of locally recorded nest sites is in that building most

readily associated with the county, Durham Cathedral. Birds reared young successfully there in 1948 and 1949 (Temperley, 1951).

What is clear is that the known distribution of the species in the county has been very much coloured by observer bias. Local work on mapping the species in the Borough of Gateshead has suggested that birds have been present in at least ten "traditional territories" between 1970 and 1990. Despite the fact that few, if any, of these localities were documented in the Durham Bird Club archive as known breeding sites or were even known to produce regular reports of birds. Further, anecdotal evidence from this area suggests that these figures are probably a minimum estimate (Bowey, Rutherford & Westerberg, 1993; Bowey unpublished).

The known nesting sites of pairs have, in the past two decades, been principally concentrated in the north-east and the east of the county. Once again this largely mirrors the spread of observers. The species has been poorly reported in the far south-west and the south of the county, along the mid-Tees for instance, but it is conceivable that this accurately describes the species' status in those areas. This statement is partly corroborated by the anecdotal evidence of some very experienced observers in those areas who have rarely, or never, come across the species, nor even heard rumours of its local presence. The most recent statement on the status of the species in the county came with the publication of the county checklist in 1992, when it was described as "an uncommon breeder" (Raw, 1992).

There is one confirmed record of *Tyto alba guttata*, the continental sub-species, for vice-county 66, a bird being shot at Prior's Close Bog, Leamside, in County Durham on 25th February 1927 (Temperley, 1951).

Survey Methodology

It was clear from the outset that due to the nature of the species it could not be adequately surveyed by a team of volunteers from any local organisation. The fact that the species is largely nocturnal, is scarce, and can be found in a number of open habitats (Taylor, 1988) mitigates against the adoption of a survey method relying on a small number of fieldworkers, such as were at our disposal. Such a method would, in any case, be unlikely to find a significant proportion of the county's total of birds due to the magnitude of the area to be covered and the time available. This is not to mention the potential problems with acquiring access to private land for fieldworkers.

The only viable option seemed to be to solicit reports of birds from members of the public and targeted groups, such as farmers, who might be in contact with birds. It was decided to follow the option of a "media blitz" campaign. This took the form of press releases to all of the local papers, a number of radio interviews, a poster campaign across the county and specific targeting of such organisations as the National Farmers Union, the Farming and Wildlife Advisory Group, Groundwork Trusts, the Durham and Cleveland Wildlife Trusts as well as certain individual land owners and all members of the Durham and Teesmouth Bird Clubs.

Press releases and information bulletins were phased through the year to try and maintain a flow of information about the owls through all seasons. Despite the reservations expressed by Cayford on such a survey method the limitations of resources available to us, in terms of people and time, left us little option but to adopt this course of action. In his work in East Anglia Cayford believed that such press and interview procedures might only reveal up to 50% of the area's birds. However he

was working in a region with a relatively high breeding density and in an area such as ours, with a thinly scattered owl population, his adopted methods of individual interview and tape logging would require a huge input of time for, potentially, relatively little reward (Cayford, 1992).

To augment the information-gathering process the Project & Surveys Group organised a network of "regional co-ordinators" across the county. Their role was to act as a conduit through which information and sightings could flow back to the survey organisers. Each regional co-ordinator was supplied with an extensive information pack which they used to leaflet local shops and post offices etc. Some regional co-ordinators managed to gain extra publicity and chase up a number of reports. In addition all Bird Club annual reports were carefully scrutinised and an extensive search was made of the Bird Club's card index system. All Barn Owl sightings back to 1980 were examined and extracted from the data files whilst information about areas frequented and "traditional" nest sites were also noted. The Hawk & Owl Trust permitted access to their confidential data from the early 1980's survey which allowed direct comparison of the 1992 information with that previous work. The purpose of the archive search was to allow the current survey results to be placed within the context of the species' historical and recent status within the county.

All reliable records of Barn Owls brought to our attention as a result of the survey publicity, but falling outside of vice-county 66, were forwarded to the relevant county recorders, or Barn Owl Conservation Network Advisors in Cleveland, Northumberland and North Yorkshire.

The maps

The information gathered during 1992 has been mapped separately to allow comparison with the five year map. The data were stored and processed using the RECORDER computer package devised by English Nature. For data analysis only records from the last five years have been used and mapped i.e. all known sightings since 1988. The inclusion of records prior to 1988 into the mapping process was deemed to be undesirable (see below). However earlier records were used to provide an indication of recently favoured areas and where short term change might have occurred. The rationale behind this decision was that the use of a five year data set would augment the results of the 1992 survey, producing a fuller picture in the mapping process. This spread of records also serves to damp down any short term fluctuations in Barn Owl numbers as a result of changes in small-mammal populations, which might have been evident in any one of the years 1988-1992.

RECORDER was used to produce the maps on a tetrad (2x2 km square) basis. This scale was decided upon as it quite accurately illustrates the distribution of the species across the county without losing too much geographical fine detail, and on a scale at which birds might be reasonably expected to be seen around a breeding locality. At the tetrad scale the maps do not compromise the confidentiality of any breeding sites by the revelation of too much detail.

For comparison the Hawk and Owl trust data from the 1980's work has also been mapped (Figure 3) but this has been mapped on a larger 10km scale, as requested by that organisation. The 1992 survey information is also reproduced at that scale, on a 10km grid, allowing easier direct comparison with the data from the Hawk & Owl Trust.

Cayford suggested winter home ranges of 3-4 km from daytime roost, falling to 2 km from the nest site in the breeding season (Cayford, 1992). However local information from high quality habitat in Northumberland suggests that in certain instances a large amount of summertime hunting is done within 0.5-1 km of the nest site (Ian Douglas pers. comm.).

The inclusion of records prior to 1988 was not felt to be advisable as this would allow too great a time in which genuine underlying population change might take place (as opposed to fluctuations induced by prey availability). Such a situation would obviously devalue the overall accuracy and usefulness of the picture obtained.

Results

Most responses to the request for information in the media came via the telephone. These telephone reports were sometimes augmented by written details at a later date. A few records were direct, by word of mouth. The response to the request for information was varied. The feedback from the general public was very good, although much time had to be spent verifying records and diplomatically discounting the many records of Tawny Owl. The response to requests for information to the large landowners, farmers and farming organisations was, to be truthful, disappointing. No doubt this was due to the understandable caution of farmers who, mistakenly, seemed to believe that hundreds of birdwatchers were about to descend upon their land in search of a rare bird.

The number of record cards submitted to the Durham Bird Club reporting the species during 1992, which is never very high, was down by about 10% on the numbers submitted for both 1990 and 1991.

The survey generated some 154 documented reports over the twelve month period. Of these 134 were deemed to be definitely Barn Owls and approximately 80% of these were referable to birds within the Durham Bird Club's recording area. A number of reports of Barn Owls came from Northumberland, Cleveland south of the Tees, and North Yorkshire. There were reports of pairs in 19 different localities, the exact nesting sites of these being known in 9 cases. Birds were double-recorded, or reported, in a further 14 or so localities in circumstances which, with supplementary information from previous years (see figure 2) suggested that pairs might be present and breeding in those areas. Single sightings were reported from approximately 15 localities and a number of these were from areas in which birds had been reported in the past five years or previously. Once again this suggests that birds could still be present in breeding territory at those sites.

Over the year there were two reports of road casualties from opposite ends of the county. Neither of these were from the busy A19 or AIM which have accounted for a number of birds in the last two decades. Another fatality could not be ascribed to a specific cause due to the nature of the report, though it seems likely that it was as a result of starvation in a period of hard weather. One bird was seized from a taxidermist by local police and a prosecution followed.

There was only one report during the survey period of a known escape and this came from Hartlepool Headland in September. Figure 1 illustrates, on a tetrad basis, the distribution of the species in the county from reports received during the survey. It should be noted that the mapping process, for reasons of confidentiality, does not differentiate between breeding sites and simple observations of birds. As can be

seen by the ribbon of occupied tetrads along the River Wear and its tributaries the Deerness and Browney, the species very much favours the sheltered valleys of the centre of the county. Other notable groupings of birds occur in the extreme north-east of the county, in the Boldon/South Shields area and eastward from Durham City across the coastal plain towards Seaham. Indeed this area, with its extensive grasslands, may hold the highest density of birds in the county. The species is effectively absent from our western uplands although birds did rear young in both 1991 and 1992 at one locality well up the Wear Valley. A pair which nested in the extreme west of the county in the early eighties was not reported in 1992. A cluster of records in the north-west of the club's recording area, around the borough of Gateshead, illustrates the status of birds in that area but it is also indicative of the intensive observer efforts especially of the author and his colleagues. There were no confirmed reports from the Derwent valley (except in the lower portion/in Gateshead) although there was some anecdotal evidence suggesting that birds might be present in one locality. This was further suggested by a confirmed sighting not far from that area in early 1993. Small numbers of birds are present in North Cleveland where there is a large amount of suitable habitat available, especially in the Seaton Snook and Seal Sands area.

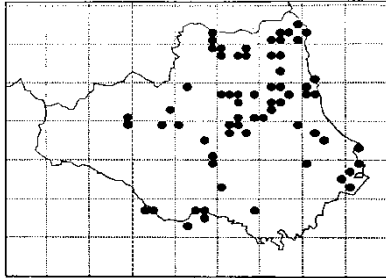


Figure 1 - The Distribution of Barn Owl in vice-county 66 (County Durham) 1992, by Tetrad.

It is conceivable that the numbers of birds are limited in this area by the availability of suitable nest sites. It is, of course, possible that they are merely under-recorded for it is known that birds are present in a number of the building complexes of various industrial sites on either side of the mouth of the Tees. There were only scarce reports from along the section of the Tees, towards Darlington, and up the mid-section of that valley. A number of reports from higher up Teesdale were the result of intensive

work by a local observer and barn owls are probably genuinely rare in that region of the county.

The species would appear to be largely absent from a large proportion of the south and south-west of the county and surprisingly the south-east strip inland from the coast. This seems somewhat strange in that some of these areas would appear to have an abundance of suitable habitat, especially where Magnesian Limestone grasslands predominate, such as at Cassop Vale. Although not recorded in many of these "blank zones" during 1992, reports from previous years suggests that birds could be present in some of them, (such as Sedgefield district - see figure 2) but probably at relatively low densities. The 1992 results, when compared to the known records 1988-1992, suggest under recording of the species in those regions of the county.

Mapping all of the records of the species in the county between 1988 and 1992 (figure 2) on a tetrad basis gives better indication of the true current distribution of the

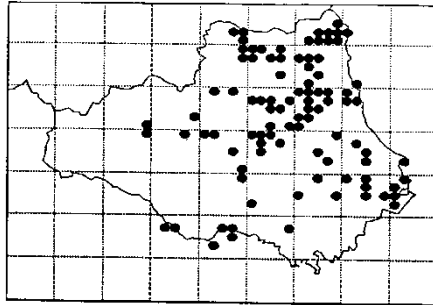


Figure 2 - Barn owl records 1988-1992 for vice-county 66 (County Durham) by Tetrad.

species in County Durham. The resultant map is broadly similar to the 1992 survey results, although the extra records have filled in some of the apparent gaps on the 1992 map. This can be seen to the east and south-east of Durham City and, to a lesser extent, in the north-east and other scattered localities around the county. When the 1992 information is mapped on a 10km basis it can be compared directly to the information provided by the Breeding Atlas and the Hawk and Owl Trust Survey data. The 1992 survey gave an occupancy rate of 72% (26 occupied 10km squares, all records being within the recording area of the Bird Club) as opposed to 58% from the Breeding Atlas and 42% for the Hawk & Owl Trust survey. See figures 3 and 4

for comparison of the 1992 10km data and the Hawk & Owl Trust figures. It should be noted that the tetrad based fieldwork, between 1988 and 1991, for the New Breeding Atlas of Birds in Britain and Ireland did not register any occupied squares in the county!

By comparing known breeding sites from the Hawk & Owl Trust and the 1992 survey we can obtain an insight into site fidelity within the county. In 1992 birds were still present at, or near, three occupied sites from the Hawk & Owl Trust survey with birds being reported in the general area of a further two sites from that data set. This would suggest that the species would appear to be quite site-faithful. This suggests (assuming no gross habitat change or actual loss of a nest site) that known sites not regularly checked in recent years could still have birds in residence.

The survey provided little information on the type of nest-sites used by the species, but the information gathered on nine known sites was as follows: three pairs were in churches, farm buildings held three pairs, tree cavities two pairs and quarries one pair. However for the localities where birds were known to be present but the exact nest site was unknown, it would appear that farm buildings would probably form the majority of suitable sites. Two long-occupied sites, coincidentally both church tower sites, which held birds through much of the 1980's, were checked during the survey but no birds were observed.

During 1992 birds were recorded in a total of 65 different tetrads. Nineteen pairs were known to account for the reports of birds in 25 tetrads, leaving 40 recorded tetrads without confirmed breeding pairs. If the ratio of reported tetrads to known pairs ($25:19 = 1.32$) is extrapolated across the remaining 40 recorded tetrads it is predicted that these would contain 30 pairs! An estimate for the whole county

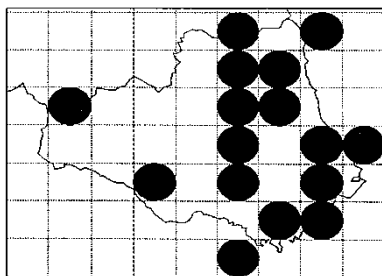


Figure 3 - The Hawk & Owl Trust Data by 10km Square for vice-county 66 (County Durham).
59

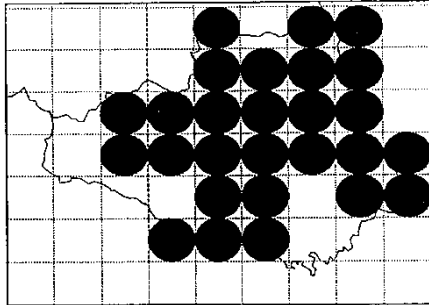


Figure 4 - The 1992 Survey Reports by 10km Square.

population would be 19 (known) + 30 (predicted) = 49 pairs. By examining the spread of birds across the county, taking into account the number of tetrads in which birds were recorded, and the double registrations of birds around localities within 1992 and over a period of time within the period 1988-1992, then we can arrive at a population estimate for the county. Taking the number of known pairs, which was 19, as an absolute minimum and adding to this the number, 14 sites, where pairs would appear to be present, it would seem reasonable to gauge the county population at a minimum of 30-33 pairs. However the use of this figure assumes that there are no pairs in the localities where birds were only noted on one or two occasions over the five-year period over which records were mapped. This does not seem to be a reasonable assumption, indeed one might argue the reverse! It would be more reasonable to assume that there a significant number of pairs remain undetected at those localities despite the survey. This is especially likely to be true if Cayford's assertion on the veracity of our adopted survey method is correct (Cayford, 1992). Indeed the early part of 1993 saw reports of the species in three areas of the county for which there are no published records in the previous two decades, although there is anecdotal evidence from local people to suggest that birds have been present at these localities over a number of years! Since birds were reported in 15 further areas where there was a degree of evidence that the sightings did not just refer to wandering juveniles then we could argue that at least a proportion of these records should be considered to represent breeding pairs.

It is unlikely that these records represent an extra 15 pairs, the upper and lower limits being chosen were one third and two thirds of this figure as minimum and maximum limits respectively, i.e. a minimum of five extra pairs and a maximum of ten. This

would give us a county population estimate, for the current time, of between 37 and 42 pairs. Rounding down we could say that the county holds between 35 and 40 pairs of Barn Owl at present. This would bring it roughly into line with the estimate made by the "occupied tetrads" method (see above). However it conceivable that this may still be an underestimate of the true picture and we may yet find that the county still holds numbers of undiscovered pairs!

Discussion

It is clear from the survey results that there has been a significant change in the estimated number of pairs in the county since the early 1980's. This, in part, may be as a result of the employment of the five year mapping method although it should be noted that the Hawk & Owl Trust survey was also conducted over a number of years.

Direct comparison of the current population estimates with the figures of both Shawyer and Perry make it clear that there has been a notable increase in numbers since their estimations were made. This is probably due in some part to better county coverage and, to a certain extent, the mapping method employed, but it is almost certain that there has been a genuine recovery in local numbers of the species. The probable reason for this observed increase is likely to be due to improved winter survival of both adult and first winter birds over the mild winters of the late 1980's and early 1990's.

What was clear from the details from some reports was that in some instances birds were quite heavily dependent for hunting territory on rough grassland on land taken out of agricultural production i.e "set-aside". At least one pair was regularly noted hunting in such habitat and birds were reported from at least two other similar localities. The increasing frequency in County Durham of this practice might be a significant factor in the future conservation of the species locally.

Undoubtedly there is potential for the conservation of the current stock of Barn Owls and the possibility of improving the situation in the future. In conservation terms a highly beneficial development would be the creation of a county-wide network of "Barn Owl rough grassland corridors". These could be designed to connect good areas of Barn Owl habitat and provide an increased area of hunting habitat in many areas. The corridors would facilitate the easier, and safer, dispersal of young birds out of their natal territories and also increase the chance of isolated birds finding a mate by allowing lone mature birds to move in and out of isolated islands of suitable habitat.

What would be of immediate benefit to birds would be the setting up of a "known nesting site data base". Such a data base could be used to alert local planning authorities of any nest sites in their areas. This would obviously require the goodwill of many land owners but it would mean that the situation which occurred in 1991 could be avoided in future. In this instance demolition workers at a previously unknown site in Pity Me discovered a family of owlets with a dead female among the rubble of a building they were working on. If the nest site had been known and "registered" as suggested above then the problem could have been solved by cessation of demolition work until the birds had completed their breeding attempt. If nothing else it would have allowed the erection of a nest box nearby, perhaps with the help of a sympathetic land owner, in an attempt to re-locate the breeding pair into a more suitable site.

the help of a sympathetic land owner, in an attempt to re-locate the breeding pair into a more suitable site.

Nest boxes do have some potential for helping the situation within the county although in this region it is probably not the availability of nest sites that limits the population but the extent and quality of available hunting habitat as well as the relative harshness of winter weather.

Where large amounts of suitable rough grassland habitat do occur in the county then it is effectively made unavailable to the species as it is very often above the 300 metre level. This factor mitigates against its use by a species that dislikes and normally avoids such exposed upland situations.

Acknowledgements

Many people helped with the organisation and implementation of the survey and I would like to thank all of them, in particular: Colin Shawyer (Hawk & Owl Trust), Alec Coles and Les Jessop (Tyne & Wear Museums), Robin Perry (Barn Owl Conservation Network Advisor for Cleveland), Steve Evans, Dennis Luckhurst, John Olley and George & Colin Wilson (Durham Bird Club) and Chief Inspector John Patrick (Northumbria Police). Stephen Westerberg (Durham Bird Club) deserves a special mention for all of his assistance with data processing and proof reading various drafts of this report.

Gateshead M.B.C's Department of Leisure Services very graciously allowed the Thornley Woodlands Centre to be used as a contact address for the survey and this was of huge assistance: many thanks to them for their enlightened attitude. Specific thanks must go the staff of the Thornley Woodlands Centre, especially Trevor Weston who was very helpful and supportive throughout the survey period.

The survey would have been nothing without the assistance and information of all of the members of the public and Barn Owl lovers who provided information, may I express my thanks to them on behalf of the Barn Owls of the county.

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Durham Bird Club index cards - held at Sunderland Museum.

THE VASCULUM

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Edited by:

A. Coles and L. Jessop

Sunderland Museum and Art Gallery, Borough Road, Sunderland.

BY THE WAY

Secretaries of societies and other contributors to the *Vasculum* should send their notes to the Editors before 15 March 1994

The Flora of Northumberland

On January 6, the *Flora of Northumberland*, published by the Natural History Society of Northumbria, was launched at the Hancock Museum. This was a momentous event in all senses: the *Flora* is the first ever devoted solely to Northumberland (vice-counties 67 and 68); it is the first survey of the flora of the county since Baker and Tale's 'New Flora of Northumberland and Durham' published through the Natural History Society's *Transactions* in 1868; it is also arguably the most ambitious publishing project that Society has ever embarked upon. Financial assistance for the volume has been provided from English Nature and The Royal Society.

The author, Professor George Swan, has coordinated botanical recording for both vice-counties for many years in effect one of the largest recording areas in England. He has pulled together all those records and they are presented clearly and concisely, largely due to the efforts of the Society's own staff who type-set the *Flora* and to Jean Lunn, who drew the maps. Dr. Angus Lunn is responsible for the excellent 'Environment' section, which reviews the most important habitats, 'solid and drift' geology, climate, land use and conservation problems and initiatives.

The *Flora* contains many useful sections that will be regularly consulted: I found the sections on local habitat terms, and an updated assessment of ballast plants, extremely useful. The acetate overlays for the maps, showing physico-chemical features etc. are also welcome, and the incorporation of larger-size versions of each overlay map is inspired no more squinting! The 92 colour photographs of either

rare, or representative species and habitats are likely to broaden the appeal of the volume. The Flora of Northumberland is certainly an essential addition to the shelves of any North-East naturalist and those who have awaited its arrival will not be disappointed. Professor Swan and his collaborators are to be heartily congratulated. A review of the Flora will appear in the next issue of the *Vasculum*

AC

Natural History Museum IDQs

We have received a circular (dated May 1993) from the Natural History Museum about a new scheme offering qualifications in the identification of animals and plants. It is summarised below: The increase in legislation and general concern about the quality of our environment has led to a heavy demand for field investigation and reports. Work on biological monitoring and the preparation of Environmental Impact Assessments usually requires the identification of animals or plants (or both). From these identifications flows information on abundance, distribution, site richness, habitat change and many other aspects. Fundamental to the entire process is accurate identification, which is often taken for granted.

In practice, identifications are often accepted as correct without quality control (certain groups eg. the birds being notable exceptions), and the names are subsequently used for descriptive statements, interpretations and ultimately to produce recommendations for action.

At present there is no accreditation scheme for identification skills and no mechanism for assessing competence.

The Natural History Museum's aim is to encourage higher standards in environmental and conservation monitoring by awarding certificates of competence in animal and plant identification, to be known as IDQs. Qualification for an IDQ will be by examination, and the scheme will be backed by practical courses and training.

IDQs will be geared towards habitats and natural assemblages of organisms and to suites of indicator species, rather than towards narrow systematic groups. The list already holds about twenty options and others will be added as the scheme develops.

For more information, contact A. Wendelaar, The Natural History Museum, Cromwell Road, London SW7 5BD.

OBITUARY NOTICE

Dr Arthur Todd (17 October 1901 - 5 September 1993)

Arthur Todd was born at Shiney Row, the son of a dentist. He was one of twins, the brother dying in infancy. There were, however, three other brothers and four sisters. Arthur was the youngest son, but one of his sisters was younger than him.

When of school age, he first attended a "Dame School" until he went, as a boarder, to Durham School at 11 years of age. He left Durham in July 1918 to attend Newcastle Medical School, University of Durham, where he obtained his M.B., B.S. in 1923.

After appointments at Princess Mary's and the Royal Victoria Infirmary, he entered General Practice, first as an assistant and then in his own single-handed practice at Thornley and Wheatley Hill. He became Honorary Assistant Surgeon at Durham County Hospital and during World War II he was Senior Medical Officer in Surgery at Dryburn Hospital, continuing in this appointment until 1960. He retired in 1973.

Dr Todd must have been interested in the wildlife of the countryside at an early age, for during an N.N.U. field meeting in the 1980s to Deepdale Woods near Barnard Castle he recounted his joy at exploring the area in 1916 when still at school he had been taken by an elder brother home on leave from the army.

In the 1930s and after World War II until the 1980s, when his sight failed, he was one of the most regular members at N.N.U. field meetings and the two annual indoor meetings. At the field meetings he could be found where the specialists were in action pointing out unusual species and talking about their special features. It was here that his expertise in photography came to be recognised. With great patience and concentration he produced results that were recognised as exceptional. In the early days of colour photography he experimented with his own developing, to produce a huge collection of slides to show at future meetings.

His ability with paint-brush and palette must not be forgotten. The flowers that were collected on outings were carefully sketched and painted. During his active years of retirement Dr Todd journeyed several times to the Scottish Western Isles with me, where the plants and insects were assiduously searched for, recorded and photographed. He also became an enthusiastic supporter of the County Wildlife Trusts and was often seen at the Durham Trust Annual Meeting in November each year, helping out by buying items on sale after the official business part of the meeting.

Dr Todd was a quiet, kindly man, always sympathetic with those in trouble, yet always ready to share a joke with others. We will not forget him.

T.C. Dunn

[Dr Todd's set of Stella Ross-Craig's *Drawings of British Plants*, bound in eight volumes, has been donated to the N.N.U. for the use of the members eds].

**Corrections to "Observations on the red-spotted form of the larva of the Poplar Hawk Moth
Laothoe populi Linn."**

The editors greatly apologise for several typographical errors that appeared in Dr Ellis's paper, published in *The Vasculum* **78(3)**.

The Vasculum is typed by the editors using a word-processor, and then passed to The Natural History Society of Northumbria where "camera-ready copy" is produced using a desk-top publishing computer program (DTP). That copy is then sent to the printers. Unfortunately, we failed to notice that the symbols ">" ("greater than") and "<" ("less than") were not recognised by the DTP.

Thus, on page 35

A3 T2 A7 A4 A2 A1 A5 T1 T3 A6 A8

should read:

A3>T2>A7>A4>A2>A1>A5>T1>T3>A6>A8

and on page 37

T2,T3,A7A3T2,A3,A4,A7T1 ,T2,T3, A1-A7 and A3,A7T2,A3

should read:

T2,T3,A7>A3>T2,A3,A4,A7>T1,T2,T3; A1-A7 and A3,A7>T2,A3

Lines 11 and 12 of page 48 should read:

"of subdorsal spots on each of the T2, A3 and A7 (P<0.001) and A4 (P<0.05) and significantly fewer larvae than expected with spots on T3 (P<0.05), A6 (P<0.01) and A8 (P<0.001). It is not clear"

Lines 17 and 18 of page 48 should read:

"are still significantly in excess of the expected numbers (P<0.001) and there are significantly fewer than expected with spots on T3 (P<0.05) and A6 (P<0.01).

There were also some mistakes made in producing the tables.

In Table 7, pattern PS1 should have the letter "a" under T1 but not under A2.

Table 11 should read:

Table 11. Third Thoracic Segment Infero-lateral (Type 2b) Spots; Numbers of Larvae with Additional Subdorsal Spots and Segmental Distribution of Infero-lateral and Subdorsal Spots.

Number of additional subdorsal markings	Number of larvae (Percent)	Segmental patterns
0	1 (7.1)	T2T3
1	2 (14.3)	T ₃ A ³ ;T ³ A ⁴
2	0	Nil
3	1 (7.1)	T ₃ A ³ A ⁴ A ⁷
4-5	0	Nil
6	1 (7.1)	T ₂ T ₃ A ¹ A ² A ³ A ⁴ A ⁷
7	0	Nil
8	2 (14.3)	T ₂ T ₃ A ¹ A ² A ³ A ⁴ A ⁵ A ⁶ A ⁷ T ¹ T ₂ T ₃ A ¹ A ² A ³ A ⁴ A ⁵ A ⁷
9	7 (50.0)	T ¹ T ₂ A ₃ A ¹ A ² A ³ A ⁴ A ⁵ A ⁶ A ⁷

In Table 10, Line 4 (3 additional sub-dorsal spots) should read:

3 16(16.5%) $T^2_2A^3A^7(15); T_2A^3A^4A^7(1)$

Line 9 (8 additional sub-dorsal spots) should read:

8 10 (10.3%) $T^1T^2_2T_3A^1A^2A^3A^4A^5A^7(5)$

Lines 1 and 10 (10 additional sub-dorsal spots should read:

10 11 (11.3%) $T^1T^2_2T^3_3A^1A^2A^3A^4A^5A^6A^7(7)$
 $T^1T^2_2T^3_3A^1A^2A^3A^4A^5A^6A^7(4)$

In Table 15 the figures have been pushed across for the line for 'Head + legs + tail-horn', they should be under yellow 0(0), under yellow-green 15(57.7), under green 0(0), under blue-green 2(13.3) and under blue 0(0).

On page 46 there is a table showing the distribution of red markings by sex. The first column should be headed male and the second column should be headed female.

Coastal location for the Bee Orchid *Ophrys apifera* Hudson at Hawthorn Hive, County Durham

H.A. Ellis. 16 Southlands, Tynemouth, NE30 2QS

The Bee Orchid *Ophrys apifera* is rare in County Durham (Summerhayes, 1951; Graham, 1988), but occasionally is locally abundant, particularly in old quarries (Graham, 1988). A few specimens have been recorded in recent years north of the river Tyne in Wallsend; these apparently represent the northernmost occurrence of the species in Britain (Coles, 1991).

On 27 June 1993 my wife and I unexpectedly encountered a colony of the Bee Orchid comprising about 30 spikes of flowers growing on old magnesian limestone talus at the foot of the cliffs in Hawthorn Hive. We returned the following day and obtained a series of photographs of the orchids and their habitat. The colony was near a shrubby sycamore towards the northern end of the bay (NZ441462).

It is difficult to assess the true frequency of the Bee Orchid since it takes from five to eight years to reach maturity and its appearance is characteristically uncertain and fluctuating (Summerhayes, 1951). During the last century the Bee Orchid was scattered very sparingly over the magnesian limestone in County Durham (Baker & Tate, 1868). It was not mentioned amongst the six orchids listed by Preston (1915) for Blackhall Rocks, but it was one of the twelve orchids listed by Richardson, Davis & Evans (1980) occurring in limestone quarries.

It is generally believed that in County Durham, the Bee Orchid is exceptionally rare or no longer occurs on the coastal magnesian limestone, but is restricted to the secondary grassland of disused quarries (Doody, 1980; Richardson, Davis & Evans, 1980; Graham, 1988). The present finding of the Bee Orchid in a coastal location, like that of Mrs Reedes of South Bents near Whitburn (Graham, 1991), must be unusual. It will be interesting to see if the species reappears in Hawthorn Hive in the next few years.

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A "lost" record found

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L. Stephenson's article, "The importance of recording" (*Vasculum* **77(4)**), contains a salutary message for us all. Nevertheless, his sad tale of a lost truffle record has a happy ending. By reading his article, I was cheered by two factors: first, his detailed memories of how and where he found the truffle together with his careful description of its appearance and texture; secondly, the suggestion that the specimen might still exist. Hoping to be able to make practical use of my pristine copy of a new monograph of British Truffles, published only this year, I made enquiries. The surviving fungal material was immediately despatched to my door and a few minutes' microscopical examination established its identity as *Melanogaster ambiguus* (Vitad.) Tul. This is considered to be slightly less "frequent" in occurrence than *M. broomeianus* but more widespread in Britain. The herbaria of the Royal Botanic gardens at Kew and Edinburgh contain specimens of *M. ambiguus* from Sheffield and Jedburgh but from nowhere in the wide area between. It is possible that material collected from our region exists in private herbaria or in museums but, in the absence of any information on such specimens, Mr Stephenson's collection is noted as a first for VC66.

The publication of the monograph has made it possible to review the existing information on the truffles of Northumberland and Durham and it is hoped to publish an account of these in *The Vasculum* in the near future.

Meanwhile, the author would be pleased to examine specimens of any truffles that readers think they have found. These may be sent fresh in a match-box or other small container or gently dried for a day or two over a radiator or on a mantleshelf in winter or a sunny window-ledge in summer. Excessive heat and lack of air circulation will cook them! Material so dried will keep indefinitely in a container or herbarium packet so long as no destructive contaminant is present. Material should be sent, along with as full a field description as possible and a S.A.E., to the above address.

Reference

- Pegler, D., Spooner, B.M. & Young, T.W.K., 1993. *British Truffles: A revision of British Hypogeous Fungi*. Kew: Royal Botanic Gardens.

RECORDS

Convolvulus Hawk Moth

Jonathan Rayner (age 10) and Peter Cockburn (age 11) found a Convolvulus Hawk Moth *Agnus convolvuli* Linnaeus, 1758) on a lamp post at a cross roads in the Hamsterley Mill estate at 3 pm on 2 October 1993. It was determined by Dr M. Harbinson and Tom Dunn, and released in Tom's garden at Chester-le-Street.

Photographs were taken by Doug McCutcheon and George Wall, and prints will be given to the keen-eyed youngsters.

Doug McCutcheon

An indoor fungus garden

In June 1993 a colleague of mine happened to mention a strange phenomenon reported by a girlfriend from offices of a warehouse of John Menzies PLC in Darlington where she works. Strange fungal growths were emerging from a carpet next to a filing-cabinet and causing consternation amongst the staff.

I forgot about this story until 1 September 1993 when my colleague arrived at my house triumphantly waving a plastic bag containing specimens of the offending fungus which had made an unwelcome reappearance in the same spot. Fungi do colonise textiles but these are almost always of natural fibre outdoors or in old, damp buildings. This specimen looked like a species of *Peziza* distorted by growth-conditions and this guess was confirmed by microscopical examination.

As I was unable to examine the site, on the assumption that the floor underlying the carpet was of concrete, I determined the fungus further as *Peziza cerea* which is known to colonise old damp mortar and plaster. This identification has now been confirmed at Kew.

The last I heard was that contractors had removed the carpet and were digging up the office floor. Presumably a leaking pipe was suspected of providing the necessary moisture. At any event, I have been unable to find an earlier record of *Peziza cerea* for County Durham although it is undoubtedly present and waiting to take advantage of human error or neglect in any suitable niche.

A.W. Legg

Death Cap fungus in Northumberland (VC67)

The Death Cap, *Amanita phalloides*, whilst never widespread and abundant, can be locally common in southern Britain. Further north it is increasingly rare and in Scotland is virtually replaced by the Destroying Angel, *Amanita virosa* (Pegler, *personal communication*). It seems that there is a handful of known locations for the Death Cap in County Durham, but until recently my wife and I mistakenly believed that it did not occur in Northumberland.

We came across our first Death Cap in Northumberland on 12 September 1993. A single specimen was growing near Beech and Silver Birch at the pathside in mixed woodland near Climbing Tree Farm, between Morpeth and Pegswood (NZ213867). We determined the fungus by its characteristic gross appearance and by the microscopy of the spores. Subsequently its identity was confirmed by Dr D.N. Pegler (Royal Botanic Gardens, Kew).

Although the species is evidently rare in the region and unlikely to be mistaken for an edible one by anyone with a knowledge of fungi, its presence in such an accessible public place is disconcerting since it is the most poisonous fungus and deadly if eaten, even in small quantities.

H.A. Ellis

Insect Records

All are from Hamsterley Forest, unless otherwise stated

Lepidoptera

Mormo maura (Old Lady) NZ093313, periodically between 4.ix.1982 ix.1992; Ladycross Quarry, Slaley Forest (NY954551) ix.1990.

Cucullia verbasci (Mullein) NZ057285 9.ix.1985

Deilephila elpenor (Elephant Hawk Moth) NZ073304 IS.ix.1980; Black Banks NZ108356 ix.1991.

Coleoptera Cerambycidae

Rhagium bifasciatum tetrad NZ021 31 .vii.1985; tetrad NZ02N 5.vi.1989; tetrad NZ02P 4.vi.1985; tetrad NZ02U 30.vii.1985; tetrad NZ03V vi.1984; tetrad NZ03X 7.vii.1988; Black Banks, tetrad NZ13C 31 .vii.1987; Slaley Forest, tetrad NY95M 10.vii.1987; Slaley Forest, tetrad NY95N 3.vi.1987.

Rhagium mordax tetrad NZ02P 1.viii.1988; tetrad NZ03V 28.iv.1987; tetrad NZ03X 17.viii.1988. *Clytus arietis* tetrad NZ03V 22.V.1984 & 29.vi.1987.

Strangalia maculata tetrad NZ02T 1.viii.1988; tetrad NZ03V 25.vii.1985; Chopwell Woods, tetrad NZ151 28.vii.1986; Chopwell Woods, tetrad NZ15J 17.vii.1985; Gibside, tetrad NZ15T 20.viii.1985; Gibside, tetrad NZ15U 20.vii.1988; Gibside, tetrad NZ15Z 20.viii.1986; Slaley Forest, tetrad NY95M 1 .vii.1986.

Stenocorus meridianus tetrad NZ03V 3.vi.1986.

Strangalia quadrifasciata tetrad NZ02P 25.vii.1986; tetrad NZ03V 10.viii.1986; Chopwell Woods, tetrad NZ151 28.vii.1986; Ravensworth Estate, tetrad NZ251 19.vii.1989; Ravensworth Estate, tetrad NZ25J 5.ix.1988.

Tetropium gabrieli tetrad NZ02U 20.vi.1988; tetrad NZ03V 26.1.1988. *Saperda scalaris* tetrad NZ02P vii.1990; tetrad NZ03V 26.vi.1989; Black Banks, tetrad NZ03X 25.iii.1991.

Judolia cerambycifformis tetrad NZ02U 18.vii.1989; Black Banks, tetrad NZ13C 3.vii.1987; Chopwell Woods, tetrad NZ151 28.vii.1986; Chopwell Woods, tetrad NZ15N 24.vi.1985; Gibside, tetrad NZ15T 30.viii.1985; Staward Woods, tetrad NY75Z 2 Aug 1988; *Grammoptera ruficomis* Staward Woods NY799596 2.viii.1988; Gibside NZ178593 22.vii.1988.

[to be continued]

G. Simpson

Some records of Plant Galls

During the 1993 season I have collected a few records of plant galls. Most of these are common and well-known and of little interest. These two appear to be less common: both are caused by cynipid Hymenoptera.

Andricus lignicola "Cola-nut Gall"

Debden, near Rothbury, NU054036. 6.ix.1993. Plessey Wood, near Hartford Bridge, NZ235797. 10.X.1993. Gosforth Park Nature Reserve, Newcastle upon Tyne, 17.x.1993. NZ252703.

Andricus quercus calicis "Knopper Gall"

The Hermitage, Chester-le-Street, NZ265501.21.viii.1993. Plessey Wood, near Hartford Bridge, NZ240795. 27.viii.1993. Holywell Dene, near Holywell, NZ323745. 30.ix.1993.

H.A. Ellis

Some 1992 butterfly records

A few of my records may be of interest: all are from Stainton (Barnard Castle) at 650 feet above 0. D.

Meadow Brown (*Maniola jurtina*) 28.vi.1992.

Clouded Yellow (*Colias croceus*) 4.ix.1992

Painted Lady (*Cynthia cardui*) 5.ix.1992

Small Tortoiseshell (*Aglais urticae*) 30.X.1992.

Mrs M.B. Sykes

NNU FIELD MEETINGS

NNU Field Meeting to Baybridge

The field meeting on 26 June 1993 to Baybridge near Blanchland was led by Lewis Davies. This list of plants seen has been compiled by Dennis Hall.

Equisetum sylvaticum

Stellaria holostea

S. graminea

S. alsine

Geranium sylvaticum

Hesperis matronalis

Lysimachia nemorum

Salix cinerea

S. myrsinifolia

Salix caprea

Melampyrum pratense

Vaccinium myrtillus

Valeriana officinalis

Cirsium helenoides

Wood Horsetail

Greater Stitchwort

Lesser Stitchwort

Bog Stitchwort

Wood Cranesbill

Dame's-violet

Yellow Pimpernel

Common Sallow

Dark-leaved Willow

Goat Willow

Common Cow-wheat

Bilberry

Common Valerian

Melancholy Thistle

Prunus padus
Angelica sylvestris
Luzula sylvatica
L. multiflora
Juncus bufonius
J. articulatus
Callitriche stagnalis
Carex binervis
Leucanthemum vulgare

Bird Cherry
 Wild Angelica
 Great Woodrush
 Heath Woodrush
 Toad Rush
 Jointed Rush
 Common Water-starwort
 Green-ribbed Sedge
 Ox-eye Daisy

NNU fungus foray to Hamsterley Forest

(report by A.W. Legg)

The foray on 2 October 1993, which I led with the support of Alex Weir and Brian Walker, was well-supported, with 40 people attending.

The site was deliberately chosen for its ordinariness, to demonstrate the wealth of fungi present and to keep people's minds off other things!

The records referring to "pasture" are from SSSI meadows visited in the late afternoon. These provided the only new county record marked with an asterisk. Other interesting finds were the two ascomycetes *Lachnellula wilkommii*, a destructive parasite of larch, and *Scutellinia cejpaii*, an uncommon relative of the common eye-lash fungus, which I recorded for the first time in County Durham earlier this year at Barnard Castle.

ASCOMYCOTINA

Aleuria aurantia
Ascocoryne cylichnium
A. sarcoides
Lachnellula wilkommii

Orange-peel Fungus

On the ground.
 Rotten wood.
 Rotten wood.
 "Larch canker fungus". On lopped branches of *Larix*.
 Confirmed by Kew.

Lasiobolus papillatus
Poculum firmum
Scutellinia cejpaii (*hirta*)
Xylaria hypoxylon

Candle-snuff Fungus

On old dung of ?roe-deer.
 On fallen branch of *Quercus*.
 On the ground under *Larix*.
 On dead wood.

**BASIDIOMYCOTINA:
 AGARICALES s.l.**

Amanita muscaria
A. rubescens
A. spissa
Armillaria mellea agg.
Asterophora parasitica

Fly Agaric
 The Blusher

With *Betula*.
 With various trees.
 With conifers.

Honey Fungus [agg.]
 Pick-a-back Toadstool

By Conifers.
 On decomposing *Russula nigricans*

Boletus erythropus
B. reticulatus
Calchaporus piperatus
Camarophyllus niveus

Snowy Wax-cap

With *Quercus*.
 With deciduous trees.
 With mixed trees.
 In pasture.

<i>C. pratensis</i>	Meadow Wax-cap	In pasture.
<i>Cantharellus dbarius</i>	Chanterelle	With <i>Quercus</i> .
<i>Clitocybe clavipes</i>	Club Foot	With conifers.
<i>C. dealbata</i>		In pasture.
<i>C. flaccida</i>	Tawny Funnel Cap	Pathside.
<i>C. suaveolens</i>		With mixed trees.
<i>Collybia cirrhata</i>		On rotten agaric remains.
<i>C. maculata</i>	Spotted Tough-shank	Underconifers.
<i>C. peronata</i>	Wood Woolly-foot	In deciduous leaf litter.
<i>Conocybe arrhenii</i>		Pathside in wood.
<i>Coprinus comatus</i>	Lawyer's Wig, Shaggy Ink-cap	Pathside.
<i>C. martinii</i>		In rotten <i>Juncus</i> remains in pasture.
<i>C. micaceus</i>	Glistening Ink-cap	On and around stumps.
<i>C. stercoreus</i>		On old dung.
<i>Cortinarius glandicolor</i>		With <i>Betula</i> .
<i>Crepidotus variabilis</i>		On fallen <i>Quercus</i> twig.
<i>Galerina hypnorum</i>		Amongst mosses under trees.
<i>Gymnopilus penetrans</i>		On woody debris.
<i>Hebeloma crustuliniforme</i>	Poison Pie	Under <i>Betula</i> .
<i>Hygrocybe chlorophana</i>		In pasture.
<i>H. conica</i>	Conical Wax-cap	Amongst grass by path.
<i>H. laeta</i>		In pasture.
<i>H. nigrescens</i>	Blackening Wax-cap	In pasture.
<i>H. psittacina</i>	Parrot Wax-cap	In pasture.
<i>Hypholoma fasciculare</i>	Sulphur Tuft	On rotten wood.
<i>Laccaria amethystea</i>	Amethyst Deceiver	Under deciduous trees.
<i>L. laccata</i>	Deceiver	Under deciduous trees.
<i>L. proxima</i>		Boggy ground under <i>Betula</i> .
<i>Lactarius quietus</i>	Oak Milk-cap	With <i>Quercus</i> .
<i>L. subdulcis</i>		With <i>Betula</i> .
<i>Leccinum scabrum</i>	Brown Birch-bolete	With <i>Betula</i> .
<i>Lepista nuda</i>	Wood Blewit	With deciduous trees.
<i>L. sordida</i>		In pasture.
<i>Lyophyllum connatum</i>		Pathside by conifers.
<i>Mycena aetites</i>		In pasture.
<i>M. epipterygia</i>		With conifers.
<i>M. filopes</i>		Under oak etc.
<i>M. flavoalba</i>		In pasture.
<i>M. galopus</i>		On debris.
<i>M. polygramma</i>		On buried wood.
<i>M. pura</i>		Edge of pasture.
<i>M. sanguinolenta</i>		On coniferous debris.
<i>Nolanea infula</i>		In pasture.
<i>Oudemansiella radicata</i>	Rooting Shank	With <i>Fagus</i> .
<i>Panaeolus semiovatus</i>		On dungy soil.

<i>P. sphinctrinus</i>	Hoop-petticoat Fungus	In pasture.
<i>Paxillus involutus</i>	Brown Roll-rim	With <i>Betula</i> .
<i>Psathyrella piluliformis</i>		On buried wood etc.
<i>Russula cyanoxantha</i>	The Charcoal Burner	With <i>Fagus</i> .
<i>R. ochroleuca</i>	Common Yellow	With deciduous trees.
	Russula	
<i>R. nigricans</i>	Blackening Russula	With <i>Quercus</i> .
<i>R. sanguinea</i>		With <i>Pinus</i> .
<i>Stropharia semiglobata</i>	Dung Roundhead	In pasture.
<i>Stiillus grevillei</i>	Larch Bolete	With <i>Larix</i> .
<i>S. luteus</i>	Slippery Jack	With <i>Pinus</i> .
<i>Tricholoma fulvum</i>		With <i>Betula</i> .
<i>T. saponaceum</i>	Soap Tricholoma	With <i>Betula</i> etc.
<i>T. ustaloides</i>		With <i>Fagus</i> .
<i>Tricholomopsis rutilans</i>	Plums and Custard	On conifer stumps etc.
<i>Tubaria furfuracea</i>		On woody debris.
<i>Xerocomus chysenteron</i>	Red-cracking Bolete	
	With various trees.	
<i>X badius</i>	Bay Bolete	
	With conifers.	

BASIDIOMYCOTINA: APHYOPHORALES

<i>Coriulus versicolor</i>		On deciduous wood.
<i>Hydnum repandum</i>	Hedgehog Fungus	On the ground.
<i>Piptoporus betulinus</i>	Birch Polypore	On moribund <i>Betula</i> .
<i>Postia caesia</i>		On dead wood.
<i>P. stipitica</i>		On conifer wood.
<i>Stereum hirsutum</i>		On deciduous wood.

BASIDIOMYCOTINA: TREMELLALES etc.

<i>Calocera cornea</i>		On dedduous wood.
<i>C. pallidospathulata</i>		On dead wood.
<i>C. viscosa</i>		On conifer stumps.
<i>Pseudohydnum gelatinosurn</i>	Jelly Tongue	On conifer stumps.

BASIDIOMYCOTINA: GASTEROMYCETES

<i>Bovista nigrescens</i>	In pasture
<i>Lycoperdon foetidum</i>	On ground in woods
<i>L. molle</i>	On ground in woods
<i>L. pertatum</i>	On ground in woods
<i>Phallus irripudicus</i>	Under conifers etc.

BASIDIOMYCOTINA: UREDINALES

<i>Phragrnidium violaceurn</i>	On <i>Rubus "fruticosus"</i>
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MYXOMYCETES

<i>Lycogala epidendrum</i>	On rotting logs.
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