

GENUS XV. *Orchis*.

By far the largest genus of the Old World, comprising some seventy-five species, of which nine are found in Berks and Oxon.

O. simia (Monkey Orchis). Oxfordshire claims to be the only county where *O. simia* now grows. Druce writing in 1886 said that it was extremely rare and nearly extirpated. Up till 1837 it was plentiful on the Thames slopes but between 1838 and 1839 the hillsides were burnt (to enrich the land!) when many thousands of plants must have perished. To-day one sheltered locality on the chalk, limited to about half-an-acre, produces up to eighty or one hundred spikes annually in May. There seemed to be no appreciable decrease in numbers between 1931 and 1933, although nearly every year word is passed to the Reading Museum that a serious attack has been made on the colony by an ignorant flower-picker or a "botanist."

Those who have had the advantage of comparing the Oxford orchis with that from the continent detect slight differences in the species. For this reason Godfery has adopted the name *O. simia* var. *macra* for the British plant. *Simia* and its near relative, *O. militaris*, are essentially orchids of bushy slopes on chalk or limestone and sometimes grow together.

O. militaris (Military or Soldier Orchis). Although now apparently extinct in the Berkshire and Oxfordshire localities, where it formerly flourished, the writer was fortunate in finding a fine specimen of this orchis growing upon a rockery in a Reading garden during late May 1932. Although there is still some mystery attached to the origin of the plant, it is possible that it may have been a survival of the wild British species growing in a district to the extreme west of the county and transplanted to the garden, probably in 1929. Early botanists were of the opinion that *militaris* and *simia* constituted only one species. They affirmed that they were able to trace, in the examples they compared, a gradual mutation from the broad lobes on the lip of *militaris* to the slender ones of *simia*. Druce and Dr. Boswell, on the other hand, regarded the species as distinct and that they freely hybridized when growing in the same locality. The

dissimilarities between the Reading *militaris* and a fine specimen of *simia* from Oxfordshire were so striking that a detailed comparison published in the Notes and Queries column of the Reading Mercury for 4th. June 1932, might be worth while quoting :—

“ The difference in form was at once apparent, most noticeably in the lip. Whereas *simia* has long narrow middle lobes (“ the monkey’s legs ”) *militaris* has short round lobes (“ the soldier’s feet.”). The lateral lobes are also distinct : those of *simia* sweep out from beneath the hood and finish in a graceful inward curve, while those of *militaris* turn inwards under the hood as if to embrace. *Simia* has a long, pointed hood, the ends of the sepals coming together and turning upwards ; *militaris* has shorter and less acutely pointed sepals and the lateral ones bend outwards. The anther lobes of *simia* are red or red-purple, but those of *militaris* are dark brown. *Simia*’s bract is green and tapers to a fine point, while that of *militaris* is pink and very short.

“ There are many other differences both of colour and form, but perhaps the most interesting is the colour of the pollen grains. When the pollinia were extracted it was found that *simia* produced yellow pollen masses, while those of *militaris* were grey.

“ Amongst the photographs of the Society’s late secretary, Mr. H. A. King, now in possession of the Reading Museum, there is a plate of a monkey orchis, the middle lobes of which are not so long and narrow as is usual in *simia*. The lobes shown in the photograph are considerably wider at the base of the lip than at the tip and are also much shorter than in a normal *simia*. This at once suggests an intermediate stage between *simia* and *militaris*, where an ancestor may have been a hybrid.”

O. purpurea (Brown-winged or Lady Orchis). Although reported to have been found in the county, this is probably a wrong identification for *O. militaris*. It has not been a native here for the last three centuries.

O. ustulata (Burnt Orchis). In the 18th century the orchis grew plentifully upon Caversham Hill and in Caversham Warren, along with *O. militaris* and *O. simia*, but it is not found there to-day. In Berkshire it grows more freely although nowhere very abundantly. It is to be found in colonies on the downs in an area roughly bounded by Streatley, Basildon, Aldworth, Compton and Moulsoford. The substratum in every case seems to be chalk, the altitude varying between 300 and 550 feet O.D. To the west and north of the county it is also found. Godfrey records a white variety near Chiswell. The orchis should be looked for at the end of May.

O. morio (Green-veined Orchis). While common in low-lying

swampy meadows and pastures, *O. morio* grows sparsely but almost uniformly along the top of the downs. In the latter situation it is usually rather smaller in size. *O. morio* commences flowering about ten days later than *O. mascula*.

One main difference between these first flowering species seems to be that *O. mascula* is generally found growing in groups of from ten to thirty spikes about a particular locality, while *morio* is mostly dotted singly or in twos over the whole area it occupies.

O. mascula (Early Purple Orchis). As already intimated this is the first species of orchid to flower in the country, appearing in April, and is exceedingly common. For this reason it is interesting to note that *O. mascula* is primarily a plant of damp oak woods on clayey soils, and in this respect differs from all other species of British orchids, with the exception perhaps of one form of *O. maculata*. Many woodland plants, like *O. mascula*, appear early in the spring and carpet the still-damp winter clay with their bright blossoms and green leaves before the dense foliage of oaks, hazels and ash trees has had time to minimize the penetration of the light rays to the ground surface. In May 1931, in a Shinfield wood, where the soil was loam, the clearing of timber a few weeks before the appearance of *O. mascula* produced plants of enormous size. The stem of one giant measured over two feet and bore about seventy flowers! Dead Men's Fingers, as it was known to Shakespeare, is found on the Downs, almost always in concentrated groups and often close to a wood from which it would seem to have strayed. Specimens with unspotted leaves are to be seen growing amongst the more normal spotted types.

MARSH ORCHIS.

This group presents nearly as much difficulty in the differentiation of the species as do the helleborines. This is chiefly because of the numerous hybrids that have arisen through cross-pollination. Godfrey recognises five species, four of which are to be found in this part of the country:—*O. incarnata* (Hood-leaved or Early Marsh Orchis); *O. praetermissa* (Flat-lipped Marsh Orchis); *O. latifolia* (Broad-leaved Marsh Orchis);

O. maculata (Spotted Orchis). All are plants of reedy marshland in the Vale of the Thames. *O. maculata* sub. sp. *elodes* (Heath Spotted Orchis) is found more often close to the swamps of mountainous districts or in peat bogs, where the soil is acid, than in the marshes of river alluvium.

O. incarnata. Distinguished by its early appearance at the beginning of June, small flesh-coloured flowers and spotless leaves, often terminating in a little hook or hood. It is a local plant and the Berkshire localities are chiefly in the valleys of the Ock and Loddon. It has been recorded on 27th May 1933 from Coleman's Moor, near Woodley.

O. prætermissa. The separation of this species from *O. latifolia* has only been made in recent years. It is somewhat taller than *incarnata* and the flowers are usually dull rose to purple, the lip broad and flat, with tiny spots in place of *latifolia*'s streaks. There are no spots or rings on the leaves. It was not recognised as distinct from *latifolia* by Druce in his early works and would naturally be included in the same localities. It is as common or commoner than the Broad-leaved Orchis. Forms with pure white flowers were found by Druce at Abingdon (Godfery).¹

O. latifolia. Chiefly distinguished by the broad black-spotted or ringed leaves, pale flowers with dark red-violet markings and lip with sides sloping down. Step points out that it is found where *O. prætermissa* and *maculata* are growing in the same neighbourhood and may therefore be a hybrid. It is not confined to marshes.

O. maculata. Perhaps no other British orchis, not even *O. mascula*, has adapted itself quite so well to any kind of situation. It is recognised by its pale lip brightly lined with purple, and narrow spotted leaves. It is true that the forms found on the various kinds of soil exhibit many small differences but are substantially the same species. The Spotted Orchis is found on steep chalk hill slopes, as below the White Horse Hill, Uffington and on the Thames slopes, Oxfordshire; in oak woods and open beech woods on thick clay under the same conditions as

O. mascula, e.g. Pearman's Copse, Shinfield (London Clay and Loam) and wood near Binfield Heath (Clay-with-Flints); on peat soils close to bogs at heads of stream (Plateau Gravels and Bagshot Beds). The variety which favours this last position is the sub-species *elodes* which has a larger, broader and paler lip with less accentuated markings.

GENUS XVI. *Ophrys*.

The genus *Ophrys* is now generally considered to be the most highly developed and specialized in this country. According to the observations of Col. Godfery and others it would seem that the lips of the flowers mimic females of particular species of hymenoptera, the males of which emerge several days before the females and, searching for their mates, alight upon the lip. While attempting to "fertilize" the labellum these insects unwittingly pollinate the flower with their heads.

O. muscifera (Fly Orchis). Local and found almost always on the borders of or just within beech woods and thickets on the chalk. Druce records several localities in Berkshire between Streatley and Bisham where it may be found. It has several stations on the Chiltern Hills in Oxfordshire and Buckinghamshire. *O. muscifera* is about a week or ten days earlier than *O. apifera*. Godfery, on the continent, has witnessed the male digger wasp, *Gorytes mystaceus*, pounce on the lip of this species and behave in an agitated manner as if it regarded the labellum as a mate. When it flew off the pollinia were attached to its head.

O. aranifera (Early Spider Orchis). Although recorded for Oxfordshire appears not to have been seen there for many years and is now apparently extinct.

O. apifera (Bee Orchis). Much commoner and more widely distributed than *O. muscifera*, *O. apifera* seeks sheltered sunny hollows on the downs and Thames slopes. Its nearest station to Reading seems to be Whitchurch. It is often to be found in very large companies. The bee, of which the lip would seem to imitate the female, has not been recorded, but as the flowers are self-pollinating, it is possible that the species or genus of bee

that thus helped in the propagation of the orchis has died out, and that the orchis has been able to develop another system of reproduction with which to carry on its existence.

References.

- ¹ GODFERY, COL. M. J. : Monograph and Iconograph of Native British Orchidaceae, *Cambridge*, 1933.
- ² DRUCE, G. C. : Flora of Berkshire, 1897.
- ³ DRUCE, G. C. : Flora of Oxfordshire, 1886.
- ⁴ DARWIN, CHARLES R. : On the various contrivances by which orchids are fertilised, 1862.
- ⁵ STEP, EDWARD : Wayside and Woodland Blossoms, Vol. III. *Warne*, 1929.
- ⁶ ROHRBACH, P. : *Epipogium Gmelini*, 1866 (Prize Essay).

SOME NOTES ON THE WILD MAMMALS, REPTILES AND AMPHIBIANS OF THE READING DISTRICT.

W. A. Smallcombe, B.Sc.

The country to the South of the Thames supports plenty of tree vegetation, with damp, boggy areas in the valleys of the Kennet and Loddon, due to the sands and clays of the Reading beds and London clay. On the higher ground towards Mortimer are coniferous areas with heath and gorse, growing upon the dry gravel. On the Oxford side of Reading are beech woods and bushy areas with little surface water, this area being chalk and usually capped with gravel.

The Thames, Kennet, Holybrook and Loddon supply all the necessary water for the aquatic creatures we have to consider. Leaving out the many remains, which have been found in fossil or semi-fossil condition of past mammals reposing in the gravels, such as the Mammoth, Aurochs, Deer, Horse, Beaver, etc., we come to our largest local mammal, the Fox.

MAMMALS.

FOX (*Vulpes canis*).

These are quite common in the district and are hunted regularly by the hound packs. "Fox-watching" is a pastime carried out by a number of local naturalists, whose observations should make very interesting reading.

OTTER (*Lutra vulgaris*).

This beautiful animal is not by any means common here, and can scarcely be called a resident. The last definite information I have is from Coley, Reading, in 1930, when an otter remained some days near the heronry at Coley on the Holy Brook. Persecution by man has probably nearly wiped them out in the district.

BADGER (*Meles meles*).

Brock is not found in the immediate neighbourhood, the nearest perhaps being Bearwood, and further afield near Newbury.

STOAT (*Mustela erminea*).

These are fairly common and are killed as vermin by the keepers of pheasants. The colour is of the usual brown, but one specimen killed at Calcot in January 1932 had a considerable amount of white pelage.

WEASEL (*Mustela nivalis*).

Often seen about, even to crossing the garden paths in the outskirts of the borough. The weasel is a small edition of the stoat in size, but is not lacking in boldness and cunning, its snake-like form being a striking sight in the country.

RED SQUIRREL (*Sciurus vulgaris*).

Unfortunately this animal is getting quite rare in this and other districts of the British Isles, having been driven out by its more active and omnivorous cousin the Grey Squirrel (*Sciurus cinereus*), which is abundant. On one occasion I saw one running about on the face of my house, being as much at home on the rough-cast surface as upon the bark of an oak tree. The Grey, an American species, is most destructive, and will turn to almost any kind of food when in want.

DORMOUSE (*Muscardinus avellanarius*).

Not common and seldom seen, but they occur at Yattendon, where I have seen living specimens caught by Mr. N. Vaslet, who kept and bred several families quite successfully. They are delightful creatures, the hairy tail and large black eyes add to their charm. They are found also at Peppard, Oxon.; also Basingstoke Road, Reading.

HARVEST MOUSE (*Micromys minutus*).

Dr. H. Joy records finding this tiny mammal at Bradfield College, but I have never found a specimen. It is reported from Peppard by Mr. Ridley.

WOOD MOUSE (*Apodemus sylvaticus*).

Is quite a common animal, and in autumn is to be found in gardens and sheds, even at times entering houses. Several forms, such as the so-called yellow-necked Mouse, have been caught.

HOUSE MOUSE (*Mus musculus*).

As abundant as in most places in the British Isles.

BROWN RAT (*Epimys norvegicus*).

More abundant than one would wish, and is found on the Manor Farm and in warehouses. Where fowls are kept in the outskirts of the borough, the brown rat often finds a home, taking foraging excursions every evening.

WATER VOLE (*Arvicola amphibius*).

Quite abundant along the waterways, burrowing in the banks of the streams and causing a certain amount of damage, but nothing compared with the depredations of the Musquash (*Ondatra zibethica*), which has settled in several districts in Britain, but so far not in the Reading district. Two specimens were caught in the Borough, but these were traced to a pen on the Bath Road from which they had escaped.

FIELD VOLE (*Microtus agrestis*).

Quite common in the meadows, and forming a diet for the local owls.

RABBIT (*Oryctolagus cuniculus*).

Abundant and troublesome everywhere.

HARE (*Lepus europæus*).

Not uncommon in the more open areas, where they may be seen squatting or racing over the open ploughland.

HEDGEHOG (*Erinaceus europæus*).

Although not seen very often, this homely "Hedge-pig" is still to be found breeding in the district in some numbers.

MOLE (*Talpa europæa*).

Quite common in the meadows and sometimes causing concern in gardens, where the burrows undermine the more delicate plants and cause destruction.

COMMON SHREW (*Sorex araneus*).

Easily distinguished by the long sharp snout. Specimens are often found dead by the roadside with no physical damage obvious. Cats bring them in from the meadows, but will not eat them, being disgusted by the powerful musk-like scent from their glands.

LESSER SHREW (*Sorex minutus*).

Only one specimen has come to my notice, but it is probably common but not distinguished from its cousin the Common Shrew. This is the smallest British mammal, being only $2\frac{1}{4}$ in. long.

WATER SHREW (*Neomys fodiens*).

The Victoria County History says that this mammal is common in the Kennet valley. I saw two specimens and captured one in August 1933, in the garden of the Mill House, Bray. The creatures were active and not very shy, running about amongst the herbs and rose bushes. Mr. Pitcher reports a water shrew in a pond near his house, Stoke Row, Henley-on-Thames. He has observed it diving, swimming and scrambling up and down the banks.

The Chiroptera have not been well worked, and Dr. Joy has supplied most of the information and specimens available. Bats are abundant, and may be seen in evening and daytime flitting over the river banks and edges of woods.

COMMON BAT (*Vespertilio pipistrellus*).

This little fellow is a constant companion when walking in the country lanes. Its high-pitched squeak can only be heard by young ears, for the pitch is so high.

LONG-EARED BAT (*Plecotus auritus*).

This quaint species is also quite abundant, and has on a few occasions been brought into the Museum.

GREAT BAT (*Nyctalus noctula*).

These are to be seen flying high in the afternoon or evening time.

DAUBENTON'S BAT (*Myotis daubentonii*).

One specimen has been supplied by Dr. Joy.

The only other species of which I have definite information is the Great Grey Bat, of which we have one local specimen.

REPTILES.

COMMON OR VIVIPAROUS LIZARD (*Lacerta vivipara*).

Not abundant, but to be seen occasionally, especially on the South of Reading and into Hampshire. The Young are born perfectly developed, although I have seen them produce eggs which hatched within a few minutes into sparkling tiny lizards.

SLOW WORM (*Anguis fragilis*).

Fairly common along the banks of sunny meadows. These are, of course, legless lizards and not snakes which they resemble in form. Slow-worms relish slugs and thrive on them.

GRASS SNAKE (*Tropidonotus natrix*).

Found generally distributed throughout the wooded areas, some specimens attaining a length of three feet and over.

VIPER OR ADDER (*Vipera berus*).

These poisonous reptiles are quite abundant to the south of Reading, and about Padworth may be found even in the heart of the dense woods. During hot weather they may be seen lying on paths in the sunshine.

AMPHIBIANS.

COMMON FROG (*Rana temporaria*).

Found everywhere, in the damper areas especially. Large numbers are killed every spring-time as they cross roads to make their way to the ponds and ditches where they spawn.

TOAD (*Bufo vulgaris*).

Equally common, and found breeding in ponds and even ditches. Many meet a violent death by being run over during springtime.

CRESTED NEWT (*Molge cristata*).

Found in the larger ponds in the area. So also the Smooth Newt (*Molge vulgaris*). The Palmate Newt (*Molge palmata*) has been found at the Three Firs, Burghfield, and is probably commoner than is supposed, being not easily distinguished from the smooth newt.

BIRDS IN THE NEIGHBOURHOOD OF READING.

J. L. Hawkins.

From an ornithological point of view, Reading may be considered a very favourable locality, inasmuch as it consists of three river valleys and the surrounding hills which they drain. The Thames is by far the most important of these, with its extensive beech woods crowning the Chilterns on the north, and its rolling chalk downs on the south and west. The eastern portion of the District consists of high grounds capped by some of the Bagshot Sands and for the most part is covered with fern, heather and conifers—a district frequented by the Woodlark, the Fern Owl, and sparingly by the Dartford Warbler. The valley of the River Kennet affords extensive, low-lying water meadows, beloved of Heron and Corncrake. The same may be said though in a lesser degree, of the “alder crowned Loddon,” which, owing to its more secluded course, is the home of Mallard and Teal. There are also very extensive Lakes in private grounds quite near, such as Whiteknights, Bulmershe, Bearwood, Aldermaston and Englefield, all of which are covered with birds of the duck tribe in the winter, and are the nesting places of Grebes (both great and small) and other species in the summer. Birds of prey are not numerous, owing to the attention they get from the gamekeepers, but one seldom returns from a country ramble without having seen a Kestrel or two, or having heard the Tawny Owls calling to each other in the woods. Sparrow Hawks, though less frequently seen, are by no means to be considered rare, and there used to be a wood in the Bradfield district in which their nesting was not only protected, but encouraged. In two or three localities the Hobby lives fairly safely all the summer, and has brought off her broods successfully year after year. One of a pair of these birds was shot a year or so ago, but the survivor brought back a mate to the same wood the following season and reared its young. The Little Owl has increased so rapidly in recent times as to become a danger to the existence of many small birds, especially warblers. With regard to warblers we

are well off. The beech woods shelter the Wood Warbler, and the undergrowth of the oak woods forms a cover for Nightingales, Blackcaps, and Garden Warblers. The Whitethroat is abundant throughout the summer in most hedgerows, and the Lesser Whitethroat is a frequent visitor to town gardens. Returning to the downland, we get the Stone Curlew as a summer migrant, and a few pairs breed there in most seasons, but their numbers fluctuate considerably and of late years they have decidedly diminished. The Wheatear, one of our earliest spring visitors, is to be seen in the same district, and nests there every year. Quite early in the year the Lapwing lays its four eggs on the downs, and has an advantage over those which prefer the lowlands, as these latter frequently get their eggs and young destroyed by floods. The juniper bushes which grow on some parts of the Berkshire Downs offer good nesting sites for Linnets, whose nests abound, and they are also used, in the absence of other trees or bushes, by the Yellow Hammer, Cirl Bunting and other small birds. Among the river-side birds, the Kingfisher can usually be seen at all times of the year. They sometimes nest in holes in the bank, and at other times some distance from the water in chalk or gravel pits. Mapledurham is a favourite locality and there is generally a pair near the mill pool. It is most in evidence in the autumn when the numbers are considerably increased by the young birds bred in the district, and others which are more or less migratory. The reed beds and withy eyots sometimes swarm with Sedge and Reed Warblers, and occasionally one meets with the rarer Marsh Warbler. In the water meadows, intersected as they are by ditches, are seen or heard the Yellow Wagtail, Grasshopper Warbler and Landrail, though this last named species has become quite a rarity of late years. The Stonechat, Whinchat and Butcher Bird frequent the commons where furze and hawthorn bushes occur, though the last named bird is perhaps more catholic in its tastes, and nests all over the district.

There are between one hundred and fifty and one hundred and sixty species of birds to be met with in the neighbourhood of Reading, though, of course, some of these are of very rare

occurrence. Of this number, all but about forty species have been seen on the Reading Sewage Farm. This area has for many years been a prolific hunting ground for the ornithologist. Dr. Norman Joy first drew attention to its possibilities some years ago, and since then it has been a favourite spot for intensive study, especially of the wading birds. At least one hundred and twenty species have been identified there, and possibly some others have escaped notice. It is a great meeting place during the spring and autumn migration for all those species which travel to and fro. The best month in the year is probably September for then the birds remain longer on the ground and are returning to their winter quarters accompanied by their young. Possibly as many, if not more, species occur in the spring—say during April—but at that season birds are hastening to their breeding grounds and do not stay more than an hour or two. But the return journey at the end of summer is a far more deliberate affair. Unless the weather is pressing, individual birds have been known to remain on the sewage beds for a month or six weeks. This gives the ornithologist an opportunity of watching them during their moult as well as studying young birds in their immature plumage. To refer to some of the rarer birds which have visited the farm since observation has been kept, perhaps the most notable occurred in May 1922, when four Black-winged Stilts were seen. Such striking crane-like birds could not fail to attract attention, and it is a matter for congratulation that they escaped (so far as is known) the gun of the collector. With one or two doubtful exceptions it is more than a century since this species had been seen anywhere near Reading, when six birds appeared on the verge of Frensham Pond, and, of these, five were shot. Fortunately our visitors remained with us for four days, which gave many bird lovers an opportunity of seeing such a remarkable sight. Two kinds of Godwit—the Black and Bar-tailed—are occasionally seen on the mud flats feeding with the Redshank, Ringed Plovers and Dunlin there. The Redshank is a very common wader, and remains to nest every year. Curlew and Whimbrel are fairly common, the former more numerous in the winter and the latter on its migration in May. Spotted

Redshank and Wood Sandpipers are rare birds, though now and then appearing, but the Common Sandpiper (or Summer Snipe) is a regular visitor twice a year, while Snipe are always in evidence. During the winter, if the weather is severe, the number of Common Snipe is considerably augmented by the immigration of foreigners and sometimes a flock of one or two hundred are seen. The Grey Phalarope has once been recorded by Dr. Joy, and the Little Stint, although by no means a regular visitor, has been seen on several occasions. Small companies of Curlew-Sandpiper occur, though not in such numbers as the Dunlin, nor so frequently. Green Sandpiper visit us every autumn, and sometimes one or two persist throughout the winter. In the fall of 1925 they were very numerous, so much so as to attract the attention of the workers on the farm, who do not usually distinguish one species from another. Owing to the shallowness of the water the farm does not attract many species of ducks, except Mallard and Teal which are present in great numbers. Garganey and Shelduck are rare, but Shovellers are of frequent occurrence, and nest in the long grass. Ruffs and Reeves are seen regularly in the autumn, and less frequently in the spring. Of late years Turnstones have taken to visiting the farm as well as Sanderlings. Of sea birds there are enormous numbers during the winter and there is no season when the Black-headed Gull is absent. The Common Gull and the Little Gull have been recorded on several occasions, and Herring Gulls are by no means uncommon, especially after stormy weather. Black Terns make short calls every year with great regularity and the Common as well as the Lesser Tern is on the list.

The larger and deeper lakes of the district are the most favoured resorts of the duck tribe during the winter. Great numbers of Widgeon are sometimes congregated on the lake at Bearwood, as well as Pochard and Tufted Ducks. The same may be said of the water at Aldermaston, Whiteknights and Englefield, which have also yielded Smew, Golden-eye, Goosander and Merganser. Nor are the winter birds attracted only by the lakes, as the alder trees which surround most of them are storehouses of food for Siskins, Redpolls, Goldfinches and Tits, which find plenty

of seed in the cones. Crossbills are rather irregular, but are generally winter visitors, and sometimes come in flocks. Several pairs have, however, been known to nest near Reading where suitable conditions are to be found.

Attention has been drawn to the striking number of species which occur in this district, but it should be remembered that birds are not like plants in their habitat. In one year a bird may be plentiful, and always to be seen in some particular locality, but in the next we may look for it in vain, although identical conditions seem to prevail. Birds are capricious and, having the means of rapidly changing their ground, often do so, therefore the localities which have been mentioned must be considered to have only a general application.

Summary.

The Reading district possesses a diversified topography, and each type contains its characteristic birds—the heathlands of the Mortimer district, the rolling Berkshire downs, the wooded Chiltern Hills, the water-meadows of Thames, Kennet and Loddon, and the many extensive Lakes in the district.

Reading is even more fortunate, however, in possessing a locality in which about 75 per cent. of the whole list of birds can be seen and studied—the Sewage Farm.

Each district is ornithologically analysed, and the birds of the Sewage Farm are dealt with in detail.

SOME BUTTERFLIES AND MOTHS OF THE READING DISTRICT.

C. Runge.

I have been asked to give some account of the lepidoptera of the Reading District. I will not attempt to furnish a list of the butterflies and moths to be found in our neighbourhood but will deal, in however inadequate a manner, with the question of distribution as it affects certain of the insects to be found within a few miles of Reading. These may be classified under five heads :—

1. Immigrants.
2. Rare, but likely to occur anywhere in the District.
3. Rare and local.
4. Common locally.
5. Generally common.

Of course the rarity of many of the insects included in Classes 2 and 3 may be more apparent than real, as a number of moths hitherto considered rare have been found to be comparatively plentiful now that their habits have become better known.

§ 1. *Immigrants.*

These include such species as the Clouded Yellow (*Colias croceus*), the Pale Clouded Yellow (*Colias hyale*), the Camberwell Beauty (*Vanessa antiopa*), the Painted Lady (*Pyrameis cardui*), the Death's Head Hawk Moth (*Acherontia atropos*), the Convolvulus Hawk (*Sphinx convolvuli*), and many others.

The majority of these immigrants are species that are unable to withstand our winters and so perish when the cold weather arrives. Some, such as the Clouded Yellow (*C. croceus*) and the Painted Lady (*P. cardui*) are continuously brooded in their native haunts, *i.e.* the South of Europe, North Africa, etc. and do not attempt to hibernate. The result is that such specimens as should reach the perfect state in September, or even October, immediately pair and lay their eggs, the caterpillars hatching from them being killed off by the cold; others attempt to hibernate but are unable to withstand the cold in their resting-stage. The Camberwell Beauty (*Vanessa antiopa*) seems to be

in a class by itself. It has an extremely wide range, being found in Europe from the South of Italy to the North of Lapland. In the South it is continuously brooded and in the North hibernates in the perfect state. One entomologist, Dr. Chapman, advanced the theory that its inability to establish itself in this country was that our winter climate was neither hot enough nor cold enough for it. If hotter, the insect would be continuously brooded, and if colder would definitely hibernate, to do which it requires a very low temperature.

It will be seen, therefore, that the majority of our immigrants are debarred by our climate from establishing themselves here. A few insects, such as the Large White (*Pieris brassicæ*), the Small White (*Pieris rapæ*) and the Silver " Y " Moth (*Plusia gamma*) are able to breed in this country and survive the winter, but are nevertheless reinforced each year, sometimes in great numbers, by immigrants. It is a question whether the two White butterflies would be able to hold on were it not for this reinforcement, not on account of the cold, but because of the attacks of parasites.

§ 2. *Rare, but likely to occur anywhere in the District.*

An outstanding example of this class is the Alder Moth (*Acronycta alni*). This is rarely seen in the perfect state and to find a caterpillar is also an entomological event. The caterpillar is peculiar in that it is protectively coloured in its early stages and exhibits warning colours when fully grown. As a young larva it bears a striking resemblance to a bird dropping. The front segments are glossy black, whilst the hind ones are cream-coloured and have a chalky appearance. The caterpillar rests with the head bent round towards the tail, which greatly adds to the deception. The glossy black foreparts have a fresh sticky appearance, so much so that when I saw my first, and only, example, though I did recognize it as a caterpillar, I thought it was one that had had the misfortune to have a bird dropping fall directly on to it. Then in its last skin it is strikingly coloured black and orange, after the manner of the caterpillar of the cinnabar moth. This combination of colours is supposed to indicate that the creature so adorned is distasteful or dangerous to interfere with. Seeing, however, that in its earlier stages our

caterpillar is protectively coloured, the black and yellow garb which it now assumes is evidently intended to cause its enemies to avoid it as having objectionable qualities which actually it does not possess.

Another moth that is of general distribution throughout the District but is by no means common anywhere, is the Lobster Moth (*Stauropus fagi*). This again has a most weird-looking caterpillar, which in its early stages much resembles an ant, and when larger can so contort itself as to look not unlike a huge bloated spider, the front three pairs of legs, the true legs, being extraordinarily long and attenuated, and so aiding the deception.

The usual way of obtaining this fine moth is to search for it on the tree trunks in the beech woods, where it is more commonly found. If a female should be taken it will usually have paired and will thus lay fertile eggs. The interesting larva can then easily be bred if it can be taken past the first change of skin. The newly-hatched caterpillar is peculiar in that it makes its first meal of the empty eggshell and then takes no more food for a week, when it moults and then commences feeding in earnest. The caterpillar feeds on a variety of trees, of which oak and beech seem to be the most commonly chosen and *may* fall into the beating-tray anywhere in the District.

The Lappet Moth (*Gastropacha quercifolia*) is generally rare, or at any rate uncommon, in the District. The caterpillar is a fairly general feeder, being found on whitethorn, blackthorn, willow, buckthorn, etc. I found it on one occasion at Cambridge feeding on apple in my garden. It is most frequently taken in the perfect state, being attracted to light and coming to the street lamps. The moth is, I believe, more common in the fens than elsewhere, though why I am unable to say. Its favourite food plant there is the alder buckthorn (*Rhamnus frangula*).

The Great Prominent (*Notodonta trepida*) is likely to be found anywhere in the District where the oak, its food plant, grows but is by no means common. I have on several occasions found the eggs laid, not on the leaves or twigs, but on the trunks of the oak trees, and should imagine that this is the usual habit. This moth, also, comes to light and may be found on the street lamps,

as it is very uncommon in the Midlands and quite rare in the North, its distribution is no doubt affected by temperature.

Two more moths whose caterpillars feed on the oak and which may be expected to turn up occasionally wherever these trees grow are the Marbled Brown (*Drymonia trimacula*) and the Lunar Marbled Brown (*D. chaonia*). These moths also become rarer the further North one gets, and their distribution appears again to be a question of climate.

A butterfly that used to be common in the District and is now extremely rare is the Large Tortoiseshell (*Vanessa polychloros*). The caterpillar feeds on elm and the late Mr. W. Holland, who, by the way, apart from being a well-known and all-round field naturalist, was an original member of our Society, told me that at one time the larvæ were common on the elm trees along the Caversham Road, from which they could be dislodged by throwing a stick up into the branches. Their present rarity is no doubt due to the attacks of parasites. South mentions that on one occasion out of a hundred caterpillars, some collected when quite small, only one was not ichneumonated. It is unlikely that the hymenopterous parasite that attacks the larvæ is peculiar to this species but it is difficult to understand why the Large Tortoiseshell should suffer so much more from its attacks than other of the *Vanessidæ*. In this, as in many other cases, the scarcity is certainly not due to over-collecting.

To return to the moths. The last one I will refer to as being generally rare is the Dotted Chestnut (*Orrhodia rubiginea*). This has only been found in the perfect state. The caterpillar has frequently been bred from eggs laid by captured females and is thus well-known, but its haunts and habits in the wild are yet to be discovered. It will take readily to oak, plum, apple and dandelion in captivity, but it is hardly possible that any of these plants are its natural food or it would surely have been discovered on one or other of them. It is another illustration, amongst many, of how much still remains to be known of the life histories of so well-worked a group as the lepidoptera, and it should be our endeavour to acquire this knowledge rather than

limit ourselves to making collections of the insects in their perfect stage.

§ 3. *Rare and local.*

There are not many butterflies and moths that can be included in this section. The first that comes to mind is that grand butterfly the Purple Emperor (*Apatura iris*). This seems to be confined to the oak-woods to the South of the town and has been more often seen at Pamber Forest and Bradfield than elsewhere. The habit this butterfly has of flying round the tops of oak trees is well known but difficult to account for, as the caterpillar feeds on the various species of willow and not on oak. Very occasionally seasons occur when the Purple Emperor, though never abundant, is more common than usual. 1919 was such a year, when as many as twenty larvæ were beaten from willow at Pamber during the month of May. Since that date, though each year the butterfly is seen by some person or other flying round the oak trees, no more larvæ have been taken.

The Scarce Vapourer (*Orgyia gonostigma*) a little moth closely resembling the Common Vapourer (*O. antiqua*) is another moth that may be included in the rare and local class, as it seems to be practically confined to the neighbourhood of Pamber Forest, though I did on one occasion beat a few larvæ from the birches on Burghfield Common; as the female is wingless it is interesting to speculate as to how the moth gets distributed over such an area. The cocoon is very loosely woven and the eggs are laid well within the meshes and not on the outside of the cocoon as in *antiqua*. It is, therefore, possible for this cocoon to get entangled in the feet of a bird and, with its contents, be carried a considerable distance. Again, the newly-hatched larva, whilst hanging from a thread of silk, as it does when disturbed, might easily be carried away by the wind somewhat as happens in the case of small spiders.

Still another moth that may be included in the rare and local class is the Ringed Carpet (*Boarmia cinctaria*) though in some years it is fairly plentiful. A favourite locality in the neighbourhood of Reading is Burghfield Common, where there is an abundance of its food plants, birch and heath.

The Striped Lychnis Moth (*Cucullia lychnitis*) is confined to the chalk where its food plants, the dark and the white mulleins, *Verbascum nigrum* and *V. lychnitis*, grow. It is more often found in the larval stage, the green, black and yellow caterpillar being a conspicuous object on the flower-spike of the plant on whose flowers and seeds it feeds.

The Plumed Prominent (*Ptilophera plumigera*) may also be considered a chalk insect. It is to be looked for on the Oxfordshire side of the river, wherever the maple (*Acer campestre*) grows. The moth is on the wing in November and is rarely seen; most of the specimens in collections being reared from caterpillars found feeding on the maple in May.

The orange-tailed Clearwing (*Sesia andreaeformis*) has only been found, so far as I am aware, in and on the edge of the beechwoods immediately to the North of the river. The larva feeds in the stems of the wayfaring trees (*Viburnum lanlana*), not in the main stems, as the majority of the Clearwings do, but in the side shoots. It also feeds on the guelder rose (*V. opulus*), which usually grows in moist localities, so that if a careful search were made, the moth would no doubt be found in localities where this latter plant grows.

The Brussels Lace Moth (*Cleora lichenaria*) is usually associated with oakwoods, and two localities for it are Pamber Forest and Padworth. The caterpillar feeds on the lichen *Usnea barbata* growing on the trunks and branches of trees. It is variegated, greenish-grey and closely resembles the lichen. The moth is similarly coloured and is almost, if not equally, as difficult to discover, when resting on a lichen-covered tree-trunk.

§ 4. *Common locally.*

This section is a very numerous one, and I have only space to mention a few.

The first example of this class that comes to mind is the Marbled White (*Melanargia galatea*). The caterpillar of this butterfly feeds on grasses such as the Cock's foot (*Dactylis glomerata*) and the Timothy-grass (*Phloeum pratense*), which certainly cannot be considered local. The perfect insect, however, is always found in colonies which are confined to quite a

small area and yet are often composed of large numbers of individuals. There is one small piece of uncultivated land at the edge of a wood near Goring Heath where this butterfly may be seen in numbers during July and yet on similar land practically adjoining it, not a single specimen will be seen.

Another grassfeeder that is decidedly local, in this district at anyrate, is the Grayling Butterfly (*Satyrus semele*). The only locality near Reading that I know of, though there are doubtless others, is the open heathland near the "Round Oak" at Padworth. There are several small clumps of Scotch firs there and on these the Grayling is very fond of sitting. It also has a habit when settling on the bare patches of stony ground of lying on its side, when its mottled hind wings so closely resemble their surroundings as to make the butterfly very difficult to distinguish.

The Duke of Burgundy Fritillary (*Nemobius lucina*) is confined to a few woods where the primrose grows. Pamber Forest is a well known locality and the butterfly is fond of flitting about the rides in a quick erratic manner that makes its capture none too easy. So far as my experience goes, it never seems to choose primrose plants growing in the open rides on which to lay its eggs but always those in the shady overgrown portions of the wood. The eggs are laid on the underside of the leaves, singly as a rule, but sometimes five or six will be found scattered on one leaf.

Another butterfly that is usually common locally, but which is rare in some seasons, is the White-letter Hairstreak (*Thecla W-album*). This is to be found in most seasons at Hardwick where the Wych elm (*Ulmus montana*) grows. The caterpillar seems to prefer the seeds of the elm to the leaves and the butterfly when on the wing is fond of visiting the flowers of the blackberry and privet.

Before leaving the butterflies mention should be made of the Adonis Blue (*Lycæna bellargus*). This brilliant little butterfly is very erratic in its comings and goings. It was not known in the District until about 1894 or 1895 and since then has appeared

in various places to disappear again in some cases after quite a short stay. A year or so ago it appeared at Hardwick after an absence of many years and it is gratifying to have to record that it was present there in numbers this last August and had even extended its range to Mapledurham. It is very difficult to account for these vagaries as the food plant of the larva, the horseshoe vetch (*Hippocrepis comosa*) is always abundantly present. Its near relative the Chalk Hill Blue (*Lycæna corydon*) is similarly erratic and has practically disappeared from a locality at Hardwick where it had for years been abundant.

The Silver-spotted Skipper (*Argiades comma*) is found locally on the Downs at Streatley, Moulsoford, etc., and feeds indifferently on any kind of grass growing in its vicinity. One can never be sure of finding this insect in the same spot two years running and it is likely that the prevailing wind at the time the butterfly is on the wing may be the cause by driving it from one spot to another.

There are many oak feeding moths that are fairly common in oakwoods but are rarely found on isolated trees; of these a notable example is the Great Oak Beauty (*Boarmia roboraria*), which is not uncommon at Aldermaston and Pamber and is occasionally found on the oaks at Burghfield. This fine moth stretches itself out to its fullest extent on the tree trunks and yet is so protectively coloured as to be almost invisible. I "boxed" one from an oak tree on one occasion, and in so doing disturbed another that was resting immediately beneath it, which I had quite overlooked.

A beautiful little jade-green moth with pinkish-brown markings is the Blotched Emerald (*Euchloris pustulata*). The caterpillar feeds on oak and may be beaten from these trees anywhere between Burghfield and Pamber. It covers itself with small brown leaf scales and other débris, and is indistinguishable amongst the litter in the beating-tray, until it begins to move about and so betray itself.

Also to be found feeding on oak is the caterpillar of the Scarce Silverlines (*Hylophila bicolorana*), which is by no means scarce where oak trees are plentiful. The caterpillar, which is green

when it hatches out in late July or August, changes to brown immediately before hibernating, and then turns green again when it starts feeding in the late Spring. In this it resembles the Small Emerald (*Geometra vernaria*), which is locally common wherever the Traveller's Joy (*Clematis vitalba*) grows. This moth is well protected in all its stages. The eggs, which are flat and circular and of a green colour, are laid one on the top of the other in little batches and closely resemble a small tendril or leaf-stalk of the clematis. They are peculiar in that they have an aromatic perfume resembling Sweet Briar. The newly-hatched caterpillar is exactly the green of its food plant, but when it stops feeding preparatory to hibernating, it gradually turns brown, just as do the stems of the clematis. Then in the Spring, when the young leaves appear, it resumes its green colouration. The pupa, which is contained in a flimsy web, is green, and so is the perfect insect.

§ 5. *Generally common.*

Generally common is perhaps rather too sweeping a term to apply to those insects that cannot be said to be rare, there being a number that can better be referred to as generally distributed and not uncommon.

The Comma Butterfly (*Polygonia c-album*) would, a few years ago, have had to be included in the generally rare class. It is now rapidly qualifying for the generally common one. When South wrote his "British Butterflies" in 1906, he referred to the Comma as being practically confined to the Counties of Herefordshire, Worcestershire and Monmouthshire. It is now spreading all over the country, and, as previously stated, is becoming quite a common butterfly in our neighbourhood. This is particularly gratifying as, in common with other members of the *Vanessidae*, it is a frequent visitor to gardens, sharing the sweets of Buddleia, Sedum and Dahlia with the Peacock, Red Admiral, Small Tortoiseshell and Painted Lady. One day this Autumn all five of these beautiful creatures were disporting themselves on the buddleia blooms in my garden. It appears in

years gone by to have been as widely distributed as it is now becoming, and it is possible that its subsequent rarity was due, as in the case of the Large Tortoiseshell, to the attacks of parasites. Its comparative abundance in Hereford, Worcester and Monmouth throughout this period of scarcity is, however, rather against the theory. One can only hope that Large Tortoiseshell will follow this good example and become as common as it was of yore. We have so few butterflies in this country compared with our friends on the Continent that additions of this sort are particularly welcome.

The Holly Blue (*Cyaniris argiolus*) is another butterfly that cannot always be classed as generally common, though in most years it is fairly plentiful. There are two broods in a year, and the caterpillars of the Spring brood feed on the flower buds and young green berries of the holly. The dogwood (*Cornus sanguinea*) and the spindle (*Euonymus europæus*) are also mentioned as food plants and I have also seen the female ovipositing on the alder buckthorn (*Rhamnus frangula*). The progeny of the summer brood feed on the buds and young berries of the ivy.

Of course many of those insects that can fairly be called generally common, have their preferences and are not to be found in every type of locality. Thus, to mention two common butterflies, one would not look for the Small Heath (*Cænonympha pamphilus*) in woods and lanes, or the Speckled Wood (*Satyrus ægeria*) on downland or pasture. The majority of butterflies and moths do not stray far from the neighbourhood of their food plant, and thus each class of country will be found to have its special fauna. Reading is very fortunately situated in this respect, as within a few miles' radius are to be found beechwoods, commons, birch and heather country, chalk downs and of course the Thames, with its various tributaries, the Kennet, Loddon, Holybrook, etc. So that when one says that an insect is generally common, one uses the expression with reservations. It is impossible, in the space of so short an article, to more than briefly refer to the insects common to the various types of country.

In the oakwoods are to be found, in addition to the insects

mentioned earlier on, the Silverwashed Fritillary (*Argynnis paphia*), with the green form of the female (*var. valezina*), the High Brown Fritillary (*A. adippe*), the Pearl-bordered Fritillary (*A. euphrosyne*), the Small Pearl-bordered Fritillary (*A. selene*) and the White Admiral (*Limenitis sibylla*). Then there are the two Bee Hawk Moths,—the Broad-bordered (*Hemaris fuciformis*), and the Narrow-bordered (*H. tityus*), several of the Clearwing Moths, such as the White-barred (*Sesia spheniformis*), Large Red-belted (*S. culiciformis*), the Lunar Hornet (*Trochilium crabroniformis*) and many other woodland species, most beautiful of which is perhaps the Light Crimson Underwing (*Catocala promissa*), which may be taken at "sugar" during July and August, and its protectively-coloured larva, which strikingly resembles a lichen-covered twig, beaten from the oaks in May. The Downs will give us, amongst other things the Adonis Blue (*Lycæna bellargus*), the Small Blue (*Zizena minima*) our smallest British butterfly, the Silver-spotted Skipper (*Augiades comma*), Juniper Pug (*Eupithecia sobrinata*) and other downland insects. From the river banks, marshes, reed-beds, etc., may be taken amongst others, the Scarlet Tiger (*Callimorpha dominula*), the Blackneck (*Toxocampa pastinum*), the Bulrush Wainscot (*Nonagria typhæ*), the Twin-spotted (*N. geminipuncta*) and the Double Lobed Moth (*Apamea ophiogramma*). The beechwoods will yield the Lobster Moth (*Stauropus fagi*), the Barred Sallow, (*Ochria aurago*), the Maple Prominent (*Lophopteryx cuculla*) and the Barred Hook-tip (*Drepana cultraria*). In the birch and heather country are to be taken the Emperor Moth (*Saturnia carpini*), the Fox Moth (*Bombyx rubi*), the Yellow-horned (*Polyphoca flavicornis*), the Orange Underwing (*Brephos partheniæ*), and the Miller Moth (*Acronycta leporina*). All of these and many more deserve more than this brief reference, but space forbids. One would also like to discuss more fully the question of their distribution, but for the reason just given, this is impossible. Suffice to say that the butterflies and moths of the District afford abundant opportunities to biologists, ecologists and others for

the testing of their theories and that, far from being worked out as many entomologists contemptuously declare, the lepidoptera are as well, if not better adapted for such investigations as any other branch of the insecta.

THE READING DISTRICT IN ROMAN TIMES.

Norah C. Jolliffe, M.A.

In Roman times most of Berkshire, Northern Hampshire and part of Wiltshire and Surrey formed the canton of the Atrebates, whose capital was at Calleva. We know of no smaller division of territory within this area and it is not easy to define the Reading district as a separate area included in it. To regard Reading as any sort of centre would be artificial and misleading, especially in the absence of definite evidence for a settlement there in Roman times. It is therefore simpler to indicate the general lines on which the whole canton would be administered, with reference where possible to sites near Reading, and to conclude with a brief summary of the evidence for Roman occupation in the neighbourhood of Reading within a radius of about ten miles from the modern town. The Newbury and Maidenhead districts are omitted, as being more suitable subjects for separate papers. Most of the Reading district lies within the boundaries of Berkshire. The present writer, therefore, must acknowledge a very great debt to Mr. Harold Peake's recently published *Archæology of Berkshire*¹, where Roman Berkshire has received full and adequate treatment. The reader is referred to the "Archæological Gazetteer" at the end of Mr. Peake's book for an up-to-date list of finds and authorities for all Berkshire sites, for sites in Oxfordshire to *Archæologia* LXXII.² Most of the finds from the Reading district are in the Reading Museum and the writer's thanks are due to Mr. W. A. Seaby for much assistance in the Museum.

Calleva Atrebatum, the capital of the canton of the Atrebates, is identified, in view of an overwhelming body of evidence, with the well-known Roman town, near the modern Silchester, Hants. Before the excavation of this site, *Calleva* was known to have been an important station on three of the routes in the *Antonine Itinerary*, and local patriotism on inadequate grounds had identified it with various sites, including Reading. But the Silchester excavations revealed a town too large to have had a

rival a few miles away—in fact, as far as we know at present there are no other Roman towns nearer to Silchester than *Corinium*, on the site of the modern Cirencester, the tribal capital of the Dobuni of the Cotswolds, and *Alchester*, an insignificant country town near Bicester, Oxon. It has also been abundantly proved that there was an important pre-Roman foundation at Silchester founded, or at any rate organised, by Commius, a prince of the Gaulish tribe of the Atrebates. Later his sons appear to have extended the power of the Atrebates from *Calleva* over South East Hampshire, West Sussex and Kent, but before the arrival of the Romans they had been eclipsed by the greater power of the Catuvellaunian Cunobelinus (Shakespeare's Cymbeline), whose kingdom, with its capital at *Camulodunum*, near the modern Colchester, included practically the whole of South Eastern Britain. Both the Atrebates and Catuvellauni of Britain were immigrants from Belgic Gaul and had seen there the beginnings of the spread of Roman culture. They maintained and increased trade relations with the continent, importing pottery and luxury articles from Gaul and Italy. Thus they were paving the way for the coming of the Romans, though doubtless this was the last thing they desired. They were borrowing from Rome instruments of civilisation and organization with the hope of using them to establish their own independence. But shortly after Cunobelin's death the Romans embarked for the long-deferred invasion of Britain, with *Camulodunum* as their primary objective. It has been plausibly argued³ that only the Belgic tribes of Britain resisted the invaders, the rest at first regarding the Romans as their deliverers from the Belgic yoke, and that the first campaigns were dictated by the movements of Cunobelin's son, Caratacus, who, when Belgic opposition proved unavailing, fled to stir up tribes lying outside the sphere of Belgic domination, knowing that the tribes who were recently brought under his father's sway had already thrown in their lot with the invaders.

The behaviour of the Belgic Atrebates, however, is left in obscurity. The dearth of military remains in their territory suggests that they were amongst the tribes who surrendered

without striking a blow. At any rate they can hardly have had the power to make much of a struggle if they had so recently been weakened by their submission to Cunobelin. Presumably they settled down peaceably at an early date under Roman rule. The foundation of a Roman town on the site of the Belgic *Calleva* is comparable with the establishment of a Roman colony near the pre-historic *Camulodunum* and a *municipium* at *Verulamium*, in the neighbourhood of which Dr. Mortimer Wheeler has been searching for the Catuvellaunian capital where that dynasty reigned before Cunobelin transferred the seat of government to Colchester. But it is to be noted that *Calleva* was never important enough to obtain Roman status. Though it probably assimilated Roman culture rapidly from soon after the invasion, the town does not appear to have been formally planned on the Roman model till the Flavian period, a time which we associate in Britain with Agricola's governorship and a great impetus to the growth of towns all over the province. The town plan of Silchester is more complete than that of any other Romano-British town, but so familiar that description of it may be safely omitted here. For the Atrebates of Roman times *Calleva* was the centre of that form of local government which Rome encouraged in both Gaul and Britain, where it would have been impolitic to break up the tribal units. Two other tribal capitals, Wroxeter and Caerwent, have provided evidence for this type of organization, in the shape of inscriptions which record the passing of decrees by the local council or senate, not of the towns, but of the cantons of the Cornovii and Silures respectively. Silchester is the only town discovered in the Reading district, which does not even contain any of the smaller country towns of the type of Alchester. But the effects of the Roman occupation are to be detected in the rise of new, though humble, settlements chiefly along the lines of the newly constructed Roman roads (of which more will be said later), in villages, which in some cases existed before the invasion and lasted with very little change throughout the Roman period, but nevertheless acquired a slight veneer of Romanisation, manifested chiefly in a higher standard of material comfort due to the pur-

chase of Roman goods, and above all in the number of Roman villas which sprang up in all the habitable and cultivable parts of the district. Mr. Peake^{1a} stresses an interesting aspect of the distribution of the villas, when he points out that the people who built the villas of South Berkshire did not confine themselves to the chalk lands and gravel terraces preferred by earlier inhabitants, but had begun to clear the woodland area at the eastern end of South Berkshire, notably in the neighbourhood of Hampstead Norris. In the lowland, i.e. non-military, area of Roman Britain the villa or large farm was the pivot on which the whole economic system turned. Mr. R. G. Collingwood has recently advanced the theory that it was the destruction of the villa system which caused the final decay of Roman Britain, when the barbarian raids forced the villa-owners to take refuge in the walled towns. The villas had been self-supporting and more than that. The towns could not continue to exist without the produce of the villas and had already begun to deteriorate by the fourth century.

It is not possible to reconstruct the history of the Reading district in Roman times. In any case it was probably not very eventful. The rather scattered population was presumably engaged almost entirely in cultivating the soil. There are few traces of industry. At one end of the Roman period there is the foundation of Silchester, at the other the closing chapters are given by the excavations of two sites which can barely be included in the district, Lowbury Hill and Thatcham-Newtown. The small homestead on Lowbury Hill lasted from pre-Roman times into the fifth century, receiving a rectangular wall probably in the fourth century, after which it was more intensively occupied than before, no doubt because its isolated position made it safe against barbarian raiders. By contrast, the village at Thatcham-Newtown, which shewed no signs of occupation till the middle of the third century and which, lying as it did not far from the road from Silchester to *Spinae*, appears to have developed a few small industries, perhaps for trading purposes with travellers on the road, came to a disastrous end by fire soon after the middle of the fourth century, may be when the Picts

and Scots over-ran Britain in 367. The most interesting objects found during the excavations, which were carried out at intervals during the years 1924-1929, were some pieces of pewter plate recovered from a well, into which they may have been thrown for safety. But wholesale destruction in the Atrebatian district probably did not occur till the later Saxon raids. At any rate hoards of coins found in Reading include coins of Arcadius, which suggests that in this neighbourhood Roman Britain was still fighting for its life in the early fifth century. Coins of the same date were found in a villa at Hambleton (Bucks) near Henley-on-Thames.

The two village sites mentioned above have rather exceptional histories. There is also in the Reading Museum some unpublished material, chiefly pottery fragments, from a gravel pit called "The Ballast Hole" near the west end of the modern village of Theale. This material indicates the existence of a typical Romano-British peasant village which lasted from long before Roman times all through the period of the Roman occupation.

Of the villas in the district, that at Hambleton is the most remarkable⁴. Villas of first century foundation are rare, but the Hambleton villa was clearly built within a few years of the invasion and, again unlike the majority of villas, lasted on into the fifth century. One of its interesting features is a number of furnaces for drying corn. Other villa-sites have been discovered at or near the following places: *in the Thames Valley*, Harpsden (Oxon), Mapledurham, between Pangbourne and Tidmarsh, Basildon; *in the Kennet Valley*, Theale Green. Less certain traces of buildings, etc., are recorded of Brimpton and Bradfield. (There are several villas in the Newbury and Maidenhead districts).

Romano-Britons, like their predecessors, tended to settle largely along the gravel terraces by the sides of rivers. Several finds are recorded as actually taken from the Thames (from Sonning to Streatley) and the Kennet (at Reading), while the valleys of the two rivers abound in pottery (mostly fragmentary), coins, bronze and iron objects and other relics of the Roman occupation,

rarely, however, in such large quantities as to make probable the existence of any sort of settlement near the spot where they were discovered. There is also a lamentable dearth of dateable pottery, especially Samian and other finer wares. *Caversham* however has produced a burial with pottery of markedly first century date, which includes early types of Samian ware and two vases of unusual profile, recalling Early Iron Age types. The abundant finds from *Reading* itself unfortunately do not include any traces of buildings or much that can be adequately dated except coins, which by themselves are not very strong evidence for occupation, though invaluable for dating associated objects. The finds consist mainly of pottery fragments, including a very small quantity of Samian ware, and a great deal of coarse pottery, whole cinerary urns and cooking-pots as well as fragments, from various parts of the town, notably from the different brickworks off the Tilehurst Road, e.g. the Prospect Park Brick and Tile Works have produced from the claypits, continually since 1930 as the clay is cut further back, small fragments of native pottery of the second century A.D., while earlier discoveries on the same site included whole pots, animal bones, and a quern stone. Hearths as well as pottery have been found in the Grovelands pit. Coins found in Reading range from the first to the fifth century, including three hoards of fourth and fifth century coins from gravel pits near Milman Road and Bob's Mount. Bronze and iron objects are very few in number.

It has been claimed that the Anglo-Saxon cemetery discovered opposite the Jack-of-Both-Sides Inn in 1890 had a Romano-British stratum underlying it and containing Christian burials. The evidence needs thorough re-examination, but if the Romano-British burials could be accepted, it would lend support to the view that there was a definite Romano-British settlement at Reading. But apart from this it is impossible to construct a convincing theory to embrace all the various finds made in Reading. At the same time it must be remembered that they are all chance finds and in many cases made under circumstances, e.g. digging foundations or rebuilding, which were not propitious for further investigations in the same locality. There appears

to be enough material to assume some kind of occupation within the area covered by the modern town, but the nature of that occupation is difficult to determine. The almost complete absence of the finer wares makes it extremely improbable that there was ever even a villa at Reading, much less a Roman town. Possibly there was a village site in the neighbourhood of one or more of the local gravel pits, but even here speculation is hazardous. The three hoards of coins belong to the unsettled last days of Roman Britain, when fear of foreign raids often led to the concealment of money and other valuables. But they furnish no clue to where their owners lived, who may equally well have hidden them in the course of flight as on their own properties.

There is greater likelihood of there having been a settlement at *Pangbourne*. Not only pottery and coins were found there, but also several skeletons and the foundations of a kiln.

Other Thames Valley sites where Roman remains have appeared, but in small quantities only, are *Henley-on-Thames*, *Wargrave*, *Streatley*, *Goring*, *Moulsford*, *Cholsey*, *North Stoke*, *South Stoke*, and *Ipsden*. There was in all probability a Romano-British settlement at *Wallingsford*. To pursue the Thames beyond this lies outside the scope of this paper. Kennet Valley sites (between Reading and Newbury) are *Tilehurst*, *Calcot*, *Sheffield Bottom*, *Sulhampstead Bannister*, *Burghfield* and *Aldermaston*.

Though the river valleys offered the greatest inducements to settlement, a few sites owed their existence to the roads rather than the rivers. The subject of the Roman roads in Berkshire has been ably dealt with by Mr. Peake^{1b} where he summarizes the results of the latest researches. It would therefore be out of place to attempt another summary here. Silchester was an important station on three of the routes of the *Antonine Itinerary*. The sections of those roads which supplemented pre-Roman roads in Atrebatian territory were the Staines to Silchester portion of the road from London to Silchester, the Silchester to *Spinae* (probably Speen) section of the road to Cirencester and South Wales, which had a branch road to Bath,

and the road which ran from the North Gate of Silchester to Dorchester. London and Bath, it may be noted, were purely Roman foundations and could have had no place in any pre-Roman system.

Mr. Peake^{2a} writes: "In East Berkshire the population was mainly confined to two areas. . . . The first of these areas was along the road from Staines to Silchester." It seems not inappropriate to mention some of the evidence of this occupation. There was in all probability a wayside station in a field in the parish of Winkfield, where in 1783 Roman tiles and pottery were found within an area enclosed by a fosse and vallum. There are traces of a similar station at Wickham Bushes, south of Caesar's Camp, in the parish of Easthampstead. At Finchampstead there is a rectangular camp, and fragments of pottery and tiles have also been found there.

Finds along the Silchester to Dorchester road come, of course, from some of the Thames Valley sites already mentioned, while those on the Silchester to Cirencester route must be regarded as belonging to the Newbury rather than the Reading district.

Earlier roads still remained in use. The Great Ridgeway of the Berkshire Downs will be treated later in this volume, but there are two branch ridgeways described by Dr. G. B. Grundy⁵ which pass through the Reading district and must have been largely used in Roman times. One of these ridgeways is not conspicuous for Roman remains in its immediate neighbourhood, but it illustrates the connexion between the old and new road system of Roman times. It can be traced for about $9\frac{1}{4}$ miles running south from Reading through Shinfield along the west watershed of the Loddon, but it disappears after uniting for a few miles with the Staines to Silchester Roman road. The other, the "Reading ridgeway," leaves the Great Ridgeway at Lockinge Down and for five sixths of its length, with which we are not concerned at the moment, follows the watershed between the Pang and Kennet basins. The rest of it runs along the watershed between the Thames and the Kennet. There are more pre-Roman than Roman remains which can be associated with this ridgeway, but a villa at Marlston, in the

parish of Bucklebury lies not far from it. It is also worth noting that it must have served some of the Kennet Valley sites already mentioned, notably Theale and Tilehurst, as it enters Reading along the modern road from Tilehurst.

There appears to have been no road running east of Reading, where the river must have been the sole means of communication, and there are comparatively few Roman sites till the Maidenhead district is reached. Coins and fragments of pottery are recorded from *Wokingham*.

Little more remains to be said about the Reading district in Roman times, except (by way of dispelling a last illusion that at least some of its inhabitants lived in splendour) to remark that a bas-relief of a hunter and his dog from *Stanford Dingley*, a marble urn with a Latin inscription from *Earley*, and an altar to Jupiter observed by Stukeley in Lord Abingdon's grounds at *Frilsham*, are not relics of the Roman occupation, but were brought to England as souvenirs of the "Grand Tour."

References.

- ¹ PEAKE, HAROLD : *Archæology of Berkshire*. *Methuen* 1931 ^{1a} p. 114, ^{1b} pp. 85-94.
- ² MANNING, P., and LEEDS, E. THURLOW : *An Archæological Survey of Oxfordshire*. *Archæologia* LXXII, pp. 227 foll.
- ³ HAWKES, C. F. C., and DUNNING, G. C. : *The Belgæ of Gaul and Britain*. *Archæological Journal* LXXXVII., pp. 150-353.
- ⁴ COCKS, A. HENEAGE : *Romano British Homestead, in the Hambleden Valley, Bucks*. *Archæologia* LXXI., pp. 141-198.
- ⁵ GRUNDY, G. B. : *The Ancient Highways and Tracks of Wiltshire, Berkshire, and Hampshire, and the Saxon Battlefields of Wiltshire*. *Archæological Journal* LXXV. (1913).

THE DROUGHT OF 1933.

A. Austin Miller, M.Sc., F.R.G.S.

It has sometimes been said that the British Isles have no climate—only weather; but the summer of 1933 must surely have put such critics to shame. There has been throughout the summer a sense of security and confidence in the settled state of the weather that has encouraged even the most cautious to leave umbrella and mackintosh at home, and such have not often had cause for anxiety as to the wisdom of their decision. This year will long be remembered as one of the warmest, driest and sunniest within living memory, worthy to rank with the hot summer of 1911, the only occasion on which the 100° F. mark has been reached in this country (Greenwich, August 10th) and the great drought of 1921. Such spells of abnormal weather make us wonder whether our climate is undergoing any change, whether temporary, progressive or cyclical; certainly they must be due to some abnormality in the influences that control our weather, and it will be the object of this paper to discover how 1933 differed in these respects from more normal years.

§ 1. *The Climates of Western Europe.*

The changeability that makes our weather so interesting, and at times so exasperating, is due to our position in a much frequented track of the cyclonic storms or "depressions" which pass in procession across the North Atlantic and the adjacent lands, especially during the winter months. It is only when, for a time, these depressions desert our islands for some other track that our weather becomes settled and that the Air Ministry dares to issue a confident "further outlook." We are continually reminded by the weather forecasts that the direction taken by these depressions is, in general, from West to East, or South-West to North-East, though it is by no means rare for them to move in other directions, and even from East to West: but the direction taken by any individual storm depends upon the prevailing distribution of atmospheric pressure, not only at the earth's surface, but for some distance up, even to the base of the stratosphere (i.e. six or seven miles in our latitudes). It may be informative,

therefore, to examine more carefully the well-known features of the distribution of atmospheric pressure over Western Europe and the North Atlantic ; for weather is not a matter than can be considered parochially, it is an international and inter-continental concern.

The prevailing South West wind experienced by us, especially in winter, is part of a great air stream that flows from a vast region of permanent high pressure centred over the Azores Islands and extending over North Africa and the North Atlantic, which we may call the " Azores High " or " Azores Anticyclone," to an equally vast region of low pressure centred near Iceland, which we may call the " Icelandic Low." From day to day the wind direction may be modified, or even reversed, by local influences, or by the swirl of air round a cyclone, but these eddies and cross-currents are of little effect compared with the steady flow of the planetary winds. In the " Azores High " (the source of these winds) and in the " Icelandic Low " (their destination), we have two of the major controls of the climates of Western Europe, the third major control is not an area of permanent high or low pressure, but one of changing pressure, namely the land mass of the Continent of Europe. Here, in winter, the air, chilled by radiation from the land surface, becomes cold and heavy, giving rise to a well marked anticyclone which can be easily recognised on the maps of mean pressure from November to March. But in summer the air, heated by the sun's rays, becomes warm and light, giving rise to an equally clearly marked " Low." In summer this low-pressure area merges with the " Icelandic Low," and shares with it the function of centre of attraction of cyclones, and the destination of winds. Summer winds in western Europe are therefore more nearly due West than in the winter, when as we have seen, they are prevailingly by South-West.

§ 2. *The Climates of the British Isles.*

Now each of these pressure areas, or " centres of action," has its own characteristic weather. The " Azores anticyclone " is fine, warm and dry ; it is the main cause of the Sahara desert, and in the summer it spreads north to give the Mediterranean lands

at this season their sun-baked, arid climate. The "Icelandic Low" is raw, stormy and wet, with an almost constant procession of depressions, to the frequency of which, in fact, it owes its low average pressure. The "Continental High" of winter is cold and dry, with severe frost, little snow and no rain. The "Continental Low" of summer is hot, dry and dusty, relieved by heavy rain-storms of a thundery nature.

Surrounded on all sides by weather systems of such varying natures, the British Isles is a sort of "No Man's Land" over which a constant struggle for possession is waged. Often in winter the Continental anticyclone spreads its influence over us, and we are in the grip of severe frost, with, probably, bitterly cold, dry East winds; we need go no further back than the January of this year, when a week's skating was enjoyed on the lakes round Reading, for an example of this type. Sometimes, more especially in winter, we are the playground of depressions of the Icelandic type for weeks on end. Sometimes, in summer, we have spells of hot, dusty weather with desiccating East winds from the Continent, broken by violent thunderstorms. And sometimes, as has happened this summer, the Azores anticyclone has spread its mantle beyond its usual border, and given us a summer which, in drought, sunshine and heat, recalls the sunny lands of Italy and the "Midi."

It is, of course, most frequently the eastern counties of England and Scotland that suffer invasion by the Continental frosts; Scotland and Ireland that know best the Icelandic depressions; and the southern counties that enjoy to the fullest extent the delights of a Mediterranean summer, and, by the same token, suffer the privations of a Mediterranean drought. These are the essential features of any climatic subdivision of these islands which, it will be appreciated, have no climate of their own, but import it impartially from their neighbours on all sides.

§ 3. *Droughts.*

This article, however, is particularly concerned with droughts, and especially with the drought of 1933, and our next step must be to consider in more detail what conditions give rise to prolonged droughts. It seems like labouring the obvious to emphasize

that a drought is due to deficiency in rainfall, but we must not forget that the seriousness of a drought may be mitigated or exaggerated by a number of other circumstances. Drought accompanied by a hot dry wind (nearly always from the East) as in parts of 1911, is more desiccating than a drought with calms and relatively moist air, as in 1933 ; again, a drought following a dry year, when the water-table has sunk in the chalk below the well bottoms, will be more devastating than one following a wet year, when springs may continue to flow with the last year's water ; a drought in spring when the crops are growing is a curse, while a drought at harvest time is a blessing. However, a drought is essentially due to a failure of the rains ; and from an analysis of the great droughts of the past, we can say that this is due to one of two causes ; droughts, that is, are of two types :—

(1). A high pressure develops over the British Isles and spreads over the North Atlantic ; and a low pressure develops further South, over the Mediterranean. This has two results, both inimical to rainfall over these islands :

(a) The normal pressure gradient is diminished, or even reversed, and instead of getting wet South West or West winds off the Atlantic, we get dry East winds off the Continent of Europe. The mountains of our North West coasts, which stand athwart these South West winds and tap their moisture, are bereft of their normal supply, and the rivers that take their rise in these mountains shrink in volume.

(b) The depressions, instead of passing up our West coasts, or across these islands, follow a track along the Mediterranean (low pressure) or up the East coast of America to Greenland and Iceland, thus robbing us of the valuable rain that these storms normally bring.

This is a common arrangement in winter and causes many short winter droughts, which are not of great significance, but only two serious summer droughts (1895 and parts of 1911), out of ten that have occurred since regular records were initiated, have been of this type. It will be noticed that the pressure distribution is a direct reversal of the normal, and being established in defiance, as it were, of the atmospheric circulation, can only be maintained for long by very abnormal conditions.

(2). Eight of the ten great droughts (1864, '68, '87, '93, '96, 1921 and '33) have been due simply to an extension of the Azores anticyclone, enveloping the south of Britain and fending off the cyclones, which therefore pass up the Atlantic seaboard to the west of Ireland and Scotland. It seldom happens that the high pressure succeeds in keeping these rain-bearers entirely out of the islands, and our mountainous western seaboard has not often shared in these droughts, whose severest visitations have been restricted to England and Eastern Scotland.

§ 4. *The Drought of 1933.*

In the following table the first column shows the rainfall recorded at the University station for the present year, the second column of figures giving the departure from the mean.

	READING. (University)		STORNAWAY		KEW		KEW		KEW
	Rainfall in inches.	Excess (+) or Deficiency (-)	Rainfall in Inches	Excess (+) or Def. (-)	Mean Temperature	Excess (+) or Def. (-) °F.	Hours	Excess (+) or Def. (-)	Days with Thunder
January ...	1·85	-05	5·70	+·5	37·9	-1·1	39	-4	0
February ...	3·93	+2·29	3·45	-1·0	41·3	+1·1	76	+16	1
March ...	2·58	+·87	1·20	-1·8	46·5	+4·0	178	+73	2
April ...	1·24	-22	2·85	-2	49·7	+2·3	175	+18	1
May ...	2·56	+·91	·92	-1·9	56·1	+2·7	173	-28	6
June ...	1·75	-20	2·06	-3	62·1	+2·9	259	+62	7
July ...	1·29	-74	2·50	-6	68·3	+5·6	244	+43	2
August ...	0·46	-1·63	6·10	+2·5	66·8	+5·2	250	+63	1
Sept. (1-23)	2·20	+·86					181		
Year up to Sept. 23 ...	17·86	+1·89					1575		

At first sight it would appear that there has not been any drought this year! The rainfall up to the September equinox is nearly two inches above the normal; but on closer inspection this is seen to be chiefly accounted for by excessive rains in

February, with a rather wet March and May. It was, in fact, not until June that the drought really began, and it is in this respect that the summer of 1933 has been a popular drought, bringing more delight than suffering. For the spring rains pleased the farmer by watering his crops, and the summer drought, with its heat and pleasant sunshine, delighted him by ripening his grain some weeks earlier than usual, and allowing him to gather a plentiful harvest under ideal conditions. The holiday maker, too, has cause to remember this year, for not only has the holiday season been dry, but, as the above figures show, it has been uniformly warm and sunny. July and August both enjoyed temperatures some 5° warmer than the normal for the month while June, July and August between them have had 168 hours more sunshine than in an average year. At many places in the South and East, August was the sunniest and hottest since the records of weather have been kept, 92° F. was recorded at South Farnborough on August 6th, and the Reading (University) shaded thermometer reached 91.5° F. This was the hottest day of the year, and came as the climax of a heat wave during which the thermometer passed the 80° mark for eight days in succession. It included, it will be remembered, the August Bank Holiday week-end, which, like the Whitsun week-end, ranked among the hottest on record. Too much heat and sun are rare embarrassments at these seasons, but many would agree that the optimum had been overshot this year.

The year early began to create records for heat waves, 86°F. being recorded as early as June 5th (Whit Monday), and continued to produce them until well into autumn, 83.1° F. being recorded as late as September 5th, and over 90° F. at many stations during the last week of August.

In most years such hot spells would breed thunderstorms, but not the least remarkable feature of 1933 has been the stability of the air and the virtual absence of such storms. For weeks on end the afternoons have been as settled as the mornings, and the sun has gone down on a serene sky which promised a fine night and a fine morrow. July and August, usually the most thundery months, have shared between them only three days on which thunder was heard.

But it is for sunshine that the year promises to be a record one. Up to the equinox (September 23rd) Kew has logged 1575 hours of sunshine (already 100 hours in excess of the average for the whole year). Only 190 hours are now required to beat the record held by 1899, and even if for the rest of the year sunshine falls 10 per cent. below the normal, 1933 will go down as the sunniest year since records were instituted more than 50 years ago.

To return to the subject of drought—the Meteorological Office defines a drought “as a period of 15 or more consecutive days on which no measurable rain (0.01 in.) falls.” Actually there has been no such thing in Reading so far this year! a small fall has always arrived to cheat the statistician. Thus April 1st—11th were quite dry, but 0.12 in. fell on the 12th, while 13th—20th were rainless. Again, August 23rd—30th were quite dry, the 31st had 0.07 in. and September 1st—10th were rainless. July had two rainless spells of 12 days, but never an official “drought.” Yet nobody would deny that there has been a drought at Reading this summer; the ponds and rivers, crops and lawns showed it in no uncertain manner. The small rainfall deficiency of June was followed by a July with less than two-thirds the normal amount, an August with less than a quarter of the normal, while September opened with the ten-day dry spell mentioned above.

Other areas, especially in Eastern England, fared still worse. There was an absolute drought in Eastern England from May 27th to June 13th; water supplies ran low or failed altogether, grass and root crops suffered severely, and forest and heath fires caused widespread loss and desolation.

The drought has served to draw attention to the unsatisfactory state of many rural and some urban water supplies, and may perhaps have brought home to the authorities that a supply of water should be based on requirements in years of minimum, not average, rainfall.

§ 5. *Causes of the 1933 Drought.*

I have beside me as I write the complete set of daily weather maps for the year up to the September equinox, and on turning

them over one by one I find the great majority characterised by anticyclonic conditions; the anticyclone in each case can be clearly identified as the one extending from the Azores. In earlier examples (January to March) it is generally united to a second anticyclone centred over Western and Central Europe, the two together forming a solid ridge of high pressure, a defence against which the Icelandic depressions have been impotent. In later maps our islands have been under a northward bulge of the isolated Azores High, which has waxed and waned from day to day. This dominance of our weather by this fine weather system is shown on the charts for March 25th to April 19th; April 22nd—24th; May 11th—30th; June 4th—12th; June 14th—16th; June 26th—July 6th; July 16th—30th; August 24th—September 11th.

In many other maps the South of England is under the fair weather system, though the North and West are under cyclonic influence. Clearly the drought is of the second type described above (§3. (2).) and in this it resembles our last great drought (1921), and, like it, has been most complete in the South and East. Scotland and Ireland have shared in a dry year, but have not really suffered a drought. The rainfall figures from Stornaway, given in the table, show that only May (a wet month in the South) has had any considerable deficiency, and that August (our driest month) has had a considerable excess of rain. The fact is that the West winds on the edge of the high pressure area have brought it adequate rain off the ocean, and, for the last half of the month, a procession of cyclones, skirting the anticyclone, has added considerably to the total.

To seek more fundamental causes than these would lead us into wide speculations which would take up much space and give little satisfaction. Among other things it appears that the strength of the Trade Winds in the preceeding year, both in the North and South Atlantic, by affecting the strength and warmth of the Gulf Stream Drift of the current year, affect the intensity of the Icelandic Low, and so bring a wet year to Britain. Again, the amount of ice round Greenland and Iceland, by mixing with, and chilling the Gulf Stream Drift, has a similar effect. In some

mysterious way that at present defies our scrutiny, our weather seems bound up with the Nile flood and the atmospheric pressure in Argentina. But these correlations, observed for some time, are still unexplained, and to make use of them at the present stage in forecasting droughts is to invite disillusionment and the loss of confidence of the scientific world.

§ 6. *Recurrence of Droughts.*

Is the 1933 drought, like that of 1921, to be a single episode in the midst of a long dreary spell of wet years? Or may we look forward to drier and sunnier years to come? It is a gloomy fact, but one quite easy to believe, that the present century, although less than 33 years old, has had enough rain for 34 years, and a complete drought for 12 months would scarcely put the balance on the right side. Surely it is legitimate to hope for an improvement which will save the face of those who delight in averages, for there does appear to be some compensation in meteorology whereby excesses or deficits are eventually wiped off. We hoped for the turn of the tide after the dry year of 1921, but 1924 was one of the wettest summers on record, and 1927 was wetter than any year since the rot set in in 1903. But although there is no space to consider the matter here, there are indications that the pendulum has at last begun its backward swing; however, the lesson of meteorology is to avoid disappointment by expecting the worst.

REPORT ON THE
OCCURENCE OF IMMIGRANT LEPIDOPTERA
IN THE NEIGHBOURHOOD OF READING
DURING 1933.

R. E. G. Smith, A.L.A. (*Recorder for Berkshire and Buckinghamshire S.E.U.S.S. Immigrant Insects Scheme*).

The Scheme organized by the South-Eastern Union of Scientific Societies for the systematic record of the movements of migratory insects is an attempt to approach from a different angle the great problem of migration. "By selecting the type of migrant having the feeblest intelligence, the slowest means of locomotion in relation to its environment, the shortest life history as compared with the seasons, the absence of the need of parental care of the embryo or feeding as an adult, we approach the problem of insect migration as the lowest common denominator of all the factors presented in the main problem. And yet the migration of insects is the only class which has never been systematically studied, a fact which is mainly due to the lack of any system of collecting data. It is this neglect which our Committee have been appointed to attempt to remedy in Great Britain." Such is the aim of the Scheme as explained in the Report for 1932.

The year 1932 was, on the whole, not a good year for immigrants; 1933 is proving much more satisfactory. Up to the present quite a good number of records have been received, though I am certain that there are other observers to whom the Scheme is unknown and yet whose observations might be of considerable importance.

Records showing evidence of actual migration in progress have been received of only one species, *Pieris rapæ*. Mr. W. E. Hodson reported that on May 20th and 21st he observed of this species "a drift to the north singly at the rate of 30 to 40 per hour, independent of wind, and none returning." Mr. W. Street reported abnormal numbers at Shiplake, April 6th to 28th, but observed no actual migration. On July 9th, however, several

hundreds were seen in the low meadows by the river at Shiplake at about 2.30 p.m., a very large proportion being males; by 4.30 p.m. only 50 or 60 remained.

The following summarises the reported occurrences of other migrant species:—

Pyrameis cardui. April 28, Shiplake (W.S.); May 18, Sulham, one worn (H.L.D.); June 3-5, Pamber, 5 good condition, (J.P., J.C., R.S.); June 4-5, Hook, several (H.T.); early June, Hyde Heath, near Amersham (S.I.W.); July 10, Woodley (H.L.D.).

Pyrameis atalanta. April 2, Shiplake (W.S.); April 7, Reading (H.L.D.); May 24, Woodley (J.P.); May 31, Combe, near Hungerford (G.B.); June 1, Reading (J.P.); June 5, Burghfield and Pamber (R.S.); July 10, Woodley, five (H.L.D.).

Colias croceus. July 30, Hardwick, perfect female (C.R.); August 19, Calcot (W.A.S.); August 25, Mapledurham, 1 male (C.R.); August 31, Mapledurham, 1 male, 1 female (C.R.); during August, Hardwick, 6 male and one female (L.R.) Both the females were in an exhausted condition when captured, one laying about ten eggs and the other none; both retained about 50 ova at death.

Colias hyale. August 27, Hardwick, 2—one male captured in good condition (L.R.).

Macroglossa stellatarum. August 16, Goring Heath, 1, fresh (C.R.); August 23, Reading (W.A.S.); September 2, Mapledurham (C.R.).

Plusia gamma. May 22, Slough, 6-8 (G.A.B.); May 25, Sulham, 8 (H.L.D.); June 10, Pamber, dozens (H.L.D.); July 10, Woodley and July 21, Hardwick, common (H.L.D.).

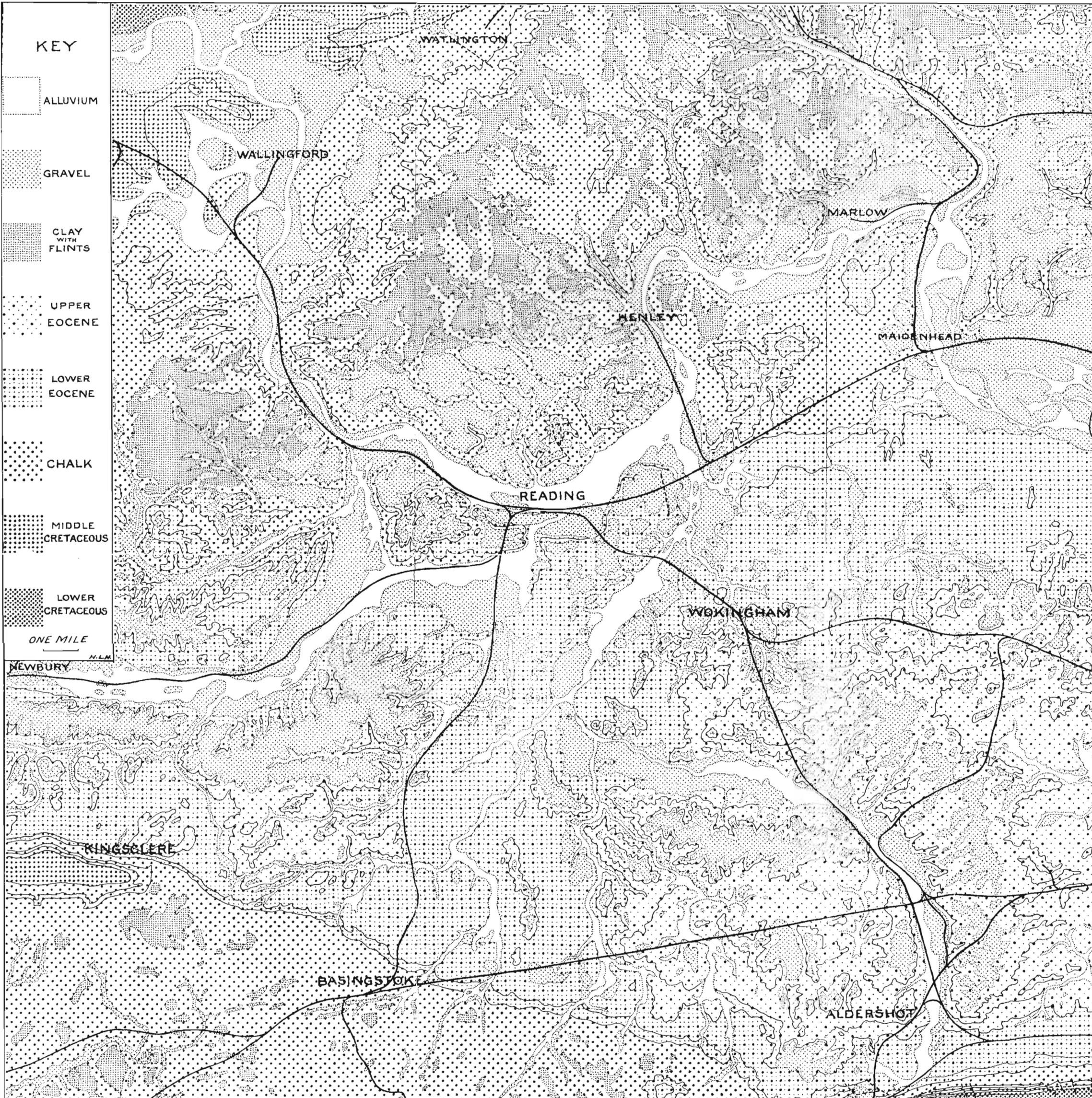
Herse convolvuli. August 31, Reading, worn (W.A.S.).

Nemophila noctuella. July 25, Sulham, about 20; August 8, Woodley, dozens; September 3, Pangbourne, about 20 (H.L.D.).

The summer and autumn individuals of many of these species are most probably offspring of early spring migrants, whose presence passed unnoticed. It is interesting to notice the abundance of *Vanessa io* (Peacock Butterfly) this year after several years of comparative scarcity; it seems almost as common as the Small Tortoiseshell (*V. urticae*) and much commoner than the Red Admiral (*V. atalanta*). This sudden abundance may be explained in several ways, but is quite possibly accounted for by an unusual influx from the continent. The Comma (*Polygonia c-album*) seems as widely distributed as in recent years, but perhaps not quite so common; Mr. W. A. Smallcombe reports the capture of another larva of this species, the second to be found in this district.

On the whole, this season has been a good one for insect life, though the extensive heath and forest fires are likely to affect some local species, and the season will quite probably close early.

20th September, 1933.



Geological Sketch Map of the Reading District.

QVAESTIONES NATVRALES.

Vcl. I. No. 1.

1933.