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THE WILTSHIRE NATURAL HISTORY MAGAZINE

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CONTENTS

THE PORTLAND BEDS (UPPER JURASSIC) OF WILTSHIRE

by W. A. WIMBLEDON

INTRODUCTION

The major lithological divisions of the Portlandian rocks in the county have been summarised by Arkell (1933) following the accounts of previous authors notably Fitton (1836), Blake (1880), Woodward (1895) and Andrews. Many quarries have been worked in Portland Beds in the past, but only one or two are now active and exposures are consequently fewer and in poor condition. Of the more complete sections available in the past no detailed bed by bed accounts have been published. During the course of a broader study of the stratigraphy of the Portlandian Stage sections have become available which enable one to elucidate the local successions and to derive true correlations with other parts of the country. Sections in the Vale of Wardour and at Swindon, and the fossils which they have produced, have proved instrumental in an understanding of the stratigraphy of the Portland Beds. These are described in this paper. One of these in particular, the quarry at Upper Chicksgrove (ST 962297) near Tisbury was the subject of one of the earliest detailed geological accounts, by Miss Etheldred Benett in 1816 (in Sowerby's *Mineral Conchology*).

VALE OF WARDOUR

In the Vale of Wardour is seen the largest outcrop of Portland Beds or Group in Wiltshire. This together with that of the underlying Kimmeridge Clay and succeeding Purbeck Beds forms a central triangle at the eastern end of the Vale, flanked by younger upper Cretaceous rocks to the north and south.

The rock units within the Portland Beds outlined by Woodward (1895) and Arkell (1933) have been, in part, renamed (Wimbledon & Cope 1976). New lithostratigraphic units are defined herein, and certain previously quoted units, the 'Basement Bed,' 'Main' and 'Upper Building Stones' and 'Chalky Series' are set aside.

The key sequence at the Chicksgrove Quarry has undergone a great lateral and downward extension since 1970 and now exposes a section (see Fig. 1) from the Wardour Member (see below) to the basal Purbeck Beds. The quarry described by Miss Benett is now largely filled and lies to the east of the present excavations. Her section is comparable to the upper portion of the expanded one now visible. A total section of some 21 metres of Portland Beds/Group is now exposed. Using this quarry and other lesser exposures the following divisions have been established for the Vale of Wardour.

PORTLAND SAND FORMATION

Wardour Member: (Thickness 10 metres+)

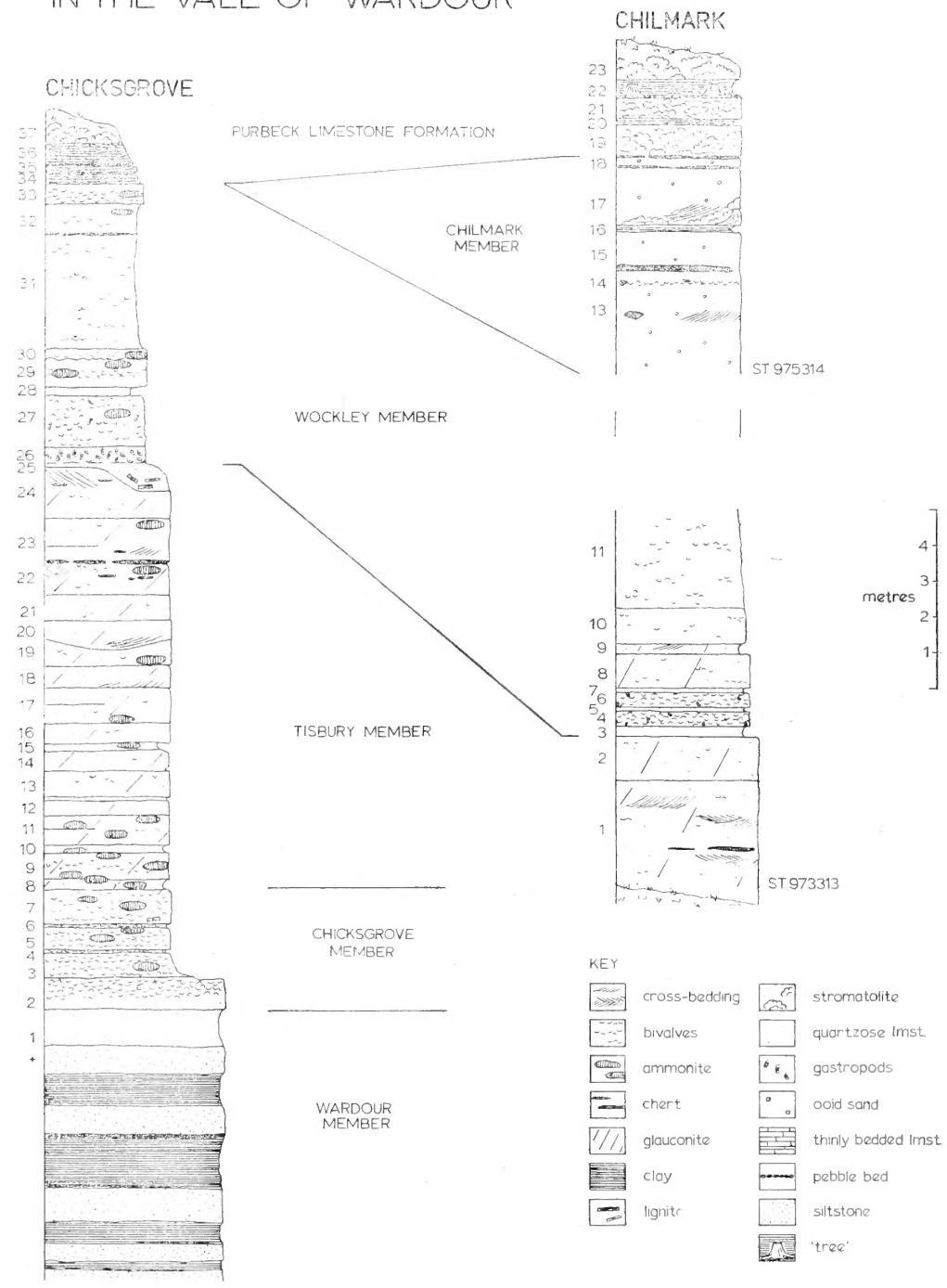
The member is made up of alternations of clays and bioturbated siltstones with minor, more sandy units. The fauna is restricted, with a few *Nanogyra* horizons and isolated rare bivalves of other genera.

A borehole was recently put down by the Geology Department of University College Swansea to prove the downward continuation of the sequence seen in the quarry at Chicksgrove. Below the limestone of the Chicksgrove Member were found 7.5 metres of silts and clays of the Wardour Member. It was hoped that the junction/transition with the main body of the Kimmeridge Clay would be found, but drilling had to be stopped before this goal was achieved.

A lydite horizon, of rounded, black chert pebbles in a sandy clay, was found 3.5 metres from the top of the member. This is the first recorded instance of such a bed south of the Vale of Pewsey (Arkell's use of the name Upper Lydite Bed for limestones within the Chicksgrove Member is not continued herein). It is tempting to assume that the pebble bed found in the core is the equivalent of the basal Portland Upper Lydite Bed of the Pewsey, Swindon and Oxford-Stewkley outcrops. However, neither the pebble bed, nor the member as a whole, has yet produced dateable fossils to support this idea.

The clays and silts of this member have seemingly only been seen by one previous author, Woodward (1895), who recorded them in the railway cutting just west of Upper Chicksgrove and in a well put down on the Teffont side of the Chilmark ravine. Arkell coupled these silts and clays with the, then little known, overlying limestones (here named the Chicksgrove Member) and called them the Basement Beds with Upper Lydite Bed.

MAJOR PORTLAND BED SECTIONS IN THE VALE OF WARDOUR FIG.1



+ this and lower units proved in borehole

Chicksgrove Member: (2-4 metres. Fig. 1; Chicksgrove beds 2-7)

The rocks of this unit are well bedded, pink-grey micrites with much bioturbation and occasional lignite. Most beds contain abundant bivalves including *Myophorella incurva*, *Isognomon bouchardi*, *Nanogyra* sp. and *Plicatula* sp. Individuals of the ammonite genus *Glaucolithites* are common also.

Poor accounts of these limestones were given by Blake (1880) and Hudleston (1883) at Hazelton, south west of Tisbury. Both noted lydite pebbles. However in the sizeable sections now showing these units, at Tisbury Station and Chicksgrove, none have been found.

Tisbury Member: (c. 12 metres. Fig. 1; Chicksgrove beds 8-24)

These are the Main Building Stones of Arkell. They are grey-green, glauconitic and quartzose bioclast sands. They show variability in the relative proportions of these three components, and their degree of cementation. Glauconite persists throughout. The lower half of the member is well bedded with some softer, uncemented units whilst the upper half shows small and large scale trough cross-bedding and occasional symmetrical mud-draped ripples.

Chert nodules are seen in the cross bedded portion of the member, and it was from such cherts, at localities near Tisbury, that the famous specimens of the coral '*Isastrea*' came (Roniewicz 1970).

The bivalve fauna of the Tisbury Member is limited to a few horizons with trigoniids together with scattered serpulids, and oyster debris. Ammonites are by contrast abundant in the lower half of the member, but less common and poory preserved in the upper half.

Inumerable small pits have been opened in these rocks in the past at Tisbury, Tuckingmill, Fonthill and Chilmark to obtain building stone. All of these have exploited the upper portions of the member and the basal beds have seldom been seen.

PORTLAND STONE FORMATION

Wockley Member: (8-11 metres. Fig. 1; Chicksgrove, beds 25-33, Chilmark beds 3-11)

This unit is equivalent to the Chalky Series and Ragstone Beds of previous accounts. These are, for the most part, white micritic limestones, with more bioclast sand towards the base. The basal, well bedded, shelly beds with intervening soft, white and sometimes green marls were previously called the Ragstone Beds. The rest of the member is made up of poorly bedded, chalky lime mudstones with scattered bivalves, notably *Laevitrigonia*.

The non-Ragstone portion of the member is thickest in the Chilmark quarries where it has much chert in its upper half. Only one thin 'bed' of chert is seen just below the top at Chicksgrove. There the top bed of these micrites is a hard, well bedded unit with *Camptonectes lamellosus*, which grades up into the thinly bedded limestones of the Purbeck Beds.

The basal bed of the Ragstones at Chicksgrove is a yellow based, grey bioclast sand, with much obvious quartz and glauconite. This contains abundant plant remains, and large reptilian bone fragments in the yellow base. The sand lenses out rapidly eastwards and passes into a thin clay with serpulid debris. This lensing unit rests on a highly irregular erosion surface cut down into the topmost bed of the Tisbury member. Upwards it grades into a hard, white-cream lime mud with abundant minute gastropods.

The dominant fauna of most of the Ragstones are trigoniids and *Protocardia*, this is the case in beds 27, 29 and 30 at Chicksgrove; the last two of which are obviously the 'Spangle' of Miss Benett's account. Smaller bivalve genera may be common also, replacing the larger forms. Beds 4 and 6 at Chilmark contain an abundance of *Astarte* sp., and common *Ampullospira* and other gastropods.

A point worth noting is that both quartz and glauconite persist to the top of the Ragstones in the Chilmark quarries and that no obvious non-sequence is seen at the base of these beds as it was at Chicksgrove.

Chilmark Member: (? 7 metres. Fig. 1; Chilmark beds 13-18)

These beds seem only to occur in the eastern Chilmark quarries and to lense out rapidly westwards. Their base has rarely been seen. Some 6 metres are now visible. This consists of cross-bedded ooid sands with occasional, thin shell bands with, in addition to the usual large bivalves, *Astarte* sp. and the gastropods *Ampullospira ceres* de Loriol and the 'Portland Screw', *Aptyxiella portlandica*. Two chert 'beds,' up to 0.25 metres in thickness, are seen in the upper part of the section now visible at the old Upper Quarry (ST 975314).

The junction between the oolites and the basal Purbeck Beds is not a clear cut one. Stromatolitic 'tufas' are seen interbedded with ooid sands in the Upper Quarry and thus Portland and Purbeck facies are mixed. Unmixed Purbeck facies directly overlies the Wockley Member micrites at Wockley and Upper Chicksgrove, with a gradational contact. This fact, together with the absence of the Chilmark oolites west of the Chilmark inlier, suggests that the oolites are in fact the facies equivalents of the upper Wockley Member at Wockley and Chicksgrove. This is not to say that the incoming of Purbeck facies was exactly synchronous at all localities, but that no gross diachroneity is suspected.

Ammonite Faunas

Four ammonite species have previously been described from the Portlandian of the Vale of Wardour. Sowerby's type series for *Ammonites giganteus* Sow., all but one of which are now lost, came from the old part of Chicksgrove quarry. Buckman (1924-25) in *Type Ammonites* figured three species: *Galbanites cretarius* Buck., an incomplete *Titanites* from the Wockley Member at Chilmark; a poor specimen of a species of *Glaucolithites* figured under the name *Gyromegalites polygyralis* Buck. from the 'Green Bed,' Chilmark (Fig. 1, bed 1 ?); and thirdly the holotype of *Kerberites kerberus* Buck., said by Buckman to come from the Tisbury Member at Chicksgrove, but on the evidence of its matrix clearly from the Ragstone Beds.

Hundreds of ammonites have come out of the workings at Upper Chicksgrove in the last few years. Several dozens of these collected by the author prove the presence of four distinct species assemblages indicating four recently defined zones (Wimbledon & Cope 1976).

The following ammonites have been collected from the Chicksgrove section:

Bed 3.	*Glaucolithites glaucolithus* Buck. *Glaucolithities* sp. nov.
Bed 5.	*G. glaucolithus*, '*Epivirgatites*' sp.
Bed 6.	*G. glaucolithus*, *Titanites* sp.
Bed 8.	*G. glaucolithus*, *G. polygyralis* (Buck.) *G.* spp. nov.
Bed 10.	*G. polygyralis*
Bed 11.	*G.* sp. nov.
Beds 15, 19 & 21	*Titanites* (*Polymegalites*) sp.
Bed 23.	*Titanites* sp. *Galbanites* sp. nov.
Bed 27.	*Titanites giganteus* (Sow.)
? Bed 27-30	*Galbanites* (*Kerberites*) *kerberus* (Buck.)
Bed 29.	*T. giganteus*, *T. trophon* (Buckman) *T.* sp. nov.
Bed 32.	*T. giganteus*
Bed 33.	*T. cf. anguiformis* Wimbledon

No ammonites have yet been found in the silts and clays of the Wardour Member. The fauna of the *Progalbanites albani* Zone, which characterises the lower half of the Portland Sand of Dorset has not been proved and it may well be that it is unrepresented, as is the case further north.

The Chicksgrove Member and lower half of the Tisbury Member at Chicksgrove yield well preserved glaucolithitids, the most prolific occurrence of such forms anywhere in the country. These ammonites characterise the Glaucolithus Zone, and are particularly important because they include fine material belonging to the species *G. glaucolithus*, which finally makes it possible to interpret this poorly defined form and use it in a meaningful way as a zonal index. Other species include *G. polygyralis* and several previously undescribed probable microconchs, related to the larger species.

If Buckman's poor specimen of *G. polygyralis* came from the horizon indicated at Chilmark, then this proves that the upper portion of the Tisbury Member there falls within the Glaucolithus Zone, not just the lower half as at Chicksgrove, and that the member is clearly diachronous.

The upper half of the Tisbury Member at Chicksgrove has yielded a scarce assemblage of ammonites comparable to those in the top few metres of the West Weare Sandstones of Portland and the lower Cockly Bed of Swindon (See below). Although preservation is poor in these beds several definable forms have been recognised. These include early species of *Titanites*, as well as inflated *Titanites* (*Polymegalites*) spp., related to *T.* (*P*) *polypreon* (Buck.), and triplicate

Galbanites. Glaucolithitids are, to date, unknown. It seems likely that some part of the Okusensis Zone is missing at Chicksgrove, in the non-sequence between the Tisbury and Wockley Members.

The Ragstones and greater part of the Wockley Member contain the same ammonites which are found in vast numbers in the Basal Shell Bed and Upper Cherty Beds of Dorset. *Titanites giganteus* (Sow.) and other species of *Titanites*, including *T. trophon* (Buck.), are reasonably common but the zonal index *G.* (*Kerberites*) *kerberus* has been found to be rare.

As to higher zones, only one specimen of *Titanites* cf. *anguiformis* Wimbledon has been found, in bed 33 at Chicksgrove, which suggests the presence of the Anguiformis Zone.

The highest horizons at Chilmark, in the oolites, are apparently barren of ammonites, so no specimens are available with which one could date that facies. It seems reasonable to assume that a small part, at least, of the Anguiformis Zone falls in Purbeck facies.

SWINDON

The lithostratigraphy of the Portland and Purbeck Beds at Swindon has been outlined by Chatwin & Pringle (1922) and Arkell (1933, 1948) and the ammonite zones by Salfeld (1913) and Arkell (1933, 1935).

Interest has centred in past accounts on the largest of the three outliers, the one which caps the top of Swindon Hill. Quarrying has been going on there for several hundred years notably in the Great Quarry, now Town Gardens (SU 152836), and in the Okus quarries to the west (SU 147837). Blake made a brief reference to the most south-easterly outlier, on the east side of Coate Water (SU 177821), where there is a very old quarry.

Little now remains at Okus, only a partial section in a protected remnant of the once extensive workings (Fig. 2). Larger sections are to be seen at Coate Water and in the railway cutting, west of Old Town Station (SU 152832). At Town Gardens good exposures of the Swindon Sand and Stone are still available, but Purbeck Bed outcrops are, and have been for many years, in poor condition.

The fourfold division of the Portland Beds, from the base upwards, into Upper Lydite Bed, Glauconitic Beds, Cockly Bed and Swindon Sand and Stone was given in earlier accounts of the succession at Swindon, and particularly Okus. Because no detailed section has ever been published for Okus, or any other major locality, the use of the two middle units is open to misinterpretation.

Arkell's measurement of 1.2 metres as the thickness of the Cockly Bed at Okus indicates that he must have included markedly glauconitic rock units in this 'bed.' It is clear that both the Glauconitic Beds and Cockly Bed, are composite units containing several lithologies and very probably several non-sequences.

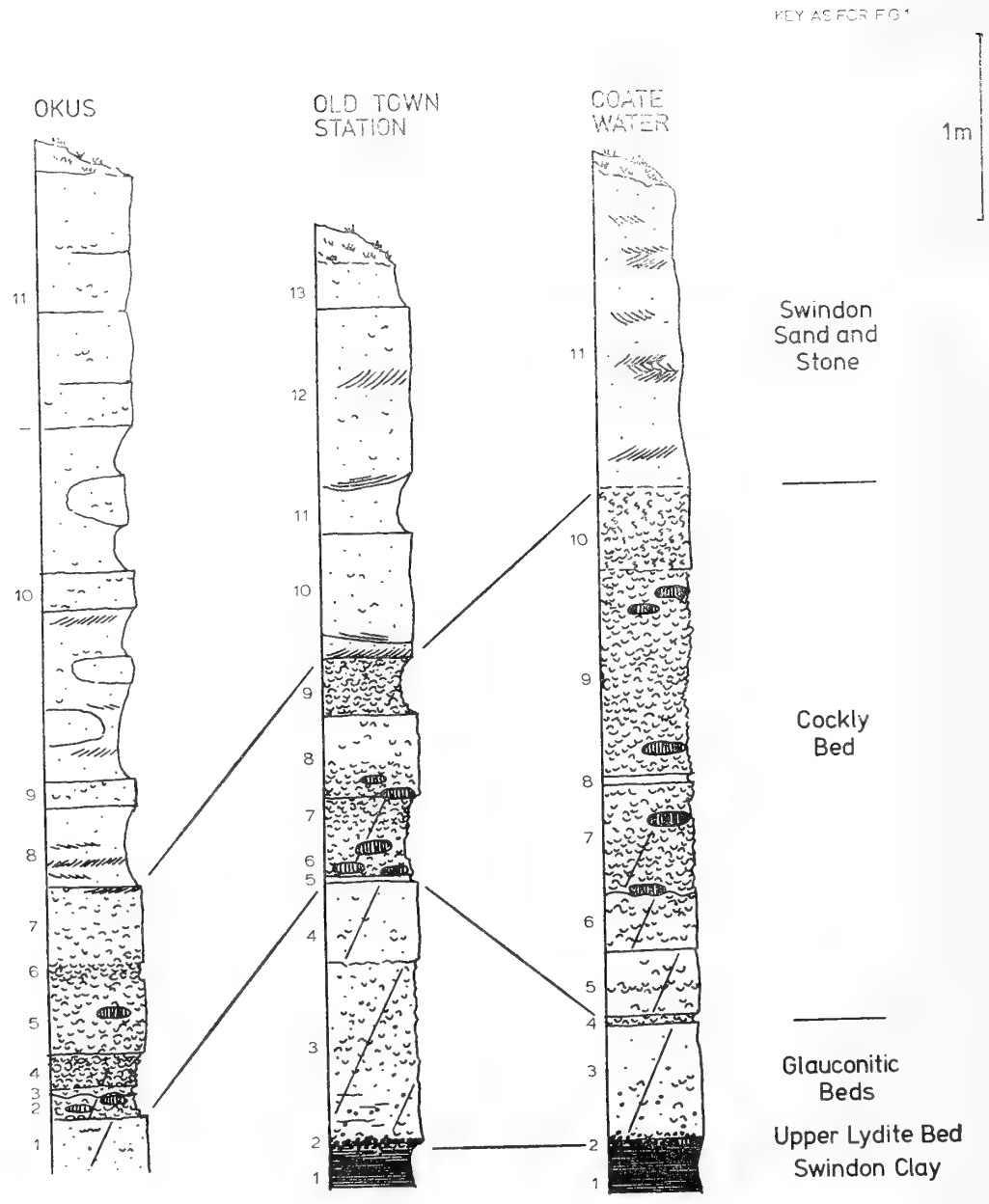
Four major lithologies are seen to succeed one another in all sections. These are from the base, as follows:—

A. The basal lithology seen is a white lime mud with much obvious quartz and glauconite, and in addition coarser particles of quartz and lydite. (Fig. 2; Okus bed 1, Coate beds 2-3, Old Town Stn. beds 2-4). This micrite is often intensely hard and at Coate it forms one massive bed. This is the facies which previous accounts have termed the Glauconitic Beds.

It is thicker on Swindon Hill and there its middle portion is strongly intraclastic. The basal few centimetres of this lime mud contains rounded phosphatic and pyritic nodules, and lydite pebbles. Its base rests unconformably on the Swindon Clay, imbedded in the top of which are the same pebbles. These pebbles constitute the Upper Lydite Bed.

B. Above lithology A are more shelly beds. They are buff-pink, grain supported, bioclast sands with a micrite matrix. Glauconite is still present in appreciable amounts but quartz is less common than below (Fig. 2; Okus beds 2-4, Coate beds 4-7, Old Town Station beds 5-7). Scattered lydite pebbles occur throughout, as they do in lithology A.

At the base at Coate and Old Town Station a red marl occurs. At Okus a similar marl full of shell debris is seen above a highly irregular surface, 0.12 metres above the base This facies makes up the lower part of the Cockly Bed.



PORTLAND BED SECTIONS AT SWINDON FIG. 2

The bivalves *Myophorella*, *Pleuromya* and *Falcimytilus* are common and ammonites very common.

C. Lithology C, forming the greater part of the Cockly Bed, has a creamy, bioturbated or porcellanous, blue-hearted lime mud matrix, with abundant, self supporting, large bivalves. Only rare grains of glauconite have been noted. (Fig. 2; Okus beds 5-7, Coate beds 7-10, Old Town Station beds 8-9). In parts fine shell debris may be self supporting.

This facies is most obvious for its bivalve fauna; large trigoniids and *Protocardia* predominating, but with common *Pleuromya* and *Camptonectes*. At Coate, where the Cockly Bed is at its thickest, the bivalves form one almost continuous shell-bed. Ammonites are again common.

D. At the top of the Cockly Bed there is a transition between the micritic shell beds below and the overlying loose quartz sands and cemented horizons of the Swindon Sand and Stone which is lithology D.

The Sand and Stone at Town Gardens is unconformably overlain by a sequence of limestones and marls normally placedaccounts, in the Purbeck Beds (Sylvester-Bradley, 1940). Exposures of these beds are now poor, but it is clear that truly marine sediments with a normal marine Portland fauna were included in this, the so called, 'Swindon Series.' Following Blake (1880), Keeping (1883) and Townson (1971) the lowest 2.1 metres of this 'Series,' up to and including the 'Swindon Roach' is here placed in the Portland Beds, and is renamed the Town Gardens Member.

Ammonite Faunas

Although hundreds of ammonites were collected from the lower Portland Beds at Okus, and many have found their way into museum collections, no great attention was ever been paid to the exact horizons from which specimens came.

Observations in the field and on the matrices of ammonites in various collections prove that specimens are primarily from lithologies B and C, defined above. They are comparatively rare in lithology A, rarer in the cross-bedded Sand and Stone and unknown in the Town Gardens Member.

Specimens from Okus prove that three distinct ammonite faunas are present. One predominantly in the Glauconitic Beds (lithology A), a second in the lower Cockly Bed (lithology B) and a third in the upper Cockly Bed (lithology C) and sparsely in the Swindon Sand and Stone.

The lowest Portlandian fauna in the Upper Lydite Bed—Glauconitic Beds is one made up of a species of *Glaucolithites*. At Okus, this fauna extends up into the base of lithology B. A Glaucolithus Zone assemblage is also the endemic fauna of the Upper Lydite Beds and Glauconitic Beds in Oxfordshire and Buckinghamshire.

The holotype of *G. polygyralis* (Buckman) came from the base of facies B at Okus. This gives a clear correlation with the Wardour sections, already mentioned, and with the Parallel Bands of the Isle of Purbeck, Dorset (correlation in Cope & Wimbledon 1973). The Portland Beds at Swindon rest with obvious unconformity on Kimmeridgian Pallasioides Zone clays, and as no Portlandian faunas older than those of Glaucolithus Zone age occur, some three ammonite zones, from the Rotunda—Albani Zones, must be absent.

The ammonites of the Cockly Bed have been regarded in the past as a single assemblage; the same species were also thought to characterise the entire 'Cherty Series' of Dorset. In fact at Okus three distinct faunas have been recognised. The second fauna, above that already mentioned with *Glaucolithites* spp., is made up of little known species of *Galbanites*, *Titanites* and *Crendonites*, including *C. gorei* (Salfeld). This Okusensis Zone assemblage includes the holotypes of both the zonal index *Galbanites okusensis* (Buck.) and of *Titanites polypreon* (Buck.). The matrix of the type specimen of *T. polypreon* proves that it came from bed 4, whilst the matrices of all specimens of *G. okusensis* are similarly from lithology B.

T. polypreon is found in the upper half of the zone in Dorset, in the Lower Cherty Beds, and for the most part at higher horizons than *G. okusensis*. On the perhaps dubious assumption that their relative vertical ranges remain constant, the fact that they appear to occur together at Swindon may suggest that we are seeing only the middle or upper part of the zone.

The ammonites of this zone have now been proved in the dolomites of the upper Portland Sand in Dorset and in the upper Glauconitic Beds—Aylesbury Limestone at Aylesbury but they, and the zonal index in particular, are best known in collections from Swindon.

The greater part of the Cockly Bed and the Swindon Sand and Stone yields the same ammonites as those in the Basal Shell Bed of Dorset and the Ragstones of Wardour. The most common and distinctive forms are the small *G.* (*K.*) *kerberus* and *Crendonites leptolobatus* Buckman (Buckman figured a specimen of the former under the name *Kerberites trikranus* Buck. and Spath (1936) what is probably a specimen of the latter, as *C. elegans*. Spath). The Portland giants *T. giganteus* (Sow) and *T.* (*Briareites*) *polymeles* (Buck.) are also seen, as are small species of *Galbanites*.

With the lack of ammonite evidence from the 'Swindon Roach' and other units above the Sand and Stone no deductions can be made with regard to the precise timing of the transition between the 'Roach' and the purely Purbeck facies above. The same applies to the length of time covered by the non-sequence between the Sand and Stone and the Town Gardens Member.

In Buckinghamshire and Oxfordshire, in all sections, a Basal Shell Bed fauna persists to the very top of the Portland Beds and there is no noticeable break between rocks of Portland and Purbeck facies—indeed the two are seen to interdigitate and the Anguiformis Zone is seemingly entirely represented by Purbeck facies. Purbeck conditions may similarly have begun earlier at Swindon than in the Vale of Wardour, but this will perhaps never be proveable one way or the other.

SUMMARY

Rocks of Okusensis Zone age at Swindon and of the Glaucolithus Zone in the Vale of Wardour have produced many ammonites, which are the key to the definition of these biostratigraphic units.

The Wiltshire localities are a vital link between the type of Portlandian sections of the Dorset coast and those in Oxfordshire and Buckinghamshire. There are suggestions that the basal Portlandian Albani Zone may not be represented in the Vale of Wardour, in contrast to the coast. This is most certainly true at Swindon and further north, where this lowest zone is absent, together with two lower Kimmeridgian zones. The dating of the upper limit of the Portland Beds at Swindon is not so simple. The Portland: Purbeck transition in Wardour comes above Anguiformis Zone strata, as in Dorset, whilst in Oxfordshire the change of facies lies above rocks containing a Kerberus Zone fauna. At the intervening section at Town Gardens, Swindon we have no ammonite evidence but some intermediate situation may be indicated.

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REFERENCES

ANDREWS, W. R., 1881 *Proc. Dorset Nat. Hist. archaeol. Soc.* 5, pp. 57-68.
ARKELL, W. J., 1933 *The Jurassic System in Gt. Britain.*
ARKELL, W. J., 1933 *Proc. Geol. Ass.* 46, pp. 301-347.
ARKELL, W. J., 1940 *Proc. Geol. Ass.* 51, pp. 385-399.
ARKELL, W. J., 1948 *Wilts archaeol. nat. Hist. Mag.* 52, pp. 195-212.
BLAKE, J. F., 1880 *Q. Jl. geol. Soc. Lond.* 36, pp. 189-236.
BUCKMAN, S. S., 1921-30 *Type Ammonites* 3-7
CHATWIN, C. P. and PRINGLE, J., 1922 *Summ. Progr. Geol. Surv. London* 1921, pp. 162-168.
COPE, J. C. W. and WIMBLEDON, W. A., 1973 *Proc. Ussher Soc.* 2, pp. 593-598.
FITTON, W. H., 1836 *Trans. geol. Soc. London* (2) 4.
HALL, R. H. K., 1911 *Trans. N. Wilts. Fld. Camera Club* 2 pp. 3.
HUDLESTON, W. H., 1881 *Proc. Geol. Ass.* 7, pp. 161-185.
RONIEWICZ, E., 1970 *Acta palaeont. pol.* 15, pp. 519-537.
SALFIELD, H., 1913 *Q. Jl. geol. Soc. Lond.* 69, pp. 423-432.
SOWERBY, J., 1816 *The Mineral Conchology of Gt. Britain* 2.
SPATH, L. F., 1936 *Meddr. Gronland* 99 (3) 1-180.
SYLVESTER-BRADLEY, P. C., 1940 *Proc. Geol. Ass.* 50, pp. 349-372.
TOWNSON, W. G., 1971 *A facies analysis of the Portland Beds.* D. Phil. thesis Oxford.
WIMBLEDON, W. A., and COPE, J. C. W., 1976 *Jl. geol. Soc. Lond.* in press.
WOODWARD, H. B., 1895 *Mem. Geol. Surv. U.K.* Jurassic Rocks of Gt. Britain 5.

CENTRAL HEATING IN LIZARDS

by L. EDWINS

Scientific ideas of reptiles being "cold-blooded" have changed in recent years. They are now generally termed poikilotherms implying a variable body temperature. Since studies by Bogert and Cowles in the 1940's, it has been realised that many reptiles and the Lacertilia, or lizards, in particular have considerable ability to regulate their own body temperatures. For example, ten species of the Mexican spiny lizard of the genus *Sceloporus* live at altitudes between 60 and 2,200 metres above sea level. Studies revealed that their mean body temperatures varied only between 32.9 C and 36.9 C., despite the much greater variation of atmospheric temperatures. Particularly remarkable is the iguanid *Liolameus multiformis*, a species living at 15,000ft. in the Andes, that can maintain body temperatures of 31 C. by judicious basking, even though the air temperature is at freezing point.

The body temperature of an animal is of great importance dictating its physiolgical activities. The overall exchange of materials and energy (including heat) within the animal is called its total metabolism and the rate of metabolism is all important to the animal for the execution of its daily activities such as feeding, avoiding predators, breathing, sensing the external environment and all the other myriad activities necessary for survival. This metabolic rate is dependant upon the body temperature. Within the temperature range tolerated by a poikilotherm its metabolic rate is roughly doubled for a rise of 10 C. So the basic problem for a reptile is to maintain its body temperature at an optimum level for useful activity, but below a lethal level.

Heat is generated within an animal by its metabolic processes and as we have seen, these are also dependant on body temperature. Benedict pointed out many years ago, that it is difficult to decide whether, in a reptile, its variable body temperature is due to an inability to maintain a high metabolic rate, or vice versa. Studies in recent years tend to indicate that the former is the case. Experiments involving *Dipsosaurus*, the desert iguana, and two desert rodents, all living at the environmental temperature of 37 C., showed the metabolism of the iguana to be one-seventh that of the rodents.

Mammals may be regarded as having reserves of heat "capital." This is by virtue of having a higher and more efficient metabolism and the evolution of efficient physiological and anatomical methods of heat retention. Fur or hair and a layer of subcutaneous fat form an efficient physical barrier to heat loss. In contrast, reptiles have only a sparse layer of subcutaneous fat and reptilian scales are not impenetrable to heat. A chilly mammal can raise its body temperature by muscular activity, shivering being one method. Reptiles are unable to shiver and their muscles are not as efficient at converting activity into heat. In any case, they are unable to retain heat so produced.

Instead, reptiles, and lizards in particular, have evolved behavioural methods of elevating their body temperature. A chilly animal will crawl into the sun and position itself at right angles to the sun, so that the warm rays are falling on to the flanks, thus exposing as great a surface area as possible. The ribs may be drawn forward and outwards to increase this surface area. The belly may also be closely applied to the substrata if this is warm and so heat is gained by direct conduction. Additional methods of heating occur in species such as the horned and earless lizards, *Phyrnosoma* and *Holbrookia*. These animals often lie in the sand in the early morning with just their heads showing. This enables the sun to warm up the blood in the large sinuses around the eyes, so that the body is "pre-heated" by the time it emerges to make its daily rounds.

It has been surmised that the huge crests of vertebral spines possessed by certain Permian pelycosaurs, such as *Dimetrodon* the sail back Dinosaur, may have served a similar function, if the crests were covered with vascular skin.

As well as behavioural methods for controlling body temperature, some species employ physiological means. In particular, desert species are able to change colour by controlling the amount of pigment in their melanophores, or pigment cells. At low temperatures, they

assume a dark appearance and so tend to absorb radiant energy, while as their body temperature rises, they become lighter and so tend to become reflective. Certain species of lizards are able to adjust their blood circulation, so that the transport of heat around the body may be modified.

Reptiles however, not only have problems reaching a high body temperature, they may also have to avoid a rise to a lethal limit. Unlike the mammals, they do not have widespread sweat glands and so cannot lose body heat via water evaporation. In extreme environments such as deserts, many mammals have become nocturnal, since the night time temperatures are considerably lower than daytime and may approach freezing point. Reptiles are unable to adopt a nocturnal existence though, since the low temperature would render them very sluggish, if not completely inactive. One form of cooling that both mammals and reptiles do employ however, is panting. If no shelter is available, an overheated lizard can cool itself temporarily by rapid breathing. Generally, though this is only seen under situations of heat stress and modifications in a lizard's behaviour usually regulate their body temperature before this case arises.

As a lizard's body temperature rises to its "preferred' level, the animal will decrease the surface area exposed to the sun. Firstly by drawing the ribs back in and assuming a less flattened appearance and then by orienting its body so that it is parallel to the sun's rays. *Dipsosaurus*, the desert iguana will scrape away the surface soil and press its belly on to the cooler soil below. Many other species will rise up on their front legs to keep the belly off the ground and in addition this may let them benefit from cooling breeze, especially noted in *Amblyrhnchus*, the marine iguana.

If a lizard's temperature continues to rise, and it cannot find suitable shelter, as well as panting it may eventually bury itself. In experiments I conducted, using *Lacerta bedriagae*, the Corsican wall lizard, it was very noticeable that panting occurred between certain temperatures, namely 28 C. and 42 C., and that above 42 C. panting stopped and burying occurred. Heath working on *Phyrnosoma*, the horned lizard, speculated that certain behaviour patterns were restricted to specific temperature ranges. Lastly it appears that a very few lizards, such as *Amphiloborus* the bearded lizard, *Tiliqua* (the giant Australian skink) and *Varanus* (the Australian monitor) are able to regulate the amount of heat they produce internally within limits. In particular *Varanus*, with a metabolic rate that at its maximum approaches that of a mammal of similar size, can be said to bridge the gap between typical mammalian and reptilian physiology. But even in these lizards physiolgical adjustments are still secondary to the traditional reptilian sun bathing.

The necessity of temperature regulation by behaviour imposes a daily cycle of activity on a lizard. In the early morning an animal will come out and bask in the sun. Once it has warmed itself sufficiently, it will go about the business of its daily activities, such as feeding, defending its territory, finding a mate and moving from sun to shade to maintain its temperature at the desired level. During the full heat of the day it will retire to a sheltered spot, returning in late afternoon to continue its activities. Finally, as the sun sinks and air and ground temperatures fall, it will retire to its sleeping quarters.

Temperature control of this kind has its limitations however, especially in temperate countries such as Britain. Nothing a reptile can do will enable it to remain active during winter and it must fatten itself up during the summer so that it may hibernate during the inhospitable winter months.

Even during summer, reptiles from cold countries may have difficulty in obtaining enough warmth. The Common lizard, *Lacerta vivipara* will seek out tussocks of grass which hold the heat, on cloudy days in Britain. And these animals have even been seen basking on snow in the Arctic tundra. that forms its northernmost limit. Hardy species such as this tend to be viviparous, enabling the embryo to benefit from the mother's thermal preferences, seeking out the warmth necessary for their incubation. It is also probably no coincidence that lizards of temperate zones tend to be smaller than tropical species, since a small body takes a much shorter time to warm up than a large one. Although a large body cools down more slowly than a small body, large size can be a disadvantage in that a reptile must expose itself during basking at a time when it may not be at its most alert, and so more susceptible if danger approaches.

Studies of thermal regulation have brought curious twists to light as well. While it is true that the preferred temperature for a lizard is the one most suitable for its internal workings it also appears that to live at this temperature permanently may be deleterious. In the spiny lizard *Sceloporous occidentalus* life at the continuous preferred temperature caused many to die after only thirteen weeks and all showed very high activity of the thyroid gland which has widespread effects on general metabolism. Thus the cool nocturnal conditions in the wild may be a very necessary safeguard for resting tissues.

Thermal factors may be important not only in restricting reptiles to specific regions of the world, but also in the evolution of a new species. A small inherited change in the range of temperature tolerance may enable a small group to exploit a new environment, too harsh for the original stock. However, reliance on an external heat source has also relegated reptiles to "have beens" in the vertebrate world. Since the evolution of warm blooded mammals, that have a higher metabolic rate, greater physiological efficiency and can remain active independent of the external environment, reptiles were destined to fall from their role as lords of the world, to become one of the smallest of the vertebrate groups surviving today.

THE WEATHER FOR 1975

by T. E. ROGERS

Month	*Temperature*	*Rainfall*	*Sunshine*
J	+++	++	O
F	+	— —	O
M	—	+	—
A	+	O	O
M	—	—	O
J	O	— — —	+++
J	++	O	+
A	+++	—	+
S	O	++	O
O	O	— — —	+
N	O	—	+
D	O	— —	O
Totals for 1975	9.46 deg. C (49.0 deg. F)	635.6mm (25.0ins.)	1,607.8 hr.
Yearly average figures: (Marlborough)	8.78 deg. C (47.8 deg. F)	828.2mm (32.6ins.)	1,428.9 hr.

N.B. In all three columns: O signifies 'average'; — means 'distinctly below average'; — — means 'very much below average.' The + and ++ signs have comparable positive meanings.

1975 was dry, warm and sunny and those who chose to take a holiday in July or August should remember it with pleasure. On the other hand, the meagre rainfall brought its problems —not least the astronomic rise in potato prices following a poor crop—and unless the new year brings prolonged wet weather, we shall soon have further reason to deplore the legacy of last year's long, hot spell. For the record, 1975 was, in fact, the driest year since 1964 (23% less than average) and the warmest and sunniest since the classic Summer of 1959.

The first two months of the year were very mild, January being the warmest since 1921 and the Winter as a whole in central England probably being the warmest since 1868/9. Throughout January and February there were only 11 nights on which air frost was registered, but, in contrast, Spring was relatively cool. Air frost was noted on 20 occasions in the three months March-May and the only significant snow of the Winter was in late March and early April, falls being relatively light, however. Once again many gardeners complained of a late start to the growing season and matters were not helped by a polar depression which brought sharp frosts as late as 31st May and June 1st.

A very spectacular change in the weather took place from June 4th-June 6th, when Summer arrived with an abruptness reminiscent of continental climate patterns. Suddenly we were basking in a very warm southerly air-stream and temperatures rose sharply from about 15 deg. C (59 deg. F) to 25 deg. C (77 deg. F) and, with few exceptions, temperatures remained well up until early in September. Indeed, for the 89 days from June 6th-September 2nd, the daily maximum exceeded (20 deg. C (68 deg. F) no less than 69 times and surpassed 30 deg. C (86 deg. F) on four occasions in the first week of August, the mercury touching 32.1 deg. C (89.8 deg. F) on August 4th at Marlborough. This was certainly the warmest spell since 1959. Moreover, for this same period, June-August, we had 36% more sun than usual and 40% less rain than average. No wonder the cricketers smiled! True, thunderstorms were more common than usual, notably on July 8th and August 8th/9th, but although these were violent, they were often quite localised and many places escaped altogether.

In contrast, September was quite notably wet, with particualrly heavy rain and gales on 13th/14th and 26th/27th, and the month as a whole was very unreliable. Thereafter the weather became more settled and, although there was a higher incidence of fog in October than is usual, Autumn was generally pleasant enough. The dominant aspect once again was undoubtedly the very low rainfall. October could not manage 20% of the usual figure and for the last three months of the year only 104mm (4.1ins.) was recorded compared with the average for this period of 253.0mm (10.0ins.). With no sign so far of a break in this dry spell, we can only look forward to the Summer of 1976 with concern. Already the River Kennet is virtually dry above Marlborough and most of the chalk streams are in a similar parlous state.

WILTSHIRE BIRD NOTES FOR 1975

RECORDER: G. L. Webber. RECORDS COMMITTEE: Mrs. R. G. Barnes, G. K. Boyle, E. J. Buxton, R. J. J. Hunt.

The list has been reproduced from the fuller report being published by the Wiltshire Ornithological Society. I would like to thank all the contributors; the list of their names appears in the W.O.S. magazine *Hobby*.

A new species was added to the Wiltshire list during the autumn, a Buff-breasted Sandpiper being identified at Ashton Keynes. Other uncommon species included a Crane, White Stork, Black and Bar-tailed Godwits. Black Redstarts bred. at Bulford, this being the first known breeding record for the County.

Abbreviations: G.P. Gravel Pit; S.F. Sewage Farm; W.O.S. Wiltshire Ornithological Society.

5. **Great Crested Grebe.** This species made an early start to the breeding season, young being seen at two sites in Feb.
9. **Little Grebe.** Widely recorded, bred at Calne sand pits for the first time.
16. **Manx Shearwater.** An immature at Lyneham in Sep.
28. **Cormorant.** Several records of singles and eight over Swindon in May.
29. **Shag.** Singles, Great Bedwyn Nov., Coate, Nov.
40. **White Stork.** Single near Stockton in Aug. May have been an escape.
47. **Gargany.** A male at Coate Water, May.
49. **Gadwall.** Seen at Chilton Foliat, Nov./Dec. Pairs at Ashton Keynes, Clarendon Lake, Cole Park, Corsham. Shearwater. Up to thirteen Fonthill Lake during winter.
50. **Wigeon.** c.200 Standlynch, c.100 Water Park. Regular in small numbers at other suitable waters.
52. **Pintail.** Singles at Corsham Jan. and Aug., two pairs near Ashton Keynes.
53. **Shoveler.** More numerous than usual, 69 Fonthill in Feb. Regular, Coate Water, Corsham Lake, Ashton Keynes. Also recorded at Cole Park, Clarendon Lake, WiltonWater.
54. **Red-crested Pochard.** Two pairs in Water Park one regularly in Wilts. A single female at Corsham in Dec.
55. **Scaup.** A pair at Corsham, Mar.
56. **Tufted Duck.** Bred at Ashton Keynes, Shalborne.
57. **Pochard.** Regular in winter, large flocks in Water Park.
60. **Goldeneye.** Regular in Water Park also seen at Coate Water, Steeple Langford and Corsham Lake.
64. **Common Scoter.** A female Westbury, Apl. and another Corsham Lake, Aug.
69. **Red-breasted Merganser.** A female at Wilton Water, Dec.
70. **Goosander.** Single male Coate Water, Feb., and Redheads at Kent End, Broad Water, Chilton Foliat and Corsham Lake.
73. **Shelduck.** Two Coate Water, Jan. and singles Corsham and Ashton Keynes, Dec.
81. **Barnacle Goose.** 13 at Lacock G.P., Feb. and single remaining until June.
86. **Bewick's Swan.** 19 at Ashton Keynes, Dec.
91. **Buzzard.** Widely reported throughout the County.
92. **Rough-legged Buzzard.** Present in unusually high numbers and recorded at Ham, Buttermere, Inkpen area also at Fyfield Down, Imber, Porton Down, Everleigh and Colerne.
93. **Sparrowhawk.** Seen eommonly throughout the County, obviously breeding successfully.
95. **Kite.** A single bird in flight near Leigh-Delamere early May.
100. **Hen Harrier.** "Ring Tails" seen at Imber regularly during the winter months; also noted at Winterslow and near Chiseldon.
102. **Montagu's Harrier.** A female hunting near Marlborough in June.
103. **Osprey.** One in flight near Shrewton in Sep.
104. **Hobby.** Apparently still maintaining its numbers.
105. **Peregrine.** One Allington Down and a possible Lyneham.

107. **Merlin.** Singles seen during winter months on suitable downland areas. The species probably bred in the County in 1974 and pairs summered in 1973 and 1975.
117. **Quail.** Heard calling May/Jul. from suitable breeding areas but no direct proof of breeding.
119. **Crane.** Single bird All Cannings for two days in Apl.
125. **Corncrake.** One at Fyfield Down in Aug.
131. **Oystercatcher.** Single Ashton Keynes in Mar. and two there in Jul.
134. **Ringed Plover.** Two Ashton Keynes in May, Aug. and 9 there later in Aug., single same site Sep.
135. **Little Ringed Plover.** Two pairs bred in the County and there were a number of sight records.
139. **Grey Plover.** A single Ashton Keynes, June.
140. **Golden Plover.** Widely reported throughout the County during winter, flocks of up to c.1,000 noted. Birds returned early in autumn, the first being seen at Ashton Keynes 26 July.
143. **Turnstone.** Single at Ashton Keynes June and July.
147. **Jack Snipe.** Single Swindon in Mar. and Lacock, Dec.
148. **Woodcock.** Roding noted at several suitable sites.
150. **Curlew.** Regular breeding sites occupied, no apparent change in numbers.
154. **Black-tailed Godwit.** One Wilts/Glos borders, Aug.
155, **Bar-tailed Godwit.** Eight Coate Water, Sept.
156. **Green Sandpiper.** Regularly reported from suitable areas.
157. **Wood Sandpiper.** Single bird Ashton Keynes, Sep.
159. **Common Sandpiper.** First noted Bowood, 14 Apl., last date Swindon, 13 Nov.
162. **Spotted Redshank.** Single bird Ashton Keynes, 2 Mar.
165. **Greenshank.** Up to 22 in autumn at Ashton Keynes. Records or singles from a number of other sites.
171. **Little Stint.** Singles Coate Water and Swindon, S.F., Sep.
178. **Dunlin.** Ashton Keynes, single in May two there in Sep. and Oct., single Coate Water. Oct.
182. **Buff-breasted Sandpiper.** A bird of this species identified at Ashton Keynes, 11 Sep. Record accepted by "B B" Rarities Committee.
184. **Ruff.** One Ashton Keynes in Aug.
189. **Stone Curlew.** Five pairs bred and a number of sight records.
198. **Great Black-backed Gull.** Singles Bradford on Avon June, Ashton Keynes Dec., three Steeple Ashton Feb.
207. **Little Gull.** Immatures at Ashton Keynes Feb. and Coate Water Apl.
212. **Black Tern.** Records for spring and autumn Coate Water and Braydon Pond.
222. **Little Tern.** Three at Ashton Keynes Aug.
230. **Puffin.** One found amongst cattle near Chippenham Nov.
235. **Turtle Dove.** First seen 24 Apl. and last date 15 Sep. Winterslow.
237. **Cuckoo.** First heard 16 Apl. and last seen 28 Aug.
241. **Barn Owl.** Apparently increasing.
248. **Long-eared Owl.** Only two records this year.
249. **Short-eared Owl.** Regular in winter months—no breeding records.
252. **Nightjar.** Reported from Bulford, Picketts Woods, Grovely Wood and Bentley Wood.
255. **Swift.** First noted 29 Apl. Salisbury, last seen 31 Aug. Ashton Keynes.
265. **Wryneck.** One Devizes Sep.
271. **Woodlark.** Single bird Hound Wood June.
274. **Swallow.** First note Chippenham 24 Mar., last date Manton 27 Oct.
276. **House Martin.** First seen Coate Water 14 Apl., latest date 1 Nov. Chippenham.
277. **Sand Martin.** First Coate Water 14 Apl. and last there 27 Sep.
295. **Bearded Tit.** Recorded at Corsham Lake Jan. and Mar.
300. **Dipper.** Apparently increasing.
302. **Fieldfare.** Last seen in spring Sherston 20 Apl., earliest autumn date 8 Oct.
304. **Redwing.** Last spring record Spye Park 16 Apl., earliest in autumn 21 Sep. Box.
307. **Ring Ouzel.** Single female Fyfield Down Apl.

311. **Wheatear.** Probably bred on Imber Ranges.
317. **Stonechat.** Widely distributed in winter and bred at three sites.
318. **Whinchat.** Bred at Fyfield, Imber, Westdown, Hoxton Down and Rybury Camps. Last seen 17 Oct. Ashton Keynes.
320. **Redstart.** A late record Ludgershall 26 Oct.
321. **Black Redstart.** There were more autumn records than usual. A pair reared two broods in a garage at Bulford.
322. **Nightingale.** Records from most suitable sites but less numerous than usual.
327. **Grasshopper Warbler.** Less numerous than usual.
333. **Reed Warbler.** First seen Corsham Lake 22 Apl. There were several Oct. records, the latest 16 Oct. at Coate Water.
337. **Sedge Warbler.** First noted 20 Apl. Corsham and also there 16 Sep.
343. **Blackcap.** Wintering birds continue to be found in the County, a total of four this year.
346. **Garden Warbler.** Less common.
347. **Whitethroat.** More singing males, but only six breeding records.
348. **Lesser Whitethroat.** Numbers apparently average.
354. **Willow Warbler.** Fairmile Down 15 Apl. and latest 13 Sep. Christian Malford.
356. **Chiffchaff.** A single overwintering at Fovant 6 Feb. and another late migrant or overwintering bird at Swindon 7 Dec. First spring bird 7 Mar.
357. **Wood Warbler.** Recorded at regular sites.
364. **Goldcrest.** Still very numerous.
365. **Firecrest.** One at Wilsford 11 Apl. and another near the Fosse Way 26 Sep.
366. **Spotted Flycatcher.** Well distributed but not particularly numerous.
368. **Pied Flycatcher.** Two Aug. records and a possible pair in Sep.
381. **Grey Wagtail.** More numerous both winter and summer.
382. **Yellow Wagtail.** Four Oct. records, the latest 11 Oct. Cole Park.
384. **Great Grey Shrike.** Single Wootton Bassett Jan., Imber Ranges Apl., Warminster Mar., Swindon Mar., Westdown Ranges Oct. and one Imber end of Dec.
391. **Hawfinch.** Single Westbury and Avoncliffe June.
394. **Siskin.** Rather fewer than in recent years.
397. **Redpoll.** Regular in small numbers.
408. **Brambling.** Well distributed but numbers lower than usual in both winter and autumn.
415. **Cirl Bunting.** Very few records.
423. **Snow Bunting.** Single male with finches Broad Hinton Nov.

WILTSHIRE PLANT NOTES (36)

Compiled by JOAN SWANBOROUGH

(All records for 1975 unless otherwise stated)

LIST OF CONTRIBUTORS

Miss E. Brown	EB	J. E. Lousley	JEL
Mrs. M. Browne	MB	Lady S. Marshall	SM
Mrs. B. Burt	BB	P. Newbery	PN
E. J. Clements	EJC	E. Smith	ES
Mrs. E. Curtis	EC	L. F. Stearn	LFS
Dr. K. Ferguson	KF	Mrs. J. Swanborough	JS
Miss D. M. Frowde	DMF	Dr. S. J. Tyler	SJT
Miss B. Gillam	BG	Mrs. M. Wareham	MW
P. J. Horton	PJH		

Asplenium tricomanes L. Maidenhair Spleenwort. 2. Walls at Corsham. Long Dean, Chippenham. (JS).
Aquilegia vulgaris L. Columbine. 10. Stonedown Wood. (LFS).
Polypodium interjectum Slivas. 2. Stanton St. Quintin. (JS).
Ophioglossum vulgatum L. Adder's Tongue. 7. Figheldean. (BG, PN, JS).
Berberis vulgaris L. Common Barberry. 2. Kington St. Michael, three places (JS).
Mahonia aquifolium (Purch) Nutt. Oregon Grape. 2. Ford. Westrop, far from habitation (JS).
Papaver lateritium C. Koch. 2. Garden weed Colerne. (DMF, JS).
Eruacestrum gallicum (Willd.) O. E. Schulz. 2. Roadside Patterdown and Lackham (JS).
Diplotaxis muralis (L.) DC Stinkweed. 2. Rough ground Trowbridge. (EC). Roadside Chippenham (BG, JS), Chippenham and Leigh Delamere tips (JS).
Diplotaxis tenuifolia (L) DC. 2. Lower Swinley. (JS 1971 onwards).
Raphanus raphanistrum L. Wild Radish (Yellow form). 2. Chippenham tip (JS).
Rapistrum rugosum (L.) All. 2. Chippenham and Leigh Delamere tips. Roadside Rudloe (JS).
Lepidium sativum L. Casual. Garden Cress. 2. Derry Hill (ES, JS).
Lunaria annua L. Honesty. 9. Side of trackway, Hawking Down (LFS '73).
Arabis hirsuta (L). Scop. Hairy Rock-cress. 8. Orcheston Down (PJH).
Rorippa islandica (Oeder) Borbas. 2. Leigh Delamere tip (JS).
Hesperis matronalis L. Dame's Violet. 2. Roadside Beacon Hill (PJH).
Stellaria neglecta (L). Vill. Greater Chickweed. 2. Lackham (JS).
Stellaria graminea. L. Lesser Stitchwort. 2. Lackham (JS 1973).
Minuartia hybrida (Vill.) Schisck. Fine-leaved Sandwort. 2. Lower Swinley. Leigh Delamere tip (JS).
Scleranthus annuus L. Annual Knawel. 8. Perimeter track near New Zealand Farm, Imber. (JS).
Linum usitatissimum L. Cultivated Flax. 2. Roadside Allington, Kington St. Michael, Rudloe and North Wraxall. (JS).
Geranium columbinum L. Long-Stalked Cranesbill. 2. Garden weed, Chippenham. (JS).
Geranium lucidum L. Shining Cranesbill. 8. Grovely Wood (LFS 1973).
Buxus sempervirens L. Box. 2. Castle Combe (1930 onwards). Ford (JS).
Guizotia abysinnica (L.f.) Cassini. Casual. 2. Leigh Delamere tip (JS). Det. EJC.
Melilotus altissima Thuill. Tall Melilot. 9. Trackway N. of Chicklade (LFS 1973).
Trifolium micranthum Viv. Slender Trefoil. 2. Lawn weed Colerne (DMF, JS).

Trifolium incarnatum L. Crimson Clover. 2. Great Cheverell (one plant 1967, JS).
Astragalus danicus Retz. Purple Milk-vetch. 6. N. Tidworth (PJH).
Coronilla varia L. Crown Vetch. 2. Roadside Hullavington (1964 JS).
Vicia narbonensis L. 1. Disturbed ground Trowbridge (EC, JS) Det. Kew.
Lathyrus annus L. 2. Garden weed Chippenham (JS) Det. (EJC).
Rosa micrantha Borrer ex. Sl. 2. Morgan's Hill (BB, JS 1974).
Pyrus communis L. Wild Pear. 2. By field pond, Langley Burrell (JS).
Malus sylvestris (L.) Mill Crab Apple. 9. Hawking Down (LFS).
Saxifraga cymbalaria L. 2. Garden weed, Chippenham (Many years JS).
Ribes rubrum L. Red Currant. 7. Figheldean (BG, PN, JS).
Oenothera parviflora L. Small-flowered Evening Primrose. 2. Roadside Hullavington (JS 1964).
Scandix pectin-veneris L. Shepherd's Needle. 2. Roadside Ford. (DMF, JS 1964).
Polygonum mite Schrank. 2. Lackham (JS). Det. Dr. S. J. Tyler.
Soleirolii soleirolii Req. Mind your own business. 2. Walls near old Rly. Station, Calne.
Ficus carica L. Fig. 2. Youngish tree Old Derry Hill (JS).
Juglans regia L. Walnut. 2. Roadside North Wraxall, known there over 50 years, trimmed back by road cutter but still struggles on (JS).
Quercus cerris L. Turkey Oak. 2. Roadside Sutton Benger. Copse near Grittleton (JS).
Carpinus betulus L. Hornbeam. 2. Upper Castle Combe (JS).
Primula veris x vulgaris Huds. False Oxlip. 2. West Kington (MB).
Lysimachia punctata L. 2. Roadside near Sheldon Corner, probably dumped with garden refuse. (JS).
Syringa vulgaris L. Common Lilac. 2. West Kington, Littleton Drew in hedges for many years (JS).
Vinca minor L. Lesser Periwinkle. 2. Nettleton (over 50 years JS) Cleverton 1960, Coulston (JS).
Vinca major L. Greater Periwinkle. 2. Kington St. Michael, Giddea Hall, near Gastard (JS).
Pentaglottis sempervirens (L.) Tausch. Evergreen Alkanet. 9. Churchyard, Hindon (LFS).
Echium vulgare L. Viper's Bugloss. 8. 3 plants, white form, in large stand, between Larkhill and Greenland Camp (BG).
Lycium barbarum Mill (L. halimifolium) Duke of Argyll's Tea-plant. 2. Rudloe (JS).
Nicandra physaloides (L.) Gaertn. Shoo-fly Plant. 2. Leigh Delamere tip (1974, 75, JS). Chippenham tip (JS).
Hyoscyamus niger L. Hen-bane. 2. Roadside Chippenham (JS).
Lycopersicon esculentum Mill. Tomato. 2. Leigh Delamere and Chippenham tips. (JS)
Datura stramonium L. Thorn-apple. 2. Leigh Delamere and Chippenham tips (JS).
Verbascum blattaria x V. nigrum. 2. Garden, Chippenham (JS) det. KF and EJC.
Linaria purpurea (L.) Mill. Purple Toadflax. 2. Walls, Corsham (JS).
Mimulus moschata Dougl. ex. Lindl. Musk. 2. Murhill (SM, JS).
Veronica montana L. Wood Speedwell. 2. Lackham (JS).
Veronica polita Fries. Grey Speedwell. 2. Garden weed, Colerne (JS) (DMF).
Veronica agrestis L. Field Speedwell. 2. Garden weed Chippenham (JS).
Veronica filiformis Sm. 2. Abundant Corsham, brookside West Kington (JS).
Verbena officinalis L. Vervain. 8. Roadside bank on east approach to Imber village (BG).
Mentha spicata L. Spearmint. 9. Streamside Fonthill Bishop (LFS).
Mentha sauvolens Ehrh. (M. rotundifolia). Apple-scented Mint. 1. Disturbed ground Trowbridge (JS). Det. JEL.
Thymus pulegioides L. Larger Wild Thyme. 2. Castle Combe (JS 1966).
Betonica officinalis L. Betony. 7. Figheldean (BG, PN, JS).
Ballota nigra ssp. foetida Hayek. Black Horehound. 9. Form with white flowers, roadside verge south of Salisbury (BG).
Lamium hybridum Vill. Cut-leaved Deadnettle. 2. Chippenham tip (JS).
Lamium maculatum L. Spotted Deadnettle. 2. Chippenham tip (JS).
Galium tricornutum Dandy. Corn Bedstraw. 2. Biddestone (JS 1968).
Leycesteria formosa Wall. Partridge-berry. 2. Neston (JS).

Valerianella dentata (L.) Poll. 2. Lower Swinley (JS).
Senecio campestre (Retz.) DC. (S. integrifolius). Field Fleawort. 6. North Tidworth (PJH).
Petasites fragrans (Vill.) C. Presl. Winter Heliotrope. 2. Kington Langley (JS 1960).
Erigeron mucronatus DC. E. Karvinskianus DC var mucronatus (DC) Aschers. Mexican Fleabane. 2. Walls at Iford (MW, JS).
Conyza canadensis L. Canadian Fleabane. 2. Garden weed Devizes (BG). Roadside near Rly. Station Chippenham (JS).
Anthemis tinctoria L. Yellow Chamomile. 2. Leigh Delamere tip (JS 1974). Det. EJC.
Centaurea diluta Aiton. 2. Sutton Benger tip (JS 1972) Det. EJC.
Lactuca serriola L. Prickley Lettuce. 2. Lower Swinley (JS 1971).
Cicerbite Bourgaei (Boissier) Meyer. 2. Kington Langley (JS 1974).
Epipactis purpurata Sm. Violet Helleborine. 2. Derry Hill (ES, JS). Bowden Hill (EB, JS).
Orchis ustulata L. Burnt-tip Orchid. 6. N. Tidworth. 8. Orcheston Down (PJH).
Orchis morio L. Green-veined Orchid. 6. N. Tidworth (PJH).
Carex strigosa Huds. 2. Derry Hill (JS).
Carex pulicaris L. 7. Pewsey (PN).
X F. loliaceum (Huds.) P. Fourn. 2. Leigh Delamere (JS).
Calamagrostis epigejos (L.) Roth. Bushgrass. 2. Sutton Benger (JS 1968).
Phalaris canariense L. Canary Grass. 2. Chippenham and Leigh Delamere tips. Roadside Rudloe (JS).
Echinochloa utilis. 2. Leigh Delamere tip (JS).
Panicum miliaceum L. 2. Leigh Delamere tip (JS).
Setaria viridis (L.) Beauv. Casual. 2. Rudloe (JS).

ENTOMOLOGICAL REPORT FOR 1975

Recorder BOWMONT WEDDELL

Assisted by DAVID BROTHERIDGE, PHILIP HORTON Bsc and ALAN STONELL

In retrospect no doubt most of us would consider it a lovely sunny year, for we are apt to remember the pleasant things and forget the dismal times. One would have thought it must have been a good year for Lepidoptera, but my experience was of quantity rather than quality. Many of the normally common species were unusually abundant, but rarities were really hard to come by.

There were hardly any early immigrants noted and consequently we were denied the pleasure of seeing the Red Admiral and Painted Lady in numbers visiting our Autumn blooms. Even some of our really indigenous species made a poor showing. The Peacock was very much under par and the Holly Blue seldom seen. Why has the latter declined so quickly after its spectacular resurgence of a couple of years ago.

The Hummingbird Hawk was seen all over the place, albeit singly, but it was a welcome sight.

A totally new species for Wilts was taken at Edington by JdA, namely the Bilberry Brind. It is supposed to feed on bilberry so it is a mystery where it bred.

More exciting still was the capture of a fine female Clifden Nonpareil reported by CMRP. This insect was released in the hope that her progeny may survive. The only other evidence of this handsome moth's appearance in the county was in 1952 when a bat kindly left the wings for identification. See de Worms Macros of Wilts.

In 1973 there was a reported sighting of the Brown Hairstreak a rather secretive insect. I now have an unexpected confirmation of this butterfly's occurrence at Somerford Common. HGP has actually found the eggs on the blackthorn twigs.

In all probability this will be the last time I shall be responsible for this report, as I hope to hand over to younger and abler hands. Therefore I take this opportunity to express my thanks for all the support and help I have received since 1948 from colleagues and correspondents all over the county.

CONTRIBUTORS

DB	Mr. David Brotheridge, Wroughton
EJMB	Mr. John Buxton, Malmesbury
JN	Mr. John Newton, Tetbury visiting Somerford
MC	Marlborough College N.H.S.
BG	Miss Beatrice Gillam, Devizes
FM	Mr. Frank Mead, Devizes
AS	Mr. Alan Stonell, Devizes
RT	Mr. R. Turner, Market Lavington
MHC	Mr. Mark Heath, Chippenham
RB	Mrs. Barnes, Seagry
PJH	Mr. Philip Horton, Urchfont
JdA	Mr. John d'Arcy, Edington
BC	Miss Barbara Cowley, Seend
MB	Mrs. Marion Browne, West Kington
BW	Mr. B. W. Weddell, Trowbridge
KM	Mr. Keith Moore, Trowbridge
SW	Mr. Stephen White, Trowbridge
SR	Mrs. S. J. Rawlings, Box
CGL	Maj-Gen. C. G. Lipscomb, Crockerton
HGP	Mr. H. G. Phelps, Crockerton
CMRP	Mr. C. M. R. Pitman, Salisbury.
SNHS	Salisbury & District N.H.S.

PHENOLOGICAL REPORT

	Average Date	**1975** *Emergence*	*Difference*
Large White	25.4	27.4	—2
Marbled White	25.6	22.6	+3
Meadow Brown	15.6	15.6	
Cinnabar	19.5	8.6	—20
Garden Carpet	29.4	10.5	—11
Brimstone Moth	11.5	17.4	+24

A Selection of Species seen 1975

Orange-tip	*Anthocharis cardamines*	RT 11.5, MB 27.5, CMRP 21.4, EJMB 4.5 till 10.6
Clouded Yellow	*Colias croceus*	BG 3.8 near Imber. Only one seen
Brimstone	*Gonepteryx rhamni*	CMRP 9.2, FM 20.4 till 5.10
Grayling	*Eumenis semele*	SNHS 31.7, 17.8
Marbled White	*Melanargia galathea*	BC 3.7
Purple Emperor	*Apatura iris*	FM 27.7 till 4.8 many sightings. SNHS in good numbers more widely distributed
White Admiral	*Limenitis camilla*	BG 19.7, FM 25.7
Red Armiral	*Vanessa atalanta*	CMRP 13.3 Rare hibernation, BG 5.9, RB 8 & 9, SW 19.6 till 28.9, CMRP larvae 17.8, RT 7.9
Painted Lady	*V. cardui*	BW 17.8, SW 2.9, RB a few 8 & 9
Comma	*Polygonia c-album*	BG 19.7 & 29.9, RB 3.9, EJMB 28.7 few
Silverwashed Fritillary	*Argynnis paphia*	SW 28.7
Marsh Fritillary	*Euphydryas aurinea*	RT 8.6, SW 6.6
Brown Hairstreak	*Thecla betulae*	HGP ova found in winter
White-letter Hairstreak	*Strymonidea w-album*	EJNB 20.7, FM 7.7—28.7
Green Hairstreak	*Callophyrys rubi*	CMRP 18.5, MB 29.5
Small Copper	*Lycaena phlaeas*	CMRP more numerous. EJMB max nos. 15.21.9 RB 20.9 plentiful later. BC 6.7, RT 7.9
Silver-studded Blue	*Plebejus argus*	RT 18.7 Rare away from heath. unconfirmed. probably overlooked.
Adonis Blue	*Lysandra bellargus*	CGL Again scarce but a new small colony located MB 31.5
Holly Blue	*Celastrina argiolus*	CMRP 18.5, EJMB 7.6, FM 17.8. Both broods very scarce this year CMRP
Death's-head Hawk	*Acherontia atropos*	CMRP Several larvae autumn 74 near Broadchalke
Convolvulus Hawk	*Herse convolvuli*	CGL 30.9

Humming-bird Hawk	*Macroglossum stellatarum*	SNHS 14.7, BW 22.8, RT 18.7, & 10.8, PJH 20.7
Figure of Eighty	*Tethia ocularis*	SR 9.6
Poplar Lutestring	*T. or*	JdA June
Black-arched Tussock	*Lymantra monacha*	SR 18.7
Common Lappet	*Gastropacha quercifolia*	SR 21.7
Emperor	*Saturnia pavonia*	SNHS Apparently established near Allington. Assembly witnessed 15.5 fertile ova found 19.5
Six-spot Burnet	*Zygaena filipendulae*	CMRP 8.6
Wood leopard	*Zeuzera pyrina*	SR 5.7
Garden Dart	*Euyoa nigricans*	DB 14.7
Stout Dart	*Spaeolits ravida*	DB 14.8
Green Arches	*Anaplectoides prasina*	SR 2.7 DB 8.7
Bordered Orange	*Pyrrhia umbra*	MHC 18.6
Hedge Gothic	*Tholera cespitis*	JdA 8
Northern Drab	*Orthosia advena*	JdA 26.4
Bulrush Wainscot	*Nonagria typhae*	MHC 19.8
Olive Kidney	*Zenobia subtusa*	SR 11.7. Few recent Wilts records
Brown Feathered	*Rusina tenebrosa*	BW 10.6
Old Lady	*Mormo maura*	DB 23.6
Marbled Vert	*Cryphia muralis*	BW 19.7, MHC 11.7
Miller	*Apatele leporina*	BW 24.6, SW 19.5
Mullein Shark	*Cucullia verbasci*	BW 25.4
Bilberry Brind	*Lithomoia solidaginis*	JdA 27.8 A most unexpected record, the first ever in Wilts. It favours heathland habitats, more Northerly
Black Rustic	*Aporophyla lunula*	SR 11.7
Grey Chi	*Antitype chi*	SR 12.8, BW 15.8 per M. Smith
Large Marbled Tort	*Nycteola revayana*	SW 25.4
Clifden Nonpareil	*Catacola fraxini*	CMRP reports a fresh female taken at M.V. light by Mr. P. Cox, later released
Mother Shipton	*Euclidimera mi*	CMRP 9.6
Burnet Companion	*Ectypa glyphica*	CMRP 9.6
Silver Y	*Plusia gamma*	CMRP 9.6 first immigrant reported. Swarming from mid Aug. MB abundant Aug.
Blackneck	*Lygephila pastinum*	BW 27.6, DB 22.7
Grass Emerald	*Pseudoterpna pruinata*	MHC 12.7
Sharp-angled Carpet	*Euphyia unangulata*	MHC 20.7
Purple Bar Carpet	*Lyncometra ocellata*	SW 6.6, DB 4.8
Red-green Carpet	*Chloroclysta siterata*	CMRP 11.11
Dark Scallop	*Philereme transversata*	BW 5.7
Chimney-sweeper	*Odezia atrata*	SW 21.6
Blomers Ripplet	*Discoloxia blomeri*	SW 13.6
Lunar Thorn	*Selenia lunaria*	MHC 20.6, DB 8.6, SR 13.6
Speckled Yellow	*Pscudopanthera macularia*	CMRP 8.6
Oak Beauty	*Biston strataria*	SNHS 11.4

ORTHOPTERA AND ODONATA RECORDS 1974 AND 75

by PHILIP HORTON

Despite a disappointing response from members in 1974,* an encouraging number of records were received for 1975.

My thanks are therefore due to those members who sent in records and especially to Mr. John Buxton for a number of interesting past and recent records of Odonata from Cole Park. Provisional national distribution maps have now been produced for these groups by the Biological Records Centre at Monks Wood and apart from records already recorded in the previous two editions of W.A.N.H.M., records for Wiltshire are very sparse.

Many members must see grasshoppers or bushcrickets in their own gardens and although these may be of fairly common species, they would almost certainly be new records for the county! I am therefore hoping for an even more positive response next year. Specimens should be sent in a suitable container to me at Wyndhams, St. Joseph's Place, Devizes.

ORTHOPTERA RECORDS

Bush-crickets (*Tettigoniidae*)			
Tettigonia viridissima (L) Great Green Bush-cricket	Chilmark Earldoms	PJH SNH	July 1975 Sept. 1975
Grasshoppers (*Acrididae*)			
Chorthippus parallelus (Zetterstedt) Meadow Grasshopper	Winklebury Hill	PJH	Aug. 1974
Omocestus viridulus (L) Green Grasshopper	Also at Winklebury Hill	PJH	Aug. 1974
Stenobothrus lineatus (Panzer) Stripe-winged Grasshopper	Also at Winklebury Hill	PJH	Aug. 1974
Myrmeleottix maculatus (Thunberg) Mottled Grasshopper	West Down Ranges	RT	Aug. 1975

ODONATA RECORDS

SUB-ORDER ANISOPTERA (HAWKER DRAGONFLIES)

Aeshna cynaea (Muller) Southern Aeshna	Cole Park Seagry	JB RB	From 1956 Aug. 1975
A. grandis (L) Brown Aeshna	Cole Park	JB	Regularly in August
A. juncea (L) Common Aeshna	Cole Park	JB	July 1972
A. mixta (Latreille) Scarce Aeshna	Devizes	PJH	Sept. 1974
Anax imperator (Leach) Emperor Dragonfly	Calne Somerford Common	BG BG	June 1975 July 1975
Sympetrum striolatum (Charpentier) Common Sympetrum	Cole Park	JB	From 1959

* *By mistake these records were omitted from the* 1975 *Magazine—Ed.*

SUB-ORDER ZYGOPTERA (DAMSEL FLIES)

Agrion splendens (Harris) Banded Agrion	Malmesbury Lavington	JB RT	Regularly seen July 1975
A. virgo (L) Demoiselle Agrion	Malmesbury Midford Brook By Brook	JB PJH PJH	Regularly seen June 1974 June 1974
Coenagrion puella (L) Common coenagrion	Cole Park	JB	From 1959
Ischnura elegans (Van der Linden) Common Ischnura	Cole Park	JB	From 1959

RECORDERS: Mrs. R. Barnes, Mr. J. Buxton, Mr. P. J. Horton, Miss B. Gillam, Mr. R. Turner, Salisbury Natural History Society.

MR. B. W. WEDDELL

As he indicates in the Entomological Report, Mr. Weddell is handing over his position as Lepidoptera recorder to a younger authority. Mr. J. N. d'Arcy. Mr. Weddell was one of the original committee members elected in 1946 and appointed as one of the recorders. He has thus completed 30 years of unbroken devoted service.

During these years he has regularly arranged the summer evening meeting during which moths are attracted by an ultra violet lamp and then identified. In 1962 was published "The Macrolepidoptera of Wiltshire," written by Baron de Worms and edited by Mr. Weddell and during 1975 he renovated the Section's collection of Butterflies and Moths replacing many specimens with equivalents from his own collection. The Section is grateful for all such devoted work and wishes him a pleasant retirement from his duties.

SHORTER NOTES

AN ORPHAN FOX CUB

On 21st July, 1975 I had a telephone call from an animal welfare organisation in London. A fox cub had been taken from a street trader who was offering it for sale as a pet; it was very small, they thought about six weeks old, and they wanted some one to care for it and later release it to the wild. They hoped to bring a prosecution against the trader, who had any way no licence for street trading quite apart from the cruelty involved. The girl who was caring for the cub proposed to bring it down by train but, imagining what the animal had already gone through, I decided to fetch it by car the same evening.

Two hours later I was threading my way through the maze of Soho with a hay-lined crate in the back of the car. Nita was waiting for me in the street and led me through a passage into a back-stage world of metal fire escapes, galleries and catwalks. People clattered up and down, greeting each other cheerfully, there was a friendly village atmosphere. Nita shared her small flat with an alsatian and a cat. The fox cub had gone to ground in a hidden corner and some twenty minutes of furniture moving followed before we found the tiny, terrified animal. I took him gently into my arms and removed the collar which had been put on by the trader; it was a tight chain covered with little bells which were fixed on with wire spikes. We put him into the crate and he burrowed deep into the hay and remained very quiet while I drove steadily home down the motorway. I put a supply of water, milk, raw meat and puppy meal with Bovril in the shed. There was a big box of earth for digging, plenty of hay and a pile of logs for shelter; I opened the crate and left the cub alone to recover and rest. Nita had called him Jasper.

I left him alone all the next day and went out at dusk, about 21.00 hrs. He scuttled behind some big flower pots in a corner of the shed. I picked him up and could feel him trembling, so I sat down and put him over my shoulder, talking quietly. Presently the trembling stopped and I felt his nose on my neck; he sniffed and prodded me and after a while his tension suddenly relaxed and he lay with his nose tucked into my collar, breathing steadily with an occasional deep sigh. He had eaten the meat and drunk a lot of water, but the milk and Bovril were untouched. His scats looked runny, he had obviously been wrongly fed and half starved—he was ready for an adult diet of flesh with bones, fur and feather to build up his strength.

On 23rd July I again left him alone all day, going out at dusk. He took cover behind the flower pots, bit me when I picked him up but quietened immediately I put him over my shoulder. When he was calm I weighed him—4lbs. His body was tiny and wasted, the size of a small cat, yet his head was well developed, the muzzle pointed and the ears upright. I thought he could not be less than ten weeks old, even that meant that he was born about seven weeks later than average. I examined him carefully all over and found no sign of physical injury, though his neck had been rubbed by the collar and I thought his claws had been cut. He was clean and I found no sign of parasites except a few fleas which transferred themselves to me. His coat was still a bit woolly and he was brown, slightly greyer on rump and tail, usual black markings on face and ears, dark legs and a white tag.

On 24th July I went out in the morning to look in at the shed window. Jasper was lying on the window ledge in the sun, fast asleep and breathing quietly. Reassured, I crept away and spent the day searching the roads for casualties, mainly young rabbits. At dusk I went out to him; he retired behind the flower pots, no longer cowering but watching me intently; he was still wary but his beautiful golden brown eyes showed no fear.

A spell of very hot weather had just started. Jasper spent his days lying in the sun on the window ledge and after dusk I spent some hours with him, sitting on the crate with writing or reading. After a few nights my presence no longer worried him and he lay on the window ledge watching me or sleeping. Later he found his way on to a high shelf where he burrowed busily about among garden cushions, old straw hats, flower pots and cricket stumps. I put down a whole rabbit and fresh water every night but he never ate while I was there. His health improved rapidly and his body filled out though he was always small. His scats were firm now that he was getting fur and bone. His coat became sleeker and changed from brown to gold, showing signs that he would one day be a fine russet dog fox with dark guard hairs.

I was rather concerned that he needed exercise to strengthen his limbs and body. He was too old when he arrived ever to imprint on me, so any hopes I had that he would follow me about were soon squashed, I knew he would bolt. So one evening I tried a soft leather collar and took him into the garden on 20ft. of binder twine. Instantly he became a pathetic twisting, terrified bundle of tormented fur and, fearing that he would escape, I took him back to the shed quickly and removed the collar which had brought back dreadful memories. I sat with him over my shoulder for a long time before the trembling stopped and I felt his nose shoving at my neck and his body relax. We began again from the beginning and he learned to trust me to a certain extent, but it was obvious that I could not exercise him so I constructed an outside run which he could enter from the shed window. It was 6ft. high, wired over the top, and the wire was buried 1ft. vertically and then 1ft. horizontally inwards so that he could not dig out. The noise rather upset Jasper, who left his sunny window ledge and retired on to the high shelf. On the afternoon of 1st August the finishing touches were put to the run and I opened the window, putting a dead bird outside so that I could tell when he went out.

The next few mornings I found that Jasper had pushed the window shut so that he could lie on the ledge, there was no sign that he had been outside. He was however, active inside the shed at night, his rabbit skins were dragged about as if he had played with them and he had become very agile, jumping easily on to high shelves.

On 5th August it was raining steadily after a thunderstorm during the night, still rumbling in the distance. At 10.00 hrs. Jasper was fast asleep in the shed but he had been out during the night, the bird had been moved and there were signs of digging at the end of the run. At 22.00 hrs. I went out to join him; he was in the run eating the remains of a pheasant but went into the shed when I arrived. He sat among the flower pots watching me intently, looking towards the window and whining quietly, not in fear but as if trying to communicate something to me. I could hear wild cubs squealing and squabbling out in the fields, the litters were beginning to break up, Jasper himself was old enough for independence and I knew he wanted freedom. His coat was red-gold and sleek and he looked full of intelligence. The next morning he was gone.

He had not been able to dig his way out but I found two strands of wire broken at ground level and thought that he must have bitten them and squeezed out.

During the next few weeks I watched the wild cubs every night. It was nearly dark when they came out of the thicket and almost impossible to recognise individuals, though they were quite close to me. They streaked about the fields, chasing each other and leaping high in the air, stiff-legged like cats, the chased cub finally going head over heels to be pounced on by the pursuer. I could hear their squeals and the rustle of their feet flying through the stubble. One, which looked like Jasper, seemed more hesitant than the others and I hoped it was him.

On 28th August the thicket was cubbed for the first time. I was away and heard later that four cubs had been dug out of a rabbit burrow, two being killed and two left. Weeks later I was talking to some one who had seen these four cubs; he said "one was a tiny little cub, we left him." "Did he have a white tag?" I asked. He answered "yes" and so I knew that Jasper had survived.

As I write, ten days before Christmas, Jasper is still out there. The thicket swarms with rabbits and there is a good living for a fox. Soon he will start barking and the vixens will call. In spite of his unlucky start, I believe he has a good a chance as any other fox. It is just possible that he has a better chance—past experience may have made him extra wary of human beings.

RENARDE

REPORTS

The Annual General Meeting was held on April 24th at the Lackham College of Agriculture. In the absence of the Chairman, Mr. C. E. Jennings, the chair was taken by Mr. R. S. Barron, who read the Chairman's report. This mentioned that Volume 70 of the Natural History Section's magazine was the first volume published independently by the Section.

The Chairman and Officers were re-elected and vacancies on the committee were filled by Mr. and Mrs. E. Stephens and Mr. E. Smith. Before closing the meeting Mr. Barron paid a tribute to Mr. B. W. Weddell, thanking him for all that he had done for the Section in the last 30 years.

After the meeting members collected samples of fresh-water life from three different habitats and studied them in the laboratory under the direction of Mr. Gould, Mr. Stonall and Mr. Edwin.

The Natural History Bulletin, edited by Mr. P. Dillon, was distributed to all Section and Claiming members in October 1975 and January 1976. It has been decided to send the next number to every member of the W.A.N.H.S. in order to acquaint them of the N.H.S. activities and in particular of the new procedure for submitting records.

BOOK REVIEW

Wildlife in Wessex by Ralph Whitlock

Mr. Ralph Whitlock has drawn on his extensive knowledge of the Natural History of Wessex to produce this basic but comprehensive guide to the delights of this area. (Wildlife in Wessex; Ralph Whitlock; Moonraker Press; £3.50). He has dealt with the very varied types of country under the following headings: Chalk; Limestone and Lias; Clay and Heath; Mendip and the Avon Uplands; Alluvial Levels; Red Lands of East Devon and South Somerset; Exmoor and the Quantocks; and the Coast. He has avoided naming the sites of too many rarieties and has added a useful glossary showing the latin names. The 'Useful Addresses' are, as is inevitable, already out of date and the list of Museums is slightly exiguous. However this book will be of great use to any visitor who comes unprepared to this area, and the illustrations are remarkably attractive. The book is of a reasonably sized format and would slip easily into a fairly large pocket. Incidentally one of the recommended books is not yet published and one feels that they might have included Baron de Worms' Macrolepidoptera of Wilts.

PREVIEW

The Geology of Wiltshire—A Field Guide, by R. S. Barron.

September publication by the Moonraker Press. The book is written for the student of geology, for the naturalist and for all those with an interest in the local history and countryside of Wiltshire.

After an introduction to some principles of geology, the reader is taken from Wiltshire's Cotswolds of the north-west to the New Forest outskirts of the south-east, traversing the Chalk Downlands and the Vales of Pewsey and Wardour. There are 85 specially drawn maps and diagrams and a suggested seven-day tour of Wiltshire's geology.

PUBLICATIONS BY THE WILTSHIRE NATURAL HISTORY SECTION

The Flora of Wiltshire by Donald Grose. Now out of print, but those interested in a reprint should see the August Bulletin.

Supplement to the Flora of Wiltshire. Compiled and edited by L. F. Stearn.

The Macrolepidoptera of Wiltshire, by Baron de Worms.

Hand List of Wiltshire Birds and a supplement, by L. G. Peirson.

The Geology of Wiltshire, a Field Guide, by R. S. Barron. (In the press).