

THE MOSS-FLORA OF THE BAGSHOT-SAND DISTRICT.

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THE present communication deals with the sandy district forming the main mass of the Bagshot Sands in the London Basin. It includes a part of Botanical District XI in Townsend's "Flora of Hampshire," and the adjoining parts of Berkshire and Surrey. In Hampshire the sandy area extends from Yateley and Eversley in the north to Aldershot and Winchfield in the south, and has a scenery and a flora very similar to that of much of the New Forest and parts of Dorset, where the same geological formation is present.

Prestwich ("Quart. Journ. Geo. Soc.," vol. iii (1847), pp. 353-409) divided the Bagshot Sands into three divisions, for which it is now the custom to use the South Hampshire names, and to speak of the Upper Bagshot Sand as Barton Beds, the Middle Bagshot Sand as Bracklesham Beds, and the Lower Bagshot Sand as Bagshot Beds. I am, however, here dealing with the botanical and not with the geological aspect of the area, and it is convenient to use the old name "Bagshot Sands" for the whole sandy series which overlies the London Clay in the London Basin. Besides the main mass, there are many outliers of Bagshot Sands in North Hampshire, Berkshire, Surrey, Middlesex, and Essex with which I am not now dealing. Their flora is, however, very much like that of the main mass, and even in small outliers the London Clay plants do not, as a rule, spread on to the sands; indeed, it is usually the other way, for the sand is apt to slip or to be washed down on to the clay, and I have noticed—in Epping Forest, for instance—that a very slight downwash of sand, gravel and pebbles on to the London Clay will carry the flora of the sand with it.

The surface of a considerable part of the Bagshot Sand district is gravel, geologically much newer than the sands. On the higher ground, such as Hartford Bridge Flats and Hazeley Heath, it is known as Plateau Gravel. It frequently contains layers of clay giving rise to damp places, so that we find, in addition to the usual vegetation of the dry moorland, such plants as *Ranunculus flammula* and *Veronica beccabunga*. The gravel of the lower ground is termed Valley Gravel, and in the fields on it we find such weeds of cultivation as *Chrysanthemum segetum* and *Veronica tournefortii* in great abundance. Along the streams there are patches of alluvium, and in some places rightly mapped Valley Gravel there is, in fact, a thin covering of clayey soil quite sufficient to affect the vegetation. In the case of plants growing on the gravel or alluvium I include all in my list where the gravel or alluvium is underlain by Bagshot Sands, but at the same time I note the fact that the plant was on gravel or alluvium, and I adopt the same course in the case of plants growing on walls, buildings, bridges, etc.

Until recently the Bagshot district was mostly barren heathland, but it has now become a favourite residential district, and is being rapidly enclosed. A good deal of the heath is on the gravels which overlie the Bagshot Sands. The Bagshots, though mainly sand, contain many layers and thin beds of clay, giving rise to wet and boggy ground, which is, however, very different botanically to wet ground on thick London Clay. In the damp areas there are considerable beds of *Sphagnum* associated with *Polytrichum commune* and *Aulacomnium palustre*. On the moorland we get an abundance of *Ceratodon purpureus*, *Dicranum scoparium*, *Campylopus pyriformis*, and *Hypnum schreberi*. *Polytrichum juniperinum* is also abundant, and is a characteristic moss of the plateaux such as Hartford Bridge Flats. On sandy banks and in woods there are patches, often of considerable extent, of *Catharinea undulata*, *Mnium hornum*, *Dicranella heteromalla*, *Aulacomnium androgynum*, and *Eurhynchium prælongum*.

The absence of lime is the marked difference between this and many other sandy areas. The flora of the Lower Greensand, for instance, is very like that of the Bagshot Sands, but there are beds of limestone in places, and they affect the vegetation wherever they occur. The heaths in the Wimbome district are very like those about Bagshot, and there, too, we have Bagshot Beds associated with wide sheets of gravel.

Except where otherwise stated, the species in the following list were collected by myself, the localities given being usually those from which I have kept a specimen for reference; and as I live near Wellington College, a good many are from that place. The whole district is, however, so uniform in character that I have little doubt all the species in the list are to be found in all three counties—Hampshire, Berkshire, and Surrey—into which the Bagshot Sand district extends. In order to save repetition, I may mention that of the localities given, Yateley, Cove, and Fleet are in Hampshire, and Finchampstead, Sandhurst, and Wellington College in Berkshire.

Most of the specimens referred to in the following list have been seen by Mr. W. R. Sherrin, A.L.S., and my thanks are due to him for the trouble he has taken in their determination.

The number of species given as found on the Bagshot Sands of the Bagshot district is 73.

I occasionally note that I have seen a species on other geological formations, but only where it appears to me fairly frequent on the formations mentioned.

I have already dealt with the *Sphagnaceæ* in a "Note on the Flora of the Bagshot district," published in the "Journal of Botany" for 1919, p. 251.

TETRAPHIDACEÆ.

Tetraphis pellucida Hedw. Usually on rotten tree-stumps, Finchampstead, Crowthorne, Easthampstead, Berks, and in Windsor Park, Surrey.

POLYTRICHACEÆ.

Catharinea undulata Web & Mohr. Abundant all over the district in Hants, Berks, and Surrey.

Polytrichum nanum Neck. Wellington College. *P. aloides* Hedw. Finchampstead. *P. urnigerum* Linn. Finchampstead and Wellington College. *P. piliferum* Schreb. Finchampstead, St. Sebastian, and Easthampstead, Berks. *P. juniperinum* Willd. On the heath, Fleet, and on Plateau Gravel; abundant all over the district. *P. formosum* Hedw. Abundant. *P. commune* Linn. Abundant.

DICRANACEÆ.

Pleuridium subulatum Rabenh. Easthampstead, Berks.

Ceratodon purpureus Brid. Abundant all over the district; also on Plateau Gravel, Valley Gravel, and Alluvium.

Dicranella heteromalla Schp. Abundant everywhere. I have found this species and the *Ceratodon* on many geological formations, and they probably occur on all.

Dicranoweisia cirrata Lindb. Finchampstead, Sandhurst, Wellington College, Easthampstead Plain, etc.; frequent. Also on the Chalk.

Campylopus flexuosus Brid. Esher Common, Surrey. *C. pyriformis* Brid. Cove, Hants; Sandhurst, etc., Berks; Oxshott Heath, Surrey. Abundant. Also on Plateau Gravel, Easthampstead Plain, etc. *C. fragilis* B. & S. Hawley Common, Yateley, Wellington College, and Broadmoor, and on Plateau Gravel, Hartford Bridge Flats. I found *C. brevipilus* B. & S. on Bagshot Beds, near Wimborne, Dorset, but have not yet seen it in our district.

Dicranum Bonjeani De Not. Finchampstead. *D. scoparium* Hedw. Abundant all over the district. Var. *paludosum* Schp. Finchampstead. Var. *orthophyllum* Brid. Hawley Common, Hants; Finchampstead, Berks; Esher Common, Surrey. Var. *spadiceum* Boul. Sandhurst.

Leucobryum glaucum Schp. Abundant on Bagshot Sands here and also near Wimborne, Dorset. In Epping Forest it spreads on to the London Clay, and it occurs on Plateau Gravel near Finchampstead.

FISSIDENTACEÆ.

Fissidens bryoides Hedw. Yateley, Hants; Wellington College, Berks; Chobham Place, Surrey. I have also found it on London Clay and Chalk. *F. adiantoides* Hedw. Miss Hinde gave me specimens from Wellington College.

GRIMMIACEÆ.

Grimmia apocarpa Hedw. Wellington College. *G. pulvinata* Smith. Frequent on walls, coping of bridges, etc.

TORTULACEÆ.

Tortula muralis Hedw. Abundant on walls, stones, etc., and, I fancy, to be found on all geological formations. *T. subulata* Hedw. A sandy bank on Valley Gravel, Yateley, Hants. *Barbula lurida* Lindb. Wellington College. *B. rubella* Mitt. Wellington College. *B. fallax* Hedw. On a railway bridge, Sandhurst, and Wellington College. *B. convoluta* Hedw. Wellington College. *B. unguiculata* Hedw. Wellington College. I have also found it on Lower Greensand near Guildford.

FUNARIACEÆ.

Physcomitrium pyriforme Brid. Miss Hinde gave me a specimen from the Alluvium of the Blackwater near Yateley. *Funaria hygrometrica* Sibth. Abundant on the heaths both on Bagshot Sand and on Gravel, particularly where the ground has been burnt; Fleet, etc.

MEESIACEÆ.

Aulacomnium palustre Schwæg. Yateley, Hazeley Heath, Hants; Finchampstead, Wellington College, etc. Frequent. *A. androgynum* Schwæg. Abundant on Bagshot Sand, Hawley, Yateley, Finchampstead, etc.; also on Plateau Gravel, Valley Gravel and Alluvium. It is common on the Lower Greensand, etc.

BARTRAMIACEÆ.

Bartramia pomiformis Hedw. Yateley, Sandhurst; also on London Clay.

Philonotis cæspitosa Wils. In a ditch near Ambarrow Farm, Sandhurst.

BRYACEÆ.

Webera nutans Hedw. Abundant on Bagshot Sands and on Plateau Gravel. I have seen it on London Clay, Chalk, etc., and it probably occurs on all geological formations.

Bryum capillare Linn. Abundant at Yateley, etc., on Bagshot Sands and Valley Gravel, and is common on the Chalk, etc.

B. atropurpureum W. & M. Wellington College, Ambarrow.

B. argenteum Linn. On the ground, Valley Gravel, Yateley Common, and frequent on walls on the Bagshot Sands and on most formations.

Mnium affine Bland var. *rugicum* B. & S. Yateley, Sandhurst, etc.; frequent. *M. hornum* Linn. Yateley, etc.; abundant. It is also common on London Clay, Chalk, Lower Greensand, etc. *M. punctatum* Linn. Finchampstead.

FONTINALACEÆ.

Fontinalis antipyretica Linn. Miss Hinde gave me a specimen from the canal, Aldershot.

LESKEACEÆ.

Thuidium tamariscinum B. & S. Yateley, Hants; Finchampstead, Berks; Windsor Park, Surrey. I have also seen it on London Clay, Chalk, etc.

HYPNACEÆ.

Climacium dendroides W. & M. Near Fleet Pond, Hants.

Camptothecium sericeum Kindb. Wall at Ambarrow Farm, Sandhurst, Berks. I found it at New Mill on the Blackwater, but that is on Valley Gravel in the London Clay district.

Brachythecium rutabulum B. & S. Abundant all over the district, and probably on all geological formations. *B. velutinum* B. & S. Yateley, etc.; abundant, and I think on all formations. *B. cæspitosum* Dixon. Wall by the bank of the river at Yateley. *B. purum* Dixon. Hawley Common,

Hants, and all over the district. I have found it on many formations.

Eurhynchium crassinervium B. & S. Railway bridge, Ambarrow, Berks. *E. speciosum* Schp. Near Fleet Pond, Hants. *E. praelongum* Hobk. One of our abundant species; and I have seen it in abundance on London Clay, Chalk, Lower Greensand, etc. *E. Swartzii* Hobk. On Alluvium of the Blackwater, Sandhurst. *E. pumilum* Schp. Yateley. *E. tenellum* Mild. Yateley. *E. confertum* Mild. Finchampstead, and on a wall at Sandhurst. It is frequent on London Clay.

Plagiothecium elegans Sull. Yateley, Finchampstead. I also have it from Plateau Gravel of the London Clay area. *P. denticulatum* B. & S. Yateley, Hants, Portnall Park, Berks, etc.; frequent. *P. silvaticum* B. & S. Cove and Yateley, Hants. Also on London Clay. *P. undulatum* B. & S. Windsor Park, Surrey, and frequent on Lower Greensand.

Amblystegium serpens B. & S. On the outlier of Bagshot Sand at Wokingham, Berks; on Valley Gravel, Yateley; and I have seen it on London Clay, Chalk, Lower Greensand, etc. *A. juratzkanum* Schp. Miss Hinde gave me a specimen from near Crowthorne, Berks.

Hypnum riparium Linn. Pirbright, Surrey. *H. aduncum* Hedw. Fleet Pond, Hants. *H. fluviatile* Linn. Spout Pond, Finchampstead, Berks. It also occurs on Bramshill Common, Hants, but that is on gravel in the London Clay district. *H. cupressiforme* Linn. Abundant all over the district in Hants, Berks, and Surrey. It seems to occur on all formations. Var. *resupinatum* Schp. Cove, Hants; Finchampstead, Berks; and on Plateau Gravel, Easthampstead. I found var. *ericetorum* B. & S. on the Bagshot Beds near Wimborne, Dorset. *H. stramineum* Dicks. Growing amongst Sphagnum, Finchampstead, Broadmoor, Easthampstead, Berks. *H. cuspidatum* (*Acrocladium cuspidatum* Lindb.). Fleet Pond, Hazeley Heath, Hants. *H. Schreberi* Willd. Abundant all over the

district in Hants, Berks, and Surrey, and on the Plateau Gravel, Finchampstead.

Hylocomium splendens B. & S. Finchampstead, Wellington College; St. Sebastian, Berks. I found it on Bagshot Beds near Wimborne, Dorset., *H. squarrosum* B. & S. Abundant in grassy places all over the district in Hants, Berks, and Surrey. It occurs on London Clay, and is abundant on Chalk, Lower Greensand, etc.