



*Photos: D. R. Hughes.*

Fig. 5. Upper.

CORLEY CUTTING. A cutting in the Corley Conglomerate and associated red sandstones.

Fig. 6. Lower.

HARBURY QUARRY. Lower Lias (Blue Lias) consisting of thin hydraulic limestones and shales. Modern workings for cement making.

At this stage it is convenient to terminate these brief notes on the 'solid' formations of the Coventry district. Although there can be no doubt that the upper part of the Lias, the rest of the Jurassic system, and Cretaceous rocks were once deposited in our area, they have now been worn off, and to examine them we have to go increasing distances to the south east, beyond the area which we are specially considering.

### THE ALPINE EARTH MOVEMENTS AND SUBSEQUENT EROSION

Another period of major earth movement occurred mainly about the end of the Palaeogene (p. 3). The area of the Warwickshire coalfield was uplifted, tilting the overlying Triassic and Jurassic rocks mainly to the south east. A great fracture, the western boundary fault, running from Tamworth, via Meriden, to Warwick, leaves the coalfield uplifted relatively to the country to the west (see Fig. 1), and another fault (Nuneaton Fault) separates the Cambrian and Pre-Cambrian from the Trias of the Leicestershire plain. By these movements, the geology of the Coventry area took on its present shape; during the succeeding millions of years up to the present day, erosion has stripped off Cretaceous and earlier rocks to leave the broad outcrop pattern that we see today (Figs. 1 and 2).

### THE PLEISTOCENE PERIOD

There remain to be described the very newest deposits, which belong to only the last few hundred thousands of years, and some even to the last few thousands of years. These are the Superficial or Drift deposits. They are shown, somewhat generalised, on the map (Fig. 1) but have been omitted from the block diagram of the area (Fig. 2). Though relatively thin, they cover a large area, exercising a profound influence on soils, and so on vegetation and economics; and they contain within themselves the evidence of fascinating changes in climate and geography which have occurred in what, geologically speaking, is only yesterday. Most people are aware of the fact that, during what is popularly called the Ice Age, glaciers developed on our high land and advanced from there, and from north-west Europe, on to our lowlands. The process was not simple for there were three major periods of cold, and so of glacial maxima, which are often given the names of Mindel, Riss and Würm; we will simply call them here, First, Second and Third. Each was itself a complex sequence of

events, with oscillation of the ice front, while between each complex the climate warmed sufficiently to dispel the glaciers from this country. The first of these **Interglacials** (between the First and Second Glaciations) is a long, but not particularly warm, period known as the Great Interglacial. The Last Interglacial (between Glaciations 2 and 3) is shorter, but with a sub-tropical climate, for such animals as the lion and hippopotamus lived in England.

The First and Second Glaciations pushed their ice sheets as far south as Gloucestershire and Essex, so that then the Coventry area was ice-covered, and deposits of these glaciers — pebbly clays called **boulder clays** or **tills**, are to be found. As the glaciers advanced on to, or retreated from, an area, their melt waters could lay down sheets of sand or gravel, and such deposits are also common in our area. The Third Glaciation never reached south of a line through Burton, Lichfield and Wolverhampton, and so during this time the Coventry district was not actually glaciated. It was a tundra, over which roamed such animals as the mammoth, woolly rhinoceros, bison and reindeer.

The story of the effect of the various glaciations upon the Warwickshire area is complex and unexpected. We now know that the River Avon came into existence during this time. How this came about can only be briefly summarized.

When the First Glacier advanced, there was no Avon valley. From a point north of Bredon Hill, a broad open valley sloped down to the north-east, past Stratford, Warwick, Wolvey and Leicester, to join the Trent. We can call this the Proto-Soar. On the other side of the coalfield, the Tame flowed northward to the Trent as it does now. The First Glacier laid down on this topography a red boulder clay (the Bubbenhall Clay), but during the succeeding Great Interglacial, most of it was eroded away, and only a few patchy relics now remain.

Just before the Second Glacier advanced, the river of the Proto-Soar was laying down gravels in the middle of its valley, and later sands on top of them (the Baginton-Lillington gravels and Baginton Sands). The climate was cold, and bones of the mammoth, woolly rhinoceros, reindeer, horse, giant ox and hyaena have been found in the gravels at Lillington and Church Lawford. Then the Second Glacier, advancing from the north, blocked up the lower end of the Proto-Soar near Leicester and also the River Tame. Simultaneously, a glacier advancing down the Severn Valley formed a wall at the top end of the Proto-Soar near Bredon. Between these two ice walls a great lake, up to 50 miles long, formed, with a water level as high as 430 feet above present sea level. It has been named 'Lake Harrison' (Fig. 8). It overflowed across the Edge Hill escarpment, sometimes down the Cherwell

valley, and sometimes down the Evenlode. In the lake a thick series of clays, often laminated, was laid down. The clays are well seen in the pits at Wolston, and are in fact known as the Wolston Series. Eventually the northern ice pushed over its own lake deposits, right down to Moreton-in-the-Marsh. It then shrank back northwards,

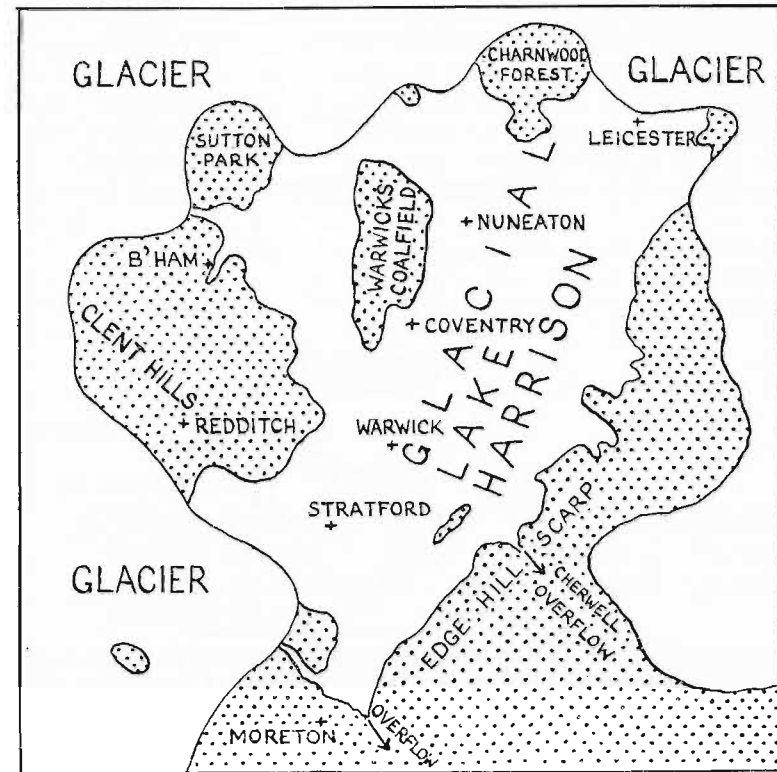


Fig. 8. The maximum extent of Lake Harrison impounded by ice-fronts and high land along the present-day valleys of the Avon, Soar and Tame. Unglaciated land, at this stage, is shown dotted.

laying down a mass of outwash gravels (the Dunsmore Gravels) on top of the clays, and for a while the lake re-established itself.

As the climate improved and the ice sheets dwindled, the barrier at the Severn end became incapable of holding up the water. As it poured out, it cut deeply into the lake deposits and the valley so

formed extended back to the north-east. So the Avon was born and in due course worked its way right back to beyond Rugby. The cut was eventually so deep that relics of the deposits of Lake Harrison are left forming the tops of the hills. Collectively these are shown on Fig. 1 as the Older Drift. It is paradoxical that to find these lake deposits now, we have to look on the hill tops rather than in the valleys; but

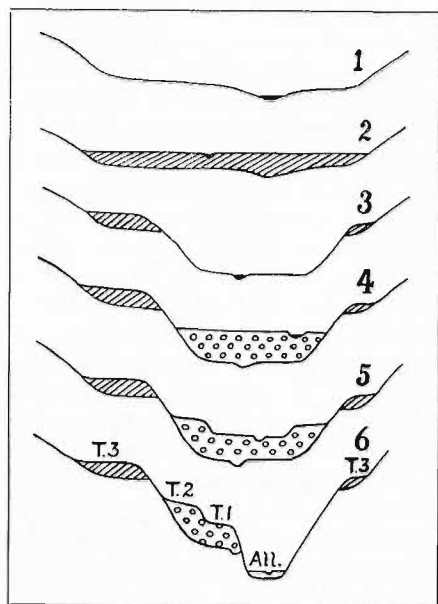


Fig. 9. Diagram showing how alternations of periods of sedimentation and of downcutting give rise to a series of river terraces (T 1-3) above the modern valley alluvium (All.).

north of the River Avon the old Proto-Soar valley still remains plugged with over 200 feet of Older Drift, mainly clays, as has been shown by borings in the Wolvey and Shilton district.

The formation and incision of the River Avon was not done in one simple operation. It was a sequence of episodes of downcutting, deposition of alluvial gravels, more and deeper erosion, further laying down of gravels and so on. At each stage of downcutting, relics of the old alluvial plain were left as shelves on the sides of the valley (Fig. 9). Along the lower Avon five such terraces can be recognised, but the highest (No. 5) is absent from the Coventry area. All the other four are well known, the highest being about 55 feet above the river

at Warwick, but only 30 feet at Brandon. Collectively these terraces can be termed the Newer Drift.

During this period of terrace formation there were great climate changes. The gravels of No. 3 belong to the Last Interglacial when the climate was sub-tropical. Coventry Museum has a magnificent skull of a hippopotamus which came from this level, opposite the Alvis works, in Coventry. In the top gravels of No. 4, mammoth has reappeared, and there are also the oldest man-made stone tools known in the area. They belong to the late Acheulian phase of the Old Stone Age. They include hand-axes of quartzite and flint, and at least nine have been found at Baginton. Terrace No. 2 is contemporary with the Third Glaciation, and once more, with the climate arctic, the bones of the mammoth, woolly rhinoceros, bison and reindeer are found.

So we come, in our story from the Pre-Cambrian of well over 600 million years ago, to the present day. It has been a much summarized account and if the reader wishes to pursue his studies further, useful references are given below.

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## TOPOGRAPHY AND SOILS

by F. W. Shotton

## TOPOGRAPHY

It is appropriate to discuss the variations of topography and soil types within the Coventry area, after consideration of the geology, for both the former are controlled by the latter. Fig. 10, which is a simple contoured map, covers exactly the same area, though on a different scale, as the geological map, Fig. 1, and comparison of the two should not be difficult.

The Coventry area, in the very heart of England, lies, not surprisingly, athwart the main English water divide, separating the drainage of the North Sea from that of the Bristol Channel. The rivers and streams in the northern half of our area belong to the first category. The River Blythe, flowing northward, is joined from the west by the Cole and the Tame, near Coleshill. Continuing northward (but now called the Tame), it is joined at Tamworth by the Anker, draining from the Nuneaton and Market Bosworth region, and so continues outside our area to join the Trent, the Humber and the North Sea. In the south, the Sherbourne joins the Sowe which flows into the Avon at Stoneleigh Park. The Avon, which rises near Naseby in Northamptonshire, flows in from Rugby and continues down through Warwick, at which point it is joined by the Leam from the east. It continues beyond the area, across the Vale of Evesham, to join the Severn at Tewkesbury, and so to the Bristol Channel and the Atlantic.

The position of the main English watershed is shown on Fig. 10, and in detail its course is unexpected. For much of the country, the water divide, which separates the east-flowing from the west-flowing rivers, naturally runs north-south (e.g. the Pennines), but in Warwickshire it makes a great loop due to the unusual history and development of the river Avon during the Pleistocene Ice Age. This has been briefly described in the section on geology. It is surprising to realise that, in the very heart of the country, the watershed can be as low as 350 feet above sea level, which is the case just east of Bedworth. It is almost confusing to stand anywhere on the ridge between, say, Fillongley and Berkswell, and to realise that the streams flowing to the west will eventually join the North Sea, and those flowing to the east (like the Sherbourne) will finish in the Bristol Channel and the Atlantic.

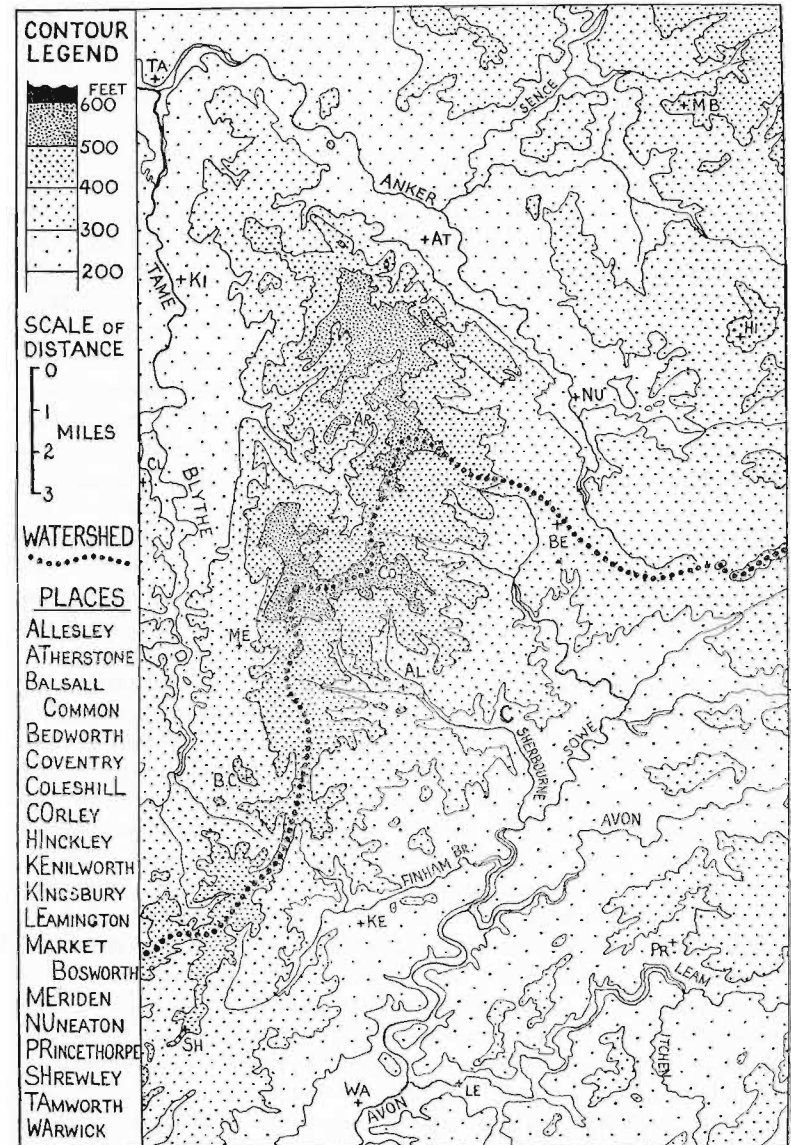


Fig. 10. Topography map of Coventry District.

There is no very high land in the Coventry area. At one point only, (Hollyberry End,  $1\frac{1}{2}$  miles north-east of Meriden) does the surface lie more than 600 feet above sea level. Nevertheless, a comparison of the geological and topographical maps shows that the Warwickshire coalfield clearly stands out as an upstanding mass, largely above 400 feet, from the lower-lying land of the Tame valley on the west, the Anker-Sence (Leicestershire plain) to the north-east and the Avon valley to the south-east. This is a clear and simple reflection of the geology — the harder rocks of the Cambrian and Carboniferous contrasting with the less-resistant Keuper Marl and Glacial Drift. The most striking relations between topography and geology occur at the Western Boundary Fault and Nuneaton Fault. The rapid rise of land at the Western Boundary Fault is very clear, and standing near Maxstoke or on the top of Meriden Hill, one can look west across the great expanse of the Tame Valley to industrial Birmingham. In the same way, from the Hartshill Ridge running north-west from Nuneaton, and made by the resistant Cambrian rocks, one can look over the great expanse of the low-lying Leicestershire plain. Within the coalfield area there are tracts of somewhat higher ground due to the resistance of the more important bands of sandstone and conglomerate. In particular, the ridge which starts at Radford (Coventry) and goes through Corley, Corley Moor and Hollyberry End, is directly due to the outcrop of the Corley Conglomerate.

Not all the ground outside the coalfield area is uniformly low-lying. The Older Drifts, once a much more continuous sheet, still remain as quite extensive areas between the rivers which have cut through them, to leave plateaux, mainly built of sand and gravel, lying typically between 350 and 400 feet above sea level. One example runs from Balsall Common towards Shrewley; another forms the Hinckley area; still another gives rise to Brinklow Heath, running west-southwest from Brinklow between the Sowe and Avon rivers. Most impressive of all is the flat-topped land which, starting at Bilston (Rugby) and Dunchurch, runs west-southwest between the Avon and the Leam, forming Dunsmore Heath and terminating at the Campion Hills, Leamington. The simplest way to appreciate this plateau is to drive along the Coventry-London road. After ascending Knightlow Hill, the road continues with astonishing flatness for the next  $5\frac{1}{2}$  miles to Dunchurch.

Finally, reference to Fig. 10 shows an area of rising ground just appearing in the south-east corner. This corresponds to the outcrop of the Lias, and is due to the resistance of the White Lias limestone

which makes a conspicuous scarp in the Long Itchington neighbourhood.

## SOILS

It is not practicable to give an exhaustive survey of soil variation within our area, but some broad generalisations may be made, and these may help to explain the distribution of certain plants which can only be expected to occur when favourable soil-conditions are present.

The dominant soil of the Coventry area is a rather heavy clay or clay-loam, deep-red in colour. It arises from four quite different geological outcrops. These are (a) the Keuper Marl; (b) the clay bands of the Upper Coal Measures, particularly the Keele clays and parts of the sequence between the Arley Conglomerate and the Kenilworth Beds (see Fig. 1); (c) the Boulder Clays and (d) the Lake Clays of the Older Drift. Such soil is slightly acid, slow-draining, but cracks badly during drought. On it are to be found the few large artificial lakes of the area and innumerable small ponds, dug either for cattle-drinking, or as holes for getting clay to add to dry, sandy soils elsewhere, in the early nineteenth century when 'marling' of the sandy soils was common practice.

In the extreme south-east of the area the Lower Lias gives rise to extremely heavy, dark-brown clay soils which can be so stiff and wet in the winter as to produce ploughing problems to the farmer. Because of thin limestones in the Lower Lias, the soil is not very acid and some lime-loving plants are to be found here. However, the only true area of dry limestone soil is the narrow outcrop of the White Lias (see Fig. 1).

Over the central coalfield area there are outcrops of sandstone, conglomerate and breccia which are often on the higher ground. These rocks give rise to sandy or pebbly loams, which are far better drained than the clay areas.

Along the rivers lie the alluvial floodplains. The alluvium of Warwickshire rivers is typically clay, and because of this, together with the water table being, at best, only just below the surface and often rising up to cause flooding, bogs and marshes tend to occur.

Along the sides of all the larger rivers occur flat shelves of sand and gravel which have previously been mentioned as river terraces. These often give rise to areas of rapidly-draining sandy soil in the midst of country which normally consists of heavier clay land.

Last of all, the plateaux such as Hinckley, Brinklow Heath and Dunsmore, which were mentioned in the topographical section, are very largely built of sands or iron-rich gravels. The constant association of the word 'Heath', in place names associated with these areas, indicates the normal, dry, and well-drained, sandy and acid character, of these soils. Even then one sometimes encounters bogs upon these heath areas. This is due to iron hydroxide separating out as a hard layer about 18 inches down — known as 'iron pan' — and this forms an impervious layer, which holds up the drainage and gives rise locally to marshes. Efficient farmers on these plateau heath areas have to resort, periodically, to very deep ploughing to break up this iron pan and re-establish good drainage.

## PRE-NORMAN ARCHAEOLOGY

by B. Stanley

Coventry was most probably founded in late Saxon times, around 800 A.D., for the name (which probably means 'Cofa's Tree') certainly does not belong to the days of the early Saxon settlement in the fifth century. No finds of late Saxon date have been found, but this is hardly surprising as so many of the finds in Coventry have been made during building operations, and so have not been numerous or spectacular. This lack of Saxon, or, for that matter, earlier remains in Coventry itself need not surprise us if we refer back to the article on the geology of our city and its surroundings. Early settlers first looked for light gravelly soils, which would carry small, easily cleared vegetation, rather than wet clayey soils carrying a heavy oak forest, and it is to these former areas that we must look for signs of early settlement. Thus the earliest recognised implement is the Acheulian Hand Axe found at Baginton, where there is a great area of sand and gravel. This crude weapon was made not of flint, which was in short supply in this area, but of a Quartzite pebble. Another early implement from Baginton is the Levalloisian Axe, made from a flint flake, and found in the bed of the River Sowe.

In the next period of Archaeological time, the Mesolithic, we find that the typical Microliths (small flint implements) have been recorded at Packington, Corley, Leek Wooton and Baginton. Of these areas, Packington seems to have all the suitable physical conditions to attract a settlement of these peoples who were hunters and fishers. The finds come from the immediate area of the springs as well as the drier high ground, which suggests summer and winter camping sites; while the scattered finds from Baginton and Leek Wooton suggest that groups of people were spreading along the lightly wooded river terraces.

The Neolithic peoples, who introduced agriculture to Britain, appear to have avoided the Avon Valley and to have preferred the high ground of the Cotswolds instead, where their burial mounds or 'long barrows' are very common. Many of the flint implements and stone axes which were previously ascribed to this period are now considered to have been the products of the later metal ages.

## QUARRIES AND WASTE PLACES

by Kathleen H. Tindall

The vegetation of a quarry is always interesting even though the species be few, because plants struggle to grow on sub-soil or even rock, with no humus to supply the normal plant nutrients. Here may be found plants in miniature, poppies and Mayweed, with flowering stems just a few inches high — tiny flowers on a dwarfed, starved 'body'. Cudweed and Mugwort, and most of our common weeds, may also be seen in this miniature form. Where gravel pit waste is piled up to form mounds of poor, well-drained soil, Rose Bay Willow-herb grows in great profusion, amongst many common weeds and grassland types, but in addition you may find the Bird's Foot (*Ornithopus perpusillus*) with its tiny, white flowers and peculiar fruits looking like a bird's foot but breaking off at all the joints. Hairy Vetch (*Vicia hirsuta*) and Slender Vetch (*V. tetrasperma*) are often to be found as dainty vetch-like plants with tiny, very pale-blue flowers; but the Slender Vetch has a pod with four seeds in it, while the Hairy Vetch or Tares has a shorter, hairy pod with only two seeds. The little pink flowers and opposite, paired, dark-green leaves of Sandspurrey (*Spergularia rubra*) is a common sight in sand and gravel quarries. It is very like Corn Spurrey in appearance but on a smaller scale. Knawel is another spiky little plant, you may find with tiny, greenish flowers, while the Yellow and Blue Forget-me-not (*Myosotis versicolor*) is one to look out for. Its flowers are quite small, but the yellow colour of some of them is easily seen. Mouse-ear Hawkweed is a plant which grows well on this type of well-drained soil.

Where mounds of surface soil collect in some of the deeper quarries, quite large showy plants are sometimes to be found, including the mallows. The purple-flowered Common Mallow (*Malva sylvestris*) is fairly common in quarries and waste places, while the prettier, pink, Musk Mallow does occur, but prefers slightly richer soil. Fortunately Deadly Nightshade (Fig. 48), is not very common, but we can rely on finding it in some of the Mancetter and Hartshill quarries. It is quite different from the hedgerow Woody Nightshade (Fig. 49), so often wrongly called 'deadly', for instead of the pretty little star-like, purple flowers and oval, red berries of the hedgerow plant, Deadly Nightshade has large, cream-coloured, bell flowers shading to dull-purple, and rather flattened, black, shiny berries.

forms a sturdy bush about two feet high and is very poisonous. It used to grow on the waste ground behind Coventry Station, now built on, so it would be interesting to know if it still crops up as a garden weed! Henbane (*Hyoscyamus*) is almost as poisonous a plant, growing two to three feet high and covered by long, soft, sticky hairs. The flowers, in the form of a broad funnel, are — 'a lurid yellow, usually veined with purple'. Henbane has been found on waste ground



Fig. 48. Deadly Nightshade. *Atropa belladonna* ( $\frac{1}{2}$  natural size).



Fig. 49. Woody Nightshade *Solanum dulcamara* ( $\frac{1}{2}$  natural size).

in Coundon, and also at Brandon on the site of the Norman Castle. The site of Baginton Castle contains two types of Mullein, both tall, striking-looking plants, with large leaves. Woolly Mullein (*Verbascum thapsus*) has a silvery appearance due to its covering of white hairs, and bears handsome wide-open yellow flowers on a stout spike. Dark Mullein (*V. niger*) is not a very hairy plant and has dark-purple coloured stamens. These also occur occasionally in hedgerows and other waste places. The uncommon Yellow Figwort was reported this year from the Baginton rubbish tip. Another interesting plant of waste places, that may not be seen for years, and is then reported simultaneously in several places, is the Thornapple (*Datura stramonium*)

(Fig. 50). There were paragraphs in the local newspaper reporting its presence in a number of places near Coventry, in the autumn of 1957. It is another poisonous plant of the same family (*Solanaceae*), as Deadly Nightshade and Henbane, and it also forms a bushy plant one to two feet high with white, convolvulus-like flowers, and large, dry fruits covered with green spikes and containing large numbers of seeds. I first saw it in the garden of Brandon Station but it is more usually found in waste places.

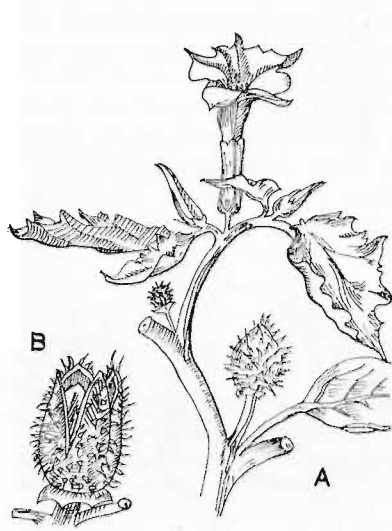


Fig. 50. Thorn Apple. *Datura stramonium*.

A Flowering and fruiting branch ( $\frac{1}{2}$  natural size).

B Fruit ( $\frac{1}{2}$  natural size).

The most rewarding hunting grounds of the district are definitely the waste places and quarry spoil-banks on the Lias and other calcareous soils, to the south-east of Coventry. Here one may find that most beautiful of British wild flowers, the Bee Orchid, with its lavender-coloured upper petals and rich-brown lower petal, shaped and marked like a bee (Fig. 51). Some years it grows in the greatest profusion, but in other years only a few solitary spikes are to be found. The Butterfly Orchid is usually to be found in the same areas, flowering a little earlier, with tall spikes of creamy, sweetly-scented flowers. Twayblade and Spotted Orchid also occur in great abundance, and



Fig. 51. Bee Orchid. *Ophrys apifera* ( $\frac{1}{2}$  natural size).

a long list of the other calcicole or 'lime-loving' plants could be given, usually with brighter or more delicately coloured flowers than are found on other soils. These include Sainfoin, Lucerne, Melilot, Greater Knapweed, Agrimony, Centaury (Fig. 52A) Yellow-wort (Fig. 52B), Ladies' Fingers, Rock Rose, Wild Carrot, Wild Parsnip, Teasel, Wild Gentian, Bush Vetch, Field Scabious and Lesser Scabious. In addition to the Birdsfoot-trefoil, one of the quarries also has the



Fig. 52.

A Centaury. *Centaureum minus* ( $\frac{1}{2}$  natural size).

B Yellow-wort. *Blackstonia perfoliata* ( $\frac{1}{2}$  natural size).

much rarer Slender Birdsfoot-trefoil (*Lotus tenuis*) in great abundance. Wild Thyme often covers areas not colonised by taller plants, and Cathartic Flax, with its tiny, white flowers, is universally found. Salad Burnet is another typical calcicole plant you should look out for, while the thistles are well worth noting. They include the Carlina Thistle with its flat flowerheads, surrounded by everlasting, almost golden, bracts; the Stemless Thistle, with its sessile flower growing out of the centre of a rosette of prickly leaves; and the Woolly Thistle, not nearly so common as the other two, but a tall, handsome plant with large, flattish, purple-red flower heads, and prickly bracts covered with cottony hairs.

Space and time do not permit more details, but the reader is recommended to read 'Wild Flowers of Chalk and Limestone' by J. E. Lousley (1950. Collins), in the New Naturalist Series, for descriptions of these and many other calcicole plants.

One word of warning — quarries when being worked are private property, and so free entry is often prohibited, because of the obvious dangers from falling stones, and on account of the presence of much costly equipment and explosives. Naturalists will receive short shrift from irate managers, called to the scene in their off-duty periods to deal with trespassers, so all are well advised to *obtain written permission* from the owners, before exploring these most rewarding of hunting grounds.

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